ProTen

Rushes Creek Poultry Production Farm

SSD 7704

RESPONSE TO SUBMISSIONS

Prepared for:
ProTen Tamworth Pty Limited

APRIL 2019



Prepared by:

EME advisory

RESPONSE TO SUBMISSIONS

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, SSD 7704
Description:	Intensive Livestock Agriculture - poultry broiler production farm
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 contains all available information that is relevant to the environmental, economic and social impact assessment of the Development; and
- It is true in all material particulars and does not materially mislead by its presentation or omission of information.

EME Advisory

Eryn Bath
12 April 2019

TABLE OF CONTENTS

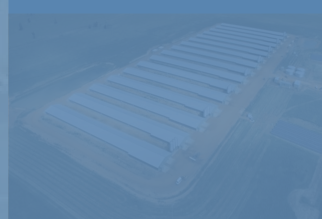
TABLES

FIGURES

APPENDICES

Section 1

INTRODUCTION



1 INTRODUCTION

1.1 Background

ProTen Tamworth Pty Limited (ProTen) is seeking development consent to construct and operate an intensive poultry broiler production farm within a rural area known as Rushes Creek in the Tamworth Regional Local Government Area (LGA). In summary, the Rushes Creek Poultry Production Farm (the "Development") will comprise a total of 54 poultry sheds and house a combined population of 3,051,000 broiler 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) and 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 (EPA); and
- Consent under section 138 of the *Roads Act 1993* from Tamworth Regional Council (Council).

A qualitative risk assessment, stakeholder consultation and baseline environmental surveys were undertaken to identify potential impacts and ensure these matters were taken in to consideration through the Development planning and impact assessment process. These activities also assisted in making refinements to the design and layout of the Development to avoid or minimise potential impacts. SLR Consulting Australia (SLR) prepared the *Environmental Impact Statement* (SLR 2018a) (EIS) on behalf of ProTen and submitted it to the Department of Environment and Planning (DPE) in late August 2018, with the following specialist assessments undertaken as part of the EIS:

- *Air Quality Assessment* (Pacific Environment Limited [PEL] 2018);
- *Traffic Impact Assessment* (RoadNet 2018);
- *Groundwater Bore Baseline Assessment* (SLR 2017);
- *Biodiversity Assessment Report* (SLR 2018b);
- *Aboriginal Cultural Heritage Assessment Report* (OzArk Environmental and Heritage Management [OzArk] 2018);
- *Noise Impact Assessment* (Global Acoustics 2018);
- *SEPP 33 - Preliminary Risk Screening and Hazard Assessment* (SLR 2018c); and
- *Stage 1 Preliminary Environmental Investigation* (SLR 2018d).

Table 1 lists and summarises the key milestones in the development assessment process to date.

Table 1 Key Milestones in the Development Assessment Process

Date	Milestone
3 June 2016	Preliminary Environmental Assessment (PEA) submitted to the DPE
9 June 2016	Planning focus meeting and site inspection attended by key government agencies
15 June 2016	Application for the Secretary's Environmental Assessment Requirements (SEARs) submitted to the DPE
12 July 2016	SEARs issued by the DPE
15 December 2016	On-site meeting and site inspection for surrounding residents and operators of the surrounding recreational facilities
20 August 2018	Draft EIS submitted to the DPE for internal adequacy review
27 August 2018	Final EIS submitted to the DPE for public exhibition
7 September 2018 to 4 October 2018	EIS on public exhibition
18 September 2018	Information session for surrounding residents and operators of the surrounding recreational facilities
16 October 2018	DPE issues a letter requesting a Response to Submissions by mid-December 2018
12 April 2019	Response to Submissions (i.e. this document) submitted to the DPE

1.2 Document Purpose and Structure

This Response to Submissions report (RTS) has been prepared to respond to the issues raised within the submissions received from government agencies, the community and special interest groups following exhibition of the EIS for the Rushes Creek Poultry Production Farm. It is provided in two volumes, with Volume 1 comprising the main report (i.e. this document) and Volume 2 comprising the specialist assessment reports and additional supporting information. The structure of the RTS is summarised in **Table 2**.

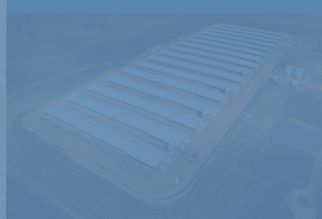
Table 2 Response to Submissions Structure

Volume 1 – Main Report	
Section 1	Provides introductory and background information
Section 2	Identifies the Development Site and summaries the proposed Development
Section 3	Overviews the submissions received following exhibition of the EIS and the methodology adopted in responding to the various issues in this RTS
Section 4	Outlines the activities undertaken during and after exhibition of the EIS, including a community information session and additional specialist input/assessment work to assist in responding to the issues raised in the submissions
Sections 5 to 24	Responds to the various issues raised in the submissions, including, but not limited to, existing contamination, development servicing, stakeholder engagement, and potential environmental, social and economic impacts of the Development
Section 25	Provides an updated Summary of Commitments
Section 26	Contains the conclusion to the RTS
Section 27	Lists the reference documents referred to within the RTS
Section 28	Lists the abbreviations used within the RTS

Volume 2 – Appendices	
Appendix A	Updated Preliminary Civil Engineering Design Drawings (Lance Ryan Consulting Engineers)
Appendix B	*Detailed Site Investigation* (SLR 2019a)
Appendix C	*Remedial Action Plan* (SLR 2019b)
Appendix D	*Response to Air Quality Issues* (Astute Environmental Consulting 2019)
Appendix E	*Response to Traffic Matters* (SLR 2018e) and *Supplementary Traffic Assessment* (SLR 2018f)
Appendix F	*Biodiversity Assessment Report Addendum* (SLR 2019c)
Appendix G	*Addendum Aboriginal Heritage Assessment Letter* (OzArk 2019)
Appendix H	*NIA Regulator and Community Response* (Global Acoustics 2019)

Section 2

THE DEVELOPMENT



2 THE DEVELOPMENT

2.1 Development Site

2.1.1 Overview

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 **Figures 1** and **2**).

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.

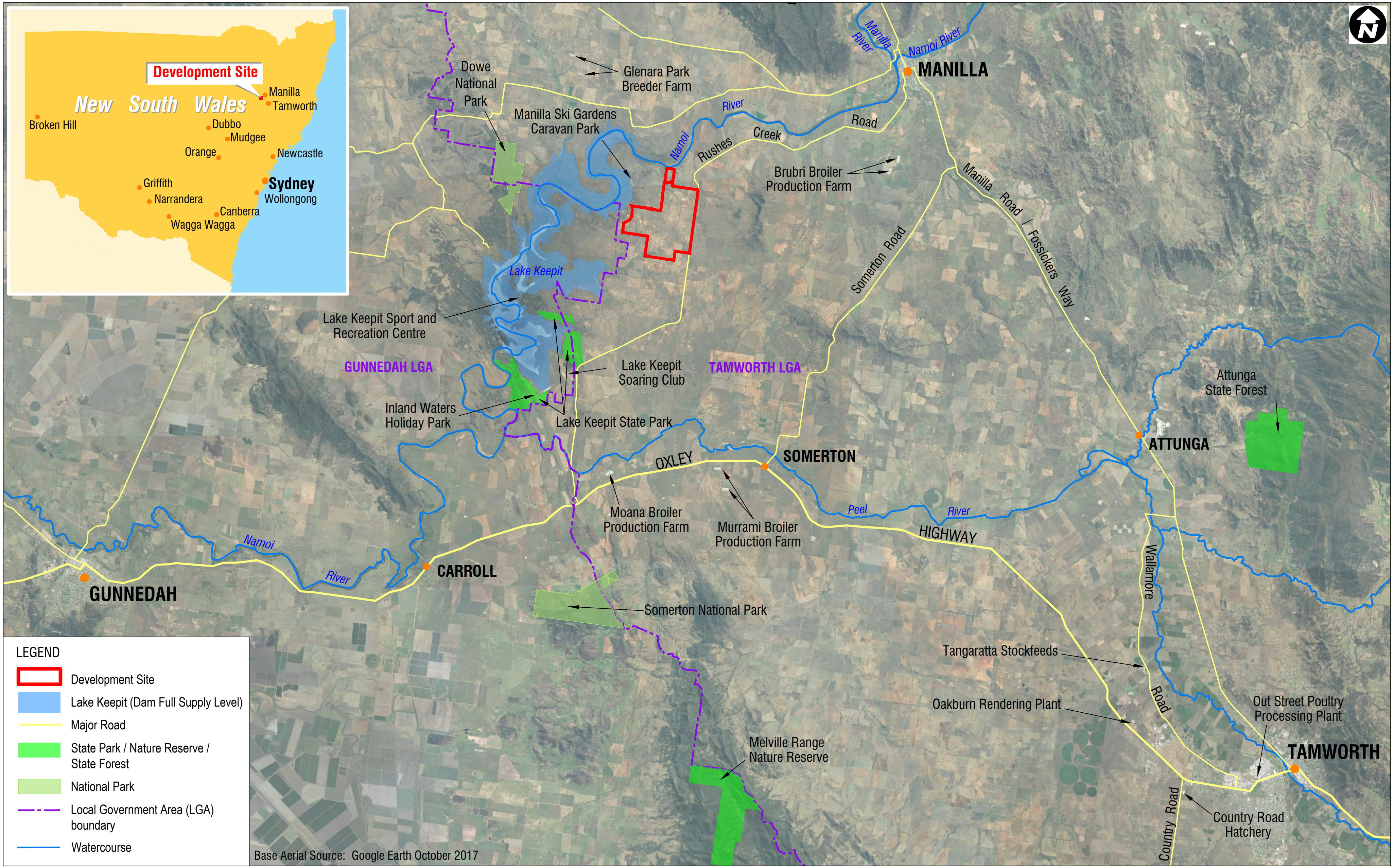
The long-standing and existing use of the Development Site is traditional agricultural production, including both livestock grazing and cropping. The extent of historical clearing and agricultural use is evident on the aerial image on **Figure 2**.

2.1.2 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 3**, the surrounding recreational facilities include:

- Manilla Ski Gardens Caravan Park (R20) and Manilla Fishing Club (R17) - 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) - approximately 6.3 km to the southwest of the Development Site. It comprises a conference centre, recreational facilities and temporary accommodation for up to around 237 guests in lodges and cabins.
- Lake Keepit Soaring Club - approximately 7.5 km to the southwest of the Development Site. This facility comprises glider hangers and landing strips, a clubhouse and temporary accommodation for up to around 50 guests in cabins and caravans/campervans.
- Inland Waters Holiday Park - approximately 9.3 km to the southwest of the Development Site. It comprises recreational facilities and 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 Water Administration Ministerial Corporation and managed by the NSW Crown Holiday Parks Trust.



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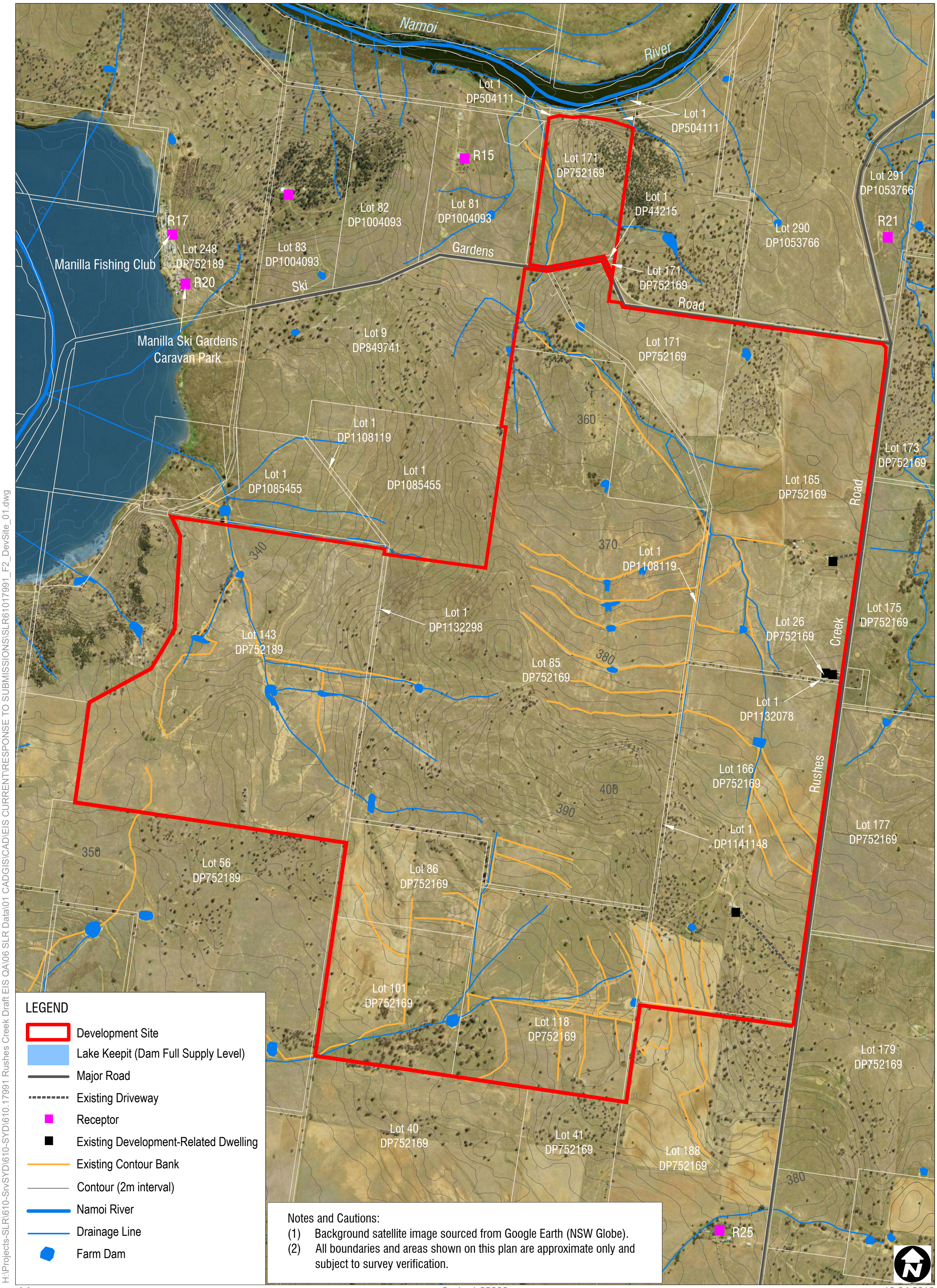
Regional Locality

FIGURE 1



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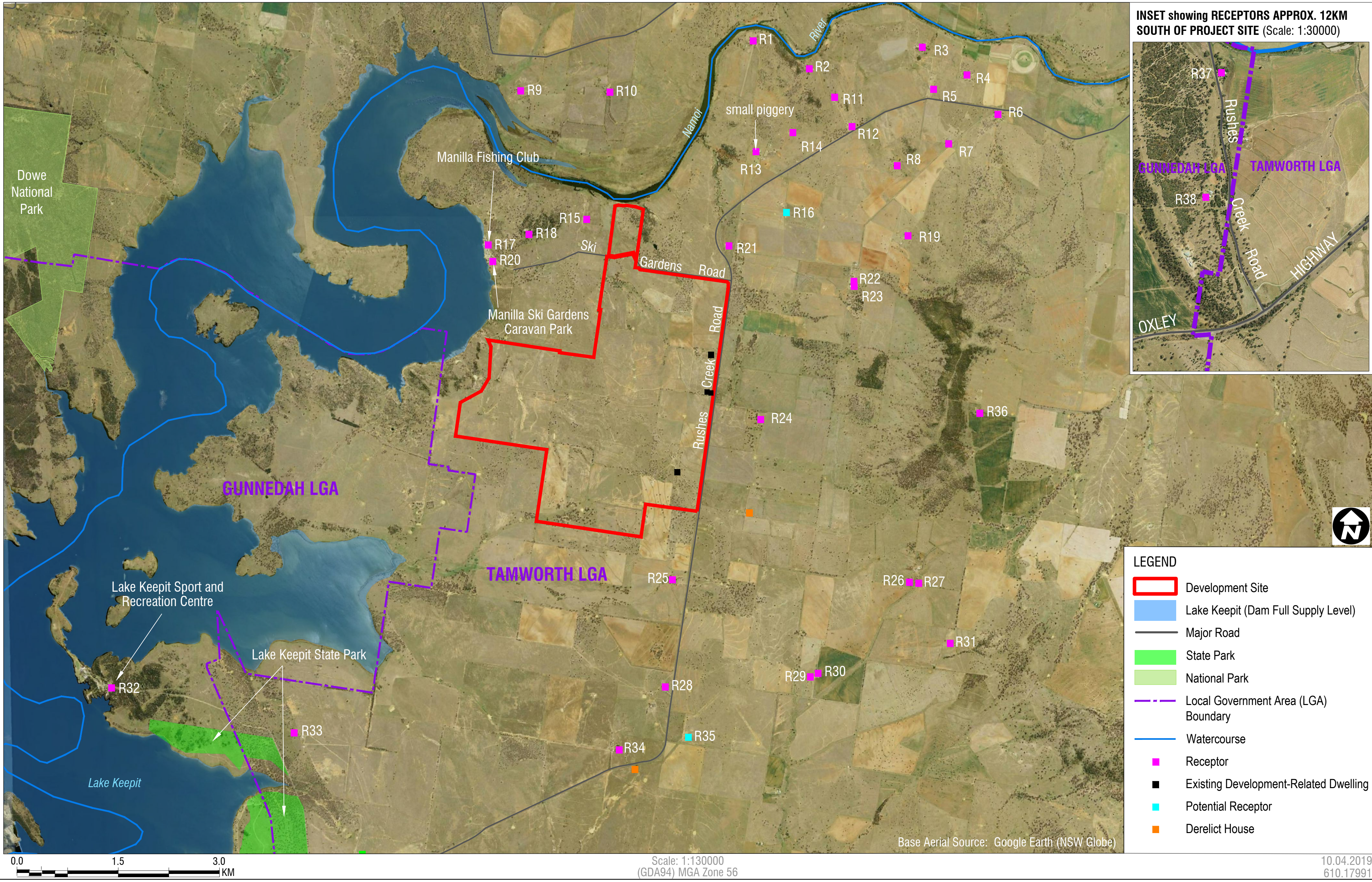
Development Site

FIGURE 2



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Surrounding Land Uses and Receptors

FIGURE 3

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.

The Development Site has a relatively low density of surrounding privately-owned residences, with the nearest shown on **Figure 3**. As listed in Table 5 in the EIS, the nearest residential receptors are identified as R25, which is approximately 1,025 m to the southeast of the nearest proposed PPU (Farm 4), and R24, which is approximately 1,335 m to the east of the nearest proposed PPU (Farm 2).

The nearest other poultry farm operations are identified (see **Figure 1**) as Glenara Park Poultry Breeder Farm approximately 8.2 km to the northwest of the nearest proposed PPU (Farm 1) and Brubri Poultry Broiler Production Farm approximately 11 km to the east-northeast of the nearest proposed PPU (Farm 2).

2.2 Development Description Summary

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 and house 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 [DPI] 2012) (Best Practice Guidelines).

Table 3 provides a summary of the various components of the Development for which consent is sought.

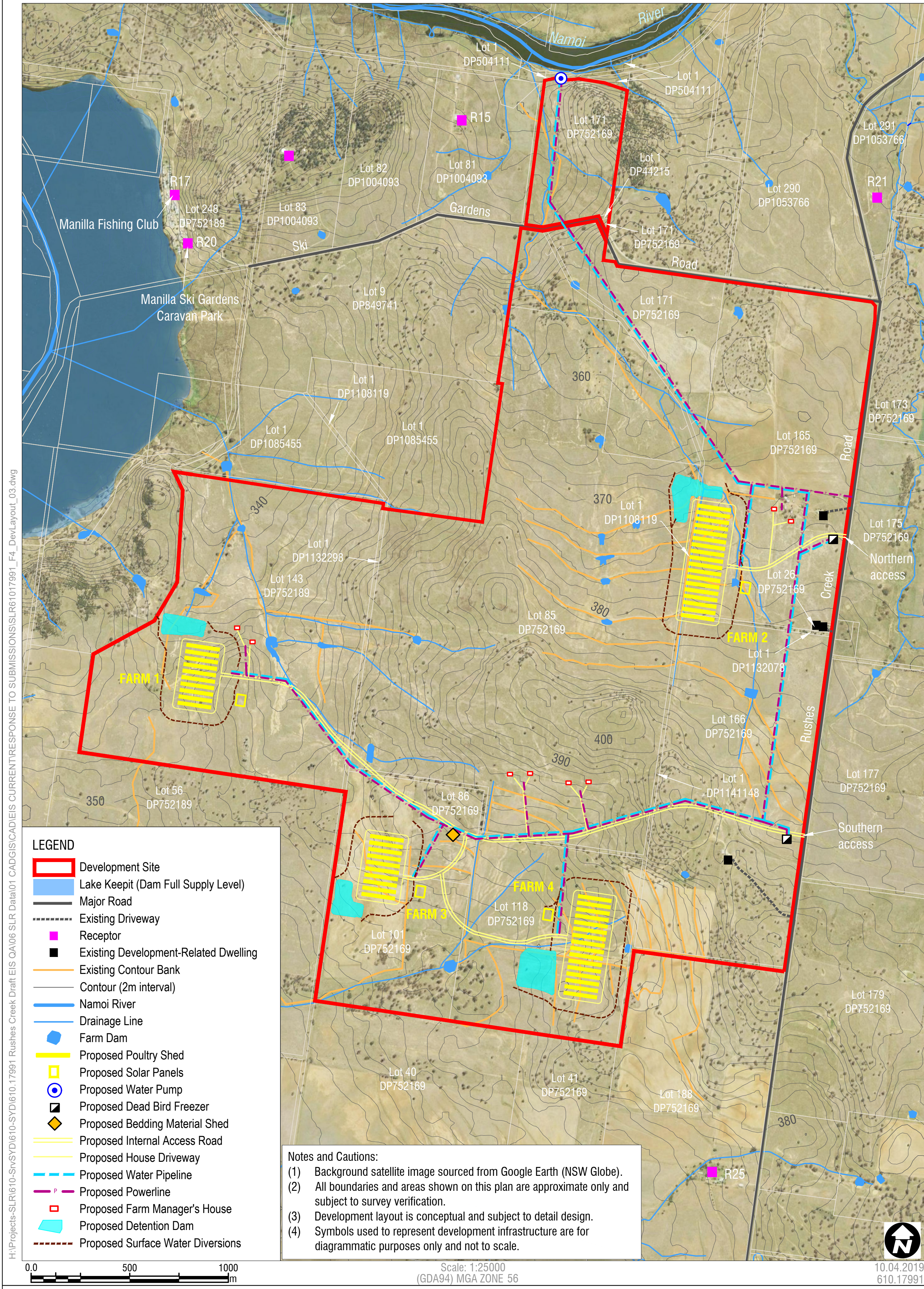
Note that the Development remains as described in the exhibited EIS, with the exception of some minor adjustments at each PPU in response to the comments and requests from WaterNSW in relation to surface water management. These minor changes are noted in **Table 3** and described in **Section 2.3**.

Table 3 Development Description Summary

Aspect	Details (as per exhibited EIS)	Minor Changes
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	Approximately 92.81 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	-
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, 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).	• Minor changes to the position of some of the ancillary infrastructure items at each PPU; • Realignment of the upstream clean water diversions at each PPU; and • Increase to the size of the detention dam at each PPU.

Aspect	Details (as per exhibited EIS)	Minor Changes
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, eight of which will live on-site.	-
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.	• Realignment of the upstream clean water diversions at each PPU; and • Increase to the size of the detention dam at each PPU.
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.	-

Figure 4 shows the overall conceptual layout of the Development incorporating the minor changes described in **Section 2.3**, and **Figures 5** to **8** show the conceptual layouts of each of the four PPUs incorporating the minor changes described in **Section 2.3**. Updated preliminary civil engineering design drawings prepared by Lance Ryan Consulting Engineers (LRCE) are provided in **Appendix A**. Note that these figures and drawings are conceptual and will be progressed to detailed design following development consent.



Updated Development Layout

FIGURE 4

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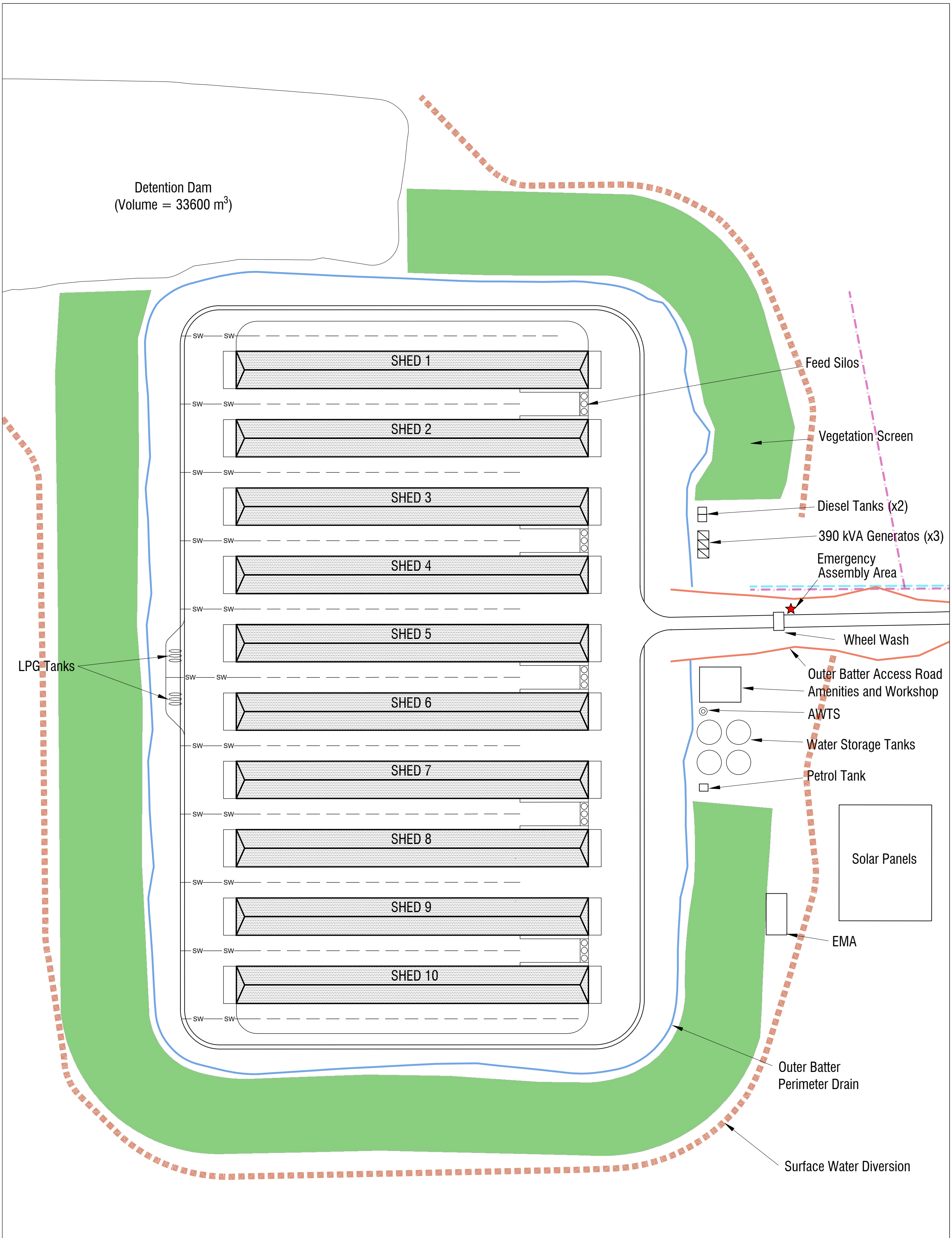

Notes and Cautions:
(1) Development layout is conceptual and subject to detail design.
(2) Symbols used to represent development infrastructure are for diagrammatic purposes only and not to scale.

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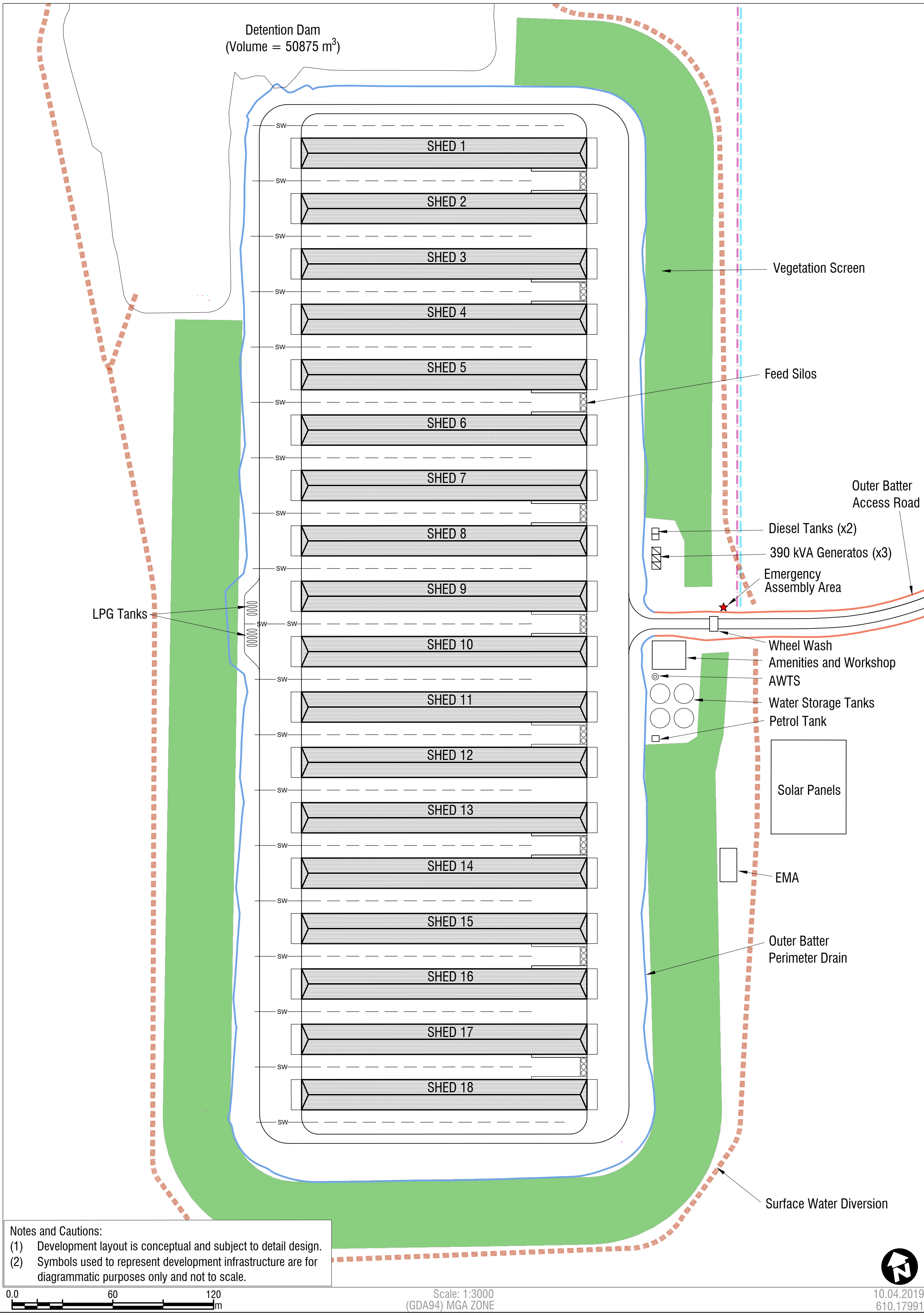
Updated PPU Layout - Farm 1

FIGURE 5



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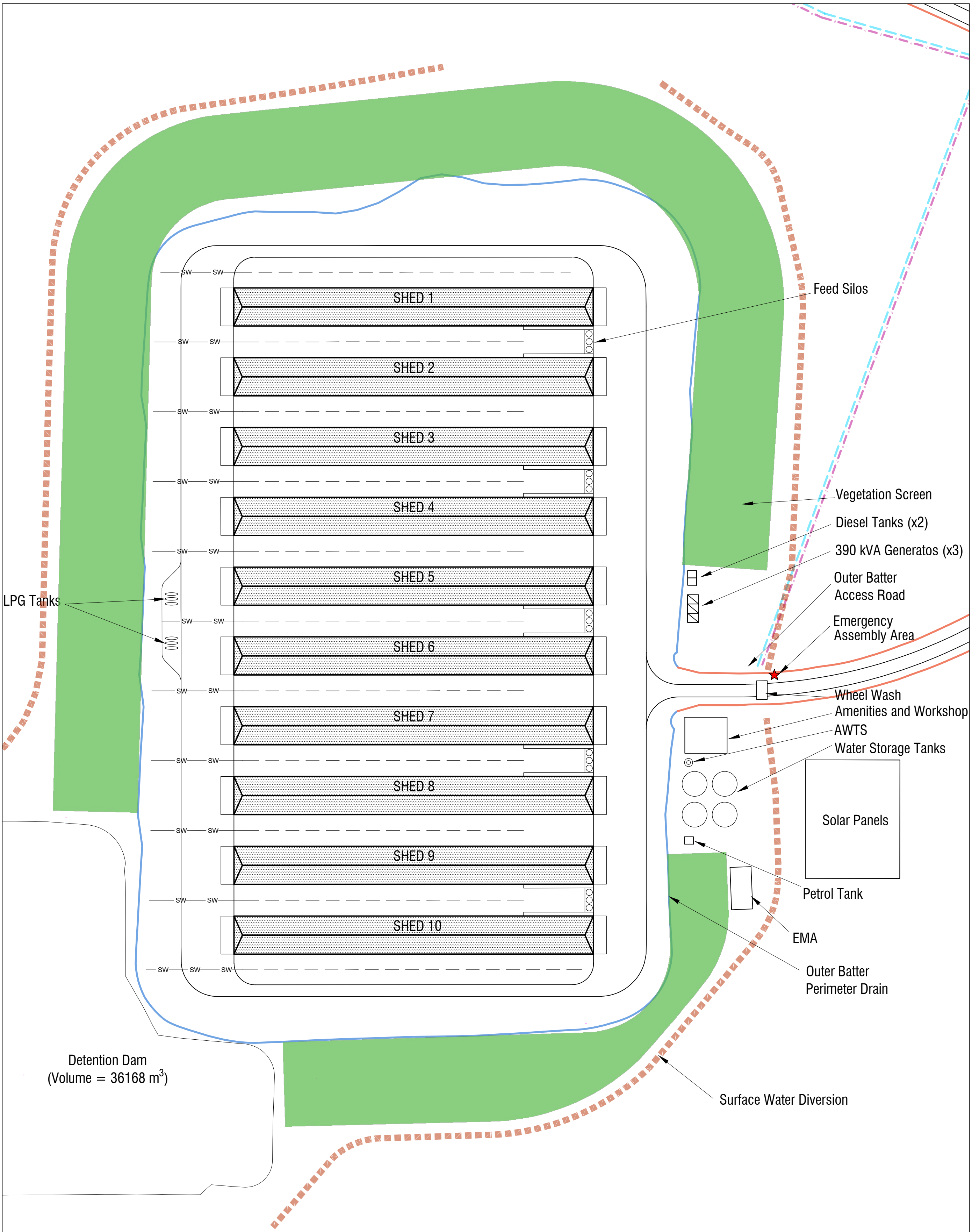
Updated PPU Layout - Farm 2

FIGURE 6



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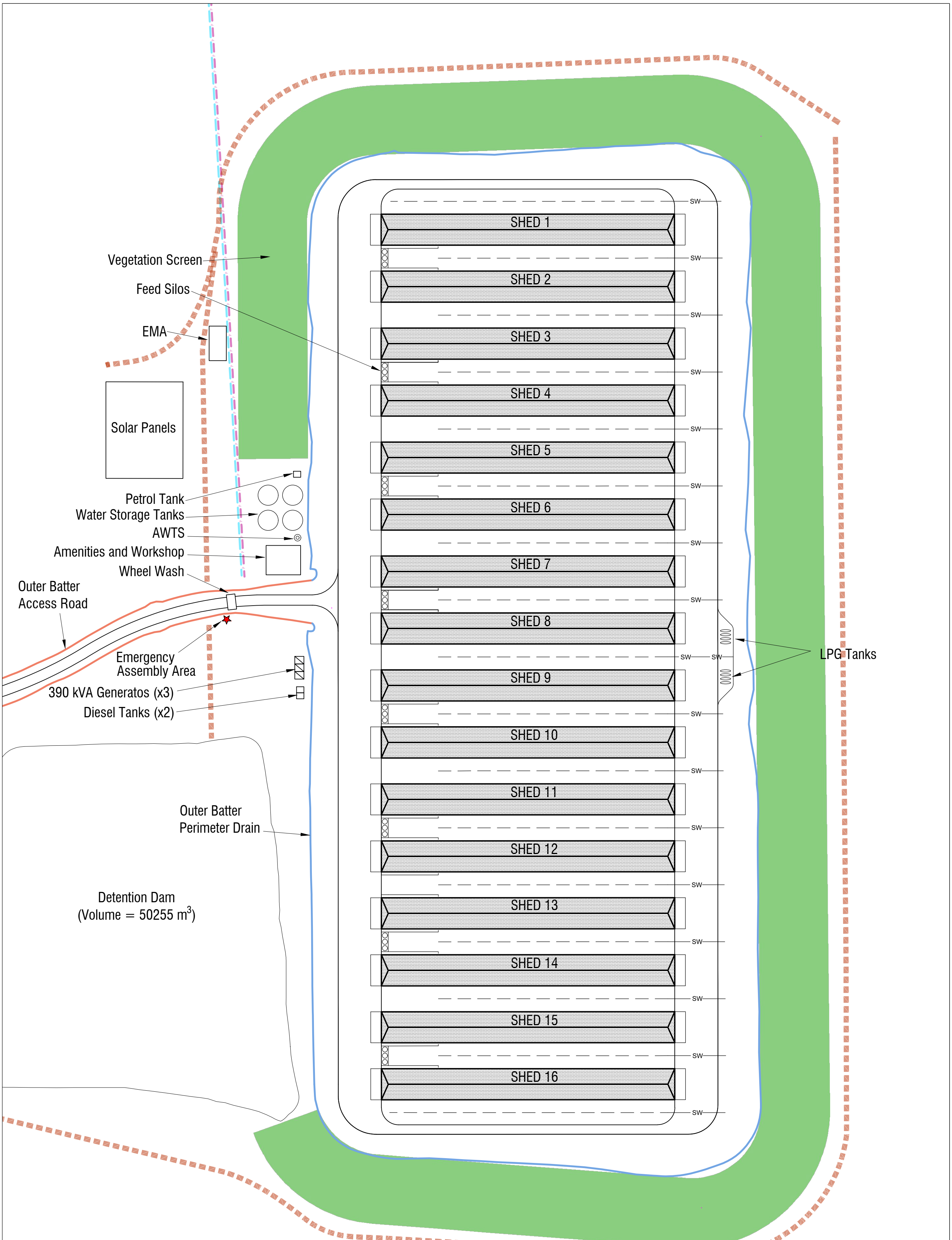
Updated PPU Layout - Farm 3

FIGURE 7



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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Updated PPU Layout - Farm 4

FIGURE 8

2.3 Minor Changes to the Development

The Development remains as described in the exhibited EIS, with the exception of some minor adjustments to the positioning of the some of ancillary infrastructure items and the upstream clean water diversions at each PPU in response to the comments and requests from WaterNSW in relation to surface water management.

The feedback received from WaterNSW and the responding minor changes to the Development are detailed in the below sub-sections.

2.3.1 Surface Water Management

WaterNSW requested that revisions be made to ensure the clean water diversions at each PPU are upslope of the office and amenities building, vegetation screens, AWTS and associated effluent management area (EMA) to ensure any runoff is captured in the controlled surface water management system.

The DPE concurred and reiterated the comments and requests provided by WaterNSW.

Responding to the comments and requests provided by WaterNSW, minor adjustments have been made to the layout of each PPU to ensure that any area where there may be a risk of dirty or contaminated runoff is located within the upstream clean water diversions. Specifically, as evident on the updated preliminary civil design drawings in **Appendix A** and the updated conceptual PPU layouts provided above as **Figures 5** to **8**, the following adjustments have been made:

- The office and amenities building, water storage tanks, fuel storage tanks, diesel generators and AWTS at each PPU have been moved a short distance closer to the poultry sheds just outside of the perimeter table drain;
- The vegetation screens surrounding each PPU have also been moved closer to the poultry sheds just outside of the perimeter table drain;
- The EMA required for the disposal of the treated effluent from the AWTS at each PPU has been positioned slightly away from the main ancillary infrastructure area to avoid any potential employee and vehicle interaction; and
- The upstream clean water diversions at each PPU has been realigned to ensure all ancillary infrastructure (with the exception of the solar panels), the vegetation screens and the EMA are located inside of the diversions.

These minor adjustments at each PPU will ensure that any runoff from the ancillary infrastructure, vegetation screens or EMA is captured in the controlled surface water management system, which will essentially operate as a closed water system, and will not compromise the clean water flows and downstream environments. The solar panels will remain outside of the clean water diversions at each PPU as there is no risk of dirty or contaminated runoff from the solar panel area (appropriate erosion and sediment control will be implemented during construction).

Realignment of the upstream clean water diversions has increased the catchment area of each PPU and, as such, the detention dam at each PPU has been re-sized to ensure it can capture all runoff generated by the 1% annual exceedance probability (AEP) 72-hour design event. Re-sizing of the dams has also assisted to balance the cut and fill requirements (earthworks) across the Development Site. The increased dimensions and volumes of the dams are shown on the updated preliminary civil design drawings in **Appendix A** and the updated conceptual PPU layouts provided above as **Figures 5** to **8**.

The detention dams are now proposed with the following approximate storage capacities:

- Farm 1 – 33,600 m^3;
- Farm 2 – 50,875 m^3;
- Farm 3 – 36,168 m^3; and
- Farm 4 – 50,255 m^3.

There is no other change to the position or size of any other infrastructure item and/or operational area at the PPUs, and no change to the operation and management of the PPUs. The surface water management system at each PPU will operate and be maintained as described in the exhibited EIS.

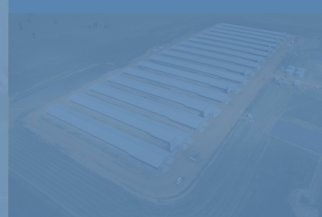
2.3.2 Disturbance Footprint

The minor changes to the layout of each PPU in response to the requests from WaterNSW described above in **Section 2.3.1** have increased the disturbance footprint of the Development from approximately 87.78 ha (8.6% of the Development Site) to approximately 92.81 ha (9.1% of the Development Site). This is an increase of approximately 5.03 ha, which is represents 0.5% of the Development Site.

The only potential environmental risks or impacts associated with the minor increase to the disturbance footprint relate to biodiversity and Aboriginal heritage. However, as addressed in **Sections 4.2.4** and **4.2.5,** respectively, there are no additional risks or impacts over and above those previously assessed as part of the EIS.

Section 3

SUMMARY OF SUBMISSIONS



3 SUMMARY OF SUBMISSIONS

3.1 Submission Sources and Issues

The submissions received by the DPE in relation to the Rushes Creek Poultry Production Farm following exhibition of the EIS can be viewed in full on the DPE's on-line major projects portal – http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7704

A total of 34 submissions were received, including:

- Eleven (11) from government agencies -
  - DPE;
  - Environment Protection Authority (EPA);
  - Office of Environment and heritage (OEH);
  - Roads and Maritime Services (RMS);
  - Department of Industry - Lands and Water (Lands & Water);
  - WaterNSW;
  - NSW Rural Fire Services (RFS);
  - Tamworth Regional Council (Council);
  - Gunnedah Shire Council (GSC);
  - Hunter New England Local Health District (HNELHD); and
  - Essential Energy (NSW Government-owned corporation).
- Twenty one (21) from the community (noting that two of these are from the same community member and two are essentially duplicate submissions); and
- Two (2) from special interest groups - Tamworth Regional Residents and Ratepayers Association (TRRRA) and Animal Liberation.

These submissions are listed and summarised in **Table 4**, including origin, view and issues raised.

Table 4 Summary of Submissions

Submission Source		Submission Position	Issue																			
Name	**LGA**		**Existing Contamination**	**Construction**	**Servicing**	**Weeds and Pests**	**Biosecurity, Disease and Mass Disposal**	**Legislation and Policy**	**Stakeholder Consultation**	**Odour (incl'. Wind)**	**Particulate Matter**	**Traffic and Transport**	**Surface Water**	**Groundwater**	**Biodiversity**	**Aboriginal Heritage**	**Noise**	**Visual Amenity**	**Social**	**Economic**	**Development Justification**	**Other**
Government Agencies																						
DPE	-	Comments	X	X	X		X	X	X	X	X	X	X			X	X	X				X
EPA	-	Comments	X							X	X			X								X
OEH	-	Comments													X	X						
RMS	-	Comments										X										
Lands & Water	-	Comments		X	X								X	X								X
WaterNSW	-	Comments			X		X						X									
RFS	-	Comments[1]																				
Council	-	Comments[1]																				
GSC	-	Comments	X					X		X	X				X		X	X	X	X		X
HNELHD	-	Comments			X	X	X		X	X	X			X			X					
Essential Energy	-	Comments			X																	
		Sub-Total	3	2	5	1	3	2	2	4	4	2	3	3	2	2	3	2	1	1	0	4
Community																						
Andrew McDonald	Tamworth	Objection								X		X					X				X	
Anthony Garske	Inner West	Objection							X	X	X	X	X	X			X		X	X		
Bart Crosby	Tamworth	Objection						X		X		X					X					
Boorobil Enterprises	Tamworth	Objection								X		X		X			X		X			
Chris Bowman 1	Tamworth	Objection				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Chris Bowman 2	Tamworth	Objection								X												

Submission Source		Submission Position	Issue																			
Name	LGA		Existing Contamination	Construction	Servicing	Weeds and Pests	Biosecurity, Disease and Mass Disposal	Legislation and Policy	Stakeholder Consultation	Odour (incl'. Wind)	Particulate Matter	Traffic and Transport	Surface Water	Groundwater	Biodiversity	Aboriginal Heritage	Noise	Visual Amenity	Social	Economic	Development Justification	Other
Christopher Smith	Tamworth	Supports							X	X												
Crosby Cattle Co.	Tamworth	Objection								X		X										
Martin Williams	Bellingen	Objection																				X
Melissa Crosby	Tamworth	Objection								X		X					X					
Peter Gaynor	Tamworth	Objection					X			X		X	X				X		X			
Richard Pryor	Tamworth	Objection								X	X						X			X	X	
Rob Crosby	Tamworth	Objection								X		X										
Robert Dircks	Tamworth	Objection								X												
Stephen Bowman	Tamworth	Objection				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Stephen McDonald	Tamworth	Objection										X								X		
Name withheld 1	Tamworth	Objection					X			X	X						X	X		X		X
Name withheld 2	Tamworth	Objection								X		X										
Name withheld 3	Tamworth	Objection					X			X		X		X			X		X			
Name withheld 4	Tamworth	Objection								X		X					X					
Name withheld 5	Karratha	Objection				X	X			X	X		X				X	X		X		X
		Sub-Total	0	0	0	3	6	3	4	19	6	14	5	5	2	0	13	4	6	7	4	5
Special Interest Groups																						
Animal Liberation	-	Objection							X	X			X									
TRRRA	Tamworth	Objection						X					X									
		Sub-Total	0	0	0	0	0	1	1	1	0	0	2	0	0	0	0	0	0	0	0	0
		TOTAL	3	2	5	4	9	6	7	24	10	16	10	8	4	2	16	6	7	8	4	9

1 – RFS and Council did not raise any specific issues in their submissions.

Table 5 lists the issues raised and shows the percentage of submissions in which each issue was raised on an "all submissions" basis (total of 34 submissions) and on a "community only submissions" basis (total of 21). The sums of the percentage columns are greater than 100% as almost all of the submissions raised more than one issue.

Table 5 Summary of Issues Raised

Issues	All Submissions (34)		Community Only Submissions (21)	
	Number	Percentage	Number	Percentage
Odour (incl. wind)	24	71%	19	91%
Traffic and Transport	16	47%	14	67%
Noise	16	47%	13	62%
Particulate Matter	10	29%	6	29%
Surface Water	10	29%	5	24%
Biosecurity, Disease and Mass Mortality	9	26%	6	29%
Other	9	26%	5	24%
Economic	8	24%	7	33%
Groundwater	8	24%	5	24%
Social	7	21%	6	29%
Stakeholder Consultation	7	21%	4	19%
Visual Amenity	6	18%	4	19%
Legislation and Policy	6	18%	3	14%
Servicing	5	15%	0	0%
Development Justification	4	12%	4	19%
Weeds and Pests	4	12%	3	14%
Biodiversity	4	12%	2	10%
Existing Contamination	3	9%	0	0%
Construction	2	6%	0	0%
Aboriginal Heritage	2	6%	0	0%

It is evident from **Tables 4** and **5** that the most common issues raised are in relation to odour, traffic, noise (traffic noise in particular), particulate matter and surface water.

3.2 Response Methodology

All submissions received were collated and categorised based on which stakeholder group they were from, being either government agency, the community or special interest group. They were then reviewed and the matters raised in each submission were identified and considered.

