ProTen

Rushes Creek Poultry Production Farm

SSD 7704

ENVIRONMENTAL IMPACT STATEMENT

Volume 1
MAIN REPORT

Prepared for:
ProTen Tamworth Pty Limited

AUGUST 2018



Prepared by:

SLR

PREPARED BY

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with ProTen Tamworth Pty Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

SUBMISSION OF ENVIRONMENTAL IMPACT STATEMENT

Prepared under Part 4 of the *Environmental Planning and Assessment Act 1979*

PREPARED BY

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APPLICANT

Company:	ProTen Tamworth Pty Limited
Address:	PO Box 1746, North Sydney NSW 2060

DEVELOPMENT

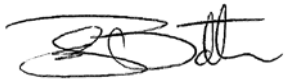
Title:	Rushes Creek Poultry Production Farm
Description:	Intensive Livestock Agriculture – Poultry Broiler Production Farm (see Section 4)
Development Site:	Lot 1 DP 44215; Part Lot 1 DP 1108119; Lot 1 DP 1132298; Lots 26, 85, 86, 101, 118, 165, 166 and 171 DP 752169; Part Lot 143 DP 752189; Lot 1 DP 1132078; Lot 1 DP 1141148; and an unformed Council public road traversing through Lot 171 DP 752169

DECLARATION

We confirm that we have prepared the contents of this document and to the best of our knowledge:

- It addresses the Secretary's Environmental Assessment Requirements (SSD 7704) issued by the Department of Planning and Environment on 12 July 2016;
- It has been prepared in accordance with clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*;
- It contains all available information that is relevant to the environmental assessment of the Development; and
- It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

SLR Consulting Australia



Eryn Bath
24 August 2018

EXECUTIVE SUMMARY

INTRODUCTION

ProTen Tamworth Pty Limited (ProTen) is seeking development consent to construct and operate a large-scale intensive poultry broiler production farm within a rural area known as Rushes Creek in the Tamworth Local Government Area. The Rushes Creek Poultry Production Farm (the "Development") will comprise 54 tunnel-ventilated fully-enclosed climate-controlled poultry sheds, along with associated support and servicing infrastructure, and will have the capacity to house 3,051,000 birds.

The Development is classified as State significant development (SSD 7704) under the provisions of Division 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in accordance with the *State Environmental Planning Policy (State and Regional Development) 2011*. It will require development consent from the Minister (or their delegate) under Part 4 of the EP&A Act, along with the following secondary approvals:

- An environment protection licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (POEO Act) from the Environment Protection Authority; and
- Consent under section 138 of the *Roads Act 1993* from Tamworth Regional Council.

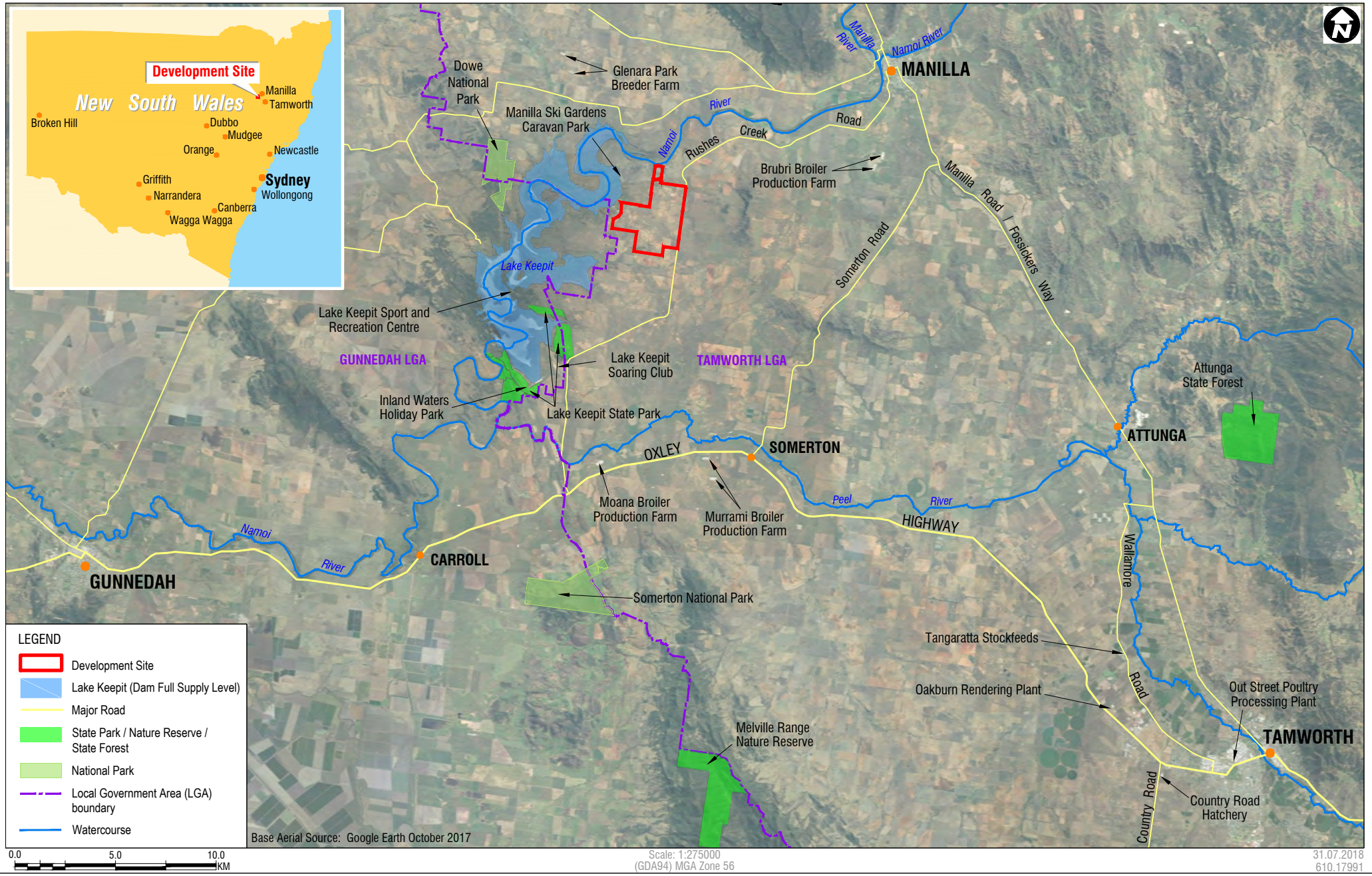
This Environmental Impact Statement (EIS) has been prepared by SLR Consulting Australia (SLR), on behalf of ProTen, to accompany the development application for SSD 7704 to the Department of Planning and Environment (DPE). It has been prepared in accordance with the EP&A Act and associated *Environmental Planning and Assessment Regulation 2000* and addresses the Secretary's Environmental Assessment Requirements (SEARs) issued by the DPE on 12 July 2016. The EIS presents a comprehensive and focussed evaluation of the Development, including environmental, social and economic considerations.

DEVELOPMENT SITE

The Development Site comprises approximately 1,016 hectares (ha) of rural land in an area known as Rushes Creek approximately 43 kilometres (km) northwest of Tamworth and 33 km northeast of Gunnedah in the New England North West region of New South Wales (NSW), as shown on **Figure A**. The nearest populated areas are the villages of Somerton and Manilla, which are located approximately 12 km to the southeast and approximately 13 km to the northeast, respectively.

Rushes Creek Road, which is a sealed two-lane rural road, forms the Development Site's eastern boundary and connects the Development Site to the Oxley Highway (NSW State Route B56). The Oxley Highway provides a connection to Tamworth, being the area's major centre and home to the various poultry industry service facilities required to support a broiler production farm. The Namoi River is located to the north of the Development Site and Lake Keepit is located to the west and southwest of the Site.

The long-standing and existing use of the Development Site is traditional agricultural production, including both livestock grazing and cropping. The surrounding area is also primarily characterised by traditional agricultural production, along with recreational activities around Lake Keepit. There is a relatively low density of surrounding privately-owned residences.



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Regional Locality

FIGURE A

EXECUTIVE SUMMARY

PROPOSED DEVELOPMENT

The Development comprises four individual poultry production units (PPUs), which are identified as Farms 1 to 4, where broiler birds will be grown for the purpose of producing poultry meat (for human consumption). Each farm will contain between 10 and 18 tunnel-ventilated fully-enclosed climate-controlled poultry sheds, which will each have the capacity to house 56,500 birds, along with associated support and servicing infrastructure. The Development will comprise a total of 54 poultry sheds, housing a combined site population of 3,051,000 birds.

The Development will generally be constructed, operated and managed in accordance with current industry best practice standards, including the relevant requirements/recommendations in:

- *RSPCA Approved Farming Scheme Standards – Meat Chickens* (RSPCA Australia 2013); and
- *Best Practice Management for Meat Chicken Production in NSW* (Department of Primary Industries 2012).

Table A provides a summary of the various components of the Development for which consent is sought, and **Figure B** shows the conceptual layout of the Development

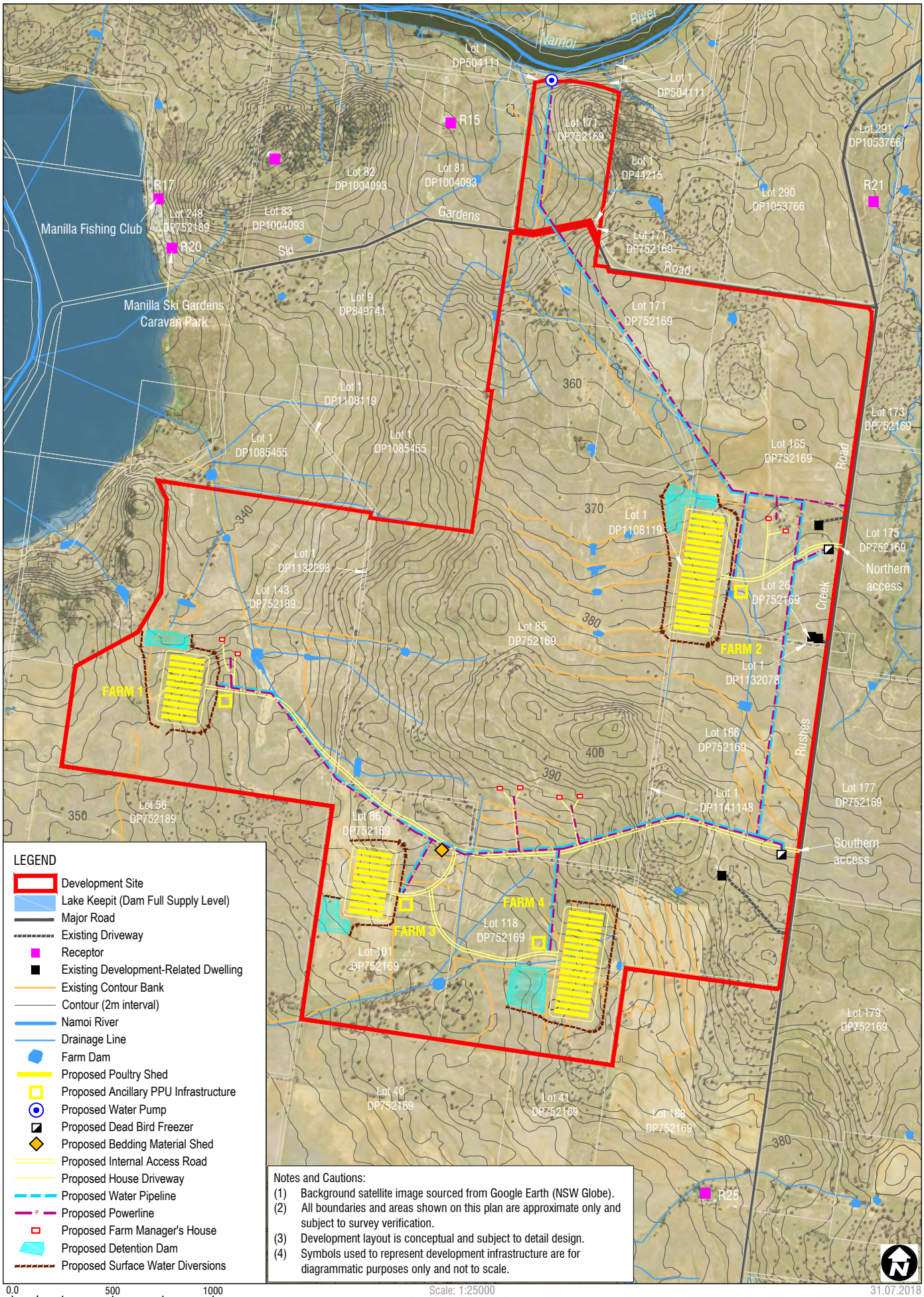
Table A Development Description Summary

Aspect	Details
Purpose	Birds grown for the purpose of producing poultry meat
Number of PPUs	Four - Farms 1, 2, 3 and 4
Total disturbance footprint	Approximately 87.78 ha
Number of poultry sheds	Farm 1 – 10 sheds Farm 2 – 18 sheds Farm 3 – 10 sheds Farm 4 – 16 sheds Total – 54 sheds
Type of poultry sheds	Tunnel-ventilated, fully-enclosed, climate-controlled
Poultry shed dimensions	160 metres (m) long by 18 m wide by 4.7 m high (to roof ridge)
Poultry shed areas	Each shed – 2,880 square metres (m^2) Total – 155,520 m^2
Bird numbers	Each shed - 56,500 birds Farm 1 – 565,000 birds Farm 2 – 1,017,000 birds Farm 3 – 565,000 birds Farm 4 – 904,000 birds Total – 3,051,000 birds
Maximum bird density within sheds	34 kilograms per square metre (kg/m^2)
Hours of operation	24 hours a day, 7 days a week
Production cycle length	Approximately 65 days, comprising maximum bird occupation of 55 days and cleaning phase of 10 days
Production cycles per year	Approximately 5.6 on average

EXECUTIVE SUMMARY

Support/servicing infrastructure	• Eight houses to accommodate farm managers; • Two access driveways from Rushes Creek Road and internal access roads; • Water supply infrastructure to extract, transfer, treat and store water from the Namoi River; • Reticulated electrical supply infrastructure; • Bedding material storage shed; • Two dead bird freezers; and • At each PPU: – Staff amenities and workshop (office, change rooms, toilets, workshop, chemical store and pump room); – Feed silos; – Water storage tanks; – Solar panels; – Fuel and gas storage facilities; – Generators; – Vehicle wheel wash; – Ring roads; – Surface water management system, including upstream diversions; and – Aerated wastewater treatment system.
Subdivision	Boundary adjustment to ensure each PPU, including associated ancillary support infrastructure and farm managers houses, is enclosed within its own lot.
Employment	Twenty (20) full-time equivalent employees.
Vehicle access	Two access driveways from Rushes Creek Road constructed to accommodate a basic left turn (BAL) treatment. Internal access roads and ring roads around each PPU constructed as all-weather rural-type roads.
Traffic generation	Heavy vehicles – approximately 8,455 per year. Light vehicles – approximately 4,597 per year.
Servicing	Electricity – solar panels and connection to Essential Energy's reticulated supply infrastructure. Generators for emergency use only. Gas – bulk liquid petroleum gas (LPG) storage tanks. Water – licensed surface water allocation from the Namoi River.
Waste management	Systems to manage all waste streams generated by the poultry production operation to ensure no on-site waste storage or disposal.
Surface Water Management	An engineered surface water management system at each PPU comprising upstream diversions, grassed swale drains, table drains and a detention dam.
External lighting	One light fixture over the front and rear loading-unloading areas of each poultry shed.
Landscaping	Landscape plantings to improve the visual and environmental amenity of the Development Site, including vegetation screens around the perimeter of each PPU.

The combined disturbance footprint for the Development will amount to approximately 87.78 ha, which is equivalent to approximately 8.6% of the Development Site. The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement.



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Development Layout

FIGURE B

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EXECUTIVE SUMMARY

KEY ENVIRONMENTAL IMPACTS

A qualitative risk assessment, stakeholder consultation and baseline environmental surveys were undertaken to identify potential impacts, issues or concerns and ensure these matters were taken in to consideration through the Development planning and impact assessment process. This resulted in refinements to the design and layout of the Development to ensure impacts will be avoided or minimised to the greatest extent practical.

Specialist impact assessments, including the use of scientific/engineering modelling, have been undertaken in accordance with current best practice for environmental impacts relating to odour, particulate matter, traffic, biodiversity, Aboriginal heritage, noise and hazard and risk. Additional issues, including surface water, groundwater and visual amenity, have also been addressed in this EIS. A summary of the key findings of the environmental impact assessment presented in this EIS in relation to the operation of the Development is presented in **Table B**.

Table B Summary of Key Environmental Impacts

Key Findings of Environmental Assessment
Odour
• All residential receptors and recreational facilities surrounding the Development Site are predicted to experience 99th percentile odour concentrations below the 5 odour unit (ou) criterion for all three batch staging scenarios. The highest predicted concentration is 4.2 ou at residential receptor R24. The highest predicted concentration at a recreational facility is 1.9 ou at the Lake Keepit Sport and Recreation Centre (R32). • Negligible potential for any cumulative odour impacts.
Particulate Matter
• All receptors are predicted to experience annual average PM10 (particulate matter less than 10 microns in diameter) concentrations below the assessment criterion of 25 micrograms per cubic metre (µg/m3), including when Development emissions are combined cumulatively with background concentrations. The highest predicted cumulative concentration is 12.3 µg/m3 at receptor R24. • All receptors are predicted to experience maximum 24-hour average PM10 concentrations below the assessment criterion of 50 µg/m3, including when Development emissions are combined cumulatively with background concentrations, with the exception of receptor R25 where a cumulative concentration of 55.2 µg/m3 is predicted during the day 4 staging scenario. The modelling shows that the predicted contribution from the Development at R25 typically results in a minor change to the existing background concentrations. Over 95% of the predicted increments due to the Development are 5 µg/m³ or below. Furthermore, the emissions rate data used is inherently conservative and over-estimates the emissions (and hence the impacts) by a factor of at least two. Taking this into consideration, along with there being no consideration of mitigation measures in the modelling (for example, vegetation screens), the results provide an unrealistically conservative assessment of particulate impacts.
Traffic
• The future forecast background traffic volumes on the Oxley Highway and Rushes Creek Road are low relative to their respective capacities. The additional traffic to be generated by the Development will be able to be easily accommodated with no significant impact on the safety or operation of the external road network. • The general layout of the Oxley Highway / Rushes Creek Road intersection meets or exceeds the traffic warrants and is appropriate for the predicted traffic volumes, with a very good level of operational performance predicted to occur. • The heavy vehicle route to be used by the Development is suitable and has sufficient facilities to accommodate the additional heavy vehicles to be generated. • The two new access driveways to be constructed off Rushes Creek Road will be separated from each other by approximately 1.5 km, meaning each access will be able to operate independently without impacting on queuing, visibility, road safety or delays. Furthermore, each driveway is located clear of other access driveways servicing other properties in the area.

EXECUTIVE SUMMARY

Key Findings of Environmental Assessment
Surface Water
• Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to local surface water resources and no detectable impact is expected. • Farms 2 and 4 are proposed to be located on relatively minor intermittent drainage lines. While this has the potential to reduce the functionality and capacity of the drainage lines, clean water diversions sized for rainfall events up to the 1% annual exceedance probability (AEP) event will be installed around the upstream sides of each of the four PPUs. The runoff in the existing drainage lines at Farms 2 and 4 will be conveyed along the new swale drains around the PPUs before re-joining the existing drainage lines downstream. Given that the drainage lines are relatively minor features and the design of the diversions will ensure that they are re-connected downstream, this should not pose any notable hydraulic or environmental impacts. • The primary construction and operational areas of the Development, being the PPU sites and access roads, are well-removed from the Namoi River and Lake Keepit. The only activities that will occur within or near waterfront land is the installation and operation of the water pump approximately 30 m back from the bank of the Namoi River and a water supply pipeline from the pump in to the Development Site. The potential for impact on the River will be addressed via appropriate erosion and sediment controls and promptly rehabilitating and revegetating the disturbed area to a stable landform. The pump will not impact on the width and functioning of the riparian corridor or stability of the watercourse. • The extraction of surface water from the Namoi River to service the Development's water supply requirements will be under the provisions of two existing water access licences owned by ProTen and, as such, the Development will be using water that is already allocated (not additional water) under the Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016. On this basis, the Development will not impact on surrounding surface water users or river flows beyond that allowable under the Water Sharing Plan. • The potential for impact to surface water resources by runoff of nutrients, chemicals or pathogens is considered negligible. An engineered surface water management system will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 millimetres (mm) of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. Based on the design volumes of the detention dams and the water reuse strategy for regular irrigation of planted vegetation screens at each PPU, there should not be any off-site discharge from the detention dams for events up to the 1% AEP event. • The impervious footprint of the Development will be very small relative to the overall size of the Development Site and the surface water management system at each PPU will operate as a closed water cycle, with the primary function to capture stormwater runoff from the impervious and disturbed surfaces. • Post-development peak flows should not exceed pre-development peak flows for events up to the 1% AEP event. On this basis, there should not be any impact on the downstream drainage features or Lake Keepit.
Groundwater
• Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to local groundwater resources and no detectable impact is expected. • There will not be any groundwater extraction or use and therefore no impact on local groundwater levels or yields. • The surface water management system at each PPU, depth to groundwater and nature of the strata (along with other development design features, best management practices and mitigation measures) will mitigate the potential for infiltration of wash down water and any potential pollutants to groundwater. • The shallow alluvial aquifer appears to be confined to the Namoi River channel itself and does not extend into the boundaries of the Development Site.
Biodiversity
• The potential ecological impact of the Development will be relatively small. The disturbance footprint will be approximately 87.78 ha, which comprises just 8.6% of the Development Site, and the commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. The impact areas are devoid of high conservation habitats apart from isolated paddock trees.

EXECUTIVE SUMMARY

Key Findings of Environmental Assessment
• There will be minor impacts to threatened ecological communities (TECs) and habitat for threatened fauna species comprising the following direct impacts: – Removal and disturbance of derived grasslands (TEC vegetation), which are dominated by exotic pasture with a low cover and moderate diversity of native species; – Clearing of some paddock trees to accommodate infrastructure where required; and – Removal of a small portion of potential fauna foraging habitat, in particular for threatened microchiropteran bats species, the Grey-crowned Babbler and the Little Eagle. • The Development will result in the removal of some highly disturbed derived grassland communities, which form part of the Box-Gum Woodland TEC, and the removal of some isolated paddock trees that cannot be avoided. The total area of required native vegetation removal is limited to approximately 1.17 ha of native derived grassland (0.1% of the Development Site). The remaining disturbance area of 86.61 ha comprises areas of exotic pasture in low condition (i.e. non-native groundcover). • The Development will not involve the imposition of a "significant impact" on any matters of NES under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and referral to the Commonwealth Department of the Environment and Energy is not necessary.
Aboriginal Heritage
• Seven of the 35 Aboriginal sites recorded within the Development Site are within the disturbance footprint of the Development and will require salvage. The remaining 28 sites are removed from the disturbance footprint and will not be impacted. • While the Development adds to the cumulative impact on the region's Aboriginal cultural heritage, the heritage impact value of this loss is considered low as the seven sites consist of isolated finds and two low density artefact scatters. The disturbance footprint avoids the majority of recorded Aboriginal sites, including the two sites deemed to have higher archaeological significance. • The inter-generational loss arising from the Development is considered to be minimal.
Noise
• The assessment of worst-case continuous and intermittent noise scenarios indicates that the Development will be able to operate on a day-to-day basis, including during noise enhancing meteorological conditions, and not exceed the development-specific criterion at any surrounding receptor during the day, evening or night periods. • The predicted noise levels from the assessment of worst-case sleep disturbance activity are below the adopted criterion at all sensitive receptors, including during enhancing meteorological conditions. • The increase in traffic on the Oxley Highway will likely cause an insignificant increase in road traffic noise levels and will not likely be noticed. The increase in traffic on Rushes Creek Road should not result in any exceedance of the road traffic impact assessment criteria for the day or night periods at any sensitive receptors.
Hazard and Risk
• The preliminary risk screening for the storage and transport of hazardous materials indicates that the Development may be considered "potentially hazardous" due to the quantities of LPG to be stored at each PPU and transported to the Development Site. • With suitable engineering and design controls in place, the Development will be unlikely to cause a risk, significant or minor, to the community. There is a requirement to ensure that the installation and maintenance of on-site LPG storage is compliant with AS/NZS 1596:2014 The Storage and Handling of LP Gas, including maintaining minimum separation distances.
Visual Amenity
• The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement. • There are significant separation distances from the PPU sites to the surrounding local road network, private residences and community recreational facilities. • The natural southeast-northwest trending ridgeline running through the centre of the Development Site will shield Farms 1 and 3 and likely Farm 4 from view from Rushes Creek Road and residences to the east and northeast. The scattered paddock trees will also provide some screening for Farms 1, 3 and 4 from these view locations.

EXECUTIVE SUMMARY

Key Findings of Environmental Assessment
• There is little elevation change / intervening topography and no tree screening between Rushes Creek Road and Farm 2. Subsequently this PPU will be visible from the road and some residences, and also likely from Ski Gardens Road. The proposed vegetation screens, once established, will provide some screening and improve the visual amenity.
• There is not anticipated to be any significant visual impacts as a result of the solar panels at each PPU. There will be no mirrors or lenses used and the panels will have anti-reflective treatment. On this basis, there should not be significant glint or glare issues for drivers on Rushes Creek Road or at surrounding residences (over 1 km away). Again, the proposed vegetation screens, once established, will provide some screening.
• There should not be any issues in terms of adverse lighting impacts (light spill, glare) on the surrounding local road network or residences.

Where there is potential for environmental impact, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

SOCIAL IMPACTS

The potential for adverse impacts on the social amenity of the area is primarily associated with those resulting from odour, dust, traffic, noise and visual impacts. In the context of this Development, social amenity (due to its location and land use characteristics) means the intrinsic value that residents place on the area, including rural character, peace and quiet, visual amenity and access to major facilities.

Based on the findings and conclusions of the impact assessments in this EIS, the potential for adverse impact on social amenity as a result of the Development is considered minimal. There should not be any change to the day-to-day life of surrounding residents and recreational land users as a result of the Development and no additional demand for community infrastructure, facilities or services.

ECONOMIC IMPACTS

The net economic impact of the Development will be one of significant benefit. Two principal aspects of economic impact will be:

- Direct and derived economic effects associated with establishing the poultry farm – the Development will provide for an extended program of capital works relating to new infrastructure, which will employ between 50 and 60 people across various contracting companies over all or part of the 16 month construction program and result in additional flow-on economic activity. The expenditure on various consumable products and services will be significant.
- On-going direct and derived economic effects associated with operation of the poultry farm – the Development will provide additional consumption activity induced by the incomes of 20 new employees and commercial transactions between ProTen and suppliers and other businesses. The economic stimulus provided by these activities will also result in the flow of further activity in the regional and State economies. Again, the expenditure on various consumable products and services will be significant.

EXECUTIVE SUMMARY

JUSTIFICATION AND CONCLUSION

The proposed Rushes Creek Poultry Production Farm has been assessed in this EIS in accordance with the EP&A Act and its regulations, the SEARs issued on 12 July 2016 and related input from consulted government agencies. A qualitative risk assessment, stakeholder consultation and baseline environmental surveys were undertaken to identify potential impacts, issues or concerns and ensure these matters were taken in to consideration through the Development planning and impact assessment process, and specialist assessments were completed for key environmental impacts.

The potential impacts of the Development have been minimised via refinements to the design and layout of the Development, primarily associated with odour emissions, high conservation vegetation areas and identified Aboriginal sites. On this basis, the Development, as proposed, represents the best of the alternatives considered when taking the environmental and social amenity impacts in to consideration.

While the Development may result in some externalised impacts, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

The potential for adverse impact on social amenity as a result of the Development is considered minimal. There should not be any change to the day-to-day life of surrounding residents and recreational land users as a result of the Development and no additional demand for community infrastructure, facilities or services.

The Development will be a catalyst for significant and sustained economic activity within the local and regional economies through employment during the construction and operational phases, commercial transactions between ProTen and suppliers and other businesses, significant expenditure on consumable products and services, and additional flow-on economic activities.

The Development is justified on environmental, social and economic grounds and it is consistent with the key objects of the EP&A Act. The Development will promote the orderly and economic use and development of land, while at the same time protecting and managing valuable environmental and cultural resources.

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Section 1

Introduction



1 INTRODUCTION

1.1 Overview

ProTen Tamworth Pty Limited (ProTen) is seeking development consent to construct and operate a large-scale intensive poultry broiler production farm within a rural area known as Rushes Creek in the Tamworth Regional Local Government Area (LGA). The Rushes Creek Poultry Production Farm (the "Development") will comprise 54 tunnel-ventilated fully-enclosed climate-controlled poultry sheds, along with associated support and servicing infrastructure, and will have the capacity to house 3,051,000 birds.

The Development is classified as State significant development (SSD 7704) under the provisions of Division 4.7 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in accordance with the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP).

This Environmental Impact Statement (EIS) has been prepared by SLR Consulting Australia (SLR), on behalf of ProTen, to accompany the development application for SSD 7704 to the Department of Planning and Environment (DPE). It has been prepared in accordance with the EP&A Act and associated *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and addresses the Secretary's Environmental Assessment Requirements (SEARs) issued by the DPE on 12 July 2016 (see **Section 1.8**). The EIS presents a comprehensive and focussed evaluation of the Development, including environmental, social and economic considerations.

1.2 The Applicant

ProTen was founded in New Zealand in 2001 and investment into the Australian market commenced in 2002. All New Zealand assets were sold between 2003 and 2006 and the capital reinvested into the Australian market through acquisition and "green field" development.

ProTen now specialises in the design, construction and operation of poultry broiler production farms throughout Australia, currently owning and operating nine farms in NSW in the Tamworth and Griffith areas, one farm in Western Australia and one farm in South Australia. Collectively these farms comprise 300 poultry sheds and have an annual capacity of approximately 76 million birds. ProTen currently employs around 150 people in Australia.

ProTen has long term extendible contracts to supply chickens to Australia's largest chicken processor, Baiada Poultry (Baiada), who markets and sells chicken products under the well-established brand names of Steggles and Lillydale.

1.3 The EIS Team

SLR was engaged by ProTen to undertake the project management and preparation of this EIS for the Development. The following specialist consultants were also engaged by ProTen to assist in the technical and scientific assessment of the Development:

- SLR - *Groundwater Bore Baseline Assessment* (2017);
- SLR - *Stage 1 Preliminary Environmental Investigation* (2018a);
- SLR - *Biodiversity Assessment Report* (2018b);
- SLR - *SEPP 33 - Preliminary Risk Screening and Hazard Assessment* (2018c);

- Pacific Environment Limited (PEL) – *Air Quality Assessment* (2018);
- RoadNet - *Traffic Impact Assessment* (2018);
- OzArk Environmental and Heritage Management (OzArk) - *Aboriginal Cultural Heritage Assessment Report* (2018); and
- Global Acoustics – *Noise Impact Assessment* (2018).

1.4 Development Site

The Development Site comprises approximately 1,016 hectares (ha) of rural land in an area known as Rushes Creek approximately 43 kilometres (km) northwest of Tamworth and 33 km northeast of Gunnedah in the New England North West Region of New South Wales (NSW) (see **Figure 1**). Rushes Creek Road, which is a sealed two-lane rural road, forms the Development Site's eastern boundary and connects the Development Site to the Oxley Highway (NSW State Route B56). The Namoi River is located to the north of the Development Site and Lake Keepit is located to the west and southwest of the Site.

The long-standing and existing use of the Development Site is traditional agricultural production, including both livestock grazing and cropping. The surrounding area is also primarily characterised by traditional agricultural production, along with recreational activities around Lake Keepit. As shown on **Figure 1**, the nearest populated areas are Somerton approximately 12 km to the southeast and Manilla approximately 13 km to the northeast.

1.5 Development Rationale and Objectives

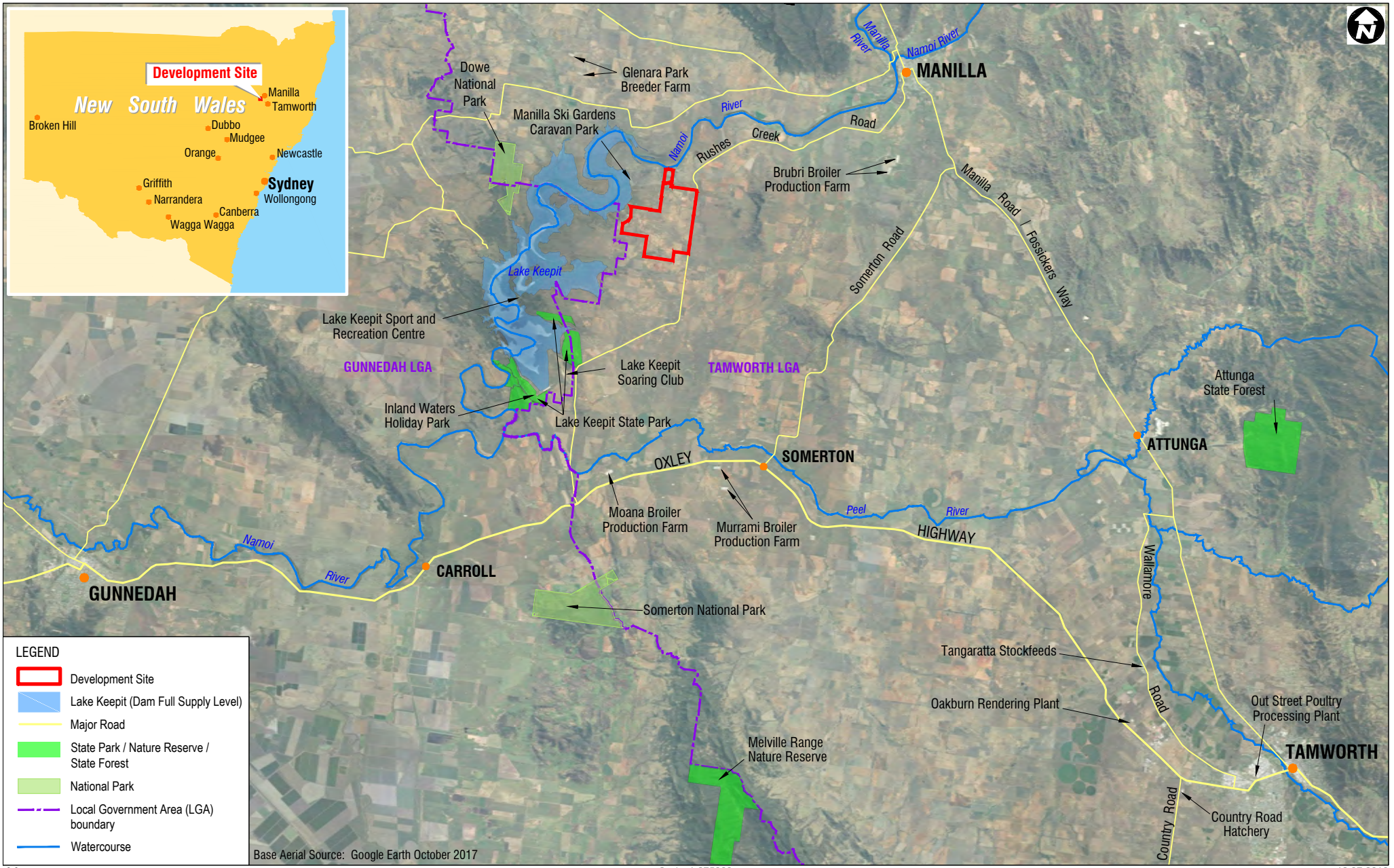
According to statistics published by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES 2015), the popularity of chicken meat has grown enormously over the last 30 years to the extent that it is currently the most consumed meat in Australia. Chicken meat production in Australia increased from approximately 380,000 tonnes in 1989-90 to around 1.15 million tonnes in 2015-16, and it is expected to reach around 1.4 million tonnes in 2021-22.

Over 95 percent (%) of the chicken meat produced in Australia is consumed domestically. In 2015-16 Australians ate an average of 47 kilograms (kg) of chicken meat per person, compared to 36 kg in 2008-09 and just 13 kg in 1975. ABARES (2015) estimates that chicken meat consumption in Australia will continue to rise, reaching 49 kg per person in 2020-21. This trend is closely associated with price, nutrition and the industry's innovation to provide a variety of chicken meat products.

Around 623 million broiler birds were processed in 2015-16 to satisfy domestic consumption needs, with NSW enjoying a significant portion of this production. Based on current growth projections, it is estimated that by 2021-22 this well need to rise to close to 724 million birds per year.

Having observed the continuing expansion of the Australian poultry meat market, ProTen's primary objective is to develop a large-scale intensive broiler production farm within the Tamworth region to augment the local supply of meat chickens and assist in meeting the immediate and projected long-term demands. The Development will increase the supply of broiler poultry by up to 17 million birds per year. This is integral to the industry's strategy for continued growth within the Tamworth region and Australia.

The poultry industry is well-established and has a high recognition factor in the Tamworth region, providing significant employment and contribution to the economy. It plays an ever increasing role in the development of local agri-business in the region. In addition to the poultry production farms operated by ProTen and others, the Tamworth region is home to various poultry industry service facilities operated by Baiada, which include hatcheries, a feedmill, a processing plant and a rendering plant.



H:\Projects-SLR\610-Srv\SYD\610-SYD\610.17991 Rushes Creek Draft EIS QA\06 SLR Data\01 CADGIS\CADEIS CURRENT\SLR610179911_F1_RegLoc_01.dwg

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(GDA94) MGA Zone 56

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Regional Locality

FIGURE 1

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The document title *Tamworth Tomorrow 2016-2021* (Tamworth Regional Council [Council] 2016), recognises "agriculture, food processing and agribusiness", which includes the poultry industry, as a key growth sector in the region and identifies investment attraction and business expansion as strategic drivers required to activate growth in the sector. To achieve such growth, significant cooperation between industry and local and State governments is essential.

It is imperative that poultry production farms, such as that proposed, be allowed to exist in close proximity to the grain belt, a reliable water supply and interdependent hatchery, feedmill and processing facilities. It is equally important that these poultry production farms are well-designed, operated and managed to ensure security and confidence with industry investors and also encourage positive community-industry interactions.

1.6 Development Overview

The Development comprises four individual poultry production units (PPUs), which are identified as Farms 1 to 4, where broiler birds will be grown for the purpose of producing poultry meat (for human consumption). Each farm will contain between 10 and 18 tunnel-ventilated fully-enclosed climate-controlled poultry sheds, which will each have the capacity to house 56,500 birds, along with associated support and servicing infrastructure. The Development will comprise a total of 54 poultry sheds, housing a combined site population of 3,051,000 birds.

Table 1 provides a summary of the various components of the Development for which consent is sought. A detail description of the Development and figures showing the development layout are provided in **Section 4.**

Table 1 Development Description Summary

Aspect	Details
Purpose	Birds grown for the purpose of producing poultry meat
Number of PPUs	Four - Farms 1, 2, 3 and 4
Total disturbance footprint	Approximately 87.78 ha
Number of poultry sheds	Farm 1 – 10 sheds Farm 2 – 18 sheds Farm 3 – 10 sheds Farm 4 – 16 sheds Total – 54 sheds
Type of poultry sheds	Tunnel-ventilated, fully-enclosed, climate-controlled
Poultry shed dimensions	160 metres (m) long by 18 m wide by 4.7 m high (to roof ridge)
Poultry shed areas	Each shed – 2,880 square metres (m^2) Total – 155,520 m^2
Bird numbers	Each shed - 56,500 birds Farm 1 – 565,000 birds Farm 2 – 1,017,000 birds Farm 3 – 565,000 birds Farm 4 – 904,000 birds Total – 3,051,000 birds
Maximum bird density within sheds	34 kilograms per square metre (kg/m^2)
Hours of operation	24 hours a day, 7 days a week
Production cycle length	Approximately 65 days, comprising a maximum bird occupation of 55 days and a cleaning phase of 10 days

Production cycles per year	Approximately 5.6 on average
Support/servicing infrastructure	• Eight houses to accommodate farm managers; • Two access driveways from Rushes Creek Road and internal access roads; • Water supply infrastructure to extract, transfer, treat and store water from the Namoi River; • Reticulated electrical supply infrastructure; • Bedding material storage shed; • Two dead bird freezers; and • At each PPU: – Staff amenities and workshop (office, change rooms, toilets, workshop, chemical store and pump room); – Feed silos; – Water storage tanks; – Solar panels; – Fuel and gas storage facilities; – Generators; – Vehicle wheel wash; – Ring roads; – Surface water management system, including upstream diversions; and – Aerated wastewater treatment system (AWTS).
Subdivision	Boundary adjustment to ensure each PPU, including associated ancillary support infrastructure and farm managers' houses, is enclosed within its own lot.
Employment	Twenty (20) full-time equivalent employees.
Vehicle access	Two access driveways from Rushes Creek Road constructed to accommodate a basic left turn (BAL) treatment. Internal access roads and ring roads around each PPU constructed as all-weather rural-type roads.
Traffic generation	Heavy vehicles – approximately 8,455 per year. Light vehicles – approximately 4,597 per year.
Servicing	Electricity – solar panels and connection to Essential Energy's reticulated supply infrastructure. Generators for emergency use only. Gas – bulk liquid petroleum gas (LPG) storage tanks. Water – licensed surface water allocation from the Namoi River.
Waste management	Systems to manage all waste streams generated by the poultry production operation to ensure no on-site waste storage or disposal.
Surface Water Management	An engineered surface water management system at each PPU comprising upstream diversions, grassed swale drains, table drains and a detention dam.
External lighting	One light fixture over the front and rear loading-unloading areas of each poultry shed.
Landscaping	Landscape plantings to improve the visual and environmental amenity of the Development Site, including vegetation screens around the perimeter of each PPU.

1.7 Development Consent Pathway and Secondary Approvals

The Development is permissible with development consent under the provisions of the *Tamworth Regional Local Environmental Plan 2010* (Tamworth LEP). It is classified as State significant development (SSD 7704) under the provisions of Division 4.7 of Part 4 of the EP&A Act in accordance with the SRD SEPP. Clause 3 of Schedule 1 of the SRD SEPP identifies development for the purposes of intensive livestock agriculture with a capital investment value (CIV) of more than $30 million as SSD. In accordance with the independent cost review prepared by Rider Levett Bucknall (RLB) (2018) in **Appendix A**, the Development has CIV of approximately $55 million, which, pursuant to clause 8(1) of the SRD SEPP, classes the Development as SSD.

The Development will require development consent from the Minister (or their delegate) under Part 4 of the EP&A Act, along with the following secondary approvals:

- An environment protection licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (POEO Act) from the Environment Protection Authority (EPA); and
- Consent under section 138 of the *Roads Act 1993* from Council.

1.8 Secretary's Environmental Assessment Requirements

A Preliminary Environmental Assessment (PEA) was submitted to the DPE on 3 June 2016 and an application for SEARs was submitted to the DPE on 15 June 2016, with SEARs issued on 12 July 2016 outlining the general requirements and key issues to be addressed within the EIS. In preparing the SEARs, the DPE consulted with the following agencies and sought their input:

- EPA;
- Roads and Maritime Services (RMS);
- Department of Primary Industries (DPI);
- Office of Environment and Heritage (OEH);
- WaterNSW (now part of Department of Industry – Lands and Water [Lands & Water]);
- Council; and
- Gunnedah Shire Council.

The SEARs and input received from consulted agencies are contained within **Appendix B**. **Table 2** lists the general requirements and key issues raised in the SEARs and references which section(s) in this EIS each issue has been addressed.

Table 2 Secretary's Environmental Assessment Requirements

SEARs	EIS Section
General Requirements	
The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 the *Environmental Planning and Assessment Regulation 2000*. The EIS must include: a) a detailed description of the development including: i) need for the proposed development; ii) justification for the proposed development; iii) likely staging of the development; iv) likely interactions between the development and existing, approved and proposed developments in the vicinity of the site, including the Keepit Dam impoundment; and v) plans of any proposed works. b) consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; c) a risk assessment of the potential environmental impacts of the development, identifying key issues for further assessment; d) a detailed assessment, where relevant, of the key issues below, and any other potential significant issues identified in the risk assessment, must include: i) a description of the existing environment, using adequate baseline data; ii) consideration of potential cumulative impacts due to other development in the vicinity; and iii) measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment. e) consideration of issues raised at the Planning Focus Meeting; and f) a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.	a) Section 4 i) Section 1.5 ii) Sections 3 and 10 iii) Section 4.3.1 iv) Section 8 v) Section 4 and Appendices K and L b) Sections 5.5 and 5.6 c) Section 7 d) Section 4 i) Sections 2 and 4 ii) Section 8.14 iii) Sections 8 and 9 e) Section 8 f) Section 9
The EIS must be accompanied by a report from a qualified quantity surveyor providing: a) a detailed calculation of the capital investment value (CIV) of the proposal (as defined in clause 3 of the Environmental Planning and Assessment Regulation 2000), including details of all assumptions and components from which the CIV calculation is derived; b) an estimate of the jobs that will be created by the development during the construction and operational phases; and c) certification that the information provided is accurate at the date of preparation.	a) Appendix A – independent cost review (RLB 2018) b) Sections 4.3.2 and 4.7 c) Appendix A – independent cost review (RLB 2018)
Key Issues	
The EIS must include an assessment of the potential impacts of the proposal (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and/or offset these impacts. The EIS must address the following matters: **Statutory and strategic context -** including: a) justification for the proposal and suitability of the site; b) demonstration that the proposal is generally consistent with all relevant planning strategies and environmental planning instruments, and justification for any inconsistencies; and c) details of any consolidation or subdivision of land.	a) Sections 1.5, 3 and 10 b) Sections 5.5 to 5.8 c) Section 4.2

SEARs	EIS Section
Air quality and odour - including: a) a quantitative odour and air quality impact assessment in accordance with the relevant Environment Protection Authority (EPA) guidelines, including appropriate consideration of impacts on temporary and permanent residents at the Lake Keepit Sport and Recreation Centre and Manilla Ski Gardens Caravan Park; b) evidence of appropriate meteorological data for use in air dispersion modelling; c) an investigation and assessment of odour impacts likely to be associated with 'cold air drainage' effects on all identified and potential receivers; d) inclusion of 'worst case' emission scenarios and sensitivity analyses; e) a contingency plan to address unpredicted operational odour impacts; and f) a description and appraisal of air quality and odour impact monitoring, emission control techniques and mitigation measures.	Sections 8.1 and 8.2 and Appendix C – *Air Quality Assessment* (PEL 2018)
Transport and road traffic - including: a) a quantitative traffic impact assessment prepared in accordance with relevant Council, Austroads and Roads and Maritime Services guidelines; b) details of all daily and peak traffic and transport movements likely to be generated during construction and operation of the development; c) including a description of haul routes, vehicle types, vehicle access routes and the impacts on nearby intersections; d) details of access to the site from the road network including intersection location, design and sight distance; e) an assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development including identification of any necessary infrastructure upgrades and consideration of cumulative impacts, using SIDRA or a similar model; f) details of any utility services which will need to be located within or across Rushes Creek Road or Ski Gardens Road; and g) detailed plans of the proposed layout of the internal road network and parking on the site in accordance with the relevant Australian standards.	Sections 4.15 and 8.3 and Appendix D – *Traffic Impact Assessment* (RoadNet 2018)
Soils and water - including: a) an accurate description of operational water demands, a breakdown of water supplies (including any water licensing or approval requirements), a description of measures to minimise water use and evidence of an adequate and secure water supply; b) a detailed water balance; c) details of water supply infrastructure to extract, transfer, treat and store water from the Namoi River; d) a contingency plan for water supply in the event extraction from the Namoi River is restricted (e.g. drought conditions); e) details of erosion, sediment, stormwater and leachate control during construction; f) a description of surface, groundwater and stormwater management systems, including on site detention, surface water diversions, flood impact mitigation and measures to treat or reuse water; g) an assessment of potential surface water, flooding and groundwater impacts, including impacts on nearby waterbodies (including Namoi River and Lake Keepit), surrounding properties, any licensed water users, landholder rights or groundwater dependent ecosystems; h) an assessment of any potential existing soil contamination in accordance with Managing Land Contamination Planning Guidelines: SEPP55 - Remediation of Land (DUAP, 1998); and i) a description and appraisal of impact mitigation, management, maintenance and monitoring measures.	a) Sections 4.14.3 and 4.16.4 to 4.16.6 b) N/A – see Section 8.4.2 c) Sections 4.14.3 and 4.16.5 d) Section 4.16.5 e) Section 4.3.5 and 4.17.2 f) Sections 4.16.6 and 4.17.2 g) Sections 8.4 and 8.5 and Appendix E – *Groundwater Bore Baseline Assessment* (SLR 2017) h) Section 2.13 and Appendix F - *Stage 1 Preliminary Environmental Investigation* (SLR 2018a) i) Sections 8.4 and 8.5

SEARs	EIS Section
Waste and wastewater management - including: a) identification and classification of waste streams that would be generated at the site in accordance with the *Waste Classification Guidelines* (EPA, 2014); b) a description of waste transport, storage, handling, processing and disposal; c) a description of proposed management and disposal of wastewater, leachate and effluent; d) details on containment and monitoring of wastewater; and e) a description and appraisal of waste impact mitigation, contingencies and management.	Sections 4.16.7 and 4.18
Biodiversity – including: a) an assessment of biodiversity impacts in accordance with the *Framework for Biodiversity Assessment* (OEH 2014) and the *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014); and b) accurate predictions of any vegetation clearing on or off the site, including buildings, access roads and servicing and support infrastructure.	Sections 2.11 and 8.6 and Appendix G – *Biodiversity Assessment Report* (SLR 2018b)
Heritage – including: a) an assessment of Aboriginal and non-Aboriginal heritage items and values of the site and surrounding area in accordance with the relevant Office of Environment and Heritage guidelines.	Sections 2.12 and 8.7 and Appendix H – *Aboriginal Cultural Heritage Assessment Report* (OzArk 2018)
Animal welfare, biosecurity and disease management – including: a) details of how the proposed development would comply with relevant codes of practice and guidelines; b) details of all bio-security and disease control measures; and c) a detailed description of the contingency measures that would be implemented for the mass disposal of livestock in the event of disease outbreak.	a) Section 4 b) Section 4.23 c) Section 4.24
Noise and vibration – including: a) a quantitative noise and vibration impact assessment in accordance with the relevant EPA guidelines; b) a description of all potential noise and vibration sources during construction and operation, including traffic noise along primary haulage routes; and c) a description of noise and vibration monitoring, management and mitigation measures.	Section 8.8 and Appendix I – *Noise Impact Assessment* (Global Acoustics 2018)
Hazards and risk – including: a) a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development; and b) should preliminary screening indicate that the project is "potentially hazardous," a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011).	Section 8.9 and Appendix J – *SEPP 33 - Preliminary Risk Screening and Hazard Assessment* (SLR 2018c)
Visual impacts – including: a) a description of the visual catchment and visual impacts including lighting impacts on surrounding receivers and public areas; and b) an appraisal of visual impact mitigation measures.	Section 8.10
Socio-economic – including: a) an analysis of the economic and social impacts of the development, particularly of any benefits to the community.	Sections 3.3, 8.12 and 8.13
Infrastructure – including: a) details of any upgrade or extension to existing services infrastructure (e.g. electricity supply).	Section 4.16.2
Contributions – including: a) consideration of Tamworth Regional Council's Section 94/94A Contribution Plan and/or details of any Voluntary Planning Agreement.	Section 8.12.3

1.9 Purpose and Structure of this EIS

A development application for SSD under Division 4.7 of Part 4 of the EP&A Act must be accompanied by an EIS prepared in accordance with the EP&A Regulation. The purpose of this EIS is to provide the information required to enable government agencies and decision makers to consider the merits and implications of proceeding with the Development. It also serves to inform the wider community and other stakeholders about the Development.

The EIS is provided in three volumes. Volume 1 comprises the main report (this document) and sets out the Development in the context of the existing environment, legislative framework, stakeholder consultation activities, environmental impact assessment and mitigation measures. It is informed by the resources contained in Volumes 2 and 3, including the SEARs and specialist assessment reports. The structure of the EIS is summarised in **Table 3**.

Table 3 Secretary's Environmental Assessment Requirements

Volume 1 - Main Report	
Preliminaries	Declaration and Executive Summary
Section 1	Provides the background and context for the Development, introduces the Applicant and the EIS project team, provides an overview of the Development and nominates the approval pathway.
Section 2	Provides an overview of the Development Site in terms of locality, land ownership, zoning, surrounding land uses and receptors, climate and vegetation.
Section 3	Outlines the process undertaken to refine the design and layout of the Development to ensure impacts were avoided or minimised to the greatest extent practical and provides an analysis of alternatives.
Section 4	Provides a detailed description of the Development.
Section 5	Describes the approval pathway and environmental legislative framework for the Development.
Section 6	Details the stakeholder consultation activities undertaken to identify and prioritise the issues to be addressed within the EIS.
Section 7	Outlines the environmental risk assessment undertaken to identify and prioritise the issues to be addressed within the EIS.
Section 8	Contains an assessment of the potential environmental, social and economic impacts of the Development, including cumulative impacts.
Section 9	Lists the mitigation and management measures to be implemented to minimise the potential for adverse impacts and ensure appropriate environmental management.
Section 10	Provides a justification for the Development and contains the conclusion to the EIS.
Section 11	Lists the reference documents referred to within the EIS.
Section 12	Lists the abbreviations used within the EIS.
Volume 2 – Appendices A to F	
Appendix A	Independent Cost Review (RLB 2018)
Appendix B	Secretary's Environmental Assessment Requirements
Appendix C	*Air Quality Assessment* (PEL 2018)
Appendix D	*Traffic Impact Assessment* (RoadNet 2018)
Appendix E	*Groundwater Bore Baseline Assessment* (SLR 2017)
Appendix F	*Stage 1 Preliminary Environmental Investigation* (SLR 2018a)
Volume 3 – Appendices G to N	
Appendix G	*Biodiversity Assessment Report* (SLR 2018b)
Appendix H	*Aboriginal Cultural Heritage Assessment Report* (OzArk 2018)

Appendix I	*Noise Impact Assessment* (Global Acoustics 2018)
Appendix J	*SEPP 33 - Preliminary Risk Screening and Hazard Assessment* (SLR 2018c)
Appendix K	Preliminary Civil Engineering Design Drawings (Lance Ryan Consulting Engineers)
Appendix L	Preliminary Infrastructure Design Drawings/Plans/Specifications
Appendix M	Water Access Licences
Appendix N	Landowners' Consents

Section 2

Development Site



2 DEVELOPMENT SITE

2.1 Overview

The Development Site is located within a rural area known as Rushes Creek approximately 43 km northwest of Tamworth and 33 km northeast of Gunnedah in the New England North West region of NSW (see **Figure 1**). It comprises approximately 1,016 ha of rural land and encompasses the land titles listed in **Table 4** and identified on **Figure 2**.

Table 4 Schedule of Land Titles

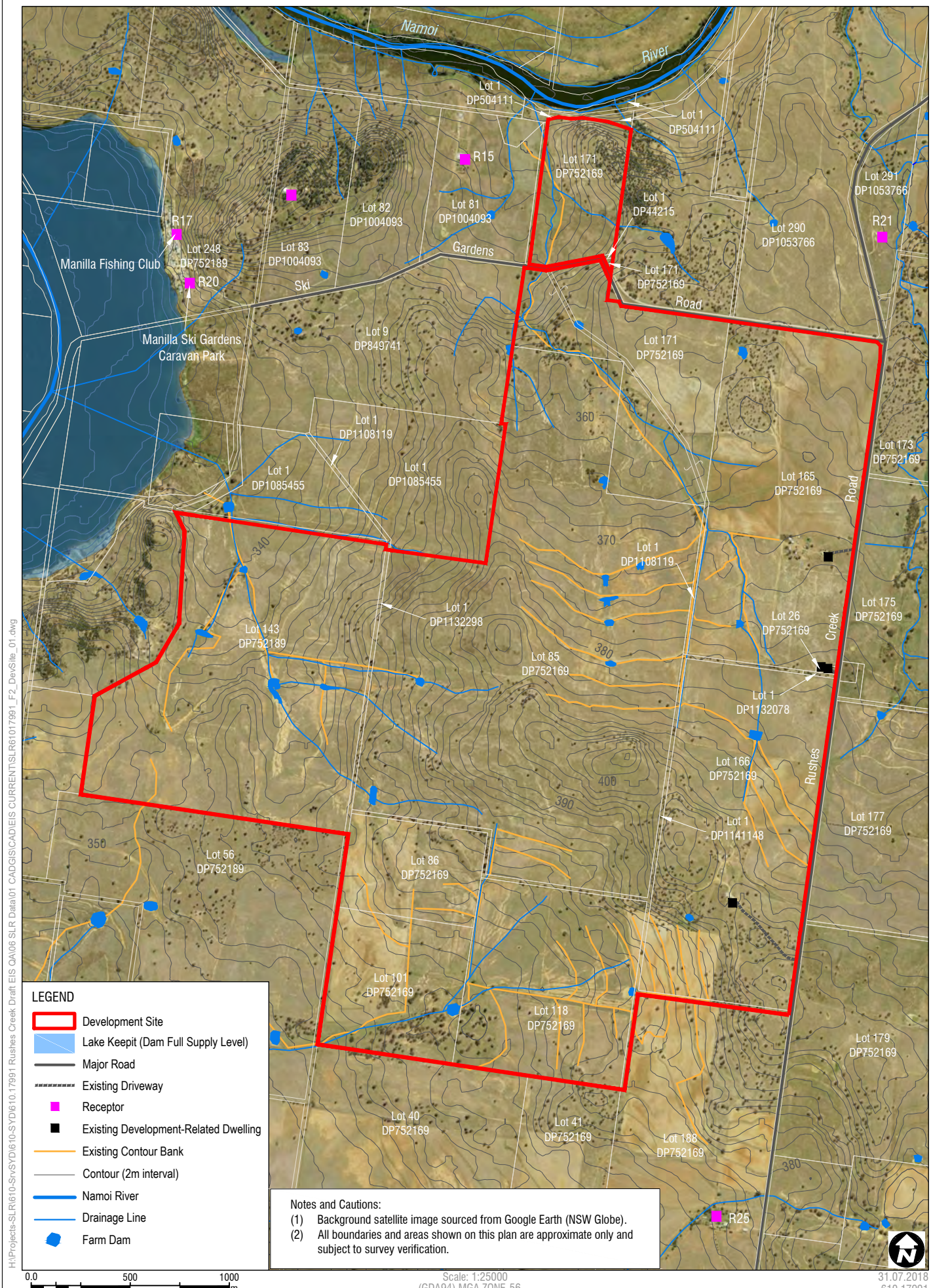
Lot	Deposited Plan (DP)	Tenure
Lot 1	DP 44215	Freehold - owned by ProTen Tamworth Pty Limited
Part Lot 1	DP 1108119	
Lot 1	DP 1132298	
Lots 26, 85, 86, 101, 118, 165, 166 and 171	DP 752169	
Part Lot 143	DP 752189	
Lot 1	DP 1132078	
Lot 1	DP 1141148	
Untitled parcel of land traversing through Lot 171 DP 752169		Council public road (unformed)

The Development Site is located within the Tamworth Regional LGA, which covers an area of approximately 9,892 square kilometres (km^2) and has a population of around 61,000. As evident on **Figure 1**, the nearest populated areas to the Development Site are Somerton and Manilla, which are located approximately 12 km to the southeast and approximately 13 km to the northeast, respectively.

Rushes Creek Road, which is a sealed two-lane rural road, forms the Development Site's eastern boundary and connects the Development Site to the Oxley Highway (NSW State Route B56) between Somerton and Carroll and also to Manilla Road (also known as Fossickers Way) (NSW State Route B95) at Manilla. The Oxley Highway provides a connection to Tamworth, being the area's major centre and home to the various poultry industry service facilities required to support a broiler production farm. Ski Gardens Road, which is a good quality gravel road, forms part of the Development Site's northern boundary and a short section traverses through the Development Site.

The Namoi River is located to the north of the Development Site and Lake Keepit is located to the west and southwest of the Site (see **Figure 2**). The topography of the Development Site ranges between around 325 and 410 metres Australian height datum (m AHD). While there is a natural southeast-northwest trending ridgeline running through the centre of the Development Site, it is relatively flat, with typical grades of 2% (2 m in every 100 m).

The visual amenity is that of a rural property that has been significantly modified by historic land clearing and long-term agricultural production activities.



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Development Site

FIGURE 2

2.2 Zoning

Under the provisions of the Tamworth LEP, the Development Site is zoned "RU1 Primary Production".

All land adjoining the Development Site is also zoned RU1 Primary Production.

2.3 Land Ownership

ProTen Tamworth Pty Limited is the registered owner of all freehold land within the Development Site (see **Table 4**). As identified on **Figure 3**, there is a narrow parcel of unformed Council public road within the Development Site traversing through Lot 171 DP 752169 under the care and management of Council. Rushes Creek Road and Ski Gardens Road are also under the care and management of Council.

As also identified on **Figure 3**, the following two land parcels sit between the Development Site and the Namoi River:

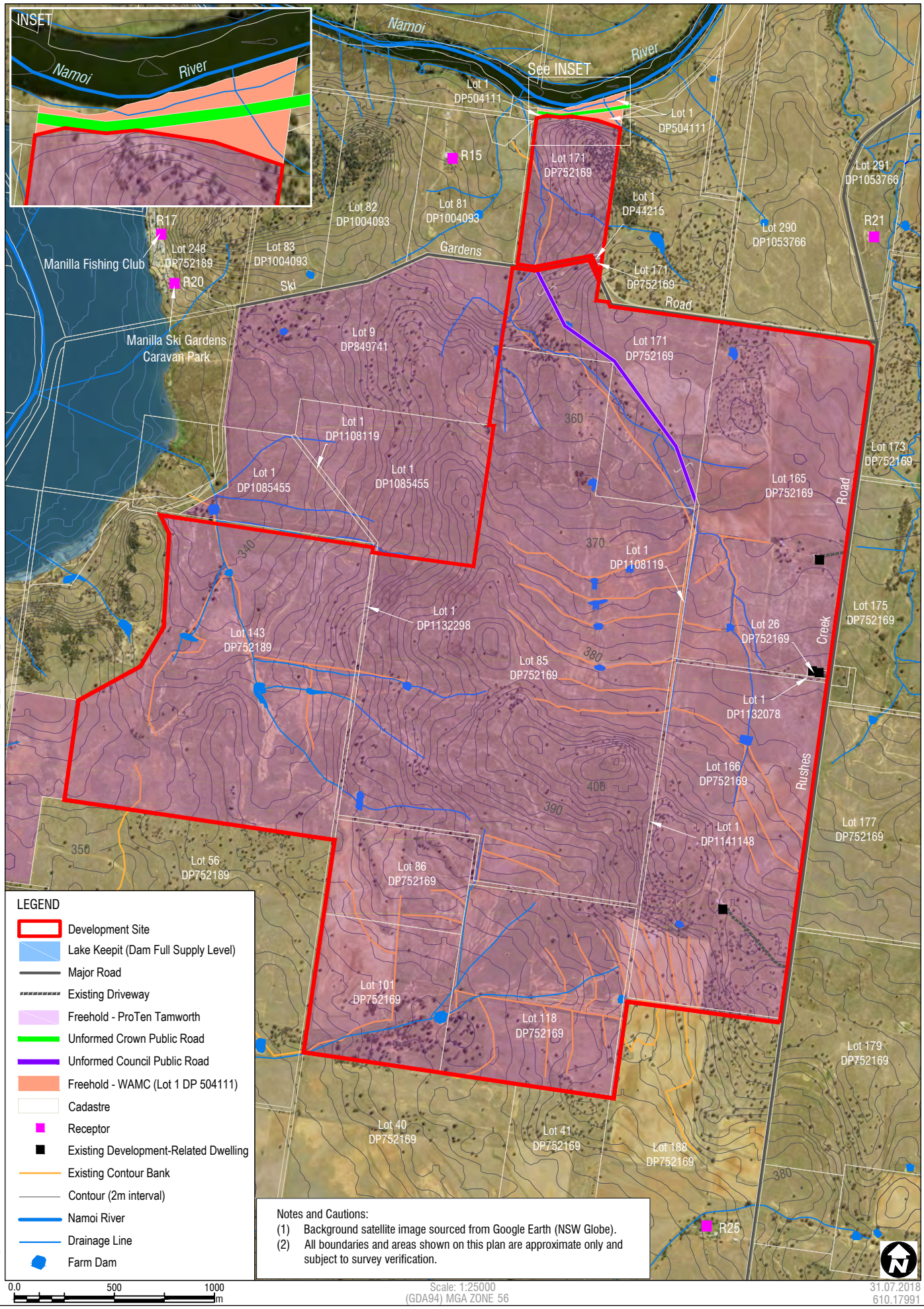
- A narrow parcel of unformed Crown public road under the care and management of Lands & Water; and
- A parcel of freehold land titled Lot 1 DP 504111 owned by the Water Administration Ministerial Corporation (WAMC) (as successor in title from the former Water Conservation and Irrigation Commission).

Council and Lands & Water have both provided written consent to submit the development application and copies of these consents are included in **Appendix N**. The WAMC deemed that their landowner consent was not required, instead advising that they would evaluate and consider granting of an easement or licence agreement over Lot 1 DP 504111 if required post consent. A copy of this correspondence is also included in **Appendix N**.

2.4 Existing Land Use and Infrastructure

The long-standing and existing use of the Development Site is traditional agricultural production, including both livestock grazing and cropping. The extent of historical clearing and agricultural use is evident on the aerial image on **Figure 2**.

Photo 1 Cleared agricultural land within Development Site



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Land Ownership

FIGURE 3

The Development Site comprises the following existing improvements:

- Lot 165 DP 752169 - one dwelling, various farm sheds and livestock pens that gain access from Rushes Creek Road via an existing driveway. The dwelling is run-down and ProTen intends to leave it un-occupied (once the current tenant moves out).
- Lot 26 DP 752169 - two dwellings and various sheds that gain access from Rushes Creek Road via an existing driveway. These dwellings are in good condition and under long-term lease from ProTen.
- Lot 166 DP 752169 - one dwelling, various farms sheds and livestock pens that gain access from Rushes Creek Road via an existing driveway. The dwelling is in good condition and occupied by a ProTen employee. There is also a derelict dwelling within this lot.

The only other identified infrastructure within the Development Site are fencing, groundwater gores/wells (see **Section 2.9.2**), farm dams, farm contour banks, which are generally around 500 millimetres (mm) high, and swales with a similar depth.

The locations of the four existing dwellings (not including the derelict dwelling), access driveways, farm dams and contour banks are shown on **Figure 2**.

2.5 Surrounding Land Uses and Receptors

The surrounding area is primarily characterised by traditional agricultural production, along with recreational activities around Lake Keepit. As identified on **Figure 4**, surrounding recreational facilities include:

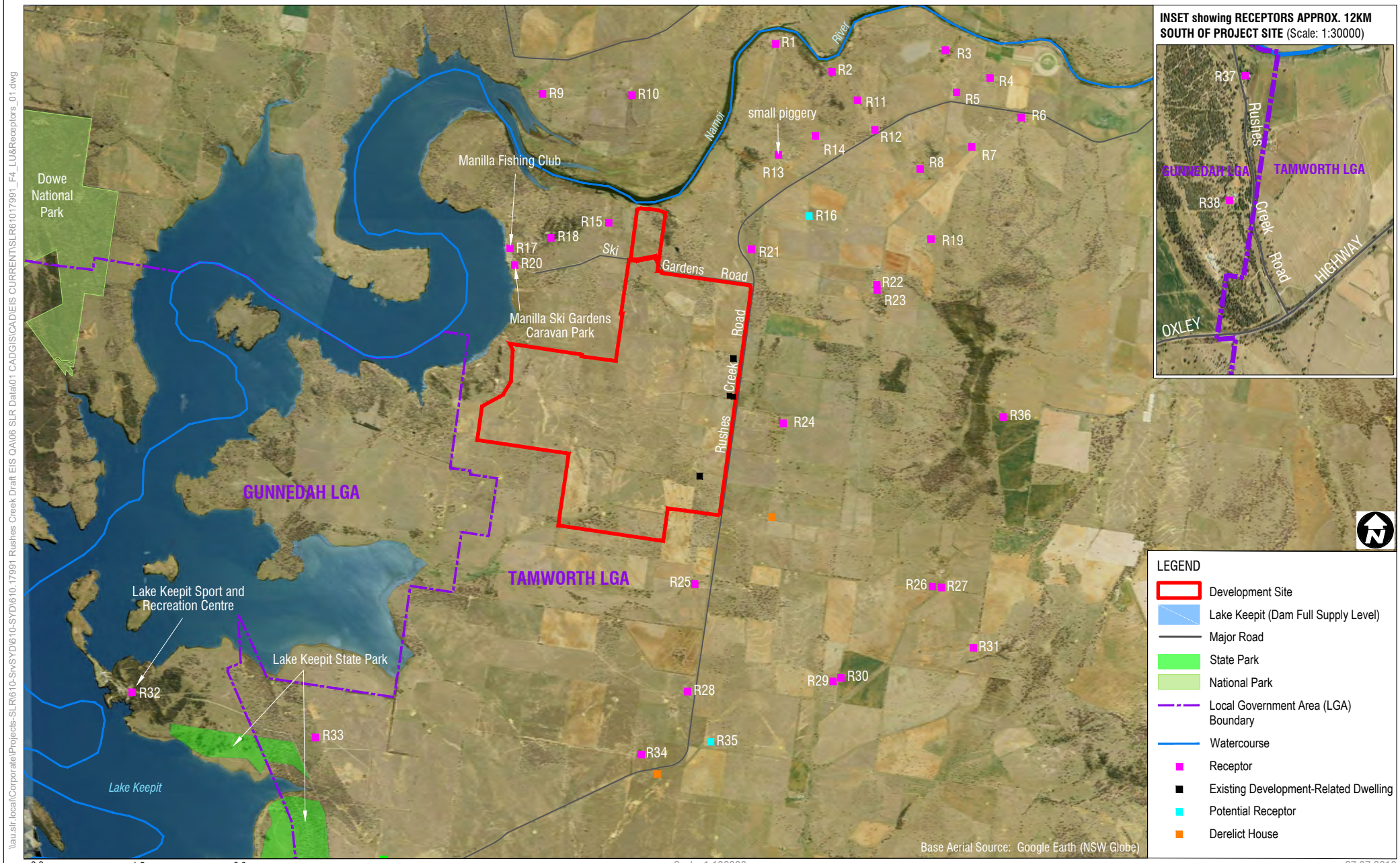
- Manilla Ski Gardens Caravan Park (R20) and Manilla Fishing Club (R17) are located approximately 1.15 km to the northwest of the Development Site. These two facilities offer temporary accommodation for up to around 175 guests and 65 guests, respectively, in caravans/campervans, cabins and camping sites.
- Lake Keepit Sport and Recreation Centre (R32), which comprises a conference centre, recreational facilities and accommodation, is located approximately 6.3 km to the southwest of the Development Site. This facility offers temporary accommodation for up to around 237 guests in lodges and cabins.
- Lake Keepit Soaring Club, which comprises gliding facilities, a clubhouse and accommodation, is located approximately 7.5 km to the southwest of the Development Site. This facility offers temporary accommodation for up to around 50 guests in cabins and caravans/campervans.
- Inland Waters Holiday Park, which comprises recreational facilities and accommodation, is located approximately 9.3 km to the southwest of the Development Site. This facility offers significant temporary accommodation in caravans/campervans, camping sites and cabins/lodges.

There are three foreshore areas around Lake Keepit that have been designated as the Lake Keepit State Park. The Park is owned by the WAMC and managed by the NSW Crown Holiday Parks Trust.

As identified on **Figure 4**, there is a small piggery facility (around 50 sows) located approximately 3.1 km to the northeast of the Development Site near receptor R13.

The nearest populated areas (see **Figure 1**) are:

- Somerton, approximately 12 km to the southeast of the Development Site. The Somerton village and surrounding rural area has a population of around 277, according to the 2016 Australian Bureau of Statistics (ABS) census; and
- Manilla, approximately 13 km to the northeast of the Development Site. The Manilla village and surrounding rural area has a population of around 2,550, according to the 2016 ABS census.



Surrounding Land Uses and Receptors

FIGURE 4

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The Development Site has a relatively low density of surrounding privately-owned residences, with the nearest identified on **Figure 4** and listed in **Table 5**. Also listed in **Table 5** are the distances between each receptor and the nearest proposed poultry production unit (PPU) (see **Section 4**).

Table 5 Surrounding Receptors

Receptor	Location	Distance from Nearest PPU (m) (nearest PPU)
R1	Dwelling, Rushes Creek Road	4,715 (Farm 2)
R2	Dwelling, Rushes Creek Road	4,585 (Farm 2)
R3	Dwelling, Rushes Creek Road	5,745 (Farm 2)
R4	Dwelling, Rushes Creek Road	5,885 (Farm 2)
R5	Dwelling, Rushes Creek Road	5,395 (Farm 2)
R6	Dwelling, Rushes Creek Road	5,855 (Farm 2)
R7	Dwelling, Moys Lane	5,025 (Farm 2)
R8	Dwelling, Moys Lane	4,225 (Farm 2)
R9	Dwelling, Corella Road	4,385 (Farm 2)
R10	Dwelling, Corella Road	3,890 (Farm 2)
R11	Dwelling, Rushes Creek Road	4,395 (Farm 2)
R12	Dwelling, Rushes Creek Road	4,185 (Farm 2)
R13	Dwelling and small piggery, Rushes Creek Road	3,145 (Farm 2)
R14	Dwelling, Rushes Creek Road	3,625 (Farm 2)
R15	Dwelling, Ski Gardens Road	2,255 (Farm 2)
R16 (potential)	Potential future dwelling, Rushes Creek Road	2,585 (Farm 2)
R17	Manilla Fishing Club, Ski Gardens Road	2,250 (Farm 1)
R18	Dwelling, Ski Gardens Road	2,460 (Farm 1)
R19	Dwelling, Moys Lane	3,775 (Farm 2)
R20	Manilla Ski Gardens Caravan Park, Ski Gardens Road	2,005 (Farm 1)
R21	Dwelling, Rushes Creek Road	1,720 (Farm 2)
R22	Dwelling, Moys Lane	2,765 (Farm 2)
R23	Dwelling, Moys Lane	2,750 (Farm 2)
R24	Dwelling, Rushes Creek Road	1,335 (Farm 2)
R25	Dwelling, Rushes Creek Road	1,025 (Farm 4)
R26	Dwelling, Perrings Road	4,160 (Farm 4)
R27	Dwelling, Perrings Road	4,305 (Farm 4)
R28	Dwelling, Rushes Creek Road	2,480 (Farm 4)
R29	Dwelling, Boundary Road	3,465 (Farm 4)
R30	Dwelling, Boundary Road	3,515 (Farm 4)
R31	Dwelling, Glenbrook Road	5,015 (Farm 4)
R32	Lake Keepit Sport and Recreation Centre, National Fitness Road	6,835 (Farm 1)
R33	Dwelling, National Fitness Road	5,255 (Farm 3)
R34	Dwelling, Rushes Creek Road	3,365 (Farm 4)
R35 (potential)	Potential future dwelling, Bidford Access	3,265 (Farm 4)

Receptor	Location	Distance from Nearest PPU (m) (nearest PPU)
R36	Dwelling, Glenbrook Road	4,510 (Farm 2)
Road Traffic Noise Sensitive Receptors		
R37	Dwelling, Rushes Creek Road	12,775 (Farm 4)
R38	Dwelling, Rushes Creek Road	13,495 (Farm 4)

The nearest residential receptors are identified as R25 and R24, which are located off Rushes Creek Road at approximate distances of 1,025 m and 1,335 m from the Development (nearest PPU), respectively.

There are two derelict and uninhabited dwellings identified on **Figure 4** to the east and south of the Development Site, which have not been allocated receptor identification numbers or listed in **Table 5** as they have been excluded from the assessment. Two potential future residential receptors have been identified and are shown on **Figure 4** and listed in **Table 5** as R16 and R35. These are properties for which development consents for new houses have been issued by Council, however, at the time of preparing this EIS, they had not been constructed.

The two residential receptors identified as R37 and R38 are located a short distance north of the Oxley Highway / Rushes Creek Road intersection (i.e. a significant distance from the Development Site). They have been included as road traffic noise sensitive receptors due to their close proximity to Rushes Creek Road.

2.6 Other Poultry Operations

2.6.1 Surrounding Operations

Poultry developments within the vicinity of the Development Site are identified on **Figure 1** and described as:

- Glenara Park Poultry Breeder Farm (Baiada) located approximately 6.6 km to the northwest of the Development Site. It was approved by Council under Development Consent DA 69-99/2000 and comprises six poultry sheds housing a combined 80,000 breeder birds.
- Murrami Poultry Broiler Production Farm (ProTen) located approximately 11.3 km to the south-southeast of the Development Site. It was approved by Council under Development Consent DA 2001/008 and comprises 16 poultry sheds housing a combined 800,000 broiler birds.
- Moana Poultry Broiler Production Farm (Praedium Agri Management) located approximately 11.7 km to the south of the Development Site. It was approved by Council under Development Consent DA 0324/2008 and comprises eight poultry sheds housing a combined 450,000 broiler birds.
- Brubri Poultry Broiler Production Farm (Russell Chickens) located approximately 10.1 km to the east of the Development Site. It was originally approved by the former Manilla Shire Council under Development Consent DA 23-00/2001, with a second approval issued by Council under Development Consent DA 0078/2013. Brubri comprises 16 sheds housing a combined 800,000 broiler birds.

2.6.2 Regional Operations

The poultry industry is well-established and has a high recognition factor in the Tamworth region, providing a significant contribution to the economy. In addition to numerous poultry production farms, notable poultry industry service facilities within the region are identified on **Figure 1** and described as:

- Country Road Hatchery (Baiada) - large-scale chicken hatchery facility located on the western outskirts of Tamworth on Country Road (via the Oxley Highway);

- Tangaratta Stockfeeds (Baiada) – poultry feedmill facility located to the northwest of Tamworth on Wallamore Road (via the Oxley Highway and Bowlers Lane);
- Out Street Poultry Processing Plant (Baiada) - poultry processing plant located in West Tamworth on Out Street (via the Oxley Highway); and
- Oakburn Rendering Plant (Baiada) – poultry rendering plant (protein recovery) located to the west of Tamworth on the Oxley Highway.

Baiada has approval to establish a new poultry processing plant at the Oakburn location, which would subsequently result in the closure of the existing Out Street Poultry Processing Plant. There is currently no timeframe for this development.

2.7 Meteorology

The Development Site is situated within the New England North West region, which is generally dominated by a dry semi-arid climate and characterised by hot summers and cool winters.

Long-term average data for temperature, rainfall and relative humidity have been sourced from the Bureau of Meteorology's (BoM's) automated weather station (AWS 055325) at the Tamworth Airport, which has been operational since 1992 and is located approximately 34 km to the southeast of the Development Site. Long-term average evaporation data has been sourced from the BoM's AWS 055024 at the Gunnedah Resource Centre, which has been operational since 1948 and is located approximately 35 km southwest of the Development Site.

Table 6 summarises this long-term temperature, rainfall, humidity and evaporation data.

Table 6 Long-Term Meteorological Conditions

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Monthly Maximum Temperature (°C) for Years 1992 to 2017[1]												
32.6	31.6	29.2	25.4	20.8	17.0	16.3	18.3	21.7	25.4	28.4	30.4	24.8
Mean Monthly Minimum Temperature (°C) for Years 1992 to 2017[1]												
17.4	16.9	14.3	10.0	6.0	3.7	2.2	2.8	5.8	9.5	13.3	15.5	9.8
Mean Monthly Rainfall (mm) for Years 1993 to 2017[1]												
62.9	71.8	50.6	25.7	30.2	55.8	42.4	40.6	46.7	53.8	83.8	80.9	642.3
Mean Number of Days of Rain (>=1mm) for Years 1993 to 2017[1]												
5.2	5.7	4.8	2.9	3.4	5.5	5.0	4.3	4.8	5.5	7.2	6.8	61.1
Mean Monthly Evaporation (mm) for Years 1948 to 2017[2,3]												
238.7	190.4	182.9	129.0	83.7	57.0	58.9	86.8	120.0	167.4	201.0	241.8	1,752.0
Mean Monthly 9am Relative Humidity (%) for Years 1992 to 2010[1]												
56	63	64	60	72	83	81	71	63	56	58	57	65
Mean Monthly 3pm Relative Humidity (%) for Years 1992 to 2010[1]												
35	40	37	36	44	52	51	41	40	38	39	36	41

1 - sourced from BoM AWS 055325 at Tamworth Airport;

2 - sourced from BoM AWS 055024 at Gunnedah Resource Centre

3 - calculated based on the average daily evaporation rate

Temperature

The local climate is characterised by very warm to hot summers and cool to mild winters. Mean monthly maximum temperatures range between 16.3 and 32.6 degrees Celsius, with January being the warmest month. Mean monthly minimum temperatures range between 2.2 and 17.4 degrees Celsius, with July being the coolest month. Autumn and spring are generally mild with sporadic temperature fluctuations.

Rainfall

Rainfall levels in the Tamworth region are generally low, with the area quite susceptible to periods of drought. The highest monthly rainfall levels typically occur in November and December. Summer rainfall tends to occur mainly from thunderstorms, resulting in higher mean monthly rainfall and mean number of days of rain.

Evaporation

Evaporation is greatest during the warmer months of November through to January (inclusive), with mean monthly rates over this period exceeding 200 mm.

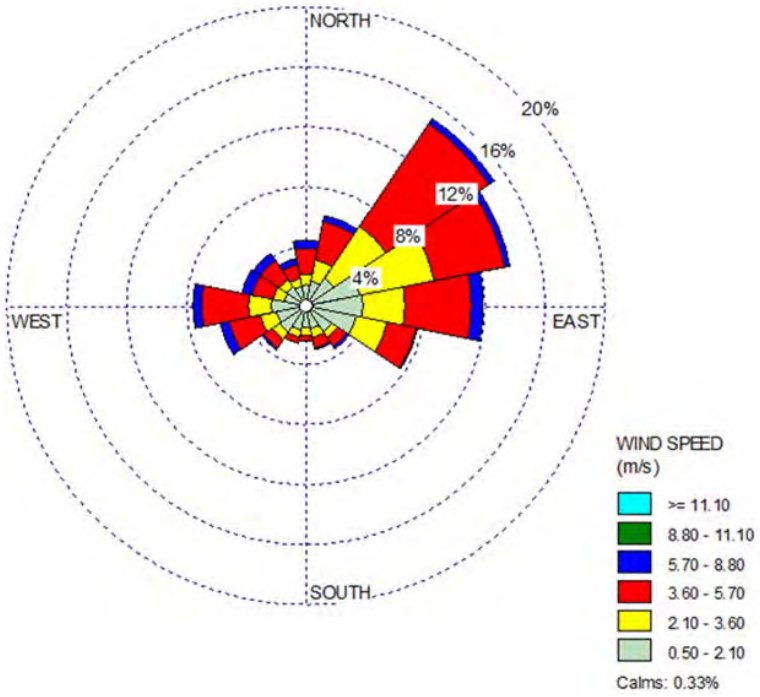
Relative Humidity

The area has a moderate relative humidity, with the winter months tending to be slightly more humid than other times of the year. The mean annual 9:00 am and 3:00 pm relative humidity are 65% and 41%, respectively.

Wind

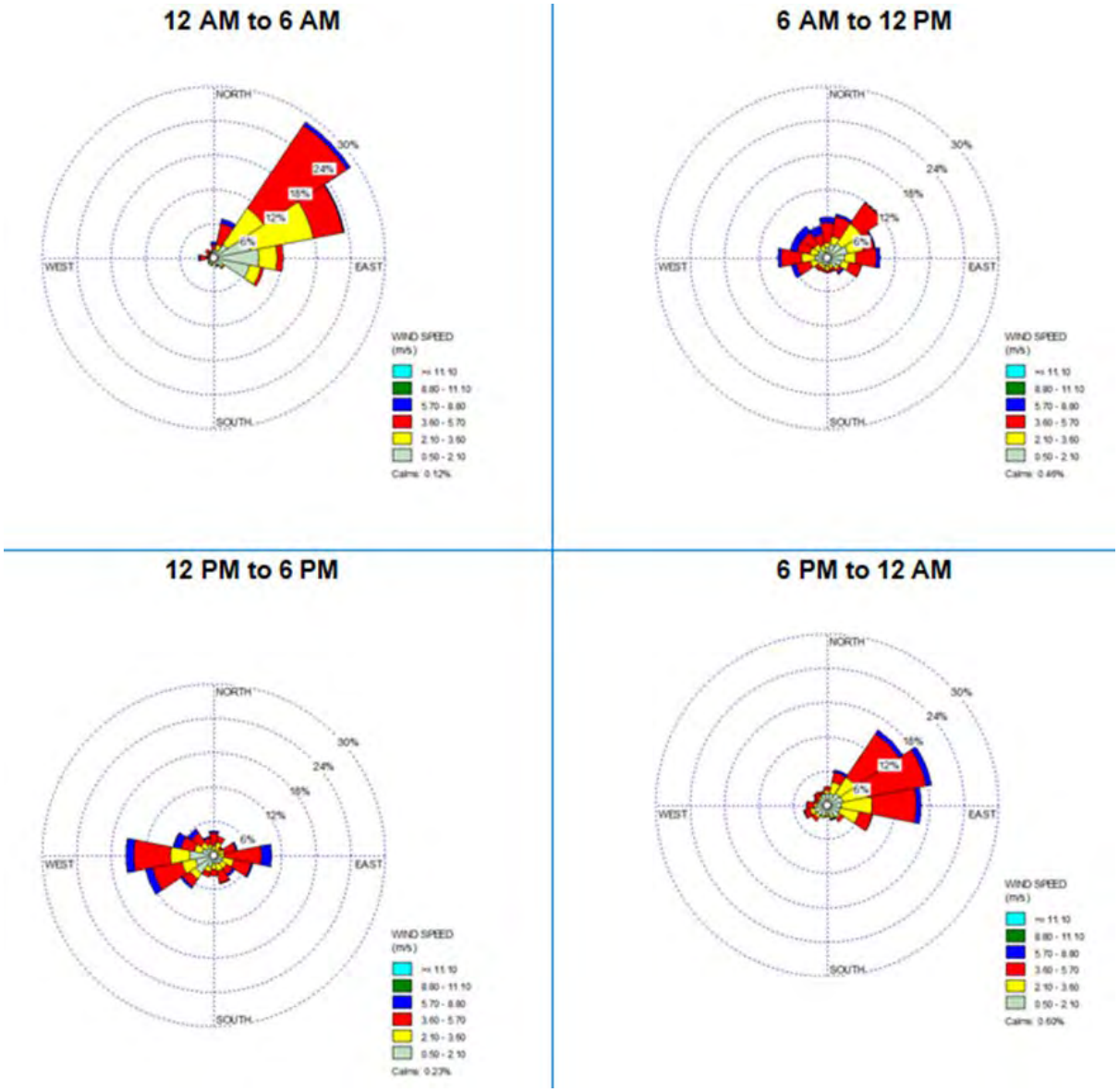
A summary of the modelled annual wind behaviour at the Development Site is presented in the wind rose generated by PEL (2018) showing the frequency of occurrence of winds by direction and strength in **Figure 5.** It shows that the prevailing winds are from both the northeast and east with some winds from the west. This is consistent with expectations when the terrain in the area is considered.

Figure 5 Predicted Annual Wind Rose



As shown on the "time of day" wind roses generated by PEL (2018) in **Figure 6**, winds in the early morning and late night are typically light (3 metres per second [m/s]) and from northeast to easterly directions, which is a function of the local and regional terrain. During the morning and afternoon, the winds are typically stronger with less wind from the northeast and a higher proportion of winds from the west and southwest. There is a high frequency of calm to light winds (up to 3 m/s), occurring 50% of the time.

Figure 6 Predicted Time of Day Wind Roses



2.8 Soil and Land Classification

The Development Site is located in an area dominated by a landscape ranging from broad gently undulating rises, to very gently inclined foot slopes and drainage plains on mixed Devonian and Carboniferous colluvium and alluvium in the north-western Duri Hills. The slopes range from 1 to 8%, with local relief less than 100 m and typically less than 20 m. The elevation of this landscape ranges between 290 and 580 m.

The Development Site is considered to consist of two soil landscapes, these being "Wongo", which is a residual landscape, and "Oodnadatta", which is a transferral landscape. These two soil landscapes are mapped within 2 km of the Development Site on both the eastern and western sides of Lake Keepit and the Namoi River. They originally supported open woodlands, most of which have now been cleared for agricultural purposes. Although early yields of winter cereal crops were high, the organic matter depletion in the silty to fine sandy topsoils led to a rapid decline in production and massive sheet erosion events. Much of the area has now been returned to pasture regimes for livestock grazing.

The soils within the area are dominated by moderately-deep to deep, well to moderately-drained Red and Brown Chromosols. Three soil profiles were recorded in the NSW eSpade soil information system, with two profiles along the eastern boundary of the Development Site (adjacent to Rushes Creek Road) and one located between the Development Site and the Namoi River. All soil profiles were considered Brown Chromosols.

Given the historical clearing, cultivation and grazing pressures on the soil, much of the area has experienced widespread sheet and gully erosion and severe structural decline within the soil profile. The current pasture management regimes have assisted in stabilising surface soils, however many erosion scalds remain.

Information on land and soil capability (LSC) has been sourced from *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH 2012). The LSC dataset consists of eight classes representing a decreasing capability of the land to sustain land use based on a number of criteria, including biophysical characteristics and soil erosion hazard. Class 1 represents land capable of sustaining most land uses, including those with a high impact on the soil (for example, regular cultivation), while Class 8 represents land that can only sustain very low impact land uses (for example, nature conservation). The Development Site is at best considered LSC Class 4 (moderate capability land). Class 4 land is defined as land with moderate to high limitations for high-impact land uses, such as cropping, high-intensity grazing and horticulture.

Acid Sulphate Soils

Acid sulphate soils are commonly found less than 10 m AHD, particularly in low-lying coastal areas. The Development Site is located approximately 230 km from the coast and has elevations ranging between 325 and 410 m AHD. On this basis, it is very unlikely that acid sulphate soils are present in the Development Site.

2.9 Water Resources

2.9.1 Surface Water

On a regional scale, the Development Site is located within the catchment of the Namoi River, which is one of the Murray-Darling Basin's major NSW sub-catchments. It covers a total area of approximately 42,000 km^2 between Tamworth and Walgett. Stream flows in the Namoi catchment are regulated by Lake Keepit on the Namoi River, Split Rock Dam on the Manilla River and Chaffey Dam on the Peel River. The catchment supports significant dryland and irrigated agricultural production, including cotton, livestock production, grain and hay, poultry, horticulture and forestry (NSW Office of Water [NOW] 2011). The region's local councils also depend on the Namoi River and Peel River to meet the urban water requirements of many of the region's urban centres (NOW 2011).

The Namoi River flows westerly to the north of the Development Site into Lake Keepit. The Namoi River is a regulated system to meet the needs of water users and the environment from Split Rock Dam to its confluence with the Barwon-Darling River at Walgett. While the Development Site extends close to the Namoi River at the northern extent of the Site, there are two narrow parcels of land between the Site and the River (see **Section 2.3** and **Figure 3**). The Peel River, which is a major regulated tributary to the Namoi Catchment, flows westerly approximately 8.5 km to the south of the Development Site.

Lake Keepit, which is located to the west and southwest of the Development Site, was commissioned in 1960 as the major irrigation storage for the Namoi Catchment. It also provides flood mitigation (see **Section 2.10**), generates hydropower via a hydropower station and supplies town water for Walgett (NOW 2011). Lake Keepit is a popular sport and recreation destination offering attractions for water sports, fishing, bush walking, camping, gliding and more.

Surface water features within the Development Site and surrounds are shown on **Figures 1** and **2**. While there are no notable surface water features within the bounds of the Development Site, there are several intermittent drainage lines traversing through the Site and several farm dams. Runoff to the east of the ridgeline trending southeast-northwest through the centre of the Development Site is directed to the Namoi River via contour banks and shallow swales. Runoff to the west of this ridgeline is channelled to Lake Keepit through drainage lines in the south, west and southwest of the Development Site. The contour banks are generally around 500 mm high and the swales a similar depth.

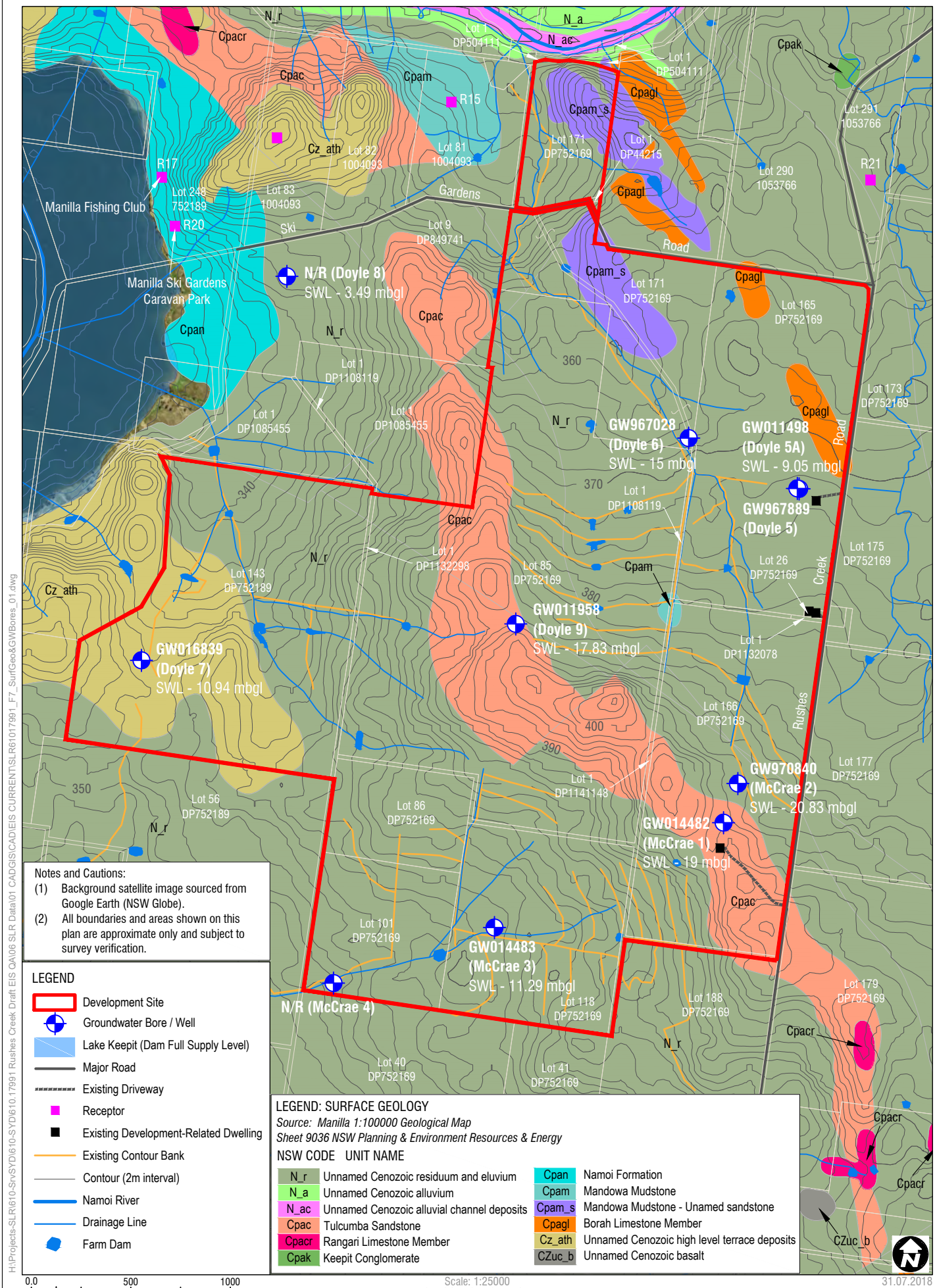
No wetlands exist within the Development Site or within the surrounding area.

Photo 2 Intermittent drainage line and farm dam

2.9.2 Groundwater

The Development Site is situated in the New England Fold Belt Groundwater Management Area (GMA) under the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011*. The New England Fold Belt groundwater system is characterised as a fractured rock system, with groundwater dominantly stored and transmitted within fractures rather than the rock mass itself.

Groundwater is known to be contained within the unconsolidated sediments (alluvium) associated with the Namoi River further to the west and northwest of the Development Site and downstream of Lake Keepit where the Namoi River alluvium is known to form an extensive and widely utilised aquifer. The alluvial aquifer is typically comprised of coarse sand, gravel, silt and clay deposits. The *Manilla 9036 1:100,000 geological map sheet* does not show any occurrence of alluvium adjacent to the Development Site. Analysis of aerial imagery suggests that if the alluvial aquifer does exist adjacent to the Development Site it is well constrained spatially to within and adjacent to the Namoi River channel itself. **Figure 7** shows the surface geology (as per the *Manilla 9036 1:100,000 geological map sheet*) within and surrounding the Development Site.



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Surface Geology and Groundwater Bores

A search of the NSW Government's on-line groundwater works database and an in-field groundwater bore survey conducted by SLR (2017) in November 2016 identified a total of nine groundwater bores or wells within the Development Site (see **Figure 7**). A review of available drill bore logs confirmed the New England Fold Belt groundwater system as a fractured rock system and indicates the water bearing zones are greater than 30 m deep. The bore survey (SLR 2017) identified that the depth to groundwater is greater than 9 metres below ground level (mbgl) across the Development Site. A relatively shallow depth of 3.49 mbgl was recorded as a tenth identified bore to the northwest of the Development Site, Doyle 8 (dam bore). Doyle 8 is located immediately adjacent to a farm dam that was full of water during the survey and, therefore, the measured groundwater level is likely influenced by dam seepage.

The results of the bore survey (SLR 2017) indicate that the direction of groundwater flow is a subdued replica of topography, with groundwater flowing away from the southeast-northwest trending ridgeline in the centre of the Development Site towards the Namoi River in the north, west and northwest. Field analysis of the groundwater bores indicates that the groundwater quality is fresh to slightly brackish, with electrical conductivity ranging between 977 and 1,609 microSiemens per centimetre (µS/cm) and pH ranging between 6.9 and 7.6 (i.e. neutral).

Groundwater Dependent Ecosystems

A search of the BoM's *National Atlas of Groundwater Dependent Ecosystems* indicates that there are no groundwater dependent ecosystems (GDEs) reliant on surface expression of groundwater (rivers, springs, wetlands) within the Development Site or its surrounds. While the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011* lists a number of high priority GDEs, none of these are located in or around the Development Site.

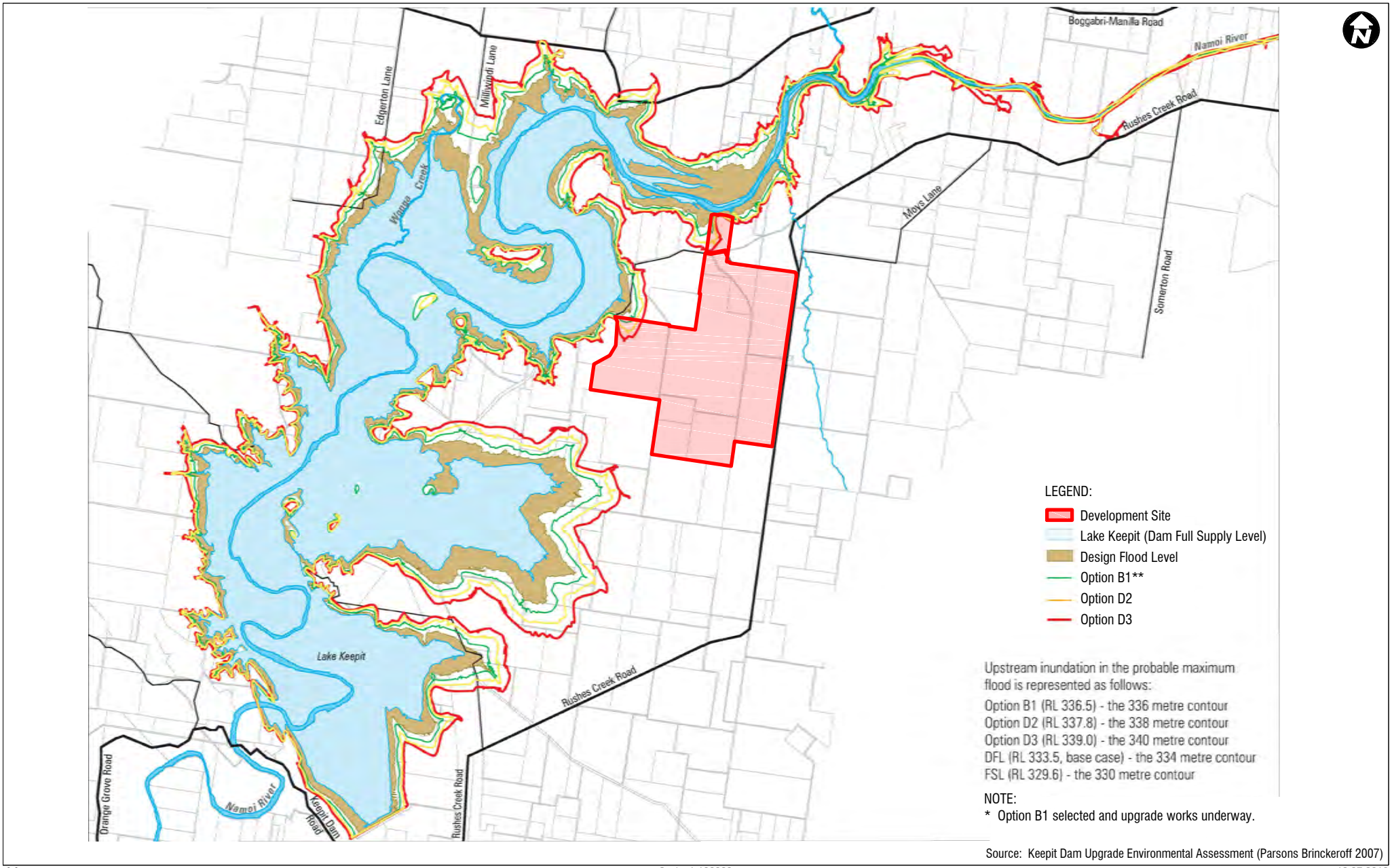
2.10 Flooding

Lake Keepit is designed to attenuate large flood events by temporarily storing a portion of the floodwaters above the dam full supply level up to the design flood level (Parsons Brinkerhoff [PB] 2007). As the inflows to the dam start to reduce, the temporarily stored flood water is released until the dam reaches its full supply level (PB 2007).

To meet modern dam safety standards, two additional spillways and three saddle dams (upgrade option B1 stage one) were built in 2011 to divert floodwaters around the dam in a rare and extreme flood so as to protect the dam and ensure it remains safe (WaterNSW n.d.). Additional work (upgrade option B1 stage two) commenced in April 2017, which when completed will raise and strengthen the main dam wall.

The *Keepit Dam Upgrade Environmental Assessment* (PB 2007) mapped the increase to the design flood level as a result of the dam upgrades for the probable maximum flood (PMF). The PMF is the largest flood that could theoretically occur in a catchment. Although the likelihood of a PMF cannot be directly determined, the chance of a PMF occurring within the Namoi River valley is estimated to be 1:500,000 each year and possibly less (PB 2007).

Figure 8 (sourced from PB 2007) shows the temporary inundation predicted to occur upstream of Lake Keepit during a PMF when the level of the dam storage rises to the new design flood level (i.e. following the option B1 upgrade works [green line] – stage one completed in 2011 and stage two commenced in 2017). As evident these areas are marginal beyond the dam full capacity level and barely encroach into the Development Site. PB (2007) predicts that these marginal areas would be inundated for a duration of approximately 60 hours in a PMF. On this basis, it is concluded that the Development Site is not flood-liable land. It is also not mapped as "flood planning area" in the Tamworth LEP.



H:\Projects-SLR\610-Srv\SYD\610.17991 Rushes Creek Draft EIS QA\06 SLR Data\01 CADGIS\CADEIS CURRENT\SLR610179911_F8_TempInund_01.dwg

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(GDA94) MGA Zone 56

12.07.2018
610.17991

Temporary Inundation during a Probable Maximum Flood Event

FIGURE 8

SLR
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2.11 Native Vegetation

The Development Site is located within the eastern margins of the Nandewar Bioregion, which comprises approximately 27,000 km^2 in northern NSW and Queensland. It lies within the Peel Interim Biogeographic Regionalisation of Australia (IBRA) subregion.

The majority of the Development Site has been historically cleared and used for traditional agricultural purposes and is consequently composed of modified often bare soils and exotic pastures. However, there are some patches of native woodland remaining associated with topographic depressions and drainage features and within paddocks where historical clearing has been less extensive. The woodland areas contain virtually no native understorey or native groundcover, most likely as a result of decades of grazing by cattle (SLR 2018b).

Widely scattered paddock trees are distributed intermittently across the Development Site, with generally limited shrub cover and low diversity and cover of native groundcover vegetation. The groundcover across most of the open portions is subject to grazing or cropping and is dominated by exotic agricultural pasture, cultivated oats and weed species typical of the locality (SLR 2018b).

Photo 3 Modified bare soils, exotic pastures and scattered paddock trees

Photo 4 Native woodland patch

The most recent published regional scale vegetation mapping applicable to the Development Site is the *Border Rivers / Gwydir / Namoi Regional Vegetation Mapping* (OEH 2015), which indicates that the vast majority of the Site comprises non-native vegetation associated with grazed and cropped land. SLR (2018b) undertook extensive field survey work in accordance with the *Framework for Biodiversity Assessment* (OEH 2014a) (FBA) in October 2016 and October 2017, which included inspecting areas of native vegetation to refine the broad-scale regional mapping. SLR (2018b) identified the following three native plant community types (PCTs) within the Development Site:

- White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (PCT 1383) – with 21.27 ha of woodland form recorded and 380.3 ha of "derived native grassland" form recorded;
- White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion (PCT 589), with 55.22 ha recorded; and
- Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion (PCT 101), with 0.10 ha recorded.

A small patch of River Red Gum riparian tall woodland / open forest wetland (PCT 78) was recorded immediately north of the Development Site (however within the Study Area of the *Biodiversity Assessment Report* [SLR 2018b]) adjacent to the Namoi River.

The distribution of the PCTs within the Development Site is shown on **Figure 9.** As evident, the majority of the Development Site supports large expanses of grazed pasture comprising mainly exotic grasses and herbs and derived grasslands that have been (and are currently) subject to grazing and/or cropping uses (SLR 2018b).

2.12 Heritage

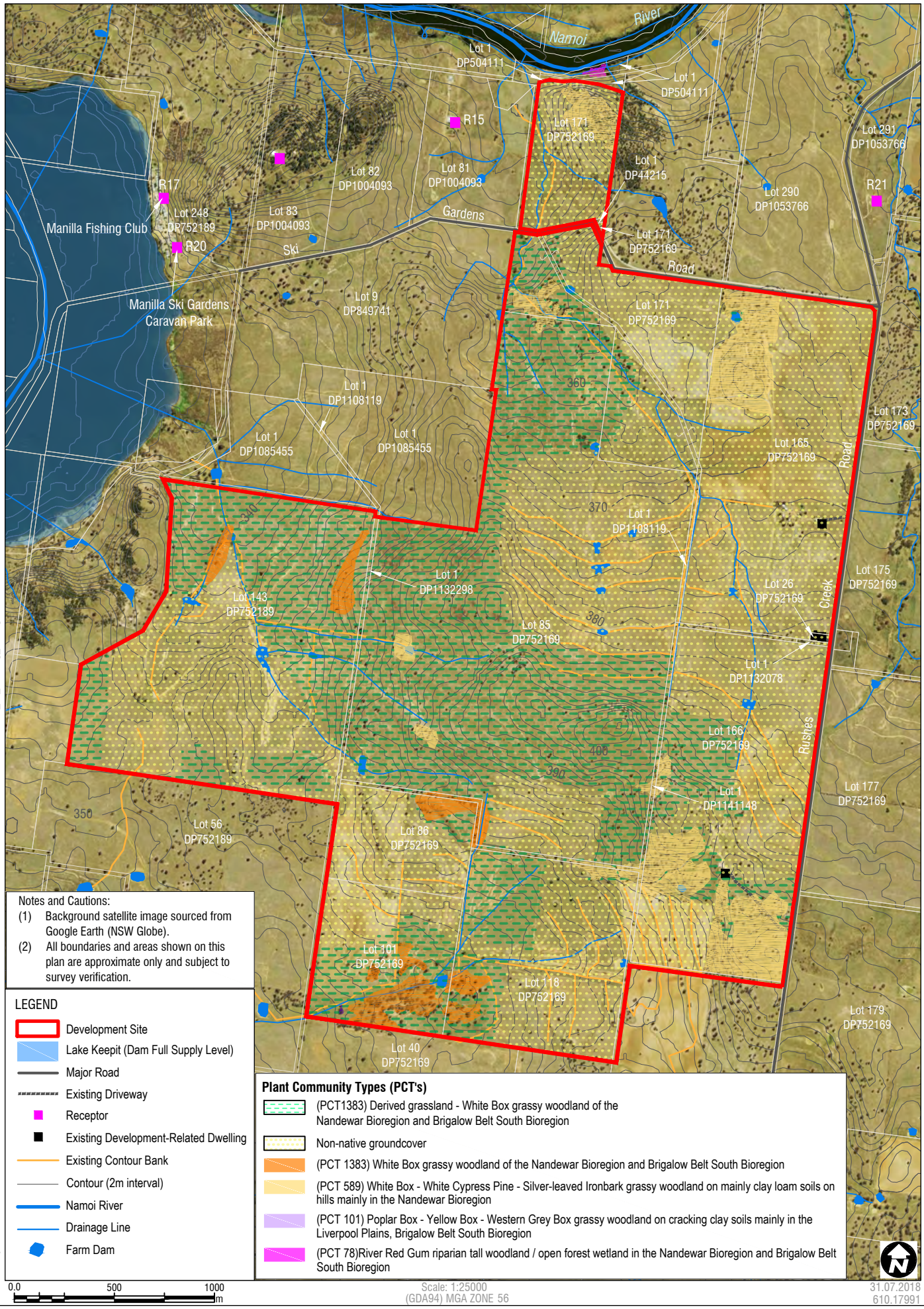
2.12.1 Aboriginal Heritage

A search of the OEH's *Aboriginal Heritage Information Management System* (AHIMS) conducted by OzArk (2018) on 12 October 2016 did not reveal any previously recorded Aboriginal sites within the Development Site. The nearest recorded site was a box scarred tree (AHIMS #20-5-0091) within the Ski Gardens Road reserve adjoining the Development Site.

OzArk (2018), with representatives from the registered Aboriginal parties (RAPs) (see **Section 6.3**), undertook field survey work in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment, Climate Change and Water [DECCW] 2010a), over four days in October 2016. As shown on **Figure 10**, this survey work identified 35 previously unrecorded Aboriginal sites within the Development Site comprising:

- Seventeen isolated finds - Happy Hills-IF1 to Happy Hills-IF4 and Bondah-IF1 to Bondah-IF13;
- Fourteen artefact scatters - Happy Hills-OS1 to Happy Hills-OS3 and Bondah-OS1 to Bondah-OS11;
- One hearth - Bondah-H1; and
- Three scarred trees - Happy Hills-ST1 to Happy Hills-ST3.

It is noted that the Development Site includes land currently subject to a native title claim by the Gomeroi People (Tribunal File No. NC2011/006, Federal Court No. NSD2308/2011). Under the provisions of the Commonwealth *Native Title Act 1993,* native title is extinguished over the freehold land parcels within the Development Site (see **Section 2.3** and **Figure 3**).



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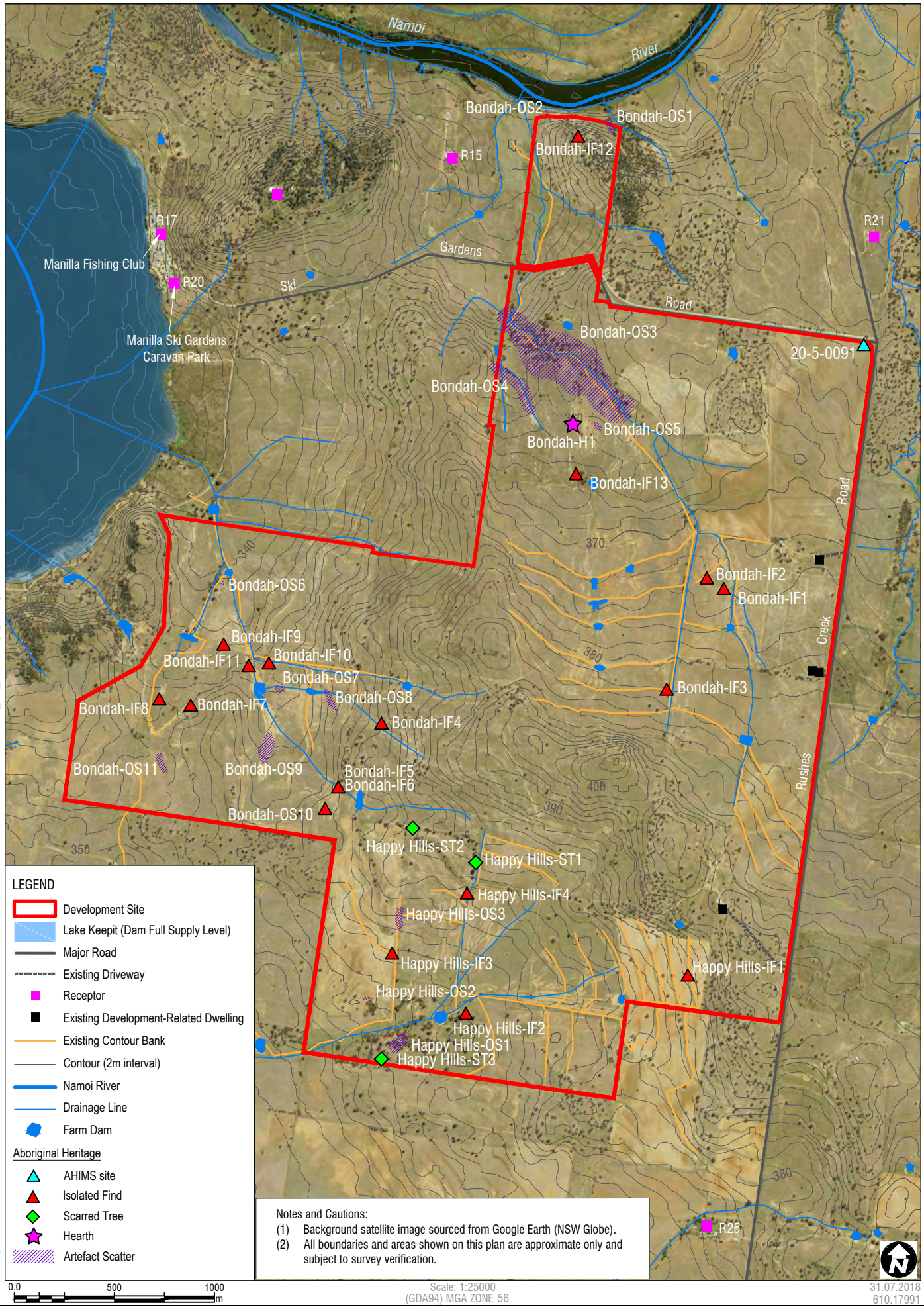
Recorded Plant Community Types

FIGURE 9



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Recorded Aboriginal Sites

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FIGURE 10

2.12.2 Historic Heritage

A search of the State Heritage Register, which lists historic heritage items deemed to be of State significance, found no references for the Rushes Creek area. The nearest listed heritage items are located in Upper Manilla and Tamworth, both a significant distance from the Development Site.

Historic heritage items of significance at a local government level are listed in the heritage schedules of the relevant LEP. There are no heritage items listed within or near the Development Site in the Tamworth LEP, with the nearest located on the western outskirts of Manilla and in Somerton, both a significant distance from the Development Site.

On this basis, no further consideration of historic heritage has been provided in this EIS.

2.13 Land Contamination

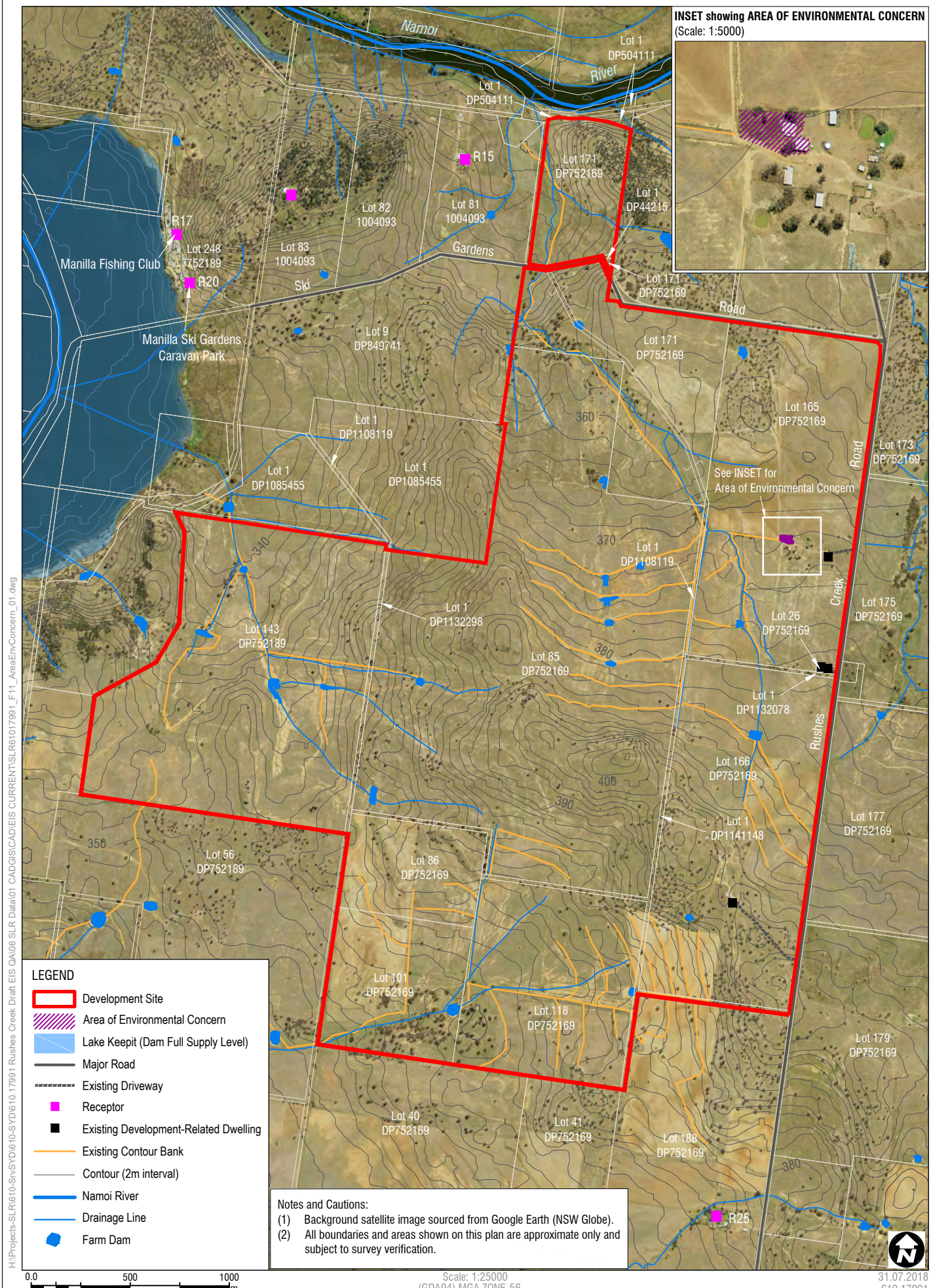
A preliminary site investigation was undertaken by SLR (2018a) to assess the potential for contamination and suitability of the Development Site in accordance with *State Environmental Planning Policy No. 55 - Remediation of Land* (SEPP 55). The *Stage 1 Preliminary Site Investigation* (SLR 2018a) detailing the methodology and results of the investigation is contained in **Appendix F**.

Based on a desktop review of available site information and a site inspection, SLR (2018a) identified one area of environmental concern, being a former sheep dip in Lot 165 DP 752169. **Figure 11** shows the location of this site. Contaminants of potential concern at this site are arsenic, organochlorine pesticides, organophosphate pesticides, carbamates and synthetic pyrethoids.

As recommended by SLR (2018a), ProTen will engage a suitably qualified and experienced consultant to undertake a targeted soil investigation at the identified area of environmental concern involving three soil boreholes with associated soil sampling and laboratory analysis for the contaminants of potential concern. Subsequently, if determined necessary, ProTen will commission the necessary works to remediate and/or manage the area prior to commencing operation of the Development. Based on the nature of the potential contaminants, SLR (2018a) advises that there are well established means of remediation and/or management that could be implemented.

2.14 Bush Fire Prone Land

The Development Site is not mapped as bush fire prone land on the NSW Rural Fire Service's Bush Fire Prone Land Mapping Tool.



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Area of Environmental Concern - Soil Contamination

FIGURE 11

Section 3

Development Optimisation and Alternatives



3 DEVELOPMENT OPTIMISATION AND ALTERNATIVES

3.1 Development Design and Layout

The potential impacts of the Development have been minimised by the iterative process ProTen has undertaken to develop and refine the development design and layout to minimise, in particular, odour impacts and disturbance of high conservation vegetation areas and identified Aboriginal heritage sites. This included using information obtained from preliminary odour modelling and baseline environmental surveys to assess various layouts in consideration of environmental constraints and the surrounding populace.

Particular scrutiny was given to the number of poultry sheds at each PPU and the alignment of linear infrastructure within the Development Site. Refinements to the design and layout of the Development to ensure impacts were avoided or minimised to the greatest extent practical are outlined below.

Poultry Sheds

The total number of poultry sheds has reduced from the originally proposed 64 sheds (as presented in the PEA) to the proposed 54 sheds. In the early stages of the Development, significant preliminary odour modelling was undertaken in parallel with consultations with the EPA (see **Section 6.1.1**) to reach a development layout that would meet the EPA's expectations in relation to odour emissions and associated impacts. Numerous development scenarios, in terms of the number of poultry sheds at each of the four PPUs, were modelled to find a development layout that achieved compliance with the agreed criterion for all receptors of 5 ou (see **Section 8.1**) and also balanced the economics of the Development.

While the original proposal comprised four separate PPUs each comprising 16 poultry sheds (i.e. 64 sheds), the selected layout at the conclusion of the preliminary odour assessment is the proposed layout detailed in **Section 4**. It comprises a total of 54 sheds (i.e. 10 less than that originally proposed) split between the four PPUs as follows -

- Farm 1 – 10 sheds;
- Farm 2 – 18 sheds;
- Farm 3 – 10 sheds; and
- Farm 4 – 16 sheds.

Poultry Production Units

After confirming the number of poultry sheds to be included at each PPU, some slight adjustments were made to the locations of some of the PPUs to improve environmental and social outcomes. Specifically:

- While Farm 2 is proposed to be located on the junction of a first order drainage line and a second order drainage line draining north towards the Namoi River, it was moved slightly to the south to lessen the associated impact. Ideally Farm 2 would have been shifted further away from the drainage lines, however constraints associated with odour impacts, vegetation communities and Aboriginal heritage sites limited the distance/options for relocation. Farm 2 is located in the upper reach of the catchment and the drainage lines are therefore relatively minor and intermittent.
- Farm 3 was moved to the north to avoid disturbance of a patch of White Box grassy woodland, which represents the Box-Gum Woodland threatened ecological community (TEC), and also to avoid a second order drainage line draining west towards Lake Keepit.
- Following a community meeting and site inspection (see **Section 6.2.1**), Farm 4 was moved to the north to lessen its visibility from receptor R25 to the southeast.

These relocations required further odour modelling to ensure compliance was maintained with the agreed criterion for all receptors of 5 ou (see **Section 8.1**).

Linear Infrastructure and Farm Managers' Houses

The alignments of internal linear infrastructure, including some significant sections of access roads, water supply pipelines and electricity supply lines, were re-aligned to avoid areas of higher conservation vegetation. Some of the proposed farm managers' houses and associated driveways were also repositioned to avoid areas of higher conservation vegetation. The original alignments of the linear infrastructure and house locations would have resulted in the disturbance of approximately 25.2 ha of derived native grassland, a treeless form of the White Box grassy woodland, which represents the Box-Gum Woodland TEC. Using an iterative process to assess potential re-alignment options, with consideration of identified Aboriginal sites and Development practicalities and economics, the selected linear infrastructure alignments (see **Section 4**) will result in the disturbance of only 1.17 ha of derived native grassland (i.e. an impact reduction of 24.03 ha). The selected alignments also avoid any other high value vegetation/woodland areas and avoid impact to any additional Aboriginal sites.

The re-positioned houses and associated driveways completely avoid areas of derived native grassland and also avoid other high value vegetation/woodland areas and Aboriginal sites.

Conclusion

While there is significant residue land available within the Development Site, further relocations of the PPUs and/or additional infrastructure items were not possible on the basis of odour impacts, areas of high conservation vegetation/woodland, Aboriginal heritage sites and the need to maximise the separation distances between the PPUs for biosecurity purposes.

The Development as proposed (see **Section 4**) represents the best of the alternatives considered when taking the environmental and social amenity impacts in to consideration. The layout also ensures that appropriate separation distances are maintained for biosecurity and the large area of residue land within the Development Site remains accessible and usable for continued traditional agricultural production.

3.2 Alternative Development Sites

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

- Proximity to a chicken hatchery facility, such as Baiada's Country Road Hatchery located on the western outskirts of Tamworth on Country Road (see **Figure 1**);
- Proximity to a reliable poultry feed source, such as Baiada's Tangaratta Stockfeeds located to the northwest of Tamworth on Wallamore Road (see **Figure 1**);
- Proximity to a poultry processing facility, such as Baiada's Out Street Poultry Processing Plant located in West Tamworth on Out Street (see **Figure 1**);
- Proximity to a poultry rendering facility, such as Baiada's Oakburn Rendering Plant located to the west of Tamworth on the Oxley Highway (see **Figure 1**);
- Proximity to major regional and State transport routes, such as the Oxley Highway;
- Adequate separation distances to other poultry farms for biosecurity purposes;
- Adequate separation distances to surrounding residences and other sensitive receptors;
- 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 for a poultry farm must be mindful of transport routes and distances to each of the abovementioned poultry industry service 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 preferable and typically limits the amount of clearing required to establish the PPUs, which is beneficial from a biodiversity perspective.

ProTen is regularly in the process of searching for potential sites to develop in the Tamworth and Griffith regions (i.e. areas with established poultry industry service facilities) and also outside of NSW with the help of real estate agents, landowners, planning consultants and legal consultants. The Development Site (see **Section 2**) was identified as a site that meets all of the above listed criteria and preliminary odour modelling and baseline environmental surveys further confirmed its suitability.

The poultry industry is well-established and has a high recognition factor in the Tamworth region, providing significant employment and contribution to the economy. Management and labour expertise are available, local transport contractors are geared to the industry and the wider community generally understands and accepts the specialised operation.

3.3 "Do Nothing" Alternative

The Development will increase the supply of broiler poultry by up to 17 million birds per year, which is integral to the industry's strategy for continued growth within the Tamworth region and Australia. It will also create 20 full-time equivalent employment positions, result in significant and sustained expenditure on various consumable products and services, and bring about various other flow-on benefits.

The consequences of the "do nothing" alternative have been considered and include:

- The loss of 20 full-time equivalent employment positions and the associated flow-on activities;
- Lost opportunities for local suppliers and businesses and transport contractors that service the poultry industry;
- The increased market for regional farmers for the supply of grain required to produce the Development's poultry feed requirement (approximately 80,000 tonnes annually) would not be realised;
- Adverse economic impacts on ProTen associated with the need to investigate development opportunities elsewhere and not being able to fulfil supply contracts with Baiada, with related problems to the vertical integration of the poultry industry within the Tamworth region; and
- Further delays to Baiada's plan to relocate its poultry processing plant from within West Tamworth to the Oakburn site (see **Section 2.6.2** and **Figure 1**). This relocation is only economically feasible with significant growth in the region's poultry broiler production.

While the do nothing alternative would avoid impact on the local environment and surrounding populace, including increased traffic on the local road network, disturbance of approximately 1.17 ha of derived native grassland and disturbance of seven Aboriginal sites, the impact assessment provided in **Section 8** shows that the Development can proceed without resulting in significant or long-term adverse impacts to the local environment or surrounding populace. The development design features, best management practices and mitigation measures committed to by ProTen will ensure that any externalised impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

The assessment documented in this EIS reveals that the Development is justified on environmental, social and economic grounds and it is consistent with the key objects of the EP&A Act. The Development will promote the orderly and economic use and development of land, while at the same time protecting and managing valuable environmental and cultural resources. Consequently, the do nothing alternative has not been considered further.

Section 4

Proposed Poultry Development

4 PROPOSED POULTRY DEVELOPMENT

4.1 Overview

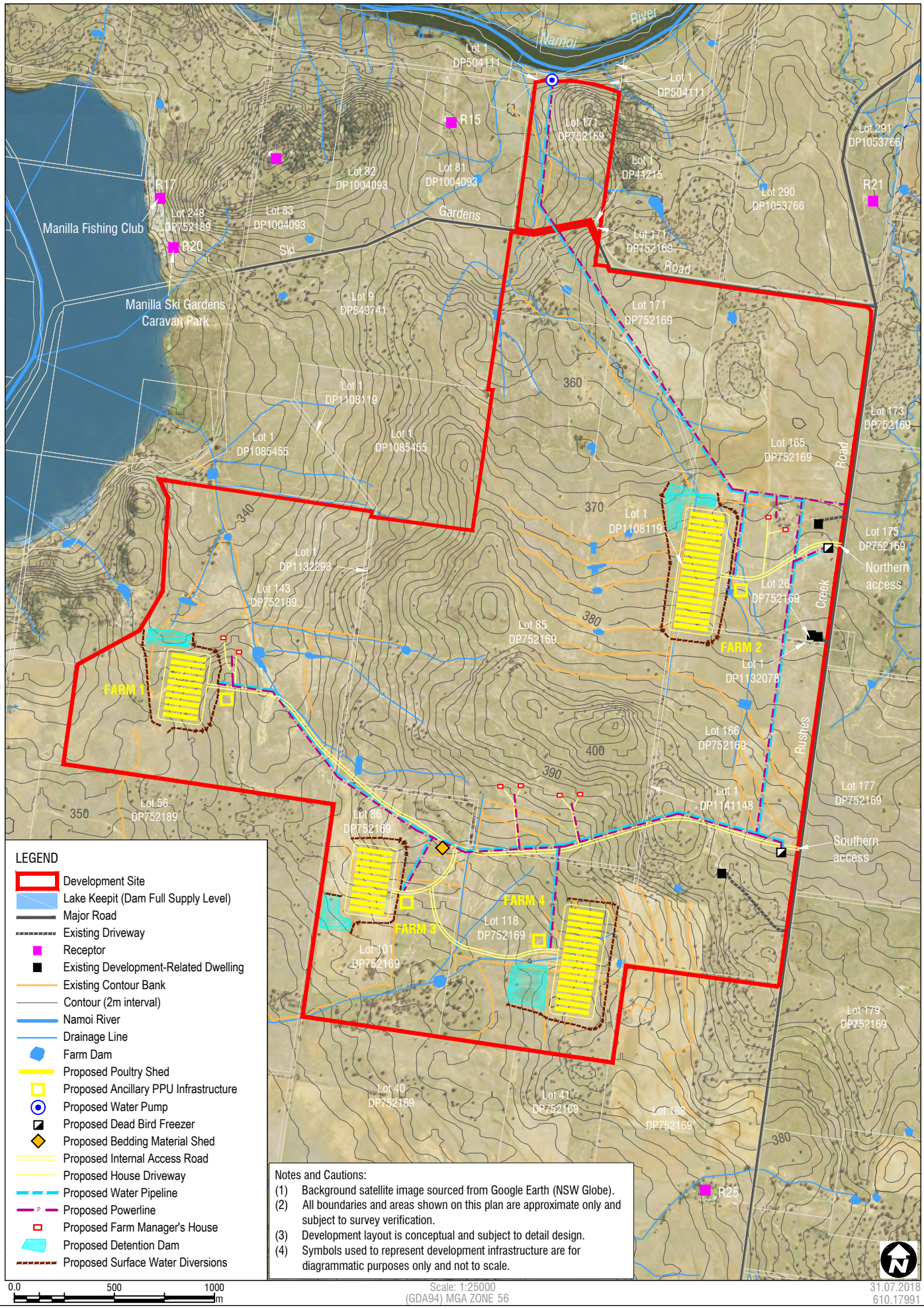
The Development comprises four individual PPUs, which are identified as Farms 1 to 4, where broiler birds will be grown for the purpose of producing poultry meat (for human consumption). Each farm will contain between 10 and 18 tunnel-ventilated fully-enclosed climate-controlled poultry sheds, which will each have the capacity to house 56,500 birds, along with associated support and servicing infrastructure. The Development will comprise a total of 54 poultry sheds, housing a combined site population of 3,051,000 birds.

Table 7 provides a summary of the various components of the Development for which consent is sought. **Figure 12** shows the conceptual layout of the overall Development and **Figures 13** to **16** show the conceptual layouts of each of the four PPUs. Preliminary civil engineering design drawings prepared by Lance Ryan Consulting Engineers (LRCE) are provided in **Appendix K** and preliminary design drawings/plans/specifications for various proposed infrastructure items are provided in **Appendix L**. Note that these figures/drawings/plans are preliminary and conceptual and will be progressed to detailed design following development consent.

Table 7 Development Description Summary

Aspect	Details	EIS References
Purpose	Birds grown for the purpose of producing poultry meat	-
Number of PPUs	Four - Farms 1, 2, 3 and 4	• Figures 12 to 16 • Appendix K – preliminary civil design drawings
Total disturbance footprint	Approximately 87.78 ha	• Section 4.4 • Figure 12
Number of poultry sheds	Farm 1 – 10 sheds Farm 2 – 18 sheds Farm 3 – 10 sheds Farm 4 – 16 sheds Total – 54 sheds	• Section 4.10 • Figures 12 to 16 • Appendix K – preliminary civil design drawings
Type of poultry sheds	Tunnel-ventilated, fully-enclosed, climate-controlled	• Section 4.10.1 • Figure 18 • Appendix L – poultry shed design drawings
Poultry shed dimensions	160 m long by 18 m wide by 4.7 m high (to roof ridge)	
Poultry shed areas	Each shed – 2,880 m^2 Total – 155,520 m^2	
Bird numbers	Each shed - 56,500 birds Farm 1 – 565,000 birds Farm 2 – 1,017,000 birds Farm 3 – 565,000 birds Farm 4 – 904,000 birds Total – 3,051,000 birds	• Section 4.10.2
Maximum bird density	34 kg/m^2	• Section 4.10.2
Hours of operation	24 hours a day, 7 days a week	• Section 4.8
Production cycle length	Approximately 65 days, comprising maximum bird occupation of 55 days and cleaning phase of 10 days	• Section 4.9
Production cycles per year	Approximately 5.6 on average	• Section 4.9

Support/servicing infrastructure	• Eight houses to accommodate farm managers; • Two access driveways from Rushes Creek Road and internal access roads; • Water supply infrastructure to extract, transfer, treat and store water from the Namoi River; • Reticulated electrical supply infrastructure; • Bedding material storage shed; • Two dead bird freezers; and • At each PPU: – Staff amenities and workshop (office, change rooms, toilets, workshop, chemical store and pump room); – Feed silos; – Water storage tanks; – Solar panels; – Fuel and gas storage facilities; – Generators; – Vehicle wheel wash; – Ring roads; – Surface water management system, including upstream diversions; and – AWTS.	• Sections 4.11, 4.12, 4.13, 4.14, 4.15.2 to 4.15.4, 4.16 and 4.17.2 • Figures 12 to 16 • Appendix K – preliminary civil design drawings • Appendix L – – House design plan – Bedding material storage shed drawings – Amenities and workshop building design drawings – Silo design drawing – Water tank design drawing – Solar panel specifications – LPG 7,500 L bulk tank specifications; – Generator drawing and specifications – AWTS manual (including system drawings)
Subdivision	Boundary adjustment to ensure each PPU, including associated ancillary support infrastructure and farm managers houses, is enclosed within its own lot.	• Section 4.2 • Figure 17
Employment	Twenty (20) full-time equivalent employees.	• Section 4.7
Vehicle access	Two access driveways from Rushes Creek Road constructed to accommodate a BAL treatment. Internal access roads and ring roads around each PPU constructed as all-weather rural-type roads.	• Sections 4.15.2 to 4.15.4 • Figures 12 to 16 and Figure 20 • Appendix K – preliminary civil design drawings
Traffic generation	Heavy vehicles – approximately 8,455 per year. Light vehicles – approximately 4,597 per year.	• Section 4.15.5
Servicing	Electricity – solar panels and connection to Essential Energy's reticulated supply infrastructure. Generators for emergency use only. Gas – bulk LPG storage tanks. Water – licensed surface water allocation from the Namoi River.	• Section 4.16 • Figures 12 to 16
Waste management	Systems to manage all waste streams generated by the poultry production operation to ensure no on-site waste storage or disposal.	• Section 4.18
Surface Water Management	An engineered surface water management system at each PPU comprising upstream diversions, grassed swale drains, table drains and a detention dam.	• Section 4.17 • Figures 12 to 16 • Appendix K – preliminary civil design drawings
External lighting	One light fixture over the front and rear loading-unloading areas of each poultry shed.	• Section 4.10.5 • Figure 18
Landscaping	Landscape plantings to improve the visual and environmental amenity of the Development Site, including vegetation screens around the perimeter of each PPU.	• Section 4.20 • Figure 22



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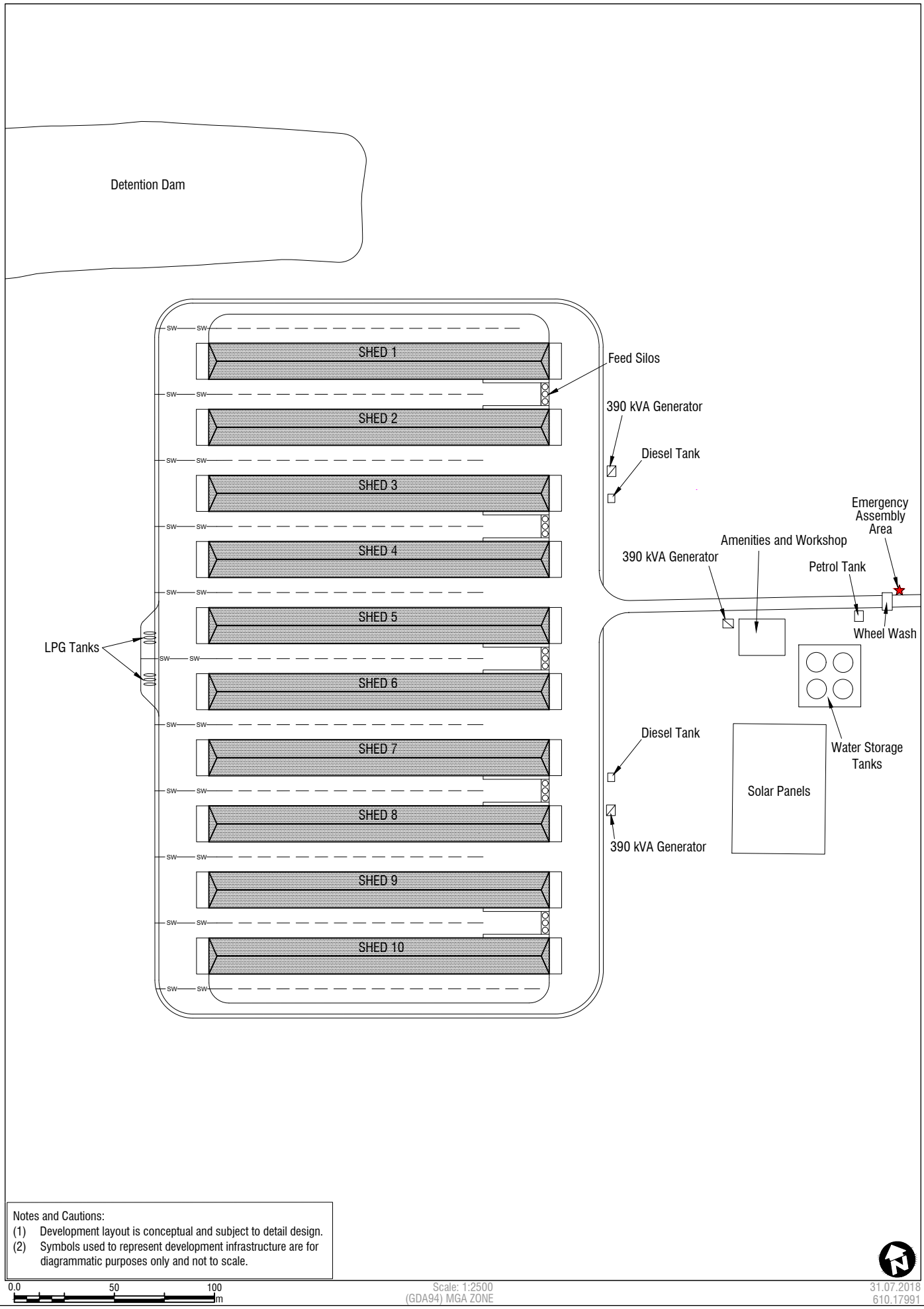
Development Layout

FIGURE 12



Notes and Cautions:
(1) Development layout is conceptual and subject to detail design.
(2) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

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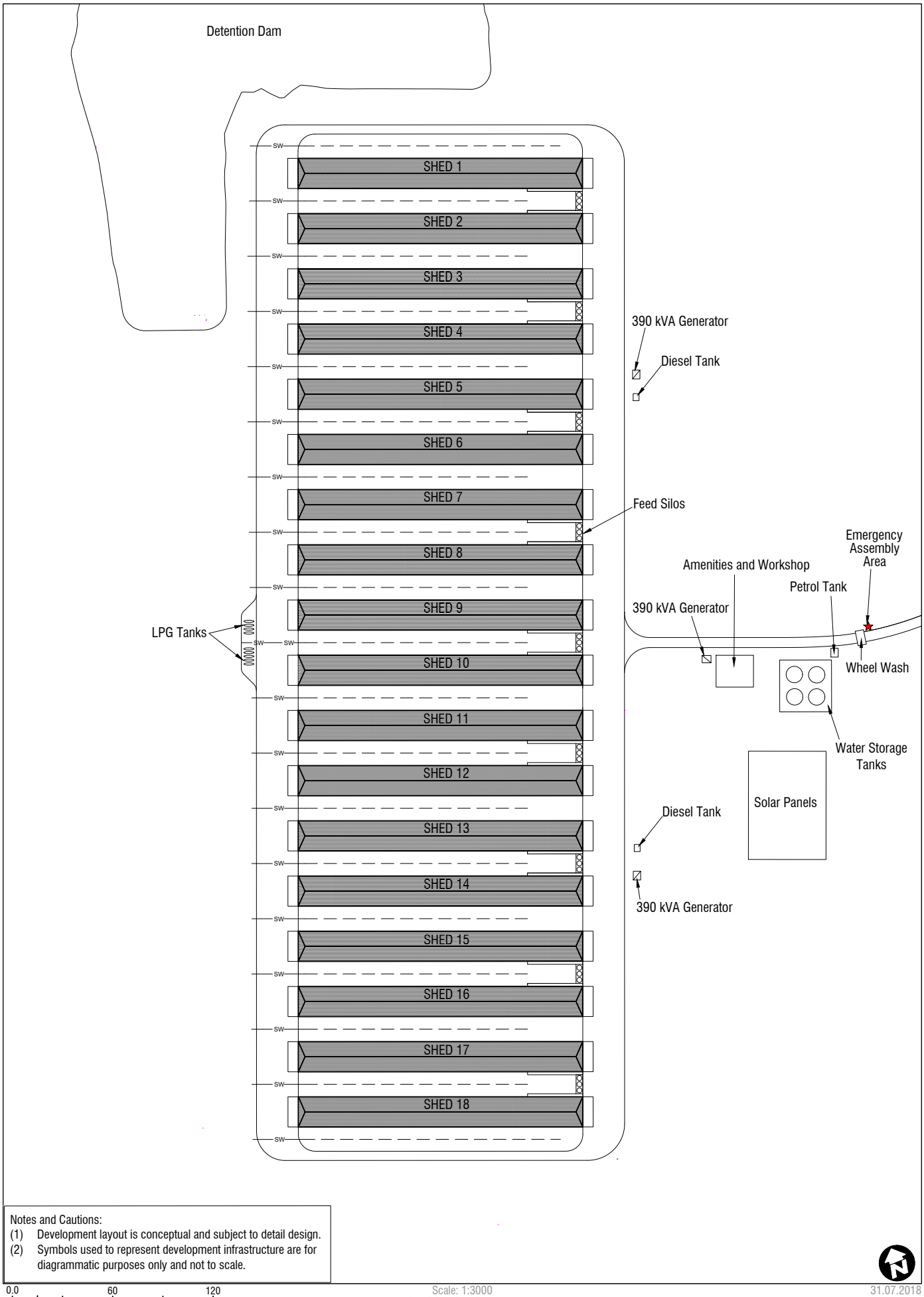
Farm 1 - Poultry Production Unit Layout



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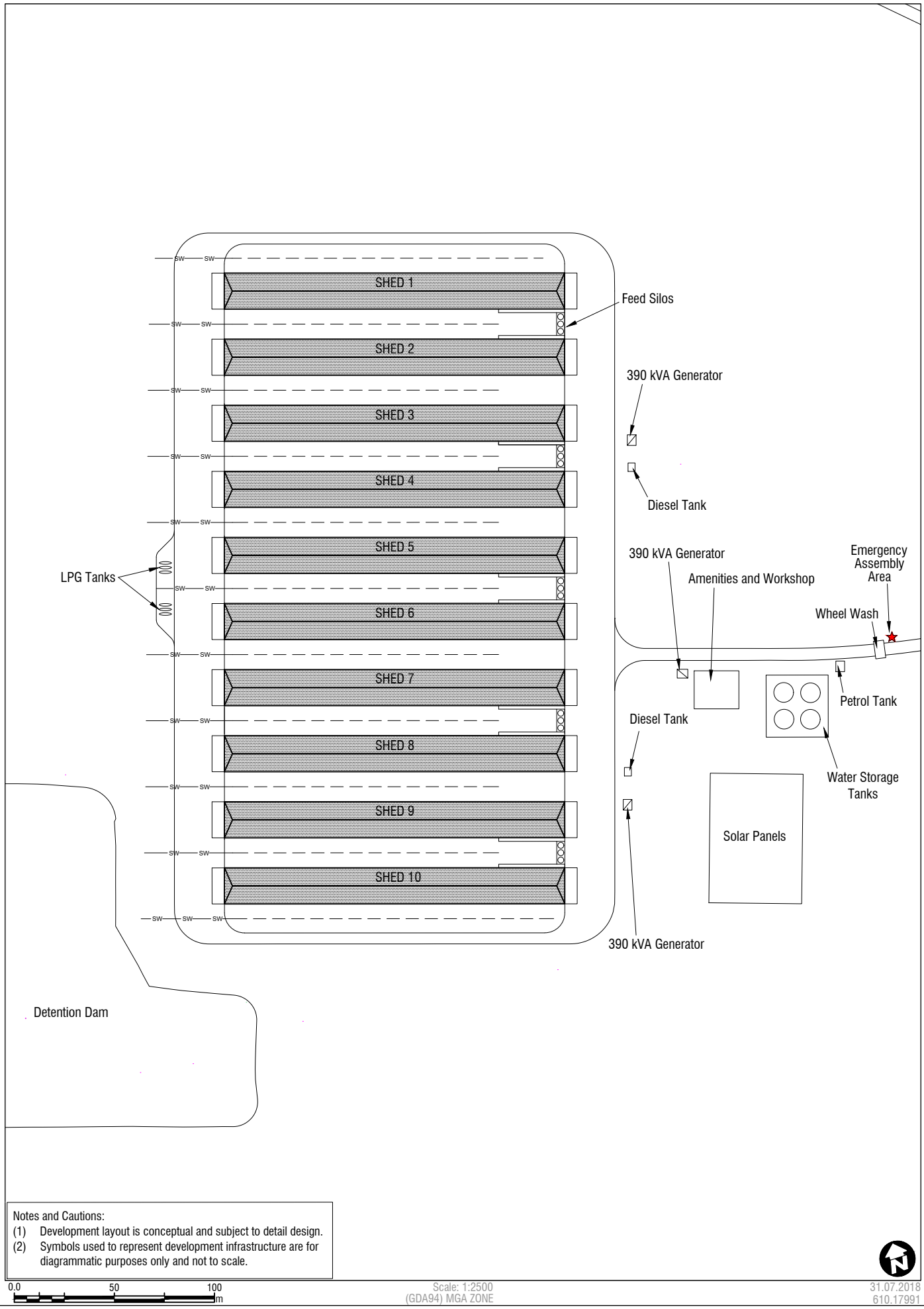
Farm 2 - Poultry Production Unit Layout



Notes and Cautions:
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(2) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

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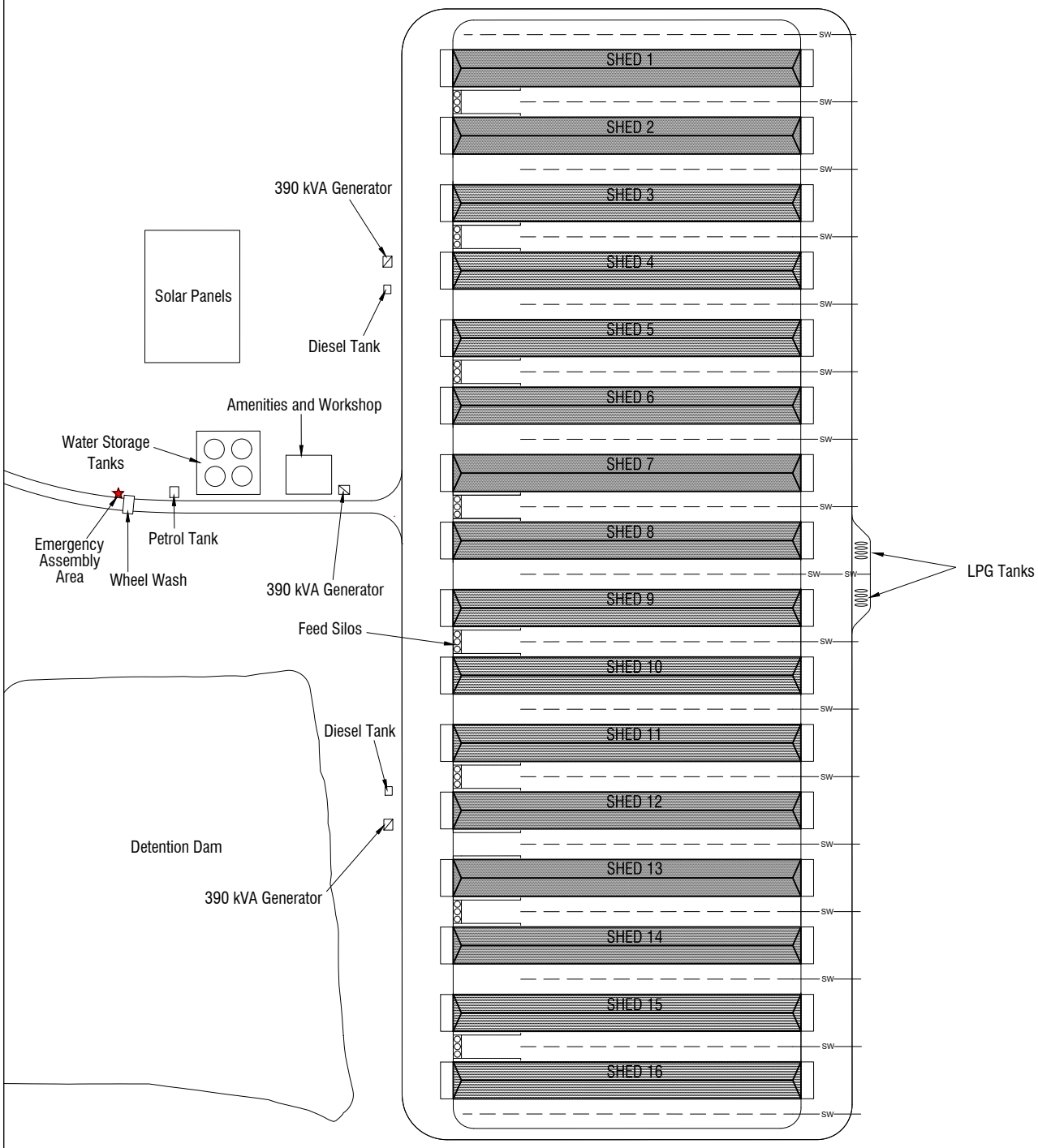
Farm 3 - Poultry Production Unit Layout



Notes and Cautions:

(1) Development layout is conceptual and subject to detail design.