The various matters raised in the submissions were grouped and addressed by "issue" (rather than on an individual or stakeholder basis) to minimise repetition and focus on the issues that warranted a more detailed response. Where similar issues were raised by more than one stakeholder, the responding information has been consolidated to allow a single all-encompassing response. This approach is consistent with the DPE's *Draft Environmental Impact Assessment Guidance Series, Guideline 5 Responding to Submissions* (July 2017).

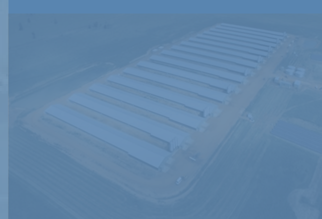
The responses provided in this RTS were prepared by ProTen and EME Advisory (EME), with specialist input and/or assessment work undertaken in the following areas:

- Existing soil contamination;
- Air quality - odour and particulate matter;
- Traffic;
- Biodiversity;
- Aboriginal heritage;
- Noise; and
- Visual amenity.

Section 4.2 describes the additional specialist work commissioned by ProTen in response to some of the issues raised by government agencies, the community and/or special interest groups.

Section 4

ACTIONS TAKEN DURING AND AFTER EIS SUBMISSION



4 ACTIONS TAKEN DURING AND AFTER EIS EXHIBITION

4.1 Community Information Session

Following submission of the final EIS to the DPE on 27 August 2018, an email was sent to the surrounding recreational facilities on the 29 August 2018 and a letter was distributed to surrounding residents via a mailbox letter-drop on 5 September 2018 providing an update on the Development and inviting them to a community information session.

The information session was held at the Lake Keepit Sport and Recreation Centre on the 18 September 2018, during the EIS exhibition period (7 September 2018 to 4 October 2018), and was well attended by the surrounding residents. The session was facilitated by ProTen's Managing Director and EME's Principal Consultant. ProTen's Regional Operations Manager and Project Construction Manager also attended.

A handout containing key information from the EIS was provided at the commencement of the session. The information included the development description summary, key environmental impacts, summary of commitments, and relevant plans/figures. A presentation was provided during the session, which included an update on the status of the Development, where to obtain/view a copy of the EIS and how to make a submission, a summary of the major components of the Development, where the Development has been optimised to reduce the potential for adverse impacts, and key environmental impacts. There was considerable discussion during the presentation and an opportunity for any additional questions after the presentation.

The key areas of concern for the residents at the meeting were the scale of the Development, odour, traffic, traffic-generated noise and dust, all of which have been addressed within this RTS. A few residents approached ProTen after the meeting in relation to potential opportunities for the supply of raw materials, access to the poultry litter at the end of the production cycles and employment.

4.2 Additional Specialist Assessment

ProTen commissioned additional specialist input and assessment work to assist in responding to the feedback, issues and requests in the various submissions. The additional work is summarised in the below sub-sections.

4.2.1 Soil Contamination

The *Stage 1 Preliminary Site Investigation* (SLR 2018d) prepared for the EIS identified one area of environmental concern (AEC) within the Development Site, being a former sheep dip in Lot 165 DP 752169, and concluded that further investigation was necessary. The submissions received from the DPE, EPA and GSC requested that a detailed assessment be undertaken in relation to this AEC. The DPE and EPA also identified that a remedial action plan may be required as part of the RTS.

Responding to these submissions, ProTen engaged SLR to undertake a detailed site investigating in accordance with the relevant guidelines under the *Contaminated Land Management Act 1997* (CLM Act) and develop a remedial action plan to guide the site's remediation in a manner that mitigates potential human health risks and ensures that the Development Site is considered suitable for the proposed use. SLR's *Detailed Site Investigation* (2019a) and *Remedial Action Plan* (2019b) are contained in **Appendices B** and **C**, respectively, with the scope of works and key findings summarised in **Section 5**. SLR (2019b) concluded that the soils within the AEC can be made suitable for the Development subject to implementation of the measures outlined in the RAP and preparation of a site validation report.

4.2.2 Air Quality

PEL (now part of ERM) prepared the *Air Quality Assessment* (2018) (AQA) for the EIS in accordance with 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) and following significant engagement with the EPA (as outlined in the EIS).

In response to various submissions received from government agencies (the EPA in particular), the community and Animal Liberation, Astute Environmental Consulting (Astute) was engaged to provide additional specialist input and assessment in relation to odour and particulate matter. The decision was made to engage Astute (as opposed to PEL/ERM) as the two lead project consultants that work on the AQA (PEL 2018) for the EIS have since left PEL/ERM and formed Astute. It made sense for consistency to have the same consultants undertake the additional work required for the RTS.

Astute's *Response to Air Quality Issues* (2019) is contained in **Appendix D**, with the responses to the specific odour and particulate matter issues summarised in **Sections 12** and **13**, respectively. Astute (2019) demonstrated that a suitable and appropriately conservative air quality assessment was performed by PEL (2018). The emissions modelled are higher than actual measured emissions at modern poultry farms and represent the upper range of potential emissions from the Development.

4.2.3 Traffic

RoadNet prepared the *Traffic Impact Assessment* (2018) for the EIS, for which the RMS advised the following in its submission:

> *Roads and Maritime considers that in our technical assessment of the EIS, specifically the RoadNet 2018 Traffic Impact Assessment - Volume 2, Appendix D, that the 'baseline' for impact assessment is reasonable and the predictions of impact are robust (and conservative) with suitable sensitivity testing and the proposal includes all reasonably feasible mitigation options.*

However, in response to the submissions received from the DPE and the community, SLR was engaged to provide additional specialist input and assessment in relation to traffic and the road network. The decision was made to engage SLR given that RoadNet no longer has a traffic impact assessment team.

SLR's *Response to Traffic Matters* (2018e) and *Supplementary Traffic Assessment* (SLR 2018f) are contained in **Appendix E**, with the responses to the individual issues summarised in **Section 14**. SLR (2018f) reaffirmed that the additional traffic to be generated by the Development will not have any significant impact on the safety or operation of the external road network and that Rushes Creek Road is of suitable existing form to accommodate the traffic to be generated by the Development.

4.2.4 Biodiversity

SLR prepared the *Biodiversity Assessment Report* (2018b) (BAR) for the EIS, for which the OEH advised the following in its submission:

> *Office of Environment and Heritage (OEH) recognises the efforts of the proponent to locate infrastructure in areas that have been previously disturbed so that the proposal largely avoids impacts to biodiversity…..*
>
> *The biodiversity assessment has followed the Framework for Biodiversity Assessment in accordance with the NSW Biodiversity Offsets Policy for Major Projects.….*
>
> *OEH supports the intended biodiversity offset strategy as presented in section 7.7 of the BAR.*

There were no submissions received that warranted any additional specialist biodiversity assessment work. However, SLR was engaged to assess the minor changes to the alignments of the upstream clean water diversions at each PPU and associated minor increase to the disturbance footprint of the Development detailed in **Section 2.3**. SLR's *Biodiversity Assessment Report Addendum* (2019c) is contained in **Appendix F** and concluded the following:

- No additional impacts to biodiversity values over and above those previously assessed and reported in the BAR (SLR 2018);
- No changes to the areas requiring offsets, as identified in Section 6.3 of the BAR (SLR 2018); and
- No implications in relation to the biodiversity offsetting strategy detailed in Section 7 of the BAR (SLR 2018).

4.2.5 Aboriginal Heritage

OzArk prepared the *Aboriginal Cultural Heritage Assessment Report* (2018) (ACHAR) for the EIS, for which the OEH advised the following in its submission:

> *The proponent has adequately undertaken Aboriginal consultation as per the prescribed method of the project SEARs…..*
>
> *OEH accept the survey coverage undertaken of the project area and recognise that the results conclude a low density of Aboriginal objects… Of important note is that the proposed project will impact only 5 isolated stone artefacts and 2 artefact scatters, BOS3 and BOS11, consisting of about 12 and 2 stone artefacts respectfully. The proposed mitigation action of collecting the artefacts post project approval further reduces the harm and is therefore supported.*

There were no submissions received that warranted any additional specialist Aboriginal heritage assessment work. However, OzArk was engaged to assess the minor changes to the alignments of the upstream clean water diversions at each PPU and associated minor increase to the disturbance footprint of the Development detailed in **Section 2.3**. OzArk's *Addendum Aboriginal Heritage Assessment Letter* (2019) is contained in **Appendix G** and concluded the following:

- No new Aboriginal cultural heritage sites are at risk of being harmed by the minor changes to the layout and footprint of the proposed PPUs; and
- The minor changes at each of the four PPUs have not changed the likely impacts of the Development to Aboriginal heritage, as previously documented in the ACHAR (OzArk 2018).

For transparency, OzArk (2019) sent an update letter to the registered Aboriginal parties (RAPs) on 8 April 2019 advising of the minor changes and confirming no additional impacts over and above those previously assessed and reported in the ACHAR (OzArk 2018).

4.2.6 Noise

Global Acoustics prepared the *Noise Impact Assessment* (2018) for the EIS and was engaged to address the issues raised in relation to noise in the submissions received from government agencies and the community. Global Acoustics' *NIA Regulator and Community Response* (2019) is contained in **Appendix H**, with the responses to the specific issues summarised in **Section 19**.

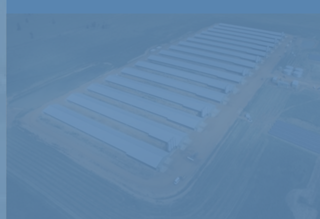
4.2.7 Visual Amenity

Visual amenity impact was addressed in Section 8.10 of the EIS, however the DPE noted that there were no plans or images from key vantage points or an assessment of impacts on surrounding residents. The DPE requested that the RTS include assessment of the visual impacts from receptor R25 towards Farm 4 and from Rushes Creek Road and any affected residences to Farm 2. To assist with this assessment, SLR was engaged to prepare visual impact plans and images, including line-of-sight views and photomontages.

Section 20 contains the assessment of visual impacts requested by DPE and the responses to the visual impact issues raised by the community.

Section 5

EXISTING CONTAMINATION



5 EXISTING CONTAMINATION

5.1 Detailed Site Investigation

The DPE, EPA and GSC requested that a detailed assessment of potential contamination be undertaken in relation to the area of environmental concern (AEC) identified in the EIS.

The *Stage 1 Preliminary Site Investigation* (SLR 2018d) prepared for the EIS identified one AEC within the Development Site, being a former sheep dip in Lot 165 DP 752169, and concluded that further investigation was necessary. In response to the submissions received from the DPE, EPA and GSC, SLR was engaged to undertake a detailed site investigation in accordance with the relevant guidelines under the CLM Act in order to:

- Assess whether contamination is present in the vicinity of the former dip site at concentrations that could potentially impact human health and/or the environment and therefore preclude the use of the site for the Development;
- Delineate the extent of contamination; and
- Obtain sufficient information to develop a remedial action plan (RAP), if necessary.

SLR's *Detailed Site Investigation* (2019a) (DSI) is contained in **Appendix B**, with the scope of works and key findings summarised below.

Contaminants of Potential Concern

Based on the findings from the *Preliminary Site Investigation* (SLR 2018d), the following contaminants of potential concern (CoPC) were identified:

- Organochlorine and organophosphorus pesticides;
- Triazine pesticides, carbamate pesticides, and synthetic pyrethroids; and
- Arsenic.

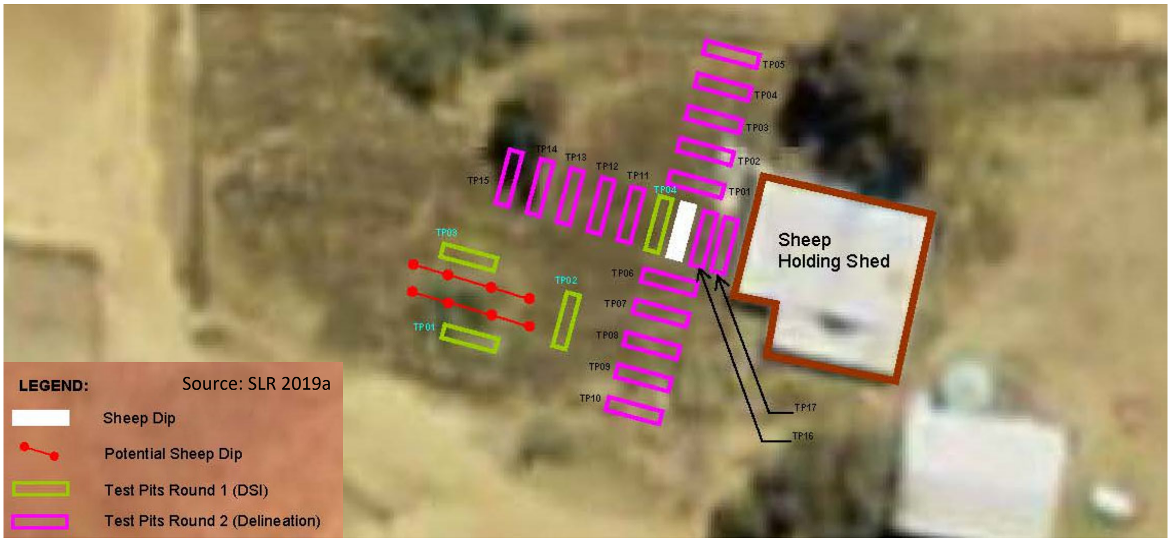
Investigation Guidelines

To assess the significance of potential soil contamination, SLR (2019a) referred to the *National Environmental Protection (Assessment of Site Contamination) Measure* (National Environmental Protection Council 2013) (ASC NEPM). Soil health investigation levels (HILs) are criteria designed to be used in the initial screening of data for assessment of potential risks to human health from chronic exposure to contaminants. In consideration of the proposed land use in the vicinity of AEC, SLR (2019a) conservatively selected soil investigation guideline values based on a residential land use, with garden/accessible soil (HIL-A).

Intrusive Works and Results

Intrusive works at the AEC were undertaken by SLR (2019a) in two separate mobilisations, with excavation of a combined 21 test pits, as shown on **Figure 9**. The initial round of sampling was undertaken to identify and confirm the location of the former sheep dip and to provide an initial soils assessment, while the second round was undertaken to delineate any identified soil contamination emanating from the former dip.

Figure 9 Detailed Site Investigation Test Pits



SLR (2019a) advises that the analytical results from the initial round of sampling concluded the following:

- Organochlorine pesticides, organophosphorus pesticides, triazine pesticides, carbamate pesticides and synthetic pyrethroids were not detected above the laboratory limit of reporting (LOR); and
- Elevated arsenic was detected in sample TP04_0.1-0.2 at 2,600 milligrams per kilogram (mg/kg), which exceeds the relevant HIL-A guideline value of 100 mg/kg.

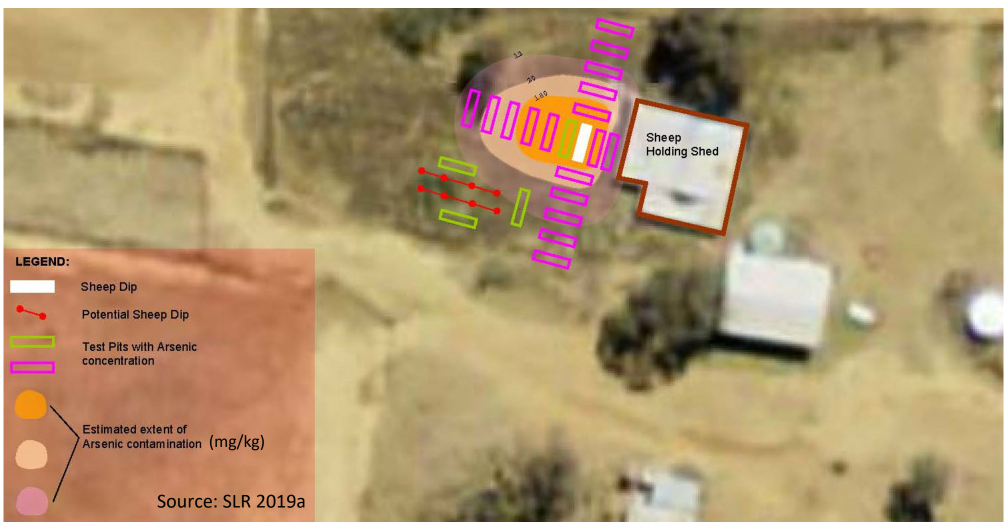
On this basis, the sheep dip location was confirmed as being adjacent to location TP04 (see **Figure 9**).

The arsenic concentrations adjacent to the former sheep dip, as determined by SLR (2019a) from the second round of sampling, are shown as concentration contours for the shallow, intermediate and deep ranges sampled on **Figures 10**, **11** and **12**, respectively.

Figure 10 Arsenic Contamination Delineation 0.1-0.2 m Deep

Figure 11 Arsenic Contamination Delineation 0.6-0.8 m Deep

Figure 12 Arsenic Contamination Delineation 0.9-1.3 m Deep



A groundwater assessment was not included in the DSI due to the limited leaching potential of the identified arsenic (confirmed via toxicity characteristic leaching procedure analysis), along with the observed reduction in concentration within a shallow depth and the anticipated depth of groundwater (SLR 2019b).

Conclusion

SLR (2019a) concludes that arsenic in the soil, likely to be associated with the former sheep dip, is elevated above the relevant HIL-A guideline value in the ASC NEPM and presents an unacceptable risk to present and future site users, particularly in association with the Development.

5.2 Remedial Action Plan

The DPE and EPA identified that a remedial action plan may be required depending on the results of the detailed site investigation.

Based on the information acquired during the DSI (SLR 2019a) (see **Section 5.1**), specifically that arsenic contamination adjacent to the former sheep dip is above applicable human health screening/investigation levels, SLR was engaged to develop a remedial action plan to guide the site's remediation in a manner that mitigates potential human health risks and ensures that the Development Site is considered suitable for the proposed use. The key remediation objectives identified by SLR (2019b) are:

- To ensure remedial works are undertaken in a manner that:
    - Is safe, with remediation works to be protective of human health and the environment;
    - Prevents potential cross-contamination with the implementation of appropriate controls;
    - Adheres to applicable legislative requirements, including any guidelines in force under the CLM Act; and
    - Confirms that materials entering and exiting the site are tracked accordingly and material to be disposed of is classified in accordance with the *Waste Classification Guidelines* (EPA 2014).
- To effectively remediate arsenic contaminated soil at the Development Site to enable it be utilised for the proposed land use; and
- To ensure that the site is remediated and environmental documentation is kept to a standard that will generally comply with the *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme* (EPA 2017).

SLR's *Remedial Action Plan* (2019b) (RAP) is contained in **Appendix C** and summarised below.

Remedial Goal

The primary remedial goal is to remediate the identified arsenic impacted soil to a level that does not present an unacceptable human health exposure risk and to render the site suitable for the proposed use. Given the Development includes residential housing (low density), SLR (2019b) conservatively selected the remedial action criterial (RAC) based upon a residential land use, with garden/accessible soil (HIL-A), as referenced in the ASC NEPM. Soils exceeding the adopted RAC will require remediation such that the resultant contaminant concentrations are reduced below the adopted RAC.

Extent of Remediation Required

Soil remediation is required for the arsenic impacted soil material within the vicinity of the former sheep dip. The lateral extents of elevated arsenic detected during the DSI (SLR 2019a) in the shallow, intermediate and deep portion of the remedial area are shown on **Figures 13**, **14** and **15**, respectively, with the extent presented based on exceedance of the adopted HIL-A guideline value of 100 mg/kg.

The maximum depth of elevated arsenic contamination detected during the DSI (SLR 2019a) was at 1.2 metres below ground level (mbgl), however this was the depth of practical refusal. Given the low leachability of the arsenic contamination detected and the reducing concentrations with depth, SLR (2019b) advises that the vertical extent is not considered to extend beyond 1.4 mbgl.

Figure 13 Estimated Arsenic Contamination (>100 mg/kg) Extent 0.1-0.2 m Deep

Figure 14 Estimated Arsenic Contamination (>100 mg/kg) Extent 0.6-0.8 m Deep

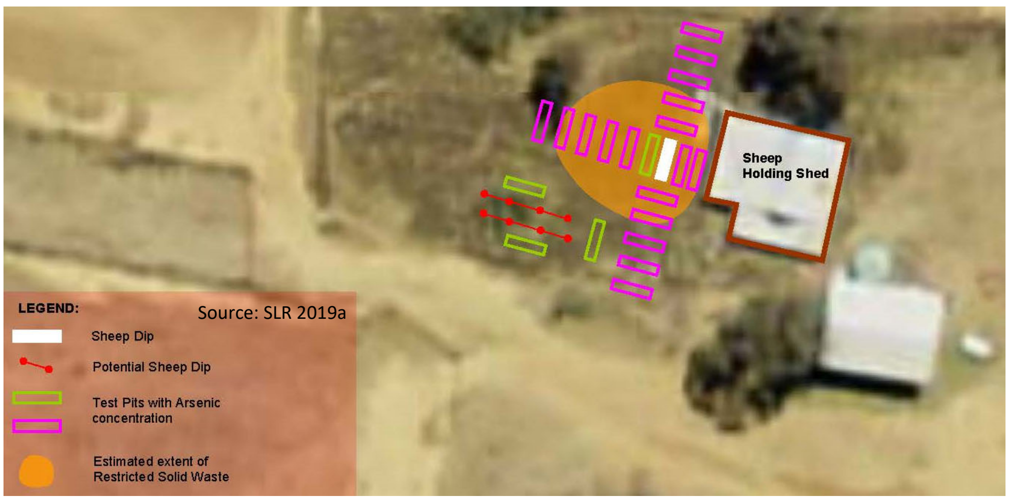
Figure 15 Estimated Arsenic Contamination (>100 mg/kg) Extent 0.9-1.3 m Deep

SLR (2019b) summarises the extent of remediation required as:

- Soil requiring remediation in the upper portion (surface to 0.4 mbgl) estimated to be 200 cubic metres (m^3);
- Soil requiring remediation in the intermediate portion (0.4 to 0.9 mbgl) estimated to be 70 m^3; and
- Soil requiring remediation in the deeper portion (0.9 to 1.4 mbgl) estimated to be 60 m^3.

Based on a statistical analysis of analytical results from the DSI (SLR 2019a), SLR (2019b) estimates that approximately 80 m^3 of the upper portion of material will require off-site disposal as restricted solid waste (RSW) when classified as per the *Waste Classification Guidelines* (EPA 2014). The lateral extent of RSW is shown on **Figure 16**. SLR (2019b) advises that the remaining 250 m^3 exceeding the HIL-A guideline value will require disposal as general solid waste (GSW) when classified as per the *Waste Classification Guidelines* (EPA 2014).

Figure 16 Extent of Restricted Solid Waste



Preferred Remedial Strategy

The preferred remedial strategy is excavation of the arsenic contaminated soil (an estimated 330 m^3) and off-site disposal at a suitably licensed landfill facility. SLR (2019b) advises that the walls and base of the excavation will require validation to ensure that arsenic contamination has been adequately removed. There are no long-term management requirements associated with this remedial option.

Remedial Sequence of Works

Approvals and Notifications

The remediation of soil impacted with arsenic is considered Category 2 remediation works (SLR 2019b). In accordance with the requirements of the *State Environment Planning Policy No. 55 – Remediation of Land* (SEPP 55) for Category 2 remediation work, the following notices will be issued to Council:

- Notice of the proposed remediation work a minimum of 30 days before commencement; and
- Notice of completion of the remediation work and a validation report within 30 days of completion.

Community Consultation

While SLR (2019b) advises that the remediation works are highly unlikely to impact adjoining neighbours, in-line with the commitments made in the EIS, ProTen will notify the surrounding residents of the remediation works a minimum of two days prior to commencement via a letter drop. The letter will provide an overview of planned remediation activities, advise expected works duration and hours, and advise relevant site contacts.

Site Establishment and Services

The remediation contractor will mobilise plant and equipment appropriate to the nature and extent of the required remediation works. Site establishment will include setting-up remediation works zones with appropriate fencing, barriers and/or signage and implementing appropriate environmental controls.

All services within the area will be identified prior to excavation and terminated or re-directed (as appropriate). Based on service clearance activities undertaken during the DSI, it is not anticipated that any services will require termination.

Excavation of Arsenic Contaminated Soil

The identified arsenic impacted soil will be excavated under the supervision of an environmental consultant. SLR's (2019b) remedial methodology comprises the following steps:

1. Excavate approximately 80 m^3 of soil classified as RSW within the upper portion of the remedial area to the lateral extent indicated on **Figure 16** and to an estimated depth of 0.4 mbgl;
2. Dispose of the RSW with a waste classification letter to a facility licensed to accept such waste;
3. Excavate the remainder of soil that exceeds the HIL-A criteria (classified as GSW) within the upper portion of the remedial area to the lateral extent indicated on **Figure 13** and to a depth of 0.4 mbgl, estimated to be approximately 120 m^3;
4. Excavate soil within the intermediate portion of the remedial area (classified as GSW) to the lateral extent indicated on **Figure 14** and to a depth of 0.9 mbgl, estimated to be approximately 70 m^3;
5. Excavate soil within the deep portion of the remedial area (classified as GSW) to the lateral extent indicated on **Figure 15** and to a depth of 1.4 mbgl, estimated to be approximately 60 m^3;
6. Dispose of the GSW with a waste classification letter to a facility licensed to accept such waste;
7. Validate the walls and base of the remedial excavation to ensure that all material exceeding the HIL-A guideline value has been removed; and
8. Backfill and contour the remedial area (if required).

The final extent of remediation required will be guided by laboratory analysis of validation samples taken from the walls and base of the remedial excavation. The excavation will be extended as required until the selected validation criteria are satisfied.

Backfilling

Backfilling will likely be required following the remedial excavations, depending on the depths of the excavation and ProTen's requirements (site re-contouring may also be considered). SLR (2019b) advises that backfilling can be undertaken using virgin excavated natural material (VENM) sourced from within the Development Site or certified VENM imported from an off-site source.

Additional Measures

The RAP (SLR 2019b) in **Appendix C** should be referred to for additional measures, including an unexpected find protocol, remediation contingency plan, validation works, site and environmental management requirements, and health and safety requirements.

Conclusion

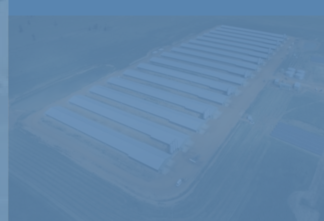
SLR (2019b) considers that soils on the site can be made suitable for the Development subject to:

- Implementation of the measures outlined in the RAP (SLR 2019b); and
- Preparation of a site validation report in accordance with *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Site* (OEH 2011).

ProTen will implement the RAP prior to commencing construction to remediate the arsenic impacted soil adjacent to the former sheep dip in Lot 165 DP 752169 and prepare a site validation report for submission to Council within 30 days of completing the remediation works. These commitments have been included in the Updated Summary of Commitments in **Section 25**.

Section 6

CONSTRUCTION



6 CONSTRUCTION

The DPE requested a detailed cut and fill plan showing total cut and fill across the Development Site.

Appendix A contains quantity drawings prepared by LRCE that are colour coded to show the cut and fill for the major earthwork components, being the PPUs and detention dams.

LRCE has balanced the required cut and fill across the Development Site as far as practical and this should avoid the need to import any fill material or export any fill material (LRCE pers. comm., 18 March 2019). Refinements will be made during the detailed design.

Lands & Water advised that a Construction Environmental Management Plan (CEMP) should be prepared in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004).

The following commitments are made in the EIS:

> *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.*

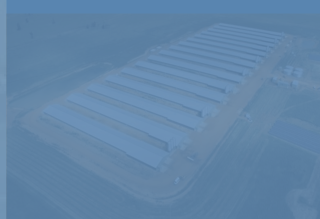
and

> *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;….*

The CEMP will include site-specific construction soil and water management requirements in accordance with the Blue Book.

Section 7

SERVICING



7 SERVICING

7.1 Electricity

Essential Energy provided general advisory comments in relation to the proposed boundary adjustment, including:

- **Easements required for any existing electrical infrastructure must be created using Essential Energy's standard easement terms current at the time of registration of the plan of subdivision; and**
- **ProTen must make the appropriate application with Essential Energy for the supply of electricity to the proposed lots and a Notification of Arrangement must be issued prior to Council releasing the Subdivision Certificate.**

The registered surveyor engaged by ProTen to undertake the proposed boundary adjustment will consult with Essential Energy during the preparation of the Plan of Subdivision and associated Section 88B Instrument for the required easements. All requirements/directives of Essential Energy will be implemented to enable issue and inclusion of the Notice of Arrangement with the Subdivision Certificate application to Council.

Essential Energy provided general advisory comments in relation to any development works in the vicinity of electricity infrastructure, including:

- **Activities must be undertaken in accordance with the latest industry guideline *ISSC 20 Guideline for the Management of Activities within Electricity Easements and Close to Infrastructure*;**
- **A "Dial Before You Dig" enquiry should be undertaken prior to carrying out any works; and**
- **It is the responsibility of those completing any works around powerlines to understand their safety responsibilities.**

ProTen's Construction Manager and/or Principal Contractor will be responsible for ensuring that development construction works do not damage electricity supply infrastructure. This will include:

- Ensuring all works are undertaken in accordance with the latest industry guideline *ISSC 20 Guideline for the Management of Activities within Electricity Easements and Close to Infrastructure*;
- Ensuring Dial Before You Dig enquiries are undertaken at least two business days prior to carrying out any excavation works, and undertaking new enquiries if the scope of works changes; and
- Ensuring all on-site workers are aware of and understand any instructions issued by Essential Energy before commencing work.

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). ProTen's Construction Manager and/or Principal Contractor will responsible for ensuring safe work practices in the vicinity of electricity infrastructure, including

- Compliance with Safework NSW's codes of practice *Work Near Overhead Power* Lines and *Work Near Underground Assets*; and
- Ensuring all on-site workers are aware of and understand the safety hazards and risks and how to avoid them and maintain a safe working environment.

The roles and responsibilities of ProTen's Construction Manager, Principal Contractor and construction workers will be nominated in the CEMP.

7.2 Potable Water Supply

HNELHD advised that there is the potential for potable water supplies from rainwater collection tanks at the PPU offices and farm managers' houses to be impacted by dust, which may contain enteric pathogens such as salmonella and campylobacter. HNELHD advised that businesses/facilities that supply drinking water from an independent water supply need to follow the *NSW Health Private Water Supply Guidelines* (2014) and develop and adhere to a "quality assurance program" under the provisions of the *Public Health Act 2010* and *Public Health Regulation 2012*.

Astute (2019) (see **Section 13** and **Appendix D**) advises that the contributions of the four proposed PPUs to dust in the area is unlikely to be significant, especially when compared to existing background concentrations. If elevated dust concentrations do leave a poultry shed, even with no controls in place, research has shown that concentrations drop to background levels within approximately 30 to 100 m of the poultry sheds (Astute 2019). This is consistent with observations at many poultry farms, where a white dust can be seen around the fan end of the sheds, but not further afield (Astute 2019). On this basis, the risk of impact from dust from the poultry sheds on rainwater tanks at the PPUs (staff amenities positioned at the opposite end of the sheds from the fan end) and the farm managers' houses is considered low.

Nevertheless, it is acknowledged that the *Public Health Act 2010* and the *Public Health Regulation 2012* require private drinking water suppliers to have a quality assurance program to minimise the potential for contamination and protect the water quality for the consumer. After reviewing the *NSW Health Private Water Supply Guidelines* (NSW Health 2014) and current practices at other poultry farms, ProTen confirms the following in relation to drinking water supplies:

PPU Staff Drinking Water Supply

ProTen will install a rainwater collection tank at each PPU to collect rainwater from the staff amenities and workshop building for the toilets. The roofs, gutters and tanks will be regularly inspected, cleaned and maintained. Given that the roof area of each amenities and workshop building is relatively small, ProTen will also plumb-in the building to the operational water supply (i.e. licenced extraction from the Namoi River) for general purposes and drinking water. As outlined in Section 4.16.5 of the EIS, this water will be appropriately treated, including filtered, pH corrected, chlorinated and dosed with chlorine dioxide. ProTen will prepare a quality assurance program for these two water supply options and submit them to HNELHD prior to commencing operation.

Farm Managers' Houses Drinking Water Supply

ProTen will install a rainwater collection tank(s) with a first flush device at each of the farm manager's houses for general household purposes and drinking water. The roofs, gutters and tanks will be regularly inspected, cleaned and maintained. ProTen will prepare a quality assurance program for this water supply and submit it to HNELHD prior to commencing operation. When tank water levels run low and/or a separate drinking water supply is considered necessary/desired, additional water will be supplied by a water carter that has their own quality assurance program and maintains records relating to the water supplied. If a separate drinking water supply is provided, it will be held in a separate tank at each house and plumbed-in separately. Water carting for additional supply will generate negligible traffic and no additional traffic impact assessment is warranted given the transport route has significant additional capacity (SLR pers. comm., 10 January 2019).

The requirement to prepare and adhere to quality assurance programs for the drinking water supplies at the PPUs and farm managers' houses has been included in the Updated Summary of Commitments in **Section 25**.

7.3 Construction and Operational Water Supply

Lands & Water advised that the available water determinations (AWDs) for general security licences in the Upper Namoi Regulated River Water Source over past years has ranged between 10 and 100% and, therefore, ProTen's licensed entitlement of 437.2 units is insufficient to meet the operational demand of 330 megalitres (ML) all the time.

Lands & Water and DPE requested additional information be provided in relation to ensuring adequate entitlement to address potential AWDs during both the construction and operational phases and viable alternative supply options if full entitlement is not available.

The construction process will require a relatively small water volume, with the only identified water requirements being:

- To assist with the cut and compaction requirements during bulk earthworks;
- Wetting down surfaces being worked and/or carrying traffic during dry conditions (i.e. dust suppression); and
- Watering / irrigation of areas that have been revegetated following disturbance (if required).

ProTen estimates that these activities will require a maximum of 15 ML over the construction period.

As detailed in Section 4.16.5 of the EIS, the operational phase will require a total water supply of around 330 ML per year (0.9 ML per day averaged over a year). ProTen advises that this is a conservative estimate and will readily cover shed ventilation, bird consumption, shed cleaning and vehicle wheel wash demands, and also PPU staff amenities.

Both the construction and operational water requirements 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 of the EIS.

The combined 437.2 units provided by the two WALs at 100% AWD (i.e. 437.2 ML) is well above the construction water demand of approximately 15 ML (over 16 months) and also above the annual operational water demand of approximately 330 ML. The AWD would need to drop below 4% before alternative options would be required for the construction phase and below 75% before alternative options would be required during the operational phase. If such a time presents itself there are three options to source additional supply during the construction and/or operational phases and a fourth fall-back option during the operational phase:

Option 1: The purchase of temporary tradeable water (if available) from other licensed user(s) in the Upper Namoi system at an agreed rate. While this was not mentioned in the EIS, it is the preferred option for ProTen and has been successfully undertaken by ProTen at other poultry farms in NSW where a temporary water shortfall was experienced. It is subject to an approved application by WaterNSW, with 90% of allocation trades processed within 5 business days. A temporary water transfer (also known as an allocation assignment) is the assignment or transfer of current year allocation from one WAL to another on a temporary basis. The assignment has no permanent effect on the share component of the WAL.

Option 2: The purchase and transfer of another WAL or share component of a WAL (if available). This would be subject to firstly identifying a suitable WAL that is available for transfer and secondly obtaining approval from WaterNSW to change the zone and/or nominated work on the WAL. ProTen is continually searching for and investigating potentially suitable and available WALs for sale in the Tamworth area to secure additional water allocation for existing and potential future developments.

Option 3: The purchase and trucking of additional water supply. This option would only be considered for the limited volume potentially required during the construction phase and/or if there was a very minor and very limited/short-term volume shortage during the operational phase.

Option 4: The fall-back option of reducing the operating capacity of the Development (i.e. destock) until the required water supply can be obtained. Obviously, this is not relevant to the construction phase.

Lands & Water requested confirmation of the ability of WaterNSW to supply the required operational water volume during a range of climatic scenarios. However, based on the above listed alternative options, particularly the fall-back position of reducing the operating capacity, WaterNSW does not need to (and could not) provide such confirmation. If the operational water requirements of the Development cannot be met at times during reduced AWDs, this is a commercial risk of ProTen. It is the same for ProTen's other poultry farms and many other intensive livestock operations. If all else fails, ProTen will destock until the required water supply can be met.

ProTen will not extract water beyond their licensed allocation and applicable AWD.

7.4 Aerated Wastewater Treatment Systems

WaterNSW and the DPE requested that the location of the 12 proposed AWTSs and associated EMAs be identified and the potential impacts assessed.

As advised in Section 4.16.7 of the EIS, the sewage to be generated by the staff amenities at each PPU and at the farm managers' houses will be treated and disposed of via separate 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) and the treated effluent will be released within an EMA of approximately 200 m^2 via sub-surface irrigation.

The updated conceptual PPU layout plans provided as **Figures 5** to **8** show the proposed locations of the AWTS and EMA at each of the four PPUs. As requested by WaterNSW (see **Section 2.3**), the AWTS and EMA at each PPU have been positioned inside of the upstream clean water diversions to ensure that any runoff from these areas is captured in the controlled surface water management system and will not compromise the clean water flows and downstream environments.

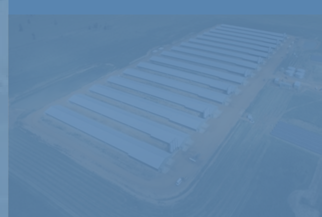
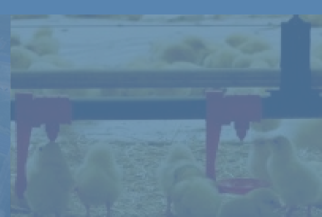
It is not possible at this point to pinpoint the locations for the AWTS and EMA at each of the eight farm managers houses as the locations will be largely dependent on the final construction specifications, including the orientation/aspect and elevations of the houses, and the specific requirements and recommendations of the system manufacturer/provider. As advised in the EIS, and evident on the development plans, there is significant land area available at each house site for effluent application and significant separation distances to any surrounding surface water features. Furthermore, the installation of each AWTS and EMA will be subject to a separate application to Council under Section 68 of the *Local Government Act 1993*.

There is negligible risk associated with sewage management at the PPUs and farm managers' houses. In additional to the information above, please note the following:

- The AWTSs and EMAs are considered conservatively over-sized for the relatively low volumes of sewage to be generated by the staff amenities and farm manager houses;
- The AWTSs will provide secondary level treatment, including disinfection;
- Each AWTS will be maintained by an approved service provider on a quarterly basis or as recommended by the manufacturer
- The EMAs will be relatively flat and the grass cover will be regularly mown to promote uptake of hydraulic and nutrient loads;
- Groundwater levels generally range between 10 and 20 mbgl across the Development Site and a weathered clay-rich regolith layer approximately 2 m below ground surface will restrict any downward movement of treated effluent to groundwater (SLR 2017); and
- The Development Site is not flood-liable land.

Section 8

WEEDS AND PESTS


8 WEEDS AND PESTS

8.1 Mosquitoes

HNELHD stated that the detention dams may create mosquito breeding habitat and increase the risk of mosquito borne disease, and recommended that management strategies be incorporated in a Pest Management Plan.

The design of the proposed surface water management system at each PPU, including the detention dam, is the same as that approved and installed at numerous other ProTen poultry farm developments, including the relatively recent Narrandera farm (SSD 6882). None of these farms have had any mosquito issues.

Mosquitoes thrive in a variety of habitats from shallow puddles to wetlands, usually where there is some growing vegetation. The potential increase in risk associated with the four proposed detention dams for mosquitoes is minor in comparison to the potential breeding habitat of Lake Keepit and the Namoi River.

Mitigation measures that will reduce mosquito breeding opportunities include:

- Maintaining the table drains and detention dams free of significant vegetation; and
- Ensuring that the vegetation screens around the PPUs are not over-irrigated to avoid water collecting in any depressions for long periods of time.

If it is identified that mosquitos have become an issue, ProTen will apply a larvicide to the detention dams and surrounds to prevent mosquitoes from maturing to adults and/or fogged the detention dams and surrounds. These mitigation measures and control options have been included in the Updated Summary of Commitments in **Section 25**.

Specific mosquito control strategies and a pest management plan are not warranted. As advised in Section 4.25 of the EIS, pest control will be included in the Operational Environmental Management Plan (OEMP) (however not as a separate issue-specific management plan).

8.2 Surrounding Farming Properties

Two community submissions claimed that the soil disturbance and vehicle movements within the Development Site and along Rushes Creek Road will potentially introduce and spread weeds, insect pests and diseases to their farm (receptor R25). These submissions also queried whether ProTen will undertake effective feral animal control, asserting that poultry farms, specifically effluent in detention dams, feed spills and dead birds, attract feral pigs.

Another community submission queried what precautions will be undertaken in relation to the movement of feral and native animals to and from the Development Site that could be transporting diseases/viruses to local farming lands and the community.

The claim that poultry farms attract feral pigs is unsubstantiated. ProTen has not experienced any issues in relation to feral pigs or other feral animals at any of the company's poultry farms around Australia.

Weed and pest management will be undertaken during both the construction and operational phases of the Development. The following development design, best management practices and mitigation measures covered in the EIS will ensure that the Development does not introduce and/or spread weeds, pests or feral animals:

Construction

- Disturbed areas will be promptly rehabilitated to a stable landform and re-vegetated following completion of the construction/disturbance activities.
- The re-vegetation works and landscape plantings will be regularly inspected and assessed for maintenance requirements, including weed and pest control.
- Vehicles leaving the Development Site will be cleaned to avoid the spread of weeds if necessary.
- An appropriate herbicide will be applied if and where necessary.
- An appropriate rodenticide will be applied if and where necessary.

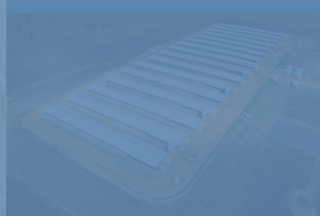
Operation

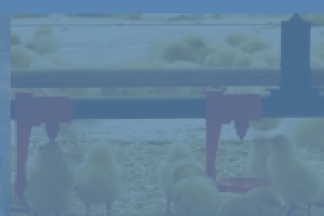
- The Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself.
- A wheel wash facility will be installed on the access road to each PPU in order to minimise the risk of spread of weeds and disease pathogens.
- The residual land within the Development Site will continue to be used and maintained for traditional agricultural production purposes, which will reduce the likelihood of weeds, pests and feral animals.
- An appropriate herbicide will be applied if and where necessary.
- ProTen's standard pest control program will be implemented as necessary, which includes:
  - Installation and maintenance of baits as a preventative measure to prevent and control outbreaks; and
  - Application of an appropriate rodenticide if and where necessary.
- 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 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.
- Appropriate sanitising agents will be used during the shed cleaning phase.
- Livestock health will be maintained through vaccination, farm hygiene and strict biosecurity.
- A broad range of proven biosecurity measures will be implemented on a routine basis in accordance with the current industry guidelines and best practice.

Importantly, as advised above, the residual land within the Development Site will continue to be used and maintained for traditional agricultural production purposes (cropping and/or grazing). ProTen will implement all necessary mitigation measures to ensure that their own property is not at risk in terms of increased weeds, pests, feral animals or diseases, and therefore it follows that the surrounding properties will also not be at risk. Weed and pest control measures will be included in both the CEMP and OEMP.

Section 9

BIOSECURITY, DISEASE AND MASS DISPOSAL





9 BIOSECURITY, DISEASE AND MASS DISPOSAL

9.1 Biosecurity Separation Distances

The DPE noted that there are "a number of non-compliances with the minimum separation distances specified" in the Best Practice Guidelines (DPI 2012) and requested further justification for the non-compliances in relation to water features. The DPE advised that the Guidelines (DPI 2012) recommend a minimum of 3,000 m between poultry farms and waterways, while the Development will only achieve 790 m to the full supply level of Lake Keepit and 2,260 m to the Namoi River.

Similarly, two community submissions identified that the Development does not comply with the biosecurity recommendations in the Best Practice Guidelines (DPI 2012), specifically being located less than 3,000 m from waterways. These submissions advised that the potential for the Development to introduce disease to waterfowl and wild birds that may inhabit Lake Keepit and the on-site detention dams cannot be dismissed.

Three other community submissions queried the biosecurity risks associated with the proximity of the Development to Lake Keepit, including the risk to wild birds.

To clarify, the only specific separation distances provided in the Best Practice Guidelines (DPI 2012) relate to separation for biosecurity purposes (i.e. to reduce to risk of disease introduction and spread). These separation distances are "recommendations" (not specifications) and, therefore, any short-fall is not considered a "non-compliance".

The Best Practice Guidelines (DPI 2012) provide the following recommendations for biosecurity separation:

- *Locate 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 metres to other intensive poultry farms (500 metres when there are extenuating circumstances such as farms with a common owner or farms supplying the same processor), 3,000 metres to commercial duck farms and 5,000 metres to poultry breeder farms.*
- *Preferably locate new farms away from waterways and wetlands (ideally 3,000 metres) that are used extensively by waterfowl, as these birds can carry avian diseases.*

The proposed PPUs are located a minimum of approximately 11 km to the nearest other broiler farm (Brubri, see **Figure 1**) and a minimum of approximately 8.2 km to the nearest breeder farm (Glenara Park, see **Figure 1**). Both distances are well over the recommendations in the Best Practice Guidelines (DPI 2012). Furthermore, the layout of the Development affords a minimum separation distance between each of the PPUs of approximately 870 m, which is well over the recommended 500 m (DPI 2012). The four PPUs will be owned and operated by ProTen (i.e. a common owner) and will be supplying to Baiada Poultry (Baiada) (i.e. the same processor).

As advised in Section 4.6 of the EIS, providing 3,000 m to waterways is mostly impracticable and, in many cases, impossible when it comes to large scale poultry farms given that they typically need to be located near a waterway for water supply purposes and/or establish large on-site detention dams for surface water management. It is acknowledged that the Development falls short of the recommended 3,000 m to notable water features, with a minimum separation of approximately 2,260 m to the Namoi River and approximately 790 m to the full supply water level of Lake Keepit. However, as advised in the Best Practice Guidelines (DPI 2012), the risk of disease developing on a poultry farm is influenced by many factors, including litter management, feed and water, shed disinfection, vermin control, dead bird management and the effectiveness of other biosecurity measures.

The main issue with a reduced separation to waterways is the biosecurity risk that wild birds and waterfowl, which can carry poultry disease, present to the poultry farm (not the other way around). Given the controlled environment in which new modern poultry farms operate, including fully-enclosed poultry sheds, bird vaccinations and strict biosecurity measures, the biosecurity risk that new poultry farms present to wild birds and waterfowl that may inhabit the surrounding environment is low. There is no opportunity for wild birds or waterfowl to come in to direct contact with the housed poultry.

The surface water management system at each PPU will essentially operate as a closed water system, ensuring that all runoff from within the PPU environs is captured and does not compromise clean water flows and downstream environments. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP 72-hour design event and, as such, there is negligible risk to the Namoi River and Lake Keepit. Dead birds will be collected daily from the poultry sheds and contained in enclosed freezers prior to off-site disposal, spent litter will be promptly removed from the poultry sheds at the end of each production cycle for off-site reuse or disposal, pest control measures will be implemented, the operational water supply will be treated as per the *National Water Biosecurity Manual – Poultry Production* (Department of Agriculture, Fisheries and Forestry [DAFF] 2009), and the poultry sheds and equipment will be sanitised and disinfected at the end of each production cycle. In short, there will not be any opportunity for discharge, emissions or any other input to the surrounding water features.

As demonstrated as its other poultry farms around Australia, ProTen will place an extremely high importance on maintaining flock health through vaccination, farm hygiene and biosecurity measures all aimed at preventing the introduction of infectious diseases and preventing the spread of disease from an infected area to an uninfected area. As outlined in Section 4.23 of the EIS, strict biosecurity measures will be implemented on a routine basis in accordance with the Best Practice Guidelines (DPI 2012), *National Farm Biosecurity Manual for Chicken Growers* (Australian Chicken Meat Federation [ACMF] 2010) and *National Water Biosecurity Manual – Poultry Production* (DAFF 2009). All staff will be provided with training in relation to site-specific biosecurity requirements.

The range of biosecurity measures that will be implemented will compensate for the reduced separation distances to the Namoi River (minimum of 2,260 m) and Lake Keepit (minimum of 790 m to the full supply water level). There is a major economic incentive for ProTen to effectively implement biosecurity measures and ensure birds are kept disease free. As well as affecting bird health and welfare, if a flock requires depopulating, the economic gain from the flock is immediately lost. On this basis, ProTen will implement all necessary mitigation measure to ensure a negligible risk.

In the unlikely event of an emergency animal disease (EAD) at the Development, strict quarantine procedures would be immediately implemented to isolate the potentially infected PPU(s) and minimise the risk the other disease-free PPUs, other poultry farms and wild birds/waterfowl. Animal and environmental regulatory authorities, including DPI, EPA and technical service units of the poultry industry, would be heavily involved in site management and decision-making. 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 within the poultry sheds. This method reduces the exposure of personnel and wildlife to infected material, eliminates the need to handle large numbers of live birds, reduces dispersal of dust and provides the opportunity for disposal by composting within the confines of the enclosed shed (AHA 2015a).

In conclusion, the biosecurity risk that the Development poses due to the separation distances to the Namoi River (approximately 2,260 m) and Lake Keepit (approximately 791 m to full supply level) is very low.

There are no other separation distances that fall short of any recommended distances in the Best Practice Guidelines (DPI 2012).