(2) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

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Farm 4 - Poultry Production Unit Layout

Photo 5 shows one of the PPUs at ProTen's relatively new Narrandera Poultry Production Farm located in south western NSW, which is a very similar scale and layout to the PPUs proposed as part of the Development. Evident in this photo is the arrangement of the poultry sheds, feed silos, water supply tanks, LPG tanks, amenities building, ring road, surface detention dam and landscape plantings.

Photo 5 Broiler poultry production unit (ProTen's Narrandera Poultry Production Farm)

Some important, and possibly contentious, facts about modern poultry broiler production, which have been verified by the Australian Chicken Meat Federation, are:

Housing

Broiler birds are run within large poultry sheds on bedding material. They are not kept in cages.

Feed

Broiler feed comprises between 65 and 90% grains, such as wheat, sorghum, barley, oats, lupins, soybean meal, canola and other oilseed meal and grain legumes.

Hormones

Hormones are not added to chicken feed or administered to commercial meat chickens in Australia. Hormone supplementation is a practice that has been banned internationally for over 40 years.

Growth

Chickens are not genetically engineered or modified. Around 50 to 60% of the improvement in broiler growth rates over the last 50 years is due to improved breeds of chicken. A further 20 to 25% is due to improved nutrition, with feed being specifically formulated to match the chicken's precise nutritional requirements throughout its lifecycle, thereby optimising growth. Other gains made in meat chicken growth and performances are due to better husbandry techniques and health management.

Antibiotics

Antibiotic use is important in chicken meat production to ensure the overall health and wellbeing of the flock. Only antibiotics approved by Australia's regulatory authorities are used and they are administered in accordance with strict regulatory guidelines. Antibiotics are usually delivered via drinking water (not in feed) and only a veterinarian can authorise and supervise these treatments.

4.2 Subdivision – Boundary Adjustment

Given that the locations of the proposed Farms 2 and 3 are over current lot boundaries (see **Figure 12**), ProTen proposes to undertake a boundary adjustment between 11 of the lots within the Development Site in order to create four new lots (proposed Lots 2 to 5) that will enclose the four PPUs and associated farm manager's houses. The conceptual layout of the proposed boundary adjustment is illustrated on **Figure 17**. Please note that the dimensions and areas shown on **Figure 17** are approximate only and subject to final survey.

The boundary adjustment will involve:

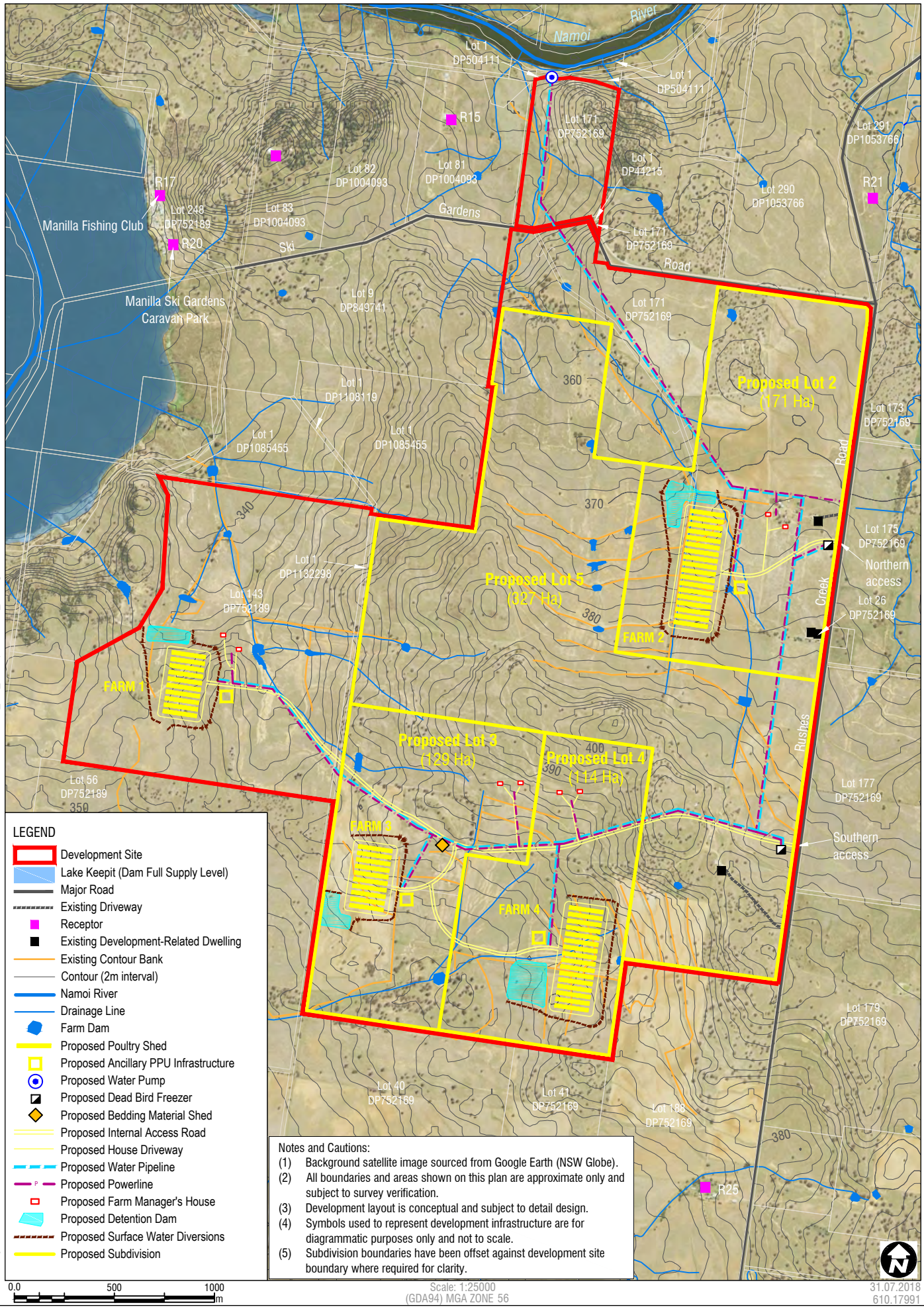
- Lot 1 DP 44215;
- Lot 1 DP 1108119;
- Lot 1 DP 1132298;
- Lots 85, 86, 101, 118, 165 and 166 DP 752169;
- Lot 1 DP 1132078; and
- Lot 1 DP 1141148.

While Lots 26 and 171 DP 752169 and Lot 43 DP 753189 are also within the Development Site, they are not part of the boundary adjustment. Nor is the unformed Council public road traversing through Lot 171 DP 752169.

Proposed Lot 2 will comprise approximately 171 ha and will enclose the proposed Farm 2 and the two proposed farm managers' houses. It will also enclose the existing dwelling, shedding and livestock pens currently located in Lot 165 DP 752169 (see **Section 2.4**). It will have frontage to Ski Gardens Road long its northern boundary and significant frontage to Rushes Creek Road along its eastern boundary. Access to the existing dwelling and improvements will continue to be via the existing driveway off Rushes Creek Road, while access to Farm 2 and the farm managers' houses will be via the proposed new northern access off Rushes Creek Road (see **Section 4.15.2**).

Proposed Lot 3 will comprise approximately 129 ha and will enclose the proposed Farm 3 and the two proposed farm managers' houses. Proposed Lot 4 will comprise approximately 114 ha and will enclose the proposed Farm 4 and the two proposed farm managers' houses. While neither of these lots will have formal road frontage, they will gain access from Rushes Creek Road via the proposed new southern access off Rushes Creek Road and internal access roads (see **Sections 4.15.2** and **4.15.3**). An appropriate easement(s) will be created over the southern access and internal access roads as either a Right of Way or Easement for Access.

Proposed Lot 5 will comprise approximately 327 ha and will enclose the existing dwelling, shedding and livestock pens currently located in Lot 166 DP 752169 (see **Section 2.4**). It will have significant frontage to Rushes Creek Road along its eastern boundary, with the existing dwelling continuing to use the existing driveway off Rushes Creek Road for access. The proposed new southern access to service Farms 1, 3 and 4 (see **Section 4.15.2**) will enter in to and traverse through proposed Lot 5. As advised above, an appropriate easement(s) will be created over the southern access and internal roads.



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Conceptual Subdivision Layout

FIGURE 17

The existing Lot 143 DP 752189, which will not be included in the boundary adjustment, will comprise the proposed Farm 1 and two proposed farm managers' houses. As is currently the situation, this lot does not have formal road frontage. It will gain access from Rushes Creek Road via the proposed new southern access off Rushes Creek Road and internal access roads through proposed Lots 3, 4 and 5, with an appropriate easement(s) created.

In addition to the easements for access, appropriate easements will be created over the water and electricity supply infrastructure traversing the Development Site to benefit each of the lots comprising the PPUs and associated farm managers' houses.

The configuration of the proposed subdivision appears to be in harmony with the surrounding area. The dimensions of the proposed lots are suitable in terms of the existing and proposed land use activities, and there is no evidence to suggest that their creation will have any impact on the locality.

It is noted that the minimum lot size for land zoned RU1 Primary Production under the Tamworth LEP is 400 ha. However clause 4.2D of the LEP permits a boundary adjustment in the RU1 zone that would result in lots under the minimum lot size if it does not increase the number of lots or increase the number of dwellings that may be erected on any of the lots. The proposed boundary adjustment will reduce the number of lots from the 11 existing lots to the four proposed lots and will not increase the number of dwellings able to the erected. The eight new houses proposed to accommodate the farm managers are ancillary and incidental to the poultry production farm operation and therefore permissible as part of the Development itself (not as a consequence of the boundary adjustment).

4.3 Construction

4.3.1 Overview

A construction program will be developed to cover the required civil, structural, electrical and building works. Construction will involve the erection of temporary buildings and facilities, including light and heavy vehicle access and parking areas, equipment storage compounds, diesel generators, diesel compressors, services and amenities. It is anticipated that the construction program will span approximately 16 months, with the four PPUs to be constructed consecutively in stages. There will be an initial lead time of approximately 4 months to complete site preparation works, early earthworks, construction of the two access driveways off Rushes Creek Road and internal access roads and installation of the water and electricity supply infrastructure. This will be followed by the construction and commissioning of 10 poultry sheds every 9 weeks. Construction activities will include:

- Site preparation, including erosion and sediment control, and earthworks;
- Construction of two new vehicular access driveways from Rushes Creek Road and internal access roads;
- Foundation and slab construction;
- Superstructure construction, including portal frames, roofing and cladding;
- Installation of associated plant and equipment, including feed silos and water tanks;
- Installation of the amenities facilities, workshops and other storage facilities;
- Construction of eight houses to accommodate the farm managers;
- Installation of servicing infrastructure, including water, electrical and LPG;
- Installation of the surface water management systems; and
- Site landscaping.

The preliminary civil design drawings (LRCE) in **Appendix K** illustrate the intended earthworks. Note that these drawings are preliminary and conceptual and will be progressed to detailed drawings following development consent.

4.3.2 Construction Employment

It is anticipated that between 50 and 60 people across various construction contracting companies will be engaged in the construction of the Development over all or part of the 16 month construction program.

Construction workers will be suitably inducted and trained. Training in relation to environmental responsibilities will take place initially through the site induction and then on an on-going basis through "toolbox talks" (or similar).

4.3.3 Construction Hours

All construction activities will be undertaken during standard daytime construction hours, which in accordance with the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change [DECC] 2009) are:

- Monday to Friday - 7:00 am to 6:00 pm;
- Saturday - 8:00 am to 1:00 pm; and
- No audible construction work on Sundays and public holidays.

4.3.4 Access and Traffic

Access to the Development Site for site preparation works will be via the existing access driveways from Rushes Creek Road (see **Section 2.4** and **Figure 2**), with the two new access driveways and internal access roads to be established at the commencement of construction. As shown on **Figure 12**, the two new vehicular access from Rushes Creek Road will be located approximately 1.2 km (northern access) and 2.7 km (southern access) south of Ski Gardens Road. Movements to and from Farms 1, 3 and 4 will occur via the southern access road, while movements to and from Farm 2 will occur via the northern access road. Refer to **Section 4.15.2** for further details.

The majority of construction traffic will travel between the Development Site and Tamworth via the Oxley Highway and Rushes Creek Road, with the potential for a small volume coming from Gunnedah way to the west via the Oxley Highway and/or from Manilla way to the northeast via Manilla Road. Site earthworks will require heavy earthmoving equipment to be brought on to the Development Site in the early stages of construction. Concrete will be batch-mixed on-site to reduce heavy traffic generation. Raw materials (for example, crushed rock, sand and cement), building materials and fit-out equipment will generally be delivered to the Site in rigid trucks and/or semi-trailers throughout the construction period.

Accurate information on required materials and the construction program will not be available until detailed design is completed following development consent. As such, it is not possible to accurately determine construction traffic volumes at this point in time. However, for the types of construction activities involved and the proposed duration of work, it is anticipated that only a low volume of traffic will be generated on a daily basis. This traffic is expected to comprise the odd truck delivering materials throughout the course of a typical day and a small number of light vehicles each day associated with construction workers. The light vehicle traffic will mostly be concentrated around the construction shift start and end times.

4.3.5 Erosion and Sediment Control

Appropriate erosion and sediment control measures will be installed in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004, also referred to as the "Blue Book") and *Erosion and Sediment Control on Unsealed Roads* (OEH 2012) to ensure no off-site impacts.

As shown on the preliminary civil design drawings in **Appendix K**, clean water diversions comprising a deflection bank and swale drain will be installed around the upstream sides of each of the four PPU sites to convey clean water run-off around the construction sites. They will be installed and stabilised prior to earthworks commencing at each PPU site. Given that these diversions will remain throughout the life of the Development (i.e. throughout the construction and operation phases), they will be designed to convey the runoff from the upstream catchment for rainfall events up to the 1% annual exceedance probability (AEP), 72-hour event.

4.3.6 Revegetation

Disturbed areas that will not be sealed or actively utilised for operational activities will be promptly rehabilitated to a stable landform and re-vegetated following completion of the construction/disturbance activities. Revegetation will generally be undertaken in accordance with the following steps:

1. Where possible, topsoil will be re-spread to a minimum depth of 100 mm in the reverse sequence to its removal so that the organic layer containing any seed or vegetation is returned to the surface. Re-spreading on the contour will aid runoff control and increase moisture retention for subsequent plant growth. The re-spread topsoil will be levelled to achieve an even surface (avoiding a compacted or an over-smooth finish) and tilled.
2. Re-vegetation will commence as soon as practicable, with a suitable pasture seed mix being spread over the disturbance area using a broadcast seeding method. For critical areas requiring quick re-vegetation or for areas where poor re-vegetation is identified, more intensive revegetation methods, such as hydromulching, may be considered.
3. Appropriate fertiliser will be applied during the seeding operation.

Table 8 contains a suitable pasture grass and legume mix for the Development Site.

Table 8 Suitable Grass and Legumes for Revegetation Purposes

Species	Rate (kilograms per hectare)	
	Spring/Summer	Autumn/Winter
Japanese Millet	20	5
Ryecorn/Oats	5	20
Couch Grass	10	8
Wimmera Ryegrass	5	10
White Clover	8	-
Lucerne	5	-
Sub Clover	-	8
Serradella	-	10
Consol	-	2

All legumes (clovers and lucerne) will be inoculated with rhizobia and lime pelleted to promote nodulation and facilitate subsequent nitrogen fixation.

4.3.7 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) will be developed for approval prior to the commencement of construction. It will specify the environmental management and mitigation measures to be implemented during construction in relation to:

- Surface water;
- Soils;
- Traffic;
- Biodiversity;
- Aboriginal heritage;
- Noise;
- Dust; and
- Waste.

The CEMP will also describe the activities to be undertaken on site during construction, outline construction staging and timing, nominate the roles and responsibilities for all relevant construction personnel and include procedures for complaints and incident management.

4.4 Disturbance Footprint

The combined disturbance footprint for the Development will amount to approximately 87.78 ha, which is equivalent to approximately 8.6% of the Development Site. This includes:

- The poultry sheds and all ancillary support/servicing infrastructure at each PPU, including the upstream clean water diversions and surface water management systems;
- The bedding material storage shed and two dead bird freezers;
- Internal access roads between Rushes Creek Road and the four PPUs;
- The eight houses and driveways to these houses from the internal access roads;
- The water supply infrastructure between the Namoi River and the four PPUs, including water pump and underground pipelines; and
- The overhead electricity servicing infrastructure throughout the Development Site.

The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement.

4.5 Best Practice Management and Bird Welfare

There is a major economic incentive for ProTen to maintain high standards of daily operation, management and bird welfare and the company has proven this commitment throughout its 16 year history within the Australian poultry industry. The Development will generally be constructed, operated and managed in accordance with current industry best practice standards, including the relevant requirements/recommendations in:

- *RSPCA Approved Farming Scheme Standards – Meat Chickens* (RSPCA Australia 2013) (RSPCA Standards); and
- *Best Practice Management for Meat Chicken Production in NSW* (Department of Primary Industries [DPI] 2012) (Best Practice Guidelines).

The Development will also comply with the relevant requirements/recommendations in the following documents:

- *National Animal Welfare Standards for the Chicken Meat Industry* (Australian Poultry Cooperate Research Centre [Australian Poultry CRC] 2008);
- *Model Code of Practice for the Welfare of Animals, Domestic Poultry* (Primary Industries Standing Committee 2002) (Model Code of Practice);
- *Model Code of Practice for the Welfare of Animals, Land Transport of Poultry* (Primary Industries Standing Committee 2006);
- *National Farm Biosecurity Manual for Chicken Growers* (Australian Chicken Meat Federation [ACMF] 2010); and
- *National Water Biosecurity Manual – Poultry Production* (Department of Agriculture, Fisheries and Forestry [DAFF] 2009).

Some of the key features of this commitment are outlined in the below sections detailing the operation and management of the Development.

4.6 Separation Distances

Separation distances are used to reduce the potential for adverse impacts upon the environment and surrounding receptors, including odour and biosecurity, and traditionally extend across adjoining properties that are not owned by the poultry farm operator. In terms of biosecurity, the Best Practice Guidelines (DPI 2012) recommends:

- Locating new poultry farms as far apart as possible to minimise the risk of disease transfer between farms. There should be a minimum of 1,000 m to other intensive poultry farms (500 m when there are extenuating circumstances such as farms with a common owner or farms supplying the same processor), 3,000 m to commercial duck farms and 5,000 m to poultry breeder farms; and
- Preferably locating new farms away from waterways and wetlands (ideally 3,000 m) that are used extensively by waterfowl, as these birds can carry avian diseases.

In relation to the last dot point, this is mostly impracticable when it comes to large scale poultry production farms given that they typically need to be located near a waterway for water supply purposes and establish large on-site detention dams for surface water management. However a range of biosecurity measures can be implemented when such separation distances are not possible and to discourage waterfowl and other birds within the vicinity of the poultry operation (refer **Section 4.23**).

Table 9 lists the minimum separation distances afforded between the Development and notable surrounding features in the natural and built environments. The distances are approximate only and have been measured as the shortest distance between the edge of the nearest individual PPU and the edge of the feature being measured to.

Table 9 Separation Distances

Feature	Approximate Minimum Separation Distance (m)	Comments
Urban / residential area	11,860	Somerton to the southeast of Farm 4
Surrounding privately-owned residence	1,025	Receptor R25 to the southeast of Farm 4
Property boundaries	125	Development Site boundary to the east of Farm 4
Recreational land use	2,000	Manilla Ski Gardens Caravan Park to the north of Farm 1
Public road	585	Rushes Creek Road to the east of Farm 2
Between poultry farms (within the Site)	870	Between Farms 3 and 4
Other poultry farm	Broiler farm – 11,015 Breeder farm - 8,210	Broiler farm – Brubri to the east-northeast of Farm 2 Breeder farm - Glenara Park to the north-northwest of Farm 1
Natural waterways (creek, river)	2,260	Namoi River to the north-northwest of Farm 2
Other notable water features	790	Lake Keepit (full supply level) to the northwest of Farm 1

The proposed PPUs are located over 1 km from the nearest privately-owned residences, over 8 km from the any other poultry operation and are well removed from notable water features. These separation distances, along with the engineering design features, biosecurity commitments, best management practices and mitigation measures to be implemented, will assist in minimising the potential for impact upon the local environment and surrounding populace over the life of the operation.

While alternative PPU sites within the Development Site were considered by ProTen, as outlined in **Section 3**, the proposed layout is considered optimal in terms of minimising the potential for adverse odour impacts on surrounding receptors, minimising impact on areas of vegetation considered to have a high or very high significance and maximising the distance between the PPUs.

4.7 Operational Employment

At full capacity the Development will directly employ 20 staff members, comprising:

- Four full-time farm managers (live on-site);
- Four full-time assistant farm managers (live on-site); and
- Twelve full-time equivalent farm hands.

There will also be several contract companies involved in the operation, including for bird catching, equipment maintenance, litter removal and shed wash down.

The design, construction and operation of the Development will comply with all relevant workplace health and safety requirements. ProTen understands that it has “duty of care” obligations to its employees and contractors under the *Work Health and Safety Act 2011* (and associated Regulation).

Employees and contractors will be suitably inducted and trained. Training in relation to environmental responsibilities will take place initially through the site induction and then on an on-going basis through toolbox talks (or similar).

4.8 Operational Hours

While the Development will operate 24 hours a day, seven days a week, the majority of activity will be carried out between 7:00 am and 7:00 pm. As the birds reached their desired processing (slaughter) weight they will be removed from the sheds and transported from Site any time between 7:00 pm and 4:00 pm.

There will typically be one daily shift for farm workers commencing at 7:00 am and finishing at 4:00 pm.

4.9 Production Cycle

The cycle of each PPU will typically last approximately 65 days, with a maximum bird occupation of 55 days and a "down-time" of around 10 days for cleaning and sanitisation in preparation for the next batch of birds. There will be approximately 5.6 production cycles per year, with each cycle typically comprising the following steps:

1. **Delivery of Bedding Material** - clean and fresh bedding material, such as rice hulls, soft wood shavings or chopped straw, will be delivered to the PPU from a local area supplier and spread over the floor of the poultry sheds. Excess material will be stored within an enclosed on-site bedding material storage shed (see **Section 4.12** and **Figure 12**) as supplementary material for use during the production cycle (for example, to replace material found with excess moisture).

2. **Delivery of Chicks** - day-old chicks will be transported from Baiada's Country Road Hatchery located on the western outskirts of Tamworth (see **Figure 1**) to the PPU in ventilated chick boxes in specially designed air-conditioned and insulated rigid trucks. On arrival, the day-old chicks will be placed on to the floor of the poultry sheds, where they will initially be confined to a smaller area (the "brooding area") and given supplementary heating from gas heaters.

3. **Chick Nurturing** - chicks will be nurtured and grown within the poultry sheds, with their period of service depending on the live-weight of the birds and market demand. The desired processing age will primarily be determined by customer weight specifications, however is normally achieved between 5 and 8 weeks of age.

4. **Removal of Birds** - removal of the birds (picks-ups or shed thinning) will be governed by customer weight specifications and maintaining a maximum stocking density of 34 kilograms per square metre (kg/m^2). It will typically occur on three occasions, these being at around day 32, day 38 and day 44 of the production cycle, with the last birds collected on day 55. The birds will be harvested and transported from the Development Site any time between 7:00 pm and 4:00 pm to Baiada's Out Street Poultry Processing Plant in West Tamworth (see **Figure 1**) in plastic crates designed for good ventilation and bird welfare.

   Baiada has approval to establish a new poultry processing plant at the Oakburn location (see **Figure 1**), which would subsequently result in the closure of the existing Out Street facility. While there is currently no timeframe for this development, the potential for the birds to the transported from the Development to the proposed new processing plant at Oakburn in the future has been considered in this EIS (specifically the traffic implications).

5. **Removal of Poultry Litter** - when all birds have been removed from the poultry sheds after about 8 weeks, the spent bedding material (poultry litter) will be promptly removed from the sheds and transported off site for beneficial re-use or disposal (see **Section 4.18**).

6. **Cleanout** – the poultry sheds will be cleaned and sanitised to reduce the risk of pathogens and disease using high pressure water in preparation for the next batch of chicks. Additional activities will include scrubbing feed pans, cleaning out water lines, cleaning the feed silos and scrubbing fan blades and other equipment.

The average mortality rates for broiler poultry housed within tunnel-ventilated sheds are:

- Week 1 of production cycle (1 to 7 days of age) - 1% of population; and
- Weeks 2 to 8 of production cycle (7 to 56 days of age) - 0.6% of population per week.

The poultry sheds will be inspected on a daily basis and any dead birds collected and moved to one of the on-site dead bird freezers (see **Section 4.13**) for short-term storage prior to being collected and transport off site to Baiada's Oakburn Rendering Plant (see **Figure 1**).

4.10 Poultry Sheds

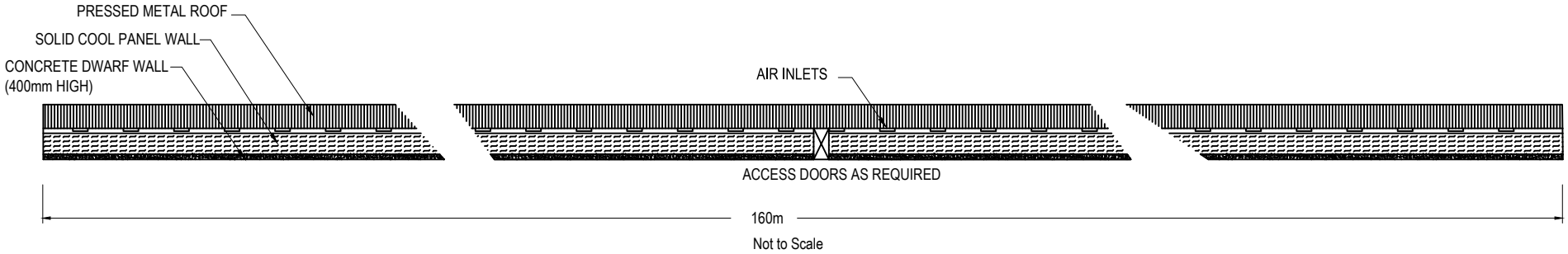
4.10.1 Overview

The Development will comprise a total of 54 poultry sheds divided between the four PPUs as follows:

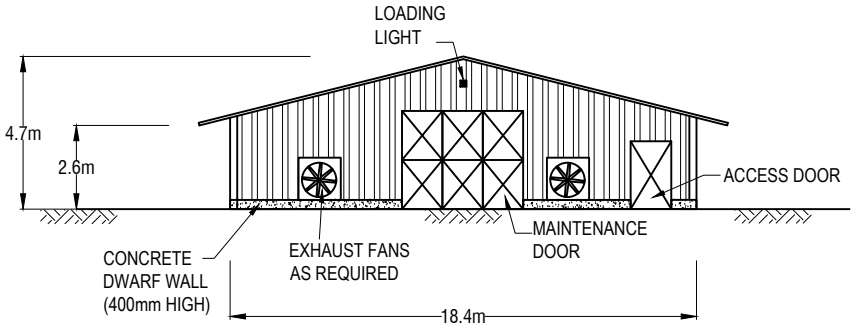
- Farm 1 – 10 sheds;
- Farm 2 – 18 sheds;
- Farm 3 – 10 sheds; and
- Farm 4 – 16 sheds.

Figure 18 illustrates the conceptual poultry shed design, with detailed design drawings (R&DG Sanday) provided in **Appendix L**.

Photo 6 Poultry broiler sheds (ProTen's Narrandera Poultry Production Farm)

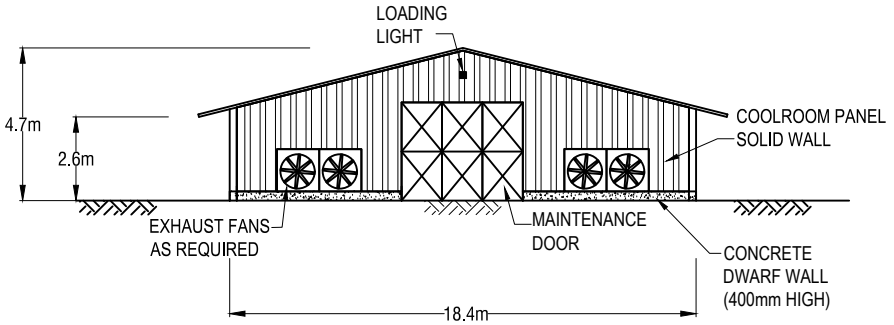


SIDE ELEVATION



FRONT ELEVATION

Not to Scale



BACK ELEVATION

Not to Scale

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Conceptual Poutry Shed Design

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FIGURE 18

Each poultry shed will measure approximately 160 m long by 18 m wide, providing an area of approximately 2,880 square metres (m^2). They will have a wall height of approximately 2.6 m to under the eaves and will measure approximately 4.7 m to the ridge of the roof. Each shed will have fully-sealed concrete flooring and will be surrounded by a dwarf concrete bund wall 400 mm high to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds.

The poultry sheds will be separated laterally within each PPU by a distance of approximately 15 m. Construction will comprise a concrete slab, steel framework, non-reflective colourbond wall cladding in a eucalyptus green (or similar) colour and non-reflective colourbond or zincalume roofing. The walls will be 50 mm sandwich panel insulated with high thermal performing expanded polystyrene with fire-retardant.

4.10.2 Bird Numbers, Placement and Stocking Density

Each of the 54 poultry sheds will have the capacity to house 56,500 birds, providing a total site population of 3,051,000 birds. The birds will be split between the four PPUs as follows:

- Farm 1 – 10 sheds – 565,000 birds;
- Farm 2 – 18 sheds – 1,017,000 birds;
- Farm 3 – 10 sheds – 565,000 birds; and
- Farm 4 – 16 sheds – 904,000 birds.

The maximum number of birds that can be placed on any given day is 636,000 (±6%), which is equal to a maximum of 12 sheds per day.

The Development will comply with the RSPCA Standards (2013) specification of 34 kg/m^2 for poultry stocking density within mechanically ventilated sheds. This is significantly less than that traditionally adopted by the industry of 40 kg/m^2 under the *National Animal Welfare Standards for the Chicken Meat Industry* (Australian Poultry CRC 2008).

The birds will be inspected on a daily basis for health, injury, distress, feed and water.

4.10.3 Bedding Material

A minimum average depth of 50 mm of clean and fresh floor bedding material, such as rice hulls, soft wood shavings or chopped straw, will be spread over the floor of the sheds prior to the placement of day old chicks. The bedding material will be delivered to the Development Site from a local area supplier, with excess material stored within an enclosed on-site bedding material storage shed (see **Section 4.12**).

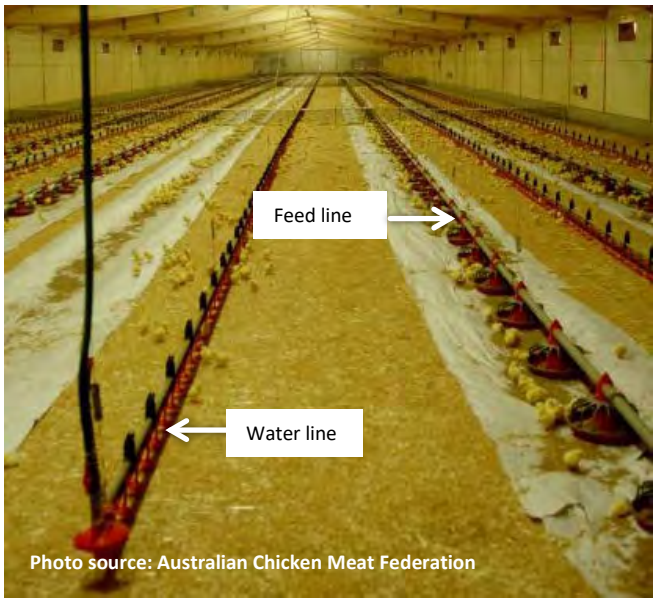
Moisture levels within poultry sheds can potentially be a significant source of odour. On this basis, the bedding material will be inspected daily in order to identify any areas with excess moisture (for example, under a leaking water line) so it can be removed and replaced with the spare material in the on-site storage shed.

At the end of each production cycle, the spent bedding material (poultry litter) will be promptly removed from the sheds and transported off site in covered trucks for beneficial re-use or disposal (see **Section 4.18**). When possible, the handling of poultry litter will be avoided during adverse climatic conditions (such as strong winds). The shed ventilation systems will not be used during the removal of poultry litter.

4.10.4 Feed and Water Lines

Feed and water lines will run the length of each poultry shed and will be automatically supplied by external feed silos and water storage tanks (see **Sections 4.14.2** and **4.14.3**, respectively). Feed pans will be spaced at regular intervals so that the birds are never more than a few metres from feed and there will be a maximum of around 70 birds per feed pan at maximum density in compliance with the Model Code of Practice (Primary Industries Standing Committee 2002). Similarly, nipple drinkers, with drip cups, will be spaced at regular intervals so that the birds are never more than a few metres from water and there will be a maximum of around 12 birds per nipple drinker at maximum density in compliance with the Model Code of Practice (Primary Industries Standing Committee 2002).

Photo 7 Interior of typical broiler shed



4.10.5 Lighting

Internal Shed Lighting

Uniform lighting will be provided within the poultry sheds to enable the birds to see the feed pans and water drinkers, with dark periods provided each day to allow the birds to rest. Reduced light has been found to minimise livestock stress and, as such, low lux internal lighting will be provided to promote calm. Control of light intensities will be via dimmer controls.

External Shed Lighting

The primary source of external lighting will comprise one light fixture mounted at a height of approximately 4 m over the front and rear loading-unloading areas of each poultry shed. The light fixtures will be aimed downwards and only used when necessary during times of low light and/or heavy fog.

4.10.6 Ventilation

The sheds will be fully-enclosed climate-controlled and tunnel-ventilated. Each shed will have up to 24 tunnel ventilation fans installed, with four of these fans along the length of the sheds operating early in the production cycle when the birds are young and the remaining 20 fans installed on one end for tunnel ventilation. Later in the production cycle the four side-wall fans will switch off and tunnel ventilation will begin. At this point the ventilation fans will operate to draw air in along the sides of the shed through mini-vents and/or cooling pads and over the birds. The fans operate automatically as required with more fans operating during warm weather and later in the production cycle when the birds require more cooling.

Temperature sensors within the sheds will allow the ventilation to be adjusted as required. Heating, which is anticipated to be required for up to 21 days of each production cycle, will be provided by wall mounted gas heaters.

Tunnel ventilation will enable ProTen to provide close to optimum conditions for bird health, comfort, growth and performance throughout the year. Additional benefits include better control over shed moisture levels, which is directly related to odour production, and reduced consumption of power and water.

The tunnel ventilation systems will be fully computer controlled and alarm monitored, with back-up power available via emergency standby generators (see **Section 4.14.6**).

Photo 8 Tunnel ventilation fans (ProTen's Narrandera Poultry Production Farm)

Photo 9 Side-wall fans (closed) and mini-vents (ProTen's Narrandera Poultry Production Farm)

Photo 10 Side-wall cooling pad (ProTen's Narrandera Poultry Production Farm)

4.11 Farm Managers' Houses

The scale and 24-hour nature of the operation will necessitate one farm manager and one assistant farm manager to live on-site near each PPU (i.e. eight farm managers residing within the Development Site). On this basis, the Development includes the construction of eight houses within the Development Site. This is an industry standard and necessary to ensure continual bird health and welfare. These houses are considered ancillary and subsidiary to the Development, in that they will provide necessary support to the poultry production operation.

The proposed locations for these houses, which are shown on **Figure 12**, have been carefully positioned near each PPU in areas that avoid disturbance of significant vegetation and identified Aboriginal heritage sites.

Each house will be a "manufactured home" delivered to the Development Site for installation on engineered pre-cast blocks, with timber or steel framing, timber panel walls and colourbond steel roofing. As evident on the design plans (Austwide Homes) in **Appendix L**, each house will measure approximately 18.5 m long by 11.2 m wide, with an internal floor area of approximately 165.8 m^2, and will comprise four bedrooms and two bathrooms. The design and construction will be compliant with the Building Code of Australia (BCA).

Additional information includes:

- Vehicular access to each house will be via relatively short driveways from the proposed internal access roads (see **Section 4.15.4**);
- Overhead electricity supply infrastructure will be extended to service the houses (see **Section 4.16.2**);
- Potable water supply will be via rainwater collection (tanks) from the house roofs (see **Section 4.16.4**); and
- Sewage will be treated and disposed of via an on-site aerated wastewater treatment system (AWTS) installed at each house (see Section **4.16.7**).

4.12 Bedding Material Storage Shed

A large enclosed bedding material storage shed will be constructed adjacent to the southern access road near Farm 3, as shown on **Figure 12**. As evident from the design drawings (Fairdinkum Sheds) in **Appendix L**, the shed will measure approximately 60 m long by 17 m wide, with a small area of hard stand around the shed, and will stand approximately 5.2 m to under the eaves and 7.5 m to the roof peak. Construction will comprise a concrete slab, steel framework, monoclad wall cladding in a non-reflective eucalyptus green (or similar) colour and monoclad roofing. The shed will be surrounded by a dwarf concrete bund wall measuring around 1 m high to improve stability.

4.13 Dead Bird Freezers

The poultry sheds will be inspected on a daily basis and any dead birds collected and moved to one of two dead bird freezers for short-term storage prior to being collected and transport off site to Baiada's Oakburn Rendering Plant. As shown on **Figure 12**, the freezers will be positioned approximately 100 m back from Rushes Creek Road adjacent to the northern and southern access roads. This will enable the dead birds to be collected and transported off site without going near the livestock as a biosecurity measure.

The dead bird freezers will be lockable refrigerated shipping containers measuring approximately 25 m^2 (including some surrounding hard stand area) A colourbond style fence in a eucalyptus green (or similar) colour measuring approximately 1.8 m will be installed, along with landscape plantings, to screen the freezers from the view of Rushes Creek Road and nearby residences.

4.14 Ancillary PPU Infrastructure

Each PPU will include various items of ancillary infrastructure (in addition to the poultry sheds) to support the poultry production operation. The below sub-sections describe these infrastructure items and **Figures 13** to **16** show their approximate locations at the PPUs.

4.14.1 Staff Amenities and Workshop

A staff amenities and workshop building will be installed at each PPU and will comprise:

- Office space;
- Change rooms and toilets;
- Quarantine areas;
- Large workshop area;
- A vented chemical store room; and
- A pump room.

As evident from the design drawings (Griffith Sheds & Garages) in **Appendix L**, it will measure approximately 20 m long by 17 m wide and include a covered verandah measuring 2 m wide off the office and staff amenities side of the building. Construction will comprise a concrete slab, steel framework and non-reflective colourbond wall cladding (or similar) in a eucalyptus green (or similar) colour and non-reflective colourbond roofing (or similar).

Additional information includes:

- Overhead electricity supply infrastructure will be extended to service the staff amenities and workshop building (see **Section 4.16.2**);

- Potable water supply will be via rainwater collection (tanks) from the building roofs (see **Section 4.16.4**);
- Sewage will be treated and disposed of via an on-site AWTS installed at each PPU (see **Section 4.16.7**); and
- Car parking will be provided adjacent to the amenities facility for employees and visitors.

4.14.2 Feed Silos

Three steel feed silos, each with a storage capacity of 47 cubic metres (m^3), will be installed between every two sheds within the PPUs. The total number of silos at each PPU will be:

- Farm 1 – 15 silos, with a combined storage capacity of 705 m^3;
- Farm 2 – 27 silos, with a combined storage capacity of 1,269 m^3;
- Farm 3 – 15 silos, with a combined storage capacity of 705 m^3; and
- Farm 4 – 24 silos, with a combined storage capacity of 1,128 m^3.

As evident from the design drawing (Enmach Industries) in **Appendix L**, the each silo will have a bin diameter of approximately 3.2 m and will stand approximately 8.7 m high (including legs).

Photo 11 Feed silos (ProTen's Narrandera Poultry Production Farm)

4.14.3 Water Storage Tanks

Four zincalume water storage tanks, each with a storage capacity of 375 kilolitres (kL), will be installed at each PPU. The combined storage capacity at each PPU of 1,500 kL will be enough to service the PPU (including shed ventilation systems and bird consumption) for two days as a contingency if the water supply infrastructure requires maintenance or repair. As evident from the design drawing (Heritage Water Tanks) in **Appendix L**, each tank will have a diameter of approximately 11.8 m and will stand approximately 3.45 m high.

The tanks will be automatically filled from pressurised lines to remain near capacity at all times. Low level alarms will be fitted to the tanks at approximately two-thirds full capacity and will alarm if the water level drops below this point. The water tanks at each PPU will be interconnected and, therefore, able to provide additional water to each other if necessary.

This water supply will also be available for firefighting purposes.

Photo 12 Water storage tanks (ProTen's Narrandera Poultry Production Farm)

4.14.4 Gas Tanks

Aboveground bulk LPG tanks will be installed at each PPU to provide the following storage volumes:

- Farm 1 – 38,250 litres (L) (45,000 L water capacity);
- Farm 2 – 57,375 L (67,500 L water capacity);
- Farm 3 – 38,250 L (45,000 L water capacity); and
- Farm 4 – 51,000 L (60,000 L water capacity).

These volumes will either be stored at each PPU in multiple 7,500 L bulk tanks (water capacity) or two to three larger sized tanks in compliance with the *AS/NZS 1596:2014 The Storage and Handling of LP Gas*, including required separation distances. ProTen is working with the LPG supplier, Elgas, in relation to the storage design. The typical specifications and requirements for the 7,500 L LPG tanks, as provided by Elgas, are contained in **Appendix L**.

Photo 13 Bulk LPG tanks (ProTen's Narrandera Poultry Production Farm)

4.14.5 Fuel Storage Tanks

Diesel will be stored at each PPU in two 2,000 L aboveground bunded tanks, and petrol will be stored at each PPU in a 700 L aboveground bunded tank. The minimum bund volumes will be 110% of the respective tank capacity.

The diesel, petrol and LPG storages will be separated from each other and separated from the chemical store in the amenities and workshop building.

4.14.6 Generators

Emergency standby diesel generators will be installed for the rare occasion when power from the electricity grid is lost. Based on experience at their other poultry production farms around Australia, ProTen anticipates that the generators will only be required between one and a maximum of five days per year. They will be tested as per the manufacturer's recommendations.

There will be three generators at each PPU, each with a maximum standby rating of 390 kilovolt-amps (kVA), positioned near the amenities facility. The generators will be contained within lockable acoustic enclosures with vertical air discharge and will meet the relevant emission standards in Schedule 4 of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (Clean Air Regulation).

The specifications and general arrangement drawings for the 390 kVA generators are contained in **Appendix L**.

4.14.7 Solar Panels

Solar panels will be installed at each PPU to generate clean renewable energy to power the PPUs and reduce dependency on reticulated electricity. The panels will produce energy during the day and any surplus energy will be able to be fed into the electricity grid. Note that the proposed panels are solely to power the PPUs, they are not "solar farms".

The solar panels at each PPU will cover an area of approximately 0.25 ha, which will provide a capacity of around 0.25 megawatts (MW). The panels will sit approximately 3.5 m above ground level. There will be no mirrors or lenses used and they will have anti-reflective treatment.

ProTen is working with Smart Commercial Solar in relation to the design, supply and installation of the solar panels branded Trina Solar, and also with Essential Energy in relation to connection in to the electricity grid. **Appendix L** contains a specification brochure and non-reflective declaration documentation for the proposed Trina Solar panels. Design and installation will comply with the International Commission on Non-Ionizing Radiation Protection's (ICNIRP) *ICNIRP Guidelines for Limited Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields* (1998).

Photo 14 Solar panels (ProTen's Narrandera Poultry Production Farm)

4.14.8 Ring Roads

A one-way circulation road (ring road) will be established around the perimeter of each PPU to enable traffic to enter, exit and manoeuvre around the PPU for loading-unloading and servicing activities in a forward direction to minimise the potential for traffic conflict and unnecessary noise (for example, reversing beepers). These roads will be constructed as all-weather rural-type roads to meet the minimum requirements of *AS 2890.2 Part 2: Off-street commercial vehicle facilities* (AS 2890.2 Part 2) and to accommodate the turning movements of B-doubles (i.e. the largest vehicle type servicing the Development).

The preliminary civil design drawings in **Appendix K** provide typical cross-sections for the ring roads.

4.14.9 Vehicle Wheel Wash

The potential for mechanical transmission of disease pathogens will be reduced through the installation of a wheel wash facility on the access road near the entrance to each PPU. All vehicles entering a PPU will be required to pass through the wheel wash to remove dust particles from the wheels and chassis.

The relatively small water volume requirement for the wheel wash will be provided from the water storage tanks at the respective PPU. An appropriate chemical sanitiser (for example, Microgard 755N or Micro-4, which are commonly used on poultry farms) will be added to the wash water and sensors will trigger automatic operation as a vehicle drives over the facility.

4.14.10 Surface Water Management System

An engineered surface water management system will be installed at each PPU to provide long-term structural controls to mitigate the impact of surface water runoff throughout the life of the Development. These systems are described in **Section 4.17** and shown on the preliminary civil design drawings in **Appendix K**. In summary, each system will comprise upstream diversions, grassed swale drains between the poultry sheds to capture wash down water and rainfall runoff, a perimeter table drain and a large detention dam. There will also be stormwater pipes to convey water under roads.

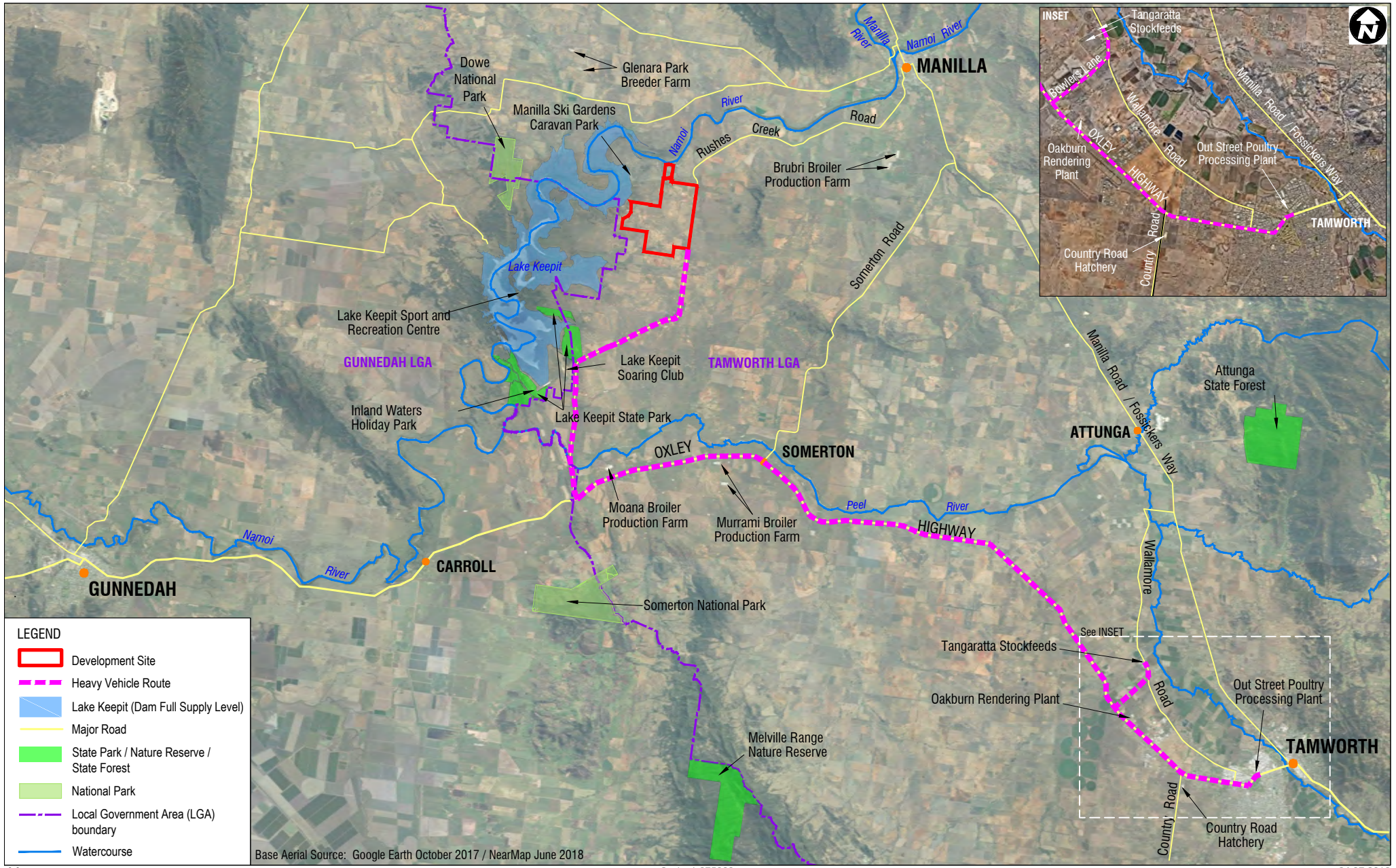
4.14.11 Aerated Wastewater Treatment System

Sewage generated by the staff amenities at each PPU will be appropriately treated and disposed of via on-site AWTSs installed and operated in accordance with the manufacturer's specifications and Council approval requirements. Each system will have a treatment capacity of 10 equivalent persons at 200 litres per person per day (L/p/d), with treated effluent released over an area of approximately 200 m^2 via sub-surface irrigation.

4.15 Access and Traffic

4.15.1 Transport Route

The vast majority of heavy vehicles will travel between the Development Site and the poultry industry service facilities located in West Tamworth and on the western outskirts of Tamworth, including the Country Road Hatchery, Tangaratta Stockfeeds, Out Street Poultry Processing Plant and Oakburn Rendering Plant, via the Oxley Highway. It is expected that the majority of light vehicles will also travel between the Development Site and Tamworth via the Oxley Highway. As shown on **Figure 19**, these vehicles will turn right in to Rushes Creek Road from the Oxley Highway and left out. Both of these roads are approved "general mass limit" (GML) 25 m B-double routes.



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Heavy Vehicle Route

FIGURE 19

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It is noted that Rushes Creek Road can become inundated during major flooding events at its southern end where it crosses the Peel River via an overbridge (approximately 1.8 km to the north of its intersection with the Oxley Highway) and northeast of the Development Site where it crosses a tributary of the Namoi River (approximately 1.4 km west of its intersection with Sherwood Road). However, anecdotal evidence suggests that the road is only ever blocked for a maximum of 24 hours and it is very infrequent (only during major flooding events). On this basis, consideration of alternative access routes is not necessary, with ProTen able to adjust operations and, if necessary, delay vehicle servicing activities over the very short period that the road is inundated.

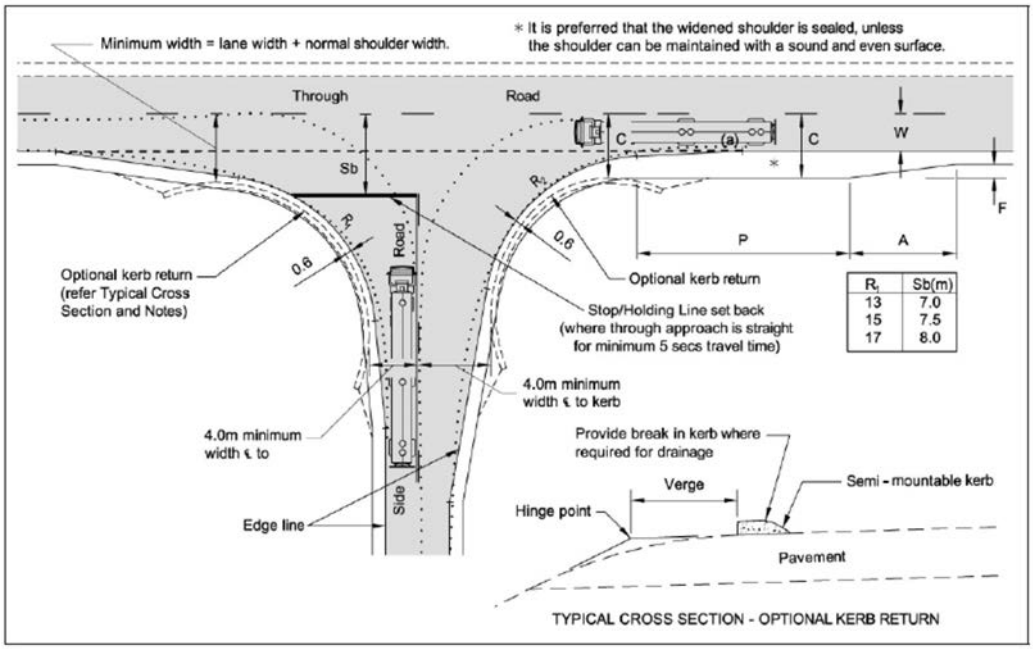
There are no upgrades to the Oxley Highway or Rushes Creek Road or their intersection proposed or necessary (see **Section 8.3**).

4.15.2 Site Access Driveways

Vehicular access in to the Development Site is proposed via the construction of two new access driveways from Rushes Creek Road located approximately 1.2 km (northern access) and 2.7 km (southern access) south of Ski Gardens Road, as shown on **Figure 12**. These driveways have been positioned approximately 1.5 km apart on straight and level sections of Rushes Creek Road. Movements to and from Farms 1, 3 and 4 will occur via the southern access road, while movements to and from Farm 2 will occur via the northern access road.

The two new access driveways from Rushes Creek Road will be constructed to accommodate a "basic left turn" (BAL) treatment in accordance with the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads 2017) (AGRD Part 4A), as shown on **Figure 20**. This will provide additional shoulder width for Development traffic turning left into the access driveways to decelerate clear of through traffic on Rushes Creek Road. Directional signage will be installed on Rushes Creek Road to assist approaching traffic identify the access points, and access control (Give Way) signage and line-marking will be provided to control vehicles exiting the Development Site.

Figure 20 BAL Treatment for Rushes Creek Road Access Driveways



4.15.3 Internal Access Roads

The alignments of the internal access roads between Rushes Creek Road and the four PPUs are shown on **Figure 12**. These roads will be approximately 6 m wide (maximum total disturbance width of approximately 14 m, including batters and drainage) and will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road. The remaining lengths will be constructed as all-weather rural-type roads to meet the minimum requirements of AS 2890.2 Part 2 and to accommodate the turning movements of B-doubles (i.e. the largest vehicle type servicing the Development).

The ring roads around the perimeter of each PPU are described in **Section 4.14.8**.

The preliminary civil design drawings in **Appendix K** provide typical road cross-sections for the internal access roads and PPU ring roads.

4.15.4 House Driveways

The two houses proposed to be constructed at each PPU to accommodate the farm managers will gain access from the internal access roads via a shared driveway, as shown on **Figure 12**. These roads will be a maximum of 4 m wide and will be constructed as all-weather rural-type driveways.

The preliminary civil design drawings in **Appendix K** provide a typical cross-section for these driveways.

4.15.5 Traffic Generation

As advised in **Section 4.15.1**, the vast majority of heavy vehicles and also light vehicles will travel between the Development Site and Tamworth via the Oxley Highway. The primary operational activities that will generate traffic are:

- Delivery of the shed floor bedding material in rigid trucks from various locations;
- Delivery of day-old chicks from Baiada's Country Road Hatchery located on the western outskirts of Tamworth on Country Road (see **Figure 19**) in insulted pantechnicon trucks;
- Delivery of feed from Baiada's Tangaratta Stockfeeds (feedmill) located to the northwest of Tamworth on Wallamore Road (see **Figure 19**) in semi-trailers and B-doubles;
- Delivery of bulk LPG from Tamworth in rigid trucks;
- Removal of birds to Baiada's Out Street Processing Plant in West Tamworth (see **Figure 19**) in semi-trailers and B-doubles (sometime in the future [yet to be determined] birds will be removed to a new processing plant to be constructed at Baiada's Oakburn location to the west of Tamworth on the Oxley Highway);
- Removal of poultry litter in semi-trailers and B-doubles to various locations;
- Removal of dead birds to Baiada's Oakburn Rendering Plant located on the western outskirts of Tamworth on the Oxley Highway (see **Figure 19**) in rigid trucks;
- Removal of general waste materials in rigid trucks to disposal facilities in the Tamworth area; and
- Staff visits by cars (noting the eight farm managers will live on-site).

Table 10 lists the anticipated traffic volumes to be generated by the Development over a typical 65 day (9.3 week) production cycle and over a typical year comprising 5.6 production cycles. As evident, the Development is expected to generate approximately 8,455 heavy vehicle visits (16,910 two-way movements) and 4,597 light vehicle visits (9,194 two-way movements) annually.

Table 10 Estimated Traffic Volumes

Activity	Vehicle Type	Vehicles (Two Way Vehicle Trips)	
		Production Cycle (approx. 65 days)	Annual
Heavy Vehicles			
Delivery of shed bedding material	Twin axle rigid truck	84 (168)	470 (940)
Delivery of chicks	Twin axle rigid truck	35 (70)	196 (392)
Delivery of feed	Semi-trailer and B-double	558 (1,116)	3,125 (6,250)
Delivery of fuel	Rigid tanker	2 (4)	11 (22)
Delivery of gas	Rigid tanker	10 (20)	56 (112)
Removal of birds	Semi-trailer and B-double	576 (1,152)	3,226 (6,452)
Removal of birds – catching equipment transporter	Semi-trailer	6 (12)	34 (68)
Removal of birds – catching staff	Bus	39 (78)	218 (436)
Removal of poultry litter	Semi-trailer and B-double	137 (274)	767 (1,534)
Shed wash down equipment transporter	Semi-trailer	2 (4)	11 (22)
Removal of dead birds	Twin axle rigid truck	59 (118)	330 (660)
Removal of general waste materials	Rigid truck	2 (4)	11 (22)
	Heavy Vehicle Sub-Total	**1,510 (3,020)**	**8,455 (16,910)**
Light Vehicles			
Staff Visits (ProTen and Baiada)	Car	749 (1,498)	4,194 (8,388)
Tradesman	Ute / Van	9 (18)	50 (100)
Catching equipment maintenance	Van	17 (34)	95 (190)
Shed litter material removal contractors	Car	18 (36)	101 (202)
Shed wash down contractors	Car	28 (56)	157 (314)
	Light Vehicle Sub-Total	**821 (1,642)**	**4,597 (9,194)**
	TOTAL	**2,331 (4,662)**	**13,052 (26,104)**

The following points should be noted in terms of the volume of traffic to be generated:

- Approximately 35% of the total traffic generated will be light vehicles (car/ute/van);
- With the exception of live bird removal, which will occur any time between 7:00 pm and 4:00 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 (with the eight farm managers residing on-site); and
- There will be on average approximately 23 heavy vehicles and 13 light vehicles travelling to and from the Development daily.

4.15.6 Parking

Car parking for employees and visitors will be provided adjacent to the amenities facility at each PPU.

While there will not generally be any heavy vehicle parking requirements, particularly for any length of time, adequate area will be available at each PPU and along the internal access roads to ensure that any heavy vehicle parking requirements can be met within the Development Site. There will be no queuing or parking on adjoining Rushes Creek Road.

4.16 Servicing

4.16.1 Solar Power

As outlined in **Section 4.14.7**, solar panels with a combined capacity of around 0.25 MW will be installed at each PPU to generate clean renewable energy and reduce dependency on reticulated electricity. The panels will produce energy during the day and any surplus energy will be able to be fed into the electricity grid.

4.16.2 Electricity

While the PPUs will be serviced by power generated by the solar panels (see above), the Development will use reticulated electricity to service any short-falls at each PPU, along with the farm managers' houses, dead bird freezers and water pump. ProTen is working with Energy Serve in relation to the design of the internal electricity supply infrastructure and has also been in contact with Essential Energy in relation to connection to the external reticulated electricity supply network along Rushes Creek Road.

The proposed alignment of electricity infrastructure within the Development Site, which will have a capacity of 11 kilovolts (kV), is shown on **Figure 12**. It will comprise overhead poles and lines, with the exception of a short section across Ski Gardens Road where is will be installed in an underground conduit system to avoid interaction issues with Essential Energy's existing overhead line down Ski Gardens Road.

The electricity lines will run parallel to the buried water supply pipelines to minimise disturbance. The alignments have been carefully selected to minimise the impact to areas of higher conservation vegetation and identified Aboriginal heritage sites (see **Section 3**), while balancing the needs of the Development and engineering design requirements. The estimated width of disturbance for installation of the electricity lines is a maximum of 6 m.

ProTen will undertake further consultation with Council, Lands & Water and WAMC, as land owners / land management authorities, following submission of this EIS in relation to necessary easements.

External Supply

In order to meet the Development's electricity needs, a new 11 kV service (poles and lines) will be required to be extended from a sub-station in Manilla to the Development Site. This infrastructure will be installed at the expense of ProTen and subsequently handed over to Essential Energy as their long-term asset. Importantly, the infrastructure from Manilla to the Development Site does not form part of the Development and is not addressed within this EIS. A separate submission under Division 5.1 of Part 5 of the EP&A Act will be submitted, with ProTen as the proponent and Essential Energy as the determining authority.

Emergency Diesel Generators

As outlined in **Section 4.14.6**, three emergency standby diesel generators will be installed at each PPU for the rare occasion when power from the electricity grid is lost. Each generator will have a maximum standby rating of 390 kVA and will only be required between one and a maximum of five days per year.

4.16.3 Liquid Petroleum Gas

Heating of the poultry sheds, which is anticipated to be required for up to 21 days of each production cycle for the brooding phase, will be provided by wall mounted gas heaters. LPG will be delivered to the Development Site in rigid tankers and stored at each PPU in bulk tanks as outlined in **Section 4.14.4**.

4.16.4 Potable Water Supply

Potable water supply for the staff amenities at each PPU and the eight houses will be via rainwater collection (tanks) from the roofs of the amenities building and houses. If water levels in the tanks become low due to an extended dry period, potable water will be trucked in as required.

4.16.5 Operational Water Supply

The poultry operation will require a total water supply of around 330 megalitres (ML) per year (0.9 ML per day averaged over a year), which includes water for shed ventilation, bird consumption, shed cleaning and vehicle wheel washes. This will be serviced via the extraction of surface water from the Namoi River under the provisions of the two existing water access licences (WALs) held by ProTen:

- WAL41834 – general security licence with a share component of 317.2 units from the Upper Namoi Regulated River Water Source; and
- WAL37794 - general security licence with a share component of 120 units from the Upper Namoi Regulated River Water Source.

Copies of these WALs are provided in **Appendix M**.

The following infrastructure is proposed to be installed to extract and transfer the water from the Namoi River:

- An electric water pump installed approximately 30 m back from the river bank, as shown on **Figure 12**;
- Underground water supply pipelines (high-density polyethylene pipe) between the water pump and the PPUs, as shown on **Figure 12**; and
- Four 375 kL water storage tanks at each PPU (1,500 kL combined storage capacity), as outlined in **Section 4.14.3**.

The sizing of the water pump and supply pipes is subject to hydraulic design.

The tanks will be automatically filled from pressurised lines to remain near capacity at all times. Low level alarms will be fitted to the tanks at approximately two-thirds full capacity and will alarm if the water level drops below this point. The water tanks at each PPU will be interconnected and, therefore, able to provide additional water to each other if necessary. This water supply will also be available for firefighting purposes.

The underground water supply pipelines will run parallel to the overhead electricity supply lines to minimise disturbance. The alignments have been carefully selected to minimise the impact to areas of higher conservation vegetation and identified Aboriginal heritage sites (see **Section 3**), while balancing the needs of the Development and engineering design requirements. The estimated width of disturbance for installation of the water pipelines is a maximum of 6 m. ProTen will undertake further consultation with Council, Lands & Water and WAMC, as land owners/land management authorities, following submission of this EIS in relation to necessary easements.

The water will be treated as per the recommendations in the *National Water Biosecurity Manual – Poultry Production* (DAFF 2009) as a biosecurity measure and to ensure it is suitable for bird consumption. It will be pumped from the Namoi River and filtered through sand media. The pH will be monitored and if it is found to be high, citric acid will be added to maintain the pH at approximately 7.0. The water will then be chlorinated to deliver approximately 3 parts per million (ppm) total dissolved solids in the water storage tanks. Finally, chlorine dioxide will be dosed in to the water delivery system supplying the poultry sheds at between 0.5 to 0.1 ppm.

Photo 15 Day old chicks at water drinkers

While the unit share of water available for extraction from the Namoi River may vary from year-to-year depending on the available water determination, the combined 437.2 units provided by the two WALs is anticipated to be able to readily service the Development's annual water demand of approximately 330 ML. If the water requirements of the Development cannot be met, for example during times of low flow or drought, this is a commercial risk for ProTen. If such a time presents itself there are three primary options:

- Transfer of another water access licence held by ProTen to provide additional allocation (if available); and/or
- Purchase and truck in additional water supply (if the short-fall is not too great); and/or
- Reduce the operating capacity until the required water supply can be obtained.

4.16.6 Water Reuse

ProTen proposes to reuse the water captured in the surface water detention dams at each PPU (see **Section 4.17.2**) for regular irrigation of the planted vegetation screens (see **Section 4.20**). Based on a conservative averaged application rate of 50 mm per week over the entire landscaped area, this has been calculated to reuse between 3 ML and 4.8 ML per week at each PPU.

There will not be any re-use of stormwater run-off within the poultry sheds for biosecurity reasons. While the captured roof water can be chlorinated, there is still an element of risk associated with introducing disease pathogens from other bird life to the livestock and the possibility of spreading disease.

4.16.7 Sewage

Sewage generated by the on-site staff amenities at each PPU and the houses will be appropriately treated and disposed of via separate on-site AWTSs (one at each PPU and house; 12 in total) installed and operated in accordance with the manufacturer's specifications and Council approval requirements. Each system will have a treatment capacity of 10 equivalent persons at 200 L/p/d and treated effluent will be released over an area of approximately 200 m^2 via sub-surface irrigation.

4.17 Surface Water Management System

4.17.1 Surface Water Production

The poultry development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing process itself. The main operational water sources from the Development will be:

- Wash down water from within the poultry sheds at the end of each 65 day (9.3 week) production cycle (approximately 5.6 times per year);
- Rainfall runoff from the shed roofs; and
- Rainfall runoff from the ground surfaces around the poultry sheds and additional improvements.

The poultry sheds will be blown and swept (i.e. dry cleaning practices) before being washed using high-pressure low-volume sprays, sanitised and disinfected. Approximately 12 kL of water will be used in the wash down process for each poultry shed at the end of each production cycle. This will amount to the following approximate volumes:

- Farm 1 – 120 kL every 9.3 weeks;
- Farm 2 – 216 kL every 9.3 weeks;
- Farm 3 – 120 kL every 9.3 weeks; and
- Farm 4 – 192 kL every 9.3 weeks.