9.2 Surrounding Poultry Farms

One community submission claimed that the Development will present biosecurity risks due to the proximity to "Russells chickens just down the road (e.g. moving live birds past another chicken farm, creating a biosecurity risk for those)".

Russell Chickens own and operate Brubri Poultry Production Farm located approximately 10.1 km to the east of the Development Site (approximately 11 km to the nearest PPU) near the Manilla end of Rushes Creek Road. Brubri is well-removed from the Development Site and is not located along the primary transport route between the Development Site and the poultry industry service facilities in and around Tamworth. Figure 19 in the EIS identifies Brubri and shows the primary transport route.

While all other poultry farms are well-removed from the Development Site, there are several along the primary transport route between the Development Site and Tamworth. As demonstrated at its other poultry farms around Australia, ProTen will place an extremely high importance on maintaining flock health through vaccination, farm hygiene and strict biosecurity measures all aimed at preventing the introduction of infectious diseases and the spread of disease from an infected area to an uninfected area.

In the unlikely event of an EAD and the regulatory authorities agreed that off-site disposal was the preferred option for infected birds and fomites, the transport route would be carefully considered and the roads selected would be mindful of all other poultry farms in the region. Attempts would be made to utilise trucks that are independent from normal ProTen and Baiada operations in order to minimise the risk of disease transfer to other poultry farms. All vehicles would be thoroughly cleaned and disinfected after unloading.

On this basis, the Development will be managed to minimise the biosecurity risk to all other poultry farms within the area and along the transport route.

9.3 Surrounding Farming Properties

Three community submissions claimed that the Development will adversely impact the biosecurity of surrounding farming properties. Two of these submissions also claimed that the feather drop from the live birds being transported past their property (receptor R25) will contaminate their farm.

The Best Practice Guidelines (DPI 2012) advise the risk of disease developing on a poultry farm is influenced by many factors, including litter management, feed and water, shed disinfection, vermin control, dead bird management and the effectiveness of other biosecurity measures. Given the controlled environment in which new modern poultry farms operate, including fully-enclosed poultry sheds, bird vaccinations and strict biosecurity measures, the biosecurity risk that new poultry farms present to the surrounding environment is low.

As demonstrated as its other poultry farms around Australia, ProTen will place an extremely high importance on maintaining flock health through vaccination, farm hygiene and biosecurity measures all aimed at preventing the introduction of infectious diseases and the spread of disease from an infected area to an uninfected area. As outlined in Section 4.23 of the EIS, strict biosecurity measures will be implemented 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). All staff will be provided with training in relation to site-specific biosecurity measures.

The surface water management system at each PPU will essentially operate as a closed water system, ensuring that all runoff from within the PPU environs is captured and does not compromise downstream environments. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP 72-hour design event. Dead birds will be collected daily from the poultry sheds and contained in enclosed freezers prior to off-site disposal, spent litter will be promptly removed from the poultry sheds at the end of each production cycle for off-site reuse or disposal, pest control measures will be implemented, the operational water supply will be treated as per the *National Water Biosecurity Manual – Poultry Production* (DAFF 2009), and the poultry sheds and equipment will be sanitised and disinfected at the end of each production cycle.

The heavy vehicles servicing the Development will travel on designated internal access roads within the Development Site and public roads (the same public roads used by heavy vehicles carrying other livestock from the surrounding agricultural properties and other intensive livestock operations). There are no known cases of poultry trucks causing the introduction or spread of poultry disease.

In the unlikely event of an EAD at the Development, strict quarantine procedures would be immediately implemented to isolate the potentially infected PPU(s) and minimise the risk the other disease-free PPUs, other poultry farms, wild birds/waterfowl and surrounding farming properties. Animal and environmental regulatory authorities, including DPI, EPA and technical service units of the poultry industry, would be heavily involved in site management and decision-making. In accordance with the *AUSVETPLAN: Operational Manual – Destruction of Animals* (AHA 2015a), the preferred available method for the euthanasia of large numbers of birds in commercial poultry units is gassing with carbon dioxide within the poultry sheds. This method reduces the exposure of personnel and wildlife to infected material, eliminates the need to handle large numbers of live birds, reduces dispersal of dust and provides the opportunity for disposal by composting within the confines of the enclosed shed (AHA 2015a).

There is a major economic incentive for ProTen to effectively implement biosecurity measures and ensure birds are kept disease free. As well as affecting bird health and welfare, if a flock requires depopulating, the economic gain from the flock is immediately lost. Importantly, the residual land within the Development Site will continue to be used and maintained for traditional agricultural production purposes (cropping and/or grazing). ProTen will implement all necessary mitigation measure to ensure a negligible risk for their own asset (i.e. the poultry farm and residual agricultural land), and therefore it follows that there will be a negligible risk for surrounding properties.

9.4 Dead Bird Freezers

One community submission queried the biosecurity risks associated with the dead bird freezers being located approximately 100 m from Rushes Creek Road and queried why the freezers will not be positioned further off the road within the Development Site.

The dead bird freezers have been strategically positioned approximately 100 m back from Rushes Creek Road along the northern and southern access roads to enable the dead birds to be collected and removed off site without the need for the collection trucks to travel further in to the Development Site closer to the livestock within the four PPUs. The separation of dead bird freezers from poultry sheds is a standard and important biosecurity measure.

The dead bird freezers will be lockable and sealed refrigerated shipping containers that will be regularly emptied. They will not be used for dead bird storage in the unlikely event of an EAD.

9.5 Human Health Risks

HNELHD advised that intensive poultry farming can pose potential human health risks for zoonotic disease transmission (for example, psittacosis and avian influenza) for poultry workers and emphasised the need to protect workers' health and safety through education and personal protective equipment (PPE).

Two community submissions also raised the potential for diseases being transferred from the poultry farm to surrounding residents and recreational users of Lake Keepit.

As advised in Section 4.7 of the EIS, the 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 prior to commencing work and will have on-going training through toolbox talks (or similar).

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 introduction and spread of disease. ProTen places an extremely high importance on maintaining flock health through vaccination, farm hygiene and strict biosecurity. As detailed in Section 4.23 of the EIS, ProTen will implement 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).

Additionally, the surface water management system at each PPU will essentially operate as a closed water system, ensuring that all runoff from within the PPU environs is captured and does not compromise downstream environments. Dead birds will be collected daily from the poultry sheds and contained in enclosed freezers prior to off-site disposal, spent litter will be promptly removed from the poultry sheds at the end of each production cycle for off-site reuse or disposal, pest control measures will be implemented, the operational water supply will be treated as per the *National Water Biosecurity Manual – Poultry Production* (DAFF 2009), and the poultry sheds and equipment will be sanitised and disinfected at the end of each production cycle.

There has not been one incident of poultry disease transmission to an employee or contractor in the 17 years that ProTen has been operating poultry farms in Australia. This is attributed to the low incidence of poultry disease in Australia, along with the strict biosecurity commitments, employee/contractor inductions and training and appropriate PPE provided at ProTen’s poultry farms. If there is no history of disease transmission to on-site poultry workers, it follows that there is no risk for the surrounding populace.

The Commonwealth Department of Agriculture and Water Resources (DAWR) advises the following in relation to avian influenza:

> *There is little risk of people in Australia being affected by avian influenza through normal contact with birds…*
>
> *Australia is well prepared to deal with a case of avian influenza should it occur in poultry here. There have been seven minor incidents of highly pathogenic avian influenza (all involving types of avian influenza which have not caused disease in humans) in Australia, the last being in 2013. Each was eradicated before the disease was able to significantly spread. Workers involved with diseased poultry did not become infected with avian influenza in any of these outbreaks.*
>
> *Australia has a surveillance program to detect incursions of avian influenza.*

Maintaining flock health though vaccination, farm hygiene and strict biosecurity will ensure that there is no opportunity for the transmission of poultry disease from the Development to surrounding residents or recreational users of Lake Keepit.

9.6 Mass Disposal

In-shed composting is identified in the EIS as the preferred mass bird disposal option in the unlikely event of an EAD. WaterNSW advised that the composted birds should not be used on-site.

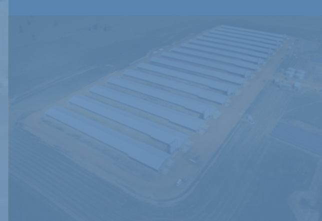
As outlined in Section 4.24 of the EIS, composting is a natural biological process that transforms organic materials into a useful and biologically stable product. The process, if carefully implemented and monitored, generates sufficient heat to destroy most pathogenic organisms (AHA 2015b). Emergency management agencies throughout Australia have identified on-farm composting as a preferred method of carcass disposal.

In the unlikely event of an EAD at the Development, animal and environmental regulatory authorities, including DPI, EPA and technical service units of the poultry industry, would be heavily involved in site management and decision-making. In-shed composting (if selected as the preferred disposal option) would occur under the supervision of these authorities 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 for mass poultry mortality composting appended to RIRDC (2014) would be implemented.

While the finished product would need to be tested for physical, chemical and microbiological properties before it is released for use, AHA (2015b) advises that it can be recycled, stored or added to the land as a soil amendment. Subject to the end-product testing results being below guideline/agreed thresholds and meeting all other requirements, including complete eradication of the poultry disease, the finished compost product would represent a valuable soil amendment and its application to land would be bona-fide reuse. Provided the land application area is appropriately located and sized and managed to prevent any migration of leachate, there should not be any risks associated with applying it to the vast area of residual agricultural land within the Development Site.

Section 10

LEGISLATION AND POLICY



10 LEGISLATION AND POLICY

10.1 Environment Protection and Biodiversity Conservation Act 1999

The TRRRA claimed that Lake Keepit should be protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and, as such, the Development should be referred to the Commonwealth Minister for approval.

The 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). As outlined in Section 5.3.1 of the EIS, 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. It concluded 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.

Water resources are only considered a matter of NES under the EPBC Act in relation to coal seam gas and large coal mining development proposals (the “water trigger”). On this basis, Lake Keepit is not a matter of NES for consideration in relation to the Development and referral to the Commonwealth Minister is not necessary.

10.2 SEPP No. 44 – Koala Habitat Protection

GSC claimed that the EIS did not adequately address the *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44), specifically it did not identify the full extent of the investigated area and therefore the presence of Koala activity across the entire Development Site cannot be determined.

The BAR (SLR 2018b) included a SEPP 44 assessment, which was summarised in Section 5.5.4 of the EIS. SLR (pers. comm., 20 December 2018) maintains that the potential for impact to koalas and koala habitat was appropriately assessed and described in accordance with SEPP 44. The applicability of SEPP 44 is assessed by addressing two key steps:

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

Potential koala habitat is defined under SEPP 44 as “areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component”. Accordingly, the woodland habitats within the Development Site were classified in the BAR (SLR 2018b) as potential koala habitat, with greater than 15% of the trees in these areas comprising Schedule 2 feed trees (Eucalyptus albens and E. populnea). These woodland areas are outside of the disturbance footprint and will not be impacted by the Development. The remaining derived grassland areas within the Development Site do not meet the definition of potential koala habitat and therefore were not required to be further assessed under SEPP 44.

SEPP 44 defines core koala habitat as “an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population”. Based on the limited number of previous recordings and the lack of evidence during field surveys of a resident population (sighting, male calls, scats, bark scratches), SLR (2018b) concluded that the woodland areas (and indeed the entire Development Site) do not constitute core koala habitat within the meaning of SEPP 44.

On this basis, as concluded in the BAR (SLR 2018b), SEPP 44 does not apply to the Development and there is no identified risk to koalas or koala habitat.

10.3 SEPP No. 55 – Remediation of Land

GSC advised that the EIS did not adequately address the *State Environmental Planning Policy No. 55 – Remediation of Land* in relation to potential contamination.

Based on the additional work that has been undertaken and reported in the *Detailed Site Investigation* (SLR 2019a) and *Remedial Action Plan* (SLR 2019b) in **Appendices B** and **C**, respectively, and summarised in **Section 5**, SEPP 55 has now been adequately addressed.

10.4 Tamworth Regional Local Environment Plan 2010

Two community submissions claimed that the eight new houses proposed to accommodate the farm managers are not permissible under the *Tamworth Regional Local Environment Plan 2010* (Tamworth LEP) given the lots in which these houses will be erected will be less than 400 ha.

One additional community submission objected to ProTen being able to build houses on land smaller than allowed under the Tamworth LEP.

As outlined in Section 4.11 of the EIS, the scale and 24-hour nature of the Development will necessitate one farm manager and one assistant farm manager to live on-site near each PPU (i.e. four farm managers and four assistant farm managers residing within the Development Site). On this basis, the proposal includes the construction of eight new houses within the Development Site. This is an industry standard and necessary to ensure continual bird health and welfare.

As advised in Section 5.1 of the EIS, these eight houses are considered ancillary and subsidiary to the Development, in that they will provide necessary support to the 24-hour poultry production operation, and, as such, they are permissible as part of the Development. On this basis, the minimum lot size requirement (and other requirements) of clause 4.2B of the Tamworth LEP is not a relevant consideration for this Development and the houses are permissible.

Two community submissions asserted that the proposed boundary adjustment does not comply with the Tamworth LEP.

Similarly, one other community submission queried why ProTen should be allowed to create four lots with dwellings smaller than allowed under the Tamworth LEP.

The permissibility of the proposed boundary adjustment is addressed in Sections 4.2 and 5.1 of the EIS. The boundary adjustment essentially represents a consolidation or partial consolidation of some of the freehold lots within the Development Site, with the minimum lot size increasing from approximately 0.34 ha (existing Lot 1 DP 1132078) to approximately 114 ha (proposed Lot 4).

The proposed boundary adjustment will create four new lots that are consistent with the predominant lot sizes and holding patterns in the surrounding area and are appropriate for their intended use. Proposed Lots 2, 3 and 4 will each accommodate one of the proposed PPUs (Farms 2, 3 and 4, respectively) and the residual land within the lots will be maintained for continued agricultural production. Proposed Lot 5 will continue to be maintained for traditional agricultural production. Neither the proposed boundary adjustment nor the Development will cause fragmentation of rural land.

The 400 ha minimum lot size requirement for subdivisions in the RU1 zone under clause 4.1 of the Tamworth LEP is not a relevant consideration in relation to the permissibility of the boundary adjustment or the permissibility of the Development itself. Clause 4.2D 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 and will not increase the number of dwellings able to the erected. As outlined above, the eight new houses proposed to accommodate the farm managers are ancillary and incidental to the poultry production farm and are therefore permissible as part of the Development itself (not as a consequence of the boundary adjustment).

Two community submissions asserted that the Tamworth LEP would have setback requirements from adjoining properties for new developments and the 125 m setback from Farm 4 to the boundary of the Development Site would not be permitted under the LEP. These submissions also note that the *Tamworth Regional Development Strategy* advises that the most effective way to avoid the impacts of a poultry development is to locate them on large properties and have adequate buffers.

Neither the Tamworth LEP nor the *Tamworth Regional Development Strategy* (GHD 2008) contain specific property boundary setback or separation distance requirements for development proposals. Instead, appropriate separation distances are determined on site-specific and development-specific bases when seeking development consent.

Specialist impact assessments were undertaken as part of the EIS to optimise the positioning of the PPUs and linear infrastructure within the Development Site and ensure adequate separation distances to surrounding receptors. While there is significant residue land available within the Development Site further away from site boundaries and some of the surrounding residences, alternative development layouts were considered and the proposed positioning of the PPUs is considered optimal in relation to minimising the potential for adverse odour impacts on surrounding residences, minimising impact to high conservation vegetation and maximising the biosecurity separation distances. Positioning the PPUs closer to the centre of the Development Site would notably increase the odour impacts for the residences located to the north of the Development Site, require the removal of high conservation vegetation, potentially impact on identified Aboriginal sites, and increase the risk of disease introduction and/or spread as a result of reduced biosecurity separation.

The separation distances afforded by the proposed layout (see Section 4.6 of the EIS), which include over 1 km to the nearest privately-owned residence, along with the development design features, best management practices and mitigation measures committed to by ProTen will assist to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

10.5 New England North West Regional Plan 2036

The DPE identified that the *New England North West Regional Plan 2036*, which was released in 2017, is a significant and relevant regional planning strategy that should be considered.

The *New England North West Regional Plan 2036* is a 20-year blueprint of the NSW Government's vision for the New England North West Region. It advises:

> *Growing broadacre and grazing sectors and expanding intensive agriculture and food processing will drive economic prosperity and jobs growth….. The poultry industry has grown around Tamworth and into Gunnedah and the Liverpool Plains. This and other emerging sectors can diversify the agricultural economy, promote value-adding opportunities and create employment.*

One of the “goals” of the Regional Plan is *a strong and dynamic regional economy*, with one of the “directions” towards this goal being to *expand agribusiness and food processing sectors*.

The operations of ProTen and Baiada play an ever-increasing role in the development of agribusiness in the New England North West Region, with Tamworth being a major stakeholder in the Australian poultry meat industry. The Development itself 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 **Figure 1**), which is only economically feasible with additional growth in the region’s poultry broiler production and will have its own economic and social benefits for the region.

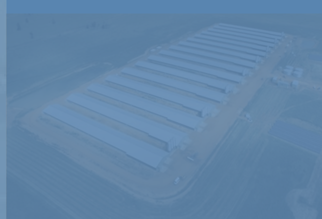
Another goal of the Regional Plan is *a healthy environment with pristine waterways,* with Lake Keepit identified as an “Environmental Asset” and the Lake Keepit State Park identified as an “Environmental Tourism Asset”. As detailed in Section 8.4.2 of the EIS and **Section 15** in this RTS, the potential for adverse impact to local surface water resources, including the Namoi River and Lake Keepit, is negligible. Given the controlled environment in which the Development will operate, including engineered upstream clean water diversions, engineered surface water management systems, best management practices and mitigation measures, it poses a very low risk to local water resources and no detectable impact is expected. Furthermore, the air quality assessment work (PEL 2018 and Astute 2019) has demonstrated that odour is unlikely to reach Lake Keepit at sufficient concentration to lead to impact (see **Section 12.3.3**) and dust is unlikely to get anywhere near Lake Keepit (see **Section 13.2.3**).

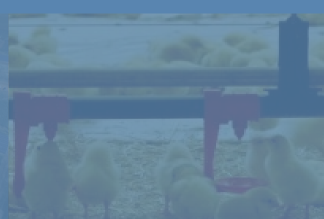
The Development, as proposed, represents the best of the alternatives considered when taking the environmental and social amenity impacts in to consideration. ProTen has committed to implementing appropriate development design features, best management practices and mitigation measures to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding environment and land uses.

On this basis, the Development appears in harmony with the Regional Plan. It will directly contribute to the expansion of agribusiness in the region, which in turn will contribute to a strong and dynamic regional economy, and it poses negligible risk to the surrounding environment, including the water resources and biodiversity associated with Lake Keepit.

Section 11

STAKEHOLDER CONSULTATION





11 STAKEHOLDER CONSULTATION

11.1 Aboriginal Community Consultation

The DPE requested details of any responses received from the RAPs following the letter sent to them on 16 February 2018 advising that the disturbance footprint had increased and three additional Aboriginal heritage sites will be impacted.

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* (Department of Environment, Climate Change and Water [DECCW] 2010). This consultation was detailed in the *Aboriginal Cultural Heritage Assessment Report* (OzArk 2018) appended to the EIS and summarised in Section 6.3 of the EIS.

OzArk (pers. comm., 20 December 2018) advised that no responses were received from the RAPs in relation to the consultation letter dated 16 February 2018.

OzArk sent an additional update letter to the RAPs on 8 April 2019 advising of the minor changes to the layout and footprint of the PPUs described in **Section 2.3** and confirming no additional impacts over and above those previously assessed and reported in the ACHAR (OzArk 2018).

11.2 Community Consultation

Several community submissions and the Animal Liberation asserted that surrounding residences were not adequately consulted during the preparation of the EIS. Some of the specific issues raised were:

- ***No information provided by ProTen to enable a good understanding of the development and potential impacts.***
- ***No contact from ProTen between the public information sessions held in December 2016 and September 2018.***
- ***Consultation with people living at the Manilla Ski Gardens Caravan Park may not have been adequately carried out.***

As outlined in Section 6.2.1 of the EIS, ProTen did consult with surrounding residents and recreational facilities during the preparation of the EIS. Some of the key community consultations activities included:

- 17 October 2016 – phone calls and emails to the recreational facilities, including provision of the PEA;
- 29 and 30 November 2016 – letter-drop to surrounding residents and emails to recreational facilities inviting them to a community meeting and site inspection;
- 15 December 2016 – on-site community meeting and site inspection;
- 29 August 2018 – emails to recreational facilities providing an update on the Development and an invitation to a community information session;
- 5 September 2018 – letter-drop to surrounding residents providing an update on the Development and an invitation to a community information session; and
- 18 September 2018 – community information session held at the Lake Keepit Sport and Recreation Centre (see **Section 4.1**).

As listed in the EIS, there were also other phone calls and emails with individual residents and recreational facilities during the EIS preparation.

Information has been provided by ProTen and/or publicly available to ensure stakeholders were aware of the Development and associated potential impacts. This information includes:

- PEA – the PEA was submitted to the DPE on 3 June 2016 and was subsequently made publicly available on the DPE's major projects tracking system website. The PEA was also emailed to the surrounding recreational facilities and provided to any resident who requested a copy following the community session in December 2016.
- Community Session December 2016 – information provided during this community meeting and site inspection included plans showing the intended 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 various components of the intended development, an overview of the EIS process and a summary of works completed to date. There was considerable discussion during the session.
- Community Session September 2018 - information handouts and a presentation was provided during this community session that included an overview of the Development (including various plans/figures), an overview of the changes made to the Development since the December 2016 community session, a summary of the key environmental impacts and a summary of commitments (development design, best management practices and mitigation measures). There was considerable discussion during the session and an opportunity for any additional questions after the presentation.
- Exhibited EIS – the final EIS was submitted to the DPE on 27 August 2018 and placed on public exhibition between 7 September 2018 and 4 October 2018. The EIS was uploaded to DPE's major projects tracking system website and was also available to review at Council offices.

It is acknowledged that there were not any notable community consultation activities undertaken by ProTen between the two community information sessions, however a lot of this time was consumed developing and running numerous odour models for various development layouts and bird population scenarios and refining the development design/layout to minimise the potential for impact on the surrounding environment and receptors. The community members that were invited to and/or attended the first information session in December 2016 were provided with relevant contact details for ProTen and SLR, with some community members contacting ProTen/SLR directly to discuss specific issues/queries.

As outlined in Section 6.2.1 of the EIS and summarised above, ProTen did undertake consultation with the Manilla Ski Gardens Caravan Park. Given it is a Caravan Park and the people staying there are temporary visitors, the consultation was specifically with the Caravan Park's manager.

Two community submissions called for improved neighbourly relations and for ProTen to offer "some incentives to accept them as new neighbours".

ProTen has made the following commitments in order to maintain amicable relationships with neighbouring landholders:

- Ensuring the Development is constructed and operated adopting best practice management;
- Ensuring implementation of the development design features, best management practices and mitigation measures committed to in the EIS; and
- On-going consultation and engagement with the surrounding community members.

Section 6.2.2 of the EIS outlines ProTen's commitments for future community consultation activities. These being:

- Community information sessions – ProTen will facilitate additional community information sessions prior to commencing both construction and operation if desired by the surrounding community.
- Face-to-face meetings – ProTen will engage in face-to-face meetings and/or phone conversations with community members if requested prior to commencing construction and throughout the construction and operational phases.
- Information letters – prior to commencing both construction and operation ProTen will inform the surrounding community of planned construction/operation activities via mailbox letter-drops. Information will include primary works/activities, key dates, staging, hours and relevant site contact details. Letters will also be distributed to inform of any changes to the construction/operation activities.
- Environmental hotline - ProTen will continue to operate its freecall environmental hotline number, which is provided on the company's website.

Community consultation will be included in both the CEMP and OEMP, which will be prepared in consultation with the relevant government agencies and will be publicly available on ProTen's website once approved by the DPE. Relevant information to be included will include:

- Contact details for ProTen, as well as relevant regulatory authorities;
- Community consultation commitments and methods;
- Community complaints management strategy; and
- Dispute resolution options.

Community and stakeholder consultation have been included in the requirements for the CEMP and OEMP in the Updated Summary of Commitments in **Section 25**.

In relation to the call for ProTen to offer "incentives" to neighbouring landholders, this is not a planning matter and does not warrant addressing within this RTS. Any potential opportunities for the surrounding landholders to benefit from the Development, for example through employment or supply of materials/goods/services, can be discussed with ProTen during future consultation activities.

HNELHD recommended that a public water use survey be considered as part of on-going community consultation due to the potential impact of dust on rainwater collection at neighbouring residences.

As detailed in **Section 13.2**, dust from the four proposed PPUs is unlikely to reach the dwellings within surrounding properties. Astute (2019) advises that if it did happen to on occasion, it would be at a very low concentration and not at a level that would lead to contamination. On this basis, a public water use survey is not warranted.

HNELHD recommended that ProTen develop a communication plan in consultation with the community and articulate how health concerns and disputes will be handled.

A specific communication plan is not warranted, particularly given the negligible risk for community health impacts from the Development associated with water supply, biosecurity, odour, dust and noise (see **Sections 7.2**, **9.5**, **12.3**, **13.2** and **19.2**, respectively). As outlined above, community consultation and dispute resolution will be included in both the CEMP and OEMP. These documents will be prepared in consultation with the relevant government agencies and will be publicly available on ProTen's website once approved by the DPE.

11.3 Government Consultation

Two community submissions asserted that the managers of the Lake Keepit State Park and State Water Resources office at Lake Keepit did not know about the Development, nor did GSC's planning department.

Lake Keepit State Park is managed by the NSW Crown Holiday Parks Trust, who is understood to have been established in 2013 by NSW Crown Lands (now part of Lands & Water). State Water is understood to be now part of WaterNSW, who manages Lake Keepit.

Lands & Water, WaterNSW and GSC were all aware of the Development and were consulted during the development planning and impact assessment process. As advised in the EIS, specific consultation activities included:

Lands & Water

- 9 June 2016 - Lands & Water invited to attend the planning focus meeting and site inspection (however did not attend).
- 16 June 2016 - DPE wrote to Lands & Water seeking input for the SEARs for the Development.
- Undated - Lands & Water submitted its input for the SEARs to DPE (see Appendix B of the EIS).
- 7 July 2016 - Lands & Water submitted additional input from the NSW Crown Holiday Parks Trust for the SEARs to DPE (see Appendix B of the EIS).
- 9 August 2016 – Lands & Water consulted in relation to their request for a groundwater monitoring program.
- 20 October 2016 – Lands & Water consulted in relation to their requests for a water balance and flooding assessment.
- 13 September 2017 – Lands & Water consulted in relation to the tenure and classification of an unformed road reserve within the Development Site.
- 12 March 2018 – Lands & Water consulted in relation to the tenure and classification of several parcels of Crown/public land within and adjoining the Development Site.
- 9 April 2018 – Lands & Water consulted in relation to licensing requirements under the *Water Management Act 2000* (WM Act) for the Development.
- 13 April 2018 – submission lodged with Lands & Water seeking land owners consent to submit the DA.
- 10 May 2018 – Lands & Water issued land owners consent to submit the DA.

WaterNSW

- 9 June 2016 - WaterNSW attended the planning focus meeting and site inspection.
- 16 June 2016 - DPE wrote to WaterNSW seeking input for the SEARs for the Development.
- 29 June 2016 – WaterNSW submitted its input for the SEARs to DPE (see Appendix B of the EIS).

GSC

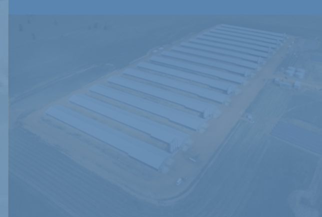
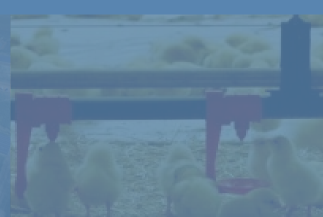
- 9 June 2016 - GSC attended the planning focus meeting and site inspection.
- 16 June 2016 - DPE wrote to GSC seeking input for the SEARs for the Development.
- 29 June 2016 - GSC submitted its input for the SEARs to DPE (see Appendix B of the EIS).

The EIS was also referred to these government agencies during the public exhibition period, with WaterNSW lodging a submission on 25 September 2018, GSC lodging a submission on 4 October 2018 and Lands & Water lodging a submission on 16 October 2018.

ProTen has committed to undertaking further consultation with Lands & Water and WaterNSW in relation to any easement/licence requirements over Crown land and issue-specific management plans prepared as part of the CEMP and/or OEMP.

Section 12

ODOUR


12 ODOUR

PEL prepared the *Air Quality Assessment* (2018) (AQA) for the EIS in accordance with the Approved Methods (EPA 2016) and *Assessment and Management of Odours from Stationary Sources in NSW* (EPA 2006), and also following significant engagement with the EPA (as outlined in the EIS). As advised in **Section 4.2.2**, Astute was engaged to provide additional specialist input and assessment in response to the odour issues raised in the submissions received from government agencies (primarily the EPA), Animal Liberation and the community. While the DPE did not raise any specific odour issues, it reverberated on the EPA's submission by advising:

> *The Department notes that the Environment protection Authority (EPA) has raised several concerns with the air quality impact assessment (AQIA) and odour modelling presented in the EIS in its submission dated 5 October 2018. The Department requests that the AQIA be revised to ensure it complies with the EPA's 'Approved Methods for the modelling and assessment of air pollutants in NSW' (EPA 2016) and addresses all issues raised by the EPA in its submission.*

After reviewing the issues raised by the EPA and undertaking additional analysis, Astute does not believe that revision of the AQA (PEL 2018) is warranted. Astute (2019) has demonstrated that a suitable and appropriately conservative air quality assessment was performed by PEL (2018). The emissions modelled are higher than actual measured emissions at modern poultry farms and represent the upper range of potential emissions from the Development. Astute's *Response to Air Quality Issues* (2019) is contained in **Appendix D**, with the responses to the specific odour issues raised summarised in the below sub-sections.

12.1 Odour Criterion

The AQA adopted a criterion of 5 odour units (ou) based on 20 potentially affected residents within the 2 ou contour. The EPA advised that a small change to model parameters could result in the Lake Keepit Sport and Recreation Centre (237 guests) being included within the 2 ou contour, resulting in 257 people potentially affected by odour from the Development, and on this basis, a criterion of 3 ou would be more appropriate than the adopted 5 ou. The EPA recommended that future feasible odour mitigation measures that could achieve compliance with an odour criterion of 3 ou be considered.

HNELHD also mentioned this issue.

As reproduced in **Table 6**, the Approved Methods (EPA 2016) include ground-level concentration criterion for complex mixtures of odorous air pollutants based on population density in the potentially affected area. These are criteria not to be exceeded more than 1% of the time. As evident, a criterion of 3 ou would be for an affected population of around 500 people and a criterion of 5 ou would be for an affected population of around 30 people.

Table 6 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

While not included in the Approved Methods (EPA 2016), the EPA's preferred approach is to determine the potentially affected population by tallying the number of dwellings within the 2 ou contour. This has the potential to result in an odour criterion based on an elevated population at the extremity of the model domain (Astute 2019).

It is important to note that the Lake Keepit Sport and Recreation Centre (Sport & Rec), which is identified as receptor R32 in the EIS, offers temporary accommodation for up to around 237 guests. Based on the type of programs offered at Sport & Rec, this accommodation is most likely to be over a weekend or a 2 to 3 night stay up to a week. Assuming the temporary visitors to Sport & Rec are the same people and continually present (i.e. permanent residents) would lead to a higher population density being applied to a rural area which, in reality, is somewhat sparsely populated with permanent residents.

The EPA highlighted a potential population in the area, including Sport & Rec, of 257 people. The 2016 ABS Census data provides a population of 13 people for the "Keepit" suburb/area and 106 people for the "Rushes Creek" suburb/area, giving a combined total population in the area of 119 people.

The permanent population within the 2 ou contour for the Development is far less than 119 people given the 2 ou contour does not cover the whole of the Keepit and Rushes Creek suburbs/areas. Eight private residences surrounding the Development Site are predicted to be within the 2 ou contour for one or more of the three modelled scenarios. While the ABS 2016 Census data for rural communities in NSW provides an average population per house of 2.4 people and the recorded average population per house in the Keepit and Rushes Creek areas is 1.0 and 2.0, respectively, the EPA's elevated value of 2.8 people per house has been conservatively adopted. This leads to an estimated population potentially impacted by the Development of 23 permanent residents. On this basis, and as previously discussed with the EPA, the applied odour criterion for the Development was 5 ou, which, according to the Approved Methods (EPA 2016), is for a population of around 30 people.

Locations with transient populations are not typically considered sensitive locations in relation to odorous operations. Astute (2019) points out that the odour criteria are based on a percentile and an averaging time that assumes the population is continually present (i.e. permanent residents). The concept of repeated exposure was an underlying feature of the early research that led to the use of odour modelling (Astute 2019). Winneke et al (2004, cited in Astute 2019) showed that the percent of annoyed people within a static population around an odour source increased with the frequency of odour events. In the context of Sport & Rec, where the population is temporary and continually changing (short stays), the frequency (and nuisance) of impacts would not be comparable to a fixed permanent population (Astute 2019).

On this basis, rather than assuming a static population at Sport & Rec, Astute (2019) advises that it would be more appropriate when considering the odour criterion to pro-rata the risk of nuisance based on the length of occupancy rather than unrealistically assuming a permanent population that is constantly impacted. Given that the guest population at Sport & Rec would mostly be 2 to 3 night stays (possibly up to one week), along with the 2016 ABS Census data for the Keepit and Rushes Creek areas, the actual and pro-rated population would be significantly less and 5 ou is considered the appropriate criterion (Astute 2019).

Astute (2019) has clearly demonstrated that a suitable and appropriately conservative assessment was performed by PEL (2018). The odour emissions modelled are higher than actual measured emissions at modern poultry farms and represent the upper range of potential emissions from the proposed Development. On this basis, along with 5 ou considered the appropriate criterion, additional odour mitigation measures (in addition to the adoption of current industry best practice) are not considered warranted. Refer to **Section 12.4** for further discussion.

12.2 Assessment Methodology

12.2.1 Weather Data and Meteorological Modelling

The AQA (PEL 2018) compared the output of the 2005 CALMET model with 2016 weather data from Moana and noted that the variation between the two datasets was expected as one was modelled and one was measured and the datasets were for locations 1.5 km apart. The EPA raised another possible contributing factor to the variation being the fact that they were obtained for different years (2005 vs 2016) and requested that CALMET be evaluated using data from the same year and location as used from the weather station at Moana.

The EPA noted that the terrain around the Development Site is significantly different to that around Moana, which reduces the EPA's confidence in the accuracy of the weather data inputs in the modelling.

The meteorological modelling in the AQA (PEL 2018) was based on prognostic data without the use of data from weather stations. The meteorological data was processed by PEL (2018) in two steps, with synoptic scale meteorological data first processed in The Air Pollution Model (TAPM) and further processed in CALMET to produce the wind field and weather data suitable for dispersion modelling with CALPUFF. Astute (2019) confirms that the use of TAPM to drive CALMET at a site where there is no local or on-site data from an ultrasonic weather station is consistent with the Approved Methods (EPA 2016) and 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* (OEH 2011).

To assist in evaluating the wind fields, PEL (2018) obtained 2016 data from the poultry broiler farm known as "Moana" approximately 11.5 km from the Development Site for comparison with the output of the CALMET model. The CALMET dataset was extracted approximately 1.5 km north of the Moana poultry farm as Moana itself was outside the PEL modelling domain. PEL (2018) concluded that the comparison indicated a reasonable to good agreement between the observed Moana measurements and the output of the CALMET model, especially considering the extract location for CALMET was on more open ground compared to the north of Moana.

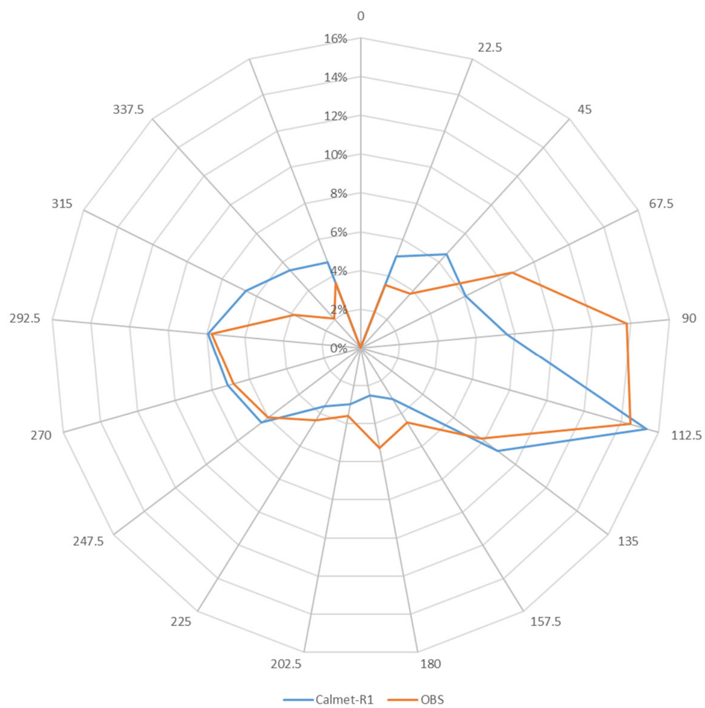
To assist in responding to the EPA's concerns, Astute (2019) obtained hourly weather data for 2016 from the Moana weather station. Astute was unable to inspect the weather station so cannot confirm whether its siting meets relevant standards. It is located near large trees and experience at other sites has shown that large trees near a station can result in greater variably in measured wind directions, especially in the upwind direction that the trees sit (Astute 2019). To test the performance of the model, Astute (2019) used a series of statistic tests (adopting standard benchmarks) to compare the hourly measured data at Moana with the hourly modelled data at Moana for 2016. The modelled CALMET data was taken from a CALMET run that used TAPM as an input and was centred on the Moana site. The results are summarised in **Table 7**.

Table 7 Moana TAPM-CALMET vs Moana Observed for 2016

Element	Test	Benchmark	Calculated	Compliance
Wind speed	Bias	+/- 0.5	0.1	Yes
	RMSE	< 2	1.5	Yes
	IO	> 0.6	0.8	Yes
Temperature	Bias	+/- 0.5	-0.3	Yes
	IO	> 0.8	1.0	Yes
	GE	< 0.2	1.2	Yes
Wind direction	Bias	+/- 10	13.0	No
	Gross error	< 30	51.9	No

The comparison shows that the model performed adequately for wind speed and temperature, however varied from the benchmarks of bias and gross error for wind direction. Astute (2019) prepared the radar plot shown in **Figure 17** to assess this further, with the orange lines showing the Moana observed data and the blue lines show the Moana CALMET data.

Figure 17 Moana TAPM-CALMET vs Moana Observed (2016) – Wind Direction Radar Plot



It is evident that the plot shapes generally agree, indicating similar wind direction frequencies, however there is a discrepancy in the easterly direction. Astute (2019) advises that this could be a function of the trees near the Moana weather station, however this cannot be confirmed. Astute (2019) further advises that in areas with complex terrain a suitable benchmark of 55 degrees can be applied for gross error for wind direction (AECOM 2013, cited in Astute 2019), which would explain some of the variation.

To further test the performance of the model, Astute (2019) model the Development Site domain with and without observed data from Moana for 2016. A radius of influence (area in the model that the data is given weight) for TAPM of 5 km (larger than what would be typically used given the terrain) was used and input into CALMET. Astute (2019) used the same series of statistic tests as above (adopting the same standard benchmarks), with the comparison results for the centre of the Development Site summarised in **Table 8**.

Table 8 Development Site CALMET With and Without Moana Observed Data

Element	Test	Benchmark	Calculated	Compliance
Wind speed	Bias	+/- 0.5	0.0	Yes
	RMSE	< 2	0.4	Yes
	IO	> 0.6	1.0	Yes
Temperature	Bias	+/- 0.5	0.0	Yes
	IO	> 0.8	1.0	Yes
	GE	< 0.2	0.8	Yes
Wind direction	Bias	+/- 10	-0.2	Yes
	Gross error	< 30	8.4	Yes

Astute's (2019) comparison shows that the winds at the Development Site with and without observed Moana data are similar. Astute (2019) concludes that the results for the Development would be unlikely to change if weather data from Moana was used in CALMET.

Regardless of the above findings, the AQA (PEL 2018) modelled three batch staging scenarios where peak emissions occur at different times during the year and only the top 1% of events are examined (i.e. 99^{th} percentile). As such, variations in wind directions are not considered significant as the staging model runs enabled the modelling to repeatedly assess scenarios where wind would have blown from each direction towards each receptor and the model is concluded to adequately capture winds in the area (Astute 2019).

Several community submissions claimed that the modelled annual wind behaviour, which shows that the prevailing winds are from the northeast and east, is inaccurate. Most of these submissions asserted that the prevailing winds are from the west and northwest.

A summary of the modelled annual wind behaviour at the Development Site is presented in the wind rose generated by PEL (2018) in Section 2.7 of the EIS. It shows that the prevailing winds are from the northeast and east with some winds from the west. PEL (2018) advised that this is consistent with expectations given the terrain in the area.

As outlined above, Astute (2019) has demonstrated that the modelled TAPM-CALMET weather data and measured Moana weather data (approximately 11.5 km from the Development Site) generally agree for 2016. Given the area around Moana is relatively open (compared to the large terrain elements further to the east and north), if north-westerly through westerly winds dominated in the area elements of this would show up in the Moana data and this is not the case (Astute 2019).

The AQA (PEL 2018) modelled three batch staging scenarios where peak emissions occur at different times during the year and only the top 1% of events are examined (i.e. 99^{th} percentile). As such, variations in wind directions are not considered significant as the staging model runs enabled the modelling to repeatedly assess scenarios where wind would have blown from each direction towards each receptor and the model is concluded to adequately capture winds in the area (Astute 2019).

Two community submissions asserted that the odour modelling was based on historical weather data collected at other sites in the region and, therefore, cannot be considered accurate as there has been no allowance for climate change and the potential for extreme weather events.

Similarly, one other community submission asserted that the data used for prevailing wind was sourced from weather stations far from the Development Site.

The meteorological modelling in the AQA (PEL 2018) was based on prognostic data without the use of data from weather stations. The meteorological data was processed by PEL (2018) in two steps, with synoptic scale meteorological data first processed in TAPM and then further processed in CALMET to produce the wind field and weather data suitable for dispersion modelling with CALPUFF. Astute (2019) confirms that the use of TAPM to drive CALMET at a site where no local or on-site data from an ultrasonic weather station exists is consistent with the Approved Methods (EPA 2016) and 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* (OEH 2011). TAPM uses databases of terrain, vegetation, soil type, sea surface temperature and synoptic-scale meteorological data for Australia. It is driven by 6-hourly synoptic measurements by the BoM and has been extensively validated (Astute 2019).

PEL (2018) assessed eight years of meteorological data from the Bureau of Meteorology's (BoM) automated weather station (AWS) at the Tamworth Airport between 2005 and 2012 to determine a representative meteorological year to model. The data was analysed for wind speed, temperature and relative humidity, with 2005 selected as the most representative year of long-term observations for the odour assessment. The wind roses for the eight years assessed are similar, indicating minor inter-annual variation.

One community submission queried why over 100 years of weather data from the historical Manilla weather station (closed in 2009), which is less than 15 km from the Development Site, was ignored.

Astute (2019) advises that air quality dispersion modelling requires hourly averaged data for climate statistics and modelling and there is no data available for Manilla (from both open and closed weather stations) that meets this requirement. On this basis, weather data from the Manilla station referred to in the submission was not suitable for inclusion, even for comparison purposes (Astute 2019).

One community submission asserted that there has not been any consideration to cold air drainage events or to the topography that affects the passage and accumulation of this air overnight, with odour dispersion only modelled during daytime convective periods.

Astute (2019) advises that a full year of meteorological data for 2005, incorporating a typical range of meteorological parameters, including cold air drainage and topographically-induced winds, was modelled and assessed in the AQA (PEL 2018). Astute (2019) further advises that the use of CALMET and CALPUFF ensures that light air drainage associated with topography is included.

Two community submissions advised that the Victorian EPA requires assessment against five years of meteorological data (as opposed to one year in NSW), with compliance required for all five years.

The use of five years of meteorological data is from an old United States Environmental Protection Agency (USEPA) requirement. However, Astute (2019) advises that with the advent of prognostic meteorological models, good practice in NSW and other areas of Australia requires the selection of a single representative year to model.

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

12.2.2 Bective Data

Two community submissions asserted that preliminary odour modelling was undertaken on ProTen's Bective poultry farm, which is over 20 km from the Development Site and significantly smaller than the proposed Development. These submissions queried how this can be a credible source of information given (as they believe) the modelling was based on three days of sampling during 2011.

There was not any preliminary modelling for the Development undertaken at ProTen's Bective poultry farm. These submissions are referring to the odour testing performed in 2011 at Bective, which was referenced in Section 8.1.2 of the EIS. The odour modelling undertaken by PEL (2018) considered years of real-world odour test data from a variety of meat chicken farms. See **Section 12.3.1** for information regarding recent odour testing.

12.2.3 Bird Placement Schedule

The EPA highlighted a possible discrepancy between the bird placement schedule modelled in the AQA and what was advised in the EIS and requested that the modelling be revised if the poultry sheds may be placed with birds over a shorter period (such as five consecutive days or on the weekend).

Section 4.10.2 of the EIS advises that the following:

> *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.*

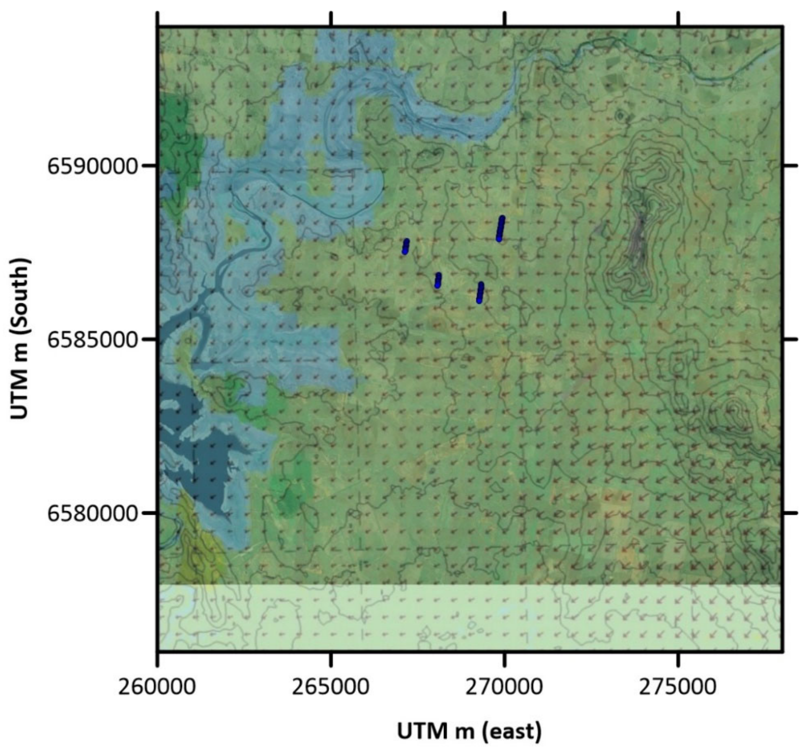
Baiada hatches and places day-old chicks at broiler farms within the Tamworth region on Mondays, Tuesday, Thursdays and Fridays. As such, the bird placement schedule modelled by PEL (2018) in the AQA, being birds placed over eight days with a maximum of two days in a row and not on weekends, is correct and no revisions to the modelling are warranted.

12.2.4 Area Modelled

One community submission queried whether the odour modelling area had been deliberately trimmed to a very small locality with no consideration outside of this area.

Figure 18 shows the area modelled by PEL (2018), with the blue areas (i.e. Lake Keepit) modelled as water and the green areas modelled as predominantly rangeland (Astute 2019).

Figure 18 Extent of Area Included in Odour Modelling



The area modelled was approximately 20 km by 20 km, which is not considered a "very small locality" in terms of an air quality assessment for a development proposal. PEL's (2018) odour contour plots provided as Figures 6-1 to 6-3 in the AQA and Figures 25 to 27 in the EIS are presented for the 2 ou contour and show a much greater area than required to demonstrate compliance with the 5 ou contour.

12.2.5 Level of Assessment

Two community submissions and the Animal Liberation asserted that the Development fails the Level 1 odour impact assessment calculator by way of not providing adequate separation distances to surrounding residential receptors and therefore should not be allowed.

The two community submissions claimed that the Level 2 assessment is speculative due to the range of variables used and subjective input selection, which can lead to ambiguous outputs/conclusions, while the Level 1 assessment can rapidly estimate separation requirements using minimal inputs.

The Approved Methods (EPA 2016) describe two levels of impact assessment:

- Level 1 – screening-level dispersion modelling technique using worst-case input data; and
- Level 2 – refined dispersion modelling technique using site-specific input data.

The Approved Methods (EPA 2016) advise that the impact assessment levels are designed so that the impact estimates from a Level 2 assessment would be more accurate than a Level 1 assessment, with a Level 1 assessment being more conservative and less specific. The Approved Methods (EPA 2016) also advise that if air quality impact is considered a significant issue for a development proposal, there is no impediment to immediately conducting a Level 2 assessment (i.e. it is not necessary to also complete a Level 1 assessment).