Analysis of wash down water from other similar poultry broiler production farms indicates the wash down water will have the following typical concentrations:

- Total suspended solids - 2,500 milligrams per litre (mg/L);
- Total nitrogen - 65 mg/L;
- Total phosphorus - 45 mg/L.

4.17.2 Engineered Surface Water Management System

An engineered surface water management system will be installed at each PPU to provide long-term structural controls to mitigate the impact of surface water runoff throughout the life of the Development. In summary, each system will comprise upstream diversions, grassed swale drains between the poultry sheds to capture wash down water and rainfall runoff, a perimeter table drain and a large detention dam. There will also be stormwater pipes to convey water under roads.

The conceptual design of the surface water management system at each PPU is shown on the preliminary civil design drawings in **Appendix K**. Note that these drawings are preliminary and conceptual and will be progressed to detailed design following development consent. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event.

Clean Water Diversions and Flood Immunity

Clean water diversions comprising a deflection bank and swale drain will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the poultry sheds and ancillary infrastructure and prevent this water from entering the controlled surface water management system. They will be constructed and stabilised prior to earthworks commencing at each PPU site and will be designed to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event.

The upstream diversions and construction pads for the poultry sheds will ensure that the sheds have immunity from the 1% AEP event. Runoff from the roofs of the poultry sheds will discharge to the grassed swales and subsequently in to the detention dams (see below).

Diversion of Minor Intermittent Drainage Lines

Farm 2 is proposed to be located on the junction of a first order drainage line and second order drainage line that drain north towards the Namoi River. Farm 4 is proposed to be located at the upper reach of a first order drainage line that drains to the west in to a tributary of Plain Gully and subsequently Lake Keepit. These PPUs are located in the upper reaches of the respective catchments and the drainage lines are therefore relatively minor and intermittent.

As discussed above, clean water diversions will be installed around the upstream side of all PPUs. Consequently, the runoff in the existing drainage lines at Farms 2 and 4 will be conveyed along the new swale drains around the PPUs before re-joining the existing drainage lines downstream of Farms 2 and 4.

Grassed Swales

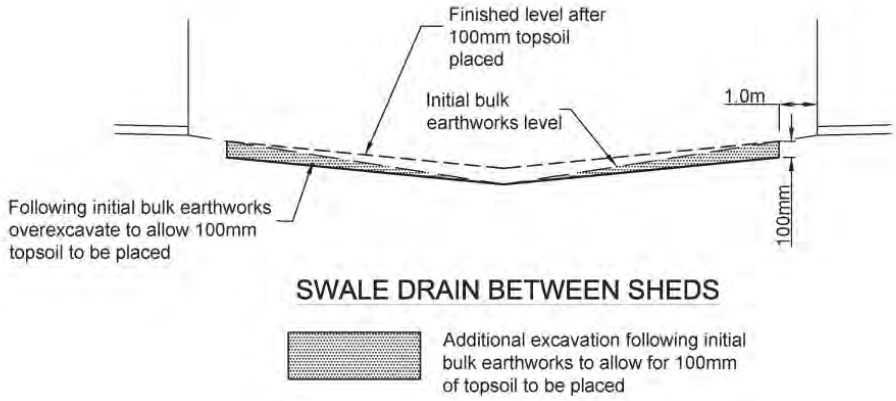
Each poultry shed will have fully-sealed concrete flooring and will be surrounded by a 400 mm high dwarf concrete bund wall to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds. The concrete bunds will have strategically located seepage holes to convey excess wash down water from the sheds into grassed swales between each of the sheds. Rainfall runoff from the shed roofs and from some of the surrounding surfaces will also be directed into the grassed swales.

Photo 16 Grassed swale drains between poultry sheds (ProTen's Bective Poultry Production Farm)

The swale drains between the sheds will have a triangular cross-section and will have a low grade to maximise infiltration and stormwater treatment potential. Following the initial bulk earthworks, additional excavation of the swale drains will be undertaken to allow approximately 100 mm of topsoil to be placed.

The typical arrangement of the swale drains is shown on **Figure 21**.

Figure 21 Typical Swale Drain Construction



The swale drains have been designed to allow infiltration of the water into the topsoil for effective nutrient uptake by the grass, which will be regularly slashed to promote continued growth. The typical annual pollutant load removal efficiencies for vegetated swales according to *Australian Runoff Quality* (Engineers Australia 2006) are:

- Total suspended solids – 60 to 80% removal;
- Total nitrogen – 25 to 40% removal; and
- Total phosphorus – 30 to 50% removal.

Table Drains

During heavy rainfall events excess water from the grassed swales will be conveyed via underground pipes under the PPU ring road and in to a table drain around the perimeter of the PPU. The construction of the perimeter table drain will ensure that all rainfall runoff from the ground surfaces within the PPU environs will be contained within the controlled surface water management system.

The table drains will have a trapezoidal cross-section with varying dimensions (depending upon the predicted runoff discharge). The batter side slopes will be approximately 1 vertical to 4 horizontal (1:4).

Detention Dams

The table drain around the perimeter of each PPU will convey the water to a large detention dam at each PPU with the following approximate storage capacities:

- Farm 1 – 21,205 m^3;
- Farm 2 – 35,149 m^3;
- Farm 3 – 24,695 m^3; and
- Farm 4 – 36,877 m^3.

These dams have been designed to capture the stormwater runoff from inside the PPU environs (i.e. all area inside the upstream diversions) for a depth of rainfall of approximately 200 mm, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. While the water captured in the detention dams will have some level of nutrients, the levels are predicted to be low given that the poultry sheds will be thoroughly blown and swept prior to being washed and the grassed swales will provide a very effective means of nutrient removal (see above).

Given the design of the surface water management system, the detention dams are only expected to receive runoff during large rainfall events. As outlined in **Section 4.16.6**, ProTen has committed to re-using some of the captured water for regular irrigation of the planted vegetation screens at each PPU. Based on the design volumes of the detention dams and the water reuse strategy, there should not be any off-site discharge from the dams.

The internal surfaces of the detention dams will be compacted or lined to provide an impermeable surface.

4.18 Waste Generation and Management

4.18.1 Primary Waste Streams

The operation of the Development will generate the following primary waste streams:

General Daily Waste

Day-to-day general waste, including waste from the farm managers' houses, will be placed in to enclosed skip bins (or other enclosed waste receptacles) and removed from the Development Site by a licensed contractor for landfill disposal at the Tamworth Waste Management Facility. It is estimated that the Development will generate approximately 10 m^3 of general waste per month (120 m^3 per year).

Chemical Containers

Chemicals required for sanitisation/disinfection, water treatment, weed control and pest control purposes (see **Section 4.19**) will be purchased from a local supply company and/or delivered direct to the Development Site by Baiada. Empty chemical containers will be returned to the local supply company and/or Baiada for reuse, recycling or appropriate disposal. Alternatively a licensed contractor will be engaged to provide a chemical container pickup service for recycling, reuse or appropriate disposal. Any non-returnable chemical containers will be collected and managed via the *drumMUSTER* program.

Poultry Litter

At the end of each production cycle a typical poultry shed of the size proposed will have around 225 m^3 of poultry litter, comprising around 135 m^3 of bedding material and 90 m^3 of poultry manure accumulated over the 8 weeks of bird occupation. Cumulatively, this will amount to approximately 68,040 m^3 per year for the Development (based on 54 poultry sheds and 5.6 production cycles per year).

The feed and water lines will be raised to the roof of the poultry sheds to allow the poultry litter to be removed using a front-end loader or bobcat and loaded in to covered trucks for transport off site. Poultry litter is highly sought after as an organic fertiliser and/or rehabilitation agent for agricultural lands. On this basis, the litter collected from the sheds will likely be sold as a commercial raw product and/or sold directly to regional farmers. ProTen will ensure truck loads leaving the Development Site are covered to minimise emissions of odour and particulate matter.

The litter will not be stockpiled or disposed of within the bounds of the Development Site under any circumstances for best management practice and biosecurity reasons. Furthermore, ProTen will make every effort to ensure litter is not spread within 5 km of a poultry shed. However this is largely out of ProTen's control, with the destination and safe handling of the litter the responsibility of the transport contractor and/or end-user. The product does not pose a health threat to the community.

Photo 17 Poultry litter being removed using a front-end loader

Dead Birds

It is estimated that the Development will generate approximately 1,300 tonnes of dead birds per year. The poultry sheds will be inspected on a daily basis and any dead birds collected and moved to one of the dead bird freezers (see **Section 4.13** and **Figure 12**) for short-term storage prior to being collected and transported to Baiada's Oakburn Rendering Plant (see **Figure 19**) for treatment and production of tallow and poultry offal meal (i.e. value-added products). The freezers have been strategically positioned adjacent to the northern and southern access roads approximately 100 m back from Rushes Creek Road so the dead birds can be collected and transported off site without the trucks going any near the livestock as a biosecurity measure.

Dead birds will not be stockpiled or disposed of within the Development Site under any circumstances for best management practice and biosecurity reasons.

4.18.2 Waste Classification and Management Practices

The primary operational waste streams identified in **Section 4.18.1**, along with other potential operational waste streams, are listed in **Table 11** with their respective classifications under the *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014) and intended reuse/recycling/disposal method.

Table 11 Operational Waste Types, Classifications and Management

Waste Type	NSW Classification	Reuse / Recycling / Disposal
General daily waste	General solid waste (putrescible and non-putrescible)	Landfill disposal – see **Section 4.18.1**.
Empty chemical and fuel containers	Hazardous waste if containers were previously used to store dangerous goods (Class 1, 3, 4, 5 or 8) and from which residues have not been removed by washing or vacuuming. General solid waste (non-putrescible) if the containers have been cleaned by washing or vacuuming.	Off site reuse, recycling or disposal at licensed facility – see **Section 4.18.1**. (N.B. transport to comply with the *Australian Code for the Transport of Dangerous Goods by Road & Rail*)
Poultry litter	General solid waste (putrescible)	Off site reuse for beneficial application on rural/agricultural land and/or off site treatment to produce a commercial product (i.e. value-added product) – see **Section 4.18.1**.
Dead birds	General solid waste (putrescible)	Off site treatment/recycling at Baiada's Oakburn Rendering plant to produce tallow and poultry offal meal (i.e. value-added products) – see **Section 4.18.1**.
Sewage (from staff amenities and houses)	Liquid waste	Treated and disposed of via on-site AWTS (one at each PPU and house) installed and operated in accordance with the manufacturer's specifications and Council approval requirements. Each system will have a treatment capacity of 10 equivalent persons at 200 L/p/d. Treated effluent will be irrigated over an area of approximately 200 m^2.
Green waste	General solid waste (non-putrescible)	Composting and/or direct reuse on site.
Tyres	Special waste	Off site recycling or disposal at licensed facility.
Air and oil filters and rags	General solid waste (non-putrescible)	Off site recycling or disposal at licensed facility.
Batteries	Hazardous waste	Off site recycling.
Light bulbs / fluorescent tubes	Hazardous waste	Off site recycling.
Mass bird mortalities	General solid waste (putrescible)	Various options exist for the disposal of bird carcasses and fomites in the event of an emergency animal disease – see **Section 4.24**.

4.19 Potentially Hazardous Materials

The only chemicals and fuels that will be used at the Development will be:

- LPG, petrol and diesel for power and equipment requirements;
- Sanitation products used within the poultry sheds during the cleaning phase at the end of production cycle;
- Sanitation products for the wheel wash facilities and foot baths;
- Water treatment agents;
- Pest control products (when necessary); and
- Weed control products (when necessary).

Table 12 lists the specific chemicals and fuels to be stored and used within the Development Site, with their respective Australian Dangerous Goods (ADG) classes and packing groups (PGs) (where relevant). Packing groups indicate the degree of danger associated with the transport the material (PG I, II and III representing low, medium and high danger, respectively).

Table 12 Inventory of Potentially Hazardous Materials

Substance	Hazardous Class (Packing Group)	Description	Total Storage at each PPU
LPG	Class 2.1	Flammable gas	Farm 1 – 38,250 L (38.25 m^3) Farm 2 – 57,375 L (57.38 m^3) Farm 3 – 38,250 L (38.25 m^3) Farm 4 – 51,000 L (51.00 m^3)
Diesel	Class C1	Combustible liquid	Each PPU – 4,000 L (2 x 2,000 L tanks)
Petrol	Class 3 (PG II)	Flammable liquid	Each PPU – 700 L (1 x 700 L tank)
Sodium hypochlorite (10-30%) (bleach, disinfectant)	Class 8 (PG III)	Corrosive substance	Each PPU – 400 L (2 x 200 L drums)
Chlorine dioxide (water supply treatment)	Class 8 (PG II)	Corrosive substance	Each PPU – 240 L (8 x 30 L drums)
Microgard 755N or Micro-4 (sanitiser)	Class 9	Miscellaneous dangerous goods/articles	Each PPU – 25 L (1 x 25 L drum)
Goal (herbicide)	Class 9	Miscellaneous dangerous goods/articles	Each PPU – 10 L (1 x 10 L drum)
Agri-Quat (disinfectant, sanitiser)	N/A	-	Each PPU – 50 L (2 x 25 L drums)
Ditrac (rodenticide)	N/A	-	Each PPU – 20 kgs (1 x 20 kg container)
Glister (herbicide)	N/A	-	Each PPU – 20 kgs (1 x 20 kg container)
Unicide (sanitiser)	N/A	-	Each PPU – 100 L (1 x 100 L drum)
Unicide d (sanitiser)	N/A	-	Each PPU – 100 L (1 x 100 L drum)
Roundup (glyphosate, herbicide)	N/A	-	Each PPU – 25 L (1 x 25 L drum)

Chemicals will be purchased from a local chemical supply company and/or delivered direct to the Development Site by Baiada. It is the usual practice for cleaning chemicals to be delivered only a few days prior to the commencement of the cleaning phase at the end of each production cycle to minimise the on-site storage requirements and time. The amenities and workshop building at each PPU comprises a vented chemical store room for the storage of the relatively small volumes of chemicals required for sanitisation/disinfection, water treatment, weed control and pest control purposes. Copies of the Safety Data Sheet (SDS) for each stored chemical will be kept within the chemical store and/or office at each PPU, and spill kits will also be maintained within the chemical store at each PPU.

Diesel and petrol will be stored at each PPU in separate aboveground bunded tanks (see **Section 4.14.5**), with a minimum bund volume of 110% of the respective fuel tank capacity. LPG will be stored at each PPU in aboveground bulk storage tanks (see **Section 4.14.4**) installed and maintained to comply with the requirements of *AS/NZS 1596:2014 The Storage and Handling of LP Gas.* Diesel, petrol and LPG storages will be separated from each other and separated from the chemical store in the amenities and workshop building.

4.20 Landscaping

Landscaping will be undertaken to improve the visual and environmental amenity of the Development and to also:

- Reduce the magnitude and frequency of any adverse air quality impacts by effectively slowing and filtering air movement, which will enhance dust deposition and odour dispersion;
- Protect the poultry sheds against any spray drift or off-target applications of chemicals from neighbouring agricultural land users; and
- Provide a high level of light screening.

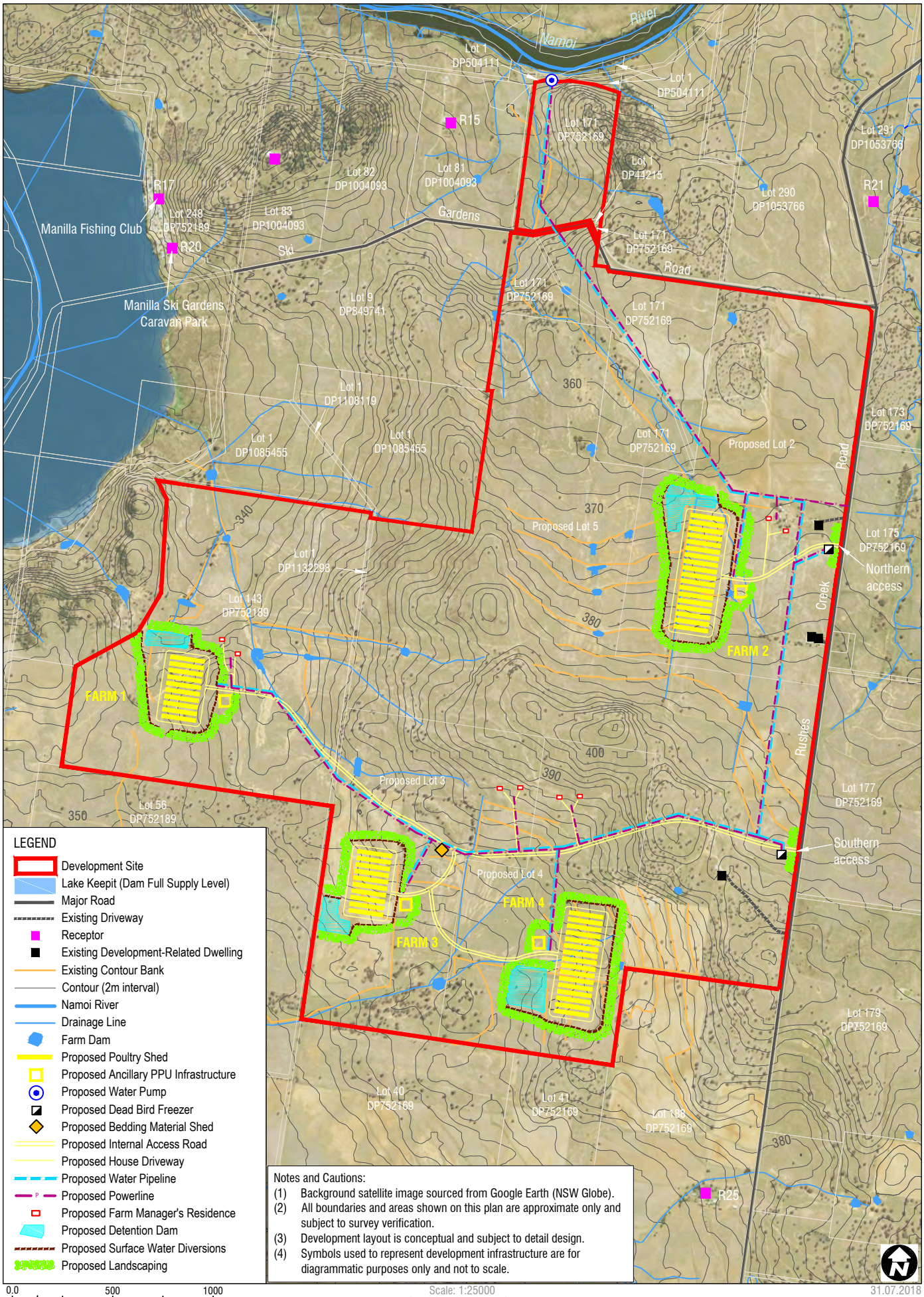
Increasing the "surface roughness" and providing some filtering effect, via the establishment of vegetation screens, assists to reduce dust and odour levels from poultry production operations. Vegetation screens set downwind of PPUs act to induce additional turbulence as the ventilation air from the poultry sheds passes through this permeable barrier and also act to partially remove fine dust particles from the ventilation air giving a corresponding percentage reduction in odour levels.

As shown in **Figure 22**, the landscape plantings will comprise suitable tree and shrub species strategically planted in "screens" around the perimeter of each PPU. The plantings will be based on the following recommendations in *Planning Guidelines Separating Agricultural and Residential Land Uses* (Queensland Department of Natural Resources 1997):

- Provide a biological buffer of a minimum of 40 m wide around the poultry sheds;
- Contain consistent, yet random, plantings of a variety of tree and shrub species of differing growth habits, at spacings of around 4 to 7 m;
- Include species with long, thin and rough foliage to facilitate the capture of spray droplets and dust particles;
- Provide a permeable barrier that allows air to pass through the buffer, aiming to achieve a porosity of around 0.5 (i.e. around 50% of the screen will be air space);
- Include species that are hardy and fast growing; and
- Provide foliage from base to crown (i.e. lower and upper storey vegetation) to ensure that the buffer is effective in slowing and filtering air movement at all levels.

ProTen will progressively establish the landscape plantings, as soon as practicable following bulk earthworks and construction of development infrastructure at each PPU.

A Landscape Management Plan (LMP) will be prepared as part of the Operational Environmental Management Plan (OEMP) (see **Section 4.25**). The LMP will detail the species to be planted, and also describe the landscaping monitoring and maintenance measures.



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Development Landscaping

FIGURE 22

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4.21 Pest Control

The presence of pest populations in and around poultry operations is a potential health hazard and an indicator of poor farm management. The Development Site will be managed in compliance with ProTen's standard operating procedures, with emphasis placed on keeping the poultry sheds and surrounding environs as clean as possible to discourage pests from establishing residency.

The following pest control measures will form part of the Development's maintenance program and biosecurity commitment:

- Implementation of ProTen's standard pest control program, which primarily comprises the installation and maintenance of baits as a preventative measure to prevent and control outbreaks;
- Dead birds will be collected from the poultry sheds on a daily basis and stored in the on-site dead bird freezers prior to removal from the Development Site;
- Poultry litter will be promptly removed from the poultry sheds and transported off site at the end of each production cycle;
- Appropriate waste management systems (see **Section 4.18**) will be implemented to ensure no on-site stockpiling or disposal of waste materials;
- Any feed or grain spills will be promptly cleaned up;
- The grass within the shed environs will be regularly slashed / mown; and
- Appropriate sanitising agents will be used during the shed cleaning phase.

4.22 Site Maintenance

The Development will be managed in compliance with ProTen's standard operating procedures, including a regular site inspection and maintenance program to minimise the potential for adverse environmental impacts, extend the life of equipment, reduce operating costs and maximise operational efficiency. Emphasis will be placed on keeping the insides of the poultry sheds and surrounding environs as clean as possible, with maintenance activities including:

- Regular inspections to ensure all necessary environmental controls are in place and any required maintenance/remediation works are identified and undertaken;
- Regular inspections and maintenance of plant and equipment to ensure optimal operation;
- Continuous monitoring and management of the internal conditions within the poultry sheds, including ventilation and temperature;
- Daily inspection and management of stocking densities, bird health and bedding material within the poultry sheds;
- Daily inspection and removal of dead birds from within the poultry sheds;
- Regular site slashing and mowing;
- Maintenance of the landscape plantings;
- Implementation of pest control measures; and
- Maintenance of the internal access roads.

4.23 Biosecurity

Biosecurity refers to those measures taken to prevent or control the introduction and spread of infectious agents to a flock. It aims to prevent the introduction of infectious diseases, and prevent the spread of disease from an infected area to an uninfected area. Biosecurity plays a vital role in the incidence of disease and is an integral part of any successful poultry production system.

The nature of each avian influenza outbreak that has occurred in Australia suggests that one or more biosecurity deficiencies were involved in the spread of the virus. Improving biosecurity is the most important way that poultry producers can prevent the spread of virus (Primary Industries Ministerial Council 2011).

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

ProTen has demonstrated a strict biosecurity commitment at its other poultry production farms and will implemented a range of proven biosecurity measures at the Development on a routine basis in accordance with the Best Practice Guidelines (DPI 2012), *National Farm Biosecurity Manual for Chicken Growers* (ACMF 2010) and *National Water Biosecurity Manual – Poultry Production* (DAFF 2009). These include, but will not be limited to, the following:

Separation Distances

The Best Practice Guidelines (DPI 2012) recommends that poultry broiler farms are located a minimum of 1,000 m to other broiler farms (500 m when there are extenuating circumstances such as farms with a common owner or farms supplying the same processor) and 5,000 m to poultry breeder farms. The greater the separation distance, the less opportunity there is for disease spread.

The proposed PPUs are located a minimum of approximately 11 km to the nearest other broiler farm, being Brubri (see **Figure 19**), and a minimum of approximately 8.2 km to the nearest breeder farm, being Glenara Park (see **Figure 19**). Both of these distances are well in excess of the recommendations in the Best Practice Guidelines (DPI 2012). Furthermore, the layout of the Development affords a minimum separation distance of approximately 870 m between the four PPUs, which is in excess to the recommended 500 m (DPI 2012). Each of the four PPUs will be owned and operated by ProTen (i.e. a common owner) and will be supplying to Baiada (i.e. the same processor).

PPU Fencing

Each PPU will have a perimeter fence or otherwise well-defined boundary (for example, vegetation screen) establishing a clearly defined biosecurity zone and excluding any grazing livestock.

Farm Signage

Appropriate signage will be erected on the access roads in to the four PPUs to notify visitors of the biosecurity zone and direct them to contact ProTen prior to proceeding, along with any other requirements.

Photo 18 Farm biosecurity signage (ProTen's Narrandera Poultry Production Farm)

Wheel Wash

As outlined in **Section 4.14.9**, the potential for mechanical transmission of disease pathogens will be reduced through the installation of a wheel wash facility on the access road to each PPU. All vehicles wishing to enter a PPU site will be required to pass through the wheel wash to remove dust particles from the wheels and chassis. An appropriate chemical sanitiser will be added to the wheel wash spray.

Single Age Farm

Vaccinated stock can become infected and show no clinical signs of disease, yet can transfer the disease to younger and/or more susceptible birds. To reduce the risk of disease transfer and outbreak, whole flock units with no age difference will be placed in to each poultry shed. On this basis, each PPU will operate on an "all in – all out" placement and depopulation program.

Closed Flock

Birds on other sites may be exposed to different strains of organisms to which other flocks may not have developed immunity to. In addition, birds may have been exposed to a disease organism and not have developed clinical signs of the disease. Moving apparently healthy birds into a disease-free flock could mean introducing disease to a clean farm site. For these reasons, once a flock is placed, no new birds will be introduced from any other source.

Water Supply Treatment

The Development's operational water requirement will be sourced via surface water extracted from the Namoi River (see **Section 4.16.5**). The water will be treated as per the recommendations in the *National Water Biosecurity Manual – Poultry Production* (DAFF 2009). It will be pumped from the Namoi River and filtered through sand media. The pH will be monitored and if it is found to be high, citric acid will be added to maintain the pH at approximately 7.0. The water will then be chlorinated to deliver approximately 3 ppm total dissolved solids in the water storage tanks. Finally, chlorine dioxide will be dosed in to the water delivery system supplying the poultry sheds at between 0.5 to 0.1 ppm.

There will not be any re-use of stormwater run-off within the poultry sheds for biosecurity reasons. While the captured roof water can be chlorinated, there is still an element of risk associated with introducing disease pathogens from other bird life to the livestock and the possibility of spreading disease.

Other Measures

Additional biosecurity measures that will be implemented on a routine basis include:

- The poultry sheds and equipment will be sanitised and disinfected at the end of each production cycle;
- Dead birds will be removed from the poultry sheds on a daily basis and stored in the on-site dead bird freezers prior to removal off site;
- Poultry litter will be promptly removed from the poultry sheds and transported off site at the end of each production cycle;
- Appropriate waste management systems will be implemented (see **Section 4.18**) to ensure no on-site stockpiling or disposal of waste materials;
- Under no circumstances will poultry litter or dead birds be allowed to stockpile within the Development Site;
- Pest control measures (see **Section 4.21**) will be implemented to prevent and control outbreaks;
- Staff members working in direct contact with livestock will not be permitted to keep other bird species or pigs at their place of residence;
- Staff members and visitors will not be permitted to travel between poultry farms without changing clothes and foot wear, and washing face and hands;
- The poultry sheds will be maintained to prevent the entry of wild birds and limit the access of vermin as far as is practical;
- The shed environs will be kept free from debris and grass will be regularly slashed/mown;
- Any equipment being moved between PPUs or coming on site from another poultry farm will be sanitised and disinfected prior to operation;
- Records will be maintained for visitors (not farm staff or Baiada contractors) entering and exiting each PPU; and
- The surface water management system at each PPU will ensure the area around the poultry sheds is adequately drained to prevent the accumulation and stagnation of water likely to attract waterfowl.

4.24 Mass Mortality Disposal

In the unlikely event of an emergency animal disease (EAD) outbreak at the Development Site, ProTen will immediately implement strict quarantine procedures to isolate the potentially infected PPU(s) and contact DPI and follow all instructions provided.

Upon confirmation that it is indeed an EAD outbreak and immediate slaughter of farm stock is necessary, slaughter will be managed by DPI. In accordance with the *AUSVETPLAN: Operational Manual – Destruction of Animals* (Animal Health Australia [AHA] 2015a), the preferred available method for the euthanasia of large numbers of birds in commercial poultry units is gassing with carbon dioxide (CO_2) within the poultry sheds. This method reduces the exposure of personnel to infected material, eliminates the need to handle large numbers of live birds, reduces dispersal of dust, provides the opportunity for disposal by composting in the shed and should be more cost-effective than methods that require birds to be caught individually (AHA 2015a).

A number of options exist for the disposal of bird carcasses and fomites. The *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b) lists burial, burning, rendering, composting and anaerobic digestion as mass disposal options. 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, the ability of a rendering plant to accept the bird carcasses, the logistics and cost associated with transportation of carcasses off site, and a site's suitability for burial. While on-farm burial has previously been the predominant disposal option in the poultry industry, this practice is now discouraged on the basis of significant environmental risks, including potential groundwater impacts.

In consideration of the above, and depending on the scale of the EAD event and instructions provided by DPI, one of the options discussed below (in order of preference) will be implemented for the disposal of bird carcasses and fomites in the unlikely event of an EAD outbreak at the Development Site.

A Mass Mortality Disposal Strategy, which will provide additional specific detailed on the disposal options, will be prepared as part of the OEMP (see **Section 4.25**). The Strategy will also detail the initial response actions, quarantine procedures and euthanasia process in the event of an EAD.

Option 1 - Composting

The preferred option for mass bird disposal is in-shed composting. Composting is a natural biological process that transforms organic materials, in a predominantly aerobic environment, into a useful and biologically stable end product. The process, if carefully implemented and monitored, generates sufficient heat to destroy most pathogenic organisms (AHA 2015b). Emergency management agencies throughout Australia have now identified on-farm composting as a preferred method of carcass disposal.

While 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 rendering or burial in that it does not require transport of the carcasses and limits the potential spread of the disease.

In-shed composting would occur under the supervision of DPI and in accordance with the procedures outlined in latest versions of *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b), *Biosecurity of Mass Poultry Mortality Composting* (Rural Industries Research and Development Corporation [RIRDC] 2014) and *Procedure – Disposal of birds by composting* (DPI 2008). The standard operating procedures (SOPs) for mass poultry mortality composting appended to RIRDC (2014) would be implemented.

When undertaken properly, in-shed composting should not result in any notable environmental impact. While odour emissions are possible during turning of compost, peak emissions usually settle down quickly and would be largely confined by being undertaken within the enclosed poultry shed. There would be no risk to surface water or groundwater with the poultry sheds having fully sealed concrete flooring and concrete bund walls.

Option 2 - Off-Site Rendering

Whilst in-shed composting has a number of significant advantages as a mass disposal option, a disadvantage is that the affected shed(s) can be out of operation for weeks as the 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.

If in-shed composting is not possible or not preferred on the basis of commercial considerations, the birds could be transported to Baiada's Oakburn Rendering Plant located to the west of Tamworth on the Oxley Highway (see **Figure 19**). However, this would only be an option if:

- The volume of the material would not exceed the rendering plant's daily processing capacity and would not significantly impact on the plant's ability to undertake normal operation and continue to service the local poultry industry (although shifts could be extended and/or prioritised to process diseased birds ahead of routine operations); and
- The off-site transport of the infected birds would not be a risk in terms of potentially spreading the disease to other poultry farms along the transport route; and
- Transportation vehicles were available.

Rendering would occur under the supervision of DPI and in consideration of the key points raised in the latest version of *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b).

Option 3 - Off-Site Landfill Disposal

If in-shed composting or rendering are not possible or preferred, a third option is the transportation of carcasses and fomites to a landfill facility. This option is dependent on the respective Council making landfill area that is appropriately sectioned and quarantined available. ProTen will consult with Council in this regard during the preparation of the Mass Mortality Disposal Strategy to be included in the OEMP.

Off-site landfill disposal would also only be an option if:

- The designated portion of the landfill had capacity to cater for the amount of material to be disposed of;
- Landfilling would not significantly impact on the landfill's ability to undertake normal operation and service the other requirements of the LGA;
- The off-site transport of the infected birds would not be a risk in terms of potentially spreading the disease to other poultry farms along the transport route; and
- Transportation vehicles and routes were available.

Landfilling would occur under the supervision of DPI and in consideration of the key points raised in the latest version of *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b). To reduce the likelihood of leachates permeating the subsoil, appropriate synthetic liner(s) may need to be used to seal and enclose the landfill area depending on the EAD (not necessary for certain EADs). Expert advice on the management and treatment of leachate would need to be obtained.

Option 4 – Off-Site Mass Burial

If in-shed composting or rendering are not possible or preferred, a fourth option is the transportation of carcasses and fomites to an appropriate site for mass burial. Burial at the Development Site is not considered suitable due to the proximity of the Namoi River and Lake Keepit.

Off-site burial would only be an option if:

- The selected burial site(s) does not have any environmental constraints, for example shallow groundwater;
- The selected burial site(s) has the capacity to cater for the amount of material to be disposed of;
- Burial would not significantly impact on the current land use and surrounding land uses;
- The off-site transport of the infected birds is not a risk in terms of potentially spreading the disease to other poultry farms; and
- Transportation vehicles and routes are available.

Burial would occur under the supervision of DPI and in accordance with the latest version of *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b). The amount of material to be buried and selection of an appropriate site(s) for burial are both critical considerations in this option. Where necessary, appropriately qualified personnel would be engaged to confirm the most-favourable site(s) in consideration of environmental constraints, including groundwater depth, soil permeability and separation distances, along with access provisions and construction requirements.

To reduce the likelihood of leachates permeating the subsoil, appropriate synthetic liner(s) may need to be used to seal and enclose the burial pit(s) depending on the EADs (not necessary for certain EADs). Expert advice on the management and treatment of leachate would need to be obtained. To reduce the likelihood of soil dispersing when wet, appropriate applications of lime would be added during burial activities.

4.25 Operational Environmental Management Plan

An OEMP will be developed for approval prior to commencing operation. It will describe the operational activities to be undertaken on site, nominate the roles and responsibilities for all relevant personnel and include procedures for complaints and incident management. The OEMP will also include the following issue-specific management plans:

- Air Quality Management Plan;
- Surface Water Management Plan;
- Biodiversity Management Plan;
- Aboriginal Cultural Heritage Management Plan;
- Waste Management Plan;
- Landscaping Management Plan;
- Mass Mortality Disposal Strategy; and
- Pollution Incident Response Management Plan.

It will also specify the environmental management and mitigation measures to be implemented in relation to traffic, noise, energy efficiency and pest control.

Section 5

Permissibility and Planning Considerations



5 PERMISSIBILITY AND PLANNING CONSIDERATIONS

5.1 Permissibility

The Development Site is zoned RU1 Primary Production under the provisions of the Tamworth LEP.

The Development is classified as "intensive livestock agriculture", which is defined in the LEP as:

> *the keeping or breeding, for commercial purposes, of cattle, poultry, pigs, goats, horses or other livestock, that are fed wholly or substantially on externally-sourced feed, and includes any of the following: (a) dairies (restricted), (b) feedlots, (c) piggeries, (d) poultry farms, but does not include extensive agriculture, aquaculture or the operation of facilities for drought or similar emergency relief.*

Intensive livestock agriculture is "permitted with consent" within the RU1 Primary Production zone under the provision of the Tamworth LEP.

The eight houses proposed to accommodate the farm managers are ancillary and incidental to the poultry production farm operation and therefore permissible as part of the Development.

In relation to the proposed boundary adjustment described in **Section 4.2**, it is noted that the minimum lot size for land zoned RU1 under the Tamworth LEP is 400 ha. However clause 4.2D of the LEP permits a boundary adjustment in the RU1 zone that would result in lots under the minimum lot size if it does not increase the number of lots or increase the number of dwellings that may be erected on any of the lots. The proposed boundary adjustment would reduce the number of lots from the 11 existing lots to the four proposed lots and would not increase the number of dwellings able to the erected (as advised above, the proposed houses are permissible as ancillary and incidental to the poultry farm, not as a consequence of the boundary adjustment).

5.2 Development Consent and Secondary Approvals

The Development is classified as State significance development (SSD 7704) under the provisions of Division 4.7 of Part 4 of the EP&A in accordance with the SRD SEPP. Clause 3 of Schedule 1 of the SRD SEPP identifies development for the purposes of intensive livestock agriculture with a CIV of more than $30 million as SSD. In accordance with the independent cost review undertaken by RLB (2018) in **Appendix A**, the Development has a CIV of approximately $55 million, which, pursuant to clause 8(1) of the SRD SEPP, classes the Development as SSD.

The Development will require development consent from the Minister (or their delegate) under Division 4.7 of Part 4 of the EP&A Act, along with the following secondary approvals:

- An EPL under Chapter 3 of the POEO Act from the EPA (see **Section 5.4.2**); and
- Consent under section 138 of the *Roads Act 1993* from Council (see **Section 5.4.3**).

5.3 Commonwealth Legislation

5.3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment and Energy (DEE) and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities, water resources and heritage places defined as matters of "national environmental significance" (NES). An action that will have, or is likely to have, a significant impact on a matter of NES must be referred to the Commonwealth Minister for a decision on whether assessment and approval is required under the EPBC Act. Assessment and approval under the EPBC Act may also be required where an action is likely to have a significant impact on the environment of Commonwealth land.

An assessment of whether the Development may have a significant impact on any matters of NES or on the environment of Commonwealth land was undertaken during the EIS investigations and preparation. A search of the DEE's on-line Protected Matters Search Tool was performed in June 2017 as part of the *Biodiversity Assessment Report* (SLR 2018b) contained in **Appendix G**. The results indicate that the following matters of NES protected by the EPBC Act are either present within or relate to the Development Site:

- Three listed wetlands of international importance (Ramsar Wetlands);
- Four listed TECs;
- Twenty nine listed threatened species; and
- Ten listed migratory species;

Section 8.6.3 details SLR's (2018b) assessment of the potential relevance of these matters of NES to the Development. A summary is provided below.

Listed Wetlands of International Importance

The three wetlands of international importance identified are all over 900 km from the Development Site and are not connected to the Site. On this basis, they will not be impacted by the Development.

Listed Threatened Ecological Communities

Of the four listed TECs, only the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ("Box Gum Grassy Woodland") is present within the Development Site (SLR 2018b). While many of the patches of grassy woodland mapped within the Development Site comply with the definition of Box Gum Grassy Woodland TEC as defined under the EPBC Act (SLR 2018b), all patches have been avoided in the design of the Development. On this basis, there will not be any direct impacts on areas of Box Gum Grassy Woodland (SLR 2018b).

Listed Threatened Species

The 29 threatened species (and/or their habitats) listed under the EPBC Act that are predicted to occur within the locality comprise six bird species, two fish species, seven mammal species, one amphibian and 10 plant species. These species were considered by SLR (2018b) in accordance with the "significant impact criteria" for vulnerable and endangered species in the *Significant Impact Guidelines 1.1* (Department of the Environment [DoE] 2013). While there is potential for minor direct and indirect impacts, being mainly loss of a small area of degraded habitat for mobile threatened fauna species, SLR (2018b) concludes that the Development will not have a "significant impact" on any threatened species.

Listed Migratory Species

Of the 10 migratory species (and/or their habitats) predicted to occur within the locality, six are wetland species, three are terrestrial species and one marine species. With reference to the criteria for migratory species in the *Significant Impact Guidelines 1.1* (DoE 2013), SLR (2018b) concludes that the Development Site does not contain an area of "important habitat" for any migratory species and the Development is highly unlikely to disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of a population of a migratory species.

Conclusion

SLR (2018b) advises that the Development will not involve the imposition of a "significant impact" on any matters of NES and referral to the DEE is not necessary. The Development will also not result in any significant impact to the environment of Commonwealth land.

5.4 NSW State Legislation

5.4.1 Environmental Planning and Assessment Act 1979

As outlined in **Section 5.2**, the Development is classified as SSD and, accordingly, consent is sought under Division 4.7 of Part 4 of the EP&A Act.

The EP&A Act is the principal piece of legislation overseeing the assessment and determination of development proposals in NSW. The objects of the Act generally seek to promote management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The objects also include ecologically sustainable development, which has been addressed in relation to the Development in **Section 10.2**.

Section 4.15(1) Evaluation

Section 4.15(1) of the EP&A Act applies to the determination of development applications for SSD. The matters listed in section 4.15(1), as are of relevance to the Development, have been addressed within this EIS to enable consideration by the Minister (or their delegate) during the assessment and determination of the development application.

Secondary Approvals

A key component of the Part 4 SSD process is that it removes the requirement for approved developments to obtain some types of secondary authorisations under other NSW legislation. Pursuant to section 4.41(1) of the EP&A Act, the following authorisations will not be required if development consent is granted:

- An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974* (NPW Act); and
- A water use approval under section 89, a water management work approval under section 90 or a controlled activity approval under section 91 of the *Water Management Act 2000* (WM Act).

Pursuant to section 4.42(1) of the EP&A Act, the following authorisations cannot be refused if development consent is granted and must be issued "substantially consistent" with the SSD consent:

- An EPL under Chapter 3 of the POEO Act (for any of the purposes referred to in section 43); and
- Consent under section 138 of the *Roads Act 1993*.

5.4.2 Protection of the Environment Operations Act 1997

The POEO Act is administered by the EPA and establishes the State's environmental regulatory framework and includes licensing requirements for certain activities.

As a result of having the capacity to accommodate more than 250,000 birds at any time, the Development is a "scheduled activity" under clause 22 of Schedule 1 of the POEO Act and, as such, will require an EPL under Chapter 3 of the POEO Act. The EPL will need to cover the scheduled activity of "livestock intensive activities" and the fee based activity of "bird accommodation" to a scale of greater than (>) 1,000 tonnes.

By operation of section 4.42(1) of the EP&A Act (see **Section 5.4.1**), an EPL cannot be refused if it is necessary for carrying out an approved SSD and must be granted substantially consistent with the SSD consent.

5.4.3 Roads Act 1993

The objectives of the *Roads Act 1993* include regulating the carrying out of various activities on public roads. Section 138 of the Act requires consent to be obtained prior to disturbing or undertaking work in, on or over a public road. As outlined in **Sections 4.15.2, 4.16.2** and **4.16.5**, the Development proposes the construction of two new access driveways off Rushes Creek Road and the installation of water and electricity supply infrastructure under Ski Gardens Road. Both of these activities will require consent from Council under section 138.

By operation of section 4.42(1) of the EP&A Act (see **Section 5.4.1**), consent under section 138 of the *Roads Act* 1993 cannot be refused if it is necessary for carrying out an approved SSD and must be granted substantially consistent with the SSD consent.

5.4.4 Water Management Act 2000

The WM Act is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans prepared in accordance with the WM Act include rules for protecting the environment and administrating water licensing and trading. The Development Site is within an area covered by the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*.

The Development's water supply requirements will be serviced via two existing water access licences (see **Section 4.16.5** and **Appendix M**) owned by ProTen permitting extraction of surface water from the Namoi River (Upper Namoi Regulated River Water Source). As outlined in **Section 4.16.5**, an electric water pump is proposed to be installed approximately 30 m back from the river bank to physically enable the water extraction.

By operation of section 4.41(1) of the EP&A Act (see **Section 5.4.1**), the Development will not require a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the WM Act.

5.4.5 National Parks and Wildlife Act 1974

The NPW Act contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage. As detailed in **Section 8.7.3**, seven Aboriginal heritage sites have been identified within the disturbance footprint of the Development and will require salvage by surface collection in accordance with an approved Aboriginal Cultural Heritage Management Plan (ACHMP) prepared following development consent in consultation with the RAPs and OEH.

By operation of section 4.41(1) of the EP&A Act (see **Section 5.4.1**), the Development will not require an Aboriginal heritage impact permit under section 90 of the NPW Act.

5.4.6 Crown Lands Act 1989

The *Crown Lands Act 1989* aims to ensure that Crown land is managed for the benefit of the people of NSW and in particular to provide for (among other things) the regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with.

There is a narrow parcel of Crown land (unformed road) between the Development Site and the Namoi River under the care and management of Lands & Water. ProTen will undertake further consultation with Lands & Water following submission of this EIS in relation to any necessary licence or easement over this land for water and electricity servicing infrastructure.

5.4.7 Contaminated Land Management Act 1997

The general objective of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3 of the Act. The relevance of this Act to the Development is addressed in **Section 5.5.3**.

5.4.8 Threatened Species Conservation Act 1995 / Biodiversity Conservation Act 2016

While the *Threatened Species Conservation Act 1995* (TSC Act) was repealed in August 2017 and replaced with the *Biodiversity Conservation Act 2016* (BC Act), the *Biodiversity Assessment Report* (SLR 2018b) prepared for the Development addresses the species, populations and ecological communities within the TSC Act schedules given that the assessment had substantially commenced before the commencement of the BC Act (in accordance with the transitional arrangements).

5.5 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are legal environmental planning instruments (EPIs) prepared by the Minister to address issues significant to NSW. The SEPPs outlined in the below sub-sections contain provisions relevant to the Development and therefore are matters to be taken in to consideration by the consent authority.

5.5.1 SEPP (State and Regional Development) 2011

The SRD SEPP identifies development to which the SSD assessment and determination process under Division 4.7 of Part 4 of the EP&A Act applies. The relevance of the SRD SEPP to the Development is outlined in **Section 5.2**.

5.5.2 SEPP (Infrastructure) 2007

The State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW by improving regulatory certainty and efficiency through a consistent planning regime and greater flexibility in the location of infrastructure and service facilities.

Clause 104 of the ISEPP specifies that the consent authority for any of the traffic-generating developments listed in Schedule 3 refer the development application to the RMS and take into consideration any submission received from the RMS, the accessibility of the site and any potential traffic safety, road congestion or parking implications. While "intensive livestock agriculture" (or similar) is not specifically listed in Schedule 3 of the ISEPP, given the combined size/capacity of the Development and the SSD assessment process, the development application will be referred to the RMS anyway.

This EIS assesses the Development's potential impacts on the public road network (see **Section 8.3**).

5.5.3 SEPP No. 55 – Remediation of Land

The *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) aims to provide a State-wide approach to the remediation of contaminated land. Clause 7(1) provides that a consent authority must not consent to the carrying out of any development on land unless:

(a) it has considered whether the land is contaminated, and

(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Further, clause 7(2) provides that before determining an application for consent to carry out development that would involve a "change of use" in respect to certain land specified in clause 7(4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with *Managing Land Contamination Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning [DUAP] and EPA 1998).

As outlined in **Section 2.13** and identified on **Figure 11**, the *Stage 1 Preliminary Site Investigation* (SLR 2018a) (see **Appendix F**) identified one area of environmental concern within the Development Site, being a former sheep dip. Contaminants of potential concern at this site are arsenic, organochlorine pesticides, organophosphate pesticides, carbamates and synthetic pyrethoids.

As recommended by SLR (2018a), ProTen will engage a suitably qualified and experienced consultant to undertake a targeted soil investigation at the identified area of environmental concern involving three soil boreholes with associated soil sampling and laboratory analysis for the contaminants of potential concern. Subsequently, if determined necessary, ProTen will commission the necessary works to remediate and/or manage the area prior to commencing operation of the Development. Based on the nature of the potential contaminants, SLR (2018a) advises that there are well established means of remediation and/or management that could be implemented.

5.5.4 SEPP No. 44 – Koala Habitat Protection

The State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to provide for the protection of koala habitat by ensuring that areas subject to development proposals are considered for their value as habitat or potential habitat for koalas.

The Tamworth Regional LGA is not listed in Schedule 1 of SEPP 44 as an area to which the SEPP applies. However, the former Manilla LGA, which is now part of the Tamworth Regional LGA, is listed in Schedule 1 and the Development Site is located within the former Manilla LGA.

The *Biodiversity Assessment Report* (SLR 2018b) contained in **Appendix G** assessed the applicability of SEPP 44 to the Development. SEPP 44 requires the consent authority to consider two key steps:

- Step 1 - Is the land potential koala habitat? (clause 7); and
- Step 2 - Is the land core koala habitat? (clause 8).

The woodland habitats within the Development Site are classified as "potential koala habitat" given that more than 15% of the trees in these areas support koala feed trees (*Eucalyptus albens* and *Eucalyptus populnea*) as listed in Schedule 2 of SEPP 44 (SLR 2018b). However, these patches of woodland are outside of the disturbance footprint and will not be impacted by the Development.

SLR (2018b) advises that there is no evidence that a resident population of koalas is present within the Development Site based on the limited number of previous records and lack of evidence (i.e. sightings, male calls, fresh scats, recent scratches in bark). On this basis, the Development Site does not constitute "core koala habitat" within the meaning of SEPP 44.

SLR (2018b) concludes that SEPP 44 does not apply to the Development.

5.5.5 SEPP No. 33 – Hazardous and Offensive Development

The State Environmental Planning Policy No. 33 - Hazardous and Offensive Development (SEPP 33) regulates, amongst other things, the determination of development applications to undertake development for the purposes of a "potentially hazardous industry" or "potentially offensive industry". These are defined in SEPP 33 as:

> ***potentially hazardous industry*** *means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment.*
>
> ***potentially offensive industry*** *means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*

The Development will implement a range of best management practices and mitigation measures, as outlined in this EIS, to avoid and/or minimise the potential for adverse impacts to the local environment and surrounding populace. Furthermore, the Development will operate under the provisions of an approved OEMP (see **Section 4.25**) and workplace health and safety management system.

The *SEPP 33 – Preliminary Risk Screening and Hazard Assessment* (SLR 2018c) undertaken for the Development is contained in **Appendix J** and summarised in **Section 8.9**. The preliminary risk screening for the storage and transport of hazardous materials indicates that the Development may be considered "potentially hazardous" due to the quantities of LPG to be stored at each PPU and transported to the Development Site. On this basis, a Preliminary Hazard Analysis (PHA) was undertaken to assess the level of risk to people, property and the environment as a result of the storage and transport of LPG.

The PHA concluded that while the Development is considered potentially hazardous in relation to the on-site LPG storage, with suitable engineering and design controls in place, it would be unlikely to cause a risk, significant or minor, to the community. There is a requirement to ensure that the installation and maintenance of on-site LPG storage is in compliance with *AS/NZS 1596:2014 The Storage and Handling of LP Gas,* including maintaining minimum separation distances.

SLR (2018c) recommends that a Fire Safety Study be undertaken following development consent for approval prior to commencing construction.

5.6 Tamworth Regional Local Environment Plan 2010

LEPs are legal EPIs that guide planning decisions for LGAs and allow local councils to manage the ways in which land is used through zoning and development consents.

Under the provisions of the Tamworth LEP, the Development Site is zoned RU1 Primary Production. The objectives of the RU1 zoning are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To permit subdivision only where it is considered by the Council to be necessary to maintain or increase agricultural production.*
- *To restrict the establishment of inappropriate traffic generating uses along main road frontages.*
- *To ensure sound management of land which has an extractive or mining industry potential and to ensure that development does not adversely affect the extractive industry.*
- *To permit development for purposes where it can be demonstrated that suitable land or premises are not available elsewhere*

The Development is permitted with consent within the RU1 Primary Production zone and appears to be consistent with the objectives of the RU1 zone. It is acknowledged that the Development will generate additional traffic on the local road network, however the *Traffic Impact Assessment* (RoadNet 2018) concludes that the additional traffic will be able to be easily accommodated with no significant impact on the road network. Furthermore, as outlined in **Section 3.2**, there is very limited land that is both available and suitable within the Tamworth LGA for a large-scale poultry production operation.

The Development Site is not mapped as containing any "flood planning area" or "heritage items" within the Tamworth LEP.

5.7 Tamworth Regional Development Control Plan 2010

Development Control Plans (DCPs) differ from EPIs in that they are never more than factors to be considered. DCPs are not legally binding even though they might spell out planning policy and development standards in quite specific terms. The *Tamworth Regional Development Control Plan 2010* (Tamworth DCP) applies to all land within the Tamworth LGA. However, pursuant to clause 11 of the SRD SEPP, DCPs do not apply to SSD proposals. On this basis, no further consideration has been given to the Tamworth DCP in this EIS.

5.8 Other Considerations

5.8.1 Tamworth Regional Development Strategy

The *Tamworth Regional Development Strategy* (GHD 2008) was adopted by Council in November 2007 and subsequently endorsed by the then Department of Planning (now DPE) in April 2008. It was prepared to inform and provide a platform for the preparation of the Tamworth LEP.

The Strategy acknowledges the poultry industry as a significant contributor to the regional economy:

> *The poultry industry is a significant contributor to the regional economy. The industry comprises both meat and egg production and is a well established and mature industry in Tamworth. Tamworth has the exciting prospect of becoming a major stakeholder in fulfilling the growing demand for poultry products in Australia and internationally. Its natural resources and market based cost competitiveness creates the opportunity to further expand its poultry industry. To achieve growth of this scale, significant cooperation between industry and local and state governments is essential. It is critical that development is well planned to ensure both security and confidence with industry investors as well as managing community-industry interactions.*

Tamworth is a major stakeholder in the Australian poultry meat industry. The operations of ProTen and Baiada play an ever increasing role in the development of agribusiness in the Tamworth region.

The Development will increase the supply of broiler poultry by up to 17 million birds per year, which is integral to the industry's strategy for continued growth within the region and Australia. It is also integral to the relocation of Baiada's poultry processing plant from West Tamworth to the Oakburn site (see **Section 2.6.2** and **Figure 19**), which is only economically feasible with significant growth in the region's poultry broiler production.

To achieve such growth, and echoing Council's own Strategy, there needs to be significant cooperation between the poultry industry and local and State governments. It is in the industry's best interests to ensure new poultry developments are well-design, operated and managed, while consent authorities must adopt a merit-based or risk-based approach to assessing poultry development proposals.

The *Strategy* goes on to advise:

> *The poultry industry may cause potential land use conflicts. The impacts of poultry may include odour, dust and noise. The most effective mechanism to avoid the impacts is to have an adequate buffer around the sheds.*
>
> *Poultry farms therefore need to be located on large properties. The locational requirements for poultry farms include a good source of water (usually directly extracted from the rivers), good road access for the delivery of feed and transportation to the processing plant.*

This EIS includes detailed specialist assessments for those issues considered materially-significant, including odour, traffic, biodiversity, Aboriginal heritage and others. While the Development may result in some externalised impacts, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

5.8.2 Tamworth Tomorrow 2016-2021

Tamworth Tomorrow (Council 2016) is a strategy focussed on driving the economic growth of the Tamworth region. "Agriculture, food processing and agribusiness" is recognised as a key growth sector in the region and the strategic drivers required to activate growth in the sector include investment attraction and business expansion.

Again, the operations of ProTen and Baiada play an ever increasing role in the development of agribusiness in the Tamworth region. The Development is integral to the industry's strategy for continued growth within the region and also to Baiada's plan to relocate its poultry processing plant from West Tamworth to the company's Oakburn site (see **Section 2.6.2** and **Figure 19**), which will have its own economic benefits for the region.

Section 6

Stakeholder Consultation

6 STAKEHOLDER CONSULTATION

Consultation has been undertaken with State and local government agencies, local Aboriginal groups, surrounding residents and wider community in relation to the Development. The following sub-sections overview these consultation activities and identify the issues raised by those consulted and where these issues have been addressed within this EIS.

6.1 Government Consultation

6.1.1 Completed Consultation

Consultation was undertaken with the following State and local government agencies during development planning and impact assessment process:

- DPE;
- EPA;
- RMS;
- OEH;
- Lands & Water;
- DPI;
- WaterNSW (now part of Lands & Water);
- WAMC;
- Council;
- Gunnedah Shire Council (GSC); and
- Hunter New England Local Health (HNELH).

Table 13 provides a summary of the consultation activities undertaken with these agencies.

Table 13 Government Consultation Summary

Date	Agency	Method	Purpose / Issues Raised
28 April 2016	DPE and EPA	Meeting	Introduce the Development and discuss key aspects, including preliminary odour modelling results.
3 June 2016	DPE	Email	Submission of the PEA.
9 June 2016	DPE, EPA, OEH, DPI, WaterNSW, Council, GSC, HNELH	Planning focus meeting and site inspection organised by DPE	Introduce the Development, discuss key aspects and undertake a site inspection. While RMS and Lands & Water were also invited, they did not attend.
15 June 2016	DPE	Email	Submission of the SEARs application.
15 June 2016	Council	Emails	Seek clarification regarding surrounding receptors (existing and proposed/future).
16 to 21 June 2016	Lands & Water, WAMC	Emails	Seek clarification of ownership of Lot 1 DP504111 located between the Development Site and the Namoi River. Confirmed to be owned by WAMC (as successor in title from the former Water Conservation and Irrigation Commission).
17 June 2016	EPA	Conference call	Discuss odour modelling, including K factor, metrological modelling, odour criteria and receptors.

Date	Agency	Method	Purpose / Issues Raised
27 July to 18 August 2016	EPA	Emails	Seeking clarification of terms used in the EPA's input to the SEARs. EPA confirmed "clear pass" with the odour criterion to mean compliance is not marginal and was not obtained by removing all conservativeness from the model – see **Section 8.1** and the *Air Quality Assessment* (PEL 2018) in **Appendix C**.
9 August 2016	Lands & Water	Conference call	Discuss the SEARs requirement for a groundwater monitoring program, noting that the desktop assessment in the PEA identified no shallow/alluvial aquifers within the Development Site and no planned extraction of groundwater. Lands & Water suggested that a groundwater bore baseline assessment be completed to verify the findings of the desktop assessment – see **Sections 2.9.2** and **8.5** and the *Groundwater Bore Baseline Assessment* (SLR 2017) in **Appendix E**.
22 September 2016	EPA	Conference call	Discuss information presented in a letter report titled *Rushes Creek Odour Assessment – Draft Summary for EPA Discussion* (PEL 2016a), including modelling methodology, batch staging scenarios, meteorological modelling, odour criterion and odour modelling results. The EPA requested – a) Consultation with recreational receptors to obtain additional information about transient occupancy rates (to assist in determining appropriate criterion) – see **Section 2.5**; and b) Additional clarification regarding meteorological modelling – see the *Air Quality Assessment* (PEL 2018) in **Appendix C**.
23 September 2016	EPA	Email	Re-confirming why installation of an on-site weather station was not possible at this point in time and advising the information / methods PEL intended to use to ensure confidence in the meteorological model.
20 October 2016	Lands & Water	Phone call and email	Seek agreement that a water balance is not necessary for the Development given that each PPU will have a closed surface water management system. Confirmed that the EIS would detail the Development's water management systems, water requirements and water supply. Lands & Water confirmed in an email on 20 October 2016 that they were satisfied with this approach – see **Section 8.4.2**.
20 October 2016	Lands & Water	Email	Seek clarification on the assessment requirements for flooding impacts. Lands & Water advised in an email on 13 December 2016 – a) Appropriate to use the information in the Lake Keepit EIS – see **Section 2.10**; and b) Some concerns about overland flows / local runoff and the reasoning behind not undertaking any further flood work would need to be outlined in the EIS – see **Sections 2.10, 4.17.2** and **8.4**.
22 December 2016	EPA	Conference call	Discuss information presented in a letter report titled *Rushes Creek Odour Assessment - Recreational Receptors Discussion* (PEL 2016b), including determination of appropriate odour criterion for all receptors, justification of ventilation rates and meteorological modelling.
25 January 2017	EPA	Meeting	Discuss information presented in a letter report titled *Rushes Creek Poultry Production Complex (SSD 7704) Odour Impact Assessment* (PEL 2017a), including suitability of multiple odour criterion, the EPA's request to validate ventilation rates against literature not specified in the SEARs and meteorological modelling.

Date	Agency	Method	Purpose / Issues Raised
27 February 2017	EPA	Email	A copy of the report titled *Draft Report ProTen Rushes Creek Poultry Production Complex – Air Quality Assessment* (PEL 2018) was provided to the EPA for review. A letter from the EPA titled *SSD 7704 Rushes Creek Poultry Production Complex – Comments on Draft Odour and Draft Assessment* was received on 26 March 2017 identifying two primary issues to be addressed in the final assessment – a) Use of one odour criterion for all receptors – see **Section 8.1** and the *Air Quality Assessment* (PEL 2018) in **Appendix C**; and b) Validation of assumed ventilation rates – see the *Air Quality Assessment* (PEL 2018) in **Appendix C**.
1 June 2017	EPA	Conference call	Discuss information presented in a letter report titled *Rushes Creek Odour Assessment – Draft Summary for EPA Discussion* (PEL 2017c), including a revised 54 shed layout (i.e. the Development), validation of ventilation rates, a 5 odour unit criterion for all receptors and modelling results. EPA responded by email on 22 June 2017 providing feedback on the validation of ventilation rates, with no issues raised in relation to the revised Development layout, odour criterion or modelling results.
22 June 2017	EPA	Email	The EPA provided a response to the report titled Rushes Creek Odour Assessment – Draft Summary for EPA Discussion (PEL 2017b). The response included feedback regarding validation of ventilation rates. There were no objections to the proposed Development layout, odour criterion or modelling results.
13 September 2017	Lands & Water	Letter	Seek clarification of tenure and classification of an unformed road reserve within the Development Site. It was confirmed as "unformed Council public road" – see **Section 2.3**.
12 March 2018	Lands & Water	Email	Seek clarification on the tenure and classification of several parcels of Crown/public land within and adjoining the Development Site – see **Section 2.3**.
28 March 2018	DPE	Email	Advised of un-expected hold-ups to the EIS and delayed submission. DPE requested a copy of the draft EIS before it is formally lodged.
9 April 2018	Lands & Water	Phone call	Discuss licensing requirements under the WM Act for the water pump and also drainage works – see **Section 5.4.1**.
10 April 2018	Council	Email	Submission seeking land owners consent to submit the DA. Council provided written consent on 23 May 2018 and a copy of this consent is included in **Appendix N**.
12 April 2018	WAMC (via WaterNSW)	Email	Submission seeking land owners consent to submit the DA. The WAMC deemed that landowner consent was not required from them, advising that they would evaluate and consider granting of an easement or licence agreement over Lot 1 DP 504111 if required post consent. See **Appendix N**.
13 April 2018	Lands & Water	Email	Submission seeking land owners consent to submit the DA. Lands & Water provided written consent on 10 May 2018 and a copy of this consent is included in **Appendix N**.
28 June and 3 July 2018	DPE	Phone call and email	Advised EIS will not be submitted prior to 12 July 2018 (i.e. 2 years from the date of SEARs issue), however would be submitted end July / early August 2018. Also confirmed that there has not been any significant changes to the Development since the SEARs were issued that may result in any additional impacts. DPE advised via an email on 4 July 2018 that it will not amend the SEARs given the EIS will be submitted in August 2018.

6.1.2 Future Consultation

Future government agency consultation activities will include, but not be limited to, the following:

- Consultation with the DPE and other relevant government agencies, as necessary, during the evaluation of the EIS to discuss any issues and address any additional information requirements;
- Consultation with Council, Lands & Water and WAMC in relation to necessary easements and/or licences required over land in their care for water and electricity servicing infrastructure;
- Application to the EPA following development consent seeking an EPL under the POEO Act (see **Section 5.4.2**);
- Application to Council following development consent seeking consent under section 138 of the *Roads Act 1993* (see **Section 5.4.3**);
- Consultation with OEH following development consent in relation to fulfilling the biodiversity offset obligations (see **Section 8.6.5**);
- Submission of draft issue-specific management plans/strategies to relevant government agencies for review and comment;
- Submission of the CEMP and OEMP, including issue-specific management plans/strategies, to the DPE for approval prior to commencing construction and operation, respectively; and
- Consultation with the DPE and other relevant government agencies, as necessary, during the construction and operation. This will include formal compliance reporting as stipulated in the development consent.

6.2 Community Consultation

6.2.1 Completed Consultation

Consultation was undertaken with the following community stakeholders during development planning and EIS preparation:

- Manilla Ski Gardens Caravan Park (abbreviated to Caravan Park in **Table 14**);
- Manilla Fishing Club (abbreviated to Fishing Club in **Table 14**);
- Lake Keepit Sport and Recreation Centre (abbreviated to Sport & Rec in **Table 14**);
- Lake Keepit Soaring Club (abbreviated to Soaring Club in **Table 14**); and
- Surrounding residents.

Table 14 provides a summary of the consultation activities undertaken with these community stakeholders.

Table 14 Community Consultation Summary

Date	Stakeholder	Method	Purpose / Issues Raised
13 October 2016	Sport & Rec, Caravan Park	Phone call	Provide an overview of the Development and query occupancy rates for odour modelling purposes.

Date	Stakeholder	Method	Purpose / Issues Raised
17 October 2016	Sport & Rec, Caravan Park, Soaring Club, Fishing Club	Phone calls and emails	Provide an overview of the Development and query occupancy rates for odour modelling purposes. A copy of the PEA was emailed, along with relevant preliminary odour modelling results, information regarding consultation with the EPA and SLR contact details for any questions/additional information. Sport & Rec provided occupancy rate information for the 2015-16 financial year on 18 October 2016 via email – see **Section 2.5**.
24 October 2016	Soaring Club	Phone call	Discuss occupancy rates. Soaring Club raised the possibility of ProTen providing an emergency landing site for gliders within the Development Site – see **Section 8.12.3**. Soaring Club provided occupancy rate information in an email on 23 November 2016 – see **Section 2.5**.
9 November 2016	Fishing Club	Phone call	Discuss occupancy rates and likely traffic generation along Ski Gardens Road – see **Section 2.5**. Fishing Club provided occupancy rate information in an email on 23 November 2013 – see **Section 2.5**.
16 November 2016	Caravan Park	Phone call	
29 November 2016	Surrounding residents	Letter drop	Invite surrounding residents to a community meeting and site inspection on 15 December 2016.
30 November 2016	Fishing Club, Sport & Rec, Caravan Park, Soaring Club	Email	Invite stakeholders to a community meeting and site inspection on 15 December 2016.
2 December 2016	Landowner (to the south of the Development Site)	Phone call and email	Landowner raised concerns in relation to: a) potential odour – see **Section 8.1** and the *Air Quality Assessment* (PEL 2018) in **Appendix C;** b) Visual amenity – see **Section 8.10**. Additional information was provided to the landowner, including a copy of the PEA, an overview of development changes since the PEA (i.e. reduction in sheds and re-location of Farm 3) and progress of specialist assessments.
8 December 2016	Landowner (to the northwest of the Development Site)	Phone call	Landowner raised general concerns regarding the receptors located in close proximity to the Development – see relevant sub-sections in **Section 8** and appended specialist impact assessments. Landowner also raised concerns in relation to chemical use – see **Sections 4.19** and **8.9**. Additional information was provided to the landowner, including a copy of the PEA, an overview of development changes since the PEA (i.e. reduction in sheds and re-location of Farm 3) and progress of specialist assessments.
15 December 2016	Surrounding residents and operators of surrounding recreational facilities	Meeting and site inspection	On-site meeting and site inspection attended by approximately 20 members of the local community. Information provided during the meeting included plans showing development layout and mapped environmental constraints (woodlands, Aboriginal sites), an overview of ProTen's business and the region's poultry industry, an overview of the proposed Development, an overview of the EIS process and a summary of works completed to date. During the meeting a landowner provided a letter advising of a small piggery operation on their property to the northeast of the Development Site and raising concer4ns in relation to: a) biosecurity – see **Section 4.23**; and b) cumulative odour – see **Section 8.1** and the *Air Quality Assessment* (PEL 2018) in **Appendix C**. It was noted that Farm 4 may be visible from receptor R25 to the southeast. ProTen subsequently relocated Farm 4 approximately 100 m to the north to reduce the visibility – see **Sections 3.1** and **8.10**.

Date	Stakeholder	Method	Purpose / Issues Raised
5 January 2017	Landowner (owner of small piggery to the northeast of the Development Site)	Phone call	Further discussion in relation to: a) biosecurity – see **Section8.23**; and b) cumulative odour – see **Section 8.1** and the *Air Quality Assessment* (PEL 2018) in **Appendix C**.
24 April 2017	Soaring Club	Email	Respond to an email querying progress of the EIS.
August / September 2018	Surrounding residents, Fishing Club, Sport & Rec, Caravan Park, Soaring Club	Letter drop	Confirm submission of the EIS and advise of planned community information session (see **Section 6.2.2**).

As listed in **Table 14**, the main issues raised by the consulted community stakeholders were:

- Odour emissions, including the potential for cumulative odour with the nearby small piggery – see **Section 8.1**;
- Traffic – see **Sections 4.15.5** and **8.3**;
- Visual amenity impact – see **Section 8.10**;
- Chemical use – see **Sections 4.19** and **8.9**;
- Biosecurity - see **Section 4.23**; and
- The provision of an emergency landing site for the Soaring Club – see **Section 8.12.3**.

6.2.2 Future Consultation

Community Information Sessions and Face-to-Face Meetings

Shortly following submission of this EIS to the DPE for public exhibition, ProTen will contact the surrounding residents and recreational facilities and invite them to a community information session. This session will serve to overview the Development (as proposed), outline and discuss the findings of key impact assessments (for example, odour and traffic) and provide an overview of the EIS assessment and determination process, including how to review and comment on the EIS during the exhibition phase.

ProTen will hold subsequent face-to-face meetings if requested by any of the community stakeholders.

ProTen will also arrange additional community information sessions prior to commencing both construction and operation if desired by the community stakeholders.

Information Letters

Prior to commencing both construction and operation ProTen will inform the surrounding residents and recreational facilities of planned commencement of construction/operation via a letter drop. The letter will advise relevant details, including general construction/operation activities, key dates, staging and hours, and relevant site contact details. These stakeholders will also be informed of any changes to the construction/operation activities in writing.

Environmental Hotline

ProTen will also continue to operate its freecall environmental hotline number, which is provided on the company's website, to ensure community concerns can be raised and addressed.

Signage

Clearly visible signage will be installed at both the site access driveways off Rushes Creek Road prior to commencing construction. The signs will advise relevant details, including the site name, site office location, site contact details and any specific access requirements (for example, reporting to the site office and/or biosecurity requirements).

6.3 Aboriginal Community Consultation

Consultation with the local Aboriginal community in relation to the Development was undertaken by OzArk in compliance with the four stage process under the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010b). The below sub-sections provide a summary of this consultation and further detailed information is contained in the *Aboriginal Cultural Heritage Assessment Report* (OzArk 2018) (ACHAR) in **Appendix H**.

6.3.1 Stage 1 – Notification of the Development and Registration of Interest

The Stage 1 consultation process involved the following activities in order to identified Aboriginal groups or individuals wishing to be consulted as RAPs:

(a) Letters were sent to the following parties on 10 August 2016 –

- Office of The Registrar, Aboriginal Land Rights Act 1983;
- NTSCORP Limited (Native Title Service Provider for Aboriginal Traditional Owners in New South Wales and the Australian Capital Territory);
- Tamworth Local Land Services;
- National Native Title Tribunal;
- OEH;
- Tamworth Local Aboriginal Land Council (TLALC); and
- Council.

(b) An advertisement was placed in the local newspaper, *The Northern Daily Leader*, on 12 August 2016. By the closing date for registration, the following 12 groups or individuals registered to be consulted as RAPs:

- TLALC;
- T&G Culture Consultants;
- Richard Slater;
- DFTV Enterprises;
- Gomery Cultural Consultant;
- Brian Draper;
- White Cockatoo Aboriginal Corporation;
- Gomeroi People NC2011/006 (C/- Sam Hegney; T/A Gomeroi Country Services Pty Ltd);
- Gomeroi People NC2011/006 (C/- NTSCORP);
- Natasha Rodgers;
- AT Gomilaroi Cultural Consultancy; and
- Veronica Talbott.

6.3.2 Stage 2/3 – Presentation of Information and Gathering Information

An information package, comprising an overview of the Development and proposed survey methodology, was sent to all RAPs on 12 September 2016 with feedback received from Natasha Rodgers and AT Gomilaroi Cultural Consultancy.

Field work was undertaken over a four day period between 18 and 21 October 2016, with the following RAPs participating:

- 18 to 21 October 2016 – TLALC;
- 18 October 2016 - Gomeroi People NC2011/006 (T/A Gomeroi Country Services) for 2 hours;
- 19 October 2016 - Gomeroi People NC2011/006 (T/A Gomeroi Country Services);
- 20 and 21 October 2016 - Gomeroi People NC2011/006 (T/A Gomeroi Country Services); and
- 21 October 2016 - Gomeroi People NC2011/006 (T/A Gomeroi Country Services).

A letter was sent to all RAPs on 6 June 2017 advising of delays to the Development in order to finalise the disturbance footprint. The letter also advised the results of the field survey work and future consultation activities.

6.3.3 Stage 4 – Review of Draft ACHAR

The draft ACHAR was sent to all RAPs on 29 August 2017, with a 28 day review period provided. No feedback was received from the RAPs in relation to the draft ACHAR. One of the RAPs phoned OzArk seeking an update on the Development and querying whether construction had commenced.

A letter was sent to all RAPs on 16 February 2018 advising that the disturbance footprint had increased to incorporate surface water management at the PPUs and this would result in an additional three Aboriginal heritage sites being impacted.

6.4 Service Providers

ProTen is consulting and working with the following service providers and companies in relation to ensuring the Development is suitably and appropriately serviced:

- Essential Energy – connection to the external reticulated electricity supply grid owned by Essential Energy, including feeding any surplus solar power in to the grid;
- Energy Serve – design of the internal electricity supply infrastructure and connection to the external supply grid owned by Essential Energy;
- Smart Commercial Solar – design, supply and installation of the solar panels at each PPU;
- Telstra – provision of telecommunication services; and
- Elgas – the design and supply of LPG storage tanks.

ProTen is working with LRCE in relation to the detailed civil design for the Development, which will be finalised following development consent, and also multiple other companies in relation to the design and supply of the various items of built infrastructure (see **Appendix L**). ProTen has also contacted several companies in relation to the design of internal water supply infrastructure (i.e. hydraulic design).

Section 7

Environmental Risk Assessment

7 ENVIRONMENTAL RISK ASSESSMENT

A high level environmental risk assessment was completed in May 2016 in order to:

- Identify those issues relating to the Development that represent the greatest risk to the local environment and surrounding populace; and
- Assist in setting (and justifying) priorities for the level of assessment required to address each identified risk within the EIS.

A qualitative risk assessment methodology, which was developed in accordance with the requirements of the *Australian Standard AS/NZS 31000:2009 – Risk Management – Principles and Guidelines*, was utilised to provide a consistent and reliable approach. Where the individual risk(s) was considered unacceptable, or where a knowledge gap was identified, specialist assessments were commissioned and appropriate mitigation measures and/or management responses nominated.

The Risk Register, which was prepared to document the findings and outcomes of the risk assessment, was appended to the PEA that was submitted to the DPE in June 2016. A total of 18 risks were assessed, with the majority being ranked as "moderate" or "low" risks. These risks and where they have been addressed within this EIS are listed in **Table 15**.

Table 15 Environmental Risk Assessment Summary

Residual Rank Ranking	Risk	EIS Section
Level V – Extreme	Nil	-
Level IV - High	Nil	-
Level III - Significant	Odour emissions	Section 8.1 and Appendix C – *Air Quality Assessment* (PEL 2018)
	Heavy vehicle traffic generation	Sections 4.15.5 and 8.3 and Appendix D – *Traffic Impact Assessment* (RoadNet 2018)
	Impacts to local biodiversity	Sections 2.11 and 8.6 and Appendix G – *Biodiversity Assessment Report* (SLR 2018b)
	Impacts to Aboriginal heritage	Sections 2.12.1 and 8.7 and Appendix H – ACHAR (OzArk 2018)
Level II - Moderate	Land use conflict with surrounding agricultural land uses	Section 8.12
	Land use conflict with surrounding recreational land uses	Section 8.12
	Noise emissions	Section 8.8 and Appendix I – *Noise Impact Assessment* (Global Acoustics 2018)
	Heavy vehicle traffic noise	Section 8.8 and Appendix I – *Noise Impact Assessment* (Global Acoustics 2018)
	Visual amenity	Section 8.10
	Waste management	Section 4.18
	Potentially hazardous materials	Sections 4.19 and 8.9 and Appendix J – *SEPP 33 - Preliminary Risk Screening and Hazard Assessment* (SLR 2018c)
	Emergency animal disease outbreak	Section 4.24
	Pest populations	Section 4.21
Level 1 – Low	Reduction in viable agricultural land	Section 8.12

Residual Rank Ranking	Risk	EIS Section
	Particulate matter emissions	Section 8.2 and Appendix C – *Air Quality Assessment* (PEL 2018)
	External lighting emissions	Sections 4.10.5 and 8.10
	Impacts to local surface water resources	Section 8.4
	Impacts to local groundwater resources	Section 8.5

As evident, the risk assessment did not identify any risks with a residual risk ranking (taking into account the proposed mitigation measures) of "extreme" (Level V) or "high" (Level IV). This can primarily be attributed to the location of the Development Site, including separation distances to populated areas and surrounding receptors, the nature of the existing environment, the engineering design features of the Development and the mitigation measures to be employed.

Four risks with a residual risk ranking of "significant" (Level III) were identified, with specialists consultants engaged to undertake detailed impact assessments for each. The remaining 14 risks were ranked as either "moderate" (Level II) or "low" (Level 1).

Section 8 contains a comprehensive and focussed assessment of all environmental issues to a level of detail commensurate with their residual risk ranking.

Section 8

Impact Assessment



8 IMPACT ASSESSMENT

This section addresses the potential environmental, social and economic impacts associated with the Development and nominates the measures that will be implemented by ProTen to mitigate and manage these impacts. The issues have been prioritised in accordance with the SEARs.

8.1 Odour

Odour 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 during the production cycle. The poultry industry has come a long way over the past 10 years and operates on the basis of continual environmental improvement driven by environmental legislation and community expectations. The odour produced in modern broiler production farms, such as that proposed, is less than that associated with older broiler production farms and less than other intensive livestock operations such as piggeries and cattle feedlots.

PEL was engaged to undertake an assessment of odour emissions and potential impacts associated with the Development. The assessment was undertaken in accordance the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2016) (the Approved Methods) and *Assessment and Management of Odours from Stationary Sources in NSW* (EPA 2006). A copy of PEL's *Air Quality Assessment* (PEL 2018) is contained within **Appendix C**, with the key findings for odour summarised in the below sub-sections.

8.1.1 Existing Environment

Odour

The Development Site is located in a rural area with no major sources of odour. The nearest existing intensive livestock operations are Glenara Park Poultry Breeder Farm located approximately 6.6 km to the northwest of the Development Site and a small piggery located close to 2 km to the northeast of the Development Site. While there is no published information, the local air quality would be considered good.

Site Meteorology

Wind

A summary of the modelled annual wind behaviour at the Development Site is presented in the wind roses generated by PEL (2018) in **Section 2.7**. The annual wind rose shows that the prevailing winds are from both the northeast and east with some winds from the west, which is consistent with expectations when the terrain in the area is considered.

Winds in the early morning and late night are typically light (3 m/s) and from northeast to east directions, which, again, is a function of the local and regional terrain. During the morning and afternoon, the winds are typically stronger with less wind from the northeast and a higher proportion of winds from the west and southwest. There is a high frequency of calm to light winds (up to 3 m/s), occurring 50% of the time.

Stability

Atmospheric turbulence is an important factor in air pollution meteorology and odour plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume. As turbulence increases, the rate of plume dilution or diffusion increases.

The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability classes from A to F. Class A is described as very unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in the early morning. Under these conditions plumes can remain relatively undiluted for considerable distances downwind. Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds.

The frequency of each stability class predicted by PEL (2018) shows a typical frequency of occurrence of classes E and F stability (41%), with a relatively high proportion of class F due to low wind speeds at night.

Mixing Height

Mixing height is the depth of the atmospheric mixing layer beneath an elevated temperature inversion. It is an important parameter in air pollution meteorology as vertical diffusion or mixing of a plume is generally considered to be limited by the mixing height. This is due to the air above this layer tending to be stable, with restricted vertical motions.

In relation to the Development Site, PEL (2018) advises that the mixing height at night is normally relatively low. It increases after sunrise in response to convective mixing due to solar heating of the earth's surface, with the maximum mixing height occurring between 12 noon and 4:00 pm.

8.1.2 Emissions Estimation

PEL (2018) adopted an odour emissions modelling methodology developed by Ormerod & Holmes (2005), which is based on odour emission rate data collected at a number of meat chicken farms over time. This methodology is consistent with that recommended in the *Best Practice Guidance for the Queensland Poultry Industry – Plume Dispersion Modelling and Meteorological Processing* (PAEHolmes 2001, cited in PEL 2018) as prepared for the Queensland Government for inclusion in the *Queensland Guidelines - Meat Chicken Farms* (DAFF 2012, cited in PEL 2018). It has also been used in regulatory matters in NSW, including ProTen's large-scale Narrandera Poultry Production Farm (SSD 6882) approved in November 2015, and in Victoria and South Australia.

Odour emission rates (OERs) for the Development are based on data from a variety of meat chicken farms in Australia, as well as theoretical considerations. The approach generates hourly varying emission rates based on:

- The number of birds, which varies later in the production cycle as harvesting takes place;
- The 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, with chicken batches at approximately 5 weeks of age or more. Given that maximum odour emissions occur around 5 weeks and later, these samples represent the maximum odour generating potential. This data was standardised to relate the OER per unit bird density and shed area to the ventilation rate at the time of sampling.

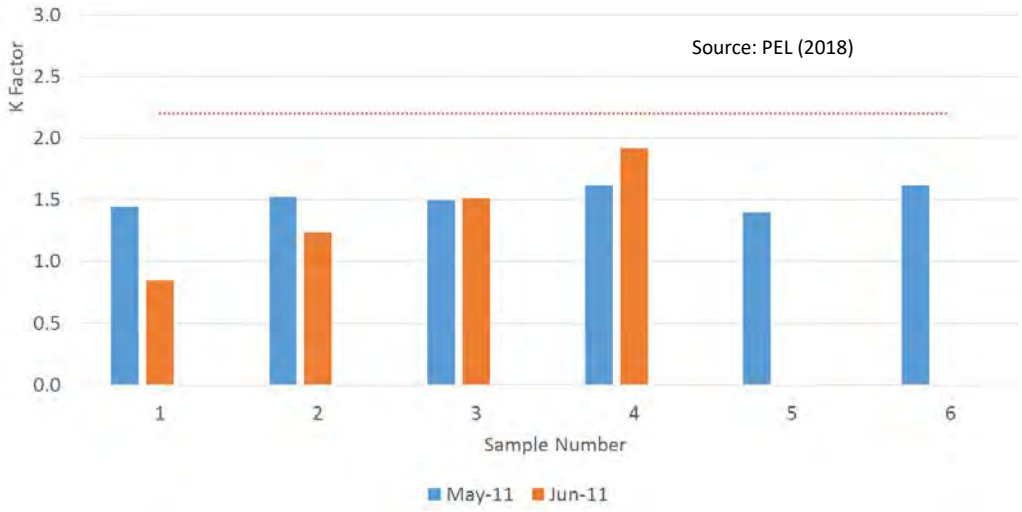
The odour emissions used by PEL (2018) were based on the following criteria/assumptions:

- A K factor of 2.0 (see below);
- The minimum ventilation rates were based on "birds placed" (i.e. maximum bird numbers, not "birds present"), meaning that the emissions were overestimated for minimum ventilation conditions;
- Design and management practices will be best practice; and
- A maximum ventilation rate of 10 cubic metres per hour per bird (m^3/hr/bird).

The K factor is a scaling factor between 1 and 5, where a value of 1 represents a very well designed and managed poultry shed operating with minimal odour emissions. The adopted K factor of 2 is based on test data collected at a number of poultry farms in Queensland and NSW over time. While older poorly managed farms typically had K factors of above 2, new well managed farms were found to be operating with a K factor of 2 or less.

PEL reviewed the results of 10 samples collected at ProTen's Bective Broiler Production Farm in 2011. The first six samples (duplicated samples collected in three sheds) were collected in the week leading up to first pickup (days 27 and 28) and the remaining samples were collected at day 41. These data are summarised in **Figure 23**, with the red line representing a K factor of 2.2. The average K factor for this period was 1.5, indicating that the farm was operating at best practice management with reduced emissions and, as such, results are notably lower than K=2.

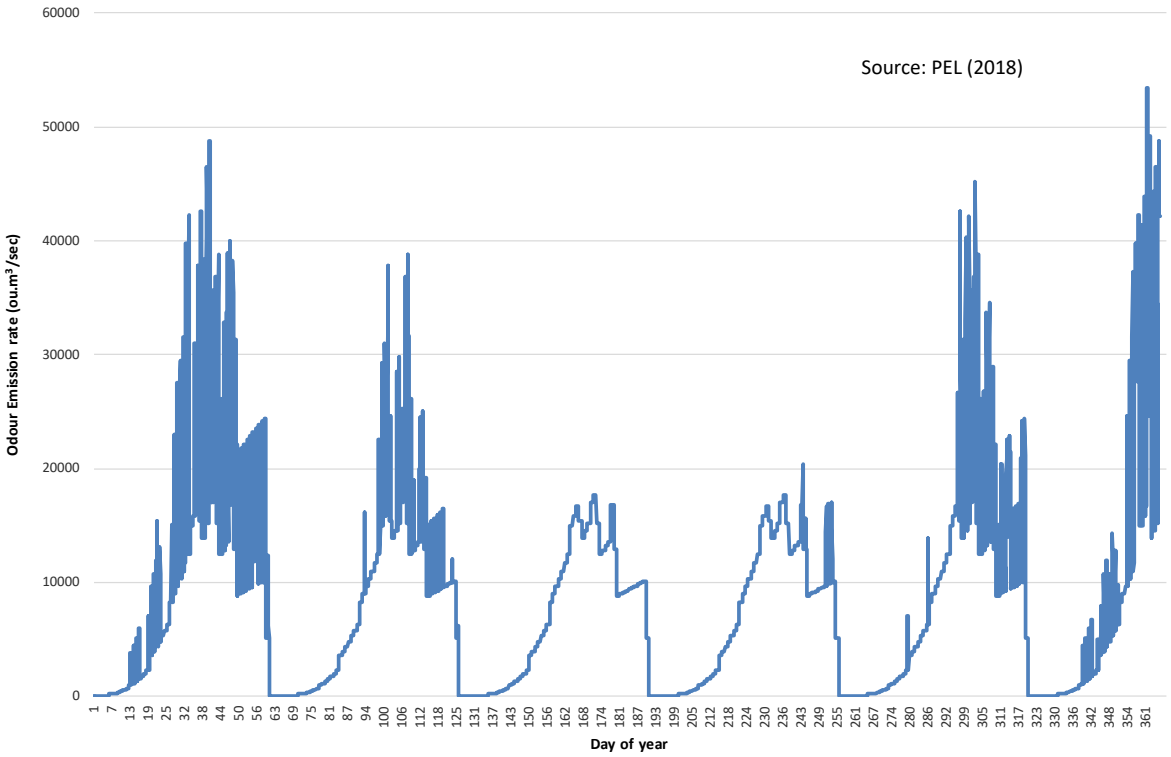
Figure 23 K Factors – ProTen's Bective Poultry Production Farm 2011



The data shown in **Figure 23** is consistent with sample data held by PEL for other sites in Queensland and NSW collected between 2012 and 2018 for birds aged between 26 and 38 days. Overall, the emission rate data shows a downward trend in emissions towards an average of around K=1.5, indicating that the adopted K=2 is likely an upper value, rather than average emission rate value, and provides conservatism.

Figure 24 shows the variability of odour emissions for one poultry shed over a full calendar year (i.e. approximately 5.6 cycles).

Figure 24 Modelled Shed OER Variations Over Time (K=2)



The decline in emissions 55 days after each batch placement represents the total removal of birds at the end of the batch and shed clean-out. While shed clean-out may result in some elevated odour release during disturbance of the poultry litter, such emissions can be easily managed by minimising the amount of air exchange through the shed and cleaning only during the daytime when atmospheric dispersion is most effective (PEL 2018). The drop in emissions midway through the year corresponds with cooler temperatures in late autumn and winter, which results in lower ventilation rates and therefore lower odour emissions.

8.1.3 Meteorological Modelling

The meteorological data used in the dispersion modelling was processed by PEL (2018) in two steps. Synoptic scale meteorological data were first processed in The Air Pollution Model (TAPM) and then further processed in CALMET to produce the wind field and weather data suitable for dispersion modelling with CALPUFF (see **Section 8.1.5**). 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. CALMET is the meteorological pre-processor to CALPUFF that uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict a gridded three-dimensional meteorological field (containing data on wind components, air temperature, relative humidity, mixing height and other micro meteorological variables).

This method is known as the "No Observation" approach, as detailed in the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for inclusion into the Approved methods for the Modeling and Assessment of Air Pollutants in NSW, Australia* (OEH 2011, cited in PEL 2018).

Representative Year

PEL (2018) assessed meteorological data from the BoM station at the Tamworth Airport between 2005 and 2012 to determine which year to model. The data was analysed for wind speed, temperature and relative humidity, with 2005 selected as the most representative year for the odour assessment. The wind roses for the eight years assessed are similar, indicating minor inter-annual variation.

8.1.4 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. Impacts from odorous air contaminants are typically nuisance-related, rather than health-related.

The Approved Methods (EPA 2016) include ground-level concentration criterion for complex mixtures of odorous air pollutants. They have been refined to take account of population density in an area. **Table 16** lists the odour ground-level concentration criteria, measured in odour units (ou), which should not to be exceeded more than 1% of the time for different population densities.

Table 16 Odour Performance Criteria

Population of Affected Community	Ground Level Concentration Criterion (ou)
Urban (≥2,000) and/or schools and hospitals	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤~ 2)	7.0

Source: Approved Methods (EPA 2016)

The ABS 2016 census data for rural communities in NSW gave an average population per house of 2.4 people, while the EPA typically adopts an average of 2.8 people per house. PEL (2018) conservatively adopted the EPA's value of 2.8 people per house, which resulted in an estimated population potentially impacted by the Development of 20 people. Practically, this has been determined by counting the number of houses within the 2 ou contour line, which is seven, and multiplying this by 2.8. There are no other receptors, including any of the surrounding recreational land uses, located within the 2 ou contour line for any of the three modelling scenarios (see **Section 8.1.5**). On this basis, the applied odour criterion for the Development is 5 ou for all sensitive receptors. This has been calculated based on the total population affected by the Development.

8.1.5 Impact Assessment

The dispersion model known as CALPUFF was used by PEL (2018) in the assessment of potential odour emissions from the Development. 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 emissions transport, transformation and removal. The model contains algorithms for near source effects such as building downwash, partial plume penetration and sub-grid scale interactions. The model employs dispersion equations based on a Gaussian distribution of emissions across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources.

In addition to the three-dimensional meteorological data output from CALMET, CALPUFF requires plant layout, emission data and receptor information. Each shed was represented in the model as a pseudo point source, with each point source assigned a diameter the same width as the shed. The source diameter and vertical velocity were set as to ensure the momentum of the plume was maintained (PEL 2018).

A sensitivity analysis of the odour risk of the Development was completed by PEL (2018) by assessing the odour impact associated with changing the assumed start day of the bird placement. By changing the start day, the peak odour emissions have been assessed against a range of meteorology conditions throughout the year. The batch staging is presented as three model scenarios to represent day 1, day 14 and day 28 bird placements. PEL (2018) set up the model so that birds were placed on the first working day of 2005 (the selected representative meteorological year, see **Section 8.1.3**) which is the Monday, day 4 of the calendar year. Therefore, the model begins on day 4, day 18 and day 32 of the calendar year. The maximum number of birds that can be placed on any given day is 636,000 (±6%), which is equal to a maximum of 12 sheds per day.

The predicted one second (peak to mean ratio included) odour concentrations for the three modelled scenarios at the most affected sensitive receptors and recreational facilities in the vicinity of the Development Site are listed in **Tables 17** and **18,** respectively.

Table 17 Predicted 99th Percentile Odour Concentrations – Most Affected Receptors

Batch Scenario	Assessment Criterion (ou)	Predicted 99th Percentile Odour Concentration (ou)			
		R22	R23	R24	R25
Day 4	5	2.1	2.0	3.4	2.7
Day 18		2.0	2.0	4.0	3.0
Day 32		3.7	3.6	4.2	2.8
Average		2.6	2.5	3.9	2.8

Table 18 Predicted 99th Percentile Odour Concentrations - Recreational Facilities

Batch Scenario	Assessment Criterion (ou)	Predicted 99th Percentile Odour Concentration (ou)		
		R20 Manilla Ski Gardens Caravan Park	R17 Manilla Fishing Club	R32 Lake Keepit Sport and Recreation Centre
Day 4	5	1.1	1.1	1.9
Day 18		1.1	1.1	1.7
Day 32		1.3	1.2	1.6
Average		1.2	1.1	1.7

The predicted 99th percentile odour concentrations for the three batch staging scenarios are illustrated as contour plots on **Figures 25**, **26** and **27**.

Figure 25 Predicted 99th Percentile Odour Concentrations Day 4

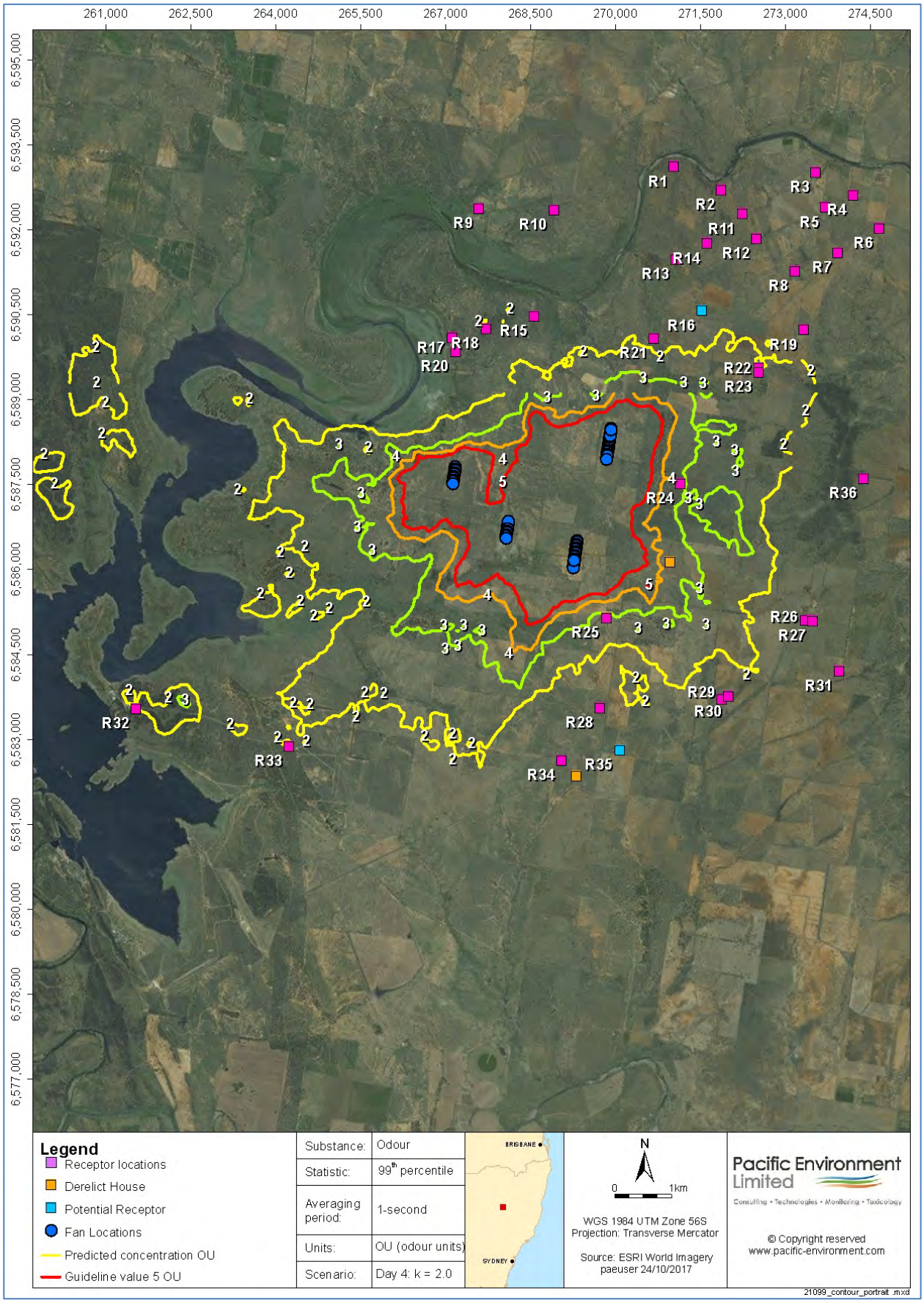


Figure 26 Predicted 99th Percentile Odour Concentrations Day 18

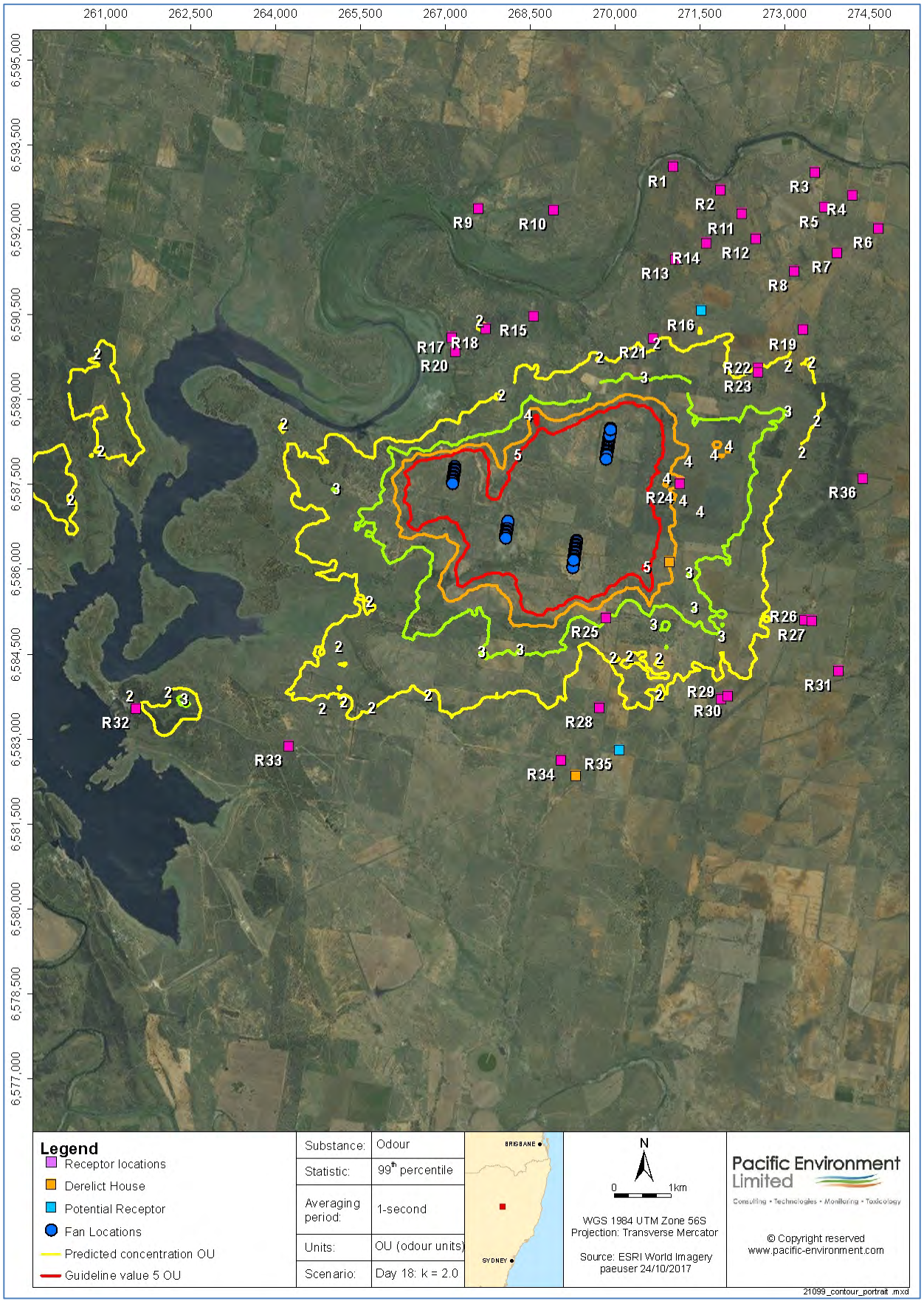
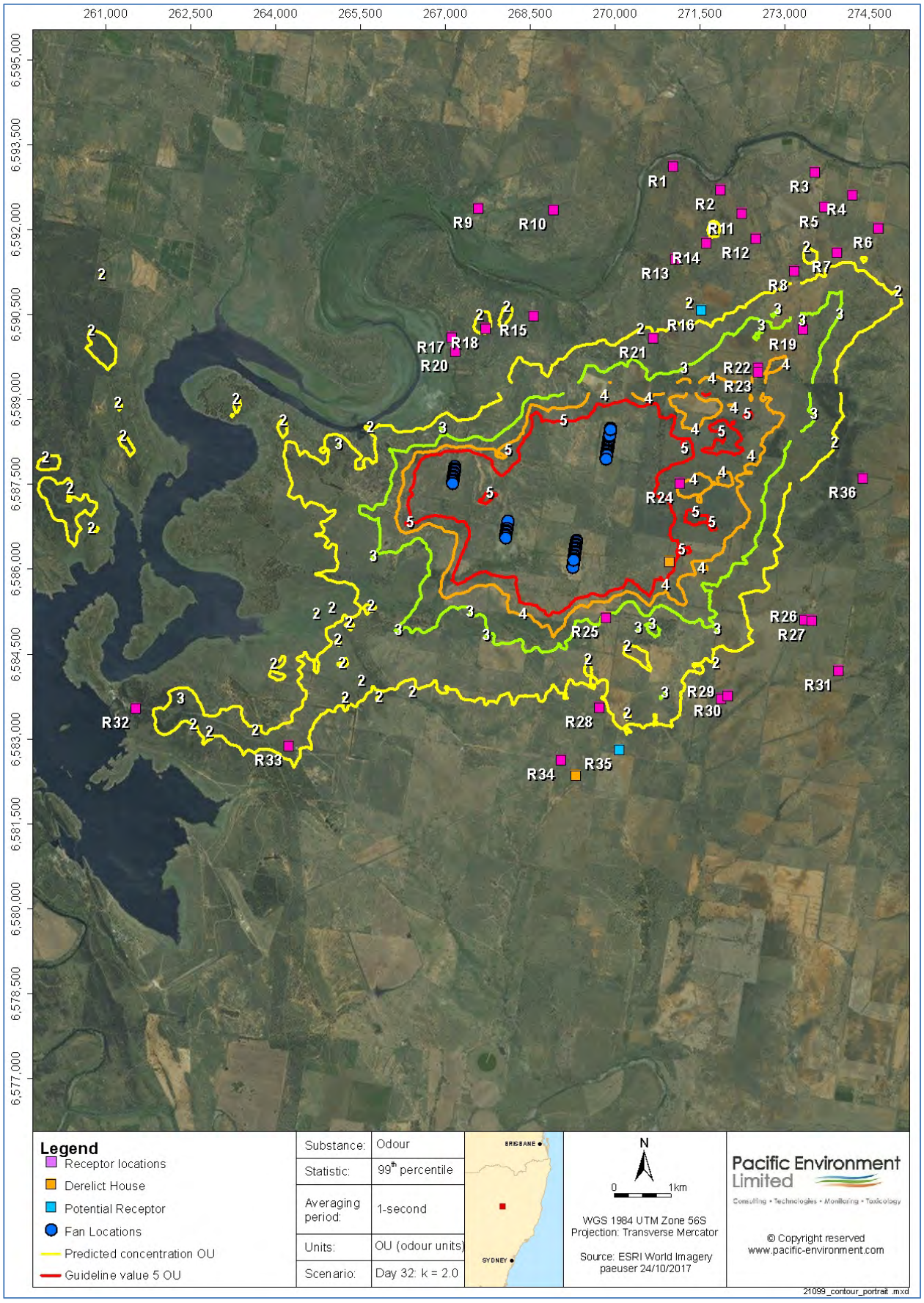


Figure 27 Predicted 99th Percentile Odour Concentrations Day 32



The results listed in **Tables 17** and **18** and shown on **Figures 25** to **27** show that all residential receptors and recreational facilities surrounding the Development Site are predicted to experience 99th percentile odour concentrations below the 5 ou criterion for all three batch staging scenarios. The highest predicted concentration is 4.2 ou at residential receptor R24 for the day 18 staging scenario.

The modelling shows that the surrounding recreational facilities are all expected to experience 99th percentile odour concentrations below 2 ou for all three batch staging scenarios. The highest predicted concentration at a recreational facility is 1.9 ou at the Lake Keepit Sport and Recreation Centre (R32) for the day 4 staging scenario.

Cumulative Odour

The nearest other intensive livestock operations are:

- Glenara Park Poultry Breeder Farm comprising six poultry sheds and housing a combined 80,000 breeder birds approximately 8.2 km to the north-northwest of the nearest PPU, being Farm 1. PEL (2018) noted that breeder farms typically have a much smaller odour footprint than equivalent sized broiler farms.
- A small piggery facility comprising around 50 sows approximately 3.1 km to the northeast of the nearest PPU, being Farm 2. PEL (2018) noted that the odour emanating from the piggery would have different odour character from that emanating from the Development.

All other intensive livestock operations are located 10 km or more from the Development Site.

Based on the size and nature of Glenara Park and the piggery, the separation distances and predicted spread of odour emissions from the Development (see **Figures 25** to **27**), a cumulative odour assessment was not undertaken as there is negligible potential for cumulative odour impacts (PEL 2018).

8.1.6 Mitigation and Management

ProTen understands that odour issues are directly related to farm operation, with good management practices playing a significant role in reducing the potential for emissions. The Development Site offers several advantages in terms of the potential for odour impacts, including being removed from any urban areas, low density of surrounding residences and significant separation distances.

While the Development is predicted to have low impact on local amenity with respect to odour impacts, ProTen will take reasonable and practicable measures to minimise emissions. The following development design features, best management practices and mitigation measures will be implemented to minimise the potential for odour impacts:

Development Design

- 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-ventilated sheds helps to maintain bedding material within the optimal moisture range.
- The poultry sheds will be fully enclosed, have wide eaves and will be surrounded by dwarf concrete bund walls to prevent stormwater entering the poultry sheds and elevated moisture levels.
- The poultry sheds will be fitted with nipple drinkers with drip cups to minimise water spillage and elevated moisture levels.
- The feed silos will be fully enclosed to prevent the entry of rainwater and elevated moisture levels.

Shed Operations During Bird Growing Phase

- The Development will not exceed a maximum population of 3,051,000 broiler birds.
- Stocking densities will comply with the RSPCA Standards (2013) specification of 34 kg/m^2.
- Stocking densities and bird health will be regularly checked and, if necessary, appropriate corrective measures implemented.
- A minimum depth of 50 mm of fresh bedding material will be laid throughout the poultry sheds at the start of each batch.
- Bedding material moisture levels will be regularly checked. Any excessively wet material and/or caked material beneath drinking lines will be promptly identified, removed and replaced.
- Bird drinkers will be maintained to minimise/avoid leakage that will result in wet patches in the bedding material.
- The poultry shed ventilation systems will be maintained to ensure air movement is at design level.
- Where possible, activities that may increase odour emissions (for example, bedding material replacement) will be undertaken during daytime hours.
- Shed access points will remain closed at all times other than for the purposes of allowing access to the sheds.
- Dead birds will be collected from the poultry sheds on a daily basis and stored in the on-site dead bird freezers prior to being removed off site.

Shed Operations During Shed Cleanout

- Poultry litter will be promptly removed from the poultry sheds and transported off site in covered trucks at the end of each production cycle.
- Where possible, litter handling will be avoided during adverse climatic conditions, such as times of cold air drainage during early morning or strong winds. The shed ventilation systems will not be used during little removal.
- Poultry litter will not be stockpiled or spread within the Development Site.

Vegetation Screens

- Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**). ProTen will progressively establish the landscape plantings as soon as practicable following bulk earthworks and construction of development infrastructure at each PPU. Vegetation screens reduce the magnitude and frequency of any adverse air quality impacts by effectively slowing and filtering air movement, which enhances dust deposition and odour dispersion.

Weather Station

- A weather station will be installed within the Development Site to collect on-going and up-to-date weather monitoring data, which will assist in investigating and responding to any air quality complaints.

8.2 Particulate Matter

Given the nature of intensive poultry production operations it in inevitable that there may be the intermittent release of fugitive particulate matter during the production cycle. However particulate matter has been demonstrated to typically not an issue for a well-run modern poultry broiler farm.

PEL was engaged to undertake an assessment of particulate matter emissions and potential impacts associated with the Development. The assessment was undertaken in accordance the Approved Methods (EPA 2016). A copy of PEL's *Air Quality Assessment* (PEL 2018) is contained within **Appendix C**, with the key findings for particulate matter summarised in the below sub-sections.

8.2.1 Existing Environment

Particulate Matter

There is no published information on local air quality available and no on-site monitoring has been undertaken. The closest EPA monitoring site is within Tamworth and therefore not representative of the rural environment in which the Development Site is located.

The EPA's Namoi Region Air Quality Monitoring Project provides baseline ambient air quality data from privately-owned monitoring stations in the Namoi region. The closest monitoring station to the Development Site is located in a rural area at Wil-gai approximately 40 km to the northeast. **Table 19** lists the available PM_{10} (particulate matter less than 10 microns in diameter) levels from the Wil-gai monitoring station between July 2015 and September 2017.

Table 19 PM_{10} Monitoring Data Collected at Wil-gai

Year	Average (µg/m^3)
Jun 2015 to Dec 2015	8.0
Jan 2016 to Dec 2016	11.2
Jan 2017 to Sep 2017	13.3

µg/m3 = microgram per cubic metre

Whilst there appears to be an increase in average concentration over time, this is in part a function of the data for 2015 and 2017 not being for a complete year (PEL 2018). PEL (2018) advises that the rolling annual average remained relatively constant until May 2017, when a gradual increase occurred. Much of NSW experienced serious to severe rainfall deficiencies in the four months between May and September 2017 that would have had a direct influence on the data.

The 2016 data, as the only complete year of data, is considered representative of air quality in the area.

Site Meteorology

See **Section 8.1.1**.

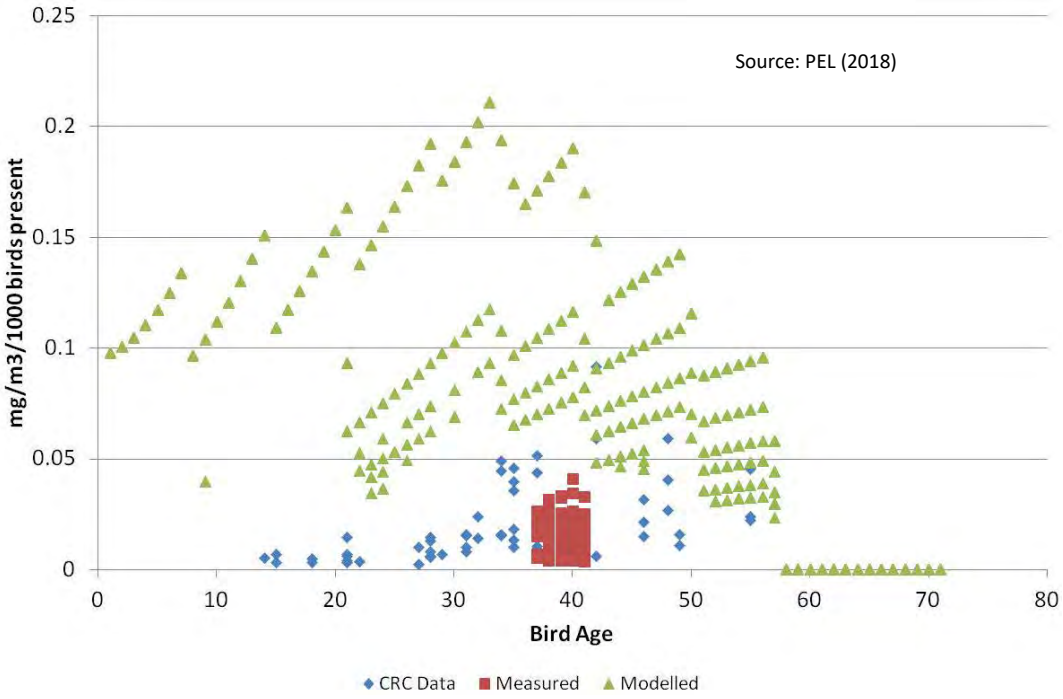
8.2.2 Emissions Estimation

PEL (2018) estimated operational particulate emission rates using a modelling approach based on data from broiler farms in NSW, along with theoretical considerations. The approach generates hourly varying emission rates from each poultry shed based on:

- Total weight of all 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.

Data sourced from Mirrabooka 2002 (cited in PEL 2018) for a tunnel-ventilated poultry farm in NSW was gathered for chicken batches between 1 and 8 weeks of age to represent particulate emissions over a full production cycle. It was standardised to relate the particulate concentration to the total bird mass at the time of sampling. Two newer datasets, being PM_{10} emission data from Australian Poultry CRC 2011 and PAEHolmes 2012, were also considered by PEL (2018). Comparison of the three datasets, as provided in **Figure 28**, shows that emission rates predicted using the Mirrabooka data are much higher, by a factor of at least two, than those from the newer data. However, for conservatism, PEL (2018) adopted the emissions estimation method using the Mirrabooka data.

Figure 28 Modelled PM_{10} Emission Rates



Green markers – emissions based on Mirrabooka (2002) data and adopted by PEL (2018) for the assessment of the Development.
Red markers – emissions from PAEHolmes (2012).
Blue markers – emission from Australian Poultry CRC (2011).

8.2.3 Meteorological Modelling

See **Section 8.1.3**.

8.2.4 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.

PM_{10} was selected by PEL (2018) as the assessment parameter for particulate matter as it is the size fraction related to human health impacts and is generally the limiting dust parameter from poultry farms. If the PM_{10} criteria are met, there is minimal risk of exceedances for dust deposition or particulate matter measuring less than 2.5 µm ($PM_{2.5}$) (PEL 2018).

Table 20 lists the PM_{10} criteria provided in the Approved Methods (EPA 2016) for assessing impacts from dust generating activities.

Table 20 Particulate Matter Emissions Criteria

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

Source: Approved Methods (EPA 2016)

8.2.5 Impact Assessment

Construction

Fugitive dust emissions during construction are most appropriately managed by good site management and implementation of dust suppression measures (see **Section 8.2.6**). The significant separation distances to surrounding receptors will minimise the risk of any off-site nuisance dust impacts during construction.

Operation

The dispersion model known as CALPUFF was used by PEL (2018) in the assessment of potential air quality impacts associated with the Development. A brief description of CULPUFF is provided in **Section 8.1.5**. Each poultry shed was represented in the model as a pseudo point source, with each point source assigned a diameter the same width as the shed. The source diameter and vertical velocity were set to ensure the momentum of the plume was maintained (PEL 2018).

A sensitivity analysis of the emissions risk was completed by PEL (2018) by assessing the impact associated with changing the assumed start day of the bird placement. By changing the start day, the peak emissions have been assessed against a range of meteorology conditions throughout the year. The batch staging is presented as three model scenarios to represent day 1, day 14 and day 28 bird placements. PEL (2018) set up the model so that birds were placed on the first working day of 2005 (the selected representative meteorological year, see **Section 8.1.3**), which is the Monday, day 4 of the calendar year. Therefore, the model begins on day 4, day 18 and day 32 of the calendar year. The maximum number of birds that can be placed on any given day is 636,000 (±6%), which is equal to a maximum of 12 sheds per day.

Tables 21 and **22** list the predicted annual average and maximum 24-hour average PM_{10} concentrations, respectively, for the three batch staging scenarios at each receptor as a result of the Development in isolation and cumulatively with background concentrations. Contour plots are included in PEL's *Air Quality Assessment* (PEL 2018) in **Appendix C**.

Table 21 Predicted Annual Average PM_{10} Concentrations

Receptor ID	Predicted Annual Average PM_{10} Concentrations ($\mu g/m^3$)						
	Assessment Criterion ($\mu g/m^3$)	Batch Scenario – Day 4		Batch Scenario – Day 18		Batch Scenario – Day 32	
		Development	Cumulative	Development	Cumulative	Development	Cumulative
R1	25	0.2	11.4	0.2	11.4	0.2	11.4
R2		0.2	11.4	0.2	11.4	0.2	11.4
R3		0.2	11.4	0.1	11.3	0.2	11.4
R4		0.2	11.4	0.1	11.3	0.2	11.4
R5		0.2	11.4	0.1	11.3	0.2	11.4
R6		0.2	11.4	0.1	11.3	0.2	11.4
R7		0.2	11.4	0.2	11.4	0.3	11.5
R8		0.2	11.4	0.2	11.4	0.3	11.5
R9		0.2	11.4	0.2	11.4	0.2	11.4
R10		0.2	11.4	0.2	11.4	0.2	11.4
R11		0.2	11.4	0.2	11.4	0.2	11.4
R12		0.2	11.4	0.2	11.4	0.2	11.4
R13		0.3	11.5	0.3	11.5	0.3	11.5
R14		0.3	11.5	0.3	11.5	0.3	11.5
R15		0.3	11.5	0.3	11.5	0.3	11.5
R16		0.4	11.6	0.3	11.5	0.4	11.6
R17		0.2	11.4	0.2	11.4	0.2	11.4
R18		0.4	11.6	0.4	11.6	0.4	11.6
R19		0.3	11.5	0.3	11.5	0.5	11.7
R20		0.2	11.4	0.2	11.4	0.3	11.5
R21		0.4	11.6	0.4	11.6	0.4	11.6
R22		0.5	11.7	0.4	11.6	0.6	11.8
R23		0.5	11.7	0.4	11.6	0.6	11.8
R24		0.9	12.1	0.9	12.1	1.1	12.3
R25		0.7	11.9	0.8	12.0	0.8	12.0
R26		0.3	11.5	0.3	11.5	0.3	11.5
R27		0.3	11.5	0.2	11.4	0.3	11.5
R28		0.3	11.5	0.4	11.6	0.4	11.6
R29		0.3	11.5	0.3	11.5	0.3	11.5
R30		0.3	11.5	0.3	11.5	0.3	11.5
R31		0.2	11.4	0.2	11.4	0.2	11.4
R32		0.3	11.5	0.3	11.5	0.3	11.5
R33		0.5	11.7	0.5	11.7	0.5	11.7
R34		0.3	11.5	0.3	11.5	0.3	11.5
R35		0.3	11.5	0.3	11.5	0.3	11.5
R36		0.2	11.4	0.2	11.4	0.2	11.4

Table 22 Predicted Maximum 24-Hour Average PM_{10} Concentrations

Receptor ID	Predicted Maximum 24-Hour Average PM_{10} Concentrations ($\mu g/m^3$)						
	Assessment Criterion ($\mu g/m^3$)	Batch Scenario – Day 4		Batch Scenario – Day 18		Batch Scenario – Day 32	
		Development	Cumulative	Development	Cumulative	Development	Cumulative
R1	50	7.6	39.5	4.1	39.5	5.6	39.5
R2		8.4	39.5	9.5	39.5	12.2	39.5
R3		7.4	39.5	5.6	39.5	6.8	39.5
R4		6.4	39.5	5.8	39.5	4.0	39.5
R5		6.6	39.5	6.7	39.5	4.3	39.5
R6		5.1	39.5	3.3	39.5	5.5	39.5
R7		6.7	39.5	4.2	39.5	7.6	39.5
R8		9.4	39.5	6.9	39.5	10.1	39.5
R9		6.7	39.5	7.0	39.5	3.0	39.5
R10		8.4	39.5	6.0	39.5	3.8	39.5
R11		8.7	39.5	8.6	39.5	10.3	39.5
R12		10.4	39.5	7.9	39.5	6.1	39.5
R13		9.7	39.6	13.4	39.5	17.3	39.5
R14		9.8	39.5	10.3	39.5	12.7	39.5
R15		10.9	39.7	9.9	39.5	13.4	39.5
R16		14.7	39.8	12.9	39.5	9.7	39.5
R17		9.8	40.4	5.2	39.5	4.2	39.5
R18		13.7	41.2	8.8	39.6	6.0	39.5
R19		6.0	39.5	8.8	39.5	10.8	42.4
R20		10.7	40.3	6.6	39.5	4.6	39.5
R21		14.5	40.1	11.1	39.5	10.6	39.5
R22		9.5	39.6	10.8	39.7	14.3	42.5
R23		9.5	39.6	10.9	39.6	13.7	42.1
R24		15.5	40.0	18.8	39.5	19.2	40.9
R25		41.6	**55.2**	17.2	42.8	24.3	40.9
R26		6.6	39.5	6.2	39.5	8.6	39.5
R27		6.5	39.5	6.0	39.5	7.8	39.5
R28		8.2	39.7	10.3	39.5	10.1	40.1
R29		9.0	39.6	6.2	39.5	8.9	39.7
R30		7.4	39.6	5.8	39.5	8.3	39.7
R31		4.7	39.5	4.9	39.5	4.5	39.5
R32		4.7	40.0	5.9	39.5	4.3	39.5
R33		8.5	39.6	5.2	39.5	4.6	39.7
R34		10.8	39.7	7.5	39.5	4.8	40.1
R35		7.9	39.6	8.6	39.5	6.3	39.9
R36		5.4	39.5	3.7	39.5	3.4	39.5

The results listed in **Table 21** show that all receptors are predicted to experience annual average PM_{10} concentrations below the assessment criterion of 25 µg/m^3, including when Development emissions are combined cumulatively with background concentrations. The highest predicted cumulative concentration is 12.3 µg/m^3 at residential receptor R24 for the day 32 staging scenario.

The results listed in **Table 22** show that all receptors are predicted to experience maximum 24-hour average PM_{10} concentrations below the assessment criterion of 50 µg/m^3, including when Development emissions are combined cumulatively with background concentrations, with the exception of receptor R25 where a cumulative concentration of 55.2 µg/m^3 is predicted during the day 4 staging scenario. With regards to this exceedance, PEL's (2018) modelling shows that the predicted contribution from the Development at R25 typically results in a minor change to the existing background concentrations. Over 95% of the predicted increments due to the Development are 5 µg/m³ or below. Furthermore, as outlined in **Section 8.2.2**, the emissions rate data used in the modelling is inherently conservative and over-estimates the emissions (and hence the impacts) by a factor of at least two (PEL 2018). Taking this into consideration, along with there being no consideration of mitigation measures in the modelling (for example, vegetation screens), the results provide an unrealistically conservative assessment of particulate impacts (PEL 2018).

Various researches have shown that dust from intensive livestock operations can be reduced by 35 to 65% with effective vegetation buffers (Laird 1997; Thernelius 1997; Hartung 1985; Malone, et al. 2006; Malone, et al. 2008, cited in PEL 2018). On this basis, PEL (2018) advises that the dust emissions can be mitigated by planting vegetative screens (see **Section 4.20**).

Excluded Emissions Sources

Emergency Diesel Generator Emissions

PEL (2018) did not assess potential emissions from the emergency diesel generators as they are not expected to exceed the relevant air quality criteria at any surrounding receptors. This was previously proven by PEL in the Response to Submissions for ProTen's approved Narrandera Poultry Production Farm (SSD 6882).

As advised in **Section 4.14.6**, the diesel generators will only be used in emergency situations when mains power from the electricity grid is lost. Based on experience at their other poultry production farms around Australia, ProTen anticipates that the generators will only be required between one and a maximum of five days per year. There will be three generators at each PPU, each with a maximum standby rating of 390 kVA, contained within lockable acoustic enclosures with vertical air discharge. The generators will meet the relevant emission standards in Schedule 4 of the Clean Air Regulation.

Given the emission standards, low level of usage and the separation distances to surrounding receptors, the generators are not expected to exceed the relevant air quality criteria at any nearby receptor location.

Internal Road Emissions

PEL (2018) did not assess the potential for wheel generated dust from the internal roads as the potential for emissions will be low given the constructed nature of the roads and subsequent lower silt loading (compared to using unformed tracks) and the general low speeds vehicles will travel on these roads. Based on previous assessments of multiple poultry operations, PEL (2018) advised that wheel generated dust from internal roads was found to be a negligible source of dust. Furthermore, the separation distances from the internal roads to surrounding receptors are suitably significant.

On this basis, modelling of dust emissions from the internal roads is not considered warranted. Such emissions can be effectively mitigated and managed via appropriate construction and operational maintenance.

8.2.6 Mitigation and Management

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 emissions. While the Development is predicted to have low impact on local amenity with respect to dust emissions, ProTen will take reasonable and practicable measures to minimise emissions. The following development design features, best management practices and mitigation measures will be implemented to minimise the potential for dust impacts:

Construction

- Surface disturbance will be limited to the smallest practicable area possible.
- Disturbed areas will be promptly rehabilitated and revegetated to a stable landform.
- When necessary, dust will be minimised by "wetting" down surfaces being worked and/or carrying traffic during dry conditions.
- Where possible, vehicles on site will be confined to designated roadways.
- Internal roads will be appropriately constructed and maintained with a suitably compacted base.
- Vehicles will not exceed a general speed limit of 60 kilometres per hour (km/hr) along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of work sites.
- Plant and equipment will be regularly maintained to ensure optimal operating condition.

Development Design

- The feed silos will be fully enclosed to minimise emissions of particulate matter when loading/ 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.

Wheel Generated Dust From Unsealed Roadways

- The two site access roads will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road.
- Internal roads will be appropriately constructed and maintained with a suitably compacted base.
- When necessary, internal roads will be "wetted down" during dry conditions.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident).

Dust Emissions from Poultry Sheds

- The bedding material will be managed to ensure that moisture levels do not drop below approximately 15%.
- The poultry shed ventilation systems will be maintained to ensure air movement is at design levels.
- The poultry sheds will be thoroughly cleaned between batches, with a focus on the fan end of the sheds.

Emergency Standby Diesel Generators

- The generators will be contained in lockable acoustics enclosures with vertical air discharge and will only be used in emergency situations when mains power from the electricity grid is lost.
- The generators will meet the relevant emission standards in Schedule 4 of the Clean Air Regulation.

Materials Handling and Transfer

- When possible, handling of bedding material/poultry litter will be limited to daytime hours to avoid adverse weather conditions.
- Poultry litter will be promptly transported off site in covered trucks at the end of each production cycle.

Vegetation Screens

- Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**). ProTen will progressively establish the landscape plantings as soon as practicable following bulk earthworks and construction of development infrastructure at each PPU. Vegetation screens reduce the magnitude and frequency of any adverse air quality impacts by effectively slowing and filtering air movement, which enhances dust deposition and odour dispersion.

Weather Station

- A weather station will be installed within the Development Site to collect on-going and up-to-date weather monitoring data, which will assist in investigating and responding to any air quality complaints.

8.3 Traffic and Transport

RoadNet was engaged to undertaken an assessment of the traffic-related issues associated with the Development. This assessment was undertaken in accordance with the *Guide to Traffic Generating Developments* (Roads and Traffic Authority 2002) and other relevant RMS and Council standards and guidelines. A copy of RoadNet's *Traffic Impact Assessment* (2018) is contained within **Appendix D** and the key findings and recommendations summarised in the below sub-sections.

8.3.1 Existing Environment

Oxley Highway

The Oxley Highway (NSW State Route B56) is a State-controlled rural highway and an approved B-double route. It provides access to Tamworth to the east, being the area's major centre and home to the various poultry industry service facilities that will support the Development, and also to Gunnedah to the west.

Between Rushes Creek Road and the outskirts of West Tamworth (near Bass Street) the Oxley Highway is a two-lane, two-way rural highway with 3.5 m sealed lanes, slightly wider sealed shoulders and grassed or gravel verges. Heading east from Bass Street (approximately) the Highway becomes more urban in character with adjacent development along the edges, roundabouts, turn lanes, wider shoulders and footpaths. To the east of Dampier Street it transitions again into a dual divided highway and retains this four-lane cross-section (with or without a central island) through to the centre of Tamworth.

The posted speed limit between Rushes Creek Road and the western outskirts of Tamworth is 100 km/hr, except through the village of Somerton where it reduces to 80 km/hr. Travelling in an easterly direction from the western outskirts of Tamworth the posted speed limit reduces to 70 km/hr and remains at this level until just before Bass Street in West Tamworth (i.e. the start of the urban area) where it reduces to 60 km/hr and later on to 50 km/hr. There are also three school zones within Westdale and West Tamworth where the posted speed limit is 40 km/hr during school drop-off and pick-up times (8.00 am to 9.30 am and 2.30 pm to 4.00 pm) on school days.

Between Rushes Creek Road and the eastern outskirts of Gunnedah where is intersects with the Kamilaroi Highway, the Oxley Highway is a two-lane, two-way rural highway with approximate 3.5 m sealed lanes, narrow sealed shoulders and grassed or gravel verges. The posted speed limit is generally 100 km/hr, except through the village of Carroll where it reduces to 70 km/hr and the outskirts of Gunnedah where it reduces to 60 km/hr.

Photos 19 and **20** show the Oxley Highway near its intersection with Rushes Creek Road.

Photo 19 Looking east along the Oxley Highway just east of Rushes Creek Road

Photo 20 Looking west along the Oxley Highway to the west of Rushes Creek Road

Rushes Creek Road

Rushes Creek Road is a two-lane two-way rural road and an approved B-double route. It forms the Development Site's eastern boundary and connects the Development Site to the Oxley Highway between Somerton and Carroll to the south and to Manilla Road (also known as Fossickers Way) (NSW State Route B95) at Manilla to the northeast. Rushes Creek Road is sealed, with a typical seal width varying between approximately 6.5 m and 7.0 m, and is line-marked along almost its entire length. While there are no edge-lines, there are guideposts at regular intervals for night-time delineation. It has predominantly grassed verges (some gravel) approximately 0.5 m to 1.5 m wide on each side. Rushes Creek Road has an open road speed limit of 100 km/hr.

There are a number of rural property accesses scattered along the length of Rushes Creek Road and also a small number of rural local access roads. The most significant of these roads being Keepit Dam Road, National Fitness Camp Road and Ski Gardens Road. There are also three existing rural access driveways from Rushes Creek Road in to the Development Site through Lots 26, 165 and 166 DP 752169.

Rushes Creek Road can become inundated during major flooding events at its southern end where it crosses the Peel River via an overbridge (approximately 1.8 km to the north of its intersection with the Oxley Highway) and northeast of the Development Site where it crosses a tributary of the Namoi River (approximately 1.4 km west of its intersection with Sherwood Road). However, anecdotal evidence suggests that the road is only ever blocked for a maximum of 24 hours and it is very infrequent (i.e. only during major flooding events).

Photos 21 to **26** show the general layout of Rushes Creek Road at various locations along its alignment.

Photo 21 Rushes Creek Road looking southbound at the bridge over the Peel River

Photo 22 Rushes Creek Road looking northbound at the Keepit Dam Road intersection

Photo 23 Rushes Creek Road looking southbound at the Ski Gardens Road intersection

Photo 24 Rushes Creek Road looking northbound adjacent to the Development Site near the existing access in to Lot 165 (on LHS)

Photo 25 Rushes Creek Road looking northbound adjacent to the Development near the existing access to Lot 26 (on LHS)

Photo 26 Rushes Creek Road looking southbound adjacent to the Development Site near the existing access to Lot 166 (on RHS)

Oxley Highway / Rushes Creek Road Intersection

The Oxley Highway / Rushes Creek Road intersection is a give-way controlled T-intersection that provides priority to Oxley Highway traffic. The intersection is sealed and line-marked and is located on the inside of a large radius left-hand horizontal curve (see **Photo 27**) and on a downgrade for traffic travelling east along the Oxley Highway. It has a left-turn lane for eastbound traffic on the Oxley Highway that is approximately 235 m long (including tapers) and a right-turn bay for westbound traffic that is approximately 150 m long (including tapers). An overtaking lane commences immediately to the west of the intersection for westbound traffic on the Oxley Highway, extending for a length in excess of 600 m (including tapers). While the layout does not provide a true "seagull" arrangement for traffic turning right out of Rushes Creek Road, it does allow for faster "through" traffic travelling westbound on the Oxley Highway to use the overtaking lane to pass vehicles accelerating up to the posted speed in the left lane after exiting Rushes Creek Road.

Visibility to the west (right) for traffic turning left out of Rushes Creek Road was observed by RoadNet (2018) to be limited to approximately 230 m by vegetation on the inside of the curve. This appears to be substandard for the geometry of the road, with AGRD Part 4A (Austroads 2017) requiring a safe intersection sight distance (SISD) of 248 m for cars on a flat grade (for a design speed of 100 km/hr and a reaction time of 2 seconds). A more detailed field investigation or survey would be required to accurately determine the horizontal and vertical geometry of the intersection and the nature and proximity of the adjacent vegetation, and hence the visibility requirements and availability. Some trimming of the vegetation may be possible (if required).

Visibility to the east (left) for traffic turning right out of Rushes Creek Road was observed by RoadNet (2018) to be in the order of 400 m or more, which appears to be suitable for the geometry of the intersection.

Photo 27 Aerial view of the Oxley Highway / Rushes Creek Road intersection

Photos 28 and **29** show the layout of the Oxley Highway / Rushes Creek Road intersection.

Photo 28 Oxley Highway / Rushes Creek Road intersection looking west

Photo 29 Oxley Highway / Rushes Creek Road intersection looking east

Existing Traffic Volumes

Existing traffic volumes along the Oxley Highway were obtained by RoadNet (2018) from data collected by RMS at various count sites between Gunnedah and Tamworth. The data indicates that the average two-way weekday traffic volumes are quite low, ranging in 2017 from approximately 3,400 vehicles per day in the vicinity of Rushes Creek Road to between 3,700 and 4,000 vehicles per day closer to Gunnedah and Tamworth. The percentage of heavy vehicles is consistently in the order of 15 to 20%. Closer to Tamworth the volume of traffic increases significantly, with the limited data available suggesting a two-way weekday volume in excess of 10,000 vehicles per day (9% heavy vehicles). Typical peak hour volumes on the Oxley Highway to the east of Rushes Creek Road intersection range between approximately 80 to 100 vehicles per hour in the AM peak (approximately 8:00 am to 9:00 am) and approximately 100 to 120 vehicles per hour in the PM peak (approximately 3:00 pm to 4:00 pm).

Existing traffic volumes at the Oxley Highway / Rushes Creek Road intersection were obtained by RoadNet (2018) via a 12-hour video intersection count on Thursday 20 October 2016 between 6:00 am and 6:00 pm. The results indicate that the peak hours on a typical weekday currently occur between 8.15 am and 9.15 am and 3.45 pm and 4.45 pm. The results also indicate that the volume of traffic currently accessing Rushes Creek Road from the Oxley Highway and vice-versa is low, with a total two-way volume of 405 vehicles observed over the 12-hour period, including 21% heavy vehicles. A summary of the peak and 12-hour volumes recorded entering and exiting Rushes Creek Road at the Oxley Highway intersection is provided in **Table 23**.

Table 23 Recorded Traffic Volumes on Rushes Creek Road (on a typical weekday)

Period	Movements In (HV%)	Movements Out (HV%)	Combined Two-Way Movements (HV%)
AM peak (8:15 am to 9:15 am)	28 (21%)	29 (24%)	57 (23%)
PM peak (3:45 am to 4:45 pm)	16 (19%)	24 (13%)	40 (15%)
12-hour (6:00 am to 6:00 pm)	193 (20%)	212 (22%)	405 (21%)

HV – heavy vehicles

Only a portion of the traffic observed on Rushes Creek Road at the Oxley Highway intersection would be expected to travel the length of Rushes Creek Road to / from Manilla, with many of the movements being associated with the recreational facilities in the area and rural properties that have access from the southern end of Rushes Creek Road. On this basis, the volume of traffic passing along the frontage of the Development Site on Rushes Creek Road is expected to be much lower than observed near the Oxley Highway intersection. However, since the overall volume of traffic observed is quite low anyway, the surveyed volumes were conservatively adopted by RoadNet (2018) without adjustment to represent the background traffic in the vicinity of the Development Site for the purposes of assessing the Development's access requirements and traffic impacts.

8.3.2 Traffic Generation

The vast majority of heavy vehicles will travel between the Development Site and the poultry industry service facilities located in West Tamworth and on the western outskirts of Tamworth, including the Country Road Hatchery, Tangaratta Stockfeeds, Out Street Poultry Processing Plant and Oakburn Rendering Plant, via the Oxley Highway (i.e. they will turn right into Rushes Creek Road from the Oxley Highway and left out). For the purposes of the traffic impact assessment, RoadNet (2018) assumed that 100% of all heavy vehicle traffic will access/egress the Development Site via the Oxley Highway to the east of Rushes Creek Road.

It is also expected that the majority of light vehicles will travel between the Development Site and Tamworth via the Oxley Highway. A small number of light vehicles may have an origin or destination from/to Gunnedah and other locations to the west of the Development Site and also from/to Manilla and other locations to the northeast. For the purposes of the traffic impact assessment, RoadNet (2018) assumed that 80% of light vehicle traffic will access/egress the Development Site via the Oxley Highway to the east of Rushes Creek Road, with 15% accessing/egressing via the Oxley Highway to the west of Rushes Creek Road and 5% via Manilla Road and its connections to the northern end of Rushes Creek Road.

As detailed in **Section 4.15.5**, the Development is expected to generate approximately 8,455 heavy vehicle visits (16,910 two-way movements) and 4,597 light vehicle visits (9,194 two-way movements) annually. **Table 24** lists the estimated average daily traffic generation and peak hourly volumes for the Development. It is estimated that approximately 70% of the total vehicle movements generated by the Development in the mornings will travel in to the Development Site and 30% will travel out of the Site, with the situation reversed in the afternoon (i.e. 30% in and 70% out).

Table 24 Daily and Peak Hour Traffic Generation

Vehicle Type	Vehicles / Day (Two-Way Movements)	AM Peak Hour Two-Way Movements	PM Peak Hour Two-Way Movements
Light Vehicles	13 (26)	12 (9 in and 3 out)	12 (3 in and 9 out)
Heavy Vehicles	23 (46)	5 (3 in and 2 out)	5 (2 in and 3 out)
Total	36 (72)	17 (12 in and 5 out)	17 (5 in and 12 out)

On average, there will be 72 two-way vehicle movements per day (46 of these heavy vehicles) associated with the Development, including 17 in both the AM and PM peak hours for the Development. It has been assumed that the heavy vehicles will be spread relatively evenly over the 9 week production cycle and will be distributed relatively evenly over the main hours of activity between 7:00 am and 7:00 pm. A number of heavy vehicle movements associated with bird removal will take place outside of these hours any time between 7:00 pm and 4:00 pm.

Future Design Year Traffic Volumes

RoadNet (2018) adopted a design horizon of 10 years (i.e. 2029) to assess the potential operational impacts of the Development with respect to any road infrastructure upgrade requirements. A recent linear traffic growth rate in the order of approximately 2% per annum was observed and considered consistent with the rural nature of the Oxley Highway and relatively low levels of development occurring in the area. This growth rate was adopted by RoadNet (2018) to factor up the background traffic volumes on the Oxley Highway and (conservatively) Rushes Creek Road to 2029 for both the peak hour and daily volumes.

The Development peak traffic generating times are expected to occur earlier than the existing network peaks, particularly in the morning, due to the farm workers shift commencing at 7:00 am and ending at 4:00 pm. However, RoadNet (2018) assumed that the Development peaks will coincide with the network peaks to simplify the analysis and provide a conservative assessment.

RoadNet (2018) advises that the future traffic volumes, in terms of both background traffic and traffic generated by the Development, are very low.

8.3.3 Impact Assessment

Construction

As outlined in **Section 4.3**, the construction program is anticipated to span approximately 16 months, with the four PPUs to be constructed consecutively. There will be an initial lead time of approximately 4 months to complete site preparation works and early earthworks, followed by the construction of 10 poultry sheds every 9 weeks. Access to the Development Site for initial site preparation will be via the existing access driveways from Rushes Creek Road (see **Section 2.4**), with the two new access driveways and internal access roads to be established at the commencement of construction. It is anticipated that the large majority of construction traffic will travel between the Development Site and Tamworth via the Oxley Highway.

Site earthworks will require heavy earthmoving equipment to be brought on to the Development Site in the early stages of construction. Concrete will be batch-mixed on-site to reduce associated heavy vehicle traffic generation. Raw materials (for example, crushed rock, sand and cement), building materials and fit-out equipment will generally be delivered to the Site in rigid trucks and/or semi-trailers throughout the construction period.

Accurate information on required materials and the construction program will not be available until detailed design is completed following development consent. As such, it is not possible to accurately determine the construction traffic volumes at this point in time. However, for the types of construction activities involved and the proposed duration of work, it is anticipated that only a low volume of traffic will be generated on a daily basis. This traffic is expected to comprise the odd truck delivering materials throughout the course of a typical day and a small number of light vehicles each day associated with construction workers.

RoadNet (2018) concludes that traffic-related impacts arising from construction activities are expected to be low and will be able to be appropriately managed through the implementation of a Construction Traffic Management Plan (CTMP) prepared as part of the CEMP (see **Section 4.3.7**). All construction-related traffic, including both light and heavy vehicles, will park within the Development Site. There will be no queuing or parking on Rushes Creek Road.

The other construction activity that may impact the local road network is the installation of water and electricity supply lines in an underground conduit to cross Ski Gardens Road. If required, appropriate traffic controls will be put in place during this period to manage traffic movements through the short section of Ski Gardens Road. Following the completion of these works, only the very occasional light vehicle will be required to use this road for maintenance purposes. Therefore, the Development is not expected to have any impacts on Ski Gardens Road.

Operation

Oxley Highway and Rushes Creek Road

Table 25 lists the future forecast daily background traffic volumes for 2029 along the Oxley Highway and Rushes Creek Road in the vicinity of the Oxley Highway / Rushes Creek Road intersection, with the additional traffic to be generated by the Development.

Table 25 Traffic Volumes on Oxley Highway and Rushes Creek Road for 2029

Background Traffic 2029 - Two-Way Movements / Day			Additional Generated Traffic – Two Way Movements / Day[1]			Percentage Increase		
Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total
Oxley Highway west of Rushes Creek Road								
3,534	624	4,158	10	0	10	<1%	0%	<1%
Oxley Highway east of Rushes Creek Road								
3,462	611	4,073	12	46	58	<1%	7.5%	1.4%
Rushes Creek Road north of the Oxley Highway								
486	129	615	22	46	68	4.5%	35.7%	11.1%

1 - excludes very small volume of light vehicle traffic potentially generated to/from Rushes Creek Road north of the Development Site.

The results in **Table 25** show that the increase in traffic on the Oxley Highway, to both the east and west of Rushes Creek Road, as a result of the Development will be marginal only and will not result any road operational issues (RoadNet 2018). While there is a 7.5% increase in heavy vehicles predicted to occur on the Oxley Highway east of Rushes Creek Road, this only equates to an extra 46 heavy vehicle movements per day (including approximately 10 movements during each peak hour), which RoadNet (2018) advises can be easily accommodated on the existing road network (i.e. without any road upgrade or improvement works). The volume of background traffic on the Oxley Highway is higher at locations closer to Tamworth. The percentage increases in traffic as a result of the Development will therefore be even less at those locations.

While the percentage increases on Rushes Creek Road are higher, particularly with respect to the increase in heavy vehicles, this reflects the very low background traffic volumes on Rushes Creek Road. The proportion of heavy vehicles in the total traffic flow on Rushes Creek Road (at 2029) increases from approximately 21% without the Development to approximately 25% with the Development. RoadNet (2018) advises that this is not expected to have any significant impact on the operation of Rushes Creek Road.

RoadNet (2018) concludes that the future forecast background traffic volumes on the Oxley Highway and Rushes Creek Road are low relative to their respective capacities and the additional traffic to be generated by the Development will be able to be easily accommodated with no significant impact on the safety or operation of the external road network.

Oxley Highway / Rushes Creek Road Intersection

RoadNet (2018) assessed the existing and future 2029 operational performance of the Oxley Highway / Rushes Creek Road intersection with and without the Development using SIDRA INTERSECTION modelling software. The results of the assessment for the key performance measures presented in **Table 26** indicate that the intersection currently performs very well during both the AM and PM peaks, with a level of service (LOS) of A and minimal delays and queues. This remains the case at the 2029 future design year, including with the Development, confirming that the Development will have no material impact on the operation of the intersection and no improvements to the intersection are required on capacity grounds to address any delay, LOS or queuing issues (RoadNet 2018).

Table 26 Oxley Highway / Rushes Creek Road Intersection Performance for 2029

Scenario	Peak Hour	Performance Measure[1]			
		Degree of Saturation (DOS)	Average Delay (s)	Level of Service (LOS)[2]	95%ile Back of Queue (m)
Existing (2016)	AM	0.075	1.8	A	1.3
	PM	0.086	1.2	A	0.9
2029 without Development	AM	0.095	1.9	A	1.7
	PM	0.109	1.3	A	1.3
2029 with Development	AM	0.095	2.2	A	2.0
	PM	0.109	1.6	A	1.8

1 - results represent the performance of the intersection as a whole for each scenario, unless otherwise stated.

2 - level of service is for the worst performing movement at the intersection.

Although the Oxley Highway / Rushes Creek Road intersection is an existing intersection complete with various turn bay provisions, a review of the intersection warrants for the intersection was undertaken by RoadNet (2018) to ensure that the current layout is suitable for the predicted traffic volumes. **Figure 29** presents the results of RoadNet's (2018) review based on the forecast 2029 AM and PM peak hours with Development traffic volumes.