Astute (2019) reinforces this by advising that a Level 1 assessment, which is typically used as a first-pass screening test, is a simple conservative assessment that typically produces unrealistically large buffer distances compared to the more comprehensive and accurate model-based Level 2 assessment. Compliance with a more detailed and accurate Level 2 assessment does not mean that a Level 1 assessment needs to be undertaken or is more appropriate or should override the more realistic of the two assessment methods (Astute 2019). While a Level 1 assessment can rapidly estimate separation distances using minimal inputs, these distances are known to be unrealistically conservative and not representative of measured real-world data.

Astute (2019) confirms that the Level 2 methodology adopted in the AQA (PEL 2018) has been extensively used across NSW and Australia and is consistent with the Approved Methods (EPA 2016) and 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* (OEH 2011). Furthermore, Astute (2019) has clearly demonstrated that an appropriately conservative assessment was performed by PEL (2018).

12.2.6 CALPUFF

The EPA requested that further information be provided on the CALPUFF set up and that a sensitivity analysis be undertaken to demonstrate the impact of assumed values, particularly sigma y and sigma z, on predicted concentrations.

The CAPUFF set-up was summarised in Section 4.2 of the AQA (PEL 2018), with key settings listed in Table 4-3.

Astute (2019) advises that sigma y and sigma z parameters are used to input the initial horizontal and vertical dispersion and explains that 0 m (zero metres) values would indicate a small source with low flows. PEL's (2018) model adopted a sigma Y and Z values of 4.5 m and 1.0 m, respectively, to reflect that the relatively large sources (i.e. poultry sheds with multiple ventilation fans at one end).

In response to the EPA's request for a sensitivity analysis, Astute (2019) modelled several scenarios based on a single poultry shed with varying source set-up. The varying parameters are listed in **Table 9** and the results are shown as ($C_{99\ 1sec}$) 2 ou contour plots in **Figure 19**.

Table 9 CALPUFF Sensitivity Analysis Scenarios

Scenario	Height	Sigma Y	Sigma Z	Line Colour in Figure 19
AQA (PEL 2018)	1 m	4.5 m	1 m	Red
1	1 m	9 m	1 m	Yellow
2	1 m	0 m	0 m	Black
3	2 m	0 m	0 m	Pink

Figure 19 CALPUFF Sensitivity Analysis Results - Single Shed

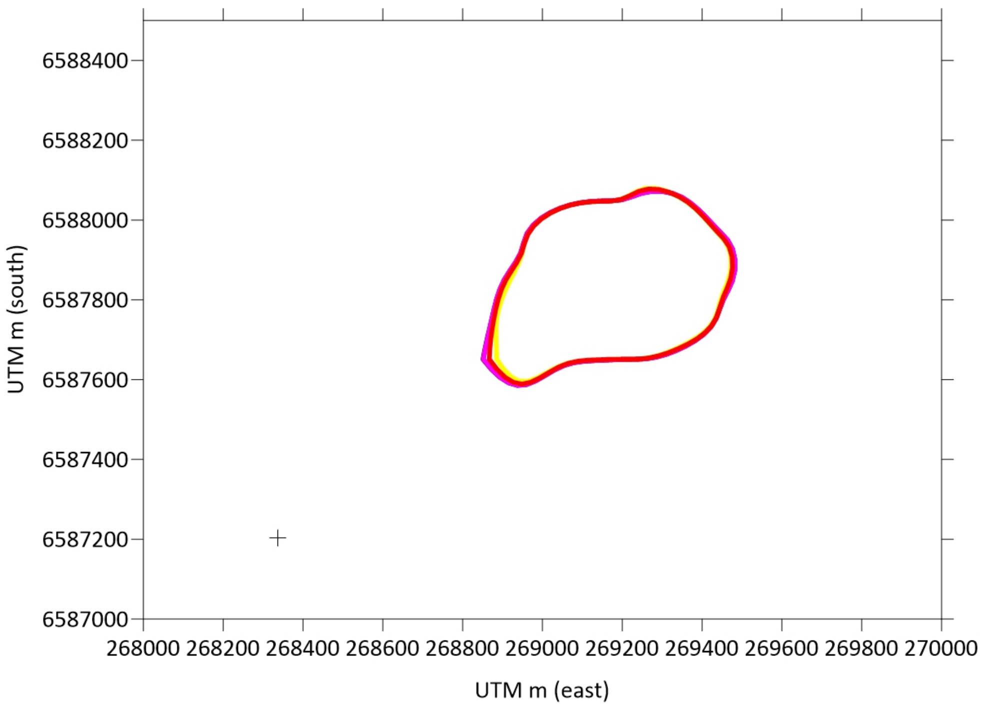


Figure 19 demonstrates that the change in contours in insignificant with the varying source set-up, even with unrealistic sigma values of 0 (Astute 2019).

The EPA requested that all CALPUFF input and output files and meteorological files used in modelling be provided.

The CALPUFF files and meteorological files (as provided by PEL to Astute) were issued to the DPE with this RTS as a Dropbox link for download.

Two community submissions advised that in January 2014 the Victorian EPA replaced the air dispersion model AUSPLUME with the more advanced and current USEPA approved air dispersion model AERMOD. The submissions further advised that the Victorian EPA has found AERMOD to generally result in better predictions of air quality impacts and require increased separation distances and land areas.

Astute (2019) confirms that the methodology adopted in the AQA (PEL 2018) has been extensively used across NSW and Australia and is consistent with the Approved Methods (EPA 2016) and 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* (OEH 2011). PEL's (2018) use of CALPUFF, which is an advanced dispersion model, is consistent with current best practice (Astute 2019). The Approved Methods (EPA 2016) advise:

> *CALPUFF is a multi-layer, multi-species, non-steady-state Gaussian puff dispersion model able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport….*
>
> *CALPUFF has been accepted by the USEPA as a guideline model to be used in regulatory applications involving the long-range transport of pollutants (>50 km). It can also be used on a case-by-case basis in situations involving complex flow and non-steady-state cases up to 50 kilometres from the source.*

AERMOD is a Gaussian plume model and steady-state model. The Approved Methods (EPA 2016) specifically state that steady-state models are not approved where there are non-steady state conditions and where there is a high frequency of calm conditions. Astute (2019) advises that the Development Site experiences both non-steady state conditions and a high frequency of calm conditions and, therefore, AERMOD (and other steady-state models) are not appropriate to assess the Development.

12.2.7 Ventilation Rate

The AQA used the modelling methodology developed by Ormerod & Holmes (2005) to estimate hourly odour emission rates (OERs), with ventilation rate data from the University of Georgia (Georgia). The EPA claimed that the Georgia ventilation rate table is known to underestimate ventilation rates and, therefore, underestimate OERs under certain conditions. The EPA requested that a further ventilation rate validation study or sensitivity analysis be undertaken using Dunlop & Duperouzel (2014) equations to demonstrate the range in potential odour impacts.

Animal Liberation also raised the ventilation rate methodology as an issue, stating that the "negligent assessment requires further clarification".

Overview of K Factor

It is important to firstly highlight that the K factor method, as noted in Ormerod & Holmes (2005, cited in Astute 2019), is based on real world test data and predicts emissions based on a series of inputs. The OER at a point in time is predicted using the following equation:

$OER = 0.025 \times K \times A \times D \times V^{0.5}$ where:

OER = odour emission rate (ou/s);
K = K factor;
A = total floor area of the poultry shed (m^2);
D = average bird density (kg/m^2); and
V = ventilation rate (m^3/s).

Astute (2019) explains that the emission rate increase is non-linear. When calculating emissions, if the ventilation rate doubles, the emissions will increase by only approximately 40%. As a further example, if the ventilation rate changes by 20%, the emissions will change by approximately 10%. Therefore, Astute (2019) advises that the K factor used is more critical than the ventilation rate.

Response to EPA

The key point made by the EPA was:

> *The University of Georgia shed ventilation rate table is known to underestimate ventilation rate and therefore odour emission rates under certain conditions.*

The EPA's reference for this statement is *Odour emissions from tunnel-ventilated broiler sheds: case study of nine Queensland farms* (Dunlop, Gallagher et al 2010, cited in Astute 2019), a copy of which is appended to the *Response to Air Quality Issues* (Astute 2019) in **Appendix D**. To check the EPA's claim, Astute (2019) searched the reference paper for the key terms of "underprediction", "Georgia", "conditions", "airflow" and "ventilation", with none of these terms found in a way that supported the EPA's statement. However, Astute (2019) notes that the emission rate data referred to in the paper are the same as those in the Australian Poultry Cooperate Research Centre's (Poultry CRC) *Dust and odour emissions from meat chicken sheds* (2011) and that most of the data were collected by forcing the sheds through ventilation modes in quick succession. Astute (2019) explains that this means that the ventilation rates in the Poultry CRC (2011) dataset increased irrespective of temperature (i.e. overventilated during testing) and, as such, the data is not representative of what would occur at a poultry farm operating normally.

The EPA refers to the Model 1 and Model 2 methods of Dunlop & Duperouzel (2014), which are based on a large dataset that was turned in to a single equation for one year. While this simplified the methodology, the equations predicted maximum ventilation rates far better than minimum rates, meaning that the method is more likely to overpredict than underpredict ventilation rates and therefore emissions (Astute 2019). Importantly, Astute (2019) advises that Dr Dunlop has noted elsewhere that the models were never intended to be used for dispersion modelling.

Additional points made by the EPA were:

- *The Dunlop and Duperouzel (2014) empirical equation (Model 2) should have also been included in the assessment as it performed slightly better than Model 1.*
- *The validation study is extremely limited. It should have covered a wide range of environmental conditions (spring, summer, autumn and winter), and covered the whole growth cycle, not just four days.*
- *The validation study design is not ideal as it appears to have used different years of data (2005 vs 2018).*

In responding to this, Astute (2019) advises that while there is debate over what ventilation methods to use, the emission rates are a key input and the methods used to estimate emissions, as noted in Dunlop, Gallagher et al (2010), should realistically estimate emissions. This is especially relevant considering the recent odour test data presented in **Section 12.3.1**.

In relation to Dunlop and Duperouzel's (2014) Models 1 and 2, the R2 value for Farm C (the Tamworth farm) was 82.6 in Model 1 and 82.9 in Model 2, which are essentially identical. However, Astute (2019) advises that Model 1 performed on average better across all farms and hence its use is considered more appropriate. Furthermore, as shown in Figure 2-2 in PEL's letter to the EPA on 1 June 2017 (Draft Summary), Model 1 more often predicted higher ventilation rates than Model 2 (Astute 2019).

Astute (2019) analysed actual test data from ProTen's Narrandera poultry farm and another poultry farm in the Griffith area to examine this further. The data is summarised in **Tables 10** and **11**, respectively.

Table 10 ProTen's Narrandera Farm Test Data – Ventilation

Bird Age (days)	Target Temp.[1] (°C)	Total Live Weight (kg)	Density (kg/m²)	Ambient Temp. (°C)	Actual Ventilation (%)	Predicted Ventilation Model 1 (%)	Predicted Ventilation Model 2 (%)	Predicted Ventilation Georgia (%)[2]
29	19	74,077	27.2	17	30	76	72	7.6
29	19	74,077	27.2	17	30	76	72	7.6
29	21	74,131	27.3	20	30	72	80	7.6
29	21	74,131	27.3	20	30	72	80	7.6

1 - based on Ross target temperatures in Dunlop & Duperouzel (2014).

2 - based on modelled ventilation rate.

Astute (2019) concludes the following from the results in **Table 10** for the Narrandera farm:

- Dunlop & Duperouzel (2014) methods over-predicted ventilation rates compared to the actual ventilation rates; and
- Georgia method under-predicted ventilation rates compared to the actual ventilation rates.

Table 11 Griffith Farm Test Data – Ventilation

Bird Age (days)	Target Temp.[1] (°C)	Total Live Weight (kg)	Density (kg/m²)	Ambient Temp. (°C)	Actual Ventilation (%)	Predicted Ventilation Model 1 (%)	Predicted Ventilation Model 2 (%)	Predicted Ventilation Georgia (%)[2]
27	19	77,758	25.5	28	54	100	100	63
27	19	77,758	25.5	28	54	100	100	63
23	21	53,940	17.7	28	54	92	100	63
23	21	53,940	17.7	28	54	92	100	63
19	22	44,690	14.7	28	46	77	95	38
19	22	44,690	14.7	28	46	77	95	38
30	18	76,961	22.6	24	92	100	100	63
30	18	76,961	22.6	24	92	100	100	63
27	19	79,689	23.4	24	94	95	100	38
27	19	79,689	23.4	24	94	95	100	38

1 - based on Ross target temperatures in Dunlop & Duperouzel (2014).

2 - based on modelled ventilation rate.

Astute (2019) concludes the following from the results in **Table 11** for the Griffith farm:

- Dunlop & Duperouzel (2014) methods significantly over-predicted ventilation rates compared to the actual ventilation rates for six of the data points and predicted similar for four of the data points; and
- Georgia method predicted ventilation rates reasonably for six of the data points and under-predicted for four of the data points.

The limited data points above and the sensitivity analysis performed on real world data highlights that the Dunlop & Duperouzel (2014) Models 1 and 2 tend to over-predict ventilation rates, whereas the Georgia method can, as noted by the EPA, under-predict ventilation rates on occasion (Astute 2019). However, Astute (2019) believes that the key question should be whether the method predicts realistic emission rates. Astute (2019) undertook additional sensitivity analysis in this regard, with the results summarised in **Tables 12** and **13** for the Narrandera farm and Griffith farm, respectively. The tables should be read as follows:

- Column 1 - bird age from test data as reference point;
- Column 2 - OER predicted using K factor method and odour test data in **Tables 10** and **11**;
- Column 3 - OER predicted using K factor method and odour test data with Model 1 ventilation;
- Column 4 - OER predicted using K factor method and odour test data with Model 2 ventilation;
- Column 5 - OER predicted using K factor method and odour test data with Georgia ventilation;
- Column 6 - actual measured OER;
- Column 7 - ratio of the average of the Models 1 and 2 OER to Actual OER; and
- Column 8 - ratio of Georgia OER to Actual OER.

Table 12 ProTen's Narrandera Farm Test Data – Measured and Predicted Emissions (K=2)

	Predicted OER (ou/s)				Actual OER (ou/s)	Ratios	
Bird Age (days)	Predicted OER Based on Test Data	Predicted OER Based on Model 1	Predicted OER Based on Model 2	Predicted OER Based on Georgia		Method 1/2 to Actual	Georgia to Actual
29	26,389	41,857	40,798	13,322	10,677	3.9	1.2
29	26,389	41,857	40,798	13,322	8,244	5.0	1.6
29	26,318	40,617	43,096	13,286	8,927	4.7	1.5
29	26,318	40,617	43,096	13,286	8,927	4.7	1.5
					Average	**4.6**	**1.5**

Table 13 Griffith Farm Test Data – Measured and Predicted Emissions (K=2)

	Predicted OER (ou/s)				Actual OER (ou/s)	Ratios	
Bird Age (days)	Predicted OER Based on Test Data	Predicted OER Based on Model 1	Predicted OER Based on Model 2	Predicted OER Based on Georgia		Method 1/2 to Actual	Georgia to Actual
27	32,056	43,685	43,685	34,536	13,392	3.3	2.6
27	32,056	43,685	43,685	34,536	8,701	5.0	4.0
23	25,244	32,972	34,401	27,197	10,338	3.3	2.6
23	25,244	32,972	34,401	27,197	10,338	3.3	2.6
19	20,677	26,781	29,640	18,638	10,104	2.8	1.8
19	20,677	26,781	29,640	18,638	10,961	2.6	1.7
30	44,991	46,828	46,828	37,021	24,743	1.9	1.5
30	44,991	46,828	46,828	37,021	28,434	1.6	1.3
27	46,458	46,803	47,981	29,382	21,480	2.2	1.4
27	46,458	46,803	47,981	29,382	21,480	2.2	1.4
					Average	**2.8**	**2.1**

The sensitivity analysis clearly demonstrates that Dunlop & Duperouzel (2014) Models 1 and 2 significantly over-estimate emissions to the point where they are not near realistic (Astute 2019). It also clearly demonstrates that the K factor method, as used by PEL (2018), predicts higher emissions than measured at modern farms like the proposed Development despite the ventilation rate method. This clearly demonstrates that the K factor method used in modelling is conservative and appropriate (Astute 2019).

Astute's (2019) findings in relation to emissions are consistent with the lack of complaints from new poultry farms that have been assessed using the same modelling method as done by PEL (2018) for the proposed Development, including ProTen's Narrandera, Jeanella and Jeanella South farms and other new farms such as the Tabbita farm near Griffith.

12.3 Emissions and Impacts

12.3.1 Worst Case Emissions

The EPA and HNELHD requested that it be demonstrated that worst-case odour emissions have been modelled.

Additionally, two community submissions asserted that unforeseen odour impacts may be experienced once the Development is operational, as odour emissions from proposed new poultry farms are unknown and are likely to differ from existing farms.

The odour modelling undertaken by PEL (2018) considered years of real-world odour test data from a variety of meat chicken farms. To assist in demonstrating that worst-case emissions were modelled, Astute (2019) organised the collection of further odour test data from ProTen's relatively new Narrandera poultry farm in south-western NSW. Narrandera was approved by the DPE in November 2015 (SSD 6882), with the same odour impact assessment methodology as that used by PEL (2018) for the proposed Development, and has been operational since April 2016. The poultry sheds and PPUs proposed at Rushes Creek are very similar in design, scale and layout to the sheds and PPUs at Narrandera and will have near identical operational and management procedures.

Testing was performed by The Odour Unit in two poultry sheds at Narrandera just before the first bird pick-up during July 2018. The testing was undertaken at this time as the bird numbers and bird density were both at maximum (Astute 2019). The test results are summarised in **Table 14**.

Table 14 Odour Test Results - ProTen's Narrandera Farm

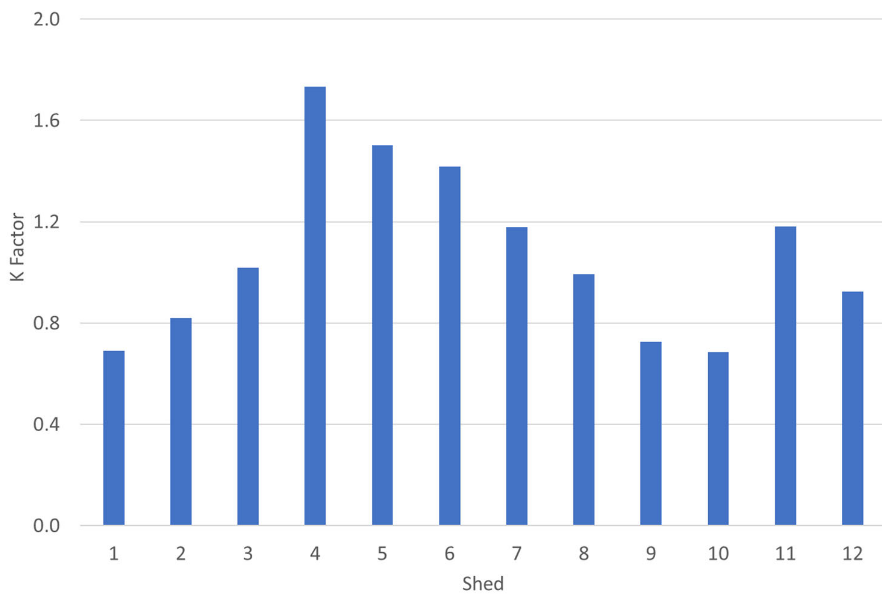
Location	Sample No.	Bird Age (days)	OER (ou/s)	Floor Area (m^2)	Number of Birds	Average Bird Weight (kg)	Ventilation Rate (STP[1]) (m^3/s)	K Factor
Farm 75 – Shed 1	1	29	10,677	2,720	46,298	1.6	49.7	0.8
	2	29	8,207	2,720	46,298	1.6	49.7	0.6
Farm 75 – Shed 2	1	29	8,297	2,720	46,332	1.6	49.3	0.7
	2	29	8,927	2,720	46,332	1.6	49.3	0.7
							Average K Factor	**0.7**

1 – standard temp and pressure

The measured K factors listed in **Table 14** are significantly lower than the recommended K factor in *Best Practice Guidance for the Queensland Poultry Industry - Plume Dispersion Modelling and Meteorological Processing* (PAEHolmes 2011, cited in Astute 2019) and significantly lower than the K factor of 2.2 adopted in the odour assessment for Narrandera. They are also significantly lower than the conservative K factor of 2 adopted by PEL (2018) for the Development. The results provide an average K factor of 0.7, which demonstrates that ProTen's newer farms are very well designed and managed and operate with minimal odour emissions (Astute 2019). Astute (2019) concludes that the K factor of 2 adopted by PEL (2018) for the Development is suitably conservative and represents a realistic worst-case emission value.

The odour test data from Narrandera is consistent with test data from other poultry farms in NSW and Queensland, were an average K factor of 1.1 has been demonstrated. The test data from these other farms collected by Astute between December 2017 and July 2018 is summarised in **Figure 20**.

Figure 20 Odour Test Results – Other NSW and Queensland Farms



Astute (2019) advises the following in relation to **Figure 20**:

- All farms tested were less than 10 years old, with most sheds less than five years old;
- All sheds had more than 45,000 birds in them at testing;
- Testing was undertaken in the lead up to the first bird pick-up or just after the first bird pick-up, with birds between 19 and 43 days old (average of 30 days);
- Each of the 12 data points shown are an average K factor from two data points per shed;
- Data points 1 to 3 and 9 to 12 relate to NSW poultry farms, with data points 9 and 10 being the July 2018 test data from ProTen's Narrandera farm (as listed above in **Table 14**);
- Data points 1 to 3, 11 and 12 are from one farm with multiple PPUs, and data points 5 to 8 are from one farm with multiple PPUs;
- The average K factor was 1.1, with a standard deviation of 0.3; and
- The 95th percentile K factor was 1.6.

This additional test data from other poultry farms reaffirms that the K factor of 2 adopted by PEL (2018) for the Development is suitably conservative and represents an upper limit K factor.

Astute (2019) has clearly demonstrated that the K factor method used in the AQA (PEL 2019) predicts higher emissions than measured at modern poultry farms and the emissions modelled represent the upper range of potential emissions from the Development. This, combined with the fact that three batch staging scenarios were modelled to test the effect of different meteorology and peak emission events, confirms that an appropriately conservative assessment was performed by PEL (2018) (Astute 2019). On this basis, higher than predicted emissions are not anticipated. The predicted odour concentrations are conservative and compliance is expected (Astute 2019).

The approval and complaint-free operation of ProTen's Narrandera, Jeanella and Jeanella South poultry farms and other new poultry farms, including the Tabbita farm near Griffith, highlights that the methodology used by PEL (2018) is appropriate (Astute 2019).

12.3.2 Modelling Results

The EPA requested that tables of predicted odour concentrations for each batch staging scenario at all sensitive receptors be provided.

Section 6.1 of the AQA (PEL 2018) and Section 8.1.5 of the EIS list the predicted 99th percentile odour concentrations for the three modelled scenarios at the four most affected sensitive receptors (R22, R23, R24 and R25) and illustrate the predicted 99th percentile odour concentrations for the three modelled scenarios as contour plots showing all sensitive receptors (R1 to R36).

As requested by the EPA, the predicted 99th percentile odour concentrations for the three modelled scenarios at all identified sensitive receptors (R1 to R36) are listed in **Table 15**. All sensitive receptors 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 receptor R24 for the Day 32 staging scenario.

Table 15 Predicted 99th Percentile Odour Concentrations

Receptor (see Figure 3)		Assessment Criterion (ou)	Batch Staging Scenario Predicted 99th Percentile Odour Concentration (ou)		
ID	Description		Day 4	Day 18	Day 32
R1	Dwelling, Rushes Creek Rd	5	0.9	0.8	0.8
R2	Dwelling, Rushes Creek Rd		1.0	1.0	1.2
R3	Dwelling, Rushes Creek Rd		0.7	0.7	0.8
R4	Dwelling, Rushes Creek Rd		0.8	0.7	0.9
R5	Dwelling, Rushes Creek Rd		0.8	0.8	1.0
R6	Dwelling, Rushes Creek Rd		0.8	0.8	1.3
R7	Dwelling, Moys Ln		1.0	1.0	1.7
R8	Dwelling, Moys Ln		1.3	1.1	1.6
R9	Dwelling, Corella Rd		0.9	1.0	1.2
R10	Dwelling, Corella Rd		0.8	0.9	1.1
R11	Dwelling, Rushes Creek Rd		0.9	1.0	1.1
R12	Dwelling, Rushes Creek Rd		0.9	1.0	1.0
R13	Dwelling & small piggery, Rushes Creek Rd		1.2	1.3	1.2
R14	Dwelling, Rushes Creek Rd		1.4	1.4	1.7
R15	Dwelling, Ski Gardens Rd		1.2	1.2	1.4
R16	Potential future dwelling, Rushes Creek Rd		1.5	1.6	1.9
R17	Manilla Fishing Club, Ski Gardens Rd		1.1	1.1	1.2
R18	Dwelling, Ski Gardens Rd		2.0	2.1	2.4
R19	Dwelling, Moys Ln		1.6	1.4	3.3
R20	Manilla Ski Gardens Caravan Park, Ski Gardens Rd		1.1	1.1	1.3
R21	Dwelling, Rushes Creek Rd		1.7	1.7	2.1
R22	Dwelling, Moys Ln		2.1	2.0	3.7
R23	Dwelling, Moys Ln		2.0	2.0	3.6
R24	Dwelling, Rushes Creek Rd		3.4	4.0	4.2
R25	Dwelling, Rushes Creek Rd		2.7	3.0	2.8
R26	Dwelling, Perrings Rd		1.3	1.5	1.2
R27	Dwelling, Perrings Rd		1.3	1.4	1.1
R28	Dwelling, Rushes Creek Rd		1.4	1.5	1.6
R29	Dwelling, Boundary Rd		1.4	1.4	1.5
R30	Dwelling, Boundary Rd		1.4	1.5	1.5
R31	Dwelling, Glenbrook Rd		1.0	1.0	0.8
R32	Lake Keepit Sport & Recreation Centre, National Fitness Rd		1.9	1.7	1.6
R33	Dwelling, National Fitness Rd		2.0	1.9	2.4
R34	Dwelling, Rushes Creek Rd		1.2	1.3	1.3
R35	Potential future dwelling, Bidford Access Rd		1.2	1.2	1.3
R36	Dwelling, Glenbrook Rd		0.9	1.0	1.1

Several community submissions noted their opposition to the Development based on excessive odour for surrounding residents.

Two community submissions asserted that the maximum predicted odour level of 4.2 ou at receptor R24 will be "unbearable" / "intolerable".

PEL's (2018) odour modelling results (see above) show that all residential receptors surrounding the Development Site are predicted to experience 99th percentile odour concentrations below the 5 ou criterion for all three batch staging scenarios. As outlined in **Section 12.2.7**, the K factor method used by PEL (2018) has been demonstrated to predict higher emissions than measured at modern poultry farms and the emissions modelled represent the upper range of potential emissions from the Development.

Twenty-eight (28) of the 36 receptors listed in **Table 15** are predicted to experience 99th percentile odour concentrations below 2 ou for all three of the modelled scenarios. Two odour units (2 ou) is the most stringent criterion in NSW and is applied to areas with a high population density (i.e. greater than 2,000 people) and to other sensitive receptors such as schools and hospitals. On this basis, there is a very low risk of impact for the majority of receptors where odour concentrations of less than 2 ou are predicted.

Of the eight receptors listed in **Table 15** predicted to experience 99th percentile concentrations above 2 ou for one or more of the three modelled scenarios, all except one are predicted to experience 99th percentile concentrations below 4 ou. The highest concentration of 4.2 ou at R24 for the Day 32 scenario was predicted by PEL (2018) at the 99th percentile on a 1-second averaging time. Astute (2019) advises that while some detectable odour may occur from time to time, the assessment indicates that R24 will not have detectable odour for the majority of the year. Astute (2019) further advises that recent odour intensity testing at a similar poultry farm near Griffith gave an intensity of approximately two (2) at 4 ou, which is a weak odour and below "distinct", and the poultry odour didn't register as distinct to around 8 ou above the odour detection threshold.

Two community submissions identified that the preliminary modelling predictions provided in the PEA included odour concentrations of 5.1 ou and 4.2 ou at receptors R24 and R25, respectively, and queried how the concentrations provided in the EIS can be lower than originally predicted.

There are several reasons for the reduction in predicted odour concentrations from the preliminary modelling results presented in the PEA to the final modelling results presented in the EIS. These include:

- As outlined in Section 3.1 of the EIS, the total number of poultry sheds was reduced from the originally planned 64 sheds (as presented in the PEA) to the proposed 54 sheds. In the early stages of the proposal, significant odour modelling was undertaken in parallel with consultations with the EPA to reach a development scale and layout that would meet the EPA's expectations in relation to odour emissions and associated impacts. Numerous development scenarios were modelled to find a development scale and layout that achieved good compliance with the adopted 5 ou criterion and also balanced the economics of the Development.

  While the original plans comprised 16 poultry sheds in each of the four PPUs (i.e. 64 sheds), the proposed Development now comprises a total of 54 sheds (i.e. 10 less than originally planned) split between the four PPUs as follows -
  - Farm 1 – 10 sheds (i.e. six less than originally planned);
  - Farm 2 – 18 sheds (i.e. two more than originally planned);
  - Farm 3 – 10 sheds (i.e. six less than originally planned); and
  - Farm 4 – 16 sheds (i.e. the same as originally planned).

- 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. As outlined in Section 3.1 of the EIS, these included moving Farm 2 to the southeast and moving Farms 3 and 4 slightly to the north.
- The preliminary odour modelling presented in the PEA adopted a K factor of 2.2, while the odour modelling presented in the EIS adopted a K factor of 2. As outlined in **Section 12.3.1**, the K factor of 2 has been demonstrated to be suitably conservative and represents an upper limit K factor.

One community submission asserted that the odour modelling results contradict wind modelling, with the wind modelling showing northeast predominate winds and the odour modelling showing residents to the northeast will be most affected.

Astute (2019) advises that the shape of the odour contours, as shown on Figures 6-1 to 6-3 in the AQA (PEL 2018) and Figures 25 to 27 in the EIS, is based on:

(a) emissions across the year for the area;

(b) winds for each hour of the year across the area;

(c) dispersion occurring during each hour of the year; and

(d) predicted concentrations.

Astute (2019) further advises that the modelling makes use of percentiles, which look at the top 1% of impacts for the year (i.e. the top 88 impacts; 99th percentile). This means that even if the winds blow infrequently in one direction, the model output still considers the top 1% of these and the odour contours are based on this. As such, in some instances, the contour may be relatively large even if the wind frequency is low (Astute 2019).

Two community submissions queried how their home (receptor R25) can be the closest receptor yet have the second highest predicted odour. These submissions asserted that the prevailing north-westerly winds will often blow odour from the Development in a south-easterly direction toward their property and that the natural southeast-northwest ridgeline running through the Development Site will direct odour carrying wind towards their property from Farms 1, 3 and 4.

Two other community submissions asserted that R25 will be in direct line of odour from the southern PPUs during the predominate north-westerly winds.

As outlined in **Section 12.2.1**, if north-westerly through westerly winds dominated in the area elements of this would show up in the Moana weather data and this is not the case (Astute 2019). The modelled annual wind behaviour at the Development Site, as presented in the wind rose in Section 2.7 of the EIS, shows that the prevailing winds are from the northeast and east with some winds from the west. PEL (2018) advised that this is consistent with expectations given the terrain in the area.

Local terrain can funnel flows/emissions under light wind or calm conditions, while moderate or stronger winds can overcome local terrain influences. Astute (2019) advises that such influences have been taken in to account in the modelling as the model makes use of both terrain and weather data.

Odour concentrations at a location are not solely based on distance. Astute (2019) advises that the predicted odour concentrations at each receptor are a function of:

(a) distance between the PPUs and the receptor;

(b) emissions across the year for the area;

(c) winds for each hour of the year across the area; and

(d) dispersion occurring during each hour of the year.

The AQA (PEL 2018) modelled three batch staging scenarios where peak emissions occur at different times during the year and the top 1% of impacts for the year were examined (i.e. the top 88 impacts; 99th percentile). Astute (2019) advises that this produces a more conservative range of conditions compared to modelling one scenario with a single batch placement day. The staging runs enabled the modelling to repeatedly assess scenarios where wind would have blown from each direction towards each receptor and the model is concluded to adequately capture winds in the area (Astute 2019). The highest predicted 99th percentile odour concentration at R25 is 3 ou, which is well below the adopted 5 ou criterion.

Two community submissions asserted that the odour from the Development will be more pronounced when the PPUs are being cleaned out between production cycles. These submissions calculated that there will be 224 days of elevated odour emissions each year (based on a 10 day cleaning phase per cycle at each of the four PPUs and 5.6 cycles per year at each of the four PPUs).

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. It certainly doesn't take 10 days to clean a poultry shed. The removal of litter, which can be a significant source of odour if mis-managed, typically takes one day and the remaining time is associated with washing and disinfecting the shed and placing fresh bedding material.

Shed clean-out can be managed to reduce the risk of odour emissions. As committed to in Sections 8.1.6 and 9 of the EIS:

- 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; and
- Poultry litter will not be stockpiled or spread within the Development Site.

Additionally, shed clean-out will only occur during the day when dispersion is typically higher.

12.3.3 Risk to Lake Keepit

GSC queried whether consideration was given to odour emissions over Lake Keepit, with the contours on Figures 25 to 27 in the EIS excluding areas over the water surface. GSC stated that the odour emissions from the Development have the potential to significantly impact recreational users of the Lake Keepit area and affect businesses that rely on the use of the area.

Some community submissions also identified excessive odour as a significant issue for Lake Keepit users and tourism operators.

Figure 18 shows the area modelled by PEL (2018), with the blue areas (i.e. Lake Keepit) modelled as water and the green areas modelled as predominantly rangeland (Astute 2019). The area of Lake Keepit modelled assumed that the lake was at full water supply level and, as such, the area had very little surface roughness (surface roughness increases odour dispersion), meaning the results would be conservative compared to if Lake Keepit was modelled as grassland (Astute 2019). The additional vegetation and/or grass associated with lower lake water levels would increase turbulence and odour dispersion.

Locations with temporary visitors and/or transient populations are not typically considered sensitive locations in relation to odorous operations. Regardless, PEL's (2018) odour contour plots provided as Figures 6-1 to 6-3 in the AQA (PEL 2018) and Figures 25 to 27 in the EIS indicate that odour is unlikely to reach Lake Keepit at sufficient concentrations to lead to impact (Astute 2019). PEL's (2018) modelling predicts that odour will be below 2 ou at Lake Keepit for the majority of time (i.e. 99% of the year) and, as such, there is a very low risk of impact to recreational users of Lake Keepit and local businesses that rely on the use of Lake Keepit. Two odour units (2 ou) is the most stringent criterion in NSW and is applied to areas with a high population density (i.e. great than 2,000 people) and to other sensitive receptors such as schools and hospitals.

Astute (2019) advises that recent odour intensity testing at a similar poultry farm near Griffith gave an intensity of approximately 1.5 at 2 ou, which equates to a weak odour that is below "distinct" and unlikely to lead to nuisance. The poultry odour didn't register as distinct to around 8 ou above the odour detection threshold.

One community submission noted that the odour modelling was undertaken for the condition of Lake Keepit being full and queried whether suitable settings were applied in CALPUFF to accurately model the movement of air over the "glassy smooth lake surface". The submission asserted:

At all lake levels air will accumulate overnight in the basin. Even under calm conditions, air movement of 0.4 m/s will carry the odour laden air more than 14 km during 10 hours. At low lake levels there will be a very large volume of accumulation, and during morning warming this air will be carried to every lakeside location. There will potentially be thousands of recipients.

Two other community submissions asserted there is the potential for odour to be drawn in to the basin occupied by Lake Keepit as a result of temperature inversions and katabatic drifts and the odour will linger there for some time during calm conditions.

As outlined above, PEL (2018) conservatively modelled Lake Keepit assuming the lake was at full water supply level and, as such, the area had very little surface roughness (surface roughness increases odour dispersion). The modelling predicts that odour will be below 2 ou at Lake Keepit for the majority of time (i.e. 99% of the year).

Astute (2019) advises that due to the size of the lake and the distance from the PPUs and associated dispersion (as demonstrated by the modelling), the odour predicted to be emitted from the poultry sheds is unlikely to lead to a situation where odour will accumulate in the lake overnight and increase in concentration where an impact would occur. The dispersion between the PPUs and the lake would be significant enough to reduce the risk of impacts at Lake Keepit to negligible and, if odour was to reach the lake, it would continue to disperse rather than fill the basin (Astute 2019). While odour can in effect pool during calm conditions where the terrain is directly below the source, the distance between the PPUs and Lake Keepit is significant enough that it is highly unlikely that the odour would condense and increase over time (Astute 2019).

12.3.4 Cumulative Impacts

Several community submissions and the Animal Liberation claimed that the potential cumulative impact of the four PPUs (i.e. 54 sheds) has been "grossly understated" and inadequately addressed and the conclusion that any cumulative impacts will be negligible is not supported by any reliable data or evidence.

PEL (2018) modelled all four PPUs together and modelled the bird placement in accordance with Baiada's placement schedule (see **Section 12.2.3**) to ensure appropriate cumulative impact assessment. A sensitivity analysis of the odour risk was also completed by PEL (2018) by modelling three batch staging scenarios where peak emissions occur at different times during the year and the top 1% of impacts for the year were examined (i.e. the top 88 impacts; 99th percentile). Astute (2019) advises that this produces a more conservative range of conditions compared to modelling one scenario with a single batch placement day.

On this basis, the potential cumulative impacts from the four PPUs were modelled and assessed with appropriate and conservative data in the AQA (PEL 2018). Astute (2019) has clearly demonstrated that the K factor method used in the AQA (PEL 2019) predicts higher emissions than measured at modern poultry farms and the emissions modelled represent the upper range of potential emissions from the Development.

The odour modelling results listed in **Table 15** and shown as contour plots in Figures 6-1 to 6-3 in the AQA and Figures 25 to 27 in the EIS are cumulative predictions for the four PPUs modelled together. The highest cumulative odour prediction is 4.2 ou at receptor R24 for the Day 32 scenario, which is below the adopted 5 ou criteria.

12.4 Risk Management and Mitigation Measures

The EPA stated that there is considerable uncertainty in the odour modelling presented in the AQA and the risk posed needs to be managed to ensure an acceptable odour impact. The EPA advised that assessing odour risk involves evaluating the modelling results in relation to:

- ***the robustness and appropriateness of assessment input data*;**
- ***the degree of compliance with the odour impact assessment criteria. Marginal compliance with the odour assessment criterion suggests a risk that actual impacts may not be acceptable*;**
- ***the level of uncertainty in dispersion model results*;**
- ***the sensitivity of model results and the odour criterion to changes in source parameters and meteorological data*;**
- ***proposed odour mitigation measures and their reliability*; *and***
- ***the availability of additional feasible mitigation measures in case offensive odour occurs once the project is in operation*.**

The EPA and HNELHD requested that additional odour control options be investigated. HNELHD also recommended that a contingency plan be developed to address unpredicted odour impacts.

One community member queried the conservativeness of the odour modelling and suggested that it should be tested by comparing the modelled predictions using real time meteorological data from Moana with the actual odour impact at a nominated location in the Peel basin.

The purpose of an odour assessment performed by a specialist consultant is to assess the "risk" of odour impacts from a potentially odorous operation. PEL's (2018) odour impact assessment for the Development was performed in accordance with accepted and tested methodologies and in accordance with the EPA's Approved Methods (2016).

The EPA's claim that *there is considerable uncertainty in the modelling presented in the air quality assessment* is disputed. PEL (2018) reduced modelling uncertainty by:

- Using accepted and tested modelling methods;
- Using proper input data, as confirmed by Astute (2019);
- Adopting a K factor of 2, which has been demonstrated by Astute (2019) to be conservative (see **Section 13.3.1**);
- Using an OER estimation method that have been shown to over-predict emission rates compared to measured real world data (see **Section 12.2.7**); and
- Modelling three batch staging scenarios to test the effect of different meteorological periods and peak emission events.

Astute (2019) has clearly demonstrated that a suitable and appropriately conservative assessment was performed by PEL (2018). The emissions modelled are higher than actual measured emissions at modern poultry farms and represent the upper range of potential emissions from the proposed Development. The results of the ventilation rate sensitivity analysis performed by Astute (2019) shows that the K factor method, as used in the AQA (PEL 2018), predicts higher emissions than measured at modern farms despite the ventilation rate method.

Poultry farm management and profitability are directly related and ProTen has demonstrated the adoption of best management practices at the company's other poultry farms around Australia. The K factor measurements at ProTen's Narrandera farm, as summarised in **Section 12.3.1**, provided an average K factor of 0.7. This is significantly lower that the K factor of 2 adopted by PEL (2018) for the assessment of the Development and is evidence that ProTen's newer farms are very well designed and managed and operate with minimal odour emissions.

Given the conservative nature of the odour modelling performed by PEL (2018) and the additional analysis undertaken by Astute (2019), along with the fact that the Development will be operated adopting best management practices, higher than predicted emissions are not anticipated (Astute 2019). The predicted concentrations are conservative and compliance is expected (Astute 2019).

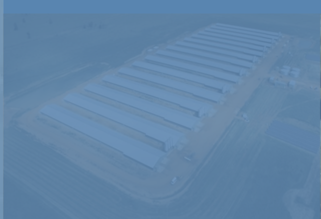
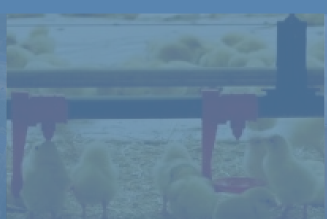
On this basis, additional odour control options (in addition to the adoption of current industry best practice) and/or a contingency plan to address unpredicted impacts are not warranted. The suggested testing/validation in the community submission is also not warranted (noting that the Moana farm and suggested monitoring location in the Peel basin are sufficiently far from the Development that they are not even relevant).

Emissions from the poultry broiler industry have been decreasing over time. This is linked to improved feed conversion, reduced poultry litter waste and RSPCA shed management, including reduced stocking density and improved bedding material management. As demonstrated by the recent odour test data summarised in **Section 12.3.1**, well managed modern broiler farms are operating with significantly lower K factors than K=2 (as adopted in the AQA) and have lower emissions than older farms (Astute 2019).

While there are some odour control technology options available, they generally come from Europe where separation distances like those available for this Development are not possible (Astute 2019). The combination of appropriate separation distances and vegetation screens represent current best practice (Astute 2019). Vegetation screens induce additional turbulence as the ventilation air from the sheds passes through the permeable barrier and this enhances odour dispersion (Astute 2019). Vegetation screens also act to partially remove fine dust from the ventilation air giving a corresponding percentage reduction in odour levels (Astute 2019). As committed to in Sections 4.20, 8.1.6 and 9 of the EIS, vegetation screens will be established and maintained around the perimeter of each PPU.

Section 13

PARTICULATE MATTER


13 PARTICULATE MATTER

PEL prepared the *Air Quality Assessment* (2018) (AQA) for the EIS in accordance with the Approved Methods (EPA 2016) and following significant engagement with the EPA (as outlined in the EIS). As advised in **Section 4.2.2**, Astute was engaged to provide additional specialist input and assessment in response to the particulate matter issues raised in the submissions received from government agencies (primarily the EPA) and the community. While the DPE did not raise any specific particulate matter issues, it reverberated on the EPA's submission by advising:

> *The Department notes that the Environment protection Authority (EPA) has raised several concerns with the air quality impact assessment (AQIA)… presented in the EIS in its submission dated 5 October 2018. The Department requests that the AQIA be revised to ensure it complies with the EPA's 'Approved Methods for the modelling and assessment of air pollutants in NSW' (EPA 2016) and addresses all issues raised by the EPA in its submission.*

After reviewing the issues raised by the EPA and undertaking additional analysis, Astute does not believe that revision of the AQA (PEL 2018) is warranted. Astute (2019) has demonstrated that PEL's (2018) particulate matter modelling provides an unrealistically conservative assessment of impacts and compliance is expected. Astute (2019) advises that the contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations. Astute's *Response to Air Quality Issues* (2019) is contained in **Appendix D**, with the responses to the individual particulate matter issues summarised in the below sub-sections.

13.1 Assessment Methodology

13.1.1 Weather Data and Meteorological Modelling

See **Section 12.2.1**.

13.1.2 Conservatism of Modelled Emissions

The AQA predicted one exceedance of the 24-hour average PM_{10} (particulate matter less than 10 microns in diameter) criterion at receptor R25 and noted that the emissions rate data used is inherently conservative and over-estimates emissions by a factor of at least two. The EPA stated that it is not adequate to simply claim an assessment is conservative in order to disregard any predicted exceedances of a criterion and that pollution controls should be included in the dispersion modelling, as necessary, to demonstrate that the Development can meet the assessment criterion.

Two community submissions asserted that dust emissions from proposed new poultry farms are unknown and unforeseen dust impacts may be experienced once the Development is operational.

The AQA (PEL 2018) used PM_{10} emissions data sourced from Mirrabooka (2002). PEL (2018) compared this data with two newer datasets, being Poultry CRC (2011) and PAEHolmes (2012), to show that the emission rates predicted using the Mirrabooka data are much higher (by a factor of at least two) than those from the newer data (see Figure 28 in the EIS). However, for conservatism, PEL (2018) adopted the emissions estimation method using the Mirrabooka data. Astute (2019) advises that the conservative nature of the Mirrabooka emission method has been included in several reports previously submitted to the EPA for other poultry farms.

Astute (2019) prepared **Figure 21** to compare the three emission sources. It is evident that the Mirrabooka emission estimation method (as used in the AQA) significantly over-predicts poultry shed dust concentrations compared to the more contemporary data. To further demonstrate this, Astute (2019) divided the Mirrabooka emissions by two (i.e. halved) and prepared **Figure 22** comparing the halved Mirrabooka emissions with the measured Poultry CRC (2011) and PAEHolmes (2012) data. The red arrow shows the upper predicted emissions that would be expected to lead to the worst-case impacts.

Figure 21 Modelled Emissions Vs Measured Emissions

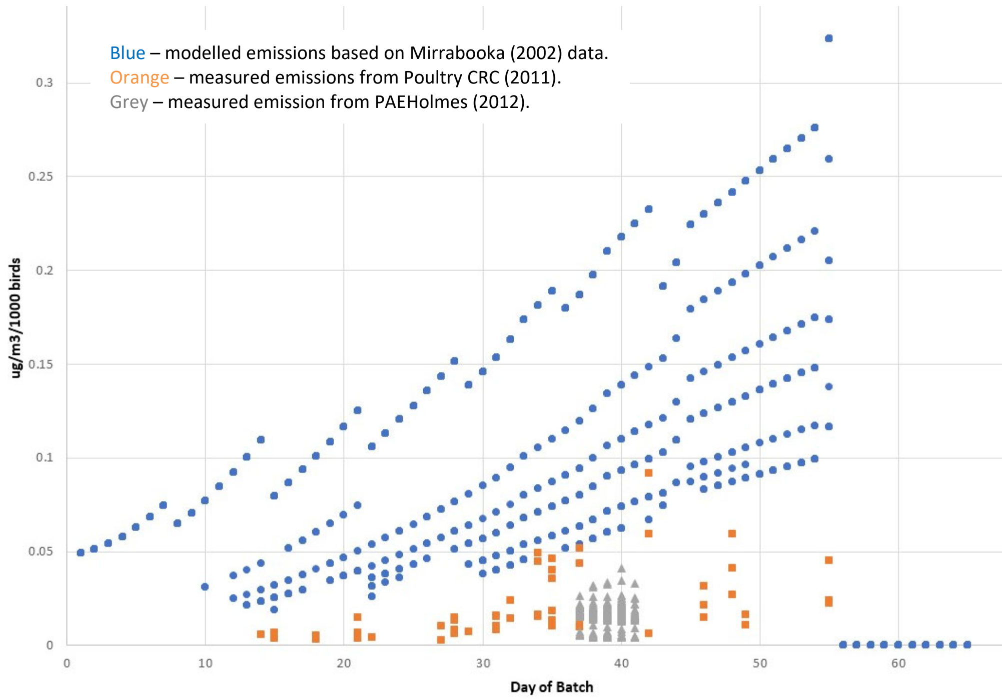


Figure 22 Modelled Emissions Halved Vs Measured Emissions

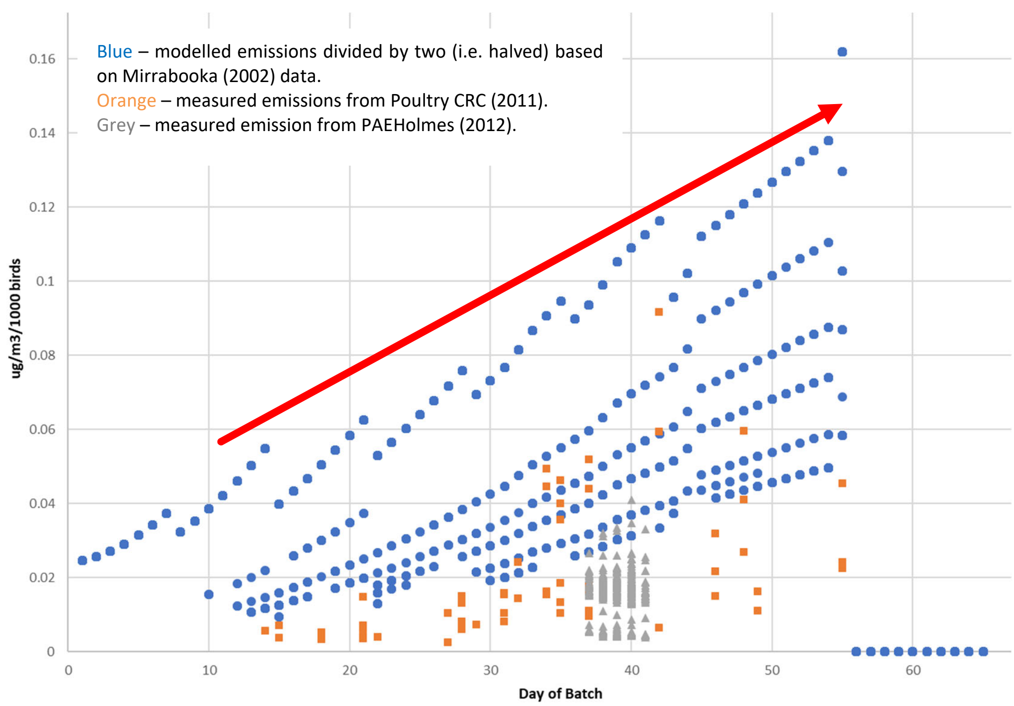


Figure 22 clearly shows that if the Mirrabooka predictions were divided by two (i.e. halved) the emissions would still be above (including outliers) the measured real-world data. This is highlighted by the red arrow showing that the upper predicted emissions, even when halved, are well above the range of measured data. On this basis, Astute (2019) concludes that the PM_{10} modelling is significantly conservative.

The AQA (PEL 2018) predicts that all receptors will experience maximum 24-hour average PM_{10} concentrations below the criterion of 50 micrograms per cubic metre (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 for the Day 4 scenario (compliance is achieved for the other two modelled scenarios). As demonstrated above, 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. 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 and compliance is expected (Astute 2019). If the modelling was re-run with the more recent measured real-world data compliance would be achieved at all receptors for all modelled scenarios.

On this basis, additional modelling is not considered warranted nor is the inclusion of particulate matter controls. See **Section 13.3** for further information on risk management and controls.

13.1.3 Excluded Emission Sources

HNELHD noted that the AQA did not consider emissions from combustion of fuels (for example, diesel) or traffic-generated dust during construction or operation.

Section 5.6 of the AQA (PEL 2018) and Section 8.2.5 of the EIS explain that the potential for significant particulate matter emissions from the emergency diesel generators and internal roads is low and not expected to exceed the relevant air quality criteria at surrounding receptors. On this basis, PEL (2018) did not considered that quantitative assessment of these potential sources was necessary. Astute (2019) confirmed this position by advising the following:

Combustion Emissions

The potential emissions from the emergency diesel generators were not assessed by PEL (2018) as they are not expected to be operated often or long enough to exceed the relevant air quality criteria at any surrounding receptors. This was previously demonstrated by PEL in the Response to Submissions for ProTen's approved Narrandera Poultry Production Farm (SSD 6882).

There will be three emergency standby diesel generators installed at each PPU 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 (the solar panels proposed to be installed at each PPU will possibly further reduce the frequency of generator use). They 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).

Given the emission standards, low frequency of use and the separation distances to surrounding receptors, the generators are not expected to exceed the relevant criteria at any nearby receptor location and further assessment is not warranted.

The emissions associated with on-site heavy vehicle activity is also not expected to be significant or warrant assessment.

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 roads will be formed to allow the travel of heavy vehicles and, therefore, will have a lower silt content (compared to unformed tracks). This, combined with the proposed low speeds limits, will reduce the potential for emissions. Based on previous assessments of multiple poultry operations, PEL (2018) advised that wheel generated dust from internal roads has been found to be a negligible source of dust. Furthermore, the separation distances from the internal roads to surrounding receptors are sufficient to ameliorate against potential impacts

Any emissions generated will be able to be mitigated and managed via the controls committed to in Sections 8.2.6 and 9 of the EIS, including limiting internal traffic speeds, road maintenance and the use of a water cart use (as required).

13.1.4 CALPUFF

See **Section 12.2.6**.

13.1.5 Cumulative Assessment

The EPA advised that the cumulative particulate matter assessment was not carried out in accordance with the Approved Methods , as the 2005 meteorological data used in the dispersion modelling was not coincident in time with the ambient 2016 monitoring data. The EPA requested that the cumulative assessment be revised accordingly.

HNELHD also mentioned this issue.

The Approved Methods (EPA 2016) allow two methods to be used for background concentrations:

- Level 1 – maximum background concentration for the averaging period added to the maximum predicted concentration at each receptor; or
- Level 2 – obtain background monitoring data for the averaging period, add the background concentration for each hour at each receptor to the predicted concentration at each receptor and determine the 100th percentile concentration at each receptor.

Astute (2019) advises that a downside to having to use the maximum background concentration is that if there is one period in the background dataset that is already above the criterion this will result in an automatic exceedance at every receptor regardless of the predicted emissions from the proposed development.

As noted in Section 4.1 of the Approved Methods (EPA 2016), if a full year of on-site meteorological data is not available for a Level 2 assessment, the year modelled should be correlated against a longer-duration site-representative meteorological database of at least five years (preferably five consecutive years) to be deemed acceptable. It must be clearly established that the data adequately describes the expected meteorological patterns at the site under investigation.

In line with the Approved Methods (EPA 2016), PEL (2018) assessed eight years of meteorological data from the BoM's AWS at the Tamworth Airport between 2005 and 2012 to determine a representative meteorological year to model. The data was analysed for wind speed, temperature and relative humidity, with 2005 selected as the most representative year of long-term observations. The wind roses for the eight years assessed are similar, indicating minor inter-annual variation.

The closest air quality monitoring station is within the urban area of Tamworth and, therefore, it was not considered representative of the rural environment in which the Development Site is located. On this basis, PEL (2018) sourced data from the EPA's Namoi Region Air Quality Monitoring Project privately-owned monitoring site at Wil-gai, approximately 40 km to the northeast of the Development Site. The PM_{10} data provided spanned between June 2015 and September 2017. During this period, the 24-hour concentrations were all relatively low, except for one event that reached just over the 50 µg/m^3 criterion. As noted above by Astute (2019), using this one event as either a background value or contemporaneously would result in exceedances at every receptor regardless of the emissions from the development.

In responding to the EPA's request to use the same year, Astute (2019) revisited the background data available from the Tamworth monitoring station for 2005 (i.e. the representative meteorological year in the AQA). Astute (2019) noted the following:

- There were gaps in the dataset associated with instrument failures, leading to data availability rates lower than the *National Environment Protection (Ambient Air Quality) Measure* (Department of the Environment [DoE] 2016) (AAQ NEPM) goal. The average of 12 years of data for each missing day was inserted to fill the gaps.
- There were two exceedances of the 24-hour criterion due to dust storms and/or bushfires. The highest concentration was 68.2 µg/m^3, well over the 50 µg/m^3 criterion. While the Approved Methods (EPA 2016) does not provide guidance in relation to background exceedances, the AAQ NEPM does define an exceptional event rule that allows exceptional event data to be removed from compliance reports. On this basis, the two events were removed from the dataset leaving a maximum 24-hour average PM_{10} concentration of 39 µg/m^3.

The 12-month dataset, with gaps filled and the two background exceedances removed, is shown in **Figure 23**.

Figure 23 Tamworth 2005 24-Hour Average PM_{10}

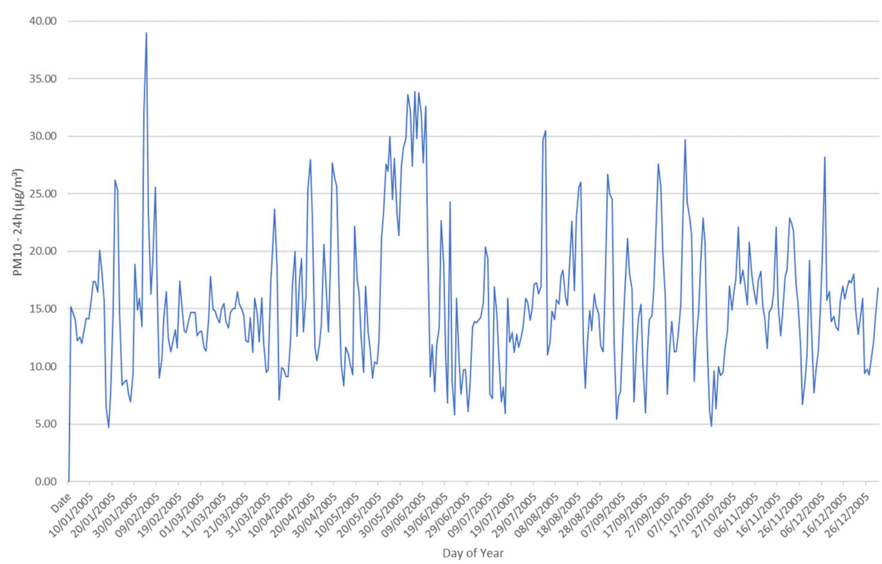


Figure 23 shows that when exceptional events and the data gaps are considered, the maximum background value of 39 µg/m^3 is conservative compared to the other hours in the 12-month period for a Level 1 assessment.

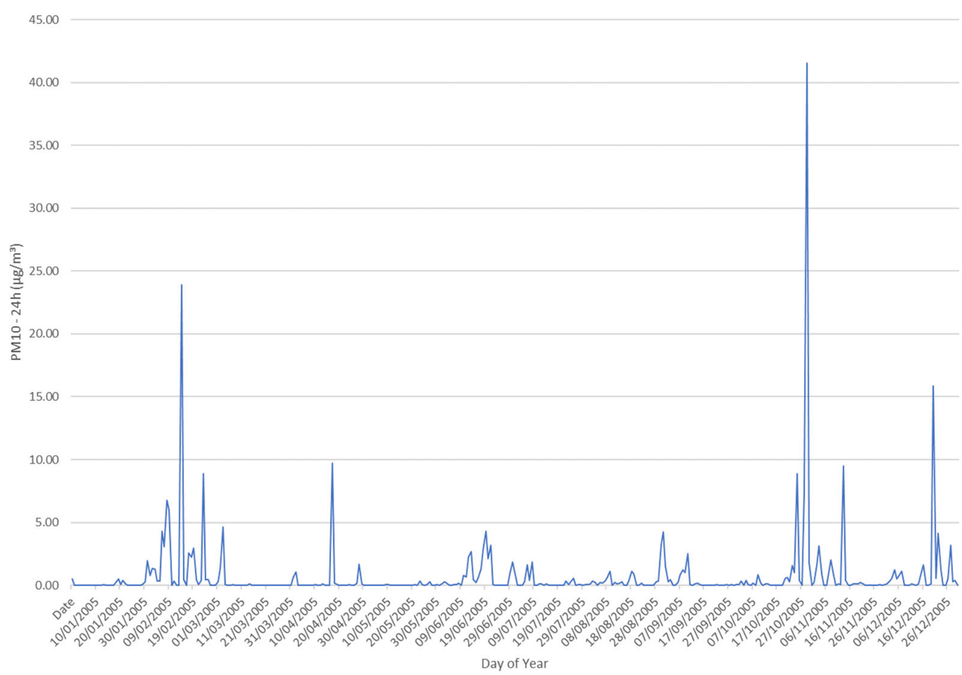
There was one receptor (R25) predicted to exceed the 24-hour average criterion in the AQA (PEL 2018). For the three batch staging scenarios modelled, R25 was predicted to experience the following 24-hour average PM_{10} concentrations when modelled in isolation (i.e. without background concentrations):

- Day 4 – 41.6 µg/m^3;
- Day 18 – 17.2 µg/m^3; and
- Day 32 – 24.3 µg/m^3.

Of the three modelled scenarios, the Day 4 run was the only one to exceed the criterion when background was included. Note that these concentrations would reduce to approximately 20.8 µg/m^3, 8.6 µg/m^3 and 12.2 µg/m^3, respectively, if the emission rates were divided by two (i.e. halved) as discussed above in **Section 13.1.2**.

PEL's (2018) predicted 24-hour concentrations at R25 for the Day 4 run (as graphed by Astute 2019) are shown in **Figure 24**. As evident, the peak event can be seen occurring on 30 October 2005.

Figure 24 Predicted 24-Hour Average PM_{10} Concentrations at R25 - Day 4 Scenario, No Background



Astute (2019) advises that the predicted concentrations need to be looked at in the context of:

(a) the background data;

(b) the conservatism of the emission estimation methodology;

(c) the degree of exceedance (if any); and

(d) possible mitigation measures.

When the contemporaneous data in **Figure 23** is added to the worst case predicted concentration at R25 for the Day 4 batch scenario in **Figure 24**, this gives a concentration of 58.8 µg/m^3 (i.e. contemporaneous background of 17.2 µg/m^3 plus predicted 41.6 µg/m^3). While this exceeds the criterion of 50 µg/m^3, the highly conservative nature of the emissions data (see **Section 13.1.2**) must be taken in to consideration. The emissions data, which has been proven to be well above real-world measured emission rates even when divided by two (i.e. halved), over-predicts the concentrations at surrounding receptors and provides an unrealistically conservative assessment (Astute 2019).

If the emissions data was divided by two, noting that this would still be conservative and above measured real-world emission rates (see **Figure 22**), the worst-case predicted concentration at R25 for the Day 4 scenario would be 38 µg/m^3 (i.e. contemporaneous background of 17.2 µg/m^3 plus 20.8 µg/m^3 [original divided by two]), which is compliant with the criterion of 50 µg/m^3.

PEL (2018) did not include any particulate matter controls in the modelling and none are considered warranted. See **Section 13.3** for further information on risk management and controls.

13.2 Emissions and Impacts

13.2.1 Modelling Results

Several community submissions noted their opposition to the Development based on increased dust for surrounding residents.

Two community submissions claimed that the maximum predicted annual average PM_{10} concentration of 12.3 µg/m^3 at receptor R24 is unacceptable.

PEL's (2018) modelling results show that all residential receptors are predicted to experience annual average PM_{10} concentrations below the criterion of 25 µg/m^3 for all three batch staging scenarios, including when Development emissions are combined cumulatively with background concentrations. The highest predicted cumulative annual average concentration of 12.3 µg/m^3 at receptor R24 is well below the criterion.

PEL's (2018) modelling results show that all residential receptors are predicted to experience maximum 24-hour average PM_{10} concentrations below the criterion of 50 µg/m^3 for all three batch staging scenarios, including when Development emissions are combined cumulatively with background concentrations, except for R25 where a cumulative concentration of 55.2 µg/m^3 is predicted for the Day 4 staging scenario (compliance is achieved for the other two modelled scenarios). As detailed in **Section 13.1.2**, Astute (2019) has demonstrated that the emissions rate data used by PEL (2018) is well above real-world measures emissions rates, even when divided by two (i.e. halved). As such, it provides an unrealistically conservative assessment and over-predicts the concentrations at surrounding receptors (Astute 2019). Astute (2019) advises that compliance at all receptors is expected. If the modelling was re-run with the more recent measured real-world data compliance would be achieved at all receptors for all modelled scenarios.

See **Section 13.3** for further information on risk management and controls.

Two community submissions asserted that the prevailing north-westerly winds will mean their property (receptor R25) will be the most severely impacted by dust from the Development and will experience 24-hour average PM_{10} concentrations above the criterion. These submissions also asserted that the natural southeast-northwest ridgeline running through the Development Site will direct dust carrying wind towards their property from Farms 1, 3 and 4.

As outlined in **Section 12.2.1**, if north-westerly through westerly winds dominated in the area elements of this would show up in the Moana weather data and this is not the case (Astute 2019). The modelled annual wind behaviour at the Development Site, as presented in the wind rose in Section 2.7 of the EIS, shows that the prevailing winds are from the northeast and east with some winds from the west. PEL (2018) advised that this is consistent with expectations given the terrain in the area.

Local terrain can funnel flows/emissions under light wind or calm conditions, while moderate or stronger winds can overcome local terrain influences. Astute (2019) advises that such influences have been taken in to account in the modelling as the model makes use of both terrain and weather data.

The AQA (PEL 2018) modelled three batch staging scenarios where peak emissions occur at different times during the year. Astute (2019) advises that this produces a more conservative range of conditions compared to modelling one scenario with a single batch placement day. The Day 4 staging scenario was the only model run to exceed the 24-hour criterion at R25, with compliance readily achieved for the other two model runs. As detailed in **Section 13.1.2**, the modelled emissions data has been proven to be highly conservative and well above real-world measured emission rates even when divided by two (i.e. halved). This provides an unrealistically conservative assessment of particulate impacts and compliance is expected (Astute 2019).

As outlined in **Section 13.3**, research has shown that dust concentrations drop back to background levels within approximately 30 to 100 m of the poultry sheds, even with no controls in place (Astute 2019). Given that R25 is located approximately 1,025 m from the nearest PPU (Farm 4), it is unlikely that significant dust from the Development will reach the dwelling. If it did happen to on occasion, it would be at a low concentration.

Two community submissions asserted that the dust modelling is not site-specific and it is based on predictions only. These submissions also queried how modelling three batch staging scenarios to represent days 1, 14 and 28 bird placements of one production cycle in 2005 can be a credible source of information in determining the potential dust impacts for the life of the Development.

Astute (2019) confirms that PEL's (2018) air quality modelling is site-specific in that it incorporates site-specific terrain and land use data and the specific design and layout of the proposed Development.

While air quality modelling is a predictive tool, it is widely used and it is the accepted method for assessing potential particulate matter impacts associated with development proposals. Astute (2019) confirms that the methodology adopted in the AQA (PEL 2018) has been extensively used across NSW and Australia and is consistent with the Approved Methods (EPA 2016) and 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* (OEH 2011).

PEL (2018) assessed eight years of meteorological data from the BoM's AWS at the Tamworth Airport between 2005 and 2012 to determine a representative meteorological year to model. The data was analysed for wind speed, temperature and relative humidity, with 2005 selected as the most representative year of long-term observations for the odour assessment. The wind roses for the eight years assessed are similar, indicating minor inter-annual variation. PEL (2018) then modelled the three batch staging scenarios to assess the effect of different meteorology and peak emissions across the year. Astute (2019) advises that this produces a more conservative range of conditions compared to modelling one scenario with a single batch placement day.

Two community submissions asserted that one of the known asthma triggers is dust generated by poultry and it will be near impossible to avoid the dust from the Development when carrying out day-to-day farming activities on their adjoining property (receptor R25). These submissions also queried what other respiratory diseases could result if the Development is permitted.

Three community submissions asserted that dust produced by the Development will settle on house roofs and contaminate drinking water in rainwater tanks.

Similarly, HNELHD recommended that consideration be given to the potential impact of dust, which may contain faecal pathogens, on rainwater collection of neighbouring residences.

Any dust, not just dust from poultry farms, has the potential to lead to asthma. Rural areas where traditional agricultural operations occur, such as the area surrounding the Development Site, have significant dust sources, including ploughing and cropping activities and wind erosion, especially during dry conditions.

Astute (2019) has demonstrated that the particulate matter emission estimation methodology adopted in the AQA (PEL 2018) is highly conservative. The contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations (Astute 2019). As outlined in **Section 13.3**, research has shown that dust concentrations drop back to background levels within approximately 30 to 100 m of the poultry sheds, even with no controls in place (Astute 2019).

On this basis, Astute (2019) advises that it is unlikely that dust from the four proposed PPUs will reach adjoining properties and receptors at sufficient concentrations to lead to any contamination or health impact, including asthma and other potential respiratory diseases. Refer to **Section 13.3** for further information on risk management and controls.

13.2.2 $PM_{2.5}$ Assessment

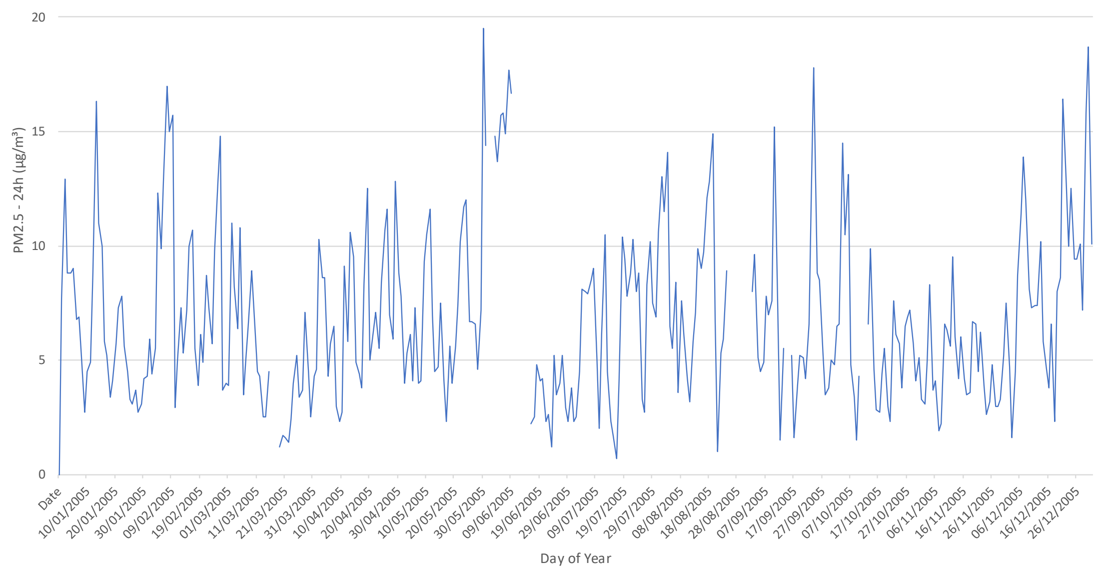
HNELHD noted that the AQA did not consider potential $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter) emissions.

While not considered necessary given the minimal risk of exceedance, Astute (2019) prepared a quantitative $PM_{2.5}$ assessment to address the HNELHD's concern.

Astute (2019) looked at the PM_{10} emission rates predicted using the Mirrabooka method, along with the data in Poultry CRC (2011), to generate the $PM_{2.5}$ emissions. Correlation coefficients were used to compare the data with key factors, including ventilation rate and birds age, however no relationship was found indicating a relatively constant relationship between the concentrations of PM_{10} and $PM_{2.5}$. The emissions rate data in Poultry CRC (2011) was analysed, yielding an average PM_{10}:$PM_{2.5}$ ratio of 4.2 and a median ratio of 3.9. Astute (2019) applied the median 3.9 ratio to the modelling, along with the (conservative) factor of 2 detailed above in **Section 13.1.2**.

As there is no local $PM_{2.5}$ background data for 2005 (i.e. the representative meteorological year), Astute (2019) adopted that 2005 background data from the EPA's monitoring site at Beresfield, which is shown in **Figure 25**. There were gaps in the dataset that were filled by Astute (2019) with the average of the available Beresfield dataset for 2005.

Figure 25 Beresfield 2005 24-Hour Average $PM_{2.5}$

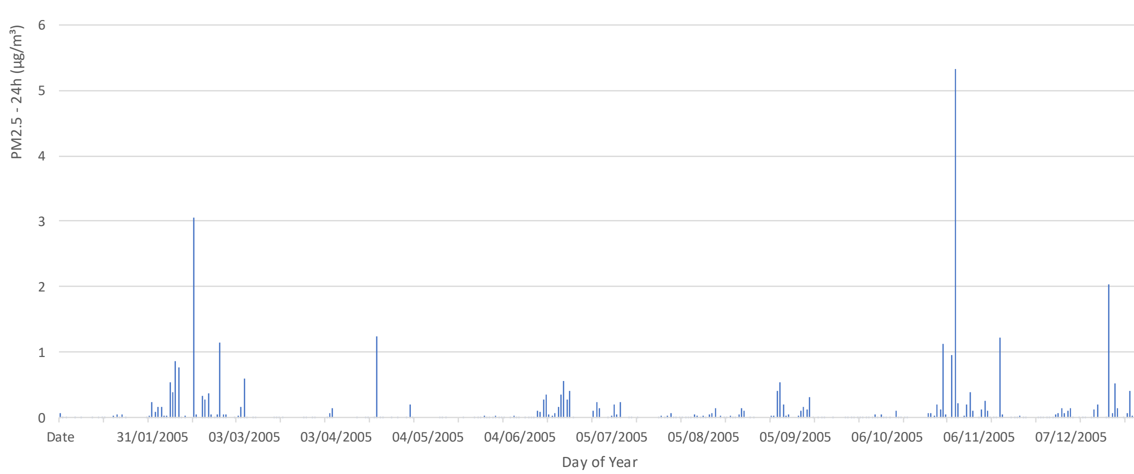


The highest recorded 24-hour concentration in 2005 was 19.5 µg/m^3 and the annual average over the 12 month period was 6.8 µg/m^3. These two values were used by Astute (2019) as the background concentrations.

The applicable maximum 24-hour average and annual average $PM_{2.5}$ criteria of 25 µg/m^3 and 8 µg/m^3, respectively, were taken from the Approved Methods (EPA 2016), which refers to the AAQ NEPM.

Figure 26 shows Astute's (2019) predicted 24-hour average $PM_{2.5}$ concentrations for the Day 4 batch staging scenario at the most affected receptor, being R25, without existing background levels.

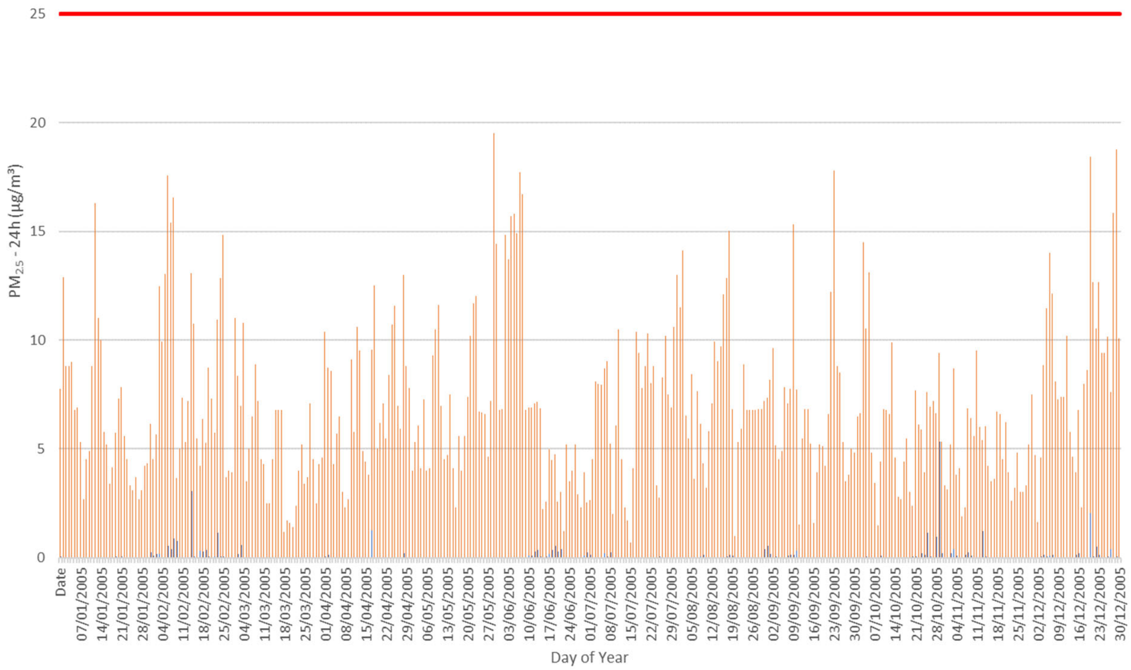
Figure 26 Predicted 24-Hour Average $PM_{2.5}$ Concentrations at R25 - Day 4 Scenario, No Background



As evident, the highest predicted 24-hour concentration is 5.3 µg/m^3, indicating that the Development will not pose $PM_{2.5}$ impacts at any of the surrounding receptors (Astute 2019).

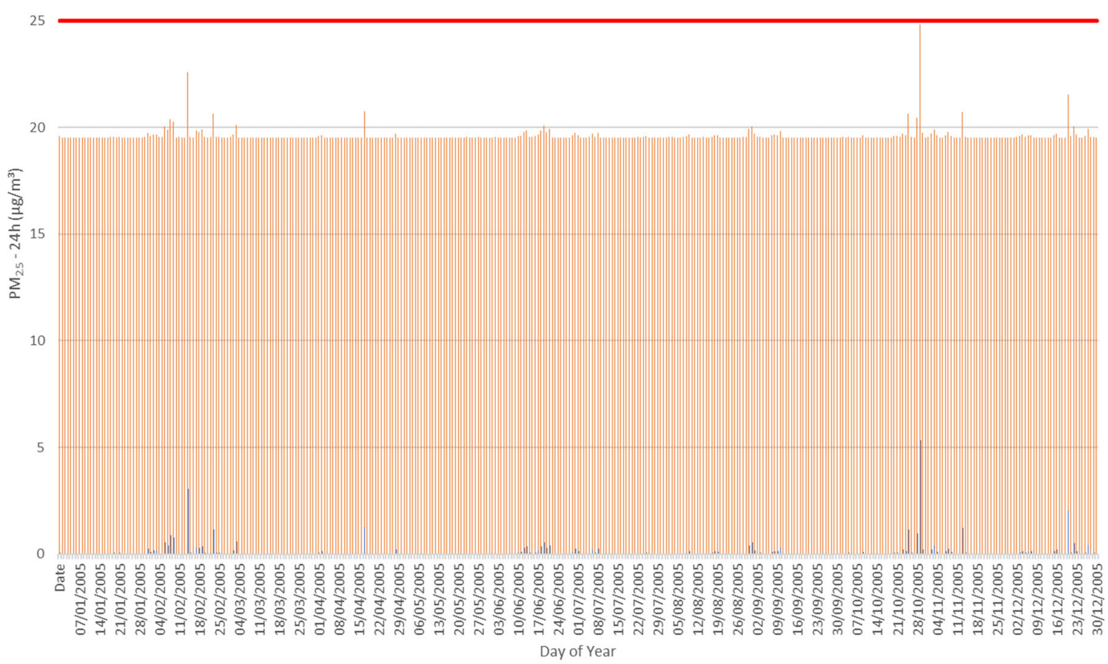
Figures 27 and **28** shows these predicted emissions modelled with the existing contemporaneous background and the existing maximum background, respectively.

Figure 27 Predicted Maximum 24-Hour Average $PM_{2.5}$ Concentrations at R25 - Day 4 Scenario, Contemporaneous Background



Blue – Development contribution.
Orange – Development contribution plus existing contemporaneous background.
Red – assessment criterion.

Figure 28 Predicted Maximum 24-Hour Average $PM_{2.5}$ Concentrations at R25 - Day 4 Scenario, Maximum Background



Blue – Development contribution.
Orange – Development contribution plus existing maximum background.
Red – assessment criterion.

Figures 27 and **28** shows that the most affected receptor (R25), and therefore all other receptors, is predicted to experience maximum 24-hour average $PM_{2.5}$ concentrations below the assessment criterion of 25 µg/m^3, including when Development emissions are combined cumulatively with contemporaneous and maximum background concentrations. The highest predicted cumulative concentration at R25 is 24.8 µg/m^3, with 79% of this associated with the maximum background concentration of 19.5 µg/m^3 (Astute 2019).

Astute's (2019) predicted maximum 24-hour $PM_{2.5}$ concentrations and annual average $PM_{2.5}$ concentrations for the three modelled scenarios at all identified sensitive receptors (R1 to R36) are listed in **Tables 16** and **17**, respectively. These predicted concentrations are also provided as contour plots in Astute's *Response to Air Quality Issues* in **Appendix D**.

The results in **Tables 16** and **17** show that all receptors are predicted to experience maximum 24-hour average and annual average $PM_{2.5}$ concentrations below the respective criterion for each of the three modelled scenarios, including when Development emissions are combined cumulatively with background concentrations and even with the conservative emission estimation methodology (see **Section 13.1.2**). Astute (2019) notes that the cumulative 24-hour average $PM_{2.5}$ concentrations are dominated by the maximum background concentration of 19.5 µg/m^3, and, similarly the annual average $PM_{2.5}$ concentrations are dominated by the average background concentration of 6.8 µg/m^3.

Table 16 Predicted Maximum 24-Hour Average $PM_{2.5}$ Concentrations

Receptor ID (see Figure 3)	Maximum 24-Hour Average $PM_{2.5}$ Concentration (µg/m^3)					
	Batch Scenario - Day 4		Batch Scenario - Day 18		Batch Scenario - Day 32	
	Development Alone	Cumulative with Max. Background	Development Alone	Cumulative with Max. Background	Development Alone	Cumulative with Max. Background
	Assessment Criterion – 25 µg/m^3					
R1	1.0	20.5	0.5	20.0	0.7	20.2
R2	1.1	20.6	1.2	20.7	1.6	21.1
R3	1.0	20.5	0.7	20.2	0.9	20.4
R4	0.8	20.3	0.7	20.2	0.5	20.0
R5	0.8	20.3	0.9	20.4	0.6	20.1
R6	0.7	20.2	0.4	19.9	0.7	20.2
R7	0.9	20.4	0.5	20.0	1.0	20.5
R8	1.2	20.7	0.9	20.4	1.3	20.8
R9	0.9	20.4	0.9	20.4	0.4	19.9
R10	1.1	20.6	0.8	20.3	0.5	20.0
R11	1.1	20.6	1.1	20.6	1.3	20.8
R12	1.3	20.8	1.0	20.5	0.8	20.3
R13	1.2	20.7	1.7	21.2	2.2	21.7
R14	1.3	20.8	1.3	20.8	1.6	21.1
R15	1.4	20.9	1.3	20.8	1.7	21.2
R16	1.9	21.4	1.7	21.2	1.2	20.7
R17	1.3	20.8	0.7	20.2	0.5	20.0
R18	1.8	21.3	1.1	20.6	0.8	20.3
R19	0.8	20.3	1.1	20.6	1.4	20.9
R20	1.4	20.9	0.8	20.3	0.6	20.1
R21	1.9	21.4	1.4	20.9	1.4	20.9
R22	1.2	20.7	1.4	20.9	1.8	21.3
R23	1.2	20.7	1.4	20.9	1.8	21.3
R24	2.0	21.5	2.4	21.9	2.5	22.0
R25	5.3	24.8	2.2	21.7	3.1	22.6
R26	0.9	20.4	0.8	20.3	1.1	20.6
R27	0.8	20.3	0.8	20.3	1.0	20.5
R28	1.1	20.6	1.3	20.8	1.3	20.8
R29	1.2	20.7	0.8	20.3	1.1	20.6
R30	0.9	20.4	0.7	20.2	1.1	20.6
R31	0.6	20.1	0.6	20.1	0.6	20.1
R32	0.6	20.1	0.8	20.3	0.6	20.1
R33	1.1	20.6	0.7	20.2	0.6	20.1
R34	1.4	20.9	1.0	20.5	0.6	20.1
R35	1.0	20.5	1.1	20.6	0.8	20.3
R36	0.7	20.2	0.5	20.0	0.4	19.9

Table 17 Predicted Annual Average 24-Hour Average $PM_{2.5}$ Concentrations

Receptor ID (see Figure 3)	Annual Average 24-Hour Average $PM_{2.5}$ Concentration (µg/m³)					
	Batch Scenario - Day 4		Batch Scenario - Day 18		Batch Scenario - Day 32	
	Development Alone	Cumulative with Max. Background	Development Alone	Cumulative with Max. Background	Development Alone	Cumulative with Max. Background
	Assessment Criterion – 8 µg/m³					
R1	0.04	6.84	0.02	6.82	0.02	6.82
R2	0.02	6.82	0.03	6.83	0.03	6.83
R3	0.03	6.83	0.02	6.82	0.02	6.82
R4	0.03	6.83	0.02	6.82	0.02	6.82
R5	0.02	6.82	0.02	6.82	0.02	6.82
R6	0.02	6.82	0.02	6.82	0.03	6.83
R7	0.02	6.82	0.02	6.82	0.04	6.84
R8	0.03	6.83	0.03	6.83	0.04	6.84
R9	0.03	6.83	0.02	6.82	0.03	6.83
R10	0.02	6.82	0.02	6.82	0.03	6.83
R11	0.03	6.83	0.02	6.82	0.03	6.83
R12	0.03	6.83	0.02	6.82	0.03	6.83
R13	0.04	6.84	0.03	6.83	0.03	6.83
R14	0.04	6.84	0.04	6.84	0.04	6.84
R15	0.06	6.86	0.03	6.83	0.04	6.84
R16	0.04	6.84	0.04	6.84	0.05	6.85
R17	0.00	0.00	0.03	6.83	0.03	6.83
R18	0.03	6.83	0.05	6.85	0.06	6.86
R19	0.06	6.86	0.04	6.84	0.06	6.86
R20	0.06	6.86	0.03	6.83	0.03	6.83
R21	0.05	6.85	0.05	6.85	0.06	6.86
R22	0.06	6.86	0.05	6.85	0.08	6.88
R23	0.01	6.81	0.05	6.85	0.08	6.88
R24	0.02	6.82	0.12	6.92	0.14	6.94
R25	0.02	6.82	0.10	6.90	0.10	6.90
R26	0.10	6.90	0.03	6.83	0.04	6.84
R27	0.03	6.83	0.03	6.83	0.03	6.83
R28	0.03	6.83	0.05	6.85	0.05	6.85
R29	0.04	6.84	0.04	6.84	0.04	6.84
R30	0.04	6.84	0.04	6.84	0.04	6.84
R31	0.04	6.84	0.03	6.83	0.03	6.83
R32	0.03	6.83	0.04	6.84	0.04	6.84
R33	0.04	6.84	0.06	6.86	0.06	6.86
R34	0.03	6.83	0.03	6.83	0.03	6.83
R35	0.01	6.81	0.03	6.83	0.04	6.84
R36	0.02	6.82	0.02	6.82	0.03	6.83

13.2.3 Risk to Lake Keepit

GSC asserted that there has not been any consideration to the implications of suspended particles on water quality through dissolvent and requested that the AQA be updated to include an investigation in to the implication of presence of dissolvent from airborne particles within the catchment and water body of Lake Keepit.

Astute (2019) has demonstrated that the particulate matter emission estimation methodology adopted in the AQA (PEL 2018) is conservative. The contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations. As outlined in **Section 13.3**, research has shown that dust concentrations drop back to background levels within approximately 30 to 100 m of the poultry sheds, even with no controls in place (Astute 2019).

On this basis, Astute (2019) concludes that dust is unlikely to travel as far as predicted by the models and unlikely to get anywhere near Lake Keepit and, as such, no further assessment is warranted.

13.3 Risk Management and Mitigation Measures

The EPA requested that pollution controls be included in the dispersion modelling, as necessary, to demonstrate that the Development can meet the assessment criterion.

Astute (2019) has clearly demonstrated that a suitable and appropriately conservative particulate matter assessment was performed by PEL (2018). Modelling uncertainty was significantly reduced by PEL (2018) by:

- Using accepted and tested modelling methods;
- Using proper input data, as confirmed by Astute (2019);
- Using emission rate data that has been shown to over-predict emissions (by a factor of at least two) compared to measured real world test data; and
- Modelling three batch staging scenarios to test the effect of different meteorological periods and peak emission events.

The emissions rate data used in the modelling has been proven to be well above real-world measured emission rates, even when divided by two (i.e. halved). As such, it provides an unrealistically conservative assessment and over-predicts the concentrations at surrounding receptors (Astute 2019). Astute (2019) advises that compliance at all receptors is expected. If the modelling was re-run with the more recent measured real-world data compliance would be achieved at all receptors for all modelled scenarios.

If elevated dust concentrations do leave a poultry shed, even with no controls in place, research has shown that concentrations drop to background levels within approximately 30 to 100 m of the poultry sheds (Astute 2019). This research includes, but is not limited to, the following:

Fine Particle Measurements Inside and Outside Tunnel-Ventilated Broiler Houses (Visser et al. 2006), which concluded:

> *No significant differences were found between the control site (background levels) and the 100, 300, and 500 ft* [30.5, 91.4 and 152.4 m, respectively] *field concentrations of gravimetric time-integrated $PM_{2.5}$. Real-time $PM_{2.5}$ data from the 100, 300, and 500 ft sampling locations indicates that $PM_{2.5}$ values are slightly greater at the 100 ft location vs. the 300 and 500 ft locations.*

Monitoring of Fine Particulates Downwind of Broiler Houses - A Field Study (Worley et al. 2012), which concluded:

> *$PM_{2.5}$ was measured in real time using aerosol monitors and from a time-integrated basis using cyclone samplers. Data were taken over a 4-week period and filtered for wind direction and internal instrument calibration checks. Results indicate a rapid dissipation of fine particulates as the distance from the source increases. When compared to nearby monitoring data, particulate levels appear to be near background levels at distances greater than 30 m.*

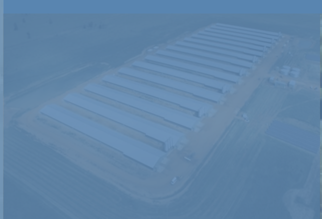
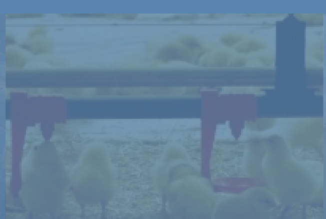
While these research papers relate to the finer $PM_{2.5}$ particles, the larger PM_{10} particles are heavier and would drop out closer to the sheds. Astute (2019) advises that these research findings are consistent with observations at many poultry farms, where a white dust can be seen around the fan end of the sheds, but not further afield. On this basis, dust from the four proposed PPUs is unlikely to travel as far as predicted by the models and the risk of impact at the surrounding receptors is low.

Astute (2019) advises that other research has shown that even a slight impedance of airflow (for example, a vegetation screen) can result in dust dropping out of suspension. As committed to in Sections 4.20, 8.2.6 and 9 of the EIS, vegetation screens will be established and maintained around the perimeter of each PPU.

Poultry farm management and profitability are directly related and ProTen has demonstrated the adoption of best management practices at the company's other poultry farms. Additional particulate matter control options (in addition to the adoption of current industry best practice) are not warranted. The contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations (Astute 2019).

Section 14

TRAFFIC AND TRANSPORT


14 TRAFFIC AND TRANSPORT

RoadNet prepared the *Traffic Impact Assessment* (2018) (TIA) for the EIS, for which the RMS advised the following in its submission:

> *Roads and Maritime considers that in our technical assessment of the EIS, specifically the RoadNet 2018 Traffic Impact Assessment - Volume 2, Appendix D, that the 'baseline' for impact assessment is reasonable and the predictions of impact are robust (and conservative) with suitable sensitivity testing and the proposal includes all reasonably feasible mitigation options.*

However, as advised in **Section 4.2.3**, SLR was engaged to provide additional specialist input and assessment in response to the traffic-related issues in the submissions received from the DPE and the community. SLR's *Response to Traffic Matters* (2018e) and *Supplementary Traffic Assessment* (SLR 2018f) are contained in **Appendix E**, with the responses to the individual issues summarised in the below sub-sections.

14.1 Live Bird Transport Hours

DPE requested that live bird transport hours be confirmed

Section 4.8 of the EIS advises:

> *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.*

The EIS is correct in that live birds will be transported from the Development Site any time between 7:00 pm and 4:00 pm. While attempts will be made to transport the birds during cooler times of the day/night, given the very large number of birds to be collected and transported from this Development and the numerous other broiler production farms in the region, transport contractors cannot guarantee transport times and it is also dependent on the operational hours and capacity of Baiada's processing plant.

The birds will be transported in plastic crates designed for good ventilation and bird welfare in accordance with the *Model Code of Practice for the Welfare of Animals, Land Transport of Poultry* (Primary Industries Standing Committee 2006).

14.2 Cumulative Traffic with Strathfield Development

DPE noted that the Strathfield Poultry Broiler Complex (2.94 million birds) has been approved by Council and that the Strathfield Farm 5 EIS advised that the haulage routes from Strathfield to Baiada's proposed new processing plant at Oakburn on the Oxley Highway will be via two routes, one including Rushes Creek Road and Keepit Dam Road. DPE requested consideration of cumulative traffic impacts with Strathfield as part of a future cumulative traffic scenario.

While the five EIS documents for Baiada's Strathfield development (Farms 1 to 5) indicate that Rushes Creek Road could potentially form part of the haulage route from Strathfield to Baiada's proposed new poultry processing plant (once operational) at the company's Oakburn site on the Oxley Highway, there was some additional work and changes to the Strathfield development prior to final approval by the Land and Environment Court (following an appeal against the development consent determination).

The five sets of "Conditions of Consent" for the five Strathfield farms, which supersede the EISs, specify the haulage routes that must be used and Rushes Creek Road does not form part of the specified routes. Specifically, condition 44 in each of the five determinations specifies the following for haulage to Oakburn:

44) Haulage Routes – Manilla to Tamworth.

Only the following roads are to be used as the haulage route from Manilla to the Out Street Processing Plant (located at 1 Out Street, Tamworth) or the Oakburn Processing Plant (located at 1154 Oxley Highway, Tamworth) or the Oakburn Rendering Plant (located at 1154 Oxley Highway, Tamworth):

- *Manilla Road (Fossickers Way) (South Manilla);*
- *Jewry Street, Tamworth;*
- *Ebsworth Street;*
- *Plain Street;*
- *Denison Street;*
- *Bridge Street; and*
- *Out Street (to the Out Street Processing Plant); or*
- *Gunnedah Road (to the Oakburn Processing Plant or the Oakburn Rendering Plant).*

If in the future, a suitable alternate route is identified and designated as a Restricted Access Vehicle Route for B-Double trucks, that gazetted route will become the approved haulage route.

As evident, Rushes Creek Road does not form part of the approved haulage route for the Strathfield development. The traffic is approved to travel through West Tamworth to Oakburn, not via Rushes Creek.

On this basis there is no need to consider the Strathfield development in terms of potential cumulative traffic impacts. The TIA (RoadNet 2018) prepared for the EIS advised that there are no 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 (i.e. Rushes Creek Road and the Oxley Highway). This statement remains accurate and, as such, a quantitative assessment of cumulative traffic impacts is not necessary.

14.3 Oxley Highway / Rushes Creek Road Intersection

DPE requested that B-double swept path assessments, visibility splay investigations and review of line marking arrangements be undertaken for the Oxley Highway / Rushes Creek Road intersection prior to determination.

As committed to in the EIS, RMS acknowledged the need to review signage and line-markings and investigate the Safe Intersection Sight Distance at the Oxley Highway / Rushes Creek Road intersection.

In order to determine the appropriateness of the existing form of the Oxley Highway / Rushes Creek Road intersection to accommodate the additional traffic associated with the Development, SLR (2018f) reviewed the TIA (RoadNet 2018) and undertook a site inspection on 19 November 2018. The existing geometric form of the intersection and signage provided in the vicinity of the intersection are illustrated in Section 2.1 of the *Supplementary Traffic Assessment* (SLR 2018f) in **Appendix E**.

Based on the information summarised below, SLR (2018f) concludes that the existing layout of the Oxley Highway / Rushes Creek Road intersection is suitable to accommodate 25 m B-double movements associated with the Development.

Existing Intersection Form

The existing AUL(S) treatment provided on the western Oxley Highway approach to the intersection is in excess of that required by the turn warrant assessment documented in the TIA (RoadNet 2018) and is therefore considered to be appropriate. The existing CHR(S) treatment provided on the eastern Oxley Highway approach to the intersection satisfies the minimum length requirements specified in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads 2017) (AGRD4A-17).

Swept Paths

The swept path assessment of turning movements anticipated to be performed by a 25 m B-double design vehicle at the intersection demonstrates that turning manoeuvres can be performed whilst providing 0.5 m clearance on either side of the design vehicle within the existing intersection footprint (see Appendix B in the *Supplementary Traffic Assessment* (SLR 2018f) in **Appendix E**).

Sight Distances

The Oxley Highway / Rushes Creek Road intersection would be required to provide Safe Intersection Sight Distance (SISD) on the major leg approach (i.e. Oxley Highway) and Approach Sight Distance (ASD) and Minimum Gap Sight Distance (MGSD) on the minor leg approach (i.e. Rushes Creek Road). The relevant requirements of AGRD4A-17 and the results of SLR's (2018f) sight distance assessment are summarised in **Table 18**.

Table 18 Oxley Highway / Rushes Creek Road Intersection Sight Distances

Road	Approach	Sight Distances		
		Requirement	Available	Compliant
Oxley Highway	Eastern	SISD: 281 m	281 m+	✓
	Western	SISD: 326 m	~260 m+	~66 m shortfall
Rushes Creek Road	Northern	ASD: 217 m	217 m+	✓
		MGSD (to east): 153 m	153 m+	✓
		MGSD (to west): 153 m	153 m+	✓

As evident, the existing Oxley Highway / Rushes Creek Road intersection satisfies all of the AGRD4A- 17 sight distance requirements, with the exception of SISD from the Oxley Highway western approach, which is approximately 66 m short of the recommended 326 m. SLR (2018f) advises that this shortfall is due to the combination of the horizontal alignment of the Oxley Highway to the west of Rushes Creek Road and the height of the batter on the northern side of the Oxley Highway.