Figure 29 Oxley Highway / Rushes Creek Road Intersection Warrants for 2029

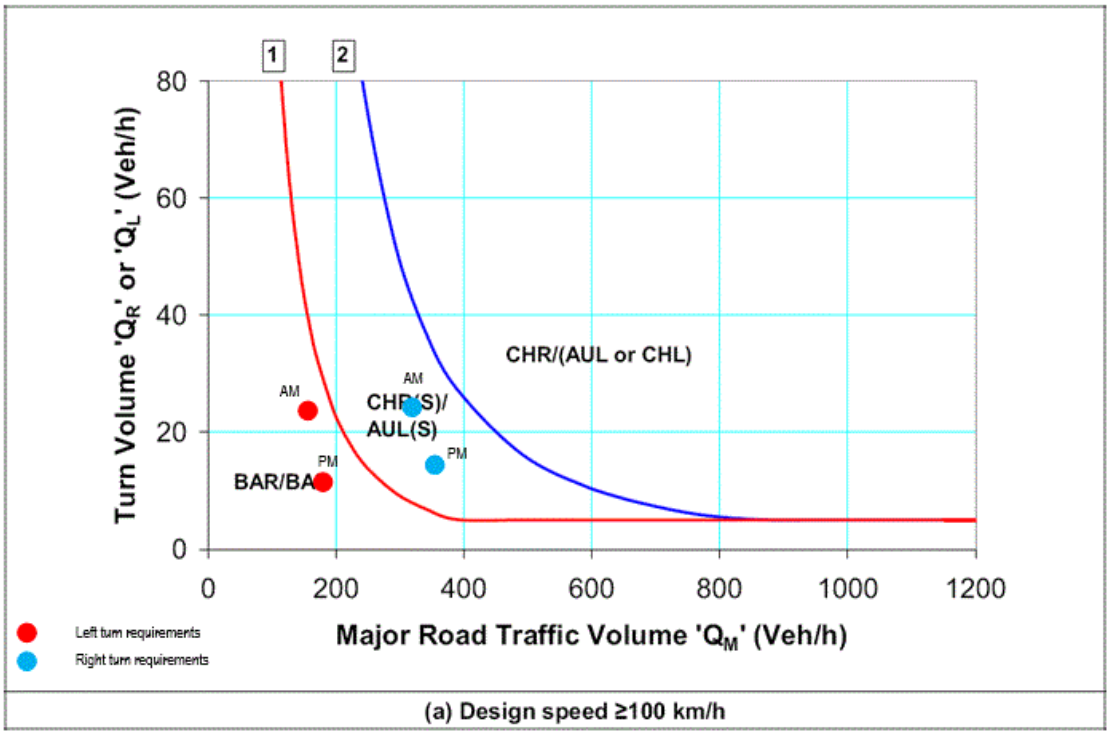


Figure 29 indicates that a BAL treatment would be suitable for the left turn from the major road based on a consideration of traffic volumes alone, and a short channelised right turn (CHR(S)) treatment suitable for the right turn from the major road.

The existing intersection layout provides turn lanes for traffic turning into Rushes Creek Road from the Oxley Highway in an auxiliary left (AUL) configuration for the left turn, which is a higher standard than required (i.e. BAL). The AUL layout provided is approximately 235 m long (including the taper), which exceeds the 155 m required for an assumed design speed of 100 km/hr, grades of up to ±2% and a comfortable deceleration rate of 2.5 m/s (RoadNet 2018).

The existing intersection layout also appears to meet the requirements of a CHR(S) configuration for the right turn. The configuration provided is approximately 150 m (including the taper), which exceeds the 95 m required (70 m deceleration length plus 25 m storage length for one B-double) for an assumed design speed of 100 km/hr and grades of up to ±2% (RoadNet 2018). Note that the CHR(S) layout is based on a right-turning vehicle slowing to 80% of the design speed in the through lane prior to moving in to the turn lane and decelerating at a higher rate of 3.5 m/s. A full CHR treatment would need to be approximately 180 m long (155 m deceleration length plus 25 m storage length) for a design speed of 100 km/hr. Based on the estimated 2029 design volumes, RoadNet (2018) advises that a further increase in the major road traffic volume of more than 20% would be required in the AM peak (the worst peak for assessing the right turn requirements) before an upgrade to the full CHR treatment would be required.

The storage length requirement for a CHR(S) is based on the need to cater for one design vehicle only, which in this case is a B-double. However, RoadNet's (2018) intersection modelling indicates that the 95 percentile maximum queue lengths during both the AM and PM peak periods at 2029, including with the addition of Development traffic, are predicted to be considerably less than one vehicle (i.e. most of the time gaps in the opposing traffic stream will be available, thereby enabling vehicles to turn right without the need to queue). On this basis, the storage length of 25 m is expected to be sufficient to cater for the maximum queues that are predicted to occur on the majority of occasions (RoadNet 2018).

The existing intersection layout also provides an overtaking lane for westbound traffic on the Oxley Highway immediately west of Rushes Creek Road. While not a true "seagull" layout, this does indirectly allow traffic exiting from Rushes Creek Road to accelerate in the left-most lane clear of through traffic (if necessary). It is considered to be sufficient given there is very little additional traffic expected to either arrive or depart from/to the west as a result of the Development (RoadNet 2018).

The remaining movement, being the left-turn out of Rushes Creek Road on to the Oxley Highway, is currently catered for by a simple BAL treatment, with flaring provided at the intersection mouth and a wider sealed shoulder. RoadNet (2018) considers this to be consistent with the intersection warrants and appropriate for the low volumes of traffic turning left from Rushes Creek Road both now and in the future (2029) with the Development in place.

RoadNet (2018) concludes that the general layout of the Oxley Highway / Rushes Creek Road intersection meets or exceeds the traffic warrants and is appropriate for the predicted traffic volumes, with a very good level of operational performance predicted to occur. No upgrade works are required at the intersection.

Heavy Vehicle Route

As previously outlined, the vast majority of heavy vehicles will travel between the Development Site and the poultry industry service facilities located in West Tamworth and on the western outskirts of Tamworth via the Oxley Highway and Rushes Creek Road (see **Figure 19**). Both of these roads are approved GML 25 m B-double routes and, as outlined above, future forecast traffic volumes of these roads are considered low. The additional 46 heavy vehicle movements per day (on average) to be generated by the Development along the Oxley Highway (east of Rushes Creek Road) and Rushes Creek Road is not expected to have any significant impact on the safety or operation of these roads.

RoadNet (2018) concludes that the heavy vehicle route to be used by the Development is suitable and has sufficient facilities to accommodate the additional heavy vehicles to be generated. No upgrades to roadways or intersections are required.

Site Access Driveways

As outlined in **Section 4.15.2**, two new access driveways will be constructed from Rushes Creek Road located approximately 1.2 km (northern access) and 2.7 km (southern access) south of Ski Gardens Road to service the Development. Given that these two driveways will be separated from each other by approximately 1.5 km, each access will be able to operate independently without impacting on the other in terms of queuing, visibility, road safety and delays (RoadNet 2018). They are proposed to be located on straight and level sections of Rushes Creek Road, ensuring a good level of inter-visibility with approaching traffic (RoadNet 2018). Furthermore, each driveway is located clear of other access driveways servicing other properties in the area.

As recommended by RoadNet (2018), each of the proposed new access driveways will be constructed as a BAL treatment in accordance with AGRD Part 4A (Austroads 2017) to provide additional shoulder width for Development traffic turning left into the access driveways to decelerate clear of through traffic on Rushes Creek Road. Directional signage will be installed on Rushes Creek Road to assist approaching traffic identify the access points, and access control (Give Way) signage and line-marking will be provided to control vehicles exiting the Development Site.

The access roads will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road and will be approximately 6.5 m wide. The remaining lengths of the internal access roads will be constructed as all-weather rural-type roads to meet the minimum requirements of AS 2890.2 Part 2 to accommodate the turning movements of B-doubles.

Based on a site inspection, RoadNet (2018) estimates that there will be in excess of 500 m sight distance available in each direction at both the northern and southern access driveways. This exceeds the requirement specified in the RMS Supplement to AGRD Part 4A for SISD of 248 m on a flat grade, based on a design speed of 100 km/hr and a reaction time of 2 seconds.

Cumulative Impacts

Evidently, the traffic generated by existing developments and land uses within the area is already present on the road network and, therefore, included in the background traffic counts outlined in **Section 8.3.1**. On this basis, no additional allowance or consideration for these developments/land uses was provided in the traffic impact assessment as their cumulative impacts with the Development are already implicitly accounted for (RoadNet 2018).

There is one development currently under construction in the area, being the Keepit Dam Upgrade Stage 2. Following completion of construction works, which is expected in mid-2019, this development will not generate any on-going traffic. On this basis, there is no requirement for consideration of potential cumulative traffic impacts with the Development (RoadNet 2018).

There are no other existing/under construction developments, approved developments (development consent issued but not yet constructed) or proposed developments (environmental impact assessment requirements issued or development application submitted) identified that will potentially lead to cumulative traffic impacts on the primary transport route for the Development, being the Oxley Highway and Rushes Creek Road. On this basis, RoadNet (2018) concludes that a quantitative assessment of cumulative traffic impacts is not necessary.

Future Relocation of Poultry Processing Plant

Baiada has approval to establish a new poultry processing plant at their Oakburn facility to the west of Tamworth on the Oxley Highway (see **Figure 19**), which would subsequently result in the closure of the existing Out Street Poultry Processing Plant in West Tamworth (see **Figure 19**). There is currently no known timeframe for this development.

In terms of potential traffic-related impacts, the proposed relocation would reduce the travel length required along the Oxley Highway between the Development Site and the poultry processing plant. While the same route along Rushes Creek Road and the Highway would be utilised, associated vehicles would not need to travel as far in to Tamworth to reach the processing plant. This would have a positive traffic impact in terms of reducing the overall number of vehicles, particularly heavy vehicles, travelling in and out of West Tamworth.

8.3.4 Mitigation and Management

RoadNet (2018) concludes that the Development will not result in any significant traffic-related impacts, including the safety and operation of the external road network, provided certain recommendations are committed to. The following development design , best management practices and mitigation measures will be implemented to minimise the potential for traffic-related issues:

Construction

- A CTMP will be prepared for approval prior to commencing construction.
- The generic traffic control plan will be implemented if the construction of the new site access driveways off Rushes Creek Road and/or the installation of water and electricity supply lines under Ski Gardens Road results in the need to restrict the two-way traffic arrangement on the respective roads to a single lane.
- Construction vehicles will enter and exit the Development Site during the initial site preparation works via the existing site access driveways off Rushes Creek Road and subsequently via the two new access driveways to be constructed off Rushes Creek Road at the commencement of construction.
- Vehicles will not exceed a general speed limit of 60 km/hr along the main site access roads from Rushes Creek Road, with a reduced speed limit of 40 km/hr in the vicinity of all work sites.
- All construction-related traffic and construction plant/equipment will park along the internal access roads and/or on construction sites. There will be no queuing or parking on Rushes Creek Road.
- Where possible, vehicles on site will be confined to designated roadways.
- 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.
- Internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking.
- Loaded heavy vehicles entering or exiting the Development Site will have their loads covered.
- Heavy vehicles exiting the Development Site will be cleaned of dirt, sand and other materials (if necessary) to avoid tracking these materials on to the public road network.
- The only traffic to enter the Development Site will be construction traffic and, if required, emergency vehicles. There will not be any general public access.
- All heavy vehicle drivers will read and sign a Driver Code of Conduct.

Oxley Highway / Rushes Creek Road Intersection

- Visibility splays at the Oxley Highway / Rushes Creek Road intersection will be checked in both the horizontal and vertical planes via detailed field investigation or survey to confirm, in particular, whether there is a need for any vegetation trimming on the inside of the horizontal curve immediately to the west of the intersection to ensure SISD.
- A review of the line-marking arrangement on Rushes Creek Road at the Oxley Highway intersection will be undertaken to ensure it is consistent with the Give-Way intersection control.
- Additional signage will be erected at the Oxley Highway / Rushes Creek Road intersection in the form of advance signposting in both directions to warn of trucks turning at the intersection.

Development Design

- The two new access driveways from Rushes Creek Road will be constructed to accommodate a BAL treatment in accordance with AGRD Part 4A (Austroads 2017). Directional signage will be installed on Rushes Creek Road to assist approaching traffic identify the access points and access control (Give Way) signage and line-marking will be provided to control vehicles exiting the Development Site.
- The two new access roads will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road and will be approximately 6.5 m wide. The remaining lengths of the internal access roads within the Development Site will be constructed as all-weather rural-type roads to meet the minimum requirements of AS 2890.2 Part 2 to accommodate the turning movements of B-doubles.
- A one-way circulation road (ring road) will be established around the perimeter of each PPU to enable traffic to enter, exit and manoeuvre for loading-unloading and servicing activities in a forward direction.

Operation

- Traffic will enter and exit the Development Site via the two new access driveways off Rushes Creek Road.
- Heavy vehicles travelling between the Development Site and the poultry industry service facilities located in and around Tamworth will utilise the nominated heavy vehicle route (approved B-double route) comprising the Oxley Highway and Rushes Creek Road (see **Figure 19**).
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- 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.
- Internal roads will be appropriately maintained to provide safe driving conditions (and also minimise noise and dust emissions).
- Internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking.
- Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident).
- Car parking will be provided adjacent to the amenities facility at each PPU for employees and visitors and adequate area will be available at each PPU and along internal access roads for any heavy vehicle parking requirements. There will be no parking along Rushes Creek Road.

  All heavy vehicle drivers will read and sign a Driver Code of Conduct.

8.4 Surface Water

8.4.1 Existing Environment

The existing surface water environment within and around the Development Site is outlined in **Section 2.9.1**. In summary:

- The Development Site is located within the catchment of the Namoi River, with stream flows in the catchment regulated by Lake Keepit.
- The Namoi River flows westerly to the north of the Development Site into Lake Keepit. The Namoi River is a regulated system to meet the needs of water users and the environment from Split Rock Dam to its confluence with the Barwon-Darling River at Walgett.
- While the Development Site extends close to the Namoi River at the northern extent of the Site, there are two narrow parcels of land between the Site and the River (see **Section 2.3** and **Figure 3**).
- Lake Keepit, which is located to the west and southwest of the Development Site, is a major irrigation storage for the Namoi Catchment and also provides flood mitigation, generates hydropower and supplies town water for Walgett. Lake Keepit is a popular sport and recreation destination.
- There are no notable surface water bodies or tributaries within the bounds of the Development Site. As shown on **Figure 2**, there are several intermittent drainage lines that traverse the Site, along with several farm dams. Runoff to the east of the ridgeline trending southeast-northwest through the centre of the Development Site is directed to the Namoi River via contour banks and shallow swales. Runoff to the west of this ridgeline is channelled to Lake Keepit through drainage lines in the south, west and southwest of the Development Site.
- No wetlands exist within the Development Site or within the surrounding area.

Mainstream Flooding

Lake Keepit is designed to attenuate large flood events by temporarily storing a portion of the floodwaters above the dam full supply level up to the design flood level (PB 2007). As the inflows to the dam start to reduce, the temporarily stored flood water is released until the dam reaches its full supply level (PB 2007).

The *Keepit Dam Upgrade Environmental Assessment* (PB 2007) mapped the increase to the design flood level as a result of dam upgrades (see **Section 2.10**) for the PMF. As evident on **Figure 8**, the temporary inundation predicted to occur upstream of Lake Keepit during a PMF when the level of the dam storage rises to the new design flood level is marginal beyond the dam full capacity level and barely encroaches into the Development Site. PB (2007) predicts that these marginal areas would be inundated for a duration of approximately 60 hours in a PMF.

On this basis, it is concluded that the Development Site is not flood-liable land. It is also not mapped as “flood planning area” in the Tamworth LEP.

8.4.2 Impact Assessment

Many traditional agricultural practices have the potential to impact upon surface water 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.

Conversely, the potential for adverse impact to surface water resources from the Development is low. Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to local water resources and no detectable impact is expected. Points to note in relation to the management of water on site include:

- The Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself.
- The main operational water sources to be managed within each PPU site will be:
  - Wash down water from within the poultry sheds at the end of each 9.3 week production cycle (approximately 5.6 times per year);
  - Rainfall runoff from the shed roofs; and
  - Rainfall runoff from the ground surfaces around the poultry sheds and additional improvements.
- The poultry sheds 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 and to allow for the controlled discharge of wash down water from the sheds.
- The poultry sheds will be blown and swept (i.e. dry cleaning practices) before being washed using high-pressure low-volume sprays, sanitised and disinfected.
- Clean water diversions comprising a deflection bank and swale drain will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the poultry sheds and prevent this water from entering the controlled surface water management system.
- As described in **Section 4.17.2** and shown on the preliminary civil design drawings in **Appendix K**, wash down water and stormwater runoff from within the PPU environs will be managed via engineered surface water management systems.
- Water captured in the detention dams at each PPU will be reused for regular irrigation of the planted vegetation screens at each PPU (see **Section 4.16.6**).
- Appropriate systems will be implemented for the safe storage and handling of potentially hazardous materials (see **Section 4.19**).
- There will not be any on-site stockpiling or disposal of waste materials (see **Section 4.18**).

Key issues and potential impacts are addressed in the below sub-sections.

Erosion and Sediment

Construction activities could potentially impact upon surface water resources primarily through loss of groundcover, soil disturbance, erosion and the creation of sediment-laden runoff. Site-specific erosion and sediment controls plans, including upstream clean water diversions, will be developed and implemented to minimise the potential for such impacts during the construction phase. Disturbed areas will also be promptly rehabilitated and revegetated to a stable landform.

Diversion of Minor Intermittent Drainage Lines

Farm 2 is proposed to be located on the junction of a first order drainage line and a second order drainage line draining north towards the Namoi River. Farm 4 is proposed to be located at the upper reach of a first order drainage line draining to the west in to a tributary of Plain Gully and subsequently Lake Keepit. These farms are located in the upper reaches of the respective catchments and the drainage lines are therefore relatively minor and intermittent. Regardless, construction activities and positioning infrastructure within drainage lines has the potential to reduce the functionality and capacity of the drainage lines, causing localised out-of-bank flows during storm events and related erosion and sediment issues and downstream connectivity issues. While Farm 2 was moved slightly to the south to lessen the associated impacts, ideally these PPUs would have been shifted completely away from the drainage lines. However constraints associated with odour impacts, high conservation vegetation communities and Aboriginal heritage sites limited the options for relocation.

As outlined in **Section 4.17.2**, clean water diversions will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the construction/operational farm sites and prevent this water from entering the controlled surface water management system. They will be constructed and stabilised prior to earthworks commencing at each farm site and will be designed to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event. Consequently, the runoff in the existing drainage lines at Farms 2 and 4 will be conveyed along the new swale drains around the PPUs before re-joining the existing drainage lines downstream of Farms 2 and 4.

Given that the drainage lines are relatively minor features and the design of the diversions will ensure that they are re-connected downstream, this should not pose any notable hydraulic or environmental impacts. It is noted that the original landform within the Development Site has been extensively modified to suit agricultural needs and, as a result, the existing drainage lines have changed over time from their natural condition.

Waterfront Land

The primary construction and operational areas of the Development, being the PPU sites and access roads, are well-removed from the Namoi River and Lake Keepit. The only activities that will occur within or near waterfront land is the installation and operation of the water pump approximately 30 m back from the bank of the Namoi River (see **Figure 12**) and a water supply pipeline from the pump to the Development Site.

The potential for impact on the River during installation will be addressed via appropriate erosion and sediment controls and promptly rehabilitating and revegetating the disturbed area to a stable landform. Once this pump is installed and the area stabilised, there will not be any on-going impacts or risks associated with its positioning and operation. The pump will not impact on the width or functioning of the riparian corridor or stability of the watercourse.

As advised in **Section 5.4.1**, pursuant to section 4.41(1) of the EP&A Act, a water use approval under section 89, a water management work approval under section 90 or a controlled activity approval under section 91 of the WM Act will not be required in relation to this water supply infrastructure.

Surface Water Extraction

The proposed extraction of surface water from the Namoi River to service the Development's water supply requirements will be under the provisions of two existing water access licences owned by ProTen (see **Section 4.16.5** and **Appendix M**) and, as such, the Development will be using water that is already allocated (not additional water) under the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*. On this basis, the Development will not impact on surrounding surface water users or river flows beyond that allowable under the Water Sharing Plan.

The Development Site will have a licensed allocation of 437.2 units per year. While the unit share of water available for extraction may vary from year-to-year depending on the available water determination under the Water Sharing Plan, extraction will not exceed the licensed allocation.

Operational Surface Water Management

The potential for impact to surface water resources by runoff of nutrients, chemicals or pathogens during the operational phase is considered negligible. As described in **Section 4.17.2** and shown on the preliminary civil design drawings in **Appendix K**, an engineered surface water management system will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event.

The grassed swale drains between the poultry sheds will allow infiltration of the water into the topsoil for nutrient uptake by the grass, which will be regularly slashed to promote continued growth. During heavy rainfall events, excess water from the grassed swales will be conveyed via underground pipes under the PPU ring road and in to a table drain around the perimeter of the PPU. This drain will ensure that all rainfall runoff from the ground surfaces within the PPU environs will be contained within the controlled surface water management system.

The perimeter table drain will convey the water to a detention dam (less the runoff held in the topsoil under the grassed swales). Based on the design volumes of the detention dams and the water reuse strategy for regular irrigation of planted vegetation screens at each PPU (see **Section 4.16.6**), there should not be any off-site discharge from the dams for events up to the 1% AEP event.

Nutrient Levels

While the water captured in the detention dams will have some level of nutrients, the levels are predicted to be low given that the poultry sheds will be thoroughly blown and swept prior to being washed and the grassed swales will provide a very effective means of nutrient removal. An analysis of wash down water from one of ProTen's poultry broiler production farms where operational procedures, litter management and shed clean out are the same as that proposed for the Development was undertaken by GHD (2007). This analysis indicates that the wash down water will have the typical concentrations listed in **Table 27**. Also listed in **Table 27** are the typical annual pollutant load removal efficiencies for vegetated swales according to *Australian Runoff Quality* (Engineers Australia 2006).

Table 27 Typical Annual Pollutant Load Removal Efficiencies for Vegetated Swales

Pollutant	Typical Wash Down Water Concentrations[1]	Typical Removal Efficiencies for Grassed Swales[2]
Total suspended solids	2,500 mg/L	60 to 80%
Total nitrogen	65 mg/L	25 to 40%
Total phosphorus	45 mg/L	30 to 50%

1 – based on analysis undertaken by GHD (2007).

2 – based on Engineers Australia (2006).

Based on the design of the surface water management system at each PPU, the relatively low volume of wash down water to be generated every 9.3 weeks and the relatively low concentrations of nutrients/pollutants, the potential for impact to local water resources by runoff of nutrients, chemicals or pathogens is negligible. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP event.

Water Reuse

As outlined in **Section 4.16.6**, ProTen proposes to reuse some of the water captured in the detention dams for regular irrigation of the planted vegetation screens at each PPU. Based on a conservative averaged application rate of 50 mm per week over the entire landscaped area, this has been calculated to reuse between 3 ML and 4.8 ML per week at each PPU. With effective uptake of the hydraulic load and remaining nutrient load, this does not pose any environmental risks or any biosecurity risks for ProTen. The water to be captured in the detention dams is expected to contain a low concentration of nutrients due to the large areas of grassed swales provided at each PPU, which, as outlined above, will provide a primary level of treatment to all stormwater runoff prior to it entering the detention dams.

This reuse strategy will assist to further minimise the risk of any off-site discharge from the detention dams.

Immunity from 1% AEP Rainfall Events

As discussed above, the upstream diversions will divert any upstream overland flow around the PPU sites for events up to the 1% AEP event. Within each PPU, the surface water management system will convey internal runoff to the detention dams for all events up to the 1% AEP event. The combination of upstream diversions and the internal surface water management systems will ensure that each PPU has immunity from 1% AEP rainfall events.

Post-Development Overland Flow and Runoff

The Development will increase the impervious footprint of the Development Site, which has the potential to increase the peak runoff discharged from the four PPUs during storm events. Increased peak runoff can cause erosion and poor bank stability of established drainage lines, which can increase sediment transport and affect the existing drainage landforms and downstream water quality.

However, the impervious footprint of the Development will be very small relative to the overall size of the Development Site and the surface water management systems at each PPU will operate as a closed water cycle, with the primary function to capture stormwater runoff from the impervious and disturbed surfaces. To reduce the volume of water that needs to be captured within the detention dams, clean water diversions will be installed upslope of each of the four PPUs to convey runoff from the upstream catchment for rainfall events up to the 1% AEP event.

The detention dams have been sized to capture the stormwater runoff from inside the PPU environs (i.e. all area inside the upstream diversions) for a depth of rainfall of approximately 200 mm, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. Based on the design volumes of the detention dams and the water reuse strategy for regular irrigation of planted vegetation screens (see above), post-development peak flows should not exceed pre-development peak flows for events up to the 1% AEP event. On this basis, there should not be any impact on the downstream drainage features or Lake Keepit.

Water Balance

A detailed water balance is not considered necessary for this Development given that each PPU will have a closed surface water management system. This was discussed with Lands & Water during consultation on 20 October 2016 (see **Section 6.1.1**), offering instead to detail the Development's water management systems, water requirements and water supply in the EIS. Lands & Water confirmed in an email on 20 October 2016 that they were satisfied with this approach.

Waste Management

Stockpiling and/or disposal of waste materials, especially poultry litter, dead birds and chemical containers, can result in leaching of nutrients and other pollutants to local water resources. However, as outlined in **Section 4.18**, 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.

Sewage Management

Sewage generated by the on-site staff amenities and farm managers' houses will be appropriately treated and disposed of via separate AWTSs (i.e. one at each PPU and house; 12 in total) installed and operated in accordance with the manufacturer's specifications and Council approval requirements. Each system will have a treatment capacity of 10 equivalent persons at 200 L/p/d and treated effluent will be released over an area of approximately 200 m^2 via sub-surface irrigation.

No detectable impact to local surface water resources is anticipated as a result of sewage management. The staff amenities and farm managers' houses will each generate a relatively low volume of sewage and the AWTSs will treat it to a secondary standard (a higher standard than septic tanks). There is significant land area available for effluent application and significant separation distances to any notable surface water features.

8.4.3 Mitigation and Management

The primary construction and operational areas of the Development, being the PPU sites and access roads, are well-removed from the Namoi River and Lake Keepit. Given the controlled environment in which the Development will operate, including engineered surface water management systems, it poses a low risk to local surface water resources and no detectable impact is expected. On this basis, no surface water monitoring is warranted.

The following development design features, best management practices and mitigation measures will be implemented to ensure negligible risk for local surface water resources throughout the life of the operation:

Construction

- Construction works will be planned and coordinated in order to limit the area of disturbance at any one time (as far as practicable).
- Erosion and sediment controls will be implemented prior to disturbance activities commencing in accordance with the Blue Book (Landcom 2004) and *Erosion and Sediment Control on Unsealed Roads* (OEH 2012).
- Clean water diversions comprising a deflection bank and swale drain will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the construction sites. They will be constructed and stabilised prior to earthworks commencing at each PPU and will be designed to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event.
- Stripped topsoil will be appropriately stockpiled and managed for use in future rehabilitation works.
- Disturbed areas will be promptly rehabilitated and revegetated to a stable landform following completion of disturbance activities (see **Section 4.3.6**).
- An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the erosion and sediment control structures throughout the construction period. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken.

Development Design and Operation

- The poultry sheds will be fully enclosed and surrounded by a dwarf concrete bund wall to prevent stormwater entering the sheds and allow for the controlled discharge of wash down water from the sheds.
- The clean water diversions (comprising a deflection bank and swale drain) installed prior to earthworks around the upstream sides of each of the four PPUs will be maintained to convey clean water run-off around the PPUs and prevent this water from entering the controlled surface water management system. The diversions will be designed and maintained to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event.
- The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event.
- An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the surface water management systems, including upstream diversions. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken to ensure the system's design capacity is maintained.
- AWTSs will be installed to manage the sewage generated by the staff amenities at each PPU and the farm managers' houses in accordance with the manufacturer's specifications and Council approval requirements. Each AWTS (12 in total) will have a treatment capacity of 10 equivalent persons at 200 L/p/d and the treated effluent will be released over an area of approximately 200 m^2 via sub-surface irrigation.
- The extraction of surface water from the Namoi River to service the Development's water supply requirements will be under the provisions of the two existing water access licences held by ProTen (WAL41834 and WAL37794). Extraction will not exceed the combined licensed allocation of 437.2 units per year under the provisions of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*.
- The grassed swale drains between the poultry sheds will be carefully managed to minimise soil disturbance and maximise infiltration and stormwater treatment potential. They will be regularly slashed to encourage continual grass growth and associated nutrient up-take.
- Dry-cleaning practices at the end of each production cycle will be maximised within the poultry sheds prior to washing with water to minimise the volume of wash water and the amount of poultry litter (and associated sediments and nutrients) in the wash down water.
- Water captured in the detention dams will be reused for regular irrigation of the planted vegetation screens at each PPU.
- The waste management systems listed **in Section 4.18** 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.
- The best management practices and mitigation measures outlined in **Section 4.19** will be implemented for the storage of chemicals and fuels.

8.5 Groundwater

8.5.1 Existing Environment

Regional Hydrogeology

The Development Site is situated in the New England Fold Belt GMA under the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011*. The New England Fold Belt groundwater source covers an area of approximately 2,799,000 ha stretching from Newcastle up through northeast NSW and further to the central Queensland coast. It evolved over more than 200 million years from Silurian to Triassic times between approximately 430 to 200 million years ago.

The New England Fold Belt comprises an eroded mountain range bounded on the south and west by border thrust fault systems. The central zone consists of moderately to highly deformed Silurian to Permian rocks that increase in the degree of deformation from west to east. The basement rocks include phyllites, cherts, jaspers and greywackes with interbedded basic volcanics. These are overlain by Carboniferous shallow marine sediments comprising mudstones, sandstones, limestones, conglomerates and tuffs with interbedded rhyolites. The western zone of the New England Fold Belt is bounded to the east by the Great Serpentine Belt and to the west by the Hunter-Mooki Thrust Fault System.

The New England Fold Belt groundwater system is characterised as a fractured rock system, with groundwater dominantly stored and transmitted within fractures rather than the rock mass itself.

Local Hydrogeology

The stratigraphic units underlying the Development Site are:

- Tulcumba Sandstone - a coarse to fine grained, cross bedded sandstone, siltstone, polymict conglomerate, calcareous mudstone and limestone. This comparatively erosion-resistant unit forms the southeast-northwest trending ridgeline that runs through the centre of the Development Site;
- Mandowa Mudstone - a thinly bedded, laminated and massive mudstone with thin siltstone; and
- Namoi Formation - fine grained sandstone beds with marine rich facies, with thinly bedded mudstone, siltstone and minor conglomerate, lithic and calcareous sandstone.

The surface is covered in residual/eluvial (i.e. weathered) deposits, which available drill logs typically show as only a few metres deep.

Groundwater is known to be contained within the unconsolidated sediments (alluvium) associated with the Namoi River to the north and northwest of the Development Site and downstream of Lake Keepit, where the Namoi River alluvium is known to form an extensive and widely utilised aquifer. The alluvial aquifer is typically comprised of coarse sand, gravel, silt and clay deposits. However, as shown on **Figure 7**, the *Manilla 9036 1:100 000 geological map sheet* does not show any occurrence of alluvium adjacent to the Development Site. Analysis of aerial imagery suggests that if the alluvial aquifer does exist adjacent to the Development Site, it is well constrained spatially to within and adjacent to the Namoi River channel itself.

NSW Groundwater Database Review

A search of the NSW Government's on-line groundwater works database identified eight registered groundwater bores within the Development Site. A review of the drill bore logs confirmed the understanding of the New England Fold Belt groundwater system as a fractured rock system and indicates the water bearing zones are greater than 30 m deep (SLR 2017).

8.5.2 Groundwater Bore Baseline Assessment

In response to concerns raised by Lands & Water in relation to using historical water level data from the on-line groundwater works database and to ensure accurate information is presented in this EIS, SLR was engaged to undertake a groundwater bore baseline assessment. In the absence of NSW standards or guidelines, SLR adopted the Queensland Department of Environment and Heritage Protection's guideline *Baseline assessments – ESR/2016/1999* (2017, cited in SLR 2017) as a means of planning and implementing the methodology of the assessment. A copy of the *Groundwater Bore Baseline Assessment* (SLR 2017) is contained within **Appendix E**.

In addition to the eight registered groundwater bores identified within the Development Site, the groundwater bore survey conducted by SLR (2017) on 8 November 2016 identified one additional bore and one well (i.e. 10 in total). The locations of these bores/well are shown on **Figure 30**. As evident, nine of the bores/well are within the Development Site and one (Doyle 8) is located to the northwest of the Site.

Groundwater Levels

Table 28 lists the 10 identified bores/wells, including their registration identification, standing water levels (SWL) (metres below ground level [mbgl]) and referenced standing water levels (RSWL) (m AHD) measured during the survey. Doyle 5 was unable to be measured due to no access, and McCrae 4 was unable to be measured due to the well being collapsed and dry.

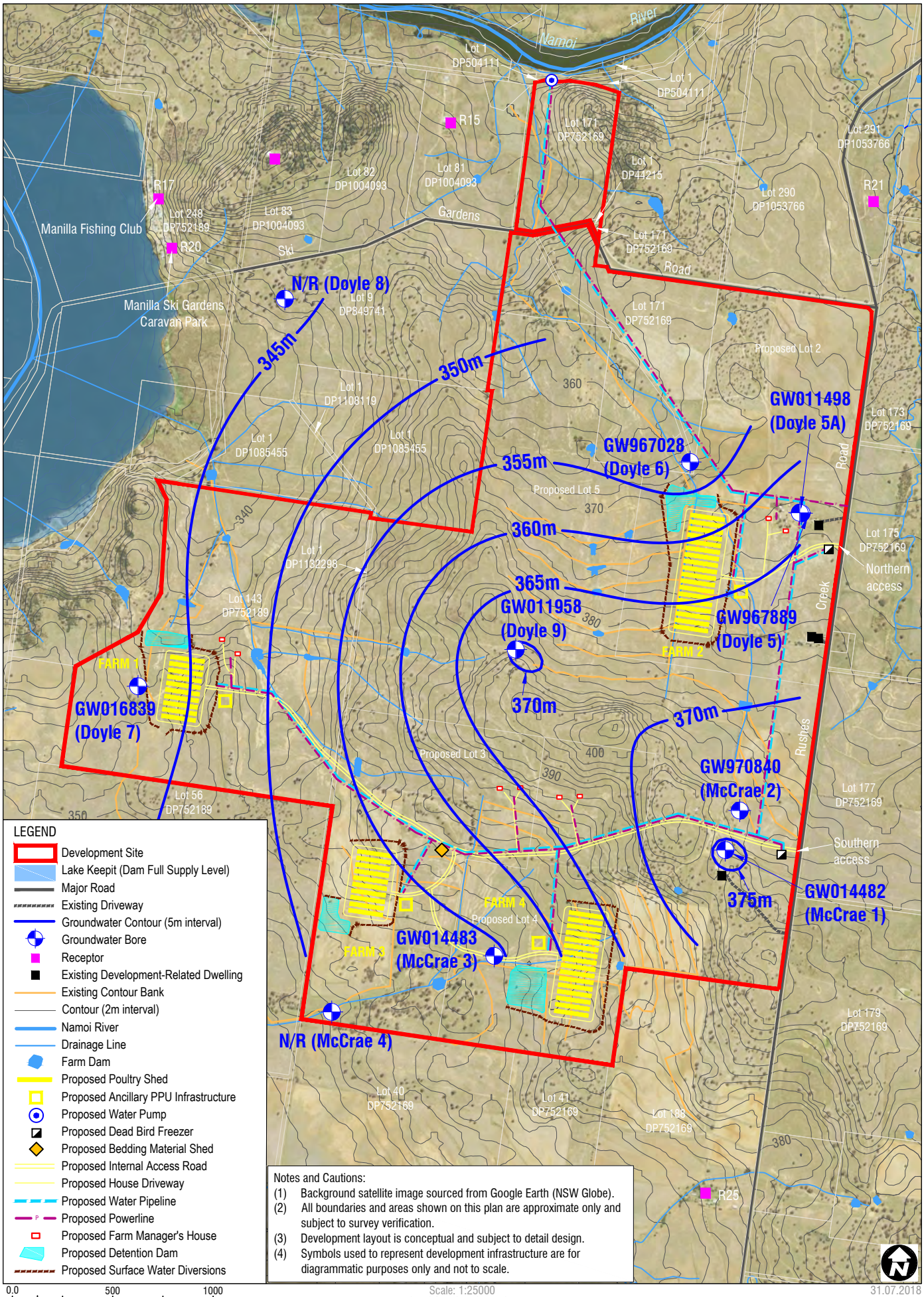
Table 28 Groundwater Levels

Local Bore ID	Registration ID	Bore Status	SWL (mbgl)	RSWL (m AHD)
Doyle 5	GW967889	Operational	N/A	N/A
Doyle 5A	GW011498	Non-operational	9.05	364.1
Doyle 6	GW967028	Operational	15	351.3
Doyle 7	GW016839	Operational	10.94	341.9
Doyle 8	-	Operational	3.49	343.9
Doyle 9	GW011958	Non-operational	17.83	370.7
McCrae 1	-	Operational	19	376.1
McCrae 2	GW970840	Operational	20.83	372.1
McCrae 3	GW014483	Non-operational	11.29	353.9
McCrae 4 (well)	-	Non-operational	N/A	N/A

N/A = Unable to be measured

Results of the bore survey show that the depth to groundwater is greater than 9 mbgl across the Development Site. While a relatively shallow depth of 3.49 mbgl was recorded at Doyle 8 (to the northwest of the Development Site), this bore is located immediately adjacent to a farm dam that was full during the survey and, therefore, the measured groundwater level was likely influenced by dam seepage.

SLR (2017) generated the potentiometric contour map shown on **Figure 30** from the results of the November 2016 bore survey. This map shows that the direction of groundwater flow is a subdued replica of topography, with groundwater flowing away from the southeast-northwest trending ridgeline in the centre of the Development Site towards the Namoi River in the north, west and northwest



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Groundwater Potentiometric Contour Map

Groundwater Quality

SLR (2017) collected groundwater samples from the six operational bores, with field and laboratory analysis results listed in **Tables 29** and **30**, respectively. Groundwater quality was noted in the field as fresh to slightly brackish, with field electrical conductivity (EC) ranging between 977 and 1,609 µS/cm and field pH ranging between 6.9 and 7.6 (i.e. neutral). The laboratory results show that the ionic composition of groundwater across the Development Site is relatively similar, with major ion compositions dominated by calcium-sodium water types and total dissolved solids (TDS) ranging between 800 and 1,500 mg/L. The majority of dissolved metals were below the respective laboratory detection limits, with the exception of barium, boron, iron, manganese and strontium, which all had low recorded concentrations.

Table 29 Groundwater Quality Field Analysis Results

Parameter	Doyle 5	Doyle 6	Doyle 8	Doyle 7	McCrae1	McCrae 2
pH	7.59	7.45	6.97	7.21	7.11	6.88
EC (µS/cm)	1045	1013	1609	977	1120	1233

Table 30 Groundwater Quality Laboratory Analysis Results

Parameter	Doyle 5	Doyle 6	Doyle 8	Doyle 7	McCrae1	McCrae 2
EC (µS/cm)	1500	1200	1300	1900	1500	1400
TDS (mg/L)	960	890	810	1500	860	980
Major Ions (mg/L)						
Calcium	140	110	140	170	160	160
Magnesium	54	56	56	87	36	61
Potassium	2.4	1.2	1.4	3	1.2	2
Sodium	120	140	94	180	120	120
Total Alkalinity (as CaCO3)	530	610	710	590	690	700
Chloride	140	100	65	230	110	140
Sulphate (as S)	60	41	21	72	24	28
Dissolved Metals (mg/L)						
Aluminium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	0.05	0.08	0.04	0.07	0.17	0.14
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.3	0.46	0.17	0.28	0.32	0.19
Cadmium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.004	<0.001	0.005	0.018	0.007	0.004
Iron	2.2	5	<0.05	0.1	<0.05	2.8
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	0.002

Parameter	Doyle 5	Doyle 6	Doyle 8	Doyle 7	McCrae1	McCrae 2
Manganese	0.056	0.085	<0.005	0.15	0.012	0.022
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel	0.002	0.001	<0.001	0.002	<0.001	<0.001
Selenium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium	3.7	4	1.5	3.3	8.3	3
Vanadium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	0.08	0.068	0.039	0.14	0.015	0.04

Local Abstraction

The six operational bores are used mainly to supply local households or for stock water supply. Abstraction rates for the four bores identified as Doyles 5, 6, 7 and 8 are unknown, however are likely to be low given a windmill is used to abstract the groundwater. McCrae 1 is powered by a submersible pump and abstraction rates are approximately 12 litres per minute for 20 minutes, the pump then shuts down as the groundwater level falls below the pump intake. McCrae 2, which is the main bore currently utilised within the Development Site, abstracts at a rate of approximately 1,200 litres per hour and is used every two to three days in hot weather and once per week in the cooler months.

Groundwater Dependent Ecosystems

A search of the BoM's *National Atlas of Groundwater Dependent Ecosystems* indicates that there are no GDEs reliant on surface expression of groundwater (rivers, springs, wetlands) within the Development Site or its surrounds. While the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011* lists a number of high priority GDEs, none of these are located in or around the Development Site.

8.5.3 Conceptual Hydrogeological Model

Driller's logs and water bearing zone information indicates that the aquifers beneath the Development Site are comprised of New England Fold Belt fractured rock strata and are found at depths between 31.5 mbgl and 103.6 mbgl. Water bearing strata for the groundwater bores identified within the Development Site are all within fractured rock types of the New England Fold Belt. Groundwater is known to be contained within the unconsolidated sediments (alluvium) associated with the Namoi River to the north and northwest of the Development Site, and downstream of Lake Keepit. However, the driller's logs for the bores within the Development Site show an absence of alluvium and no registered bores within the Site are completed in a shallow alluvial aquifer, further suggesting the alluvial aquifer is not present within the Development Site.

Three of the four bore drill logs indicate the presence of weathered regolith (saprolite) recorded as clay lithology. This layer, where logged, is between 0.5 and 3 m thick approximately 2 m below the surface immediately above competent basement rocks. A conceptual hydrogeological cross-section is presented in the *Groundwater Bore Baseline Assessment* (SLR 2017) in **Appendix E**. The conceptual understanding is that the regolith exists across the Development Site (and regional area) acting as an aquitard (a geological formation that may contain groundwater however is not capable of transmitting significant quantities of it under normal hydraulic gradients) and its presence would restrict any downward movement of water into the groundwater system. This type of groundwater system is typical in areas were fresh bedrock is present at or close to the surface. In place, chemical alteration of fresh rock results in a (saprolite) layer, rich in clay and a zone of low permeability, overlying fresh bedrock. Alteration depths depend on weathering processes in the area and alteration depths will vary.

Results of the bore survey conducted by SLR (2017) support the conceptual understanding of the groundwater system within and around the Development Site. Groundwater levels measured during the survey indicate groundwater is topographically driven, with groundwater flowing away from the southeast-northwest trending ridgeline in the centre of the Development Site towards the Namoi River in the north, west and northwest. Groundwater levels generally range between 10 and 20 mbgl across the Development Site, indicating confined aquifer conditions given water bearing zones are found at depths between 31.5 mbgl and 103.6 mbgl (as recorded in drill logs). Groundwater chemistry results show that water types are very similar across the Development Site and dominated by calcium-sodium ions, indicating groundwater accessed from the existing bores on the Development Site is from the same source (i.e. the New England Fold Belt fractured rock strata), confirming the review of available drill logs.

In summary, the groundwater system beneath and adjacent the Development Site is solely comprised of the New England Fold Belt fractured rock system. Water bearing zones are generally found between 30 and 100 m deep and are confined by shallower strata, including the weathered clay rich regolith. The shallow alluvial aquifer appears to be confined to the Namoi River channel itself and does not extend into the boundaries of the Development Site.

8.5.4 Impact Assessment

The potential for adverse impact to local groundwater resources from the Development is very low. Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to groundwater resources and no detectable impact is expected.

Groundwater Levels / Yields

The Development's water supply requirements will be serviced via the extraction of surface water from the Namoi River under the provisions of two existing water access licences owned by ProTen (see **Section 4.16.5** and **Appendix M**). There will not be any groundwater extraction or use and therefore no impact on local groundwater levels or yields.

Groundwater Quality

Some intensive livestock operations have the potential to impact on groundwater resources through seepage of development-generated runoff. However the Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing process itself. The engineered surface water management systems (see **Section 4.17.2**) at each PPU will capture and manage wash down water and stormwater runoff within the PPU environs throughout the life of the operation. The grassed swale drains will allow infiltration of the water into the topsoil for nutrient uptake by the grass, which will be regularly slashed to promote continued growth. During heavy rainfall events, excess water from the grassed swales will be conveyed via underground pipes under the PPU ring road and in to a table drain around the perimeter of the PPU that will convey the water to a detention dam.

The detention dams will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event, and the internal surfaces will be compacted or lined to provide an impermeable surface. While the water captured in the detention dams will have some level of nutrients, the levels are predicted to be low given that the poultry sheds will be thoroughly blown and swept prior to being washed and the grassed swales will provide a very effective means of nutrient removal (see **Section 8.4.2**).

No detectable impact to groundwater is anticipated as a result of sewage generated by the staff amenities at each PPU and the farm manager houses. Each will generate a relatively low volume of sewage and the proposed AWTSs will treat the wastewater to a secondary standard (a higher standard than septic tanks). Each AWTS (12 in total) will have a treatment capacity of 10 equivalent persons at 200 L/p/d and the treated effluent will be released over an area of approximately 200 m^2.

Current groundwater levels within the Development Site are greater than 9 mbgl and water bearing zones are greater than 30 m deep (see **Section 8.5.1**), indicating confined aquifer conditions. As outlined in **Section 8.5.3**, bore logs indicate the presence of a weathered clay-rich regolith layer above basement rocks across the Development Site. This layer acts as an aquitard restricting any downward seepage of water from the surface in to the groundwater system and confines the water bearing strata as demonstrated by recent measurement of groundwater levels across the Development Site.

In summary, the surface water management systems, depth to groundwater and nature of the strata (along with other development design features, best management practices and mitigation measures) will mitigate the potential for infiltration of wash down water and any potential pollutants to groundwater. On this basis, there will be no detectable impact to groundwater quality.

The shallow alluvial aquifer appears to be confined to the Namoi River channel itself and does not extend into the boundaries of the Development Site (see **Figure 7**).

8.5.5 Mitigation and Management

The Development poses a very low risk to groundwater resources and no detectable impact is expected. On this basis, no groundwater monitoring is warranted. The following development design features, best management practices and mitigation measures will be implemented to ensure negligible risk for impact to groundwater throughout the life of the operation:

- There will not be any groundwater extraction or use by the Development.
- Each poultry shed will be fully enclosed and have concrete flooring.
- Each poultry shed will be surrounded by a dwarf concrete bund wall measuring 400 mm high to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds.

- The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event.
- The internal surfaces of the detention dams will be compacted or lined to provide an impermeable surface.
- AWTSs will be installed to manage the sewage generated by the staff amenities at each PPU and the farm managers' houses in accordance with the manufacturer's specifications and Council approval requirements. Each AWTS (12 in total) will have a treatment capacity of 10 equivalent persons at 200 L/p/d and the treated effluent will be released over an area of approximately 200 m^2 via sub-surface irrigation.
- An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the surface water management systems. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken to ensure the system's design capacity is maintained.
- The grassed swale drains between the poultry sheds will be carefully managed to minimise soil disturbance and maximise infiltration and stormwater treatment potential. They will be regularly slashed to encourage continual grass growth and associated nutrient up-take.
- Dry-cleaning practices at the end of each production cycle will be maximised within the poultry sheds prior to washing with water to minimise the volume of wash water and the amount of poultry litter (and associated sediments and nutrients) in the wash down water.
- The waste management systems listed in **Section 4.18** 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.
- The best management practices and mitigation measures outlined in **Section 4.19** will be implemented for the storage of chemicals and fuels.

8.6 Biodiversity

SLR was engaged to undertake an assessment of potential biodiversity impacts associated with the Development. The assessment was undertaken in accordance with the FBA (OEH 2014a) and the Offsets Policy (OEH 2014b) and comprised:

- An initial desktop review, including database searches to identify listed threatened biota (species, populations and communities), geographic information system (GIS) mapping and survey design;
- Field survey in October 2016 and October 2017;
- GIS mapping and data compilation;
- "Landscape assessment" using GIS, available geographic and vegetation data and field survey results;
- Identification of vegetation zones and use of BioBanking plot/transect data and GIS mapping to assess "site value";
- Identification of threatened species of relevance to the Development Site, including both ecosystem credit species and species credit species;
- Assessment of the Development's disturbance footprint in GIS to calculate vegetation removal; and
- Application of the Credit Calculator and impact credit calculations.

A copy of SLR's *Biodiversity Assessment Report* (SLR 2018b) is contained within **Appendix G**, with the key findings and conclusions summarised in the below sub-sections.

8.6.1 Existing Environment

Native Vegetation

The majority of the Development Site has been historically cleared and used for agricultural purposes and is consequently composed of modified often bare soils and exotic pastures. However, there are some patches of native woodland remaining associated with topographic depressions and drainage features and within paddocks where historical clearing has been less extensive. The woodland areas contain virtually no native understorey or native groundcover, most likely as a result of decades of grazing by cattle (SLR 2018b).

Widely scattered paddock trees are distributed intermittently across the Development Site, with generally limited shrub cover and low diversity and cover of native groundcover vegetation. The groundcover across most of the open portions is subject to grazing or cropping and is dominated by exotic agricultural pasture, cultivated oats and weed species typical of the locality (SLR 2018b).

SLR (2018b) undertook extensive field survey work in accordance with the FBA (OEH 2014a) in October 2016 and October 2017, which included inspecting areas of native vegetation to refine the broad-scale regional mapping (OEH 2015). As listed in **Table 31** and shown on **Figure 31**, three native PCTs were recorded by SLR (2018b) within the Development Site, with an additional PCT identified between the Development Site and the Namoi River.

SLR (2018b) has categorised the PCTs listed in **Table 31** as vegetation zones of "low" or "moderate to good" condition according to the FBA (OEH 2014a). To qualify as low condition the native vegetation (woody vegetation) within a vegetation zone must have:

- A value of less than 25% of the lower benchmark value in the canopy; and
- A groundcover that is either less than 50% indigenous (or native) or over 90% cleared.

Table 31 Recorded Plant Community Types

PCT Code	PCT Name and Vegetation Zone	Formation	Class	Area (ha)
1383	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (moderate to good)	Grassy Woodlands	Western Slopes Grassy Woodlands	21.27
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion (moderate to good)	Grassy Woodlands	Western Slopes Grassy Woodlands	55.22
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion (moderate to good)	Grassy Woodlands	Western Slopes Grassy Woodlands	0.10
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Forested Wetlands	Inland Riverine Forests	0.47
1383	Derived grassland (White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion)	Grassy Woodlands	Western Slopes Grassy Woodlands	380.3
N/A	Non-native groundcover	N/A	N/A	558.77
			Total:	1,016.12

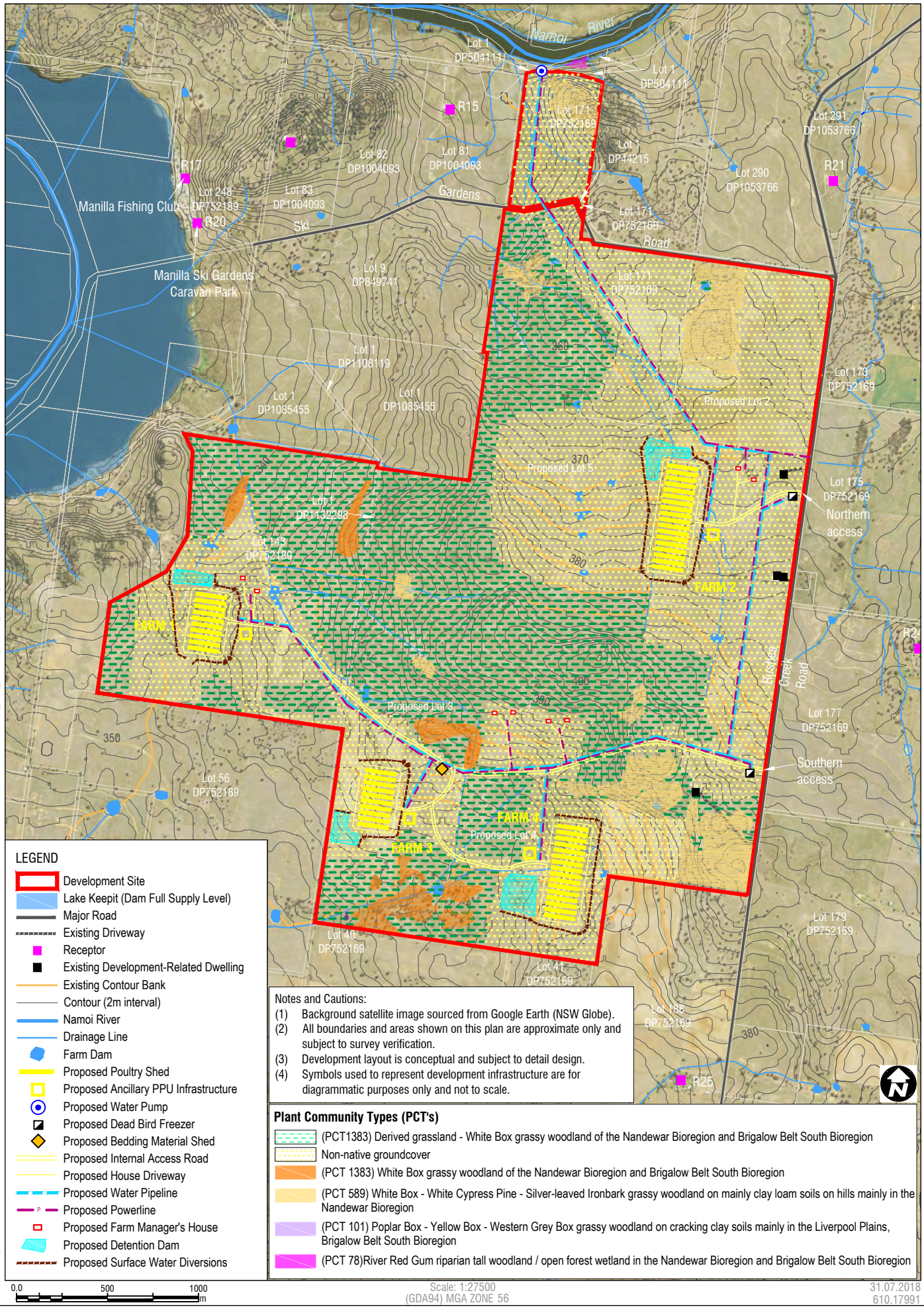
N.B. the small patch of River Red Gum riparian tall woodland / open forest wetland (PCT 78) is recorded immediately north of the Development Site (however within the Study Area of the *Biodiversity Assessment Report*) adjacent to the Namoi River (see **Figure 31**). While it is outside of the disturbance footprint of the Development, it was included by SLR (2018b) as the approximate location of the water pump adjacent to the Namoi River was unknown at the time SLR was undertaking field surveys.

The majority of the Development Site supports large expanses of grazed pasture comprising mainly exotic grasses and herbs and derived grasslands that have been (and are currently) subject to grazing and/or cropping uses (SLR 2018b). The patches of derived grasslands have been assigned by SLR (2018b) to PCT 1383 based on the surrounding vegetation type, survey plot results and prevailing topography. The patches of non-native groundcover and derived grasslands intergrade with each other, however have been distinguished based on the predominance of exotic groundcover species, values for native species diversity (being below benchmark for non-native plots) and with consideration of the definition of "low condition" in the FBA (OEH 2014a).

Threatened Ecological Communities

SLR's (2018b) search of the *Atlas of NSW Wildlife* identified the following six TECs listed under the BC Act potentially occur within the Development Site:

- Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions;
- Howell Shrublands in the New England Tableland and Nandewar Bioregions;
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions;
- Native Vegetation on Cracking Clay Soils of the Liverpool Plains;
- Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions; and
- White Box Yellow Box Blakely's Red Gum Woodland.



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Recorded Plant Community Types

As listed in **Table 32** and shown on **Figure 32**, two of these TECs were identified by SLR (2018b) within the Development Site during the field surveys.

Table 32 Recorded Threatened Ecological Communities

Threatened Community	PCT Code	Status[1]		Mapped Extent (ha)
		TSC Act	EPBC Act	
White Box Yellow Box Blakely's Red Gum Woodland	1383 589	E	CE	63.15
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	101	E	E	0.10

1 - E = endangered; CE = critically endangered

The OEH's input to the SEARs listed the Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions TEC as a matter requiring further consideration. However, no evidence of this community, including any individuals of Brigalow *Acacia harpophylla*, was recorded by SLR (2018b) during field surveys. Accordingly, the Brigalow TEC is not considered further in this assessment.

Threatened Species

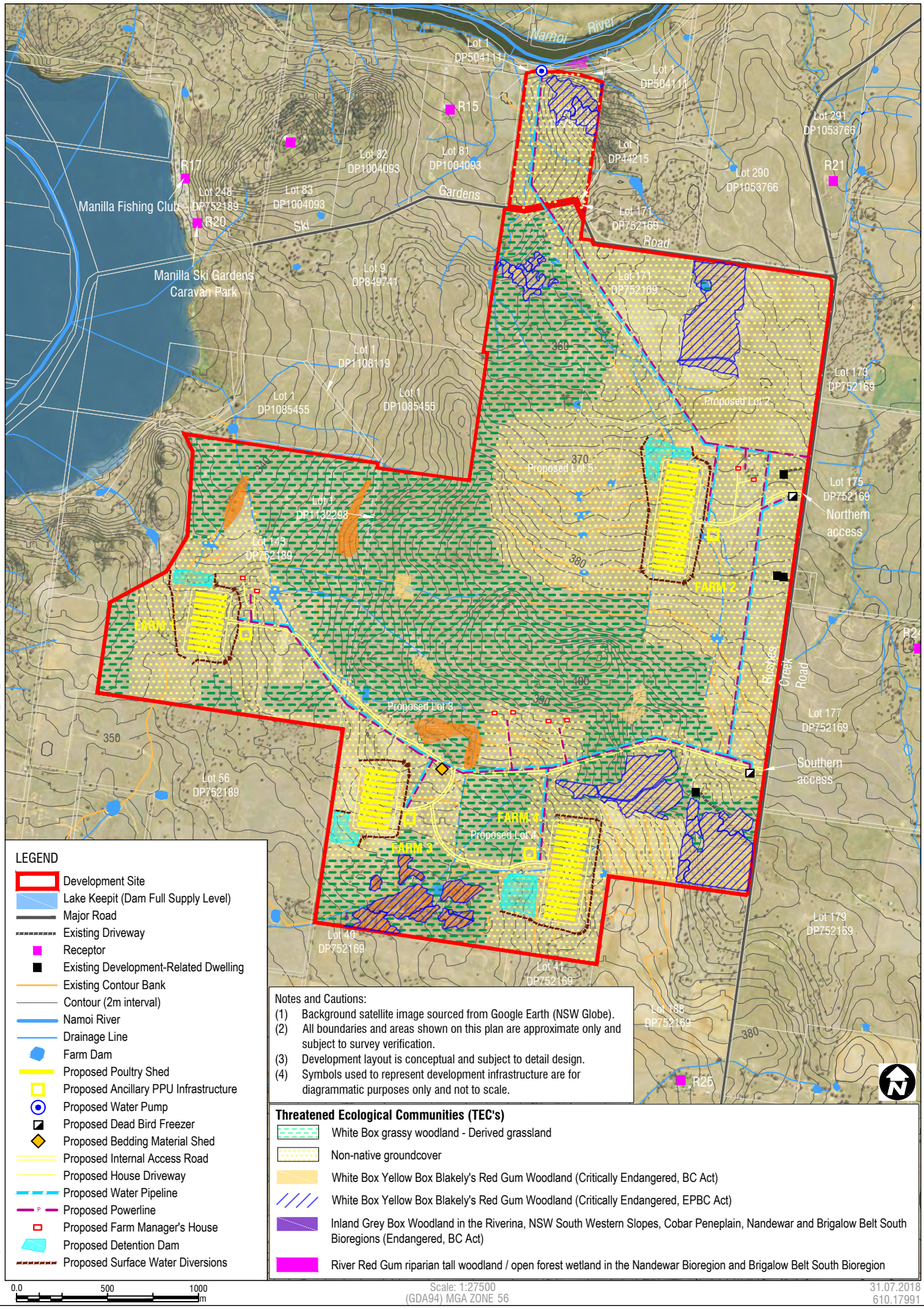
The Credit Calculator outputs of ecosystem credit species and species credit species were used by SLR (2018b), along with the previously recorded threatened species retrieved from the *Atlas of NSW Wildlife* database (10 km search area), to create a list of candidate threatened species and populations relevant to the Development Site. In addition, the OEH's input to the SEARs listed the Regent Honeyeater (*Anthochaera phrygia*) and Lake Keepit Hakea (*Hakea pulvinifera*) as threatened species requiring further consideration. These two species were targeted by SLR (2018b) during field surveys.

Combining these information sources, SLR (2018b) compiled a candidate list of 81 threatened species and populations, including 14 plants, 44 birds, 16 mammals, one amphibian, two fish and four reptiles. SLR's "likelihood of occurrence" rating in the *Biodiversity Assessment Report* (2018b) is based on field survey results and the extent, nature and condition of habitat types and habitat features within the Development Site.

Of the 81 threatened biota potentially relevant to the Development Site, SLR (2018b) recorded two species during the field surveys, being the Little Eagle and Grey-crowned Babbler. Five threatened bat species that were not predicted to occur in the Credit Calculator and not previously recorded within the locality (in the *Atlas of NSW Wildlife* database), were also recorded by SLR (2018b) within the Development Site during field surveys. The recorded species are listed in **Table 33** and recorded locations are shown on **Figure 33**.

Table 33 Recorded Threatened Species

Species	Status	Credit type
Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)	Vulnerable (TSC Act)	Ecosystem
Little Eagle (*Hieraaetus morphnoides*)	Vulnerable (TSC Act)	Ecosystem
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	Vulnerable (TSC Act)	Ecosystem
Eastern Freetail-bat (*Mormopterus norfolkensis*)	Vulnerable (TSC Act)	Ecosystem
Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)	Vulnerable (TSC Act)	Ecosystem and Species
Eastern Cave Bat (*Vespadelus troughtoni*)	Vulnerable (TSC Act)	Ecosystem and Species
Greater Broad-nosed Bat (*Scoteanax rueppellii*)	Vulnerable (TSC Act)	Ecosystem



LEGEND

- Development Site
- Lake Keepit (Dam Full Supply Level)
- Major Road
- Existing Driveway
- Receptor
- Existing Development-Related Dwelling
- Existing Contour Bank
- Contour (2m interval)
- Namoi River
- Drainage Line
- Farm Dam
- Proposed Poultry Shed
- Proposed Ancillary PPU Infrastructure
- Proposed Water Pump
- Proposed Dead Bird Freezer
- Proposed Bedding Material Shed
- Proposed Internal Access Road
- Proposed House Driveway
- Proposed Water Pipeline
- Proposed Powerline
- Proposed Farm Manager's House
- Proposed Detention Dam
- Proposed Surface Water Diversions

Notes and Cautions:

(1) Background satellite image sourced from Google Earth (NSW Globe).
(2) All boundaries and areas shown on this plan are approximate only and subject to survey verification.
(3) Development layout is conceptual and subject to detail design.
(4) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

Threatened Ecological Communities (TEC's)

- White Box grassy woodland - Derived grassland
- Non-native groundcover
- White Box Yellow Box Blakely's Red Gum Woodland (Critically Endangered, BC Act)
- White Box Yellow Box Blakely's Red Gum Woodland (Critically Endangered, EPBC Act)
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Endangered, BC Act)
- River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion

0.0 500 1000 m

Scale: 1:27500
(GDA94) MGA ZONE 56

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Recorded Threatened Ecological Communities

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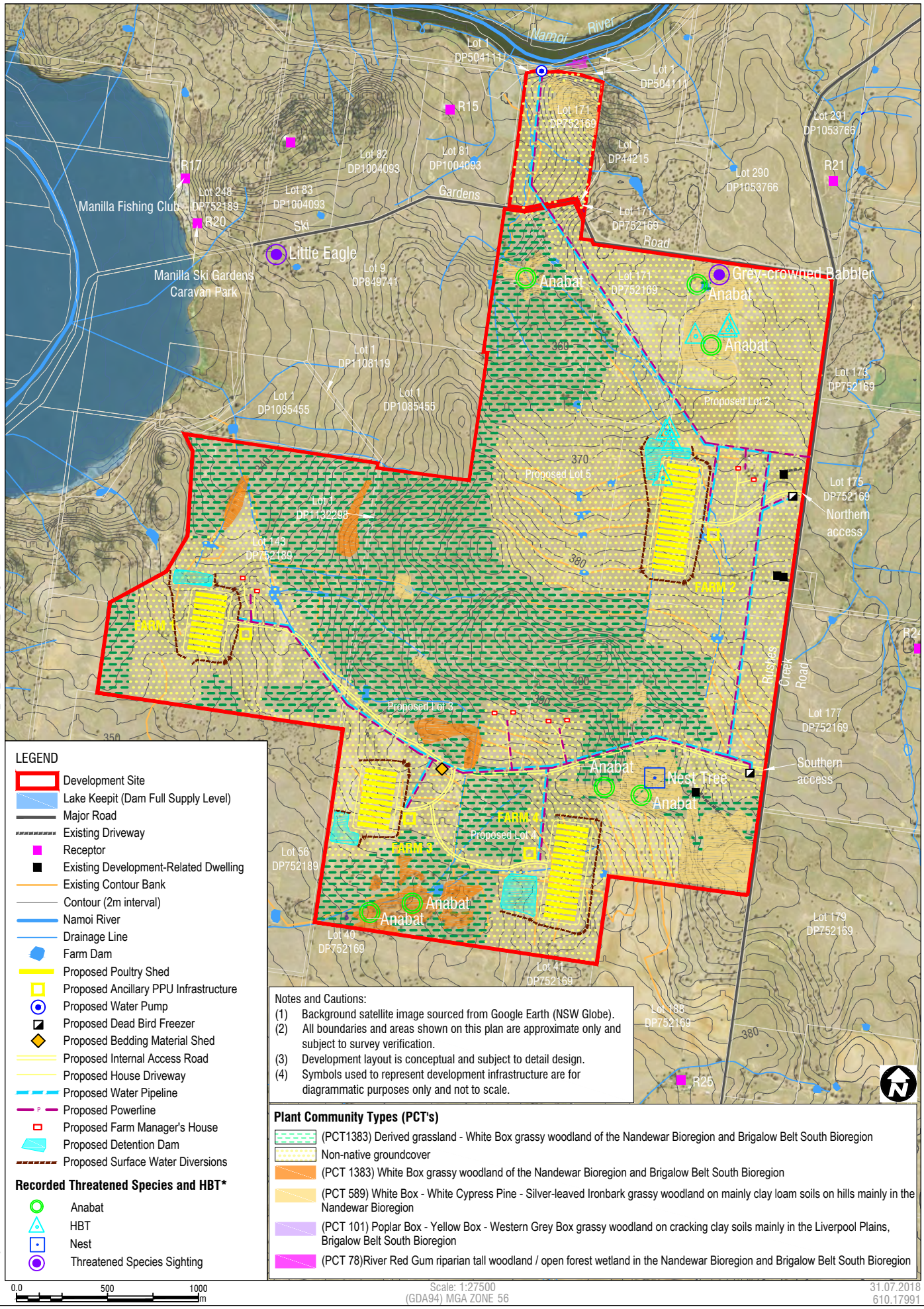
FIGURE 32



LEGEND

- Development Site
- Lake Keepit (Dam Full Supply Level)
- Major Road
- Existing Driveway
- Receptor
- Existing Development-Related Dwelling
- Existing Contour Bank
- Contour (2m interval)
- Namoi River
- Drainage Line
- Farm Dam
- Proposed Poultry Shed
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- Proposed Bedding Material Shed
- Proposed Internal Access Road
- Proposed House Driveway
- Proposed Water Pipeline
- Proposed Powerline
- Proposed Farm Manager's House
- Proposed Detention Dam
- Proposed Surface Water Diversions

Recorded Threatened Species and HBT*

- Anabat
- HBT
- Nest
- Threatened Species Sighting

Notes and Cautions:

(1) Background satellite image sourced from Google Earth (NSW Globe).
(2) All boundaries and areas shown on this plan are approximate only and subject to survey verification.
(3) Development layout is conceptual and subject to detail design.
(4) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

Plant Community Types (PCT's)

- (PCT1383) Derived grassland - White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion
- Non-native groundcover
- (PCT 1383) White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion
- (PCT 589) White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion
- (PCT 101) Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion
- (PCT 78)River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion

0.0 500 1000 m

Scale: 1:27500
(GDA94) MGA ZONE 56

31.07.2018
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*NOTE:
Threatened microchiropteran bat species were recorded at Anabat locations.
See Table 17 for list of species

Threatened Species and Hollow-Bearing Trees

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FIGURE 33

8.6.2 Impact Assessment

Direct Impacts

The potential ecological impact of the Development will be relatively small, with a disturbance footprint of approximately 87.78 ha, which comprises just 8.6% of the Development Site, and the commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. The impact areas are devoid of high conservation habitats apart from isolated paddock trees (SLR 2018b).

SLR (2018b) advises that the Development will involve minor impacts to TECs and habitat for threatened fauna species comprising the following direct impacts:

- Removal and disturbance of derived grasslands (TEC vegetation), which are dominated by exotic pasture with a low cover and moderate diversity of native species;
- Clearing of some paddock trees to accommodate infrastructure where required; and
- Removal of a small portion of potential fauna foraging habitat, in particular for threatened microchiropteran bats species, the Grey-crowned Babbler and the Little Eagle.

The areas of native vegetation to be cleared have been carefully considered and all high-conservation habitats have been avoided where possible. However, the Development will result in the removal of some highly disturbed derived grassland communities, which form part of the Box-Gum Woodland TEC, and the removal of some isolated paddock trees that cannot be avoided.

As listed in **Table 34**, the total area of required native vegetation removal is limited to approximately 1.17 ha of native derived grassland (0.1% of the Development Site). The remaining disturbance area of 86.61 ha comprises areas of exotic pasture in low condition (i.e. non-native groundcover) (SLR 2018b).

Table 34 Direct Vegetation Impacts

PCT Code	Vegetation Zone Name	Clearing Area (ha)
1383	White Box grassy woodland (moderate to good condition)	0
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland (moderate to good condition)	0
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland (moderate to good condition)	0
78	River Red Gum riparian tall woodland / open forest (moderate to good condition)	0
1383	White Box grassy woodland – moderate to good (derived grassland)	1.17
N/A	Non-native groundcover	86.61
	Total vegetation	**87.78**

Indirect Impacts

SLR (2018b) identifies the following indirect impacts in relation to the Development:

- Potential for erosion, runoff and sedimentation to occur during construction and also during the operational phase if appropriate controls are not properly installed and maintained. These potential impacts are to be avoided and/or managed via the installation of appropriate erosion and sediment control measures and engineered surface water management systems at each PPU.

- Potential for animal strike, particularly macropods and birds, by increased traffic within the Development Site. However, the speed limit will be limited to 60 km/hr along the internal access roads and animal strikes are unlikely at this speed.
- Potential for increased presence of weeds across the Development Site. However, weed management will be undertaken during both the construction and operational phases. A wheel wash facility will be installed at the entrance to each PPU and on-going farming and maintenance of the residual land within the Development Site will reduce the likelihood of weeds.
- Potential for rubbish and other waste streams generated by the Development entering the environment. Appropriate management systems will be implemented for each waste stream to ensure that there will be no on-site stockpiling or disposal of waste materials.
- Increased artificial light. The primary source of external lighting will comprise one light fixture mounted at a height of approximately 4 m over the front and rear loading-unloading areas of each poultry shed. These lights will be aimed downwards and only switched on during loading-unloading and servicing activities during times of low light and/or heavy fog.

Impacts Requiring Offsetting

According to the FBA (OEH 2014a), impacts on native vegetation that require an offset include:

- Impacts on endangered ecological communities (EECs) and critically endangered ecological communities (CEECs), unless specifically nominated in the SEARs as an impact requiring further consideration; and
- Impacts on PCTs associated with threatened species habitat and in a vegetation zone that has a site value score of greater than or equal to 17.

All but one of the vegetation zones mapped with the Development Site have current site value scores of over 17 and represent habitat for at least some threatened species. SLR (2018b) advises that any clearing in these vegetation zones would, in theory, require an offset according to the FBA (OEH 2014a). However, as outlined above, clearing will only be required within one mapped native vegetation zone, being White Box grassy woodland - Derived Native Grassland, with approximately 1.17 ha to be permanently removed. **Table 35** lists the vegetation zone requiring offsetting and the number of credits required.

Table 35 Vegetation Zones Requiring Offsetting and Credits Required

PCT Code	Vegetation Zone Name	Mgt Area (ha)	Current Site Value Score	Future Site Value Score	Ecosystem Credits
1383	White Box grassy woodland (moderate to good condition)	0.0	58.47	58.47	0
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland (moderate to good condition)	0.0	60.11	60.11	0
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland (moderate to good condition)	0.0	21.31	21.31	0
78	River Red Gum riparian tall woodland / open forest (moderate to good condition)	0.0	54.1	54.1	0
1383	White Box grassy woodland - Derived Native Grassland	1.17	38.25	0	29
N/A	Non-native groundcover	86.61	16.94	0	0
	Total	**87.78**	-	-	**29**

No local populations of threatened species that generate species credits are likely to occupy the vegetation within the Development Site other than on a transient basis (SLR 2018b). On this basis, SLR (2018b) advises that there are no species credit polygons that require offsetting as part of the Development.