SLR (2018f) believes that the SISD of 260 m currently available on the western approach to the intersection is adequate to accommodate the minor uplift in traffic to be generated by the Development based on the following information:

- It is an existing arrangement that would require significant expenditure to remediate (lowering the batter would require significant earthworks and vegetation removal to the northwest of the intersection).
- The crash data summarised in the TIA (RoadNet 2018) does not indicate any history of crashes at the Oxley Highway / Rushes Creek Road that are likely to be sight distance related.

- The Development will result in up to 17 additional vehicle movements during peak hour periods compared with the existing situation. The minor increase in traffic demand, which is equivalent to around one additional vehicle movement every three minutes during peak hour periods, is not expected to materially impact on the existing situation.

  The Normal Design Domain (NDD) parameters on which the sight distance requirements have been calculated adopt a conservative "observation time" of 3 seconds. Extended Design Domain (EDD) SISD requirements, as described in AGRD4A-17, adopt lower observation time parameters. For reference, NDD design parameters are applied in the case of new intersections in greenfield situations, whereas EDD design parameters are sometimes applied in constrained situations or brownfield sites.

  AGRD4A-17 indicates that an observation time of 2 seconds is suitable for a T-intersection on a single carriageway road where volumes are greater than (>) 4,000 vehicles per day (vpd) on the major road and >400 vpd on the minor road (the forecast 2029 daily traffic volumes are >4,000 vpd along the Oxley highway and >400 vpd along Rushes Creek Road). Given the significant amount of signage currently installed prior to and at the Oxley Highway / Rushes Creek Road intersection, the adoption of this lower parameter is considered to be appropriate.

  The minimum EDD SISD requirement in AGRD4A-17 for a 2 second observation time is 257 m. The existing intersection form therefore satisfies the EDD SISD requirement.

- The approximate location from where SISD is currently available heading eastbound on the Oxley Highway is shown on **Photo 1**. At the time of SLR's (2018f) site inspection, SISD could not be observed from further west of this location due to the long grass on the verge and some low hanging tree branches. As periodic roadside maintenance (for example, grass trimming, vegetation control) is conducted by the relevant road authority, the sight available at this location would improve.

Photo 1 Looking east along the Oxley Highway

Source: SLR 2018b

- The field sight distance measurements were taken from 1.1 m (i.e. driver's eye height) on the Oxley Highway to 1.25 m (top of car) at the potential conflict point in line with Rushes Creek Road. Based on the traffic surveys documented in the TIA (RoadNet 2018), a reasonably high proportion of heavy vehicles use the Oxley highway and Rushes Creek Road (15 to 20% on all approaches), providing a higher vantage point (2.4 m) and improving the available sight distance over that assessed.

Signage and Line-Marking

A significant amount of signage is installed to alert motorists on both the Oxley Highway and Rushes Creek Road as to the presence of the intersection.

All line-marking in the vicinity of the intersection is generally in good condition and consistent with the requirements of AGRD4A-17. However, while a give way sign is present on the Rushes Creek Road approach to the intersection, there is no associated give way hold line-marking present. This line-marking has likely faded over time and SLR (2018f) recommends that it be replaced in accordance with the layout shown on Figure 2 in the *Supplementary Traffic Assessment* (SLR 2018f) in **Appendix E**. SLR (2018f) further recommends that the line-marking be replaced by the relevant road maintenance authority given it should be replaced regardless of the Development proceeding.

14.4 Rushes Creek Road

Many community submissions raised concerns in relation to the appropriateness of the existing form of Rushes Creek Road to accommodate the additional heavy vehicle traffic to be generated by the Development.

As detailed in the EIS, it is proposed to use heavy vehicles up to 25 m B-doubles to service the Development. Vehicles will travel between the Development Site and the Oxley Highway to the south along Rushes Creek Road. In order to determine the appropriateness of the existing form of Rushes Creek Road to accommodate the additional traffic associated with the Development, SLR reviewed the TIA (RoadNet 2018) and undertook a site inspection on 19 November 2018.

Existing Heavy Vehicle Access Approvals

A B-double is classified as a Class 2 Restricted Access Vehicle (RAV) in accordance with the Heavy Vehicle National Law (HVNL). RAVs are required to travel on networks/routes gazetted by the various State road authorities and where a gazetted network/route does not exist for an RAV an operator may apply for a permit via the National Heavy Vehicle Regulator (NHVR). SLR (2018f) advises that the NHVR website provides the following information in the relation to the decision to grant access for an RAV to a particular network/route:

> *NHVR - considers requests for access and makes the final decision to grant a mass or dimension authority. The NHVR can only grant access if:*
>
> - *it is satisfied that the use of heavy vehicles under the authority will not pose a significant risk to public safety*
> - *each relevant road manager has consented to the grant*
> - *any other consents required by law have been obtained or given.*

SLR (2018f) advises that Rushes Creek Road has previously been assessed by the NHVR and consent has been given by Council (i.e. the relevant road manager) for the use of B-doubles. The entire length of Rushes Creek Road between the Oxley Highway to the south of the Development Site and Manilla to the north is approved as a Higher Mass Limit 25/26 m B-double route by the NHVR. This means that B-doubles associated with the Development will be able to travel along Rushes Creek Road without the need to apply for a Class 2 heavy vehicle access permit.

While the existing route consent would typically provide sufficient confidence that the route is appropriate for use by the proposed vehicle type, given the amount of community concern, SLR (2018f) has undertaken additional investigation, as summarised below.

RoadNet Assessment

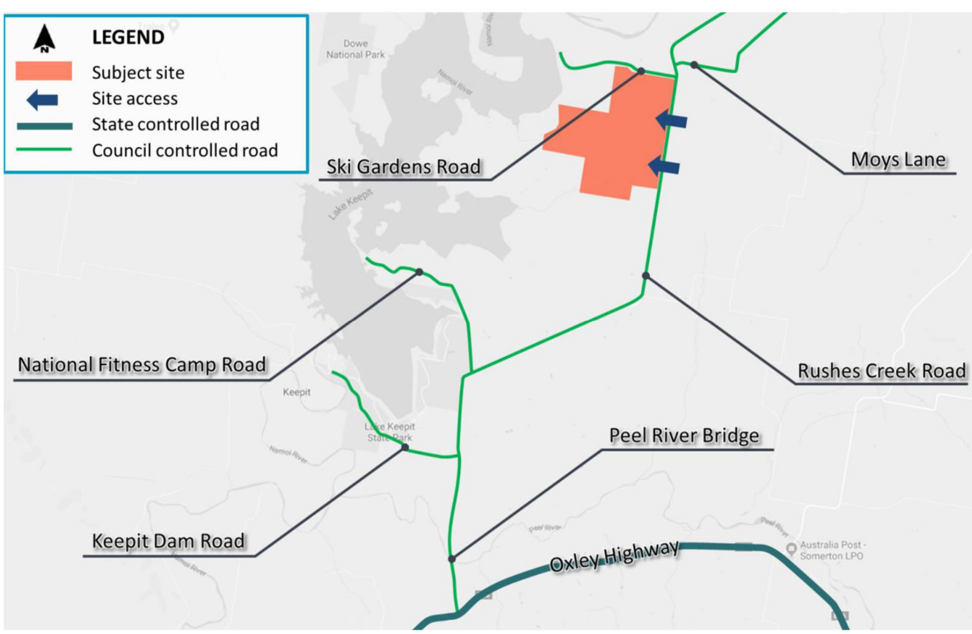
The TIA (RoadNet 2018) provides the following information in relation to Rushes Creek Road:

- Existing typical road seal width of between 6.5 m and 7.0 m.
- Grass shoulders (gravel in certain locations) with a width of between 0.5 m and 1.5 m are provided on either side of the carriageway.
- Centre line-marking is provided along the entire length of the road and guideposts are provided at regular intervals.
- RMS crash data for the four year period to September 2016 indicates that four crashes occurred along Rushes Creek Road between the Development Site and Oxley Highway. All crashes were single vehicle accidents where the vehicle left the carriageway and involved either speed or fatigue.
- Future traffic volumes for the "With Development" scenario at the 2029 design horizon at the southern end of Rushes Creek Road are:
  - AM peak hour – 89 vehicles per hour (vph);
  - PM peak hour – 67 vph; and
  - Daily – 683 vpd.
- The Development is expected to generate an additional 46 heavy vehicle movements per day on average along Rushes Creek Road.
- The existing road cross-section is sufficient for B-doubles to pass in either direction.

SLR Review

The configuration of the existing road network, including the existing alignment of Rushes Creek Road between the Oxley Highway and the Development Site, is shown on **Figure 29**.

Figure 29 Existing Road Network



Source: SLR 2018f

Based on the relevant information in the TIA (RoadNet 2018) and observations made the site inspection, SLR (2018f) advises the following in relation to the existing conditions along Rushes Creek Road:

- Centre line-marking is provided along the entire length and guideposts are provided at regular intervals along Rushes Creek Road between the Oxley Highway and the Development Site (as per RoadNet 2018).
- Measurements taken at various locations along Rushes Creek Road confirmed that the carriageway is generally between 6.5 m and 7.0 m in paved width with grass shoulders (as per RoadNet 2018). Based on the width of a B-double design vehicle (2.5 m), the minimum pavement width of 6.5 m provides sufficient width for two B-doubles to pass with a minimum of 0.5 m of clearance on both sides of either vehicle (i.e. 1 m between vehicles).
- The existing grassed shoulders would accommodate a stopped vehicle along the majority of Rushes Creek Road between the Oxley Highway and the Development Site. Whilst desirable, the construction of sealed shoulders would likely provide limited safety benefits relative to the significant associated costs (i.e. likely to be several million dollars over the approximate 18.5 km length) in consideration of the following:
  - The low existing and future traffic volumes along Rushes Creek Road (i.e. less than [<] 100 vph and <1,000 vpd); and
  - The low existing crash rate along Rushes Creek Road and nature of crashes reported (i.e. do not appear to be related to carriageway width).
- The top (i.e. northern) two thirds of Rushes Creek Road between the Oxley Highway and the Development Site is relatively straight in horizontal alignment (with the exception of the horizontal curve between the two straight sections), relatively flat in vertical alignment and roadside areas are largely clear of trees and vegetation. The combination of these conditions provides excellent inter-visibility between vehicles travelling in either direction, allowing drivers to adjust the position of their vehicle within the lane (i.e. move towards the shoulder if required) or slow down marginally for the safe passing of a heavy vehicle travelling in the other direction. The lower (i.e. southern) third of Rushes Creek Road between the Oxley Highway and the Development Site is still relatively straight (with slight undulations in horizontal alignment) and flat. There is generally more roadside vegetation, however there is still good inter-visibility between vehicles, allowing for safe passing of heavy vehicles travelling in the other direction.
- The Development is expected to generate an additional 46 heavy vehicle movements per day on average along Rushes Creek Road, with around 84% of heavy vehicle movements likely to be B-doubles or semi-trailers (as per RoadNet 2018). Using a typically adopted daily to peak hour conversion factor of 10%, there is likely to be up to four (0.1 x 0.84 x 46 = 3.9) B-double/semi-trailer movements on average along Rushes Creek Road during peak hours, or two movements in either direction. Based on the above information relating to the existing form and alignment of Rushes Creek Road, combined with the low forecast future (2029 “With Development”) bidirectional traffic volumes of around 90 vph (i.e. maximum during AM peak), the additional heavy vehicle movements to be generated by the Development are not anticipated to be problematic.
- The pavement along Rushes Creek Road was generally observed to be in good condition. There were minor maintenance issues observed in various locations (i.e. potholes and shoulders of pavement worn), however this is typical of a rural type road of this nature.
- While the heavy vehicles movements associated with the Development are likely to accelerate pavement wear along Rushes Creek Road, the proponent will be levied development contributions to Council and therefore the costs of any maintenance or repair to the pavement along Rushes Creek Road that has a nexus to the Development will be funded.

Based on the above, SLR (2018f) agrees with RoadNet's (2018) assessment of Rushes Creek Road, and also the NHVR and Council consents, indicating that Rushes Creek Road is of suitable existing form to accommodate the traffic to be generated by the Development, including B-double vehicles.

14.5 Development Site Access Driveways

The DPE requested B-double swept path assessments for the proposed access driveways from Rushes Creek Road.

Some of the community submissions raised concerns regarding the form and available sight distances for the two proposed site access driveways.

The EIS commits to constructing the two new access driveways from Rushes Creek Road in to the Development Site with "basic left" (BAL) turn treatments in accordance with the AGRD4A-17 to provide additional shoulder width for 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.

Based on the information summarised below, SLR (2018f) concludes that the proposed form and locations of the two proposed site access driveways from Rushes Creek Road are appropriate.

Sight Distances

SLR (2018f) assessed site distances for the proposed northern and southern site access locations to Rushes Creek Road in accordance with the Australian Standard *Parking Facilities Part 2: Off-street commercial vehicle facilities* (AS2890.2) for a frontage road speed of 100 kilometres per hour (km/hr). As listed in **Table 19**, the two proposed access locations satisfy the AS2890.2 sight distance requirements. Rushes Creek Road is straight and flat in the vicinity of the proposed access locations and there is several hundred metres of sight distance available in either direction at both access locations (SLR 2018f).

Table 19 Site Access Sight Distances

Access	Direction	Sight Distances		
		Requirement	Available	Compliant
Rushes Creek Road / Northern Site Access	To the north	139 m	139 m++	✓
	To the south	139 m	139 m++	✓
Rushes Creek Road / Southern Site Access	To the north	139 m	139 m++	✓
	To the south	139 m	139 m++	✓

Access Turn Warrants

SLR (2018f) undertook a turn lane warrant assessment to establish the desirable form of the proposed site access in accordance with AGRD4A-17 for greenfield sites. The warrants provide guidance where turning lanes should be provided based on the design traffic volumes.

Figures 12 to 15 in the *Supplementary Traffic Assessment* (SLR 2018f) in **Appendix E** indicate that BAL turning treatments should be provided at both the northern site access and southern site access locations to Rushes Creek Road, as already committed to in the EIS. Given that negligible traffic will arrive at the Development Site from the north, basic right turn treatments at the site access locations are not warranted (SLR 2018f).

Swept Paths

SLR's (2018f) swept path assessments at the proposed northern and southern site accesses with BAL turning treatments (see Appendix B in the *Supplementary Traffic Assessment* (SLR 2018f) in **Appendix E**) demonstrate that a 25 m B-double can enter and exit the Development Site with 0.5 m clearance on either side of the vehicle in accordance with the requirements of AS2890.2. On this basis, the proposed northern and southern site accesses are appropriate (SLR 2018f).

14.6 Construction Traffic

The DPE requested that a conservative estimate of construction traffic volumes be provided and a worst-case scenario evaluated.

To provide a reasonable estimate of the construction traffic volumes, the following inputs would be required at a minimum:

- Construction methodologies, staging and timeframes;
- Material types and quantities;
- Location of suppliers, contractors and haulage routes;
- Design vehicle types; and
- Workforce numbers and origins.

Detailed design has not been undertaken at this point and hence accurate inputs for an assessment of the potential traffic impacts associated with construction of the Development are not available. SLR (2018e) states that any assessment of construction traffic impacts at the conceptual design stage would be inefficient and rework would likely be required as a result of design adjustments through the detailed design process and associated amendments to the required information inputs (as listed above).

SLR (2018e) notes the following in relation to the potential impacts of construction traffic:

- Based on the likely construction methodologies and timeframe, the traffic generated by construction activities will be highly unlikely to exceed the operational peak hour traffic volumes (i.e. up to 17 vph) forecast for the Development.
- The typically adopted performance threshold in SIDRA (intersection modelling software) for an unsignalised intersection is a Degree of Saturation (DOS) of 0.80 (i.e. 80%). The results of the SIDRA assessment in the TIA (RoadNet 2018) for the Oxley Highway / Rushes Creek Road intersection for the "With Development"' scenario at the 2029 design horizon indicated a maximum DOS of 11% during the PM peak hour period. This indicates that the intersection has significant remaining capacity and is therefore not sensitive to additional traffic movements.

  The *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads 1988, cited in SLR 2018e) (superseded, however still relevant in this instance) identifies that capacity analysis is unnecessary for unsignalised intersections where the two-way traffic volume on the major road (two lane) is <400 vph and the turning volumes are <250 vph on the minor leg. The traffic volumes for the "With Development" scenario at the 2029 design horizon in RoadNet (2018) indicate a maximum two-way traffic volume of 89 vph (AM peak period) along Rushes Creek Road between the Development Site and the Oxley Highway. Given that the major road traffic volumes are significantly lower than 400 vph, turning movement volumes of a minimum of 250 vph would be required at the site accesses or other intersections before any capacity analysis is warranted. The site accesses and other intersections with Rushes Creek Road are not sensitive to additional traffic movements (i.e. from an operational perspective).

Based on the above, SLR (2018e) concludes that no further operational assessment of the construction traffic impacts associated with the Development is warranted.

SLR (2018e) advises that an assessment of the construction traffic impacts would likely only need to consider over-dimension vehicles (if proposed), potential pavement impacts and the need for Traffic Control Plans, and that these matters can be addressed through a Construction Traffic Management Plan (CTMP) following detailed design. A CTMP would provide the relevant road authorities with an appropriate level of confidence that any traffic impacts associated with construction activities can be appropriately managed. The EIS commits to the provision of a CTMP for approval prior to commencing construction.

14.7 Driver Code of Conduct

RMS requested that the Driver Code of Conduct include the following specific matters:
a. A map of the primary transport route/s highlighting critical locations.
b. Safety initiatives for transport through residential areas and/or school zones.
c. An induction process for vehicle operators and regular toolbox meetings.
d. A complaints resolution and disciplinary procedure.
e. Any community consultation measures for peak transport periods.

The EIS commits to all heavy vehicle drivers being required to read and sign a Driver Code of Conduct. As requested by RMS, the Driver Code of Conduct will include the following:

- A map of the primary transport route(s) highlighting critical locations;
- Safety initiatives for transport through residential areas and/or school zones;
- A driver induction process and regular toolbox talks (or similar); and
- A complaints resolution and disciplinary procedure.

These items have been included in Updated Summary of Commitments in **Section 25**.

It is not considered necessary to include “community consultation measures for peak transport periods” given the estimated traffic volumes. Additionally, it would be difficult to facilitate given that various transport contractors will be utilised during the construction and operational phases of the Development. The community consultation commitments made in Section 6.2.2 of the EIS (and summarised in **Section 11.2**) will be included in the CEMP and OEMP.

Two community submissions advised that their farming property (receptor R25) is on both sides of Rushes Creek Road and they often move livestock and machinery across the road. The submissions raised concern that the Development-related traffic will not slow down and give way to the livestock.

As advised above, the EIS commits to all heavy vehicle drivers being required to read and sign a Driver Code of Conduct. To address this concern, the Driver Code of Conduct will include a provision requiring drivers to slow down and provide right-of-way to any livestock and/or farm machinery on the transport route. This has been included in Updated Summary of Commitments in **Section 25**.

14.8 Traffic Volumes

Two community submissions asserted that the predicted traffic volumes for the Development are "grossly understated", stating that the Strathfield Poultry Broiler Complex has an estimated traffic volume of over 35,000 vehicles per year for a smaller bird population (2.94 million).

A direct like-for-like comparison of the predicted traffic generation for Strathfield and the Development is not possible. In summary:

- Strathfield (based on the Farm 5 EIS) is predicted to generate approximately 31,790 two-way movements annually for 2.94 million birds, with 5,527 of these movements comprising heavy vehicles (B-doubles and semi-trailers).
- The Development is predicted to generate approximately 26,104 two-way movements annually for 3.051 million birds, with 16,910 of these movements comprising heavy vehicles (B-doubles, semi-trailers and rigid trucks).

It is evident that the estimated heavy vehicle traffic for the Development is significantly higher than that for Strathfield. Reviewing the breakdown of traffic generating activities for both developments shows that this is likely due to different vehicle types/sizes proposed for certain activities. It is also likely due to these developments being owned and managed by different operators who have varying transport contractors and varying on-site provisions and management procedures (for example, on-site feed storage and bedding material storage which would impact frequency of deliveries etc.).

ProTen confirms that the estimated traffic volumes reported in the EIS for the Development are accurate and conservative.

Two community submissions asserted that the predicted traffic volumes for the Development are understated as the traffic movements associated with trucking water to the Development Site in the event of a water shortage have not been included.

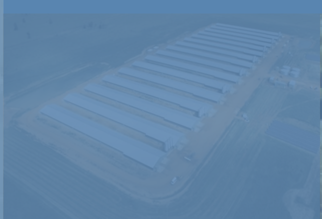
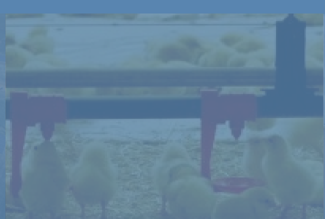
The Development's annual water demand of approximately 330 ML (conservative) will be serviced via extraction of surface water from the Namoi River under the provision of the two existing WALs that provide a combined 437.2 units of general access allocation. If the water requirements of the Development cannot be met during times of extreme drought or low flow, as advised in **Section 7.3**, there are three options to source additional supply and a fourth fall-back option to reduce the operating capacity (i.e. destock) until the required supply can be obtained.

The option of trucking in additional water supply (i.e. option 3 in **Section 7.3**) would only be considered if the first two options of purchasing additional allocation from the Namoi River (temporary tradeable water or an additional WAL/share component) could not be achieved and if it was a very minor and very limited/short-term volume shortage. If the shortage was more significant, ProTen would take the fall-back option of reducing the operating capacity.

SLR (pers. comm., 10 January 2019) confirmed that there is significant additional capacity on the transport route (i.e. the Oxley Highway and Rushes Creek Road) for the "With Development" scenario at the 2029 design horizon and, as such, the additional traffic potentially generated by water deliveries, which would be short-term, would be able to be readily accommodated and no additional assessment is warranted.

Section 15

SURFACE WATER


15 SURFACE WATER

15.1 Surface Water Management

WaterNSW requested that revisions be made to ensure the clean water diversions at each PPU are upslope of the office and amenities building, vegetation screens, AWTS and associated EMA to ensure any runoff is captured in the controlled surface water management system.

The DPE reiterated the comments and requests provided by WaterNSW.

Responding to the comments and requests provided by WaterNSW, minor adjustments have been made to the layout of each PPU to ensure that any area where there may be a risk of dirty or contaminated runoff is located within the upstream clean water diversions. These minor changes to the Development are detailed in **Section 2.3** and illustrated on the updated preliminary civil design drawings in **Appendix A** and updated conceptual development layout plans provided as **Figures 4** to **8**.

The minor adjustments at each PPU will ensure that any runoff from the ancillary infrastructure, vegetation screens or EMA is captured in the controlled surface water management system, which will essentially operate as a closed water system, and will not compromise the clean water flows and downstream environments. The surface water management system at each PPU will operate and be maintained as described in the exhibited EIS.

WaterNSW noted that Farm 1 is located immediately at the head of a drainage depression with a relatively short flow path into Lake Keepit. In this regard, WaterNSW requested:

- **Measures be included to direct diverted clean water flow safely in to this drainage depression; and**
- **Construction and management of the detention dam at Farm 1 does not compromise the drainage depression and includes desilting to prevent capacity reductions.**

LRCE considered the topography surrounding Farm 1 and the nearby intermittent drainage lines and made the following minor adjustments on the updated preliminary civil design drawings in **Appendix A**:

- The downstream ends of the upstream clean water diversion around the perimeter of Farm 1 have been slightly extended and/or angled to the northwest to direct the diverted flow to the downstream drainage lines to the north and northwest of Farm 1; and
- The downstream ends of the upstream clean water diversion around the perimeter of Farm 1 have been slightly flared and rock lining erosion control added to spread the diverted flow over a wider area/width and avoid any concentrated flow and associated erosion and/or scouring.

The following development design features, best management practices and mitigation measures committed to in the EIS will ensure that the detention dams at each PPU do not compromise the surrounding drainage lines:

Construction

- 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 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.

- Disturbed areas will be promptly rehabilitated and revegetated to a stable landform following completion of disturbance activities.
- 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 clean water diversions 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 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.
- Water captured in the detention dams will be reused for regular irrigation of the planted vegetation screens at each PPU.

The following additional control has been added to the Updated Summary of Commitments in **Section 25** in response to WaterNSW's request:

- The detention dams at each PPU will be visually inspected on an annual basis and, if necessary, will be desilted to ensure the dams maintain their design capacity.

WaterNSW stated that Section 4.17.2 in the EIS advises that both dirty and clean water diversions are directed to the detention dam at the PPUs and requested this be clarified to ensure the capacities of the detention dams are not compromised by clean water inflows.

Section 4.17.2 of the EIS advises the following:

> *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…..*
>
> *The table drain around the perimeter of each PPU will convey the water to a large detention dam at each PPU ….. designed to capture the stormwater runoff from inside the PPU environs (i.e. all area inside the upstream diversions)….*

To clarify, clean water flows and dirty water flows will be managed separately to ensure that one doesn't compromise the other. Clean water diversions will be installed around the upstream sides of each of the four PPUs to convey clean water runoff around the construction/operational areas and safely back in to existing downstream drainage lines and/or overland flow paths ensuring that the clean water flows do not enter the controlled surface water management system at each PPU. These diversions have been engineered taking in to account local terrain, historical rainfall volumes and guideline runoff coefficients for the terrain surfaces to cater for runoff from the upstream catchment for rainfall events up to the 1% AEP design event. They will be installed and stabilised prior to earthworks commencing at each PPU and will be maintained throughout the life of the Development.

The controlled surface water management system at each PPU, comprising the swale drains, perimeter table drains and detention dam, will essentially operate as a closed water system and will ensure that all runoff from within the PPU environs (i.e. within the upstream clean water diversions) is captured and does not compromise the clean water flows and downstream environments. These systems have been engineered taking in to account local terrain, development cut and fill requirements, historical rainfall volumes and guideline runoff coefficients for the varying surfaces to cater for the runoff from the 1% AEP 72-hour design event. They will be installed and stabilised prior to commencing operation at each PPU and will be maintained throughout the life of the Development.

Lands & Water advised that the surface water management at each PPU should be designed to ensure stability of the diversions and the water is conveyed at a stable discharge point into the downstream watercourse.

The upstream diversions at each PPU will convey clean water runoff around the construction/operational areas and safely back in to existing downstream drainage lines and/or overland flow paths. They have been engineered taking in to account local terrain, historical rainfall volumes and guideline runoff coefficients for the terrain surfaces to cater for runoff from the upstream catchment for rainfall events up to the 1% AEP design event. As shown on the updated preliminary civil design drawings in **Appendix A**, the downstream ends of the upstream clean water diversions have been slightly flared and rock lining erosion control added to spread the diverted flow over a wider area/width and avoid any concentrated flow and associated erosion and/or scouring.

The upstream diversions will be installed and stabilised prior to earthworks commencing at each PPU and will be maintained throughout the life of the Development. As committed to in the EIS, disturbed areas will be promptly rehabilitated to a stable landform and re-vegetated following completion of the construction/disturbance activities. 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.

Lands & Water advised that the detention dams should be designed to ensure they meet a relevant exclusion from consideration under "harvestable rights" as detailed in Schedule 1 of the *Water Management (General) Regulation 2018*. Lands & Water noted that the proposal to convey clean water past the PPU is key and this will need to ensure stable discharge back into the natural channel.

Clause 3 of Schedule 1 of the *Water Management (General) Regulation 2018* lists the following as "excluded works"

> *Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.*

"Minor streams" are defined in the *Water Management (General) Regulations 2011* and the Strahler stream ordering method as a first or second order stream that does not permanently flow and does not at any time carry flows from a third, fourth or higher order stream.

The sole purpose of the detention dam at each PPU is to ensure the wash down water from the poultry sheds and the rainfall runoff from within the PPU environs (i.e. within the upstream clean water diversions) is captured and does not compromise the clean water flows and downstream environments. Each of the detention dams is proposed to be located upstream or on a minor stream. Specifically:

- Farm 1 – immediately upstream of a first order drainage line;
- Farm 2 – on the junction of a first order drainage line and second order drainage line;
- Farm 3 – upstream of a second order drainage line; and
- Farm 4 – on the upper reach of a first order drainage line.

On this basis, the proposed detention dams appear to fit squarely within the definition and purpose advised in Clause 3 of Schedule 1 of the *Water Management (General) Regulation 2018* and, therefore, are excluded works.

The "harvestable right" is not intended to be contrary to initiatives to prevent pollution of water sources (WaterNSW 2017). The dams are required to capture runoff from within the PPU environs that potentially has elevated suspended solids and nutrient levels. They will not receive any clean water inflows and, as such, do not need to be considered in assessing the harvestable rights.

The clean water diversions to be installed around the upstream sides of each of the four PPUs will convey clean water runoff around the construction/operational areas and safely back in to existing downstream drainage lines and/or overland flow paths ensuring that the clean water flows do not enter the controlled surface water management system, including the detention dams, at each PPU. As shown on the updated preliminary civil design drawings in **Appendix A**, the downstream ends of the upstream clean water diversions have been slightly flared and rock lining erosion control added to spread the diverted flow over a wider area/width and avoid any concentrated flow and associated erosion and/or scouring.

HNELHD advised that the redirecting and detention of surface water to "two small basins constructed at the corner of the poultry farm" is not clearly defined in the EIS and the capacities of these basins is also not clearly defined.

HNELHD's reference to "two small basins constructed at the corner of the poultry farm" is assumed to have come from the preliminary development layout presented in the PEA, which was not progressed. The proposed engineered surface water management system at each PPU is detailed in Section 4.17.2 of the EIS and illustrated on Figures 12 to 16 in the EIS and the preliminary civil design drawings appended to the EIS. There is one large detention dam proposed at each PPU.

Responding to the comments and requests provided by WaterNSW, minor adjustments have been made to the layout of each PPU to ensure that any area where there may be a risk of dirty or contaminated runoff is located within the upstream clean water diversions. These minor changes are detailed in **Section 2.3** and illustrated on the updated preliminary civil design drawings in **Appendix A** and updated conceptual development layout plans provided as **Figures 4** to **8**.

The detention dams are now proposed with the following approximate storage capacities:

- Farm 1 – 33,600 m^3;
- Farm 2 – 50,875 m^3;
- Farm 3 – 36,168 m^3; and
- Farm 4 – 50,255 m^3.

The surface water management system at each PPU will operate and be maintained as described in the exhibited EIS. The controlled surface water management system at each PPU, comprising the swale drains, perimeter table drains and detention dam, will essentially operate as a closed water system and will ensure that all runoff from within the PPU environs (i.e. within the upstream clean water diversions) is captured and does not compromise the clean water flows and downstream environments. These systems have been engineered taking in to account local terrain, development cut and fill requirements, historical rainfall volumes and guideline runoff coefficients for the varying surfaces to cater for the runoff from a 1% AEP 72-hour event. They will be installed and stabilised prior to commencing operation at each PPU and will be maintained throughout the life of the Development.

15.2 Works on Waterfront Land

Lands & Water advised that works on waterfront land, including stormwater works and installation of the water pump and pipeline, should be undertaken in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (Natural Resources Access Regulator [NRAR] 2018). Lands & Water also advised that the potential impacts associated with the installation of the water pump and pipeline can be adequately addressed in a management plan in accordance with the controlled activity approval guidelines.

The *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018) defines "waterfront land" as:

> *Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.*

Waterfront land in the vicinity of the Development Site comprises all land within 40 m of the Namoi River and Lake Keepit. As outlined in Section 8.4.2 of the EIS, the only activities proposed within waterfront land is the installation of the water pump approximately 30 m from the bank of the Namoi River and the associated water supply pipeline from the pump to the Development Site. The remaining construction and operational areas are well-removed from waterfront land.

A controlled activity approval under the WM Act is not required for the Development given it is classified as SSD (pursuant to section 4.41(1) of the EP&A Act). However, installation of the water pump and pipeline will be undertaken in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018) and relevant controlled activity approval guidelines to ensure that the activities are carried out in a manner that avoids or minimises the potential for impact on the waterfront land and associated riparian corridor. Appropriate erosion and sediment controls will be installed prior to commencing the works and the disturbed area will be promptly rehabilitated and revegetated to a stable landform once works are completed. There should not be any on-going impacts or risks associated with the positioning and/or operation of the pump and pipeline. The pump will not impact on the width or functioning of the waterfront land/riparian corridor or the stability of the watercourse.

15.3 Risk to Lake Keepit and Namoi River

Several community submissions, the TRRRA and the Animal Liberation noted significant concern in relation to the potential for adverse impacts to Lake Keepit. These concerns include the proximity of the PPUs to Lake Keepit and the potential for discharge from the detention dams during significant rainfall events.

Similarly, two community submissions raised concern in relation to the Namoi River, including the potential for discharge from the detention dams reaching the Namoi River.

The location of Lake Keepit and the Namoi River in relation to the Development Site and the Development can be best seen on **Figures 3** and **4**, respectively. Farm 1 is proposed approximately 790 m from the full supply water level of Lake Keepit, with the other three PPUs well over 2,000 m away. There are significant separation distances between the proposed PPUs and the Namoi River.

Runoff from within the Development Site to the east of the natural ridgeline trending southeast-northwest through the centre of the Site is directed to the Namoi River via contour banks and shallow swales, while runoff from within the Site to the west of the ridgeline is channelled to Lake Keepit via intermittent drainage lines.

Due to the controlled environment in which the Development will operate, it poses a negligible risk to Lake Keepit and the Namoi River and no detectable impact is expected. As addressed below, the key controls include erosion and sediment controls, sewage management systems, clean water diversions and engineered surface water management systems.

Erosion and Sediment

Site-specific erosion and sediment controls will be implemented during the construction phase and disturbed areas will be promptly rehabilitated and revegetated to a stable landform.

Effluent

The Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself.

The relatively low volumes of sewage to be generated by the staff amenities at the PPUs and farm managers' houses will be treated and disposed of via separate 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 L/p/d and the treated effluent will be released within an EMA of approximately 200 m^2 via sub-surface irrigation.

There is negligible risk associated with sewage management at the PPUs and farm managers' houses. As advised in **Section 7.4**:

- The AWTS and EMA at each PPU have been positioned inside of the upstream clean water diversions (see **Figures 5** to **8**) to ensure that any runoff from these areas is captured in the controlled surface water management system and will not compromise the clean water flows and downstream environments;
- There is significant land area available at each house site for the AWTS and EMA and significant separation distances to any surrounding surface water features;
- The AWTSs and EMAs are considered conservatively over-sized for the relatively low volumes of sewage to be generated by the staff amenities and farm managers' houses;

- The AWTSs will provide secondary level treatment, including disinfection;
- The AWTSs will be maintained by an approved service provider on a quarterly basis or as recommended by the manufacturer;
- The EMAs will be relatively flat and the grass cover will be regularly mown to promote uptake of hydraulic and nutrient loads; and
- The Development Site is not flood-liable land.

Clean Water Diversions

Clean water diversions will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the poultry sheds and associated operational areas and safely back in to existing drainage lines and/or overland flow downstream of the PPUs. These diversions have been engineered taking in to account local terrain, historical rainfall volumes and guideline runoff coefficients for the terrain surfaces to cater for runoff from the upstream catchment for rainfall events up to the 1% AEP event. They will be installed and stabilised prior to earthworks commencing at each PPU and will be maintained throughout the life of the Development.

As detailed in **Section 2.3**, and responding to the comments and requests provided by WaterNSW, minor adjustments have been made to the layout of each PPU to ensure that any area where there may be a risk of dirty or contaminated runoff is located within the upstream clean water diversions. This will ensure that any runoff from the ancillary infrastructure, vegetation screens or EMA is captured in the controlled surface water management system and does not compromise the clean water flows and downstream environments, including Lake Keepit and the Namoi River.

Surface Water Management Systems

The potential for runoff from the Development is negligible. A surface water management system will be installed at each PPU to capture and manage all wash down water and stormwater runoff from within the PPU environs. These systems have been engineered taking in to account local terrain, development cut and fill requirements, historical rainfall volumes and guideline runoff coefficients for the varying surfaces to cater for the runoff from a 1% AEP 72-hour event. They will be installed and stabilised prior to commencing operation at each PPU and will be maintained throughout the life of the Development.

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 of the EIS, some of the water captured in the detention dams will be used to irrigate the planted vegetation screens around each PPU, which will draw-down the water level in the dams and provide additional storage capacity to receive flows.

On this basis, the surface water management system at each PPU will essentially operate as a closed water system, ensuring that all runoff from within the PPU environs (i.e. within the clean water diversion) is captured within the surface water management system and does not compromise the clean water flows and downstream environments. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP event and, as such, there is negligible risk to the downstream drainage features, the Namoi River and Lake Keepit.

An on-going inspection and maintenance program will be implemented to ensure the continued integrity of the upstream clean water diversions and 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 design capacity is maintained.

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, the grassed swales will provide a very effective means of nutrient removal, and there will be mixing and dilution in the dams. An analysis of wash down water undertaken at one of ProTen's poultry farms where operational and management procedures are very similar to the proposed Development was undertaken by GHD in 2007. This analysis indicates that poultry shed wash down has the typical pollutant concentrations listed in **Table 20**. Also listed in **Table 20** are the typical annual pollutant load removal efficiencies for vegetated swales according to *Australian Runoff Quality* (Engineers Australia 2006).

Table 20 Typical 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).

Analysis of the water captured in the detention dams at ProTen's Narrandera farm (SSD 6882) between April 2017 and April 2018 (quarterly grab samples) was reported in the farm's *Annual Review 2017-2018* (SLR 2018g). The results show the following pollutant concentrations:

- Total suspended solids – between 9 mg/L and 1,660 mg/L, with an average of 417 mg/L;
- Total kjeldahl nitrogen – between <2 mg/L and 15 mg/L, with an average of 5 mg/L;
- Total nitrogen – between <2 mg/L and 16 mg/L, with an average of 7 mg/L;
- Nitrate/Nitrite as N - between 0.1 mg/L and 5.9 mg/L, with an average of 1.4 mg/L; and
- Total phosphorous – between <0.01 mg/L and 2.7 mg/L, with an average of 0.7 mg/L.

It is evident that the quality of the water in the detention dams has even lower solids and nutrient loads than previously anticipated, indicating lower levels within the poultry shed wash down water and/or greater removal efficiencies in the grassed swales and/or mixing and dilution in the detention dams.

Extreme Rainfall Event

The 1% AEP 72-hour rainfall event is considered conservative in relation to the design of the surface water management system at each PPU. There is only a one in 100 chance that this design event will be exceeded in any one year period. If the detention dams did happen to discharge/overflow during a rare extreme rainfall event (i.e. greater than the 1% AEP design event), the potential for significant impact to the downstream water resources would be low based on the following:

- As outlined above, the nutrient loads are anticipated to be relatively low.
- There are no other sources of significant pollutants or contaminants:
  - The Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself;
  - The relatively low volumes of sewage to be generated by the staff amenities at the PPUs and farm managers' houses will be managed via separate AWTSs, which will be conservatively over-sized and will provide secondary treatment (see **Section 7.4**);

- The types of fuels and chemicals to be stored and used on-site are relatively benign and many of them would be found at surrounding farming properties (diesel, petrol, herbicides and rodenticides). The water supply treatment products, sanitisers and disinfectants, which are more specific to intensive livestock operations, will all be fit-for-purpose and approved for the intended uses;
- The quantities of fuels and chemicals to be stored on-site at each PPU will be relatively minor (except LPG) and storage will be in appropriately secured, sealed and/or bunded facilities;
- LPG will be stored at each PPU in aboveground bulk storage tanks installed and maintained to comply with the requirements of *AS/NZS 1596:2014 The Storage and Handling of LP Gas;* and
- There will not be any on-site stockpiling or disposal of waste.

- In the event of an extreme rainfall event, there would be significant mixing and dilution of any water that happened to discharge from the detention dams with the likely overland runoff, Namoi River flows and Lake Keepit flows.

In conclusion, the Development poses a negligible risk to downstream surface water resources, including the Namoi River and Lake Keepit.

15.4 Risk to Adjoining Farming Properties

Two community submissions asserted that the Development will significantly alter the natural drainage lines, with Farms 2, 3 and 4 proposed to be built across existing farm waterways. Erosion, out-of-bank flows and unforeseen flooding were identified as potential implications.

These submissions asserted that Farm 4, which is to the north of their property (receptor R25), will be built over a major farm waterway and the required "fill" will effectively dam the runoff that would normally flow down that waterway and this could result in part of their property being inundated by stormwater when the runoff cannot get away quick enough in the altered drainage channel.

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 to a tributary of Plain Gully and subsequently Lake Keepit. Farms 1 and 3 are clear of surrounding drainage lines.

Farms 2 and 4 are located in the upper reaches of the respective catchments and the drainage lines are therefore relatively minor and intermittent. Constraints associated with cumulative odour impacts, high conservation vegetation and Aboriginal heritage sites limited the options for relocation of these two PPUs away from the drainage lines (noting Farm 2 was moved slightly to the south to lessen the associated impacts).

Positioning infrastructure within drainage lines does have 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. However, as outlined in Section 4.17.2 of the EIS, clean water diversions will be installed around the upstream sides of each of the four PPU sites to convey clean water run-off around the construction/operational areas and safely back in to existing drainage lines and/or overland flow paths downstream of the PPUs. These diversions have been engineered taking in to account local terrain, historical rainfall volumes and guideline runoff coefficients for the terrain surfaces to cater for runoff from the upstream catchment for rainfall events up to the 1% AEP design event. They will be installed and stabilised prior to earthworks commencing at each PPU and will be maintained throughout the life of the Development.

On this basis, the pre-development flows within the drainage lines at Farms 2 and 4 will be conveyed along the new diversions around the PPUs before re-joining the existing drainage lines downstream. Given that these drainage lines are relatively minor features and the design of the diversions will ensure that they are re-connected downstream, there should not be any notable hydraulic or environmental impacts. Runoff will not "dam" upstream of the PPUs or there should not be additional inundation of adjoining properties during rainfall events up to the 1% AEP design event.

As outlined in Section 8.4.2 of the EIS, post-development peak flows should not exceed pre-development peak flows for events up to the 1% AEP design event and, as such, there should not be any impact on the downstream properties and drainage features.

Site-specific erosion and sediment controls will be implemented during the construction phase and disturbed areas will also be promptly rehabilitated and revegetated to a stable landform.

Two community submissions queried what contamination the adjoining properties may experience as a result of water running off the poultry sheds and roads during flooding and extreme rainfall events. These submissions casted doubt over the ability of the detention dams to capture all runoff during extreme events.

The issues raised in these community submissions are addressed by the information provided above in **Section 15.3**. In short, there is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP 72-hour design event and, as such, there is negligible risk to the downstream properties. If the detention dams did happen to discharge/overflow during a rare extreme rainfall event, the potential for significant impact to the downstream properties would be low (see **Section 15.3**).

The internal access roads will be constructed as all-weather rural-type roads and will be used for the sole purpose of access to and from the PPUs. They will not have any potential source of contamination apart from low levels of silt/dust associated with their gavel construction.

15.5 Surface Water Monitoring

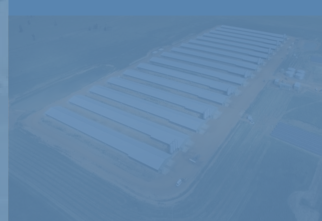
One community submission and the TRRRA suggested that surface water quality monitoring be undertaken on a regular basis.

As detailed in Section 8.4.2 of the EIS and above in **Section 15.3**, the potential for adverse impact to local surface water resources as a result of the Development is negligible. Given the controlled environment in which the Development will operate, including engineered upstream clean water diversions, engineered surface water management systems, best management practices and mitigation measures, it poses a very low risk to local water resources and no detectable impact is expected. On this basis, no surface water monitoring activities are warranted.

The development design features, best management practices and mitigation measures listed in Sections 8.4.3 and 9 of the EIS will be implemented to ensure negligible risk for local surface water resources throughout the life of the Development (construction and operation).

Section 16

GROUNDWATER



16 GROUNDWATER

16.1 Groundwater Extraction

A few community submissions identified groundwater security as an issue and queried whether groundwater will be used to service the Development.

Sections 8.5.5 and 9 of the EIS make the following commitment:

There will not be any groundwater extraction or use by the Development.

As detailed above in **Section 7.3**, if the water requirements of the Development cannot be met at times during reduced AWDs relating to the licensed allocation from the Namoi River, there are three options to source additional supply and a fourth fall-back option to reduce the operating capacity (i.e. destock) until the required supply can be met. None of these options involve the extraction or use of groundwater.

ProTen will not extract water beyond their licensed allocation and applicable AWD from the Namoi River and will not extract groundwater.

16.2 Groundwater Infiltration

The EPA noted that while the surface water management systems appear to be appropriately sized to enable dirty water to be contained on-site, the permeable nature of the grassed swales and table drains pose a risk of contaminant migration to groundwater. The EPA advised that the Best Practice Guidelines (DPI 2012) recommend compacting drains and stormwater retention systems, however an engineered liner may be able to be installed in the swales and drains.

Similarly, Lands & Water claimed that the use of the grassed swales as a primary treatment mechanism for poultry shed wash down water represents a risk to groundwater due to the nutrient removal efficiencies of the swales being less than 50% and the intention to maximise infiltration in the swales. Lands & Water asserted that the clay layer in the groundwater bore logs is highly variable in thickness and hence potentially limited in its ability to prevent movement of nutrients into the groundwater.

Three community submissions and HNELHD also raised groundwater infiltration as an issue.

As outlined in Section 4.17.2 of the EIS, an engineered surface water management system will be installed at each PPU to capture and manage all wash down water and stormwater runoff from within the PPU environs throughout the life of the Development. The grassed swale drains between the poultry sheds have been designed to allow infiltration of the wash down water and runoff into the topsoil (100 mm of topsoil placed following bulk earthworks) for nutrient uptake by the grass, which will be regularly slashed. During heavy rainfall, 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 for subsequent flow to the large detention dam. The design of the proposed surface water management systems is the same as that approved and installed at numerous other ProTen poultry farm developments, including Narrandera (SSD 6882), Jeanella and Jeanella South.

Significant compaction or lining of the grassed swale drains would reduce their treatment capacity (i.e. nutrient uptake capacity) and is not warranted based on the following:

Frequency of Shed Cleaning and Wash Water Volumes

The average 65 day production cycle comprises a maximum bird occupation of 55 days and a down-time of around 10 days for cleaning and disinfection and preparation for the next batch of birds. After removing the poultry litter, the poultry sheds will be thoroughly blown and swept (i.e. dry-cleaned) before being washed using high-pressure low-volume sprays, which significantly reduces the volume of wash water runoff from the sheds. Approximately 12 kL of water is 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.

The wash down process at each PPU will only occur roughly 5.6 times per year (i.e. every 9.3 weeks). There is no potential for seepage or runoff from the poultry sheds (apart from clean rainfall runoff from the shed roofs) during the 8 week bird occupation periods. The sheds are not washed at all during bird occupation and no effluent is generated as a result of the poultry-rearing itself.

Given the low frequency of poultry shed wash down and the relatively low volumes of wash down water, the large areas of grassed swales should operate effectively and there should not be any detectable downward seepage of water from the swales to groundwater.

Pollutants / Contaminants

The anticipated concentrations of suspended solids and nutrients in the wash down water are not considered overly significant and the grassed swales provide an effective and sustainable means of nutrient uptake. There are no other sources of significant pollutants or contaminants in the wash water.

Underlying Groundwater Depth and Strata

The *Groundwater Bore Baseline Assessment* (SLR 2017) completed for the EIS identified the following in relation to the groundwater and strata beneath the Development Site:

- Groundwater levels generally range between 10 and 20 mbgl across the Development Site and the water bearing zones are found at depths between 31.5 and 103.6 mbgl (as recorded in bore drill logs), indicating confined aquifer conditions.
- Bore drill logs indicate the presence of a weathered clay-rich regolith layer between 0.5 and 3 m think approximately 2 m below the surface immediately above basement rocks. The conceptual understanding is that this layer exists across the Development Site and the 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). Its presence would restrict any downward movement of water into the groundwater system and confine the water bearing strata (as demonstrated by groundwater measurement across the Development Site).

Based on the design and function of the surface water management system at each PPU, the low frequency of shed cleaning, relatively low wash down water volumes and nature of the strata, there is a low risk of downward seepage of water from the grassed swales and table drains to the groundwater 10 to 20 mbgl. Additionally, the wash down water should be free of any significant pollutants/contaminates and the conceptual understanding of the regolith layer is that it measures 0.5 to 3 m thick, sits approximately 2 m below ground level and exists across the Development Site and the regional area acting as an aquitard.

On this basis, significant compaction or lining of the grassed swales is not warranted.

The EPA and Lands & Water advised that the detention dams should be lined to mitigate groundwater impacts.

Three community submissions and HNELHD also raised groundwater infiltration from the detention dams as an issue.

Sections 4.17, 8.5.5 and 9 of the EIS make the following commitment:

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

Irrespective, and as outlined in **Section 15.3**, the water captured in the detention dams is anticipated to have relatively low nutrient levels and is anticipated to be relatively clean with no other significant sources of potential pollutants or contaminants.

Based on the design and function of the surface water management systems, depth to groundwater and nature of the strata (see above), there is a low risk of downward seepage of water from the detention dams to groundwater.

HNELHD advised that consideration should be given to potential groundwater impacts from leachate associated with a mass mortality event resulting in mass in-shed burial of carcasses.

As advised in the EIS, each poultry shed will have fully-sealed concrete flooring and concrete bund walls, which will prevent any infiltration of liquids from within the sheds to groundwater. Notably, the only liquid to be generated within the poultry sheds will be wash down water at the end of each production cycle.