Impacts Requiring Further Consideration

SLR (2018b) advises that there are no impacts associated with the Development that require further consideration. With reference to the thresholds for such impacts in the FBA (OEH 2014a), SLR (2018b) advises:

- While the Namoi River runs close to the northern-most boundary of the Development Site and water extraction infrastructure is proposed to be installed adjacent to the River, there is no riparian vegetation in this location and hence there will be no impacts that will substantially reduce the width of the riparian buffer zone.
- There are no important wetlands or estuarine areas within the Development Site.
- There are no State significant biodiversity links within or adjoining the Development Site and hence the Development will not impact on the movement of native fauna along such links (corridors).
- The estimated impacts on native vegetation are in no way likely to cause the extinction (or significantly reduce the viability) of a TEC in the Namoi IBRA subregion. Impacts will be limited to areas of highly disturbed derived grassland and will not reduce the viability of vegetation in the locality or IBRA subregion or cause its local extinction.
- There is no critical habitat within the Development Site.
- There are no threatened species or populations likely to become extinct (or have their viability reduced significantly) in the IBRA subregion.
- The predicted impacts on native vegetation are not likely to impact on a critically endangered species or on any species that have not previously been recorded in the IBRA subregion in the *Atlas of NSW Wildlife* database.

Biodiversity Credit Requirement

The BioBanking Credit Calculator was used by SLR (2018b) to calculate the impacts of the Development and potential offset requirements in accordance with the FBA (OEH 2014a). The below dot points provide a summary of the credit calculations:

- **Ecosystem credits** – as listed in **Table 35**, a total of 29 ecosystem credits are required to offset the clearing of native vegetation.
- **Landscape value score** - the loss in landscape value score is 12.
- **Species credits** - no species credits are required to offset the impacts of the Development.

Table 36 lists the ecosystem credit types required to offset the Development and the matching credits and IBRA subregions that can be used as "offset options". Any such credits can only be used as substitutes (or offset options) for credit types required if they belong to an IBRA subregion that adjoins the IBRA subregion in which the Development occurs (i.e. Namoi IBRA subregion).

Refer to the BioBanking credit reports appended to the *Biodiversity Assessment Report* (SLR 2018b) for further details.

Table 36 Ecosystem Credits Required for Offsetting and Matching Credit Types

Ecosystem Credit Required	No. of Credits	Offset Options
1383 White Box grassy woodland (derived grassland)	29	• White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226) • Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion, (NA141) • Grey Box - Blakely's Red Gum - Yellow Box grassy open forest of the Nandewar Bioregion and New England Tableland Bioregion, (NA144) • White Cypress Pine - Silver-leaved Ironbark grassy woodland of the Nandewar Bioregion, (NA230) • Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion, (NA237) • White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, Brigalow Belt South Bioregion, (NA400) • Silver-leaved Ironbark grassy tall woodland on clay-loam soils on plains in the Brigalow Belt South Bioregion, (NA350) • Grey Box grassy woodland or open forest of the Nandewar Bioregion and New England Tableland Bioregion, (NA293) • White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion, (NA395)

8.6.3 EPBC Act Matters

A search of the DEE's on-line Protected Matters Search Tool was performed in June 2017 as part of the *Biodiversity Assessment Report* (SLR 2018b) contained in **Appendix G**. The results indicate that the following matters of NES protected by the EPBC Act are either present within or relate to the Development Site:

- Three listed wetlands of international importance (Ramsar Wetlands);
- Four listed TECs;
- Twenty nine listed threatened species; and
- Ten listed migratory species;

The potential relevance of these matters of NES to the Development Site and the Development is discussed below.

Listed Wetlands of International Importance

The three wetlands of international importance identified are:

- Banrock station wetland complex located between 1,000 and 1,100 km from the Development Site;
- Riverland located between 900 and 1,000 km upstream of the Development Site; and
- The Coorong and Lakes Alexandrina and Albert wetland located between 1,100 and 1,200 km from the Development Site.

These wetlands are not located on or connected to the Development Site and will not be affected by the Development.

Listed Threatened Ecological Communities

The four listed TEC that have been recorded or are predicted to occur within the locality include:

- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland;
- New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands;
- Weeping Myall Woodlands; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Of these listed communities, only the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ("Box Gum Grassy Woodland") is present within the Development Site (SLR 2018b). SLR (2018b) advises that the following recorded PCTs are considered to form part of the Box Gum Grassy Woodland EPBC Act community:

- White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (PCT 1383);
- White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion (PCT 589); and
- Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion (PCT 101).

Many of the patches of grassy woodland mapped within the Development Site comply with the definition of Box Gum Grassy Woodland TEC as defined under the EPBC Act (SLR 2018b). Smaller degraded patches and areas of derived grassland are below the specified condition thresholds and are not part of the EPBC Act Box Gum Grassy Woodland (SLR 2018b). Regardless, all patches have been avoided in the design of the Development and, as such, there will not be any direct impacts on areas of Box Gum Grassy Woodland.

Listed Threatened Species

The 29 threatened species (and/or their habitats) listed under the EPBC Act that are predicted to occur within the locality comprise six bird species, two fish species, seven mammal species, one amphibian and 10 plant species. These species were considered by SLR (2018b) in accordance with the "significant impact criteria" for vulnerable and endangered species in the *Significant Impact Guidelines 1.1* (DoE 2013). While there is potential for minor direct and indirect impacts on listed threatened species, being mainly loss of a small area of degraded habitat for mobile threatened fauna species, SLR (2018b) concludes that the Development will not have a "significant impact" on any threatened species based on the following:

- Suitable habitat for most of the species is absent within the Development Site. For those species that have either been recorded or could utilise the habitats present, there are not likely to be local populations present wholly within the Development Site or reliant on the Development Site for their survival in isolation. Any such populations present within the locality will not be rendered locally extinct by the Development. This is based on the large ranges of these species and the poor quality and condition of the habitats present within the Development Site.
- The Development Site is not assessed as likely to contain habitat critical to the survival of a species.
- The Development Site is not likely to support an "important population" of any threatened species.
- The mitigation and management measures (see **Section 8.6.4**) will avoid or reduce impacts on threatened species.

With reference to the criteria for vulnerable and endangered species, the Development is not likely to:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of an important population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that a species is likely to decline;
- Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause a species to decline; or
- Interfere substantially with the recovery of any of these species.

Listed Migratory Species

Of the 10 migratory species (and/or their habitats) predicted to occur within the locality, six are wetland species, three are terrestrial species and one marine species. SLR (2018b) advises that the Development Site does not contain any habitat for the six listed migratory wetland species and only marginal habitat for the single migratory marine species. In regard to the three terrestrial species, SLR (2018b) advises that the Development Site contains marginal foraging habitat amongst the woodland and scattered paddock trees and it is theoretically possible that these species could utilise the Site temporarily during foraging or dispersal. However, the vegetation lacks favourable complexity for these species and would constitute only a relatively small proportion of the large ranges of such species (SLR 2018b).

With reference to the criteria for migratory species in the *Significant Impact Guidelines 1.1* (DoE 2013), SLR (2018b) concludes that the Development Site does not contain an area of "important habitat" for any migratory species and the Development is highly unlikely to disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of a population of a migratory species.

Conclusion

SLR (2018b) concludes that the Development will not involve the imposition of a "significant impact" on any matters of NES and referral to the DEE is not necessary.

8.6.4 Mitigation and Management

The following development design features, best management practices and mitigation measures will be implemented to minimise the direct and indirect impacts on biodiversity as a result of the Development:

Construction

- Construction areas will be clearly delineated to ensure no native vegetation outside of these areas is cleared.
- Erosion and sediment controls will be implemented prior to disturbance activities commencing in accordance with the Blue Book (Landcom 2004) and *Erosion and Sediment Control on Unsealed Roads* (OEH 2012).

- An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the erosion and sediment control structures throughout the construction period. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of work sites.
- If considered necessary, vehicles leaving the Development Site will be cleaned to avoid the spread of weeds.
- The NSW Wildlife Information Rescue and Education Service (WIRES) will be contacted prior to planned tree felling to advise of proposed works and arrange a volunteer wildlife handler (if required and available) to rescue any fauna.
- Rubbish, including building material wastes and food scraps, will be properly managed and will not be stockpiled within areas of native vegetation.
- Disturbed areas will be promptly rehabilitated and revegetated to a stable landform following completion of disturbance activities (see **Section 4.3.6**).
- Revegetation works and landscape plantings will be regularly inspected and assessed for maintenance requirements, including weed control.

Operation

- The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation.
- If any native fauna are by chance injured during operations, WIRES will be contacted to arrange proper care for the animal. WIRES will also be contacted to remove any bats discovered within the poultry sheds.
- Suitable signage will be erected to direct traffic, limit traffic speed and minimise night time noise levels.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident).
- Efforts will be made to ensure the poultry sheds and other site buildings are fully enclosed and maintained in an attempt to exclude bats from roosting within the sheds/buildings.
- The waste management systems listed **in Section 4.18** 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.
- External lighting will be aimed downwards and only used when necessary during times of low light and/or heavy fog.
- A wheel wash facility will be installed on the access road to each PPU in order to minimise the risk of spread of plant pathogens and weeds.
- Pest control measures (see **Section 4.21**) will be implemented to prevent and control outbreaks.

Biodiversity Offset Strategy

- The Biodiversity Offset Strategy outlined in **Section 8.6.5** will be implemented to fulfil the offset requirements for the Development.

8.6.5 Biodiversity Offset Strategy

The *Biodiversity Assessment Report* (SLR 2018b) determined that a biodiversity offset is required in accordance with the FBA (OEH 2014a) and the Offsets Policy (OEH 2014b). As outlined in **Section 8.6.2**, the offset requirement for the Development comprises 29 ecosystem credits. No species credits are required.

SLR (2018b) advises that ProTen can meet the offset obligations for the Development through one or a combination of the offset options listed in **Table 37**.

Table 37 Biodiversity Offset Options

Option	Offset Option	No. of Credits	Offset Options/Comments
1a	Purchase and retire matching (like-for-like) ecosystem credits	29	Proponent purchases the required number and type of BioBanking credits from the BioBanking credit "market" (publically available through the BioBanking Credit Register). • Like-for-like ecosystem credits comprise those of the 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 36**. • Number and type of credits must be available or become available prior to construction (or during timeframe specified in the development consent).
1b	Purchase land and create required credits through a BioBanking Agreement	29	Proponent creates a BioBank site on their own land, which generates the required credits to fulfil their offset requirement, and retires the required number and type of credits from their own portfolio of credits. • 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. • Proponent retires their own credits to offset development using only Part A costs (i.e. management costs of BioBank per credit).
2	Variation rules - purchase and retire other credits within same vegetation formation	TBC	Where like-for-like offsets are not available and the proponent can demonstrate that "reasonable steps" have been taken to find a suitable offset, the proponent may apply the FBA "variation rules" (as outlined in the Offsets Policy). • Apply variation rules when matching credit types are not available. • Find ecosystem credits for PCTs that fall within same vegetation formation, with equal or greater cleared value for CMA. • Cannot be for PCTs that are critically endangered or listed under the EPBC Act.

3	Supplementary measures	N/A	For this option to be available, the proponent must demonstrate that reasonable steps have been taken to secure like-for-like offsets under Option 1 and/or varied offsets under Option 2. • Aim to supplement like-for-like offsets. • Apply FBA variation rules. • Apply when suitable credits and/or BioBank site unavailable or cannot be secured within appropriate timeframe. • Aim to target investment in threatened biota affected by the Development. • Where appropriate, use interim method to calculate monetary contribution for supplementary measures.
4	Payment in to the Biodiversity Conservation Fund (the Fund)	TBC	Proponent calculates the equivalent monetary value of their offset requirement and pays this amount into the Fund established under the BC Act. • Convert credits calculated under the FBA in to equivalent Biodiversity Assessment Method (BAM) credits. • Calculate monetary value of BAM credits and pay value into the Fund to fulfil offset obligation.

The options listed in **Table 37** have been considered by SLR (2018b) and are discussed in relation to the Development below. Further consultation will be undertaken with OEH and DPE to determine the most suitable offset for the Development.

Option 1a - Purchase Like-For-Like Credits

ProTen may choose to purchase and retire the 29 ecosystem credits listed in **Table 36**. At the time of preparing the *Biodiversity Assessment Repo*rt (SLR 2018b), SLR (2018b) advised that one BioBank site listing ecosystem credits for NA 226 White Box grassy woodland (PCT 1383) was listed on the BioBanking Credit Register (BioBanking Agreement ID 228). In addition, two sites identified as supporting this PCT in the Expression of Interest (EOI) register (EOI ID 35 and ID 128) were showing an availability of the required credit type within the Namoi and Liverpool Plains IBRA region. On this basis, the purchase of like-for-like credits is a potential option available to ProTen.

Option 1b - Generate Credits by Creating a BioBanking Agreement

ProTen may 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. This option is however not favoured as ProTen intends for the residual land outside of the disturbance footprint within the Development Site to be used for continued agricultural production purposes under some form of lease or share farming arrangement. This intended future land use is not compatible with management of a portion of the land for biodiversity conservation.

Purchasing of offset lands (i.e. suitable properties known to be for sale in the IBRA subregion) is also not a viable option for ProTen considering the small quantity of ecosystem credits required and the likely costs of purchasing land and setting up a BioBanking Agreement.

Option 2 - Apply Variation Rules

In the case where the required credits are not available and hence a like-for-like offset is not achievable, ProTen could apply the variation rules for matching ecosystem credits. However a hierarchy of options must be followed, with the need to demonstrate that “all reasonable steps have been taken…to secure a matching ecosystem credit”.

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 credits to be proposed as part of the offset strategy, where in the consent authority's opinion the strategy demonstrates that:

- All "reasonable steps" to secure a matching ecosystem credit have been taken by the proponent; and
- The required ecosystem credit is not for a PCT associated with a CEEC listed on the BC Act or an ecological community listed on the EPBC Act; and
- The PCT from the same vegetation formation has a percent cleared value of the PCT in the major catchment area equal to or greater than the percent cleared of the PCT to which the required ecosystem credit relates; and
- Where the required ecosystem credit is for a PCT that is associated with a CEEC/EEC, the PCT from the same formation is also associated with a CEEC/EEC.

Option 3 - Supplementary Measures

Where a proponent can demonstrate that all reasonable steps have been taken to obtain like-for-like credits or a suitable offset site, they can choose to use "supplementary measures" listed in the Offsets Policy (OEH 2014b).

Option 4 – Fund Payment

Under the BC Act, proponents may choose to pay into the Biodiversity Conservation Fund (the Fund) as an alternative to retiring biodiversity credits. Proponents can choose to use the Fund to meet their offset obligations immediately (i.e. they do not have to first try to find their own offsets). As the offset obligation in the *Biodiversity Assessment Report* (SLR 2018b) was calculated using the FBA (OEH 2014a), ProTen will need to seek a "credit equivalence" statement from the OEH confirming the Biodiversity Assessment Method (BAM) equivalent credits and subsequently apply to the Biodiversity Conservation Trust to make a payment in to the Fund. Following receipt of payment, the Trust will issue a certificate under section 6.33 of the BC Act confirming fulfilment of offset obligations.

Offset Strategy Actions

SLR (2018b) lists the following actions to fulfil the offset requirement for the Development:

- Upload an EOI for the required ecosystem credits on the "Credit Wanted" register of the BioBanking Credit Register.
- Contact sellers of White Box (NA 226/PCT 1383) credits listed on the BioBanking Agreements Register and, where credits are available, commence negotiations on agreed credit pricing.
- Contact landowners advertising availability of required credits (i.e. NA 226) on the EOI Register and, where suitable, commence negotiations to proceed with Biodiversity Stewardship Agreement to generate required credits.
- Monitor the availability of matching ecosystem credits during the agreed advertisement period and consult regularly with OEH on the availability of suitable credits or offset sites.
- During, or at the end of, the agreed advertisement period, either:
  - Purchase like-for-like credits or, if not available, purchase variation credits, or if both credit types not available, then;
  - Pay monetary value into the Fund; or
  - Apply supplementary measures and calculate suitable monetary fund deposit.

8.7 Aboriginal Heritage

OzArk was engaged to undertake an assessment of Aboriginal cultural heritage and potential impacts associated the Development. The "Survey Area" adopted by OzArk comprised the Development Site, with the exception of a small area in the southwest corner where no impact is proposed, the land between the Development Site and the Namoi River, the short section of Ski Gardens Road traversing through the Development Site and the section of Rushes Creek Road adjoining the Development Site. The areas outside of the Development Site were included to assess potential impacts associated with the proposed water and electricity supply infrastructure and proposed new vehicular access roads from Rushes Creek Road.

The assessment was undertaken in accordance the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b). A copy of OzArk's *Aboriginal Cultural Heritage Assessment Report* (2018) (ACHAR) is contained within **Appendix H**, with the key findings and recommendations summarised in the below sub-sections.

8.7.1 Existing Environment

The Survey Area falls within the limits of the lands occupied by the Gamilaraay (Kamilaroi) language group (Tindale 1974, cited in OzArk 2018). OzArk (2018) advises that the topography, hydrology and climate of the Survey Area would have been conducive to year-round occupation by Aboriginal people in the past. In such a relatively hospitable environment one could expect wide-spread evidence of Aboriginal occupation.

Aboriginal Heritage Information Management System

A search of the OEH's AHIMS conducted by OzArk (2018) on 12 October 2016 did not reveal any previously recorded Aboriginal sites within the Survey Area. The nearest recorded site was a box scarred tree (AHIMS #20-5-0091) within the Ski Gardens Road reserve adjoining the Development Site approximately 65 m west of the Rushes Creek Road intersection (see **Figure 10**).

Field Survey

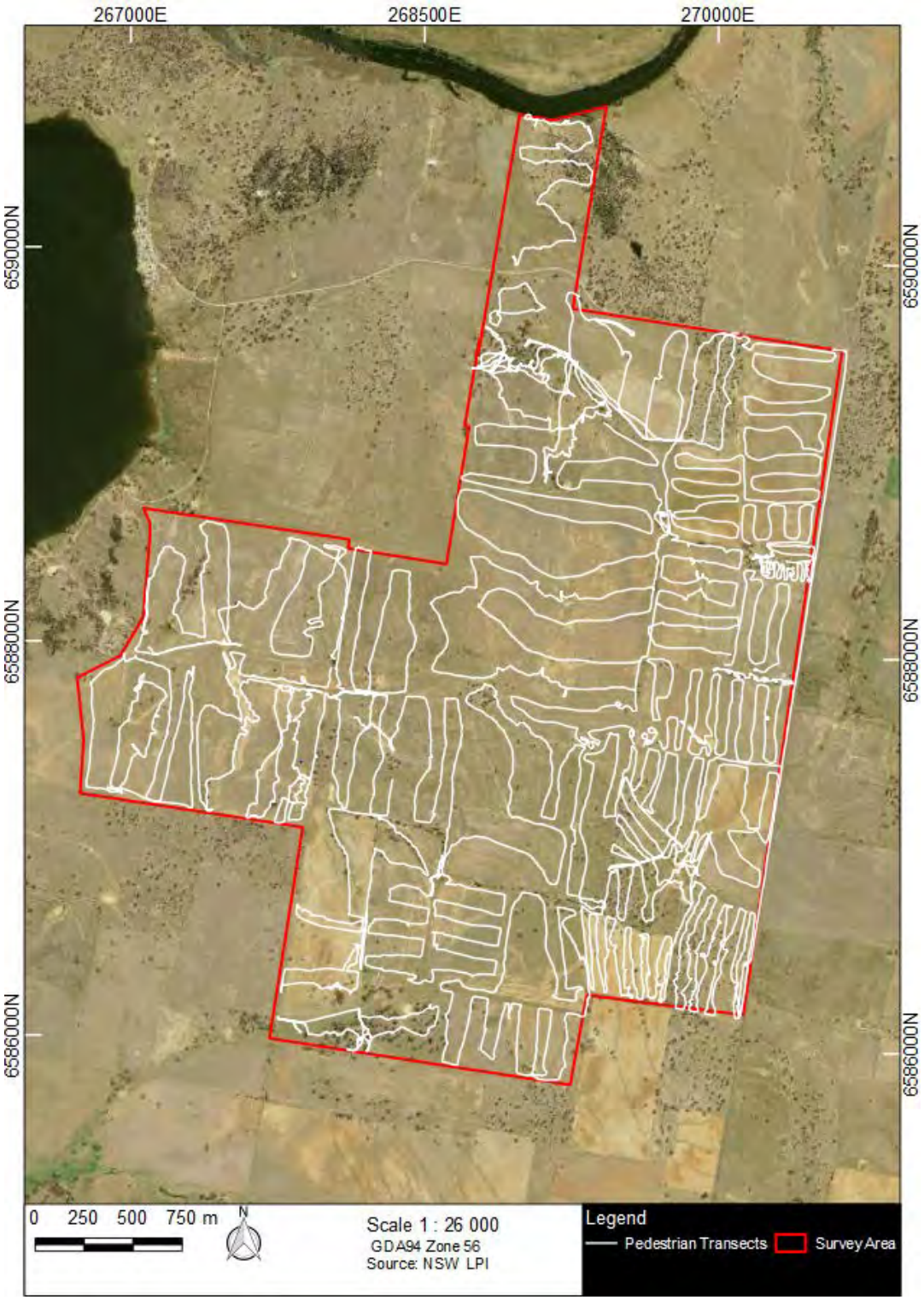
OzArk (2018), with representatives from the RAPs (see **Section 6.3**), undertook field survey work over a four day period between 18 and 21 October 2016. The field survey methodology comprised pedestrian transects within the entire Survey Area, with greater effort expended on landforms deemed to have greater Aboriginal archaeological potential. It included:

- Full pedestrian survey of all four PPU locations;
- Full pedestrian survey in areas with minimal disturbance and good ground surface visibility within landforms possessing Aboriginal archaeological potential, which included raised areas adjacent to the Namoi River, areas within 200 m of the Namoi River and other watercourses, and the flat or gently sloping crests and benches of all ridges, spurs and hills;
- Targeted pedestrian survey in all other areas (i.e. areas more than 200 m from watercourses, areas with poor ground surface visibility, landforms with low archaeological potential and areas with significant prior disturbance);
- Inspection of all mature native trees with the potential to contain Aboriginal scarring to be impacted by the Development; and
- Location and assessment of the AHIMS #20-5-0091 site (scarred tree on Ski Gardens Road).

Note that there were some areas not physically assessed as they were deemed by the RAPs and OzArk to be significantly disturbed or possess a very low likelihood of Aboriginal sites.

Figure 34 illustrates the pedestrian coverage of the Survey Area. OzArk (2018) advises that while the Survey Area was assessed by four surveyors each day, **Figure 34** only displays transects of two surveyors.

Figure 34 Aboriginal Heritage Field Survey Pedestrian Transects



As shown on **Figure 35**, the field survey identified 35 previously unrecorded Aboriginal sites within the Survey Area. These sites include:

- Seventeen isolated finds - Happy Hills-IF1 to Happy Hills-IF4 and Bondah-IF1 to Bondah-IF13;
- Fourteen artefact scatters - Happy Hills-OS1 to Happy Hills-OS3 and Bondah-OS1 to Bondah-OS11;
- One hearth - Bondah-H1; and
- Three scarred trees - Happy Hills-ST1 to Happy Hills-ST3.

Some notable results from the field survey, according to OzArk (2018), include:

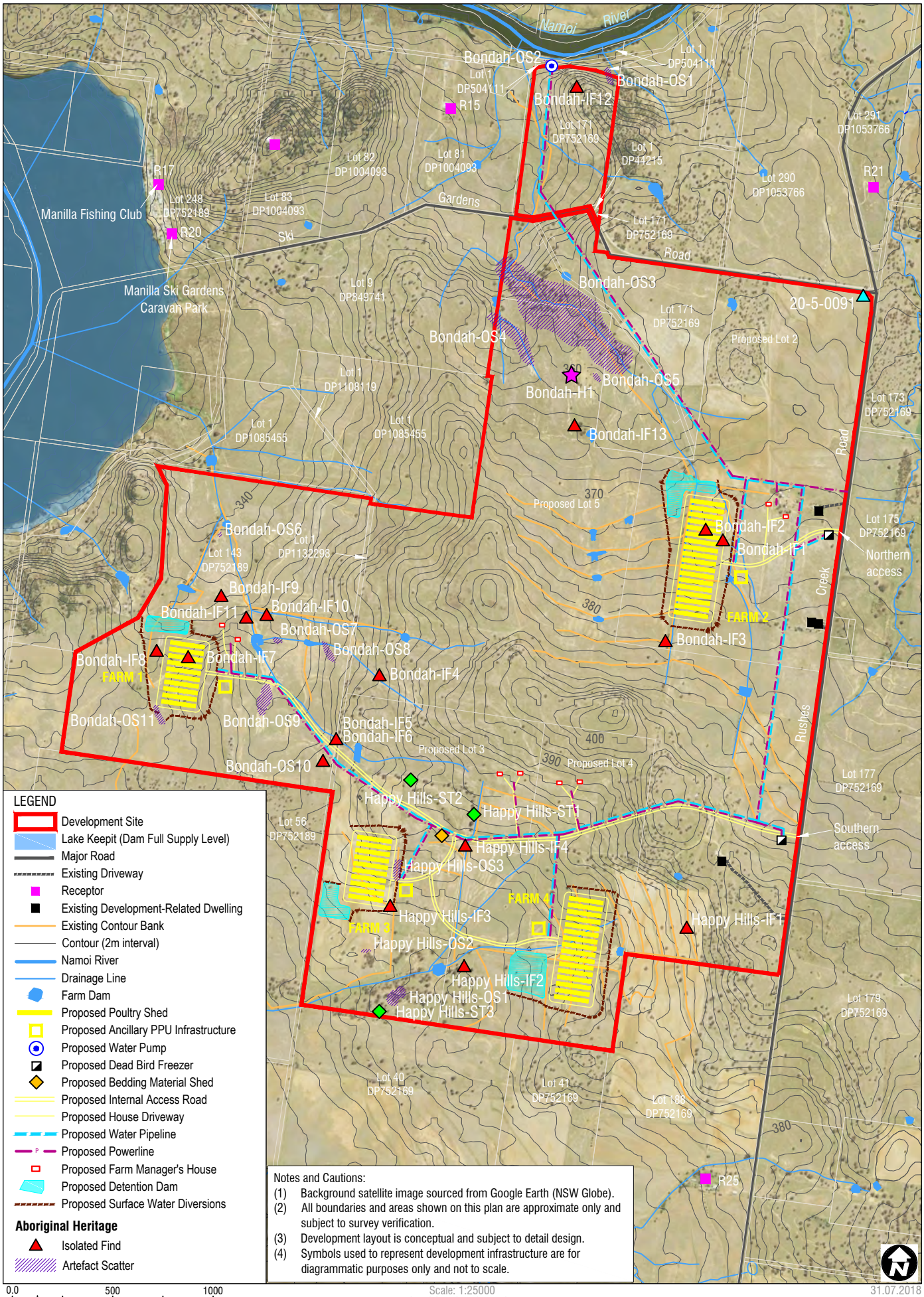
- Ninety seven percent (97%) of the newly recorded sites are either isolated finds or low density artefact scatters without associated archaeological deposits.
- Only one site, being Bondah-OS3, was assessed as having a likelihood to contain sub-surface deposits (likely to be at a low density).
- The absence of stone quarries and grinding grooves is attributable to the absence of suitable rock outcropping.
- The absence of freshwater middens may be attributed to the small area of land adjacent to the Namoi River and a lack of suitable landforms for base camp activity.
- The crests and ridges contained no evidence of ceremonial sites. If these had consisted of stone arrangements, it is likely they have been removed due to past land use.

8.7.2 Significance Assessment

All values of the *Burra Charter* (Australia International Council on Monuments and Sites, cited in OzArk 2018) are considered when evaluating the significance of Aboriginal sites. The features of "representativeness", "rarity" and "integrity" of the identified sites within the Survey Area are discussed by OzArk (2018) as follows:

- Representativeness – the recorded sites, including isolated finds, artefact scatters and scarred trees, are very representative of sites in the region that are located in landforms near water. In terms of site size, artefact density, raw materials and artefact types, the results of the survey neatly complement the regional and local archaeological context. This context also highlights that hearths are not well represented in the region.
- Rarity – although the recorded sites are in no way remarkable, their presence alone, in albeit a much modified landscape, remains a memory of the past in a landscape that is fast changing (or has changed). Scarred trees are rarer today following large-scale vegetation clearance and the fact that the site type will only remain extant within the landscape for the lifespan of the tree. Hearths are the rarest of the site types recorded within the Survey Area and are rare at a regional level.
- Integrity – the results of the survey indicate that the general site integrity is very low. Ninety seven percent (97%) of the newly recorded sites are assessed as having no associated archaeological deposits and are therefore surface manifestations and possibly, on an individual artefact level, displaced.

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance and likely impacts of any proposed development. Scientific, cultural and public significance are identified as baseline elements of significance assessment and it is through the combination of these elements that the overall cultural heritage values of a site/place/area are resolved.



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Recorded Aboriginal Sites within Disturbance Footprint

Social / Cultural Value

The assessment of social or cultural value concerns the importance of a site to the relevant cultural group, which, in this case, is the local Aboriginal community. Aspects of social value include assessment of sites, items and landscapes that are traditionally significant or that have contemporary importance to the Aboriginal community. The draft ACHAR was sent to all RAPs on 29 August 2017, with a 28 day review period provided. No feedback was received from the RAPs in relation to the social or cultural value of the newly recorded sites. As such, for the purposes of assessing the potential impact to Aboriginal cultural heritage, OzArk (2018) assigned high social and cultural values to all recorded sites.

Aesthetic Value

Happy Hills-IF1 to IF3, Bondah-IF1 to IF12, Happy Hills-OS1 to OS3, Bondah-OS1 to OS11 and Bondah-H1 were assessed by OzArk (2018) as having low aesthetic value as the integrity of the sensory landscape has been altered in historic and modern times. Additionally, the artefacts themselves are generally not remarkable.

Happy Hills-ST1 to ST3 were also assessed as holding low aesthetic value. Scars on trees are typically less difficult for the layperson to interpret than stone artefact remains, and the aesthetic value of a site is derived from its relationship to and position within the surrounding landscape. These sites are located within areas previously cleared as a result of past land use.

Historic Value

None of the Aboriginal sites recorded have an apparent direct relationship to known historical Aboriginal sites. It is possible that the area saw some of the earliest contact between Aboriginals and non-Aboriginal settlers, however none of the sites display evidence that they constitute “contact” or “post-contact” sites. To that end, OzArk (2018) assessed all recorded sites as having no historic value.

Archaeological / Scientific Value

Happy Hills-IF1 to IF3, Bondah-IF1 to IF12, Happy Hills-OS1 to OS3, Bondah-OS1 and OS2 and Bondah-OS4 to OS11 were assessed by OzArk (2018) as having “low” archaeological or scientific significance based on the following factors:

- Low density of artefacts;
- Few formal tool types;
- Located in areas where there has been an almost complete loss of A-horizon soils by erosion;
- Widespread past and current erosion creating landform modification; and
- Not possible to determine the original or primary context of the recorded artefacts.

Bondah-OS3 exhibits slightly less disturbance and was assessed by OzArk (2018) as having moderate scientific value. It is possible that there are intact sub-surface deposits in the grass-covered areas adjacent to exposures that may yield further data about Aboriginal occupation.

Happy Hills-ST1 to ST3 (scarred trees) are representative examples of one of the region’s most common site types and, as such, the archaeological significance of these sites is somewhat reduced. None are associated with landforms displaying a high level of sub-surface archaeological potential. Nevertheless, the trees strengthen the evidence for a picture of widespread Aboriginal modification of trees throughout the region.

Bondah-H1 (hearth) was assessed as having moderate to high archaeological potential. The site is intact and has potential to advise archaeological research in the region through dating (should it ever be undertaken).

Table 38 summarises OzArk's (2018) significance assessment of the recorded Aboriginal sites.

Table 38 Significance Assessment of Recorded Aboriginal Sites

Site Name	Social / Cultural Value	Aesthetic Value	Historic Value	Archaeological / Scientific Value
Happy Hills-IF1	High	Low	Nil	Low
Happy Hills-IF2	High	Low	Nil	Low
Happy Hills-IF3	High	Low	Nil	Low
Happy Hills-IF4	High	Low	Nil	Low
Bondah-IF1	High	Low	Nil	Low
Bondah-IF2	High	Low	Nil	Low
Bondah-IF3	High	Low	Nil	Low
Bondah-IF4	High	Low	Nil	Low
Bondah-IF5	High	Low	Nil	Low
Bondah-IF6	High	Low	Nil	Low
Bondah-IF7	High	Low	Nil	Low
Bondah-IF8	High	Low	Nil	Low
Bondah-IF9	High	Low	Nil	Low
Bondah-IF10	High	Low	Nil	Low
Bondah-IF11	High	Low	Nil	Low
Bondah-IF12	High	Low	Nil	Low
Bondah-IF13	High	Low	Nil	Low
Happy Hills-OS1	High	Low	Nil	Low
Happy Hills-OS2	High	Low	Nil	Low
Happy Hills-OS3	High	Low	Nil	Low
Bondah-OS1	High	Low	Nil	Low
Bondah-OS2	High	Low	Nil	Low
Bondah-OS3	High	Low	Nil	Moderate
Bondah-OS4	High	Low	Nil	Low
Bondah-OS5	High	Low	Nil	Low
Bondah-OS6	High	Low	Nil	Low
Bondah-OS7	High	Low	Nil	Low
Bondah-OS8	High	Low	Nil	Low
Bondah-OS9	High	Low	Nil	Low
Bondah-OS10	High	Low	Nil	Low
Bondah-OS11	High	Low	Nil	Low
Bondah-H1	High	Low	Nil	Moderate to high
Happy Hills-ST1	High	Low	Nil	Low
Happy Hills-ST2	High	Low	Nil	Low
Happy Hills-ST3	High	Low	Nil	Low

8.7.3 Impact Assessment

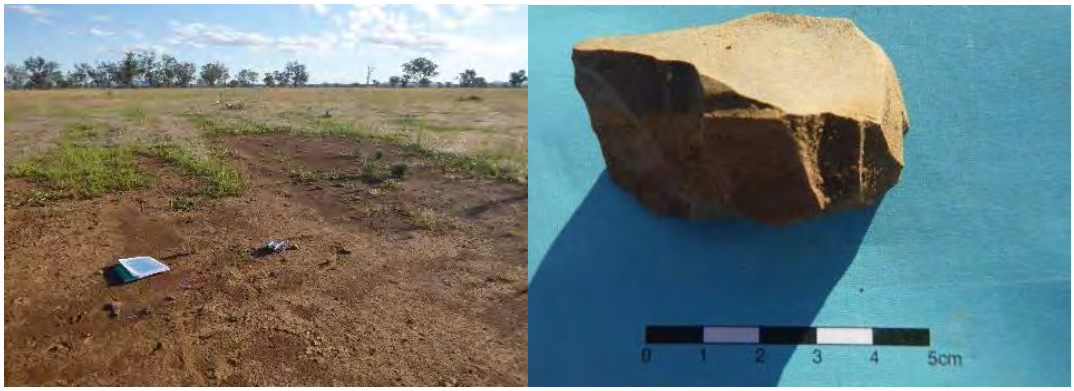
The combined disturbance footprint of the Development will amount to approximately 87.78 ha, which is equivalent to 8.6% of the Development Site. While most of the activities associated with constructing the Development will involve some degree of surface disturbance and direct impact to the landscape, the commercial activities associated with operation will be largely confined to the four PPU sites and internal access roads. As listed in **Table 39** and shown on **Figure 35**, seven of the 35 recorded Aboriginal sites are within the disturbance footprint of the Development. The remaining 28 sites are removed from the disturbance footprint and will not be impacted.

Table 39 Recorded Aboriginal Sites within Disturbance Footprint

Site Name	Social / Cultural Value	Aesthetic Value	Historic Value	Archaeological / Scientific Value	Type of Harm (Direct or Indirect)	Degree of Harm (Total or Partial)	Consequence of Harm (Total or Partial Loss of Value)
Happy Hills-IF3	High	Low	Nil	Low	Direct	Total	Total loss of value
Bondah-IF1	High	Low	Nil	Low	Direct	Total	Total loss of value
Bondah-IF2	High	Low	Nil	Low	Direct	Total	Total loss of value
Bondah-IF7	High	Low	Nil	Low	Direct	Total	Total loss of value
Bondah-IF8	High	Low	Nil	Low	Direct	Total	Total loss of value
Happy Hills-OS3	High	Low	Nil	Low	Direct	Total	Total loss of value
Bondah-OS11	High	Low	Nil	Low	Direct	Total	Total loss of value

Photo 30 Example of isolated find - Happy Hills-IF3 view of site and recorded artefact

Photo 31 Example of artefact scatter – Bondah-OS11 view of site and recorded artefact



In relation to Aboriginal heritage, the most important aspect of ecological sustainable development is "inter-generational equity" whereby the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. Similarly inter-generational equity maintains that places and items of cultural heritage value should be preserved for the education, enjoyment and use of future generations (OzArk 2018).

While the Development adds to the cumulative impact on the region's Aboriginal cultural heritage, the heritage impact value of this loss is low as the seven sites consist of isolated finds and two low density artefact scatters (OzArk 2018). The disturbance footprint of the Development avoids the majority of recorded Aboriginal sites, including the two sites deemed to have higher archaeological significance (see **Section 8.7.2**).

Table 40 summarises OzArk's (2018) assessment of each of the Aboriginal sites within the disturbance footprint arriving at a standardised "value of impact" in accordance with the guidelines developed by the DPE (2016, cited in OzArk 2018).

Table 40 Recorded Aboriginal Sites within Disturbance Footprint

	Bondah-IF1	Bondah-IF2	Happy Hills-IF3	Bonday-IF7	Bondah-IF8	Happy Hills-OS3	Bondah-OS11
Social/Cultural Value	2	2	2	2	2	2	2
Historic Value	0	0	0	0	0	0	0
Aesthetic Vale	0	0	0	0	0	0	0
Scientific Value	0	0	0	0	0	0	0
Site Significance	Low	Low	Low	Low	Low	Low	Low
Degree of Harm (Full or Partial)	Full	Full	Full	Full	Full	Full	Full
Overall Value of Potential Impact	Low	Low	Low	Low	Low	Low	Low
Reasoning Behind Scores	General disturbance at site; no associated artefacts or deposits					General disturbance at site; very low artefacts density; no associated deposits	

As evident from **Table 40**, the proposed impact to the seven recorded sites within the Development's disturbance footprint was evaluated by OzArk (2018) as having a "low value". This statement is not a reflection that the Aboriginal sites are considered to have a low value, rather that the loss of heritage has a low value when considered at a regional setting (OzArk 2018). OzArk (2018) concludes that the inter-generational loss arising from the Development is considered to be minimal.

8.7.4 Mitigation and Management

As a consequence of the likely impacts to Aboriginal heritage sites within the Survey Area, and in accordance with the recommendations made by OzArk (2018), the following best management practices and mitigation measures will be implemented in an effort to responsibly manage the Aboriginal sites *in situ* or, where appropriate, mitigate the loss of cultural heritage at those sites within the disturbance footprint.

Aboriginal Cultural Heritage Management Plan

Prior to the commencement of construction, an Aboriginal Cultural Heritage Management Plan (ACHMP) will be prepared for approval in consultation with the RAPs and OEH. It will describe the management actions for all Aboriginal sites within the Development Site, including the seven sites within the disturbance footprint, and include an unexpected finds protocol.

Archaeological Salvage and Fencing

- The seven Aboriginal sites within the disturbance footprint of the Development, being Happy Hills-IF3, Bondah-IF1, Bondah-IF2, Bondah-IF7, Bondah-IF8, Happy Hills-OS3 and Bondah-OS11, will be salvaged by a surface collection and recording of all visible surface artefacts in consultation with the RAPs and OEH. The salvage works will be detailed in the ACHMP and will include the mapping, analysis and collection of all surface artefacts at the seven sites. The results of the salvage will be included in a report to preserve the data in a useable form.
- The five Aboriginal sites in close proximity to the disturbance footprint of the Development will be fenced with appropriate buffers and signed. Specifically:
  - Happy Hills-IF4 is located within 50 m of an access road – it will be permanently fenced with a 10 m buffer and signed “Do Not Enter”;
  - Bondah-IF5 is located within 30 m of an access road – it will be permanently fenced with a 10 m buffer and signed “Do Not Enter”;
  - Bondah-OS2 is located within 50 m of water and electricity supply lines – it will be fenced with a 10 m buffer and signed “Do Not Enter” during construction;
  - Bondah-OS3 is located within 60 m of water and electricity supply lines – it will be fenced with a 10 m buffer along its eastern extents and signed “Do Not Enter” during construction; and
  - Bondah-OS9 is located within 20 m of water and electricity supply lines – it will be permanently fenced with a 10 m buffer around its northern extent and signed “Do Not Enter”.

General

- No disturbance will occur outside of the disturbance footprint assessed in this EIS. Any alterations to the Development footprint will be assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010c).
- Employees and contractors will be made aware of the presence of the identified Aboriginal sites during site inductions and training.
- If any Aboriginal sites are uncovered during construction or operation, all work within the vicinity will cease immediately and the unexpected finds protocol in the approved ACHMP will be followed.

8.8 Noise

While noise emissions from construction and operational activities have the potential to impact upon surrounding residences, noise has been demonstrated not to be an issue for well-managed poultry broiler production farms. The Development Site offers several advantages in terms of potential noise impacts, including being removed from any urban areas, low density of surrounding receptors and significant separation distances.

Global Acoustics was engaged to undertake an assessment of noise emissions and potential impacts associated with the Development. The assessment was undertaken in accordance with the *Interim Construction Noise Guideline* (DECC 2009) (ICNG), *NSW Industrial Noise Policy* (EPA 2000) (INP; see below note) and the *NSW Road Noise Policy* (DECCW 2011) (RNP). A copy of Global Acoustics' *Noise Impact Assessment* (2018) is contained within **Appendix I**, with the key findings summarised in the below sub-sections.

N.B. The implementation arrangements for the new *Noise Policy for Industry* (EPA 2017) allows for the use of the old INP (EPA 2000) for two years from the date of issue of the SEARs (i.e. 12 July 2016). While the two year timeframe has passed in relation to submission of the EIS, it has only passed by approximately one month. Furthermore, Global Acoustics' *Noise Impact* Assessment was finalised in January 2018, well before the two year timeframe. On this basis, along with the fact that the Development not predicted to have negligible impacts on local amenity with respect to noise emissions, there has not been any consideration of the new policy.

Key terminologies relevant to understanding noise include:

- dB(A) - noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise.
- RBL - the rating background level, which is the background noise level for a period (day, evening or night).
- L_{A1} - noise level exceeded for 1% of the sample period.
- L_{A90} – noise level exceeded for 90% of the sample period. This is described as the average minimum background noise level (in the absence of the source under consideration) or simply the background level.
- L_{Aeq} - the A-weighted equivalent noise level, which is essentially the average noise level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

8.8.1 Existing Environment

Published information on noise levels within the locality is limited, with no known monitoring site in the vicinity. However, the Development Site is located in a rural area with no other notable noise-generating developments or land uses nearby. The existing noise levels would be typical of a rural environment that comprises traditional agricultural activities and vehicle traffic on the road network.

Background noise monitoring was not undertaken as part of the noise impact assessment as Global Acoustics (2018) assumed background levels would be less than L_{A90} 30 dB during all time periods, which is typical for a rural environment. In accordance with the INP (EPA 2000), where background levels are less than 30 dB, a default minimum RBL of 30 dB was adopted by Global Acoustics (2018).

8.8.2 Assessment Criteria

Construction

The INCG (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 where a quantitative assessment is required, such as the Development, the impact assessment criteria for work undertaken in the standard construction hours are:

- Noise affected limit - $_{LAeq,15min}$ equal to background plus 10 dB; or
- Highly noise affected limit - $_{LAeq,15min}$ 75 dB.

An L_{Aeq} 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 (2018) adopted the INP (EPA 2000) default minimum RBL of 30 dB for all time periods, and subsequently a conservative construction noise criterion of $L_{Aeq,15min}$ 40 dB.

Operation

The INP (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". Applicable intrusiveness and amenity limits are derived independently and then compared to determine development-specific criteria.

The intrusiveness criterion is expressed as $L_{Aeq,15min} \leq$ RBL + 5 dB. As a minimum RBL of 30 dB for all time periods was adopted by Global Acoustics (2018), the $L_{Aeq,15min}$ intrusiveness criterion is therefore 35 dB.

Table 41 lists the intrusiveness and amenity criteria adopted by Global Acoustics (2018) for day, evening and night periods. The lower of the two (intrusiveness or amenity) apply and have been adopted as the development-specific impact assessment criteria.

Table 41 Development-Specific Operational Noise Criteria

Period	Adopted RBL (dB)	Intrusiveness Criterion L_{Aeq}(dB)	Acceptable Amenity Criteria L_{Aeq}(dB)	Impact Assessment Criteria L_{Aeq}(dB)
Day (7:00 am to 6:00 pm)	30	35	50	35
Evening (6:00 pm to 10:00 pm)			45	35
Night (10:00 pm to 7:00 am)			40	35

Sleep Disturbance

The INP (EPA 2000) application notes indicate a criterion based on the $L_{A1,1min}$ not exceeding background noise levels by more than 15 dB(A) can be used as a guide to identify the likelihood of sleep disturbance. As an initial assessment of sleep disturbance, Global Acoustics (2018) adopted a criterion of background (RBL) plus 15 dB. Night period background noise levels are likely to be less than or equal to L_{A90} 30 dB, and, therefore, a sleep disturbance criterion of $L_{A1,1min}$ 45 dB was adopted by Global Acoustics (2018).

Traffic Noise

The RNP (DECCW 2011) applies different noise limits depending on the road category and type of development/land use. **Table 42** lists the traffic noise criteria for the Development.

Table 42 Traffic Noise Criteria

Road Category	Development Type / Land Use	Assessment Criteria (External dB)	
		Day (7:00 am to 10:00 pm)	Night (10:00 pm to 7:00 am)
Freeway / arterial / sub-arterial roads	Existing residences affected by additional traffic generated by land use developments	$L_{Aeq,15hour}$ 60	$L_{Aeq,9hour}$ 55

The Oxley Highway is considered an "arterial road", while Rushes Creek Road is considered a "sub-arterial road" for the purpose of the noise impact assessment.

8.8.3 Impact Assessment

Acoustic modelling for construction, operational and road traffic noise sources was undertaken by Global Acoustics (2018) using CadnaA noise prediction software. Modelling considers the height and location of each noise source and receiver and takes into account topography, meteorological effects, ground type, air absorption and barrier effects.

Meteorological effects were calculated using the CONCAWE calculation methodology within the CadnaA software. The INP (EPA 2000) states that only enhancing meteorological conditions with an occurrence of 30% or more in any time period within any season need to be included in noise prediction calculations. A conservative approach was adopted by Global Acoustics (2018) assuming source to receiver winds of up to 3 m/s were prevailing conditions for each noise-sensitive receptor and that temperature inversion conditions were a predominant feature of the area.

Neutral and enhancing meteorological conditions were considered for each construction and operational scenario. Gradient winds were assessed with a 3 m/s source to receiver wind and stability class D conditions. Temperature inversion conditions were assessed with a 2 m/s drainage flow wind and stability class F conditions.

Global Acoustics (2018) adopted sound power levels for construction and operational plant and equipment from the company's own database of representative equipment and also measurements taken at similar facilities. Sound power for ventilation fans and feed silo refill pumps were measured at ProTen's Bective Poultry Production Farm.

Construction

As outlined in **Section 4.3**, it is anticipated that the construction program will span approximately 16 months, with all construction activities to be undertaken during standard daytime construction hours.

Site preparation/earthworks and road construction are considered to represent the most significant noise impact during the construction phase, with these activities using substantial noise generating equipment. Construction of the two new access driveways, which will include a dozer, grader, excavator and dump truck operating at the northern and southern accesses off Rushes Creek Road, was selected by Global Acoustics (2018) as the worst-case construction noise scenario. Construction of these new accesses is expected to take 2 to 3 weeks.

Table 43 lists the model predictions during neutral and enhancing atmospheric conditions at the noise-sensitive receptors for the worst-case construction noise scenario. The predicted levels are below the adopted impact assessment criterion of 40 dB at all receptors, including during enhancing meteorological conditions. The highest impact is predicted at receptor R24 (see **Figure 4**) during source to receiver wind conditions at 35 dB.

Table 43 Predicted Construction Noise Levels

Receptor ID	Criterion $L_{Aeq,15min}$ (dB)	Noise Levels $L_{Aeq,15min}$ (dB)		
		Neutral Conditions	Source to Receiver Wind Conditions	Temperature Inversion Conditions
R15	40	<20	<20	<20
R16		20	25	25
R17		<20	<20	<20
R20		<20	<20	<20
R21		23	28	28
R22		<20	24	24
R23		<20	24	24
R24		30	35	30
R25		<20	20	<20

Operation

The primary operational noise sources from the Development will be:

- Feed silo refill pump and auger;
- Heavy vehicle traffic movements;
- Occasional tractor and other farm type machine and vehicle movements;
- Ventilation fans; and
- Bird delivery and collection using transport truck and forklift.

Global Acoustics (2018) identified the ventilation fans as the primary continuous noise source, and feed silo refilling and bird delivery/collection as the primary intermittent noise sources.

Based on a site inspection and attended noise measurements at ProTen's Bective Broiler Production Farm, Global Acoustics (2018) did not include water pumps, feed augers or heaters in the assessment. These sources were not audible above the ventilation fans and would not contribute to overall noise levels measured off site.

Global Acoustics (2018) modelled the three operational scenarios addressed in the below sub-sections to assess the various combinations of noise sources.

Scenario 1 – Continuous Operation

The worst-case continuous operational noise will be when all of the 20 tunnel ventilation fans (see **Section 4.10.6**) on each poultry shed are running, which is only likely to occur late in the production cycle during warmer weather. **Table 44** lists the noise level predictions for this scenario during neutral and enhancing atmospheric conditions at nearby receptors. The predicted levels are below the adopted impact assessment criterion of 35 dB at all receptors, including during enhancing meteorological conditions. The highest impact is predicted at receptors R24 and R25 (see **Figure 4**) during source to receiver wind conditions at 33 dB.

Table 44 Predicted Noise Levels for Operational Scenario 1

Receptor ID	Criterion $L_{Aeq,15min}$ (dB)	Noise Levels $L_{Aeq,15min}$ (dB)		
		Neutral Conditions	Source to Receiver Wind Conditions	Temperature Inversion Conditions
R15	35	<20	22	22
R16		<20	<20	<20
R17		20	24	24
R20		21	25	26
R21		23	28	28
R22		<20	<20	<20
R23		<20	<20	<20
R24		28	33	30
R25		28	33	28

Scenario 2 – Feed Silo Refilling

Feed silo refilling will occur throughout the production cycle and was assessed on the basis of one delivery truck and silo refill auger operating at each farm simultaneously. Each feed truck was assessed filling two feed silos in a 15 minute period. **Table 45** lists the noise level predictions for this scenario during neutral and enhancing atmospheric conditions at nearby receptors. These levels represent worst-case impact due to feed silo refilling, combined with the worst-case continuous noise source operations (i.e. scenario 1). The predicted levels are below or meet the adopted impact assessment criterion of 35 dB at all receptors, including during enhancing meteorological conditions. The highest impact is predicted at receptor R25 (see **Figure 4**) during source to receiver wind conditions at 35 dB.

Table 45 Predicted Noise Levels for Operational Scenario 2

Receptor ID	Criterion $L_{Aeq,15min}$ (dB)	Noise Levels $L_{Aeq,15min}$ (dB)		
		Neutral Conditions	Source to Receiver Wind Conditions	Temperature Inversion Conditions
R15	35	22	26	26
R16		<20	<20	<20
R17		20	24	24
R20		22	26	26
R21		25	30	31
R22		<20	<20	<20
R23		<20	<20	<20
R24		29	34	32
R25		30	35	30

Scenario 3 – Bird Collection

Bird collection will occur any time between 7:00 pm and 4:00 pm, with trucks arriving and departing the Development Site regularly during this period until bird collection is complete. This scenario includes continuous operation of one forklift and one truck at each PPU. Trucks have been modelled travelling to each PPU along the access roads and then left idling as the forklift loads the truck.

Table 46 lists the noise level predictions for this scenario during neutral and enhancing atmospheric conditions at nearby receptors. These levels represent worst-case intermittent noise impact during the night period. The predicted levels are below the adopted impact assessment criterion of 35 dB at all receptors, including during enhancing meteorological conditions. The highest impact is predicted at receptor R25 (see **Figure 4**) during source to receiver wind conditions at 27 dB.

Table 46 Predicted Noise Levels for Operational Scenario 3

Receptor ID	Criterion $L_{Aeq,15min}$ (dB)	Noise Levels $L_{Aeq,15min}$ (dB)		
		Neutral Conditions	Source to Receiver Wind Conditions	Temperature Inversion Conditions
R15	35	<20	<20	<20
R16		<20	<20	<20
R17		<20	<20	<20
R20		<20	<20	<20
R21		<20	<20	<20
R22		<20	<20	<20
R23		<20	<20	<20
R24		21	25	22
R25		23	27	23

The assessment of worst-case continuous and intermittent noise scenarios presented in **Tables 44** to **46** indicates that the Development will be able to operate on a day-to-day basis, including during noise enhancing meteorological conditions, and not exceed the development-specific criterion during the day, evening or night periods.

Sleep Disturbance

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. The primary noise generating activity that may cause sleep disturbance is bird collection, which is scheduled any time between 7:00 pm and 4:00 pm.

Operational noise scenario 3 (see above) considered general noise emission resulting from the continuous operation of one forklift and one truck at each farm. Short duration increases to noise emissions during bird collection may result from revving engines or impact noise associated with truck loading. An impact noise from a forklift with an L_{Max} sound power of 117 dB(A)/120 dB was modelled by Global Acoustics (2018) in additional to the noise sources in scenario 3 to assess the potential for sleep disturbance.

Table 47 lists the noise level predictions during neutral and enhancing atmospheric conditions at nearby receptors. These levels represent worst-case sleep disturbance during bird collection. The predicted levels are below the adopted criterion of 45 dB at all receptors, including during enhancing meteorological conditions. The highest impact is predicted at R25 (see **Figure 4**) during source to receiver wind conditions at 39 dB.

Table 47 Predicted Sleep Disturbance Noise Levels

Receptor ID	Criterion $L_{A1,1min}$ (dB)	Noise Levels $L_{A1,1min}$ (dB)		
		Neutral Conditions	Source to Receiver Wind Conditions	Temperature Inversion Conditions
R15	45	<20	<20	<20
R16		<20	<20	<20
R17		<20	<20	20
R20		<20	20	21
R21		25	30	30
R22		<20	<20	<20
R23		<20	<20	<20
R24		30	35	33
R25		34	39	34

Road Traffic Noise

As detailed in **Section 8.3.2**, traffic generated by the Development is predicted to increase heavy vehicles on the Oxley Highway by around 7.5% and total traffic counts by around 1.4% (based on future forecast background traffic volumes for the year 2029). Global Acoustics (2018) advises that this increase in traffic would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed. On this basis, no assessment of traffic noise impact on the Oxley Highway was undertaken.

As also detailed in **Section 8.3.2**, traffic generated by the Development is predicted to increase heavy vehicles on Rushes Creek Road by around 35.7% and total traffic counts by around 11.1% (based on future forecast background traffic volumes for the year 2029). A comparison of predicted existing traffic noise levels and proposed traffic noise levels (i.e. existing traffic plus traffic to be generated by the Development) for the day and night periods is presented in **Table 48**.

Table 48 Predicted Road Traffic Noise Levels

Receptor ID	Day / Night Criteria $L_{Aeq,period}$	Predicted Existing Traffic Noise Levels		Predicted Proposed Traffic Noise Levels	
		Day $L_{Aeq,15hour}$	Night $L_{Aeq,9hour}$	Day $L_{Aeq,15hour}$	Night $L_{Aeq,9hour}$
R16	60 / 55	<20	<20	<20	<20
R21		<20	<20	<20	<20
R22		<20	<20	<20	<20
R23		<20	<20	<20	<20
R24		28	22	29	25
R25		35	30	36	32
R28		41	35	42	38
R29		<20	<20	20	<20
R30		<20	<20	20	<20
R34		34	28	35	31
R35		38	32	39	35
R37		53	47	54	50
R38		44	38	45	41

The results in **Table 48** show that the increase in traffic on Rushes Creek Road as a result of the Development should not result in any exceedance of the road traffic impact assessment criteria for the day or night periods at any receptors, including R37 and R38 (see **Figure 4**) specifically identified by Global Acoustics (2018) as sensitive receptors due to their close proximity to Rushes Creek Road.

The future forecast background traffic volume for the 2029 on Rushes Creek Road is 615 vehicles (see **Section 8.3.3**), which is a 26% increase on the existing traffic volumes used by Global Acoustics (2018). Global Acoustics (2018) advises that this will equate to an increase of approximately 1 dB in road traffic noise levels, with predicted future noise levels still remaining in compliance with the RNP (DECCW 2011).

8.8.4 Mitigation and Management

While Global Acoustics (2018) concludes that the Development will have negligible impact on local amenity with respect to noise emissions, ProTen will take reasonable and practicable measures to minimise noise emissions. The following best management practices and mitigation measures will be implemented to minimise the potential for noise impacts:

Construction

- Construction activities will be restricted to the following standard daytime hours:
  - Monday to Friday – 7:00 am to 6:00 pm;
  - Saturday – 8:00 am to 1:00 pm; and
  - No audible construction work on Sundays or public holidays.
- Plant and equipment operators will be instructed on how to minimise noise generation at all times. If necessary, this may include avoiding the operation of noisy plant and equipment simultaneously.
- Plant and equipment will be maintained to meet regulatory and industry standards, as well as ensure optimal operating conditions.

Operation

- Noise generating equipment purchased by the operator will comply with relevant workplace health and safety requirements.
- Plant and equipment will be maintained to meet regulatory and industry standards and ensure optimal operating conditions.
- A unidirectional traffic movement system, via a one-way circulation road around each PPU, will be established to minimise the use of reversing beepers.
- Internal roads will be appropriately constructed and maintained with a suitably compacted base.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hour in the vicinity of the PPUs.
- Suitable signage will be erected to direct traffic, limit traffic speed and minimise night time noise levels.
- The emergency standby diesel generators will be contained in lockable acoustics enclosures with vertical air discharge and will only be used in emergency situations when mains power from the electricity grid is lost.

8.9 Hazard and Risk

SLR was engaged to undertake a preliminary risk screening for the Development, specifically in relation to the storage of hazardous materials within the Development Site, in accordance with *Hazardous and Offensive Development Application Guidelines, Applying SEPP 33* (Department of Planning [DoP] 2011a) (Applying SEPP 33). The purpose of such a screening is to assess the storage of hazardous materials that have the potential for significant off-site impacts and determine the need for a Preliminary Hazard Analysis (PHA). The screening indicated that the Development may be considered "potentially hazardous" due to the volumes of LPG to be transported to the Development Site and stored at the four PPUs. As a result, SLR also undertook a PHA for the Development in accordance with *HIPAP No. 4 – Risk Criteria for Land Use Safety Planning* (DoP 2011b) (HIPAP 4).

A copy of SLR's *SEPP 33 – Preliminary Risk Screening and Hazard* Assessment (2018c) is contained in **Appendix J**, with the key findings and recommendations summarised below.

8.9.1 Preliminary Risk Screening

Potentially Hazardous Materials

Table 49 lists the potentially hazardous materials to be stored within the Development Site and compares the storage quantities at each PPU against the respective screening threshold in Applying SEPP 33 (DoP 2011a). The materials have been grouped into their respective Australian dangerous goods (ADG) classes and packing groups (PGs) have been assigned to indicate the degree of danger associated with the transport of the material (PG I, II and III representing low, medium and high danger, respectively). The materials listed in **Table 49** without an ADG class are not considered hazardous and, therefore, were not considered further by SLR (2018c).

Applying SEPP 33 (DoP 2011a) states "if combustible liquids of class C1 are present on site and are stored in a separate bund or within a storage area where there are no flammable materials stored they are not considered to be potentially hazardous". Diesel, which is a Class C1 material, will be stored in aboveground bunded tanks, with the minimum bund volume being 110% of the tank capacity and there will be no flammable materials stored in the vicinity. On this basis, diesel is not considered to pose a hazard risk and was not considered further by SLR (2018c).

The quantities of diesel, petrol, sodium hypochlorite, chlorine dioxide, Microgard 755N / Micro-4 (sanitiser) and Goal (herbicide) are minor quantities well below the respective screening thresholds and are not considered to pose a hazard risk (SLR 2018c). On this basis, these materials were not considered further by SLR (2018c). They will each be stored in appropriately secured, sealed and bunded facilities at each PPU. LPG, diesel and petrol will be stored separately from each other and separately from the chemical store in the amenities and workshop building at each PPU.

The only remaining material listed in **Table 49** is LPG, which will be stored in bulk tanks at each PPU in quantities exceeding the screening threshold of 16 m^3 (16,000 L) and also above the Safe Work Australia manifest quantity of 5,000 L.

Table 49 Inventory of Potentially Hazardous Materials

Substance	Hazardous Class		Total Storage at each PPU1	SEPP 33 Threshold Quantity	SEPP 33 Threshold Screening
	Class (Packing Group)	Description			
LPG	Class 2.1	Flammable gas	Farm 1 – 38,250 L (38.25 m^3) Farm 2 – 57,375 L (57.38 m^3) Farm 3 – 38,250 L (38.25 m^3) Farm 4 – 51,000 L (51.00 m^3)	16 m^3 (above ground storage)	**Above**
Diesel	Class C1	Combustible liquid	Each PPU – 4,000 L (2 x 2,000 L tanks)	100,000 L	Below
Petrol	Class 3 (PG II)	Flammable liquid	Each PPU – 700 L (1 x 700 L tank)	5 tonnes	Below
Sodium hypochlorite (10-30%) (bleach, disinfectant)	Class 8 (PG III)	Corrosive substance	Each PPU – 400 L (2 x 200 L drums)	25 tonnes (PG II)	Below
Chlorine dioxide (water supply treatment)	Class 8 (PG II)	Corrosive substance	Each PPU – 240 L (8 x 30 L drums)	25 tonnes (PG II)	Below
Microgard 755N or Micro-4 (sanitiser)	Class 9	Miscellaneous dangerous goods/articles	Each PPU – 25 L (1 x 25 L drum)	10,000 L	Below
Goal (herbicide)	Class 9	Miscellaneous dangerous goods/articles	Each PPU – 10 L (1 x 10 L drum)	10,000 L	Below
Agri-Quat (disinfectant, sanitiser)	N/A	-	Each PPU – 50 L (2 x 25 L drums)	N/A	N/A
Ditrac (rodenticide)	N/A	-	Each PPU – 20 kgs (1 x 20 kg container)	N/A	N/A
Glister (herbicide)	N/A	-	Each PPU – 20 kgs (1 x 20 kg container)	N/A	N/A
Unicide (sanitiser)	N/A	-	Each PPU – 100 L (1 x 100 L drum)	N/A	N/A
Unicide d (sanitiser)	N/A	-	Each PPU – 100 L (1 x 100 L drum)	N/A	N/A
Roundup (glyphosate, herbicide)	N/A	-	Each PPU – 25 L (1 x 25 L drum)	N/A	N/A

1 - Each PPU is located a minimum of 870 m apart and, therefore, the storage at each PPU has been considered on its own (i.e. not combined for the overall Development)

Transport of Potentially Hazardous Materials

A development may be deemed potentially hazardous if generated traffic movements for certain hazardous materials and/or volumes transported (per load) are above the thresholds specified in Applying SEPP 33 (DoP 2011a). The maximum weekly vehicle movements for the delivery of relevant hazardous materials to the Development Site are listed in **Table 50** and compared against the respective thresholds in Applying SEPP 33 (DoP 2011a).

Table 50 Transport of Potentially Hazardous Materials

Substance	ADG Class (Packing Group)	Weekly Vehicle Movements	Load Type	SEPP 33 Threshold Weekly Vehicle Movements	SEPP 33 Threshold Minimum Quantity	SEPP 33 Threshold Screening
LPG	Class 2.1	1-2	Bulk	>30	2 tonnes / load (1 tonne LPG = 1,960 L)	**Above** (in relation to quantity per load only)
Petrol	Class 3 (PG II)	<1	Bulk	>45	3 tonnes / load	Below
Diesel	Class C1	<1	Bulk	N/A	N/A	Below
Sodium hypochlorite (10-30%) (bleach, disinfectant); and chlorine dioxide (water supply treatment)	Class 8	<1	Packages	>30	5 tonnes / load	Below

While the number of vehicle movements for the delivery of LPG is well-below the screening threshold, the quantity of LPG to be delivered per load will be greater than screening threshold of 2 tonnes (equivalent to approximately 3,920 L or 3.92 m^3). The LPG supplier, Elgas, will deliver the LPG in rigid tankers ranging in size between 4 tonnes and 12 tonnes.

The vehicle movements for the transport of other hazardous materials to the Development Site and quantities per delivery are all below the respective screening thresholds.

Preliminary Risk Screening Conclusion

The above preliminary risk screening for the storage and transport of hazardous materials indicates that the Development may be considered potentially hazardous due to the quantities of LPG to be stored at each PPU and transported to the Development Site. On this basis, a PHA has been determined necessary to assess the level of risk to people, property and the environment as a result of the storage and transport of LPG.

8.9.2 Preliminary Hazard Analysis

Hazard Identification

SLR (2018c) carried out a PHA for the Development addressing the storage and transport of LPG in accordance with the HIPAP 4 (DoP 2011b). The procedure relies on a systematic and analytical approach to the identification and analysis of hazards and the quantification of off-site risks to assess risk tolerability and land use safety implications. HIPAP 4 advocates a merit-based approach, with the level and extent of analysis being appropriate to the hazards present.

Based on a review of the surrounding land uses and receptors, SLR (2018c) identified one potentially hazardous incident in relation to the storage and transport of LPG, being the risk of an LPG fire at the Development Site.

While the volume of LPG to be transported per load to the Development Site will exceed the SEPP 33 threshold (see **Section 8.9.1**), it will only be delivered around 56 times per year, which is equivalent to just over 1 delivery on average each week, and the delivery area is sparsely populated. On this basis, SLR (2018c) does not considered further consequence analysis for LPG transport necessary. Elgas will deliver the LPG in rigid tankers that meet all necessary safety requirements.

Hazard Mitigation Strategies

While LPG storage at each PPU will exceed the SEPP 33 threshold, the location and installed equipment will meet the requirements of *AS/NZS 1596:2014 The storage and handling of LP Gas.* AS/NZS 1596:2014 requires the installation and maintenance of number of safety features for LPG plant and equipment specifically designed to reduce the overall risk of operations.

The aboveground storage will comply with the following requirements (among others) for ventilation, access and set up:

- The aboveground storage tanks will be in the open air, outside buildings;
- Nearby construction, fences, walls, vapour barriers and the like will permit free access around the tanks and cross-ventilation for the tanks; and
- The minimum distance between adjacent tanks will be the same as the diameter of the largest tank installed.

AS/NZS 1596:2014 specifies the minimum allowable distances between the LPG storage tanks at each PPU and a public place is 10 m and a protected place is 17 m. The Development exceeds these distances, with a minimum distance of approximately 125 m between LPG storage tanks and the nearest public place, being the Development Site boundaries, and a minimum distance of approximately 20 m between LPG storage tanks and the nearest protected place, being the poultry sheds.

The technical and management safeguards required for LPG storage facilities are self-evident and readily implemented as part of safety engineering (SLR 2018c). ProTen is working with the LPG supplier, Elgas, in relation to the storage design.

Table 51 provides an assessment of potential hazard incidents and the controls required to reduce risks to an acceptable level.

Table 51 LPG Potentially Hazardous Incidents

Incident	Cause	Consequences	Prevention / Protection Requirements to Reduce Risks to Acceptable Level
Rupture of gas line	Failure of pipe or connection	Leak/release of LPG to atmosphere resulting in ignition	• Installations should comply with AS/NZS 1596:2014, specifically sections 3, 5, 6, 8, 11, 12 and 13. • Tanks should be made of steel and comply with the requirements AS/NZS 1200. • Tank filling should comply with section 6.6 of AS/NZS 1596:2014. • Tanks should have an automatic fill shutoff when they have reached capacity in accordance with section 6.6 of AS/NZS 1596:2014. • Outflow should be controlled in accordance with section 5 of AS/NZS 1596:2014. • Appropriate compliant safety shut down and isolation valves should be installed as per sections 5.3 and 6.7 of AS/NZS 1596:2014. • Inspections, testing and maintenance should be undertaken is in accordance with section 11.5 of AS/NZS 1596:2014. • Separation distances should be maintained as per AS/NZS 1596:2014. • Hazard area classification should be in accordance with AS/NZS 60079.10.1:2009. • Electrical equipment should comply with AS3000. • Fire safety systems should be installed and/or available in accordance with section 13 of AS/NZS 1596:2014. • Fire-sensing elements of the emergency shutdown system should be located in a position to sense a fire at the filling/loading connection. • Staff should be trained in how to use firefighting equipment and fire drills should be undertaken.
Leak during tank filling	Rupture of filling pipe; overfilling tanks; over pressure of lines		
Tank failure	Overpressure of tank due to adjacent fire; tank failure due to corrosion		

The requirements for firefighting are more appropriately based on the surroundings and less on the need of the LPG installation, given a gas fire is most often terminated by stopping the gas flow and almost never by extinguishing the fire (SLR 2018c). The actual LPG storages may not require a great deal of firefighting equipment if the engineering fire safety requirements of AS/NZS 1596:2014 are in place (SLR 2018c). The building improvements at the PPUs will have firefighting equipment to comply with building regulations and this should be counted as an important part of the overall protection of the Development Site, including the LPG storages (SLR 2018c).

Heat protection is essential when there is a fire risk that could present a significant threat of heat radiation to the LPG storage. The need for heat protection also depends on the surrounding structures, hazards and activities, rather than the quantity of LPG or the size of the storage tanks (SLR 2018c).

Where an aboveground LPG storage tank is located in a Class B site (as per Figure 13.1 of AS/NZS 1596:2014) in relation to a public place or protected place (nearest protected place at the Development Site is a poultry shed within 100 m of the LPG tanks), the firefighting requirements need to be determined from an evaluation of the needs and the available facilities, conducted on the basis of the two following principles:

1. For all other tank installations, at least a hose reel installation in accordance with clause 13.7.2 -
    - Hose reels should comply with AS/NZS 1221 and should be installed in accordance with AS 2441;
    - The water supply to a hose reel may be provided by any available on-site reticulated water supply system or from any form of storage system provided that the hose reel is able to deliver at least 0.33 litres per second (L/s). Where the supply is from a storage system the duration should be at least 15 minutes;

- The number and location of hose reels should be such as to ensure that a hose nozzle will reach every point in an area bounded by a line around and 5 m distant from any tank and tanker standing area; and
- Maintenance should be in accordance with AS 1851-2012.

Sections 4.14.3 and **4.16.5** details the supply and availability of water at each PPU.

The water storage tanks at each PPU will be located around 300 m from the LPG tanks. While this will ensure that the water supply is not compromised in a fire emergency, it could present as an issue if the fire service does not carry 300 m hose. However, as advised above, gas fire is most often terminated by stopping the gas flow and almost never by extinguishing the fire (SLR 2018c).

2. Where the capacity of an individual LPG tank or a group of tanks exceeds 50 kL, the installation should be assessed for heat protection.

   Given that the LPG storage at each of the four PPUs will exceed 50 kL, a Fire Safety Study should be undertaken following development consent for approval prior to commencing construction.

Assessment Criteria

In accordance with HIPAP 4 (DoP 2011b), SLR (2018c) advised the following in relation to applicable risk assessment criteria:

- Heat-flux radiation - consequence analysis of an incident involving heat radiation from a fire from neighbouring sites should be included in a Fire Safety Study undertaken for approval prior to commencing construction.
- Explosion over-pressure - consequence analysis of an incident involving explosion over-pressure from an on-site fire should be included in a Fire Safety Study undertaken for approval prior to commencing construction.
- Toxic exposure and biophysical environmental risk - the Development will store notable quantities of chemicals, specifically sodium hypochlorite and chlorine dioxide. However the quantities will be divided by four and stored at the four PPUs separated from each other by a minimum distance of 870 m. On this basis, consequence analysis of an incident involving toxic gas emissions or toxic releases in to the biophysical environment from an on-site fire is not considered necessary.

Preliminary Hazard Analysis Conclusion

While the Development is considered potentially hazardous in relation to the on-site LPG storage, with suitable engineering and design controls in place, the Development would be unlikely to cause a risk, significant or minor, to the community (SLR 2018c). There is a requirement to ensure that the installation and maintenance of on-site LPG storage is in compliance with *AS/NZS 1596:2014 The Storage and Handling of LP Gas,* including maintaining minimum separation distances.

However it is recommended that a Fire Safety Study be undertaken following development consent for approval prior to commencing construction.

8.9.3 Mitigation and Management

The following development design features, best management practices and mitigation measures will be implemented to minimise the potential for hazards/risks associated with hazardous materials:

- Diesel and petrol will be stored in aboveground bunded tanks, with the minimum bund volumes being 110% of the respective tank capacity.
- LPG will be stored in aboveground tanks installed and maintained in compliance with *AS/NZS 1596:2014 The Storage and Handling of LP Gas.* Minimum separation distances will be maintained.
- Chemicals will be stored in the vented chemical store within the amenities and workshop building at each PPU.
- Copies of the SDSs for each chemical/fuel will be kept within the chemical store and/or office at each PPU.
- Spill kits will also be maintained within the chemical store at each PPU.
- Diesel, petrol and LPG storages will be separated from each other and separated from the chemical store in the amenities and workshop building at each PPU.
- The following controls will be implemented in relation to LPG storage to reduce risks to an acceptable level -
  - Installations will comply with AS/NZS 1596:2014, specifically sections 3, 5, 6, 8, 11, 12 and 13;
  - Tanks will be made of steel and comply with the requirements AS/NZS 1200;
  - Tank filling will comply with section 6.6 of AS/NZS 1596:2014;
  - Tanks will have an automatic fill shutoff when they have reached capacity in accordance with section 6.6 of AS/NZS 1596:2014;
  - Outflow will be controlled in accordance with section 5 of AS/NZS 1596:2014;
  - Appropriate compliant safety shut down and isolation valves will be installed as per sections 5.3 and 6.7 of AS/NZS 1596:2014;
  - Inspections, testing and maintenance will be undertaken is in accordance with section 11.5 of AS/NZS 1596:2014;
  - Separation distances will be maintained as per AS/NZS 1596:2014;
  - Hazard area classification will be in accordance with AS/NZS 60079.10.1:2009;
  - Electrical equipment will comply with AS3000;
  - Fire safety systems will be installed and/or available in accordance with section 13 of AS/NZS 1596:2014;
  - Fire-sensing elements of the emergency shutdown system will be located in a position to sense a fire at the filling/loading connection; and
  - Staff will be trained in how to use firefighting equipment and fire drills should be undertaken.
- If considered necessary, a Fire Safety Study will be undertaken following development consent, in parallel with development detailed design, for approval prior to commencing construction.

8.10 Visual Amenity

8.10.1 Existing Environment

The visual amenity of the Development Site is that of a rural property that has been significantly modified by historic land clearing and long-term agricultural production activities. The original landform has been cleared and extensively modified to suit agricultural needs. However, there are some patches of native woodland remaining associated with topographic depressions and drainage features and within paddocks where historical clearing has been less extensive. Widely scattered paddock trees are distributed intermittently across the Development Site, with generally limited shrub cover and low diversity and cover of native groundcover vegetation.

The existing amenity of the Development Site and surrounding area is evident from the aerial image that forms the backdrop to **Figures 2** and 4 (and others).

8.10.2 Impact Assessment

Construction

While construction activities will likely be more visible than the operational stage of the Development, the construction activities will be temporary and transient in nature.

Operation

The combined disturbance footprint for the Development will amount to approximately 87.78 ha, which is equivalent to only 8.6% of the Development Site. The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement.

There are significant setback distances from the surrounding local road network, private residences and community recreational facilities. Specifically:

- The Development Site is removed from any urban areas, with the villages of Somerton and Manilla located approximately 12 km away and 13 km away, respectively (see **Figure 1**).
- The closest PPU to the adjoining public roads, being Farm 2, is setback from Rushes Creek Road by a distance of approximately 585 m and from Ski Gardens Road by approximately 1,080 m (see **Figure 12**).
- There is a low density of surrounding receptors, with a minimum separation distance of over 1 km between the PPUs and surrounding privately-owned residences (see **Figure 12**). The closest residence to the Development, being R25, is located approximately 1,025 m from the closest PPU, being Farm 4.
- There is significant separation between the Development and surrounding community recreational facilities (see **Figures 4** and **12**). The closest facility, being the Manilla Ski Gardens Caravan Park, is located approximately 2 km from the closest PPU, being Farm 1.

It is clear that the majority of view locations surrounding the Development Site will be significantly removed from the PPU locations.

While the poultry sheds will only measure 4.7 m to the roof peaks, the bedding material storage shed near Farm 3 will stand approximately 7.5 m to the roof peak and the feed silos at each PPU will stand approximately 8.7 m high (including legs).

The natural southeast-northwest trending ridgeline running through the centre of the Development Site will shield Farms 1 and 3 and likely Farm 4 from view from Rushes Creek Road and the residences to the east and northeast. The scattered paddock trees will also provide some screening for Farms 1, 3 and 4 from these view locations. As advised in **Sections 3.1** and **6.2.1**, it was noted during the community meeting and site inspection on 15 December 2016 that Farm 4 would be visible from receptor R25 to the southeast. ProTen subsequently relocated Farm 4 approximately 100 m to the north to reduce its visibility from this receptor.

There is little elevation change / intervening topography and no tree screening between Rushes Creek Road and Farm 2. Subsequently this PPU will be visible from the road and some residences, and also likely from Ski Gardens Road. The proposed vegetation screens (see **Figure 22**), once established, will provide some screening and improve the visual amenity.

There is not anticipated to be any significant visual impacts as a result of the solar panels at each PPU. They will comprise only approximately 0.25 ha at each PPU and sit approximately 3.5 m above ground level. There will be no mirrors or lenses used. Solar panels are designed to absorb light and, as such, reflect only a small amount of the sunlight that falls on them. In addition, the panels proposed have anti-reflective treatment (see **Appendix L**). On this basis, there should not be significant glint or glare issues for drivers on Rushes Creek Road or at surrounding residences (over 1 km away). Again, the proposed vegetation screens, once established, will provide some screening.

As outlined in **Section 4.10.5**, the primary source of external lighting will comprise one light fixture mounted at a height of approximately 4 m over the front and rear loading-unloading areas of each poultry shed. These lights will be aimed downwards and only used when necessary during times of low light and/or heavy fog. On this basis, along with the significant separation distances, there should not be any issues in terms of adverse lighting impacts (light spill, glare) on the surrounding local road network or residences.

8.10.3 Mitigation and Management

The following development design features, best management practices and mitigation measures will be implemented to minimise the potential for adverse visual amenity impacts:

Development Design

- The poultry sheds, along with some other infrastructure items, will be constructed using non-reflective materials. The walls will be a eucalyptus green (or similar) colour sympathetic with the surrounding natural environment.
- The solar panels will have anti-reflective treatment and there will not be any mirrors or lenses used.
- External lighting will comprise individual light fixtures mounted at a height of approximately 4 m over the front and rear of each poultry shed, with no broad area or flood lighting.

Vegetation Screens

- Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**). ProTen will progressively establish the landscape plantings, as soon as practicable following bulk earthworks and construction of development infrastructure at each PPU. Once established, these plantings will visually screen the PPUs and provide a high level of light screening.

Operation

- External lighting will be aimed downwards and only used when necessary during times of low light and/or heavy fog.

8.11 Greenhouse Gas and Energy Efficiency

8.11.1 Greenhouse Gas Emission Sources

The primary sources of greenhouse gas (GHG) from the Development 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.

The disturbance footprint for the Development is relatively small and largely comprises land that is already disturbed. The original landform has been cleared and extensively modified to suit agricultural needs. On this basis the value of the soil within the disturbance footprint is considered to be of relatively low value in terms of sequestering carbon.

Fossil Fuel Emissions

ProTen endeavours to reduce costs associated with their poultry developments, with a reduction in energy consumption translating into lower on-going operational costs. As research and development identifies areas where energy efficiency can be improved, where practicable, ProTen implements change to achieve cost reductions.

While the Development will still use reticulated electricity and LPG, one of the initiatives to be implemented by ProTen at this development is the installation of solar panels (see **Section 4.14.7**) to power the PPUs with clean renewable energy and reduce dependency on reticulated electricity. The panels will produce energy during the day and any surplus energy will be able to be fed into the electricity grid.

Additionally, 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, improve efficiency by continuously monitoring parameters such as light, temperature, humidity and static pressure and adjusting the ventilation to suit conditions. The Development will therefore require less energy to regulate the internal conditions of the poultry sheds compared to older style poultry sheds. 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.

8.11.2 Mitigation and Management

The following development design features, best management practices and mitigation measures will be implemented to improve energy efficiency and reduce associated GHG emissions:

Development Design

- The poultry sheds walls will insulted with high thermal performing expanded polystyrene with fire-retardant.
- The poultry sheds will be tunnel-ventilated fully-enclosed and climate-controlled, which will reduce power consumption.

- Solar panels will be installed at each PPU to generate clean renewable energy to power the PPUs and reduce dependency on reticulated electricity. The panels will produce energy during the day and any surplus energy will be able to be fed into the electricity grid.
- Low lux lighting, which has a significantly reduced power demand compared to past lighting practices, will be installed within the poultry sheds.

Operation

- 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 to identify and rectify any air leaks, which place additional load on ventilation fans.
- Internal lighting, temperature, humidity and static pressure will be continuously monitored within the poultry sheds and automatically adjusted to suit conditions. This will avoid unnecessary solar, electricity and LPG usage.
- Equipment such as ventilation fans and heaters will be regularly maintained and serviced to ensure optimal performance and efficiency.

8.12 Social Impacts

8.12.1 The Community

The Development Site is located within the Tamworth Regional LGA, which covers an area of approximately 9,892 km^2 and has a population of around 61,000. As identified on **Figure 1**, the nearest populated areas are:

- Somerton, approximately 12 km to the southeast of the Development Site. The Somerton village and surrounding rural area has a population of around 277, according to the ABS 2016 census; and
- Manilla, approximately 13 km to the northeast of the Development Site. The Manilla village and surrounding rural area has a population of around 2,550, according to the ABS 2016 census.

The surrounding area is primarily characterised by traditional agricultural production, along with the recreational facilities around Lake Keepit identified in **Section 2.5** and on **Figure 4**. There is a relatively low density of surrounding privately-owned residences, with the nearest listed in **Section 2.5** and identified on **Figure 4**.

The majority of permanent residents within the area are involved in traditional farming. These residents would enjoy the rural location and close proximity to the regional centres of Tamworth and Gunnedah.

In addition to the permanent residents, the surrounding recreational facilities offer temporary accommodation (see **Section 2.5**) in the form of cabins/lodges, caravans/campervans and camping sites.

8.12.2 Impact Assessment

The potential for adverse impacts on the social amenity of the area is primarily associated with those resulting from odour, dust, traffic, noise and visual impacts. In the context of this Development, social amenity (due to its location and land use characteristics) means the intrinsic value that residents place on the area, including rural character, peace and quiet, visual amenity and access to major facilities.

Based on the findings and conclusions of the impact assessments in this EIS, the potential for adverse impact on social amenity as a result of the Development is considered minimal. There should not be any change to the day-to-day life of surrounding residents and recreational land users as a result of the Development and no additional demand for community infrastructure, facilities or services. A summary of salient information in this regard is provided below.

Odour

As outlined in **Section 8.1.5**, it is predicted that all receptors surrounding the Development Site will experience 99th percentile odour concentrations below the 5 ou criterion for all three batch staging scenarios. The highest predicted concentration at a residential receptor is 4.2 ou at R24, and the highest predicted concentration at a recreational facility is 1.9 ou at the Lake Keepit Sport and Recreation Centre (R32). On this basis, the Development is expected to have a low impact on local amenity with respect to odour impacts.

Particulate Matter

The Development is also expected to have a low impact on local amenity with respect to dust impacts. As outlined in **Section 8.2.5**, all receptors are predicted to experience PM_{10} concentrations below the relevant assessment criteria, including when Development emissions are combined cumulatively with background concentrations. The one exception to this is receptor R25 where a cumulative maximum 24-hour average PM_{10} concentration of 55.2 µg/m^3 (criterion is 50 µg/m^3) is predicted during the day 4 staging scenario. PEL's (2018) modelling shows that the predicted contribution from the Development at R25 typically results in a minor change to the existing background concentrations. Over 95% of the predicted increments due to the Development are 5 µg/m³ or below. Furthermore, as outlined in **Section 8.2.2**, the emissions rate data used is inherently conservative and over-estimates the emissions (and hence the impacts) by a factor of at least two (PEL 2018). Taking this into consideration, along with there being no consideration of mitigation measures in the modelling (for example, vegetation screens), the results provide an unrealistically conservative assessment of particulate impacts (PEL 2018).

Various researches have shown that dust from intensive livestock operations can be reduced by 35 to 65% with effective vegetation buffers (Laird 1997; Thernelius 1997; Hartung 1985; Malone, et al. 2006; Malone, et al. 2008, cited in PEL 2018). On this basis, PEL (2018) advises that the dust emissions can be mitigated by planting vegetative screens (see **Section 4.20**).

Traffic

It is acknowledged that the Development will generate additional traffic on the local road network, particularly the primary transport route being the Oxley Highway (between Tamworth and the Rushes Creek Road intersection) and Rushes Creek Road. As detailed in **Section 8.3.3**, key findings and conclusions of the traffic impact assessment (RoadNet 2018) relevant to local road users include:

- The future forecast background traffic volumes on the Oxley Highway and Rushes Creek Road are low relative to their respective capacities and the additional traffic to be generated by the Development will be able to be easily accommodated with no significant impact on the safety or operation of the external road network.
- The general layout of the Oxley Highway / Rushes Creek Road intersection meets or exceeds the traffic warrants and is appropriate for the predicted traffic volumes, with a very good level of operational performance predicted to occur.
- The heavy vehicle route to be used by the Development is suitable and has sufficient facilities to accommodate the additional heavy vehicles to be generated.
- The two new access driveways to be constructed off Rushes Creek Road will be separated from each other by approximately 1.5 km, meaning each access will be able to operate independently without impacting on queuing, visibility, road safety or delays. Furthermore, each driveway is located clear of other access driveways servicing other properties in the area.

Noise

The assessment of worst-case continuous and intermittent noise scenarios in **Section 8.8.3** indicates that the Development will be able to operate on a day-to-day basis, including during noise enhancing meteorological conditions, and not exceed the development-specific criterion at any surrounding receptor during the day, evening or night periods. Furthermore, the predicted noise levels from the assessment of worst-case sleep disturbance activity are below the adopted criterion at all sensitive receptors, including during enhancing meteorological conditions.

In terms of road traffic noise, Global Acoustics (2018) advises:

- The increase in traffic on the Oxley Highway would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed; and
- The increase in traffic on Rushes Creek Road should not result in any exceedance of the road traffic impact assessment criteria for the day or night periods at any sensitive receptors, including R37 and R38 (see **Figure 4**) specifically identified as sensitive receptors due to their close proximity to the road.

Visual Amenity

The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. As described in **Section 8.10.2**, there are significant setback distances between the proposed PPU sites and the surrounding local road network, private residences and recreational facilities. The majority of view locations surrounding the Development Site will be significantly removed from the PPU sites.

While Farm 2 will be visible from adjoining public roads and some residences, the natural southeast-northwest trending ridgeline running through the centre of the Development Site will shield Farms 1 and 3 and likely Farm 4 from Rushes Creek Road and residences to the east and northeast. The scattered paddock trees will also provide some screening for Farms 1, 3 and 4. As outlined in **Sections 3.1** and **6.2.1**, Farm 4 was shifted approximately 100 m to the north to reduce its visibility from receptor R25.

There is not anticipated to be any significant visual impacts as a result of the solar panels at each PPU. They will have anti-reflective treatment and there will not be any mirrors or lenses used. There should not be significant glint or glare issues for drivers on Rushes Creek Road or at surrounding residences (over 1 km away).

External lighting on the poultry sheds, which will comprise one light fixture over the front and rear loading-unloading area, will be aimed downwards and only used when necessary during times of low light and/or heavy fog. There should not be any light spill or glare on the surrounding local road network or residences.

Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**), which, once established, will visually screen the infrastructure and provide a high level of light screening. ProTen will progressively establish the landscape plantings, as soon as practicable following bulk earthworks and construction of development infrastructure at each PPU.

Agricultural Land Use

The combined disturbance footprint of the Development will amount to approximately 87.78 ha, which is equivalent to only 8.6% of the Development Site. The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement. On this basis, the Development will not deny access to large areas of viable agricultural lands nor significantly reduce the land area available for agricultural production.

8.12.3 Mitigation and Management

ProTen is committed to on-going community consultation and will undertake the future consultation activities advised in **Section 6.2.2**.

During community consultation (see **Section 6.2.1**), the Lake Keepit Soaring Club raised the possibility of ProTen providing an emergency landing strip for gliders within the Development Site. With more than adequate and suitable land area available, ProTen is happy to provide an emergency landing strip and will work with the Soaring Club following development consent to establish the strip.

In addition, ProTen will be levied and pay development contributions to Council pursuant to the EP&A Act and in accordance with the *Tamworth Regional* Council *Section 94A (Indirect) Development Contributions Plan 2013*.

8.13 Economic Impacts

Development projects, regardless of size and by their very nature, increase economic activity within the locality in which they are situated. Two principal aspects of economic impact relate to the Development:

- Direct and derived economic effects associated with establishing the poultry farm – the Development will provide for an extended program of capital works relating to surface infrastructure; and
- On-going direct and derived economic effects associated with operation of the poultry farm – the Development will provide additional consumption activity induced by the incomes of new employees and commercial transactions between ProTen and suppliers and other businesses. The economic stimulus provided by these activities also results in the flow of further activity in the regional and State economies.

Development construction will result in the employment of between 50 and 60 people across various contracting companies over all or part of the 16 month construction program. Once operating at full capacity, the Development will directly employ 20 full-time equivalent staff members. There will also be several contract companies engaged in the operation for activities like bird catching, equipment maintenance, litter removal and shed wash down. The salaries/wages paid to these workers during construction and operation will also support additional flow-on activity in other sectors of the economy.

The expenditure on various consumable products and services will be significant. Some examples include the on-going demand for:

- Telecommunications, electricity, water and gas supply;
- Poultry bedding material and poultry feed;
- Other goods, such as fuel, tyres, clothing and groceries (to name a few); and
- Equipment maintenance and servicing; and
- Haulage of materials to and from the Development Site.

The grain required to fulfil the demand of the Development represents a significant increase in the potential market for regional farmers. It is estimated that the Development will consume around 80,000 tonnes of poultry feed annually, which translates to an expenditure of between $35 million and $40 million annually.

Additional economic benefit that will accrue to the local and/or State communities include a range of federally-levied taxes, a proportion of which is redistributed across the State community, and State and local government taxes, rates and charges, including payroll tax and Council rates.

It is evident that the net economic impact of the Development will be one of significant benefit.

The poultry industry is well-established and has a high recognition factor in the Tamworth region, providing significant employment and contribution to the economy. The operations of ProTen and Baiada play an ever increasing role in the development of agribusiness in the Tamworth region. The Development will increase the supply of broiler poultry from the Tamworth region by up to 17 million birds per year, which is integral to the industry's strategy for continued growth in the Tamworth region and Australia. It is also integral to the relocation of Baiada's poultry processing plant from West Tamworth to the Oakburn site (see **Section 2.6.2** and **Figure 1**), which is only economically feasible with significant growth in the region's poultry broiler production.

8.14 Cumulative Impacts

Potential cumulative impacts associated with the proposed Rushes Creek Poultry Production Farm and other developments / land uses in the area were considered, where relevant, in the specialist impact assessments undertaken for this EIS and have been addressed in the above sections. It is noted that the Development Site is located in a rural area with no other notable intensive land use developments or operations nearby.

A summary of the cumulative impacts considered in this EIS is provided in the below sub-sections. For further details please refer to the relevant specialist impact assessments appended.

8.14.1 Odour

The nearest other intensive livestock operations are:

- Glenara Park Poultry Breeder Farm comprising six poultry sheds and housing a combined 80,000 breeder birds approximately 8.2 km to the north-northwest of the nearest PPU, being Farm 1. PEL (2018) noted that breeder farms typically have a much smaller odour footprint than equivalent sized broiler farms.
- A small piggery facility comprising around 50 sows approximately 3.1 km to the northeast of the nearest PPU, being Farm 2. PEL (2018) noted that the odour emanating from the piggery would have different odour character from that emanating from the Development.

All other intensive livestock operations are located 10 km or more from the Development Site.

Based on the size and nature of Glenara Park and the piggery, the separation distances and predicted spread of odour emissions from the Development (see **Figures 25** to **27** in **Section 8.1.5**), a cumulative odour assessment was not undertaken as there is negligible potential for cumulative odour impacts (PEL 2018).

8.14.2 Particulate Matter

PEL (2018) modelled particulate emissions, specifically annual average and maximum 24-hour average PM_{10} concentrations, from the Development with existing background particulate concentrations (i.e. the cumulative scenario). The results in **Section 8.2.5** are summarised as follows:

- Annual average PM_{10} – all receptors are predicted to experience annual average PM_{10} concentrations below the assessment criterion of 25 µg/m^3, including when Development emissions are combined cumulatively with background concentrations. The highest predicted cumulative concentration is 12.3 µg/m^3 at receptor R24, which is well below the criterion.
- Maximum 24-hour average PM_{10} – all receptors are predicted to experience maximum 24-hour average PM_{10} concentrations below the assessment criterion of 50 µg/m^3, including when Development emissions are combined cumulatively with background concentrations, with the exception of receptor R25 where a cumulative concentration of 55.2 µg/m^3 is predicted during the day 4 staging scenario.

With regards to the exceedance at R25 during the cumulative maximum 24-hour average PM_{10} assessment, PEL's (2018) modelling shows that the predicted contribution from the Development at R25 typically results in a minor change to the existing background concentrations. Over 95% of the predicted increments due to the Development are 5 µg/m³ or below. Furthermore, as outlined in **Section 8.2.2**, the emissions rate data used for the modelling is inherently conservative and over-estimates the emissions (and hence the impacts) by a factor of at least two (PEL 2018). Taking this into consideration, along with there being no consideration of mitigation measures in the modelling (for example, vegetation screens), the results provide an unrealistically conservative assessment of particulate impacts (PEL 2018).

Various researches have shown that dust from intensive livestock operations can be reduced by 35% to 65% with effective vegetation buffers (Laird 1997; Thernelius 1997; Hartung 1985; Malone, et al. 2006; Malone, et al. 2008, cited in PEL 2018). On this basis, PEL (2018) advises that the dust emissions can be mitigated by planting vegetative screens (see **Section 4.20**).

8.14.3 Traffic

Evidently, the traffic generated by existing developments and land uses within the area is already present on the road network and, therefore, included in the background traffic counts undertaken by RoadNet (2018) (see **Section 8.3.1**). On this basis, no additional allowance or consideration for these developments/land uses was provided in the traffic impact assessment as their cumulative impacts with the Development are already implicitly accounted for (RoadNet 2018).

There is one development currently under construction in the area, being the Keepit Dam Upgrade Stage 2. Following completion of construction works, which is expected in mid-2019, this development will not generate any on-going traffic. On this basis, there is no requirement for consideration of potential cumulative traffic impacts with the Development (RoadNet 2018).

There are no other existing/under construction developments, approved developments (development consent issued but not yet constructed) or proposed developments (environmental impact assessment requirements issued or development application submitted) identified that will potentially lead to cumulative traffic impacts on the primary transport route for the Development, being the Oxley Highway and Rushes Creek Road. On this basis, RoadNet (2018) concludes that a quantitative assessment of cumulative traffic impacts is not necessary.

8.14.4 Noise

Global Acoustics (2018) did not specifically undertake a cumulative noise assessment as there is negligible potential for cumulative noise impacts. The Development Site is located in a rural area with no other notable noise-generating developments or land uses nearby. In accordance with the INP (EPA 2000), Global Acoustics (2018) adopted the default minimum RBL of 30 dB, which accounts for the low levels of background noise.

There is the potential for cumulative impacts associated with road traffic noise. Global Acoustics (2018) assessed road traffic noise based on the traffic data provided by RoadNet (2018), which, as outlined in **Section 8.14.3**, inherently includes traffic generated by existing developments and land uses within the area. Global Acoustics' (2018) assessment concluded:

- The increase in traffic along the Oxley Highway as a result of the Development will likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed. On this basis, no assessment of traffic noise impact on the Oxley Highway was undertaken.
- The increase in traffic along Rushes Creek Road as a result of the Development should not result in any exceedance of the road traffic impact assessment criteria for the day or night periods, including at receptors R37 and R38 (see **Figure 4**) specifically identified as sensitive receptors due to their close proximity to Rushes Creek Road.

Section 9

Summary of Commitments



9 SUMMARY OF COMMITMENTS

Table 52 provides a consolidated summary of the development design, best management practices and mitigation measures committed to in **Sections 4** and **8** to avoid, mitigate and/or manage the potential impacts of the Development.

Table 52 Summary of Development Design, Best Management Practices and Mitigation Measures

Aspect and Commitments
Development Construction
• ProTen will implement all practicable measures to prevent or minimise any harm to the local environment and surrounding populace that may result from the construction of the Development. • ProTen will construct the Development generally as described in this EIS and in accordance with detailed design completed following development consent, along with the necessary construction approvals (for example, construction certificates). • A CEMP will be developed for approval prior to commencing construction. It will describe the activities to be undertaken on site during construction, outline construction staging and timing, nominate the roles and responsibilities for all relevant construction personnel and include procedures for complaints and incident management. The CEMP will also specify the environmental management and mitigation measures to be implemented during construction in relation to: – Surface water; – Soils; – Traffic; – Biodiversity; – Aboriginal heritage; – Noise; – Dust; and – Waste. • Construction workers will be suitably inducted and trained. Training in relation to environmental responsibilities will take place initially through the site induction and then on an on-going basis through toolbox talks (or similar).
Development Operation
• ProTen will implement all practicable measures to prevent or minimise any harm to the local environment and surrounding populace that may result from operation of the Development. • The Development will generally be constructed, operated and managed in accordance with current industry best practice standards, including the relevant requirements/recommendations in the RSPCA Standards (RSPCA Australia 2013) and Best Practice Guidelines (DPI 2012). • ProTen will operate the Development generally as described in this EIS. • An OEMP will be developed for approval prior to commencing operation. It will describe the operational activities to be undertaken on site, nominate the roles and responsibilities for all relevant personnel and include procedures for complaints and incident management. The OEMP will also include the following issue-specific management plans: – Air Quality Management Plan; – Surface Water Management Plan; – Biodiversity Management Plan; – Aboriginal Cultural Heritage Management Plan; – Waste Management Plan; – Landscaping Management Plan; – Mass Mortality Disposal Strategy; and – Pollution Incident Response Management Plan. It will also specify the environmental management and mitigation measures to be implemented in relation to traffic, noise, energy efficiency and pest control. • The Development will not exceed a maximum population of 3,051,000 broiler birds, and the maximum number of birds placed on any given day will be 636,000 (±6%).

Aspect and Commitments
• Stocking densities will comply with the RSPCA Standards (2013) specification of 34 kg/m^2.
• Employees and contractors will be suitably inducted and trained. Training in relation to environmental responsibilities will take place initially through the site induction and then on an on-going basis through toolbox talks (or similar).
• The Development will be managed in compliance with ProTen's standard operating procedures, including a regular site inspection and maintenance program to minimise the potential for adverse environmental impacts, extend the life of equipment, reduce operating costs and maximise operational efficiency. Emphasis will be placed on keeping the insides of the poultry sheds and surrounding environs as clean as possible.
Land Contamination
• ProTen will commission a targeted soil investigation at the identified area of environmental concern (see **Section 2.13**) involving three soil boreholes with associated soil sampling and laboratory analysis for the contaminants of potential concern. Subsequently, if determined necessary, ProTen will commission the necessary works to remediate and/or manage the area prior to commencing operation of the Development.
Odour
Development Design
• The poultry sheds will be tunnel-ventilated to allow control over internal moisture levels and promote optimum growing conditions and bird health.
• The poultry sheds will be fully enclosed, have wide eaves and will be surrounded by dwarf concrete bund walls to prevent stormwater entering the poultry sheds and elevated moisture levels.
• The poultry sheds will be fitted with nipple drinkers with drip cups to minimise water spillage and elevated moisture levels.
• The feed silos will be fully enclosed to prevent the entry of rainwater and elevated moisture levels.
Shed Operations During Bird Growing Phase
• The Development will not exceed a maximum population of 3,051,000 broiler birds.
• Stocking densities will comply with the RSPCA Standards (2013) specification of 34 kg/m2.
• Stocking densities and bird health will be regularly checked and, if necessary, appropriate corrective measures implemented.
• A minimum depth of 50 mm of fresh bedding material will be laid throughout the poultry sheds at the start of each batch.
• Bedding material moisture levels will be regularly checked. Any excessively wet material and/or caked material beneath drinking lines will be promptly identified, removed and replaced.
• Bird drinkers will be maintained to minimise/avoid leakage that will result in wet patches in the bedding material.
• The poultry shed ventilation systems will be maintained to ensure air movement is at design levels.
• Where possible, activities that may increase odour emissions (for example, bedding material replacement) will be undertaken during daytime hours.
• Shed access points will remain closed at all times other than for the purposes of allowing access to the sheds.
• Dead birds will be collected from the poultry sheds on a daily basis and stored in the on-site dead bird freezers prior to being removed from site.
Shed Operations During Shed Cleanout
• Poultry litter will be promptly removed from the poultry sheds and transported off site in covered trucks at the end of each production cycle.
• Where possible, litter handling will be avoided during adverse climatic conditions, such as times of cold air drainage during early morning or strong winds. The shed ventilation systems will not be used during little removal.
• Poultry litter will not be stockpiled or spread within the Development Site.
Vegetation Screens
• Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**) on a progressive basis as soon as practicable following bulk earthworks and construction at each PPU.
Weather Station
• A weather station will be installed within the Development Site to collect on-going and up-to-date weather monitoring data, which will assist in investigating and responding to any air quality complaints.

Aspect and Commitments
Particulate Matter

Construction

- Surface disturbance will be limited to the smallest practicable area possible.
- Disturbed areas will be promptly rehabilitated and revegetated to a stable landform.
- When necessary, dust will be minimised by "wetting" down surfaces being worked and/or carrying traffic during dry conditions.
- Where possible, vehicles on site will be confined to designated roadways.
- Internal roads will be appropriately constructed and maintained with a suitably compacted base.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of work sites.
- Plant and equipment will be regularly maintained to ensure optimal operating condition.

Development Design

- The feed silos will be fully enclosed to minimise emissions of 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.

Wheel Generated Dust From Unsealed Roadways

- The two site access roads will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road.
- Internal roads will be appropriately constructed and maintained with a suitably compacted base.
- When necessary, internal roads will be "wetted down" during dry conditions.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident).

Dust Emissions from Poultry Sheds

- The bedding material will be managed to ensure that moisture levels do not drop below approximately 15%.
- The poultry shed ventilation systems will be maintained to ensure air movement is at design levels.
- The poultry sheds will be thoroughly cleaned between batches, with a focus on the fan end of the sheds.

Emergency Standby Diesel Generators

- The generators will be contained in lockable acoustics enclosures with vertical air discharge and will only be used in emergency situations when mains power from the electricity grid is lost.
- The generators will meet the relevant emission standards in Schedule 4 of the Clean Air Regulation.

Materials Handling and Transfer

- When possible, handling bedding material/poultry litter will be limited to daytime hours to avoid adverse weather conditions.
- Poultry litter will be promptly transported off site in covered trucks at the end of each batch.

Vegetation Screens

- Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**) on a progressive basis as soon as practicable following bulk earthworks and construction at each PPU.

Weather Station

- A weather station will be installed within the Development Site to collect on-going and up-to-date weather monitoring data, which will assist in investigating and responding to any air quality complaints.

Traffic

Construction

- A CTMP will be prepared for approval prior to commencing construction.
- The generic traffic control plan will be implemented if the construction of the new site access driveways off Rushes Creek Road and/or the installation of water and electricity supply lines under Ski Gardens Road results in the need to restrict the two-way traffic arrangement on the respective roads to a single lane.

Aspect and Commitments

- Construction vehicles will enter and exit the Development Site during the initial site preparation works via the existing site access driveways off Rushes Creek Road and subsequently via the two new access driveways to be constructed off Rushes Creek Road at the commencement of construction.
- Vehicles will not exceed a general speed limit of 60 km/hr along the main site access roads from Rushes Creek Road, with a reduced speed limit of 40 km/hr in the vicinity of all work sites.
- All construction-related traffic and construction plant/equipment will park along the internal access roads and/or on construction sites. There will be no queuing or parking on Rushes Creek Road.
- Where possible, vehicles on site will be confined to designated roadways.
- 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.
- Internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking.
- Loaded heavy vehicles entering or exiting the Development Site will have their loads covered.
- Heavy vehicles exiting the Development Site will be cleaned of dirt, sand and other materials (if necessary) to avoid tracking these materials on to the public road network.
- The only traffic to enter the Development Site will be construction traffic and, if required, emergency vehicles. There will not be any general public access.
- All heavy vehicle drivers will read and sign a Driver Code of Conduct.

Oxley Highway / Rushes Creek Road Intersection

- Visibility splays at the Oxley Highway / Rushes Creek Road intersection will be checked in both the horizontal and vertical planes via detailed field investigation or survey to confirm, in particular, whether there is a need for any vegetation trimming/clearing on the inside of the horizontal curve immediately to the west of the intersection to ensure SISD.
- A review of the line-marking arrangement on Rushes Creek Road at the Oxley Highway intersection will be undertaken to ensure it is consistent with the Give-Way intersection control.
- Additional signage will be erected at the Oxley Highway / Rushes Creek Road intersection in the form of advance signposting in both directions to warn of trucks turning at the intersection.

Development Design

- The two new access driveways from Rushes Creek Road will be constructed to accommodate a BAL treatment in accordance with AGRD Part 4A (Austroads 2017). Directional signage will be installed on Rushes Creek Road to assist approaching traffic identify the access points and access control (Give Way) signage and line-marking will be provided to control vehicles exiting the Development Site.
- The two new access roads will be bitumen-sealed for a minimum of 50 m from Rushes Creek Road and will be approximately 6.5 m wide. The remaining lengths of the internal access roads within the Development Site will be constructed as all-weather rural-type roads to meet the minimum requirements of AS 2890.2 Part 2 to accommodate the turning movements of B-doubles.
- A one-way circulation road (ring road) will be established around the perimeter of each PPU to enable traffic to enter, exit and manoeuvre for loading-unloading and servicing activities in a forward direction.

Operation

- Traffic will enter and exit the Development Site via the two new access driveways off Rushes Creek Road.
- Heavy vehicles travelling between the Development Site and the poultry industry service facilities located in and around Tamworth will utilise the nominated heavy vehicle route (approved B-double route) comprising the Oxley Highway and Rushes Creek Road (see **Figure 19**).
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- 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.
- Internal roads will be appropriately maintained to provide safe driving conditions (and also minimise noise and dust emissions).
- Internal roads will be maintained clear of obstruction and used exclusively for the purposes of transport, loading-unloading and parking.

Aspect and Commitments
• Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident). • Car parking will be provided adjacent to the amenities facility at each PPU for employees and visitors, and adequate area will be available at each PPU and along internal access roads for any heavy vehicle parking requirements. There will be no parking along Rushes Creek Road. • All heavy vehicle drivers will read and sign a Driver Code of Conduct.
Surface Water
Construction • Construction works will be planned and coordinated in order to limit the area of disturbance at any one time (as far as practicable). • Erosion and sediment controls will be implemented prior to disturbance activities commencing in accordance with the Blue Book (Landcom 2004) and *Erosion and Sediment Control on Unsealed Roads* (OEH 2012). • Clean water diversions comprising a deflection bank and swale drain will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the construction sites. They will be constructed and stabilised prior to earthworks commencing at each PPU and will be designed to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event. • Stripped topsoil will be appropriately stockpiled and managed for use in future rehabilitation works. • Disturbed areas will be promptly rehabilitated and revegetated to a stable landform following completion of disturbance activities (see **Section 4.3.6**). • An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the erosion and sediment control structures throughout the construction period. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken. **Development Design and Operation** • The poultry sheds will be fully enclosed and surrounded by a dwarf concrete bund wall to prevent stormwater entering the sheds and allow for the controlled discharge of wash down water from the sheds. • The clean water diversions (comprising a deflection bank and swale drain) installed prior to earthworks around the upstream sides of each of the four PPUs will be maintained to convey clean water run-off around the PPUs and prevent this water from entering the controlled surface water management system. The diversions will be designed and maintained to convey the runoff from the upstream catchment for rainfall events up to the 1% AEP event. • The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. • AWTSs will be installed to manage the sewage generated by the staff amenities at each PPU and the farm managers' houses in accordance with the manufacturer's specifications and Council approval requirements. Each AWTS (12 in total) will have a treatment capacity of 10 equivalent persons at 200 L/p/d and the treated effluent will be released over an area of approximately 200 m2 via sub-surface irrigation. • The extraction of surface water from the Namoi River to service the Development's water supply requirements will be under the provisions of the two existing water access licences held by ProTen (WAL41834 and WAL37794). Extraction will not exceed the combined licensed allocation of 437.2 units per year under the provisions of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*. • An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the surface water management systems, including upstream diversions. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken to ensure the system's design capacity is maintained. • The grassed swale drains between the poultry sheds will be carefully managed to minimise soil disturbance and maximise infiltration and stormwater treatment potential. They will be regularly slashed to encourage continual grass growth and associated nutrient up-take. • Dry-cleaning practices at the end of each production cycle will be maximised within the poultry sheds prior to washing with water to minimise the volume of wash water and the amount of poultry litter (and associated sediments and nutrients) in the wash down water. • Water captured in the detention dams will be reused for regular irrigation of the planted vegetation screens at each PPU.

Aspect and Commitments
• The waste management systems listed in **Section 4.18** will be implemented to ensure that each waste stream generated is effectively managed and disposed of off site. There will not be any on-site stockpiling or disposal of waste. • The best management practices and mitigation measures outlined in **Section 4.19** will be implemented for the storage of chemicals and fuels.
Groundwater
• There will not be any groundwater extraction or use by the Development. • Each poultry shed will be fully enclosed and have concrete flooring. • Each poultry shed will be surrounded by a dwarf concrete bund wall measuring 400 mm high to prevent rainwater and runoff entering the sheds and to allow for the controlled discharge of wash down water from the sheds. • The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. • The internal surfaces of the detention dams will be compacted or lined to provide an impermeable surface. • AWTSs will be installed to manage the sewage generated by the staff amenities at each PPU and the farm managers' houses in accordance with the manufacturer's specifications and Council approval requirements. Each AWTS (12 in total) will have a treatment capacity of 10 equivalent persons at 200 L/p/d and the treated effluent will be released over an area of approximately 200 m2 via sub-surface irrigation. • An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the surface water management systems. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken to ensure the system's design capacity is maintained. • The grassed swale drains between the poultry sheds will be carefully managed to minimise soil disturbance and maximise infiltration and stormwater treatment potential. They will be regularly slashed to encourage continual grass growth and associated nutrient up-take. • Dry-cleaning practices at the end of each production cycle will be maximised within the poultry sheds prior to washing with water to minimise the volume of wash water and the amount of poultry litter (and associated sediments and nutrients) in the wash down water. • The waste management systems listed in **Section 4.18** will be implemented to ensure that each waste stream generated is effectively managed and disposed of off site. There will not be any on-site stockpiling or disposal of waste. • The best management practices and mitigation measures outlined in **Section 4.19** will be implemented for the storage of chemicals and fuels.
Biodiversity
Construction • Construction areas will be clearly delineated to ensure no native vegetation outside of these areas is cleared. • Erosion and sediment controls will be implemented prior to disturbance activities commencing in accordance with the Blue Book (Landcom 2004) and *Erosion and Sediment Control on Unsealed Roads* (OEH 2012). • An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the erosion and sediment control structures throughout the construction period. They will be visually inspected on a monthly basis and following significant rainfall events and any required maintenance work will be promptly undertaken. • Vehicles will not exceed a general speed limit of 60 km/hr along the main site access roads from Rushes Creek Road, with a reduced speed limit of 40 km/hr in the vicinity of work sites. • If considered necessary, vehicles leaving the Development Site will be cleaned to avoid the spread of weeds. • WIRES will be contacted prior to planned tree felling to advise of proposed works and arrange a volunteer wildlife handler (if required and available) to rescue any fauna. • Rubbish, including building material wastes and food scraps, will be properly managed and will not be stockpiled within areas of native vegetation. • Disturbed areas will be promptly rehabilitated and revegetated to a stable landform following completion of disturbance activities (see **Section 4.3.6**). • Revegetation works and landscape plantings will be regularly inspected and assessed for maintenance requirements, including weed control.

Aspect and Commitments

Operation

- The engineered surface water management systems described in **Section 4.17.2** will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation.
- If any native fauna are by chance injured during operations, WIRES will be contacted to arrange proper care for the animal. WIRES will also be contacted to remove any bats discovered within the poultry sheds.
- Suitable signage will be erected to direct traffic, limit traffic speed and minimise night time noise levels.
- Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hr in the vicinity of the PPUs.
- Internal traffic will be restricted to the designated access roads (except in the event of an emergency or incident).
- Efforts will be made to ensure the poultry sheds and other site buildings are fully enclosed and maintained in an attempt to exclude bats from roosting within the sheds/buildings.
- The waste management systems listed in **Section 4.18** will be implemented to ensure that each waste stream generated is effectively managed and disposed of off site. There will not be any on-site stockpiling or disposal of waste.
- External lighting will be aimed downwards and only used when necessary during times of low light and/or heavy fog.
- A wheel wash facility will be installed on the access road to each PPU in order to minimise the risk of spread of plant pathogens and weeds.
- Pest control measures (see **Section 4.21**) will be implemented to prevent and control outbreaks.

Biodiversity Offset Strategy

- The Biodiversity Offset Strategy outlined in **Section 8.6.5** will be implemented to fulfil the offset requirements for the Development.

Aboriginal Heritage

Aboriginal Cultural Heritage Management Plan

- Prior to the commencement of construction, an ACHMP will be prepared for approval in consultation with the RAPs and OEH. It will describe the management actions for all Aboriginal sites within the Development Site, including the seven sites within the disturbance footprint, and include an unexpected finds protocol.

Archaeological Salvage and Fencing

- The seven Aboriginal sites within the disturbance footprint of the Development, being Happy Hills-IF3, Bondah-IF1, Bondah-IF2, Bondah-IF7, Bondah-IF8, Happy Hills-OS3 and Bondah-OS11, will be salvaged by a surface collection and recording of all visible surface artefacts in consultation with the RAPs and OEH. The salvage works will be detailed in the ACHMP and will include the mapping, analysis and collection of all surface artefacts at the seven sites. The results of the salvage will be included in a report to preserve the data in a useable form.
- The five Aboriginal sites in close proximity to the disturbance footprint of the Development will be fenced with appropriate buffers and signed. Specifically:
  - Happy Hills-IF4 is located within 50 m of an access road – it will be permanently fenced with a 10 m buffer and signed “Do Not Enter”;
  - Bondah-IF5 is located within 30 m of an access road – it will be permanently fenced with a 10 m buffer and signed “Do Not Enter”;
  - Bondah-OS2 is located within 50 m of water and electricity supply lines – it will be fenced with a 10 m buffer and signed “Do Not Enter” during construction;
  - Bondah-OS3 is located within 60 m of water and electricity supply lines – it will be fenced with a 10 m buffer along its eastern extents and signed “Do Not Enter” during construction; and
  - Bondah-OS9 is located within 20 m of water and electricity supply lines – it will be permanently fenced with a 10 m buffer around its northern extent and signed “Do Not Enter”.

General

- No disturbance will occur outside of the disturbance footprint assessed in this EIS. Any alterations to the Development footprint will be assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010c).
- Employees and contractors will be made aware of the presence of the identified Aboriginal sites during site inductions and training.

Aspect and Commitments
• If any Aboriginal sites are uncovered during construction or operation, all work within the vicinity will cease immediately and the unexpected finds protocol in the approved ACHMP will be followed.
Noise
Construction • Construction activities will be restricted to the following standard daytime hours: – Monday to Friday – 7:00 am to 6:00 pm; – Saturday – 8:00 am to 1:00 pm; and – No audible construction work on Sundays or public holidays. • Plant and equipment operators will be instructed on how to minimise noise generation at all times. If necessary, this may include avoiding the operation of noisy plant and equipment simultaneously. • Plant and equipment will be maintained to meet regulatory and industry standards, as well as ensure optimal operating conditions. **Operation** • Noise generating equipment purchased by the operator will comply with relevant workplace health and safety requirements. • Plant and equipment will be maintained to meet regulatory and industry standards and ensure optimal operating conditions. • A unidirectional traffic movement system, via a one-way circulation road around each PPU, will be established to minimise the use of reversing beepers. • Internal roads will be appropriately constructed and maintained with a suitably compacted base. • Vehicles will not exceed a general speed limit of 60 km/hr along the internal access roads, with a reduced speed limit of 40 km/hour in the vicinity of the PPUs. • Suitable signage will be erected to direct traffic, limit traffic speed and minimise night time noise levels. • The emergency standby diesel generators will be contained in lockable acoustics enclosures with vertical air discharge and will only be used in emergency situations when mains power from the electricity grid is lost.
Hazard and Risk
• Diesel and petrol will be stored in aboveground bunded tanks, with the minimum bund volumes being 110% of the respective tank capacity. • LPG will be stored in aboveground tanks installed and maintained in compliance with AS/NZS 1596:2014 The Storage and Handling of LP Gas. Minimum separation distances will be maintained. • Chemicals will be stored in the vented chemical store within the amenities and workshop building at each PPU. • Copies of the SDSs for each chemical and fuel will be kept within the chemical store and/or office at each PPU. • Spill kits will also be maintained within the chemical store at each PPU. • Diesel, petrol and LPG storages will be separated from each other and separated from the chemical store in the amenities and workshop building at each PPU. • The following controls will be implemented in relation to LPG storage to reduce risks to an acceptable level - – Installations will comply with AS/NZS 1596:2014, specifically sections 3, 5, 6, 8, 11, 12 and 13; – Tanks will be made of steel and comply with the requirements AS/NZS 1200; – Tank filling will comply with section 6.6 of AS/NZS 1596:2014; – Tanks will have an automatic fill shutoff when they have reached capacity in accordance with section 6.6 of AS/NZS 1596:2014; – Outflow will be controlled in accordance with section 5 of AS/NZS 1596:2014; – Appropriate compliant safety shut down and isolation valves will be installed as per sections 5.3 and 6.7 of AS/NZS 1596:2014; – Inspections, testing and maintenance will be undertaken is in accordance with section 11.5 of AS/NZS 1596:2014; – Separation distances will be maintained as per AS/NZS 1596:2014; – Hazard area classification will be in accordance with AS/NZS 60079.10.1:2009; – Electrical equipment will comply with AS3000; – Fire safety systems will be installed and/or available in accordance with section 13 of AS/NZS 1596:2014;

Aspect and Commitments
– Fire-sensing elements of the emergency shutdown system will be located in a position to sense a fire at the filling/loading connection; and – Staff will be trained in how to use firefighting equipment and fire drills should be undertaken. • If considered necessary, a Fire Safety Study will be undertaken following development consent, in parallel with development detailed design, for approval prior to commencing construction.
Visual Amenity
Development Design • The poultry sheds, along with some other infrastructure items, will be constructed using non-reflective materials. The walls will be a eucalyptus green (or similar) colour sympathetic with the surrounding natural environment. • The solar panels will have anti-reflective treatment and there will not be any mirrors or lenses used. • External lighting will comprise individual light fixtures mounted at a height of approximately 4 m over the front and rear of each poultry shed, with no broad area or flood lighting. **Vegetation Screens** • Vegetation screens will be established and maintained around the perimeter of each PPU (see **Section 4.20** and **Figure 22**) on a progressive basis as soon as practicable following bulk earthworks and construction at each PPU. **Operation** • External lighting will be aimed downwards and only used when necessary during times of low light and/or heavy fog.
Greenhouse Gas and Energy Efficiency
Development Design • The poultry sheds will be insulted with high thermal performing expanded polystyrene with fire-retardant. • The poultry sheds will be tunnel-ventilated, fully-enclosed and climate-controlled, which will reduce power consumption. • Solar panels will be installed at each PPU to generate clean renewable energy to power the PPUs and reduce dependency on reticulated electricity. The panels will produce energy during the day and any surplus energy will be able to be fed into the electricity grid. • Low lux lighting will be installed within the poultry sheds. **Operation** • 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 to identify and rectify any air leaks, which place additional load on ventilation fans. • Internal lighting, temperature, humidity and static pressure will be continuously monitored within the poultry sheds and automatically adjusted to suit conditions. This will avoid unnecessary solar, electricity and LPG usage. • Equipment such as ventilation fans and heaters will be regularly maintained and serviced to ensure optimal performance and efficiency.
Social
• Shortly following submission of this EIS to the DPE for public exhibition, ProTen will hold a community information session. This session will serve to overview the Development, outline and discuss the findings of key impact assessments and provide an overview of the EIS assessment and determination process, including how to review and comment on the EIS during the exhibition phase. • ProTen will hold subsequent face-to-face meetings if requested by any of the community stakeholders. • ProTen will arrange additional community information sessions prior to commencing both construction and operation if desired by the community stakeholders. • Prior to the commencing both construction and operation ProTen will inform the surrounding residents and operators of the surrounding recreational facilities of planned commencement of construction/operation via a letter drop. The letter will advise relevant details, including general construction/operation activities, key dates, staging and hours, and relevant site contact details. These stakeholders will also be informed of any changes to the construction/operation activities in writing. • Clearly visible signage will be installed at both the site access driveways off Rushes Creek Road prior to commencing construction and during operation. The signs will advise relevant details, including the site name, site office location, site contact details and any specific access requirements.

Aspect and Commitments
• ProTen will continue to operate its freecall environmental hotline number, which is provided on the company's website, to ensure community concerns can be raised and addressed. • ProTen will work with the Lake Keepit Soaring Club following development consent to establish an emergency landing strip for gliders within the Development Site. • ProTen will be levied and pay development contributions to Council pursuant to the EP&A Act and in accordance with the *Tamworth Regional Council Section 94A (Indirect) Development Contributions Plan 2013*.

Section 10

Justification and Conclusion



10 JUSTIFICATION AND CONCLUSION

In accordance with the statutory requirements for an EIS, it is necessary to consider the reasons why the Development should be approved, having regard to environmental, social and economic considerations and the principles of ESD. **Section 8** contains a comprehensive and focussed assessment of the significant components of the biological and physical environments surrounding the Development Site, along with social and economic considerations, to a level of detail commensurate with their residual risk ranking (see **Section 7**). The below sub-sections provide an overview or summary of the key findings and conclusions of that assessment, and also addresses ESD.

10.1 Development Justification

10.1.1 Environmental Considerations

The potential impacts of the Development have been minimised by the iterative process ProTen has undertaken to develop and refine the development layout to minimise, in particular, odour impacts and disturbance of high conservation vegetation areas and identified Aboriginal heritage sites. This included using information obtained from preliminary odour modelling and baseline environmental surveys to assess various layouts in consideration of environmental constraints and the surrounding populace. Key outcomes, as outlined in **Section 3.1**, included the reduction in the number of poultry sheds from the originally proposed 64 sheds (as presented in the PEA) to the proposed 54 sheds and significant realignment of linear infrastructure to avoid areas comprising higher conservation vegetation. On this basis, the Development, as proposed, represents the best of the alternatives considered when taking the environmental and social amenity impacts in to consideration.

Some key features of the Development worth re-iterating here include:

- The Development will generally be constructed, operated and managed in accordance with current industry best practice standards, including the relevant requirements/recommendations in the RSPCA Standards (RSPCA Australia 2013) and Best Practice Guidelines (DPI 2012).
- The Development will maintain a maximum bird stocking density of 34 kg/m^2 in compliance with the RSPCA Standards (RSPCA Australia 2013), which is significantly less than that traditionally adopted by the industry of 40 kg/m^2 under the *National Animal Welfare Standards for the Chicken Meat Industry* (Australian Poultry CRC 2008). This will have positive flow-on effects for odour emissions and bird welfare and health.
- Solar panels will be installed at each PPU to generate clean renewable energy and reduce dependency on reticulated electricity.
- The extraction of surface water from the Namoi River will be under the provisions of two existing water access licences owned by ProTen and, as such, the Development will be using water that is already allocated (not additional water) under the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016.* On this basis, the Development will not impact on surrounding surface water users or river flows beyond that allowable under the Water Sharing Plan.
- An engineered surface water management system will be installed at each PPU to provide long-term structural controls to mitigate the impact of surface water runoff throughout the life of the Development and minimise the risk of off-site discharge. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event.

- Vegetation screens will be established around the perimeter of each PPU on a progressive basis as soon as practicable following bulk earthworks and construction to screen the PPUs from surrounding residences and public roads, reduce the magnitude and frequency of any adverse air quality impacts and improve the general visual and environmental amenity of the Development.
- Surface water captured in the detention dams at each PPU will be reused for regular irrigation of the planted vegetation screens around the perimeter of each PPU.

It is acknowledged that the Development may result in some externalised impacts, however, as summarised in **Section 9**, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses. A summary of the key findings of the environmental assessment in **Section 8** in relation to the operation of the Development is presented in **Table 53**.

Table 53 Summary of Key Environmental Impacts

Key Findings of Environmental Assessment
Odour
• All residential receptors and recreational facilities surrounding the Development Site are predicted to experience 99th percentile odour concentrations below the 5 ou criterion for all three batch staging scenarios. The highest predicted concentration for the residential receptors is 4.2 ou at R24, and the highest predicted concentration for the recreational facilities is 1.9 ou at the Lake Keepit Sport and Recreation Centre (R32). • Negligence potential for any cumulative odour impacts.
Particulate Matter
• All receptors are predicted to experience annual average PM_{10} concentrations below the assessment criterion of 25 µg/m3, including when Development emissions are combined cumulatively with background concentrations. The highest predicted cumulative concentration is 12.3 µg/m3 at receptor R24. • All receptors are predicted to experience maximum 24-hour average PM_{10} concentrations below the assessment criterion of 50 µg/m3, including when Development emissions are combined cumulatively with background concentrations, with the exception of receptor R25 where a cumulative concentration of 55.2 µg/m3 is predicted during the day 4 staging scenario. The modelling shows that the predicted contribution from the Development at R25 typically results in a minor change to the existing background concentrations. Over 95% of the predicted increments due to the Development are 5 $\mu g/m^3$ or below. Furthermore, the emissions rate data used is inherently conservative and over-estimates the emissions (and hence the impacts) by a factor of at least two. Taking this into consideration, along with there being no consideration of mitigation measures in the modelling (for example, vegetation screens), the results provide an unrealistically conservative assessment of particulate impacts.
Traffic
• The future forecast background traffic volumes on the Oxley Highway and Rushes Creek Road are low relative to their respective capacities and the additional traffic to be generated by the Development will be able to be easily accommodated with no significant impact on the safety or operation of the external road network. • The general layout of the Oxley Highway / Rushes Creek Road intersection meets or exceeds the traffic warrants and is appropriate for the predicted traffic volumes, with a very good level of operational performance predicted to occur. • The heavy vehicle route to be used by the Development is suitable and has sufficient facilities to accommodate the additional heavy vehicles to be generated. • The two new access driveways to be constructed off Rushes Creek Road will be separated from each other by approximately 1.5 km, meaning each access will be able to operate independently without impacting on queuing, visibility, road safety or delays. Furthermore, each driveway is located clear of other access driveways servicing other properties in the area.
Surface Water
• Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to local water resources and no detectable impact is expected.

Key Findings of Environmental Assessment
• Farms 2 and 4 are proposed to be located on relatively minor intermittent drainage lines. While this has the potential to reduce the functionality and capacity of the drainage lines, clean water diversions sized for rainfall events up to the 1% AEP event will be installed around the upstream sides of each of the four PPUs. The runoff in the existing drainage lines at Farms 2 and 4 will be conveyed along the new swale drains around the PPUs before re-joining the existing drainage lines downstream. Given that the drainage lines are relatively minor features and the design of the diversions will ensure that they are re-connected downstream, this should not pose any notable hydraulic or environmental impacts. • The primary construction and operational areas of the Development, being the PPU sites and access roads, are well-removed from the Namoi River and Lake Keepit. The only activities that will occur within or near waterfront land is the installation and operation of the water pump approximately 30 m back from the bank of the Namoi River and a water supply pipeline from the pump in to the Development Site. The potential for impact on the River will be addressed via appropriate erosion and sediment controls and promptly rehabilitating and revegetating the disturbed area to a stable landform. The pump will not impact on the width and functioning of the riparian corridor or stability of the watercourse. • The extraction of surface water from the Namoi River to service the Development's water supply requirements will be under the provisions of two existing water access licences owned by ProTen and, as such, the Development will be using water that is already allocated (not additional water) under the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016*. On this basis, the Development will not impact on surrounding surface water users or river flows beyond that allowable under the Water Sharing Plan. • The potential for impact to surface water resources by runoff of nutrients, chemicals or pathogens is considered negligible. An engineered surface water management system will be installed at each PPU to capture and manage wash down water and stormwater runoff within the PPU environs, providing long-term structural management controls throughout the life of the operation. Each system will be designed to capture the runoff from 200 mm of rainfall, which is equivalent to the depth of rainfall for a 1% AEP, 72-hour event. Based on the design volumes of the detention dams and the water reuse strategy for regular irrigation of planted vegetation screens at each PPU, there should not be any off-site discharge from the detention dams for events up to the 1% AEP event. • The impervious footprint of the Development will be very small relative to the overall size of the Development Site and the surface water management system at each PPU will operate as a closed water cycle, with the primary function to capture stormwater runoff from the impervious and disturbed surfaces. • Post-development peak flows should not exceed pre-development peak flows for events up to the 1% AEP event. On this basis, there should not be any impact on the downstream drainage features or Lake Keepit.
Groundwater
• Given the controlled environment in which the Development will operate, including engineered surface water management systems, best management practices and mitigation measures, it poses a low risk to local water resources and no detectable impact is expected. • There will not be any groundwater extraction or use and therefore no impact on local groundwater levels or yields. • The surface water management systems, depth to groundwater and nature of the strata (along with other development design features, best management practices and mitigation measures) will mitigate the potential for infiltration of wash down water and any potential pollutants to groundwater. • The shallow alluvial aquifer appears to be confined to the Namoi River channel itself and does not extend into the boundaries of the Development Site.
Biodiversity
• The potential ecological impact of the Development will be relatively small, with a disturbance footprint of approximately 87.78 ha, which comprises just 8.6% of the Development Site, and the commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. The impact areas are devoid of high conservation habitats apart from isolated paddock trees. • Minor impacts to TECs and habitat for threatened fauna species comprising the following direct impacts: – Removal and disturbance of derived grasslands (TEC vegetation), which are dominated by exotic pasture with a low cover and moderate diversity of native species; – Clearing of some paddock trees to accommodate infrastructure where required; and – Removal of a small portion of potential fauna foraging habitat, in particular for threatened microchiropteran bats species, the Grey-crowned Babbler and the Little Eagle.

Key Findings of Environmental Assessment
• The Development will result in the removal of some highly disturbed derived grassland communities, which form part of the Box-Gum Woodland TEC, and the removal of some isolated paddock trees that cannot be avoided. The total area of required native vegetation removal is limited to approximately 1.17 ha of native derived grassland (0.1% of the Development Site). The remaining disturbance area of 86.61 ha comprises areas of exotic pasture in low condition (i.e. non-native groundcover). • The Development will not involve the imposition of a "significant impact" on any matters of NES under the EPBC Act and referral to the DEE is not necessary.
Aboriginal Heritage
• Seven of the 35 Aboriginal sites recorded within the Development Site are within the disturbance footprint of the Development and will require salvage. The remaining 28 sites are removed from the disturbance footprint and will not be impacted. • While the Development adds to the cumulative impact on the region's Aboriginal cultural heritage, the heritage impact value of this loss is considered low as the seven sites consist of isolated finds and two low density artefact scatters. The disturbance footprint avoids the majority of recorded Aboriginal sites, including the two sites deemed to have higher archaeological significance. • The inter-generational loss arising from the Development is considered to be minimal.
Noise
• The assessment of worst-case continuous and intermittent noise scenarios indicates that the Development will be able to operate on a day-to-day basis, including during noise enhancing meteorological conditions, and not exceed the development-specific criterion at any surrounding receptor during the day, evening or night periods. • The predicted noise levels from the assessment of worst-case sleep disturbance activity are below the adopted criterion at all sensitive receptors, including during enhancing meteorological conditions. • The increase in traffic on the Oxley Highway would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed. The increase in traffic on Rushes Creek Road should not result in any exceedance of the road traffic impact assessment criteria for the day or night periods at any sensitive receptors.
Hazard and Risk
• The preliminary risk screening for the storage and transport of hazardous materials indicates that the Development may be considered potentially hazardous due to the quantities of LPG to be stored at each PPU and transported to the Development Site. • While the Development is considered potentially hazardous in relation to the on-site LPG storage, with suitable engineering and design controls in place, the Development would be unlikely to cause a risk, significant or minor, to the community. There is a requirement to ensure that the installation and maintenance of on-site LPG storage is in compliance with *AS/NZS 1596:2014 The Storage and Handling of LP Gas*, including maintaining minimum separation distances.
Visual Amenity
• The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and internal access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement. • There are significant separation distances from the PPU sites to the surrounding local road network, private residences and community recreational facilities. • The natural southeast-northwest trending ridgeline running through the centre of the Development Site will shield Farms 1 and 3 and likely Farm 4 from view from Rushes Creek Road and residences to the east and northeast. The scattered paddock trees will also provide some screening for Farms 1, 3 and 4 from these view locations. • There is little elevation change / intervening topography and no tree screening between Rushes Creek Road and Farm 2. Subsequently this PPU will be visible from the road and some residences, and also likely from Ski Gardens Road. The proposed vegetation screens (see **Figure 22**), once established, will provide some screening and improve the visual amenity. • There is not anticipated to be any significant visual impacts as a result of the solar panels at each PPU. There will be no mirrors or lenses used and the panels will have anti-reflective treatment. On this basis, there should not be significant glint or glare issues for drivers on Rushes Creek Road or at surrounding residences (over 1 km away). Again, the proposed vegetation screens, once established, will provide some screening. • There should not be any issues in terms of adverse lighting impacts (light spill, glare) on the surrounding local road network or residences.

In summary, the Development adopts current best practice and significant environmental impact will be avoided. Where externalised impacts are predicted to occur, they will be effectively mitigated and/or managed.

10.1.2 Social Considerations

The potential for adverse impacts on the social amenity of the area is primarily associated with those resulting from odour, dust, traffic, noise and visual impacts. In the context of this Development, social amenity (due to its location and land use characteristics) means the intrinsic value that residents place on the area, including rural character, peace and quiet, visual amenity and access to major facilities.

Based on the findings and conclusions of the impact assessments in this EIS, the potential for adverse impact on social amenity as a result of the Development is considered minimal. While there will be some externalised impacts (see **Section 10.1.1**), the surrounding residents and recreational land users should not experience any unacceptable or significant impacts relating to odour, dust, traffic, noise or visual amenity. There should not be any change to the day-to-day life of surrounding residents and recreational land users as a result of the Development and no additional demand for community infrastructure, facilities or services.

10.1.3 Economic Considerations

The net economic impact of the Development will be one of significant benefit (see **Section 8.13**). Two principal aspects of economic impact will be:

- Direct and derived economic effects associated with establishing the poultry farm – the Development will provide for an extended program of capital works relating to new infrastructure, which will employ between 50 and 60 people across various contracting companies over all or part of the 16 month construction program and result in additional flow-on economic activity. The expenditure on various consumable products and services will be significant.
- On-going direct and derived economic effects associated with operation of the poultry farm – the Development will provide additional consumption activity induced by the incomes of 20 new employees and commercial transactions between ProTen and suppliers and other businesses. The economic stimulus provided by these activities will also result in the flow of further activity in the regional and State economies. Again, the expenditure on various consumable products and services will be significant.

10.2 Ecologically Sustainable Development

Australia's *National Strategy for Ecologically Sustainable Development* (Ecologically Sustainable Development Steering Committee 1992) defines ESD as:

> *using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

The objects of the EP&A Act include ESD and a set of principles are provided in section 6(2) of the *Protection of the Environment Administration Act 1991.* The Development's compatibility with these principles is considered in the below sub-sections.

10.2.1 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 qualitative risk assessment, stakeholder consultation and baseline environmental surveys were undertaken to identify potential impacts, issues or concerns and ensure these matters were taken in to consideration through the Development planning and assessment process. This resulted in refinements to the Development design to ensure impacts are avoided or minimised to the greatest extent practical.

Specialist impact assessments, including the use of scientific/engineering modelling, have been undertaken in accordance with current best practice for environmental impacts relating to odour, particulate matter, traffic, biodiversity, Aboriginal heritage, noise and hazard and risk. Additional issues, including surface water, groundwater and visual amenity, have also been addressed in this EIS. Where there is potential for environmental impact, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

To this end, there has been careful evaluation undertaken in order to avoid serious or irreversible damage to the environment.

10.2.2 Inter-generational Equity

Inter-generational 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 combined disturbance footprint of the Development will amount to approximately 87.78 ha, which is equivalent to only 8.6% of the Development Site. The commercial activities associated with the poultry operation will be largely confined to the four PPU sites and access roads. It is intended to continue using the residual land outside of the disturbance footprint within the Development Site for continued agricultural production purposes under some form of lease or share farming arrangement. On this basis, the Development will not deny access to large areas of viable agricultural lands nor significantly reduce the land area available for agricultural production.

While the Development will add to the cumulative impact on the region's Aboriginal cultural heritage, OzArk (2018) concludes that the inter-generational loss arising from the Development is considered to be minimal. The disturbance footprint avoids the majority of recorded Aboriginal sites, including the two sites deemed to have higher archaeological significance. The seven Aboriginal sites within the disturbance footprint will be salvaged by a surface collection and recording of all visible surface artefacts and the results of the salvage will be included in a report to preserve the data in a useable form.

The avoidance of native woodland patches was an important factor during the Development design process. Consequently, the Development's biodiversity impact is limited to the disturbance of approximately 1.17 ha of highly disturbed derived native grassland and the removal of some isolated paddock trees that could not be avoided. A biodiversity offset strategy has been developed.

The impacts on other natural resources, including surface water and groundwater, will be avoided or minimised through development design features, best management practices and mitigation measures.

On this basis, there is no evidence to suggest that the Development will impact on the long-term health, diversity and production of the environment.

10.2.3 Conservation of Biological Diversity and Ecological Integrity

This principle holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The majority of the Development Site has been historically cleared and used for agricultural purposes. Native vegetation is limited to discreet patches of woodland, with the vast majority of the Development Site comprising either exotic pasture or derived native grassland. The woodland areas contain virtually no native understorey or native groundcover (SLR 2018b).

The avoidance of these native woodland patches was an important factor during the Development design process. Consequently, the Development's biodiversity impact is limited to the disturbance of approximately 1.17 ha of highly disturbed derived native grassland and the removal of some isolated paddock trees that could not be avoided. A biodiversity offset strategy has been developed and, once implemented, will ensure the limited impact to biological diversity and ecological integrity is compensated.

10.2.4 Improved Valuation, Pricing and Incentive Mechanisms

This principle 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. ProTen will meet the expenses associated with the avoidance, minimisation, management and offset of potential environmental impacts. Relevant to this principle, ProTen will:

- Commission and pay for the salvage works for the seven Aboriginal sites within the disturbance footprint of the Development. This will include mapping, analysis and collection of all surface artefacts and reporting of results in consultation with the RAPs and OEH.
- Implement the biodiversity offset strategy to compensate for the loss of 1.17 ha of highly disturbed derived native grassland. Offset options will include purchasing biobanking credits, paying in to the Biodiversity Conservation Fund and/or contributing money to supplementary measures.
- Install solar panels at each PPU to generate clean renewable energy and reduce dependency on reticulated electricity. Any surplus energy will be able to be fed into the electricity grid.
- Be pay contributions to Council in accordance with the *Tamworth Regional* Council *Section 94A (Indirect) Development Contributions Plan 2013*.

10.3 Conclusion

The proposed Rushes Creek Poultry Production Farm has been assessed in this EIS in accordance with the EP&A Act and its regulations, the SEARs issued on 12 July 2016 and related input from consulted government agencies. A qualitative risk assessment, stakeholder consultation and baseline environmental surveys were undertaken to identify potential impacts, issues or concerns and ensure these matters were taken in to consideration through the Development planning and impact assessment process, and specialist assessments were completed for key environmental impacts.

The potential impacts of the Development have been minimised via refinements to the design and layout of the Development, primarily associated with odour emissions, high conservation vegetation areas and identified Aboriginal sites. On this basis, the Development, as proposed, represents the best of the alternatives considered when taking the environmental and social amenity impacts in to consideration.

While the Development may result in some externalised impacts, ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that such impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

The potential for adverse impact on social amenity as a result of the Development is considered minimal. There should not be any change to the day-to-day life of surrounding residents and recreational land users as a result of the Development and no additional demand for community infrastructure, facilities or services.

The Development will be a catalyst for significant and sustained economic activity within the local and regional economies through employment during the construction and operational phases, commercial transactions between ProTen and suppliers and other businesses, significant expenditure on consumable products and services, and additional flow-on economic activities.

The Development is justified on environmental, social and economic grounds and it is consistent with the key objects of the EP&A Act. The Development will promote the orderly and economic use and development of land, while at the same time protecting and managing valuable environmental and cultural resources.

Section 11

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11 REFERENCES

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Section 12

Abbreviations



12 ABBREVIATIONS

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ACHAR	*Aboriginal Cultural Heritage Assessment Report*
ACHMP	Aboriginal Cultural Heritage Management Plan
ACMF	Australian Chicken Meat Federation
ADG	Australian Dangerous Goods
AEP	annual exceedance probability
AGRD Part 4	*Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*
AHA	Animal Health Australia
AHD	Australian height datum
AHIMS	Aboriginal Heritage Information Management System
Applying SEPP 33	*Hazardous and Offensive Development Application Guidelines, Applying SEPP 33*
Approved Methods	*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*
AS 2890.2 Part 2	*AS 2890.2 Part 2: Off-street commercial vehicle facilities*
AUL	auxiliary left
Australian Poultry CRC	Australian Poultry Cooperate Research Centre
AWS	automated weather station
AWTS	aerated wastewater treatment system
Baiada	Baiada Poultry
BAL	basic left turn
BC Act	*Biodiversity Conservation Act 2016*
Best Practice Guidelines	*Best Practice Management for Meat Chicken Production in NSW*
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CHR(S)	short channelised right turn
CIV	capital investment value
Clean Air Regulation	*Protection of the Environment Operations (Clean Air) Regulation 2010*
CLM Act	*Contaminated Land Management Act 1997*
Council	Tamworth Regional Council
CTMP	Construction Traffic Management Plan
DAFF	(former) Department of Agriculture, Fisheries and Forestry
dB	decibel
DCP	Development Control Plan
DECC	(former) Department of Environment and Climate Change
DECCW	(former) Department of Environment, Climate Change and Water
DEE	Commonwealth Department of the Environment and Energy
DoE	(former) Commonwealth Department of the Environment
DoP	(former) Department of Planning
DP	Deposited Plan
DPE	Department of Planning and Environment
DPI	Department of Primary Industries

DUAP	(former) Department of Urban Affairs and Planning
EAD	emergency animal disease
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	environmental planning instrument
EPL	Environment Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
ESD	Ecologically Sustainable Development
FBA	*Framework for Biodiversity Assessment*
GDE	groundwater dependent ecosystem
GHG	greenhouse gas
GIS	geographic information system
GMA	groundwater management area
GSC	Gunnedah Shire Council
Ha	hectare
HIPAP 4	*Hazardous Industry Planning Advisory Paper No. 4 Risk Criteria for Land Use Safety Planning*
HNELH	Hunter New England Local Health
IBRA	Interim Biogeographic Regionalisation of Australia
ICNG	*Interim Construction Noise Guideline*
INP	*NSW Industrial Noise Policy*
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
kg	kilograms
kg/m^2	kilograms per square metre
kL	kilolitres
km	kilometre
km^2	square kilometres
km/hr	kilometres per hour
kVA	kilovolt-amps
L	litre
Lands & Water	Department of Industry – Lands and Water
LEP	Local Environmental Plan
LGA	local government area
LMP	Landscape Management Plan
LOS	level of service
LPG	liquid petroleum gas
LSC	land and soil capability
L/p/d	litres per person per day
m	metre
m^2	square metre
m^3	cubic metre
mbgl	metres below ground level

mg/L	milligrams per litre
ML	megalitre
mm	millimetre
Model Code of Practice	Model Code of Practice for the Welfare of Animals, Domestic Poultry
MW	megawatt
m/s	metres per second
NES	national environmental significance
NOW	NSW Office of Water
NPWS Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
Offsets Policy	*NSW Biodiversity Offsets Policy for Major Projects*
ou	odour unit
OzArk	OzArk Environmental and Heritage Management
PCT	plant community type
PEA	Preliminary Environmental Assessment
PG	packing group
PGB	Parsons Brinkerhoff
PHA	Preliminary Hazard Analysis
PMF	probable maximum flood
PM_{10}	particulate matter less than 10 microns in diameter
POEO Act	*Protection of the Environment Operations Act 1997*
PPU	poultry production unit
ppm	parts per million
ProTen	ProTen Tamworth Pty Limited
RAP	registered Aboriginal party
RBL	rating background level
RIRDC	Rural Industries Research and Development Corporation
RMS	Road and Maritime Services
RNP	*NSW Road Noise Policy*
RSPCA Standards	*RSPCA Approved Farming Scheme Standards – Meat Chickens*
RSWL	referenced standing water level
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEPP 33	*State Environmental Planning Policy No. 33 - Hazardous and Offensive Development*
SEPP 44	*State Environmental Planning Policy No. 44 – Koala Habitat Protection*
SEPP 55	*State Environmental Planning Policy No. 55 - Remediation of Land*
SISD	safe intersection sight distance
SLR	SLR Consulting Australia Pty Ltd
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State significant development
SWL	standing water level

Tamworth DCP	*Tamworth Regional Development Control Plan 2010*
Tamworth LEP	*Tamworth Regional Local Environmental Plan 2010*
TAPM	The Air Pollution Model
TDS	total dissolved solids
TLALC	Tamworth Local Aboriginal Land Council
TSC Act	*Threatened Species Conservation Act 1995* (now repealed)
WAL	water access licence
WAMC	Water Administration Ministerial Corporation
WM Act	*Water Management Act 2000*
µg/m^3	microgram per cubic metre
µS/cm	microSiemens per centimetre