Section 4.24 in the EIS describes the below four options in the event of an EAD outbreak within the Development Site:

- Option 1 – in-shed composting;
- Option 2 – off-site rendering;
- Option 3 – off-site landfill disposal; and
- Option 4 – off-site mass burial.

Mass burial within the Development Site is not one of the proposed options due to the proximity of the Namoi River and Lake Keepit.

In the unlikely event of an EAD at the Development, animal and environmental regulatory authorities, including DPI, EPA and technical service units of the poultry industry, would be heavily involved in site management and decision-making. The only option that involves on-site management, is the preferred option of in-shed composting (Option 1), which, if agreed to by all stakeholders, would occur under the supervision of the regulatory authorities and in accordance with the procedures outlined in latest versions of *AUSVETPLAN: Operational Manual – Disposal* (AHA 2015b), *Biosecurity of Mass Poultry Mortality Composting* (RIRDC 2014) and *Procedure – Disposal of birds by composting* (DPI 2008). The standard operating procedures for mass poultry mortality composting appended to RIRDC (2014) would be implemented.

Composting is a natural biological process that transforms organic materials into a useful and biologically stable product. When undertaken properly, in-shed composting should not result in any notable environmental impacts. There would be no risk to surface water or groundwater given that the poultry sheds will have fully sealed concrete flooring and concrete bund walls.

While the finished product would need to be tested for physical, chemical and microbiological properties before it is released for use, AHA (2015b) advises that it can be recycled, stored or added to the land as a soil amendment. Subject to the end-product testing results being below guideline/agreed thresholds and meeting all other requirements, including complete eradication of the poultry disease, the finished compost product would represent a valuable soil amendment and its application to land would be bona-fide reuse. Provided the land application area is appropriately located and sized and managed to prevent any migration of leachate, there should not be any risks associated with applying it to the vast area of residual agricultural land within the Development Site.

16.3 Groundwater Monitoring

Lands & Water suggested that a groundwater monitoring plan be prepared to enable regular groundwater monitoring and response to any aquifer impacts due to the Development.

One community submission also requested groundwater testing.

As detailed in Section 8.5.2 of the EIS and above in **Sections 16.1** and **16.2**, the potential for adverse impact to groundwater resources as a result of the Development is low. Key points include:

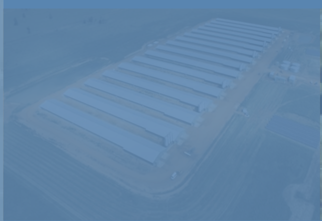
- The design and function of the surface water management system at each PPU, including compaction or lining of the detention dams;
- The low frequency of shed cleaning (roughly 5.6 times per year) and the relatively low volumes of wash down water;
- The water captured in the detention dams should have relatively low nutrient levels and should be free of any other significant pollutants/contaminants;
- Groundwater levels generally range between 10 and 20 mbgl across the Development Site; and
- The conceptual understanding of the regolith layer is that it measures 0.5 to 3 m thick, sits approximately 2 m below ground level and exists across the Development Site and the regional area acting as an aquitard.

No detectable groundwater impact is expected and, as such, no groundwater monitoring activities are warranted.

The development design features, best management practices and mitigation measures listed in Sections 8.5.3 and 9 of the EIS will be implemented to ensure negligible risk to groundwater resources throughout the life of the Development.

Section 17

BIODIVERSITY



17 BIODIVERSITY

SLR prepared the *Biodiversity Assessment Report* (2018b) (BAR) for the EIS, for which the OEH advised the following in its submission:

> *Office of Environment and Heritage (OEH) recognises the efforts of the proponent to locate infrastructure in areas that have been previously disturbed so that the proposal largely avoids impacts to biodiversity…..*
>
> *The biodiversity assessment has followed the Framework for Biodiversity Assessment in accordance with the NSW Biodiversity Offsets Policy for Major Projects.….*
>
> *OEH supports the intended biodiversity offset strategy as presented in section 7.7 of the BAR.*

There were no submissions received that warranted any additional specialist biodiversity assessment work. However, SLR was engaged to assess the minor changes to the alignments of the upstream clean water diversions at each PPU and associated minor increase to the disturbance footprint of the Development detailed in **Section 2.3**. SLR's *Biodiversity Assessment Report Addendum* (2019c) is contained in **Appendix F** and concluded the following:

- No additional impacts to biodiversity values over and above those previously assessed and reported in the BAR (SLR 2018);
- No changes to the areas requiring offsets, as identified in Section 6.3 of the BAR (SLR 2018); and
- No implications in relation to the biodiversity offsetting strategy detailed in Section 7 of the BAR (SLR 2018).

The below sub-sections address the biodiversity comments and issues in the submissions received from the OEH, GSC and the community.

17.1 Koala Habitat

GSC claimed that the EIS did not adequately address the *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44), specifically it did not identify the full extent of the investigated area and therefore the presence of Koala activity across the entire Development Site cannot be determined.

This issue is addressed in **Section 10.2**. In short, SLR (pers. comm., 20 December 2018) maintains that the potential for impact to koalas and koala habitat was appropriately assessed and described in the BAR (SLR 2018b) in accordance with SEPP 44. SEPP 44 does not apply to the Development and there is no identified risk to koalas or koala habitat.

17.2 Risk to Lake Keepit Fauna

Two community submissions queried the potential for impact to terrestrial and aquatic fauna that inhabit and/or use Lake Keepit. Specific issues raised were the use of growth promotants and antibiotics in the poultry production process, biosecurity breaches and contamination incidents.

The location of Lake Keepit in relation to the Development Site and the Development can be best seen on **Figures 3** and **4**, respectively. Farm 1 is proposed approximately 790 m from the full supply water level of Lake Keepit, with the other three PPUs well over 2,000 m away. Runoff from within the Development Site to the east of the natural ridgeline trending southeast-northwest through the centre of the Site is directed to the Namoi River via contour banks and shallow swales, while runoff from within the Site to the west of the ridgeline is channelled to Lake Keepit via intermittent drainage lines.

SLR undertook a detailed assessment of the potential biodiversity impacts associated with the Development as part of the BAR (SLR 2018b). SLR (pers. comm., 20 December 2018) confirmed that the Development poses a negligible risk to terrestrial and aquatic fauna associated with Lake Keepit providing the mitigation and management measures committed to in the EIS are properly implemented and maintained.

Due to the controlled environment in which the Development will operate, no detectable impact to the water resources or biodiversity of Lake Keepit is expected. The key issues raised in the community submissions and associated controls include:

Growth Promotants and Antibiotics

Hormones/growth promotants will not be added to chicken feed or administered to the livestock, with such practices being banned for over 40 years.

Antibiotic use is important in poultry production to ensure the overall health and wellbeing of the flock. Only antibiotics approved by Australia's regulatory authorities will be used and they will be administered to the livestock in their drinking water in accordance with strict regulatory guidelines and under veterinarian supervision.

Waste Materials

There will not be any on-site stockpiling or disposal of waste materials.

Effluent

The Development will be a largely dry operation, with no effluent generated as a result of the poultry-rearing itself.

The relatively low volumes of sewage to be generated by the staff amenities at the PPUs and farm managers' houses will be treated and disposed of via separate 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 L/p/d and the treated effluent will be released within an EMA of approximately 200 m^2 via sub-surface irrigation. Based on the information provided in **Section 7.4**, there is negligible risk associated with sewage management at the PPUs and farm managers' houses.

Clean Water Diversions

As described in **Section 15.3**, clean water diversions will be installed around the upstream sides of each of the four PPUs to convey clean water run-off around the poultry sheds and associated operational areas and safely back in to existing drainage lines and/or overland flow downstream of the PPUs. They will ensure that any runoff from the infrastructure and operational areas is captured in the controlled surface water management system and does not compromise the clean water flows and downstream environments, including Lake Keepit and the Namoi River.

Surface Water Management Systems

As detailed in **Section 15.3**, an engineered surface water management system, which will essentially operate as a closed water system, will be installed at each PPU to capture and manage all wash down water and stormwater runoff from within the PPU environs. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP 72-hour design event and, as such, there is negligible risk to the downstream environments, including Lake Keepit.

As also outlined in **Section 15.3**, the water captured in the detention dams should have relatively low nutrient levels and should be free of any other significant pollutants/contaminants.

Biosecurity

The Best Practice Guidelines (DPI 2012) advises that the risk of disease developing on a poultry farm is influenced by many factors, including litter management, feed and water, shed disinfection, vermin control, dead bird management and the effectiveness of other biosecurity measures. Given the controlled environment in which new modern poultry farms operate, including fully-enclosed poultry sheds, bird vaccinations and strict biosecurity measures, the biosecurity risk that new poultry farms present to wild birds and waterfowl that may inhabit the surrounding environment is low. There is no opportunity for wild birds and waterfowl to come in to direct contact with the housed poultry.

The biosecurity risk that the Development poses to Lake Keepit is very low. ProTen will implement all necessary mitigation measures and controls to ensure a very low biosecurity risk for their own asset and the surrounding environment. Refer to Section 4.23 in the EIS and **Section 9** in this RTS for details.

Contamination Incidents

The types of fuels and chemicals to be stored and used on-site are relatively benign and many of them would be found at surrounding farming properties (diesel, petrol, herbicides and rodenticides). The water supply treatment products, sanitisers and disinfectants, which are more specific to intensive livestock operations, will all be fit-for-purpose and approved for the intended uses.

The quantities of fuels and chemicals to be stored on-site at each PPU will be relatively minor (except LPG) and are not considered to pose a hazard risk. They will each be stored in appropriately secured, sealed and/or bunded facilities. LPG will be stored at each PPU in aboveground bulk storage tanks installed and maintained to comply with the requirements of *AS/NZS 1596:2014 The Storage and Handling of LP Gas.*

All fuel and chemical storage facilities will be located within the upstream clean water diversions at each PPU and, in the unlikely event of an incident, any spill would be contained within the controlled surface water management system (see **Sections 2.3** and **15.3**). Spill kits will be maintained within the chemical store at each PPU.

Based on the above information, and reiterating SLR's (pers. comm., 20 December 2018) advice, the Development poses a negligible risk to terrestrial and aquatic fauna associated with Lake Keepit provided the mitigation and management measures committed to in the EIS and this RTS are properly implemented and maintained.

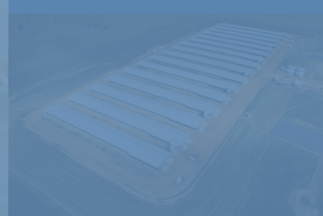
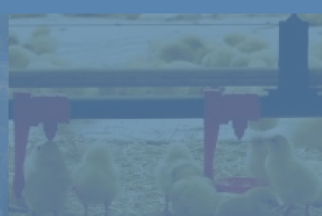
17.3 Biodiversity Offset Strategy

OEH advised that it supports the intended biodiversity offset strategy presented in the BAR (SLR 2018b) and requested that the offset actions and outcomes are documented in an addendum to the strategy within 12 months of obtaining development consent.

The biodiversity offsetting actions and outcomes will be documented in an addendum to the biodiversity offset strategy for submission to the DPE and OEH within 12 months of obtaining development consent. This has been included in Updated Summary of Commitments in **Section 25**.

Section 18

ABORIGINAL HERITAGE


18 ABORIGINAL HERITAGE

OzArk prepared the *Aboriginal Cultural Heritage Assessment Report* (2018) (ACHAR) for the EIS, for which the OEH advised the following in its submission:

> *The proponent has adequately undertaken Aboriginal consultation as per the prescribed method of the project SEARs…..*
>
> *OEH accept the survey coverage undertaken of the project area and recognise that the results conclude a low density of Aboriginal objects… Of important note is that the proposed project will impact only 5 isolated stone artefacts and 2 artefact scatters, BOS3 and BOS11, consisting of about 12 and 2 stone artefacts respectfully. The proposed mitigation action of collecting the artefacts post project approval further reduces the harm and is therefore supported.*

There were no submissions received that warranted any additional specialist Aboriginal heritage assessment work. However, OzArk was engaged to assess the minor changes to the alignments of the upstream clean water diversions at each PPU and associated minor increase to the disturbance footprint of the Development detailed in **Section 2.3**. OzArk's *Addendum Aboriginal Heritage Assessment Letter* (2019) is contained in **Appendix G** and concluded the following:

- No new Aboriginal cultural heritage sites are at risk of being harmed by the minor changes to the layout and footprint of the proposed PPUs; and
- The minor changes at each of the four PPUs have not changed the likely impacts of the Development to Aboriginal heritage, as previously documented in the ACHAR (OzArk 2018).

For transparency, OzArk (2019) sent an update letter to the RAPs on 8 April 2019 advising of the minor changes and confirming no additional impacts over and above those previously assessed and reported in the ACHAR (OzArk 2018).

The below sub-sections address the Aboriginal heritage comments and issues in the submissions received from the DPE and OEH.

18.1 Artefact Scatter - Bondah-OS3

OEH requested that monitoring of the artefact scatter identified as Bondah-OS3 be included as a site management action in the Aboriginal Cultural Heritage Management Plan (ACHMP) given the potential for significant numbers of stone artefacts to be revealed during the early phases of construction. OEH offered an alternative of establishing an appropriate buffer around the artefact scatter based on the field survey results to reduce the risk of harm to Aboriginal objects.

The ACHAR (OzArk 2018) describes Bondah-OS3 as an artefact scatter with potential archaeological deposit (PAD). The location of Bondah-OS3 relative to the Development is shown on Figure 35 in the EIS.

Bondah-OS3 was assessed by OzArk (2018) as having a likelihood to contain sub-surface deposits (likely to be at a low density) and having a moderate scientific value. The eastern extents of the scatter are located within 60 m of proposed water and electricity supply lines to service the Development. In accordance with OzArk's (2018) recommendation, Sections 8.7.4 and 9 of the EIS made the following commitment:

> *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…*

This is considered appropriate and sufficient given the limited construction works in the vicinity of the artefact scatter and the separation distance between the scatter and the proposed water and electricity supply lines. Any maintenance and repair requirements for the water and electricity lines during the operational phase of the Development would have a very confined disturbance footprint that would not encroach anywhere near the scatter (given the available separation distance).

This commitment in relation to Bondah-OS3 will be included in the ACHMP, which will be prepared following development consent in consultation with the RAPs and OEH.

18.2 Hearth – Bondah H1

The DPE and OEH requested archaeological excavation of the Aboriginal hearth feature identified as Bondah-H1 to determine if it is an Aboriginal oven and, if so, whether in-situ charcoal remains beneath the cluster of stones for radio carbon C14 dating.

The ACHAR (OzArk 2018) describes Bondah-H1 as a hearth comprised of heat fractured rocks, with no evidence of burning or charcoal on the surface. The location of Bondah-H1 relative to the Development is shown on Figure 35 in the EIS.

Bondah-H1 was assessed by OzArk (2018) as having moderate to high archaeological potential. OzArk (2018) notes that the site is intact and has potential to advise archaeological research in the region through dating (should it ever be undertaken).

Consultation with the RAPs will be undertaken to determine the cultural appropriateness of excavating the hearth as part of the preparation of the ACHMP following development consent. If the RAPs confirm the appropriateness and potential benefits, archaeological excavation of Bondah-H1 to determine if it is an Aboriginal oven will be included in the ACHMP. The excavation will also be used to determine whether in-situ charcoal remains beneath the cluster of stones for radio carbon C14 dating. This has been included in Updated Summary of Commitments in **Section 25**.

18.3 Scarred Trees

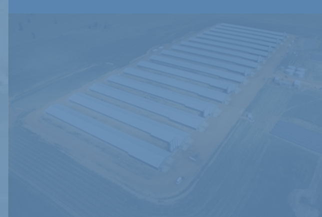
OEH asserted that the descriptions provided in the ACHAR (OzArk 2018) do not demonstrate conclusively that the scars on the three Aboriginal scarred trees identified within the Development Site are the result of traditional Aboriginal practice. OEH requested that the trees be further examination with reference to the OEH manual for scarred tree recording if the Development footprint changes in a manner that threatens the trees.

OzArk (pers. Comm., 20 December 2018) maintains that the three Aboriginal scarred trees identified within the Development Site were appropriately assessed and described in the ACHAR (OzArk 2018).

Regardless, these three trees will be further examined with reference to the *Aboriginal Scarred Trees in New South Wales, A Field Manual* (Department of Environment and Conservation [DEC] 2005) should the Development's disturbance footprint change in a manner that potentially threatens these trees. This has been included in Updated Summary of Commitments in **Section 25**.

Section 19

NOISE



19 NOISE

Global Acoustics, who prepared the *Noise Impact Assessment* (2018) (NIA) for the EIS, was engaged to address the issues raised in relation to noise in the submissions received from government agencies and the community. Global Acoustics' *NIA Regulator and Community Response* (2019) is contained in **Appendix H**, with the responses to the individual issues summarised in the below sub-sections.

19.1 Assessment Methodology

Two community submissions raised several issues in relation to the methodology used to assess operational noise, including:

- ***The modelling is based on predictions only.***
- ***It is not site-specific. There has been no data gathered from the proposed development site...***
- ***The modelling is based on measurements taken at ProTen's Bective Poultry Production Farm. This farm is only a fraction of the size of the proposed farm and would not produce anywhere near the mount of noise that the proposed development will…***

The assessment of operational noise emissions and potential impacts associated with the Development was undertaken by Global Acoustics (2018 and 2019) in accordance with the *Interim Construction Noise Guideline* (Department of Environment and Climate Change [DECC] 2009), *NSW Industrial Noise Policy* (EPA 2000; see Section 8.8 in the EIS) (INP) and the *NSW Road Noise Policy* (DECCW 2011) (RNP). The below information addresses the specific issues raised in the two community submissions regarding the assessment methodology.

Site-Specific and Conservative Predictions

While noise modelling is a predictive tool, it is widely used and it is the accepted method for assessing potential noise impacts associated with development proposals (Global Acoustics 2019). The modelling was undertaken using CadnaA noise prediction software, which takes in to consideration the height and location of each noise source within the Development Site and each potential receptor surrounding the Development Site, along with the local topography, meteorological effects, ground type, air absorption and barrier effects. The model was set up by Global Acoustics (2018) adopting the specific design and layout of the Development, including the position, type and number of noise sources, sound power levels of noise sources and location of surrounding receptors. On this basis, the modelling is site-specific.

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. Global Acoustics (2018) adopted a conservative approach assuming source to receiver winds of up to 3 m/s were the prevailing weather conditions for each surrounding receptor and assuming temperature inversion conditions were a predominant feature of the area.

Background Noise Monitoring

There are no known noise monitoring sites in the vicinity of the Development Site. However, given that the Site is in a rural area with no other notable noise-generating developments or land uses nearby, background noise monitoring was not considered necessary by Global Acoustics. The existing noise levels would be typical of a rural environment that comprises traditional farming activities and vehicle traffic on the local road network. On this basis, as widely accepted for rural environments, Global Acoustics (2018) assumed background levels would be less than L_{A90} 30 dB during all time periods and adopted a default minimum rating background level (RBL) of 30 dB in accordance with the INP (EPA 2000).

Sound Power Levels – Measurements at Bective

Global Acoustics (2018) adopted sound power levels for operational plant and equipment from the company's own database of representative equipment and measurements taken at similar facilities. Measurements at ProTen's Bective poultry farm were undertaken specifically for the ventilation fans and feed silo refill pumps, which are the same as those proposed to be installed at the Development. Sound power measurements of existing identical/similar noise sources allows for accurate predictive modelling (Global Acoustics 2019).

19.2 Operational Impacts

19.2.1 Operational Scenario 3 and Sleep Disturbance

The DPE requested that scenario 3 in the NIA (Global Acoustics 2018) assess the worst-case continuous noise sources in scenario 1 (in addition to bird collection) and include an assessment of sleep disturbance.

HNELHD noted that there is the potential for sleep disturbance, particularly given bird collection is scheduled to occur anytime between 7:00 pm and 4:00 pm.

Global Acoustics (2018) modelled three operational scenarios to assess the various combinations of noise sources:

- Scenario 1 assessed the worst-case continuous operational noise when all of the 20 tunnel ventilation fans on each poultry shed are running (only likely to occur late in the production cycle during warmer weather);
- Scenario 2 assessed feed silo refilling combined with the worst-case continuous noise source operations (i.e. scenario 1); and
- Scenario 3 assessed worst-case intermittent noise due to bird collection.

As pointed out by the DPE, scenario 3 should have also included the worst-case continuous noise source operations from scenario 1. The ventilation fans will operate during bird collection, with the fans on individual sheds switched off only once the shed has been emptied of livestock.

On this basis, Global Acoustics (2019) remodelled scenario 3 to ensure it assessed the worst-case intermittent noise associated with bird collection combined with worst-case continuous noise of all 20 ventilation fans on each shed operating continuously as per scenario 1 (this is a conservative approach as not all ventilation fans will operate during bird collection - as one shed is emptied the fans will cease operating). **Table 21** lists the noise level predictions for the revised scenario 3 during neutral and enhancing atmospheric conditions at the nearby receptors.

Table 21 Revised 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	22	22
R16		<20	<20	<20
R17		21	24	24
R20		22	26	26
R21		24	28	29
R22		<20	<20	<20
R23		<20	<20	<20
R24		28	33	31
R25		29	34	29

The predicted levels for the revised scenario 3 are below the adopted 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 34 dB.

Global Acoustics (2018) assessed one sleep disturbance scenario for night time bird collection that included the worst-case intermittent noise from bird collection combined with short duration increases to noise resulting from revving engines or impact noise. Global Acoustics (2019) has remodelled the sleep disturbance scenario to also include the worst-case continuous noise of all 20 ventilation fans on each shed operating continuously as per scenario 1 (again, this is a conservative approach as not all ventilation fans will operate during bird collection - as one shed is emptied the fans will cease operating). **Table 22** lists the noise level predictions for the revised sleep disturbance scenario during neutral and enhancing atmospheric conditions at the nearby receptors.

Table 22 Revised 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	22	22
R16		<20	<20	<20
R17		21	25	25
R20		22	27	27
R21		27	32	33
R22		<20	<20	<20
R23		<20	<20	<20
R24		32	37	35
R25		35	40	35

The predicted levels for the revised sleep disturbance scenario 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 40 dB.

On this basis, the following conclusions in the NIA (Global Acoustics 2018) remain true:

- The assessment of worst-case continuous and intermittent operational 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 criteria during the day, evening or night periods; and
- The Development will have negligible impact on local amenity with respect to operational noise emissions.

Section 19.3 addresses the mitigation measures recommended by HNELHD in relation to potential sleep disturbance.

A few community submissions objected to the Development based on high operational noise impacts, including health impacts, on 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 operational noise impacts, including low density of surrounding receptors and significant separation distances. There are only three residences within 2 km of a proposed PPU, with the closest located approximately 1,025 m from Farm 4.

A significant level of conservatism was incorporated in to the noise assessment by Global Acoustics (2018 and 2019), particularly in relation to assuming source to receiver winds of up to 3 m/s were prevailing conditions for each surrounding receptor and assuming temperature inversion conditions are a predominant feature of the area.

The modelling results for the worst-case continuous and intermittent operational noise scenarios assessed by Global Acoustics (2018 and 2019) indicate 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 criteria at any surrounding receptor during the day, evening or night periods.

While the Development may result in some externalised operational noise emissions, the significant separation distances and ProTen's commitments to best management practices and mitigation measures will ensure that any operational noise impacts are within acceptable criteria and that the Development can co-exist with the surrounding residents without amenity, nuisance or health implications.

19.2.2 Heavy Vehicle Traffic Noise

Two community submissions asserted the following:

The consultant incorrectly advises "that the increase in traffic would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed." This statement is false…

The statement identified in the two community submissions comes from Section 3.6 of the NIA (Global Acoustics 2018), which advises:

> *Traffic generated by the Development is predicted to increase heavy vehicles on Oxley Highway by up to 8% and total traffic counts by up to 2%......this increase in traffic would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed. No further assessment of traffic noise impact for the Oxley Highway has been undertaken, however a detailed assessment of traffic on Rushes Creek Road has been prepared.*

Global Acoustics (2019) confirms that this statement is solely in relation to the Oxley Highway and it is justification for not undertaking further assessment of potential road traffic noise impacts on the Oxley Highway only. It should not be confused with Global Acoustics' assessment of potential road traffic noise impacts along Rushes Creek Road detailed in Section 4.4 of the NIA (2018) and summarised in Section 8.8.3 of the EIS.

Many of the community submissions raised concerns and objections in relation to excessive road traffic noise on Rushes Creek Road.

Traffic generated by the Development is predicted to increase heavy vehicles on Rushes Creek Road by around 35.7% and total traffic counts (i.e. heavy and light vehicles) by around 11.1% (based on future forecast background traffic volumes for the 10 year design horizon of 2029). Global Acoustics' (2018) comparison of predicted existing and proposed (i.e. existing traffic plus Development-generated traffic) traffic noise levels on Rushes Creek Road for the day and night periods was presented in Table 13 of the NIA (2018) and Table 48 of the EIS. The Development is predicted to increase existing traffic noise levels on Rushes Creek Road by 1 dB during the day period and 3 dB during the night period. Specifically:

- The predicted day period traffic noise levels for the proposed scenario are below the RNP (DECCW 2011) criterion of 60 dB at all receptors along Rushes Creek Road. The highest day period impact is predicted at R37 at 54 dB, which is an increase of 1 dB from the existing predicted 53 dB; and
- The predicted night period traffic noise levels for the proposed scenario are below the RNP (DECCW 2011) criterion of 55 dB at all receptors along Rushes Creek Road. The highest night period impact is predicted at R37 at 50 dB, which is an increase of 3 dB from the existing predicted 47 dB.

The future forecast background traffic volume for 2029 on Rushes Creek Road is 615 vehicles, 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 remaining compliant with the RNP (DECCW 2011).

19.2.3 Emergency Generators

GSC queried the noise implications from the operation of the emergency generators.

As advised in Section 4.14.6 of the EIS, three emergency standby diesel generators will be installed at each PPU 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. Each generator will have a maximum standby rating of 390 kilovolt-amps (kVA) and they will be contained within lockable acoustic enclosures.

The generator specifications provided in Appendix L of the EIS advises a sound power (L_{WA}) of 97 dB for the 390 kVA generator in an acoustic enclosure. This sound power needs to be considered in relation to the other modelled noise sources at each PPU, particularly the poultry shed ventilation fans. Global Acoustics (2019) advises that one ventilation fan has a sound power of 87 dB and each shed (20 fans) will have a sound power of 100 dB, which is double the sound power of one generator (in logarithmic units a source that is 3 dB higher has twice the acoustic energy). Each PPU will have an average total sound power of 111 dB. Global Acoustics (2019) advises that the total sound power for three generators operating at one PPU (i.e. 102 dB) will cause an increase of less than 0.5 dB to the sound power of each PPU, which will not be noticeable off-site and noise levels will remain compliant with the adopted criteria at all receptors.

On this basis, along with the fact that the generators will only be used on the rare occasion when power from the electricity grid is lost, no further assessment is warranted (Global Acoustics 2019). The solar panels proposed to be installed at each PPU will possibly further reduce the frequency of generator use.

19.3 Mitigation Measures

HNELHD recommended the following best management practices for noise mitigation and management:

1. Prevent generation of noise at source by good design and maintenance.

2. Minimise or contain noise at source by observing good operational techniques and management practice.

3. Increase the distance between the source and receiver.

4. Use physical barriers or enclosures to prevent transmission to sensitive receptors.

5. Practice considerate timing and control of unavoidably noisy operations.

HNELHD specifically recommended that noisy operations, such as truck movements, be limited to between 7:00 am and 10:00 pm to minimise noise impacts on the nearby residences.

Many if the community submissions requested a restriction on night time traffic movements and some requested a restriction on compression braking.

The Development Site offers several advantages in terms of potential operational noise impacts, including being removed from any urban areas, low density of surrounding receptors and significant separation distances. There are only three residences within 2 km of a proposed PPU, with the closest located approximately 1,025 m from Farm 4.

A significant level of conservatism was incorporated in to the noise assessment by Global Acoustics (2018 and 2019), particularly in relation to assuming source to receiver winds of up to 3 m/s were prevailing conditions for each surrounding receptor and assuming temperature inversion conditions are a predominant feature of the area. Global Acoustics (2018 and 2019) concludes:

- The modelling results for the worst-case continuous operational noise scenarios and revised worst-case intermittent operational noise scenario (see **Section 19.2.1**) indicate that the Development will be able to operate on a day-to-day basis, including during noise enhancing meteorological conditions, and not exceed the adopted criteria at any surrounding receptor during the day, evening or night periods.
- The modelling results for the revised sleep disturbance scenario (see **Section 19.2.1**) of worst-case night-time bird collection indicate that all receptors will experience noise levels below the adopted criterion, including during enhancing meteorological conditions.
- Future traffic noise levels along Rushes Creek Road are predicted to be compliant with the adopted criteria during both the day and night periods (see **Section 19.2.2**).

Based on these findings, additional noise control options (in addition to the adoption of current industry best practice) are not warranted. While the Development may result in some externalised operational noise emissions, the significant separation distances and ProTen's commitments to best management practices and mitigation measures will ensure that any operational noise impacts are within acceptable criteria and that the Development can co-exist with the surrounding residents without amenity, nuisance or health implications.

In response to the specific mitigation measures recommended/requested by HNELHD and the community:

Preventing the generation of noise at the source by good design and maintenance

Minimising/containing noise at the source by observing good operational and management practices

These recommendations of HNELHD have already been incorporated in to Development. Sections 8.8.4 and 9 of the EIS make the following commitments relating to noise mitigation and management:

- 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.

Increasing the distance between the noise source and receiver

Using physical barriers or enclosures to prevent the transmission of noise to sensitive receptors

While there is significant residue land available within the Development Site further away from some of the surrounding residences, alternative development layouts were considered and the proposed positioning of the PPUs is considered optimal in relation to minimising the potential for adverse odour impacts on surrounding residences, minimising impact on high conservation vegetation and maximising biosecurity separation distances. Positioning the PPUs closer to the centre of the Development Site would notably increase the odour impacts for the residences located to the north of the Development Site, require the removal of high conservation vegetation, potentially impact on identified Aboriginal sites, and increase the risk of disease introduction and/or spread as a result of reduced biosecurity separation.

There are only three residences within 2 km of a proposed PPU, with the closest located approximately 1,025 m from Farm 4. Furthermore, the assessment of worst-case continuous and intermittent operational 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 criteria at any surrounding receptor during the day, evening or night periods. On this basis, increasing the distances between the various noise sources and receivers is not warranted, nor is the inclusion of physical barriers/enclosures for noise control.

Practicing considerate timing and control of unavoidably noisy operations

Limiting noisy operations to between 7:00 am and 10:00 pm

Restricting night time traffic movements

Given the nature of the operation, particularly in relation to maintaining the health and welfare of livestock, and being reliant on third-party transport contractors and service facilities, it is not possible to restrict the timing or control noisy activities such as heavy vehicle traffic or ventilation fans.

The majority of operational activities will be carried out between 7:00 am and 7:00 pm. Live bird collection and transport from the Development Site however may occur any time between 7:00 pm and 4:00 pm. While attempts will be made to transport the birds during cooler times of the day/night, given the very large number of birds to be collected and transported from this Development and the numerous other broiler production farms in the region, transport contractors cannot guarantee transport times and it is also dependent on the operational hours and capacity of Baiada's processing plant. For this reason, it is not possible to restrict heavy vehicle movements to the day period only or to between 7:00 am and 10:00 pm.

Restricting compression braking

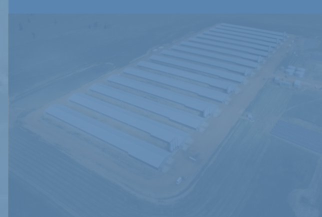
In response to the concerns regarding potential road traffic noise in many of the community submissions and the proximity of a few residences to Rushes Creek Road, ProTen has made the following additional commitments in relation to heavy vehicle compression braking:

- A directive to heavy vehicle drivers will be included in the Driver Code of Conduct to avoid the use of compression braking along Rushes Creek Road;
- Signage will be installed on the two access driveways near their intersections with Rushes Creek Road within the Development Site instructing heavy vehicle drivers to avoid the use of compression braking within the Development Site and on Rushes Creek Road; and
- Consultation will be undertaken with Council and the local traffic committee in relation to installing signage on Rushes Creek Road near the Development Site and near the Oxley Highway intersection instructing heavy vehicle drivers to avoid compression braking along Rushes Creek Road.

These have been included in the Updated Summary of Commitments in **Section 25**.

Section 20

VISUAL AMENITY



20 VISUAL AMENITY

20.1 Impact Assessment

The DPE noted that the assessment of visual impact in Section 8.10 of the EIS does not include any plans or images from key vantage points or a detailed assessment of impacts on residents. The DPE requested an assessment of visual impacts from receptor R25 towards Farm 4 and from Rushes Creek Road and any affected residences to Farm 2.

The visibility and significance of the visual impacts of the Development will primarily result from a combination of:

- The distance between a view location and the proposed PPUs;
- The topography and vegetation between a view location and the proposed PPUs;
- The construction materials and constructed height of the infrastructure at the PPUs; and
- Effectiveness of mitigation measures.

Based on the separation distances, topography and existing vegetation, the most visible components of the Development will be the infrastructure at Farms 2 and 4. The poultry sheds will measure approximately 4.7 m high to the roof peaks and the feed silos will measure approximately 8.7 m high. The significant separation distances, intervening topography and scattered paddock trees will shield or partially shield Farms 1 and 3 from the residences to the east and northeast and from Rushes Creek Road.

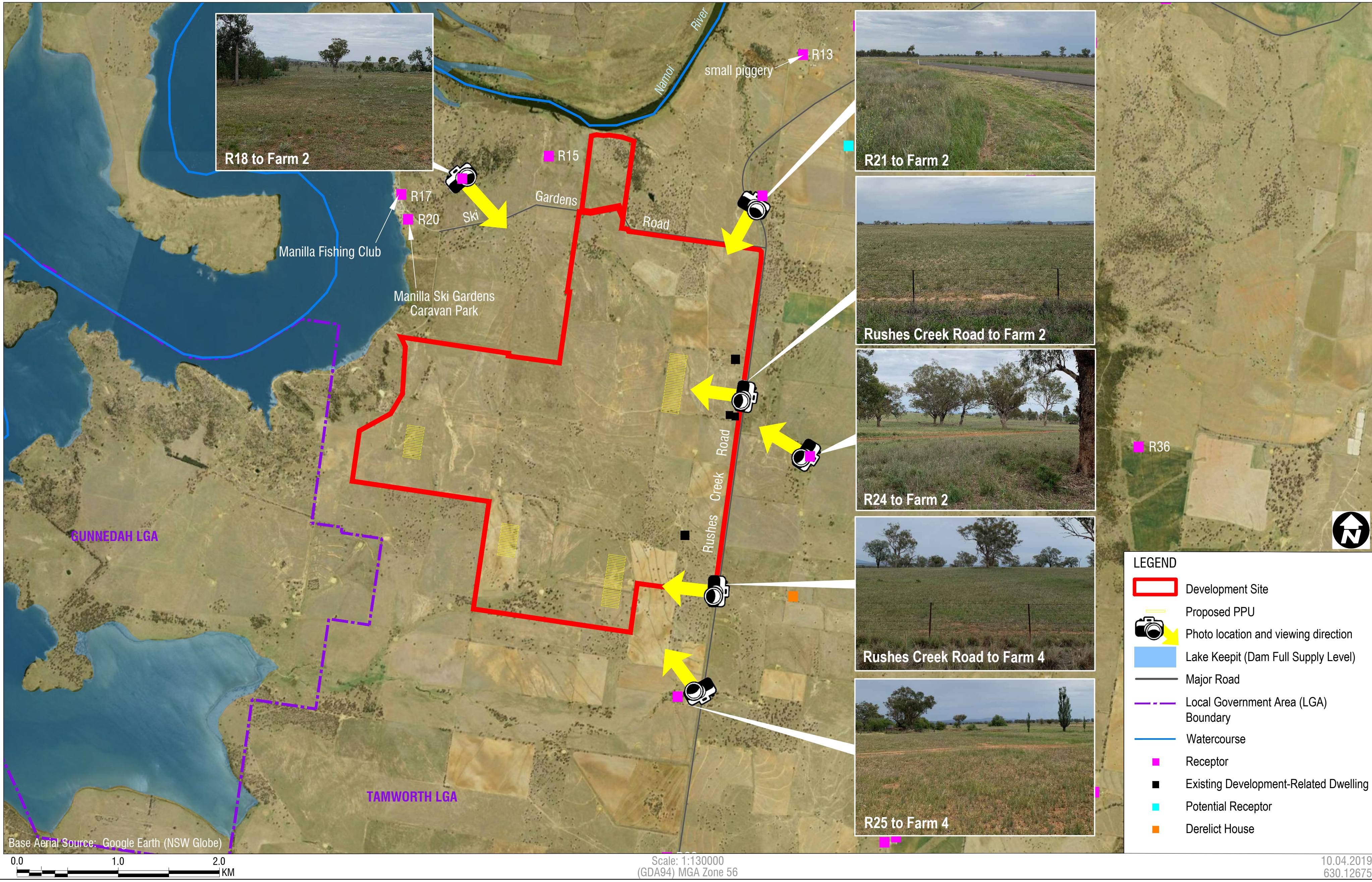
In responding to the DPE's comments and requests, the following viewpoints have been assessed for potential visual impact:

- Receptor R18 to Farms 1 and 2 (due to the elevated position of the residence);
- Receptor R21 to Farm 2 (due to proximity);
- Receptor R24 to Farm 2 (due to proximity);
- Receptor R25 to Farm 4 (dur to proximity); and
- Rushes Creek Road to Farms 2 and 4 (die to proximity).

SLR prepared the following plans/images to assist with the assessment of potential visual impact:

- **Figure 30** – existing photographic viewpoints from the four residences and Rushes Creek Road towards the proposed Farms 2 and 4 to show the pre-development views;
- **Figure 31** – alignments of assessed visual profiles from the four residences and Rushes Creek Road towards the proposed Farms 1, 2 and 4; and
- **Figure 32** – conceptual post-development visual profiles (line-of-sight views at an eye height of 1.8 m) from the four residences and Rushes Creek Road to the proposed Farms 1, 2 and 4.

SLR also prepared a conceptual post-development photomontage of Farm 2 from Rushes Creek Road.



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Scale: 1:130000
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10.04.2019
630.12675

SLR

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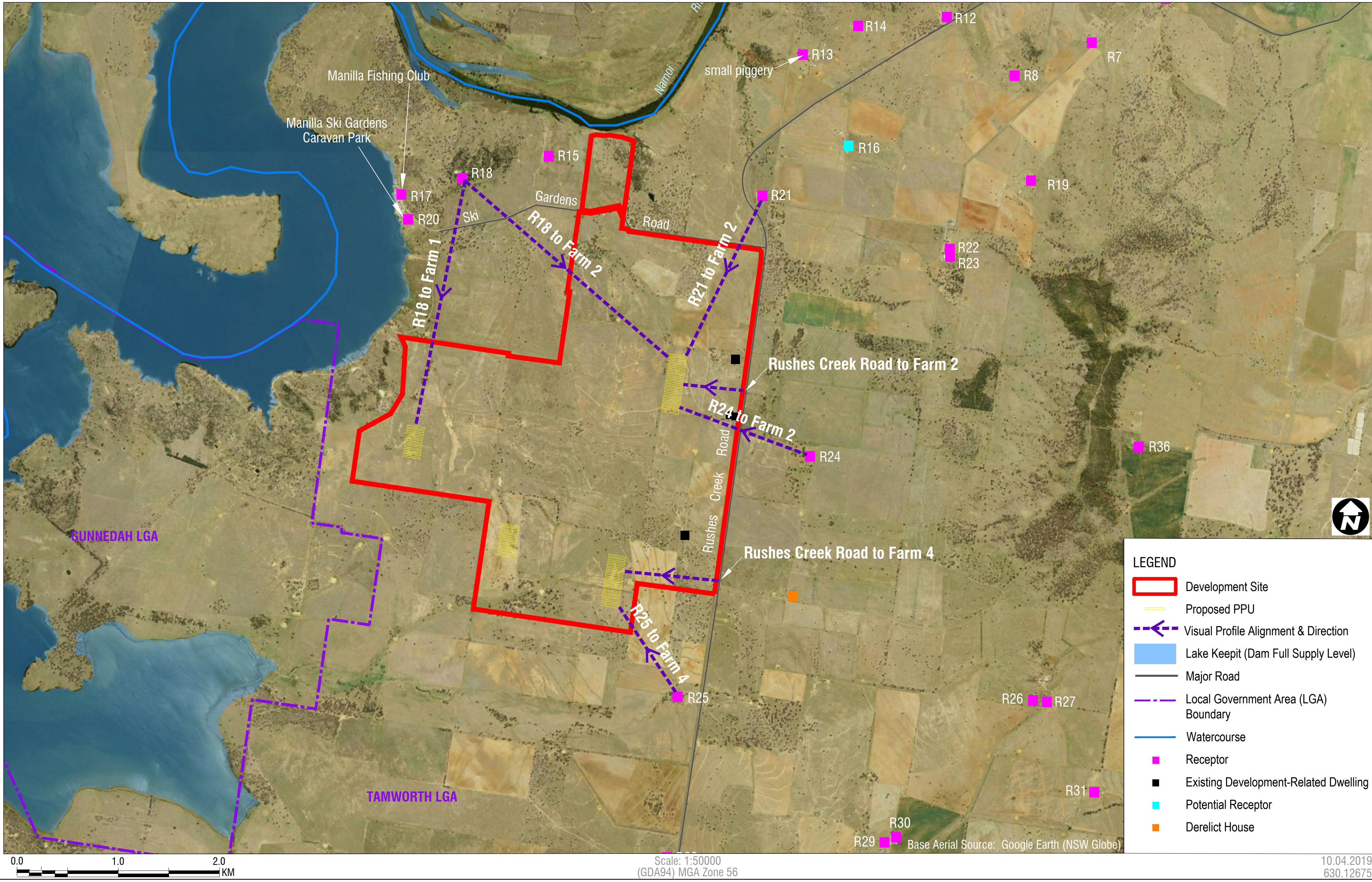
Existing Viewpoints

FIGURE 30



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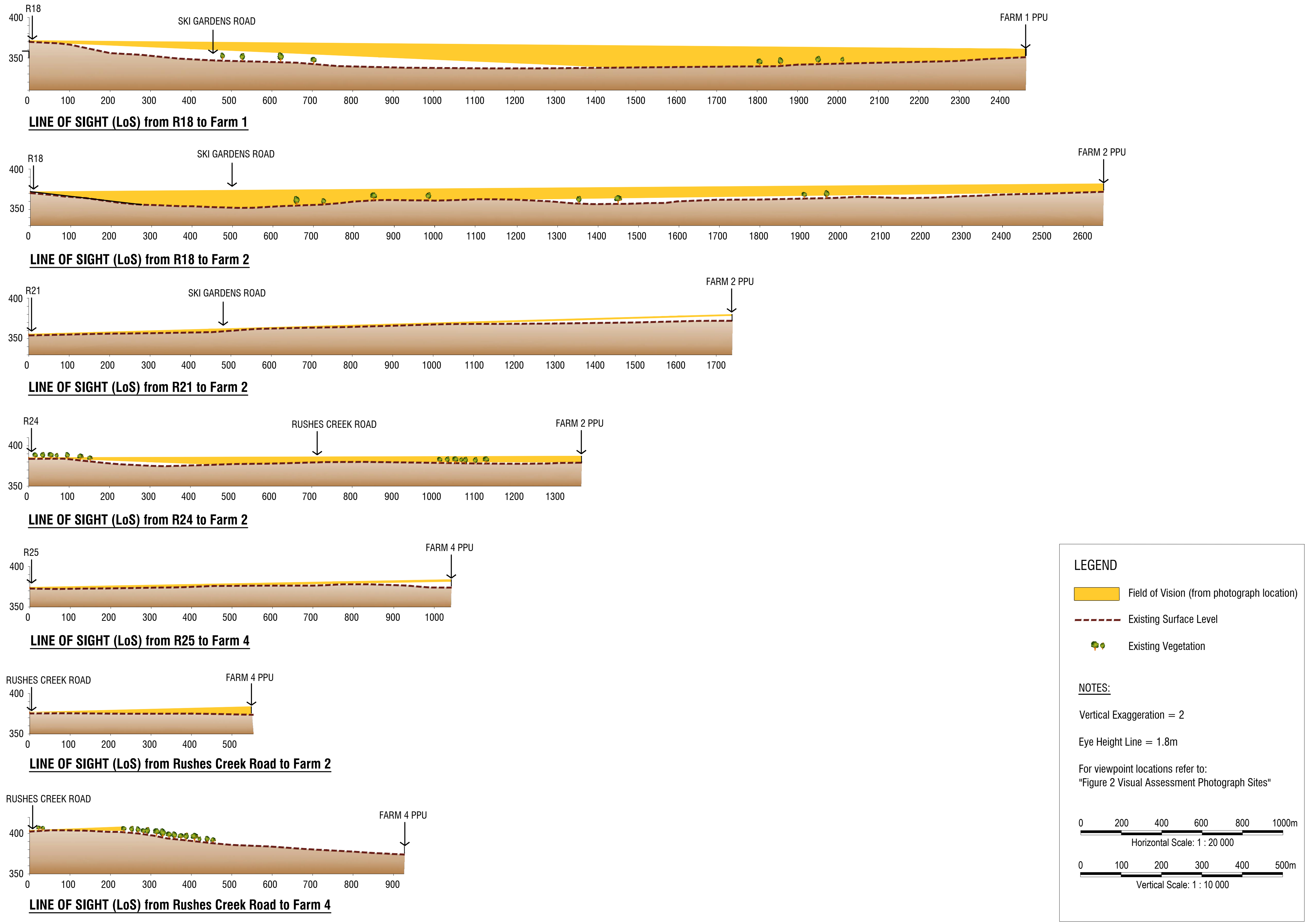
Visual Profile Alignments

FIGURE 31



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Scale: Refer Scale Bar
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Conceptual Post-Development Visual Profiles

FIGURE 32

Farm 1

Farm 1 will comprise 10 poultry sheds and associated support and servicing infrastructure. It will be positioned in the western extent of the Development Site well-removed from surrounding residences and public roads. The closest receptors are:

- Manilla Ski Gardens Caravan Park (R20) approximately 2,005 m to the north;
- Manilla Fishing Club (R17) approximately 2,250 m to the north; and
- Residential receptor R18 approximately 2,460 m to the north.

Ski Gardens Road is approximately 1,890 m to the north and Rushes Creek Road is approximately 3,000 m to the east. The significant separation distances, intervening topography and scattered paddock trees will shield or partially shield Farm 1 from the residences to the east and northeast and Rushes Creek Road.

Farm 1 will however be visible from certain locations along Ski Gardens Road and from R18 to the north due to the elevated position of the residence. The visual profile on **Figure 32** shows that R18 will have a relatively clear line-of-sight towards Farm 1. However, the view distance of close to 2.5 km is significant and the view to Farm 1 will be seen within the context of the much wider views across the surrounding landscape. Farm 1 will not dominate the views within the surrounding landscape from R18 or other nearby vantage points.

Farm 2

Farm 2 will comprise 18 poultry sheds and associated support and servicing infrastructure. It will be positioned in the eastern extent of the Development Site, with the closest residential receptors being R24 approximately 1,335 m to the east and R21 approximately 1,720 m to the north-northeast. Farm 2 will be visible or partially visible from some of the residences to the north and east and from Ski Gardens Road, which is approximately 1,080 m to the north, and Rushes Creek Road, which is approximately 585 m to the east.

Receptor R18 to Farm 2 – the visual profile on **Figure 32** shows that the elevated position of R18 will provide a relatively clear line-of-sight towards Farm 2. However, the view distance of over 2.6 km is significant and there are some existing scattered trees that will provide some screening (see **Photo 2**). The view to Farm 2 will be seen within the context of the much wider views across the surrounding landscape. Farm 2 will not dominate the views within the surrounding landscape from R18 or other nearby vantage points.

Photo 2 Viewpoint from receptor R18 to Farm 2

Source: SLR

Receptor R21 to Farm 2 – the visual profile on **Figure 32** shows that there is some intervening topography that will partially shield Farm 2 from the view of R21, however the tops of the poultry sheds and/or feed silos will likely be visible due to their height. While there is no existing tree cover between R21 and Farm 2 (see **Photo 3**), the topography and view distance of approximately 1.7 km will likely obscure the view of Farm 2 and it will unlikely constitute a marked effect on the existing views from R21. The views towards Farm 2 will be seen within the context of the much wider views across the surrounding landscape.

Photo 3 Viewpoint from Rushes Creek Road near receptor R21 to Farm 2

Source: SLR

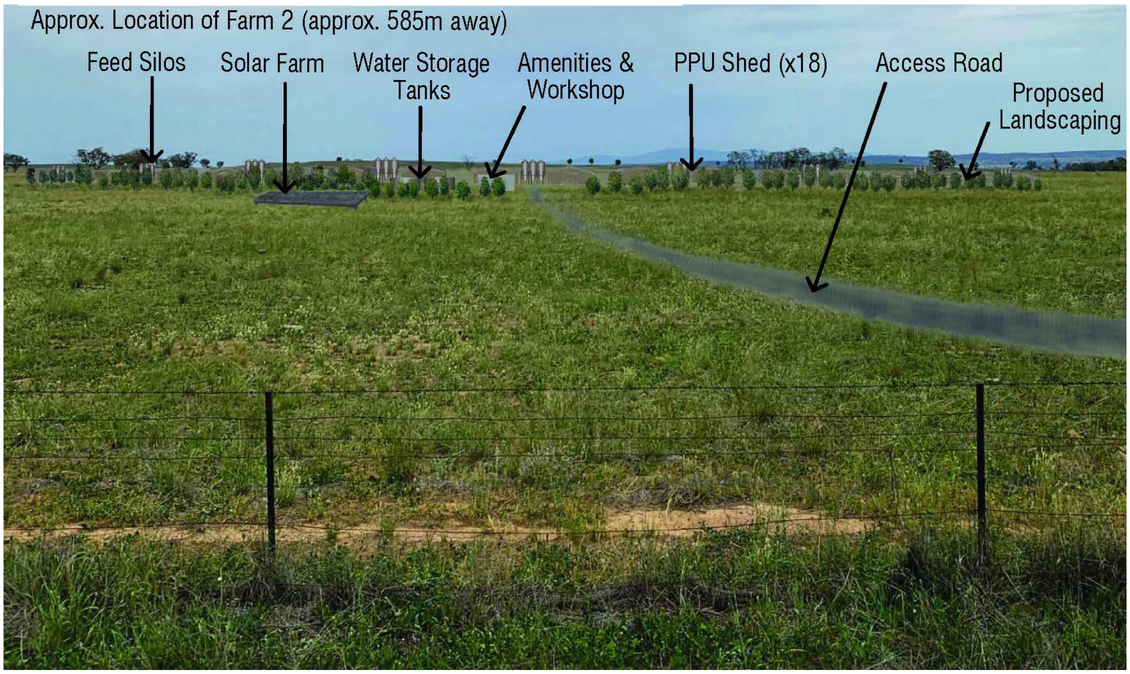
Receptor R24 to Farm 2 – the visual profile on **Figure 32** shows that the slightly elevated location of R24 will provide a relatively clear line-of-sight towards Farm 2. There are some existing scattered trees around the dwelling (see **Photo 4**) that will provide some screening. These trees and the view distance of approximately 1.3 km will ensure that Farm 2 does not constitute a marked effect on the existing views from R24. The views towards Farm 2 will be seen within the context of the much wider views across the surrounding landscape.

Photo 4 Viewpoint from receptor R24 to Farm 2

Source: SLR

Rushes Creek Road to Farm 2 – the visual profile on **Figure 32** shows that there will be a clear line-of-sight from Rushes Creek Road to Farm 2. The view distance is approximately 585 m and there is no intervening topography or tree cover. The visibility will be partially alleviated by the mitigation measures committed to in the EIS (see **Section 20.2**). As evident on **Photo 5**, which is a post-development photomontage prepared by SLR, the vegetation screen to be planted around the perimeter of the PPU will provide some screening once established. The planted trees shown on **Photo 5** are around 3 to 4 m tall at around five years old.

Photo 5 Post-development photomontage from Rushes Creek Road to Farm 2



Source: SLR

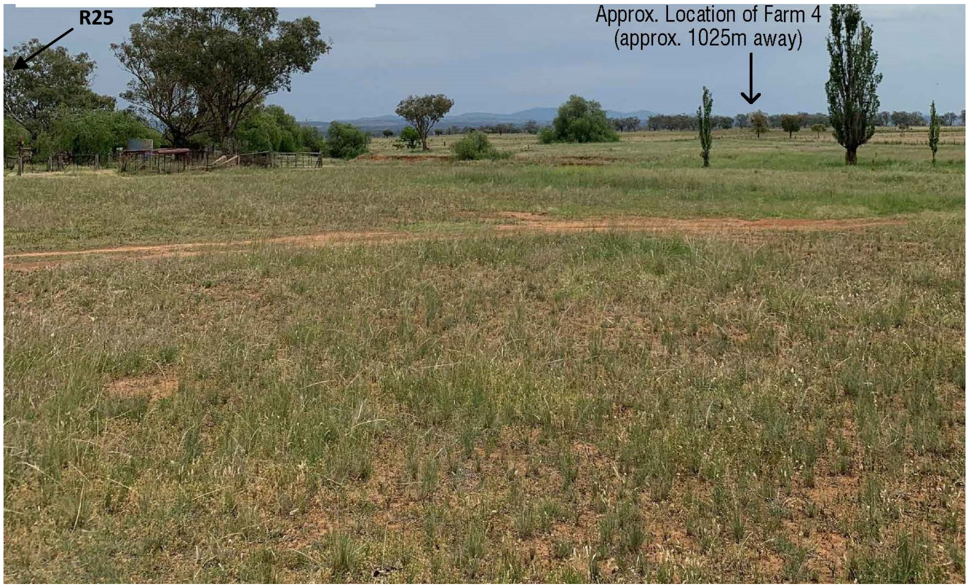
It should be noted that the visual impact of Farm 2 from Rushes Creek Road will primarily be for passing motorists who will see or partially see the infrastructure momentarily as they drive past the Development Site. Motorists are considered to have a low sensitivity to visual impacts.

Farm 4

Farm 4 will comprise 16 poultry sheds and associated support and servicing infrastructure. It will be positioned in the south-east corner of the Development Site, with the closest residential receptors being R25 approximately 1,025 m to the southeast and R24 approximately 2,000 m to the northeast. Rushes Creek Road is approximately 1,000 m to the east. The significant separation distances, intervening topography and scattered trees will shield or partially shield Farm 4 from residences and Rushes Creek Road.

Receptor R25 to Farm 4 – the visual profile on **Figure 32** shows that there is some intervening topography that will partially shield Farm 4 from the view of R25, however the tops of the poultry sheds and/or feed silos will likely be visible due to their height. There are some existing scattered trees around the dwelling that will provide some screening. The views towards Farm 4 will be seen within the context of the much wider views across the surrounding landscape and, given the view distance of over 1 km, it will not dominate these wider views.

Photo 6 Viewpoint from Rushes Creek Road near receptor R25 to Farm 4



Source: SLR

Rushes Creek Road to Farm 4 – the visual profile on **Figure 32** and **Photo 7** show that there is no line-of-sight from Rushes Creek Road due-west to Farm 4 given the intervening topography. While there is some intervening topography that will partially shield Farm 4 from the view of Rushes Creek Road to the south of the Development Site, the tops of the poultry sheds and/or feed silos will likely be visible due to their height.

Photo 7 Viewpoint from Rushes Creek Road due-west to Farm 4

Source: SLR

Conclusion

The visual impact significance of the Development from the four assessed residential receptors is low to moderate based on the significant separation distances and wide views available from each residence across the surrounding landscape. Some viewpoints will have intervening topography and scattered trees that will partially shield/screen the proposed PPUs.

While there is a relatively low separation distance (approximately 585 m) and a direct line-of-sight from Rushes Creek Road to Farm 2 and partial views from Rushes Creek Road to Farm 4, the visual impact significance of the Development from Rushes Creek Road is considered low to moderate given that motorists are considered to have a low sensitivity to visual impacts. The visual impact of the PPUs from Rushes Creek Road will primarily be for passing motorists who will see or partially see the infrastructure momentarily as they drive past the Development Site.

The visibility of the Development and the assessed visual impact significance for the surrounding residences and motorists will be reduced through the mitigation measures committed to in the EIS, which are repeated below in **Section 20.2**.

Three community submissions raised lighting of the poultry sheds at night as an issue.

As advised in Sections 4.10.5 and 8.10.2 of the EIS, the primary source of external lighting will comprise one light fixture mounted at a height of approximately 4 m over the front and rear of each poultry shed. These lights will be aimed downwards and only used when necessary during loading-unloading and servicing activities at times of low light and/or heavy fog. There will not be permanent external night-time lighting and there will not be any broad area or flood lighting. On this basis, along with the significant separation distances, there should not be any issues in terms of adverse lighting impacts on the surrounding residences and public roads.

One community submission from a landholder to the north of Ski Gardens Road asserted that there is a direct line-of-sight from his/her land to the proposed PPUs and that the furthest location for any potential future dwelling on this land would be approximately 2.8 km from the PPUs.

Without knowing the location of this landholder's property or the specific site for any potential future dwelling it is not possible to ascertain the separation distances, any intervening topography and/or existing tree screening and, as such, it is not possible to assess the visual impacts.

However, the visibility of Farms 1 and 2 from receptor R18 to the north of Ski Gardens Road on a particularly elevated site was assessed above. It was concluded that R18 will have a relatively clear line-of-sight towards Farms 1 and 2 approximately 2.5 km and 2.6 km away, respectively. However, the separation distances are significant and the views to the PPUs will be seen within the context of the much wider views across the surrounding landscape. It was concluded that the PPUs will not dominate the views within the surrounding landscape from R18 or other nearby vantage points.

Two community submissions asserted that the views from their house (receptor R25) will be dominated by poultry sheds and feed silos and the visual amenity of a rural property overlooking grazing and cropping land will be significantly impacted. These submissions also asserted:

- **Vehicle headlights will shine towards their house as vehicles driving around the PPUs at night; and**
- **There will be significant glare from the buildings and glint from vehicle windscreens.**

Receptor R25 is located approximately 1,025 m to the southeast of Farm 4 and approximately 2,160 m to the southeast of Farm 3. The visual profile on **Figure 32** shows that there is some intervening topography that will partially shield Farm 4 from the view of R25, however the tops of the poultry sheds and/or feed silos will likely be visible due to their height. The visibility of Farm 3 from R25 has not be specifically assessed, however there is some existing scattered trees, including a patch of White box grassy woodland, that will partially screen Farm 3 from R25. There are also some scattered trees around R25 itself.

The views towards Farms 3 and 4 from R25 will be seen within the context of the much wider views across the surrounding landscape. Given the separation distances and partial screening by intervening topography and/or existing trees, the PPUs will not dominate the views within the surrounding landscape and there should not be any issues in relation to glare from buildings, vehicle headlights or glint from vehicle windscreen. The poultry sheds will be constructed using non-reflective materials and the vegetation screens to be established around the perimeter of the PPUs will provide some additional screening once established (see **Section 20.2**).

Two community submissions asserted that the four PPUs will be visible from Rushes Creek Road and that this will have a significant impact on the rural character and amenity of the area.

Based on the separation distances, topography and existing vegetation, the most visible components of the Development from Rushes Creek Road will be Farms 2 and 4. The significant separation distances, intervening topography and scattered paddock trees will shield or partially shield Farms 1 and 3 from Rushes Creek Road.

While there is a relatively low separation distance (approximately 585 m) and a direct line-of-sight from Rushes Creek Road to Farm 2 and partial views from Rushes Creek Road to Farm 4, the visual impact significance of the Development from Rushes Creek Road is considered low to moderate given that motorists are considered to have a low sensitivity to visual impacts. The visual impact of the PPUs from Rushes Creek Road will primarily be for passing motorists who will see or partially see the infrastructure momentarily as they drive past the Development Site. The visibility of the PPUs from Rushes Creek Road will be reduced through the mitigation measures committed to in the EIS (see **Section 20.2**), particularly the perimeter vegetation screens.

Given that the combined footprint of the Development is only around 9.1% of the Development Site and the visual impact from Rushes Creek Road will be momentary views or partial views for motorists as they pass by, the visibility of the Development from Rushes Creek Road will have a low impact on the rural character and amenity of the area.

Two community submissions asserted that the overhead powerline to be extended from a sub-station in Manilla to the Development Site will have a major visual impact and that this will change the natural value and character of the area.

As advised in Section 4.16.2 of the EIS, the new electricity service (poles and lines) to be extended from a sub-station in Manilla to the Development Site does not form part of the Development. A separate submission under Division 5.1 of Part 5 of the EP&A Act has been submitted to Essential Energy (determining authority), including a Review of Environmental Factors (REF).

It is unlikely that the residents along and around the powerline route will consider it a major visual impact. There are overhead power and telecommunications lines in most locations, including rural areas, and they are essential services. Some of these residents will in fact benefit by connecting to the new electricity service.

20.2 Mitigation Measures

The DPE requested details of any additional mitigation measures.

GSC advised that the vegetation screens should be established prior to commencing works to ensure that the vegetation reaches maturity prior to occupation of each PPU.

The visibility of the Development and the assessed visual impact significance for the surrounding residences and motorists on the public roads will be reduced through the following mitigation measures committed to in Sections 8.10.3 and 9 of the EIS:

- The poultry sheds will be constructed using non-reflective materials and the walls will be a eucalyptus green (or similar) colour that is sympathetic with the natural environment. This will reduce the degree of visual contrast between the poultry sheds and the surrounding landscape.
- There will be no mirrors or lenses used in conjunction with the solar panels and the panels will have anti-reflective treatment. On this basis, there should not be any glint or glare issues for the surrounding residences and motorists along Rushes Creek Road.
- External lighting will comprise individual light fixtures mounted at a height of approximately 4 m over the front and rear of each poultry shed. These lights will be aimed downwards and only used when necessary during loading-unloading and servicing activities at times of low light and/or heavy fog. There will not be permanent night-time lighting and there will not be any broad area or flood lighting.
- Vegetation screens will be established and maintained around the perimeter of each PPU as described in Section 4.20 of the EIS and shown on **Figures 5** to **8**. ProTen will progressively establish the landscape plantings, as soon as practicable following bulk earthworks and construction of the major infrastructure at each PPU (not prior to commencing construction as requested by GSC).

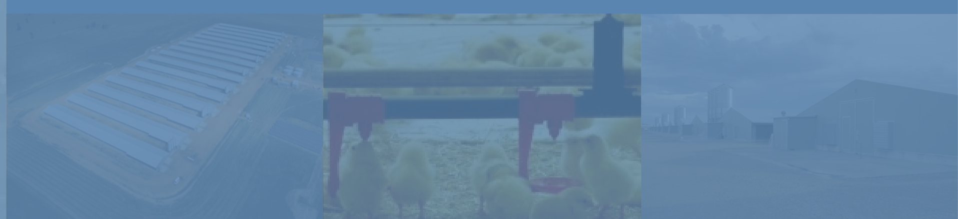
  While it is acknowledged that the vegetation screens will take time to establish and grow to a height that will provide effective screening, a variety of tree and shrub species of differing growth habits that are hardy and fast growing will be selected. The vegetation screens will also be regularly irrigated with water captured in the detention dam at each PPU. Based on experience at other ProTen farms, it is anticipated that the height of the vegetation screens will reach around 3 to 4 m at around the five-year mark.

  As advised in **Section 24.7**, advice with be sought from an appropriate professional to ensure that the tree and shrub species selected for the vegetation screens can effectively cope with and utilise the anticipated nutrient loads within the irrigation water.

There are no additional visual mitigation measures proposed.

Section 21

SOCIAL



21 SOCIAL

Section 8.12 of the EIS addresses the potential social impacts associated with the Development. It concludes that the potential for adverse impact on social amenity is low. The below sub-sections address the social issues raised by GSC, TRRRA, Animal Liberation and the community.

21.1 Employment

GSC asserted that the EIS does not provide any detail regarding the proposed workforce, potential training programs or the availability of skilled workers in the local community. GSC recommended that a skills and employment strategy be developed prior to commencing works.

GSC further asserted that the EIS does not consider the social impacts associated with the prospective population increases in the surrounding region from construction and operational employment, including the ability of the surrounding local centres to accommodate an increase in population.

Construction Employment

As advised in Section 4.3.2 of the EIS, 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. ProTen has committed to engaging local companies (with locally-based employees), where possible, for the capital works program, including land surveying, earthworks and civil construction, concreting, plumbing and electrical. The only exception at this point is the specialised poultry shed design and construction company based on the NSW Central Coast.

On this basis, there will not be any population increases associated with construction employment and the availability of skilled workers is not a concern for the construction phase. Furthermore, there will be no need for training programs or a skills and employment strategy. Construction workers will be suitably trained through the site induction process and then on an on-going basis through “toolbox talks” (or similar).

Operational Employment

As advised in Section 4.7 of the EIS, the Development will employ 20 full-time equivalent staff members. Eight of these staff members will be farm managers and assistant farm managers that will live on-site, with the remaining 12 staff members being farm hands. The eight managers will be required to have previous relevant experience and appropriate skills, while on-the-job training will be provided for the 12 farm hands and ProTen will firstly seek interest for these positions from the local region. If there is a lack of interest, availability or suitability from the local region, ProTen will seek to employ staff members from outside of the region and relocate them. However, given the large number of poultry and other livestock operations in the region, ProTen does not anticipate any issues in relation to local availability of potential and suitable workers.

There is no need for training programs or a skills and employment strategy. Operational workers will be suitably trained through the site induction process and then on an on-going basis through toolbox talks (or similar).

There will not be any notable population increases associated with operational employment, especially given that eight of the 20 staff members will reside on-site. While there will be several contract companies engaged for certain activities, including bird catching, equipment maintenance, litter removal and shed wash down, these will be existing contracting companies with existing employees that already service the region. Some are local companies and some are based elsewhere within NSW.

21.2 Surrounding Farming Properties

Some of the community submissions and Animal Liberation claimed that locating the PPUs close to property boundaries contravenes the Best Practice Guidelines (DPI 2012), which recommends locating sheds and facilities near the centre of the site, and poses impacts to the use and enjoyment of the adjoining farming properties.

Other community submissions asserted that the Development is incompatible with the surrounding farming properties and raised issues with the close proximity of the proposed PPUs to site boundaries and receptor R25.

The Best Practice Guidelines (DPI 2012) do not contain specific property boundary setback or separation distance requirements. Instead, appropriate separation distances are determined on a site-specific and development-specific basis when seeking development consent.

Specialist impact assessments were undertaken as part of the EIS to optimise the positioning of the PPUs and linear infrastructure within the Development Site and ensure adequate separation distances to surrounding receptors. While there is significant residue land available within the Development Site further away from the site boundaries and some of the surrounding residences, alternative development layouts were considered and the proposed positioning of the PPUs is considered optimal in relation to minimising the potential for adverse odour impacts on surrounding residences, minimising impact to high conservation vegetation and maximising the biosecurity separation distances. Positioning the PPUs closer to the centre of the Development Site would notably increase the odour impacts for the residences located to the north of the Development Site, require the removal of high conservation vegetation, potentially impact on identified Aboriginal sites, and increase the risk of disease introduction and/or spread as a result of reduced biosecurity separation.

The separation distances afforded by the proposed layout (see Section 4.6 of the EIS), which include over 1 km to the nearest privately-owned residence, along with the development design features, best management practices and mitigation measures committed to by ProTen will assist to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

The potential for conflict between the Development and the existing surrounding farming activities is considered low and there is no evidence to suggest that the Development will reduce the agricultural production potential of the surrounding farming properties. Points to note in this regard include:

- The Development Site is zoned RU1 Primary Production under the Tamworth LEP and intensive livestock agriculture, such as that proposed, is a permissible land use (with consent). All land surrounding the Development Site is also zoned RU1 Primary Production, which indicates compatibility of the Development with surrounding lands and land uses.
- The combined footprint of the Development will amount to approximately 92.81 ha, which is only around 9.1% of the Development Site, and the commercial activities associated with the poultry operation will be largely confined to this area.
- The Development does not pose any impact to local surface water or groundwater resources that are potentially relied upon by surrounding farming properties (see Sections 8.4 and 8.5 in the EIS, and **Sections 15** and **16** in this RTS).
- The Development does not pose any increased risk for the introduction or spread of weeds, pests or feral animals to surrounding lands (see **Section 8**).
- The Development does not pose any increase risk to the biosecurity of surrounding farming properties (see Section 4.23 in the EIS and **Section 9.3** in this RTS).

- The Development does not pose any impacts to surrounding farming activities in relation to dust, including dust deposition on crops, improved pasture and farm dams. The particulate matter modelling has been demonstrated to be conservative and the results show that the contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations (see **Section 13.2**).
- Traditional farming livestock are typically only impacted by noise when constantly high noise or sudden loud noise leads to a decrease in animal productivity through increased stress. 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 adopted criteria during the day, evening or night periods (see **Section 19.2.1**). On this basis, noise does not pose an impact to agricultural production within the area.
- Many of ProTen's existing poultry farms in NSW have been operating for a long time in rural areas surrounded by traditional agricultural farming activities. ProTen is yet to be made aware of any aspect of their operations that are impacting on the surrounding farming activities.
- The residual land within the Development Site will continue to be used and maintained for traditional agricultural production purposes (cropping and/or grazing). This is undertaken successfully within other ProTen development sites in NSW, with the poultry operation and farming activities co-existing without conflict. It therefore follows that there should not be any conflict with surrounding farming activities.

ProTen has made the following commitments to assist in maintaining amicable relationships with neighbouring landholders:

- Ensuring the Development is constructed and operated adopting best practice management;
- Ensuring implementation of the development design features, best management practices and mitigation measures committed to in the EIS and this RTS; and
- On-going consultation and engagement with the surrounding community members.

21.3 Surrounding Rural Amenity

Some of the community submissions asserted that the Development will impact on the rural character and quiet rural lifestyle of the surrounding area.

There is a relatively low density of privately-owned residences surrounding the Development Site and there are significant separation distances between the Development and these residences. There are only three residences within 2 km of a proposed PPU, with the closest located approximately 1,025 m from Farm 4. Most of the permanent residents in the area are involved in traditional farming. These residents enjoy the rural location and associated lifestyle, along with the proximity to the regional centres of Tamworth and Gunnedah.

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

The Development, as proposed, represents the best of the alternatives considered when taking the environmental, social and economic impacts in to consideration, along with biosecurity requirements. The potential for impact on the surrounding environment and social amenity has been reduced via the iterative process ProTen undertook to optimise the development and ensure adequate separation distances, which resulted in fewer poultry sheds and fewer birds, with associated reductions in odour, dust, traffic and noise.

The information presented in the EIS and this RTS demonstrates that the Development poses a low risk to social amenity. The relevant findings of the key impact assessments are summarised below.

Odour

PEL's (2018) odour modelling results show that all residential receptors surrounding the Development Site are predicted to experience 99th percentile odour concentrations below the 5 ou criterion for all three batch staging scenarios. Astute (2019) demonstrated that a suitable and appropriately conservative assessment was performed by PEL (2018). The emissions modelled are higher than actual measured emissions at modern poultry farms and represent the upper range of potential emissions from the Development.

Dust

Astute (2019) has demonstrated that the particulate matter emission estimation methodology adopted in the AQA (PEL 2018) is highly conservative. The contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations (Astute 2019).

Traffic

RoadNet (2018) advised that the additional traffic to be generated by the Development will not have any significant impact on the safety or operation of the external road network, including Rushes Creek Road. SLR's review (2018f) confirmed that Rushes Creek Road is of suitable existing form to accommodate the additional traffic and there is significant additional capacity on the transport route (i.e. the Oxley Highway and Rushes Creek Road) for the "With Development" scenario at the 2029 design horizon.

Noise

Global Acoustics' (2018 and 2019) assessment of worst-case continuous and intermittent operational 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 criteria at any receptor during the day, evening or night periods. On this basis, the Development will have negligible impact on local amenity with respect to operational noise emissions.

Road Traffic Noise

The Development is predicted to increase existing traffic noise levels on Rushes Creek Road by 1 dB during the day period and 3 dB during the night period, with all future road traffic noise levels being compliant with the adopted criteria (Global Acoustics 2018). In response to the concerns raised by the community in relation to heavy vehicle traffic noise, ProTen has committed to additional mitigation measures aimed at restricting compression braking along Rushes Creek Road (see **Section 19.3**).

Visual Amenity

The visibility of the Development from Rushes Creek Road will have a low impact on the rural character and amenity of the area. Points to note in this regard include:

- The combined footprint of the Development is only around 9.1% of the Development Site; and
- As addressed in **Section 20**:
  - The visual impact significance of the Development from the surrounding residences is considered low to moderate based on the significant separation distances and wide views available from each residence across the surrounding landscape;
  - The visual impact from Rushes Creek Road will be momentary views of the PPUs by motorists as they drive past the Development Site;
  - There is intervening topography and/or scattered trees that will screen or partially screen the proposed PPUs from some residences and some stretches of the adjoining pubic roads; and
  - The visibility of the PPUs will be further reduced through the mitigation measures committed to in EIS, particularly the perimeter vegetation screens.

The significant separation distances and ProTen's commitments in relation to development design features, best management practices and mitigation measures will assist to ensure that the Development can co-exist with the surrounding residents and pose a low risk to existing rural amenity.

21.4 Surrounding Recreational Land Uses

A few of the community submissions asserted that the Development is incompatible with the recreational activities that occur on and around Lake Keepit.

The TRRRA asserted that the Development will greatly devalue Lake Keepit's pristine recreation area.

The location of Lake Keepit in relation to the Development Site and Development can be best seen on **Figures 3** and **4**, respectively. **Table 23** lists the main recreational areas and facilities surrounding the Development Site and the distances between these areas/facilities and the nearest proposed PPU.

Table 23 Surrounding Recreational Areas and Facilities

Recreational Area / Facility	Approximate Distance to Nearest PPU
Lake Keepit – full supply dam level	790 m (Farm 1)
Manilla Ski Gardens Caravan Park (R20)	2,005 m (Farm 1)
Manilla Fishing Club (R17)	2,250 m (Farm 1)
Lake Keepit State Park	5,520 km (Farm 1)
Lake Keepit Sport and Recreation Centre (R32)	6,835 (Farm 1)
Lake Keepit Soaring Club	8,100 km (Farm 1)
Inland Waters Holiday Park	9,600 km (Farm 1)

It is evident that the main recreational areas and facilities surrounding the Development Site are well-removed from the proposed PPUs. As described in Sections 6.1.1 and 6.2.1 of the EIS, consultation was undertaken with the nearest recreational facilities and/or the government agencies involved in managing/overseeing some of these facilities/areas. There have been no specific concerns raised by the consulted recreational facilities or agencies in relation to the Development being incompatible with the recreational land uses or posing significant impact or risk to these land uses.

The information presented in the EIS and this RTS demonstrates that the Development poses a negligible risk to Lake Keepit and the associated recreational facilities and recreational users/visitors, including in relation to odour, dust, traffic, surface water, biodiversity, noise, visual amenity and biosecurity. The relevant findings of the key impact assessments are summarised below.

Odour

PEL's (2018) odour impact assessment indicates that odour is unlikely to reach Lake Keepit at sufficient concentrations to lead to impact (Astute 2019). PEL's (2018) modelling predicts that odour will be below 2 ou at Lake Keepit for the majority of time (i.e. 99% of the year) and, as such, there is a very low risk of impact to recreational users of Lake Keepit and local businesses that rely on the use of Lake Keepit.

Dust

The contribution of the Development to dust in the area is unlikely to be significant, especially when compared to existing background concentrations (Astute 2019). Dust is unlikely to travel as far as predicted by the models and unlikely to get anywhere near Lake Keepit (Astute 2019).

Traffic

RoadNet (2018) advised that the additional traffic to be generated by the Development will not have any significant impact on the safety or operation of the external road network, including Rushes Creek Road. SLR's review (2018f) confirmed that Rushes Creek Road is of suitable existing form to accommodate the additional traffic and there is significant additional capacity on the transport route (i.e. the Oxley Highway and Rushes Creek Road) for the "With Development" scenario at the 2029 design horizon.

Surface Water

Due to the controlled environment in which the Development will operate, it poses a negligible risk to Lake Keepit and no detectable impact is expected. The clean water diversions to be installed around the upstream sides of each PPU will convey clean water run-off around the poultry sheds and associated operational areas and safely back in to existing drainage lines and/or overland flow downstream of the PPUs. The surface water management system at each PPU will essentially operate as a closed water system, ensuring that all runoff from within the PPU environs (i.e. within the clean water diversion) is captured within the controlled surface water management system and does not compromise the clean water flows and downstream environments. There is negligible risk of runoff generated by the Development flowing off site for events up to the 1% AEP 72-hour design event and, as such, there is negligible risk to the downstream environments, including Lake Keepit.

Biodiversity

SLR (pers. comm., 20 December 2018) confirmed that the Development poses a negligible risk to terrestrial and aquatic fauna associated with Lake Keepit providing the mitigation and management measures committed to in the EIS are properly implemented and maintained.

Noise

The Development will have negligible impact on local amenity with respect to operational noise emissions (Global Acoustics 2018 and 2019). In response to the concerns regarding potential road traffic noise in many of the community submissions, ProTen has committed to additional mitigation measures aimed at restricting compression braking along Rushes Creek Road (see **Section 19.3**).

Visual Amenity

The visual impact significance of the Development for the recreational facilities in the area is considered low to negligible based on the significant separation distances and topography. The Development should not detract from the visual outlook of these recreational facilities or constitute a marked effect on the existing views. The visibility of the Development and the visual impact will be reduced through the mitigation measures committed to in the EIS, particularly the perimeter vegetation screens (see **Section 20.2**).

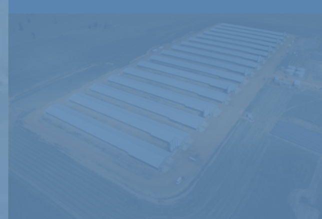
Biosecurity

Given the controlled environment in which new modern poultry farms operate, including fully-enclosed poultry sheds, bird vaccinations and strict biosecurity measures, the biosecurity risk that the Development poses to the surrounding environment is very low. There is no opportunity for wild birds and waterfowl that may inhabit Lake Keepit to come in to direct contact with the housed poultry.

In conclusion, the significant separation distances and ProTen's commitments to development design features, biosecurity, best management practices and mitigation measures will work to ensure that the Development can co-exist with the surrounding recreational land uses and pose negligible risk for adverse impact.

Section 22

ECONOMIC



22 ECONOMIC

Section 8.13 of the EIS addresses the potential economic implications of the Development. It concludes that the net economic impact of the Development will be one of significant benefit, with direct and derived economic benefits during both the construction and operational phases associated with capital works, employment, consumables and other flow-on activities.

Council's submission advises the following:

> *The Tamworth Region is one of the largest poultry producers in NSW and is an important part of the economy. For this reason Council supports its continued growth.*

The below sub-sections address the economic issues raised by GSC and the community.

22.1 Employment

Two community submissions queried whether the Development will in fact create job opportunities for the local community.

Construction Employment

As advised in Section 4.3.2 of the EIS, 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. ProTen has committed to engaging local companies (with locally-based employees), where possible, for the capital works program, including land surveying, earthworks and civil construction, concreting, plumbing and electrical. The only exception at this point is the specialised poultry shed design and construction company based on the NSW Central Coast.

Operational Employment

As advised in Section 4.7 of the EIS, the Development will employ 20 full-time equivalent staff members. Eight of these staff members will be farm managers and assistant farm managers that will live on-site, with the remaining 12 staff members being farm hands. The eight managers will be required to have previous relevant experience and appropriate skills, while on-the-job training will be provided for the 12 farm hands and ProTen will firstly seek interest for these positions from the local region. If there is a lack of interest, availability or suitability from the local region, ProTen will seek to employ staff members from outside of the region and relocate them. However, given the large number of poultry and other livestock operations in the region, ProTen does not anticipate any issues in relation to local availability of potential and suitable workers.

22.2 Construction Contracts

One community submission asserted that the Development will not directly benefit the local economy given it is likely that most of the capital works will be contracted to large/commercial companies who can afford the extensive outlay for materials, insurance, etc.

Similarly, another community submission asserted that the Development will draw most business/contracts away from the local area.

ProTen has demonstrated at other poultry farm developments that it tries to support and engage local contractors and suppliers where/when possible.

ProTen has committed to engaging local companies, where possible, for the capital works program, including land surveying, earthworks and civil construction, concreting, plumbing and electrical. The only exception at this point is the specialised poultry shed design and construction company based on the NSW Central Coast.

On this basis, the construction of the Development will result in direct and derived economic benefits for the local community.

22.3 Section 94 Contributions

One community submission asserted that the roads surrounding the Development will be paid for by ratepayers and Council without an even return.

ProTen will be levied development contributions to Council and, therefore, the costs of any maintenance or repair to the pavement along Rushes Creek Road that has a nexus to the Development will be funded.

22.4 Land Devaluation

Several community submissions asserted that the Development will devalue surrounding properties.

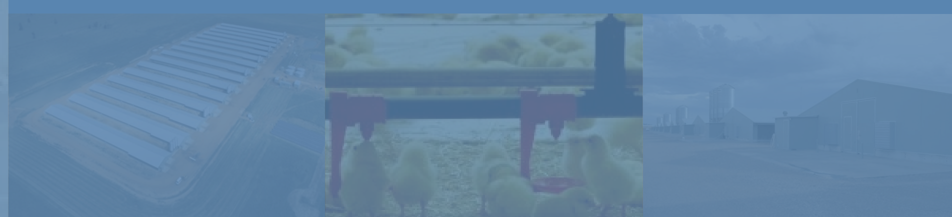
The Development Site is zoned RU1 Primary Production under the Tamworth LEP and intensive livestock agriculture, such as that proposed, is a permissible land use (with consent). All land surrounding the Development Site is also zoned RU1 Primary Production, which indicates compatibility of the Development with surrounding lands and land uses.

There are no higher density living areas, such as residential and/or rural-residential developments, in the area and no evidence to suggest that the Development will devalue the surrounding agricultural properties. The Development will not reduce the viability or production potential of surrounding agricultural land (see **Section 21.2**), nor the subdivision potential of surrounding agricultural land. Many of ProTen's existing poultry farms in NSW have been operating for a long time in rural areas surrounded by traditional agricultural farming properties. ProTen is yet to be made aware of any aspect of their operations that are impacting on the surrounding farming activities.

The significant separation distances and ProTen's commitments in relation to development design features, best management practices and mitigation measures will assist to ensure that the Development can co-exist with the surrounding land uses and pose a low risk for significant or long-term impact.

Section 23

DEVELOPMENT JUSTIFICATION



23 DEVELOPMENT JUSTIFICATION

Three community submissions queried whether a poultry farm development of the size proposed is needed in the Tamworth region.

Two of these submissions noted that Baiada has recently gained approval for the Strathfield poultry farm, which will comprise 70 broiler sheds, and queried whether two new major poultry farms are economically viable in the area. These submissions asserted that there are several other broiler farms for sale in the region and this would indicate an over-supply of broilers in the Tamworth area.

The market demand for chicken meat in Australia and the related future growth requirements for the industry is detailed in Section 1.5 of the EIS. As a snap shot, around 623 million broiler birds were processed in 2015-16 in Australia and, based on current growth projections, it is estimated that this will need to rise to close to 724 million birds per year by 2021-22 to satisfy domestic consumption needs.

Having observed the current and growing expansion of the Australian chicken meat market, Baiada is planning for continued growth of the industry within the Tamworth region to fulfil the immediate and projected long-term demands. Baiada currently processes approximately 600,000 birds per week (approximately 31.2 million per year) at its processing plant in West Tamworth. Subject to significant growth in the region's poultry broiler production, Baiada plans to relocate its processing service to the company's Oakburn site within the next 3 to 5 years. The proposed new plant at Oakburn currently has approval to process one million birds per week (approximately 52 million per year), however Baiada is seeking approval to increase this to three million birds per week (approximately 156 million per year).

On this basis, close to 350 new additional broiler sheds are required to be constructed and commissioned in the Tamworth region to supply the three million birds per week to Oakburn. This need is over and above the birds provided by the existing broiler farms in the region. Baiada's Strathfield development will provide 70 additional sheds and ProTen's Rushes Creek development will provide 54 additional sheds, however there is still a notable shortfall from the required 350 new sheds.

Baiada is the largest chicken processor in Australia and would not be making moves towards growing the chicken meat industry in the Tamworth region unless there was a significant market demand and long-term economic viability was certain. ProTen would also not commit to the significant capital investment required to establish a new poultry farm without economic viability assured for the company.

One community submission queried why a poultry development of this size needs to be built in a populated area such as Rushes Creek where there will be high odour, noise and dust impacts for local residents. This submission suggested that large poultry developments and the associated service facilities (processing plants, rendering plants, feed mills and hatcheries) could be situated on a site in an outback location with a water source, wide-open spaces and no close neighbours.

Rushes Creek is not considered a "populated area". The 2016 ABS Census data provides a population of 13 people for the "Keepit" suburb/area and 106 people for the "Rushes Creek" suburb/area, giving a combined total population in the area of 119 people. The Development Site is removed from any urban areas and there is a low density of surrounding receptors, with only three residences within 2 km of a proposed PPU.

As discussed in Section 3.2 of the EIS, the principal siting requirements for a poultry broiler production farm, such as that proposed, include:

- Proximity to a chicken hatchery facility;
- Proximity to a reliable poultry feed source;

- Proximity to a poultry processing facility;
- Proximity to a poultry rendering facility;
- Proximity to major regional and State transport routes;
- 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. Site selection 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 critical and, in many rural locations, sometimes prohibitive, and the cost of satisfying the necessary power requirements in rural areas is also sometimes prohibitive. Finding a site that already has a compatible agricultural land use is preferable and typically limits the amount of vegetation clearing required.

ProTen is regularly in the process of searching for potential sites in NSW to develop new poultry farms, however these sites must be in reasonable proximity to the poultry industry service facilities already well-established within the Tamworth and Griffith areas. The Development Site at Rushes Creek was identified as a site that met all the above listed criteria and preliminary odour modelling and baseline environmental surveys further confirmed its suitability.

The detailed information presented in the EIS and this RTS demonstrates that the Development poses a low risk to the local environment and the surrounding populace. It also poses a low risk to surrounding farming and recreational activities. ProTen has committed to appropriate development design features, best management practices and mitigation measures to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses.

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. It plays an ever-increasing role in the development of local agri-business in the region. If the numerous poultry farms and associated service facilities (hatchery, feedmill, processing plant, rendering plant, etc.) were relocated to an “outback location”, as suggested in the community submission, Tamworth would lose significant job numbers and the associated flow-on benefits.

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.

Two community submissions queried why ProTen has continually reduced the number of poultry sheds proposed for the Development Site, stating it has been reduced from an initial proposal of 80 sheds, down to 64 sheds and now down to the proposed 54 sheds. These submissions asserted that the reduction indicates that the Development is not economically viable and the benefits that ProTen claims the Development will bring to the local area will not eventuate.

As outlined above, finding a development site for a poultry broiler production farm that is both available and meets the principal siting requirements is very difficult. ProTen was initially hoping to find a site in the Tamworth region that would accommodate around 80 poultry sheds. When the Rushes Creek properties that make up the Development Site were identified, preliminary odour modelling indicated that 64 sheds would be the upper limit. While ProTen hoped to purchase additional adjoining land to increase this to 80 sheds, this did not eventuate.

Following further odour modelling and consultations with the EPA, the total number of poultry sheds was reduced from the originally proposed 64 sheds (as presented in the PEA) to the proposed 54 sheds in order to achieve comfortable compliance at all receptors with the agreed odour criterion of 5 ou (see **Section 12.1**) and balance the economic viability of the Development. ProTen would not commit to the significant capital investment required to establish the Development without economic viability assured.

As outlined in Section 8.13 of the EIS and addressed above in **Section 22**, the net economic impact of the Development will be one of significant benefit, with direct and derived economic benefits during both the construction and operational phases associated with capital works, employment, consumables and other flow-on activities. As advised in **Section 22.2**, ProTen has committed to engaging local companies, where possible, for the capital works program, including land surveying, earthworks and civil construction, concreting, plumbing and electrical. The only exception at this point in the specialised poultry shed design and construction company based on the NSW Central Coast. Furthermore, given the large number of poultry and other livestock operations in the region, ProTen envisions that many of the operational employment positions will be filled with people from the local region.

Two community submissions noted that Red Lea Chickens (Red Lea) went in to voluntary administration in early 2018 and queried if there is any need for ProTen to build additional broiler sheds to supply Baiada if some of Red Lea's previous farms are now suppling Baiada? These submissions also queried why ProTen doesn't purchase the Red Lea farms instead of developing a new farm.

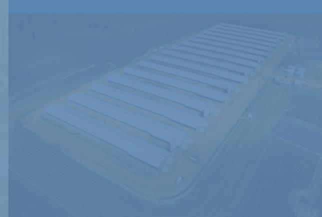
Red Lea primarily owned and operated poultry breeder farms, many of which were aging. Baiada has purchased a number of these farms for its own breeder capacity. Red Lea's broiler farms were concentrated around the Sydney and NSW Central Coast areas, with some of these farms now contracting to Baiada and Cordina and some have moved to egg production.

In relation to whether there is still a need for ProTen to build additional broiler sheds, please refer to the first issue addressed above in this **Section 23**. The planned increase to the broiler capacity in the Tamworth region was planned well before Red Lea went in to administration.

While some of Red Lea's properties in the Tamworth region may have been suitable for a broiler farm, it would involve demolition of the breeder farm infrastructure and a complete re-build, including associated development application and approval requirements. Furthermore, many of Red Lea's breeder farm properties were relatively small and would not accommodate a large-scale broiler farm, such as the proposed Development.

Section 24

OTHER



24 OTHER

24.1 Crown Roads

Lands & Water requested that all Crown roads affected by the Development be closed and purchased prior to commencing.

As shown on Figure 3 in the EIS, the only Crown road potentially affected by the Development is a small section of unformed Crown public road between the Development Site and the Namoi River. Water and electricity servicing infrastructure is proposed to be installed across this section of unformed Crown road as indicated on **Figure 4**.

ProTen has committed to undertaking further consultation with Lands & Water in relation to associated easement/licence requirements over this section of Crown road. While it doesn't appear necessary to close this section of Crown road, especially given it extends east past the Development Site through neighbouring land, ProTen will discuss the matter with Lands & Water following development consent and proceed with the closure and purchase if still required by Lands & Water.

24.2 Boundary Adjustment

GSC asserted that the EIS does not include a plan of the proposed boundary adjustment.

The proposed boundary adjustment is described in Section 4.2 in the EIS and the conceptual layout is shown on Figure 17 in the EIS.

A Plan of Subdivision prepared by a registered surveyor and associated Section 88B Instrument for the required easements will be submitted to Council following development consent for the proposed boundary adjustment. The Subdivision Certificate issued by Council will be subsequently submitted to the NSW Land Registry Services with the required supporting documentation for plan and title registration.

24.3 Existing Dwellings

One community submission asserted that the existing houses within the Development Site will be left to deteriorate once the current tenants move out and queried whether ProTen will remove the derelict houses before building the proposed new farm managers' houses as it may interfere with residential zoning rights.

As described in Section 2.4 of the EIS, there are five existing dwellings within the Development Site:

- Two in good condition and under long-term lease from ProTen;
- One in good condition and occupied by a ProTen employee;
- One in poor condition and under long-term lease from ProTen. ProTen will leave this house un-occupied once the current tenant moves out (no current/known intentions); and
- One derelict dwelling.

There is no requirement or desire of ProTen for the current tenants to move out of the houses within the Development Site now or following commencement of construction or operation. The three houses that are in good condition will be maintained by ProTen for on-going tenancy. The house considered to be in poor condition and the derelict house will remain within the Development Site, with no current requirements or intentions for demolition.

The existing dwellings and the proposed farm managers' houses will not have any implications in relation to the zoning of neighbouring properties or the permissibility of new dwellings within neighbouring properties. All land adjoining the Development Site is zoned RU1 Primary Production under the Tamworth LEP and any future development applications for new dwellings within the surrounding lands will be subject to the permissibility provisions and development standards of the LEP.

24.4 Farm Managers' Dwellings

GSC noted that the EIS does not include the necessary documentation or plans, including elevations, sections or BASIX certificates, for the proposed farm managers' houses.

As outlined in Section 4.11 in the EIS, the Development includes eight new houses to accommodate the farm managers and assistant farm managers. The proposed locations for these houses are shown on **Figure 4** and the intended house design plans are contained in Appendix L in the EIS. 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. The design and construction will be compliant with the Building Code of Australia.

Separate construction certificate applications will be prepared and submitted to Council following development consent for each of the proposed houses. These applications will be accompanied by the necessary documentation (as advised by Council), which will likely include structural details, specifications, elevation plans and BASIX certificates.

24.5 Waste Management

One community submission queried how waste will be managed, noting the potential risks for the Lake Keepit ecosystem from nutrient/waste leaks.

The operational waste streams to be generated by the Development and the proposed management of these waste streams (reuse, recycling or disposal) are detailed in Section 4.18 of the EIS. There will not be any on-site waste storage or disposal and therefore no potential for leaching of nutrients or other pollutants to downstream environments, including Lake Keepit.

Given the controlled environment in which the Development will operate, it poses a negligible risk to Lake Keepit. This is addressed in more detailed in **Section 15.3**.

24.6 Bunding for Potentially Hazardous Materials

The EPA requested that ProTen demonstrate that appropriate bunding will be provided for all chemical and fuel storage, loading and unloading areas, in accordance with the relevant Australian Standard.

Section 4.19 in the EIS lists the specific chemicals and fuels to be stored and used within the Development Site, with their respective Australian Dangerous Goods (ADG) classes. The commitments in relation to the storage of potentially hazardous materials in Sections 4.19 and 8.9.3 in the EIS include:

- The relatively small volumes of chemicals required for sanitisation/disinfection, water treatment, weed control and pest control purposes will be stored in the vented chemical store within the amenities and workshop building at each PPU;
- Diesel and petrol will be stored at each PPU in separate aboveground bunded tanks, with a minimum bund volume of 110% of the respective tank capacity; and
- LPG will be stored in aboveground tanks installed and maintained in compliance with *AS/NZS 1596:2014 The Storage and Handling of LP Gas.*

All areas where chemicals and fuels will be stored and used at each PPU will be within the upstream clean water diversion and therefore within the controlled surface water management area (see **Figures 5** to **8**). This will ensure that any runoff from these areas is captured in the controlled surface water management system, which will essentially operate as a closed water system, and will not comprise the clean water flows and downstream environments.

The chemical and fuel storage bunding will be constructed of material sufficiently impervious to the stored chemicals/fuel and be able to prevent the migration of any spillage or leakage. Where relevant, the bunding will comply with the relevant requirements of the following Australian Standards:

- *AS/NZS 1596:2014 The Storage and Handling of LP Gas*, where applicable to the proposed LPG storage tanks;
- *AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids,* where applicable to the proposed petrol and diesel storage tanks;
- *AS 2507:1998 The Storage and Handling of Agricultural and Veterinary Chemicals,* where applicable to the proposed storage of chemicals comprising ADG Classes 3, 6.1, 8 and 9 and non-dangerous goods; and
- *AS 3780:2008 The Storage and Handling of Corrosive Substances,* where applicable to the proposed storage of chemicals comprising ADG Class 8 substances.

This has been included in Updated Summary of Commitments in **Section 25**.

24.7 PPU Vegetation Screens

The EPA requested that ProTen ensure that the tree/plant species planted in the proposed vegetation screens can cope with and effectively use the nutrient loads applied through irrigation.

As advised in Section 4.16.6 of the EIS, ProTen proposes to reuse some of the water captured in the detention dams for regular irrigation of the planted vegetation screens at each PPU. While the water captured in the detention dams will have some level of nutrients, the levels are predicted to be relatively low (see **Section 15.3**). Regardless, advice with be sought from an appropriate professional to ensure that the tree and shrub species selected for the vegetation screens can effectively cope with and utilise the anticipated nutrient loads within the irrigation water. This has been included in Updated Summary of Commitments in **Section 25**. The selected species will be listed in the Landscape Management Plan to be prepared as part of the OEMP.

24.8 Impacts and Benefits

One community submission questioned the following:

- ***Where are the real world observations to substantiate your projections?***
- ***What are variables considered in your modelling?***
- ***Where is the data available for independent analysis (i.e. local recorded data and not projections)?***
- ***Who will profit most?***
- ***At what impact?***
- ***What will the community benefit?***

The detailed information presented in the EIS and this RTS addresses each of the questions posed in the submission. Additional specialist input and assessment was sought for this RTS to address the specific comments, issues and requests in the submissions received from government agencies, the community and specialist interest groups, particularly for the two key areas of odour and traffic. The various impact assessments undertaken have been shown to be appropriately conservative and undertaken in accordance with the relevant guidelines and/or standards.

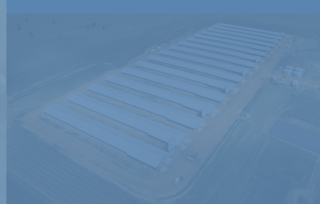
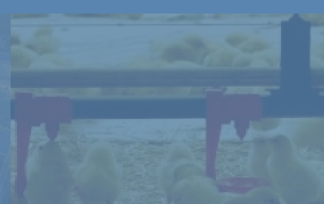
ProTen has committed to appropriate development design features, best management practices and mitigation measures to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses. The Development will not result in any significant or long-term impacts to the local environment or surrounding populace. The potential for adverse impact on surrounding farming and recreational activities and existing social amenity in the area is low.

While the Development will benefit ProTen and the local poultry industry, it will also bring significant direct and derived economic benefits to the region during both the construction and operational phases though capital works, employment, consumables and other flow-on activities.

To avoid repetition in addressing the broad questions posed in the submission, refer to the detailed information presented in Volumes 1, 2 and 3 of the EIS (SLR 2018a) and **Sections 4** to **25** and **Appendices B** to **H** in this RTS.

Section 25

UPDATED SUMMARY OF COMMITMENTS


25 UPDATED SUMMARY OF COMMITMENTS

DPE requested that the Summary of Commitments in Section 9 of the EIS be updated to reflect any revisions to the technical reports.

Section 9 of the EIS provides a consolidated summary of the development design, best management practices and mitigation measures committed to by ProTen to avoid, mitigate and/or manage the potential impacts of the Development.

The Development remains as described in the exhibited EIS, with the exception of some minor adjustments at each PPU in response to the comments and requests from WaterNSW in relation to surface water management. These minor changes are described in **Section 2.3**. Note that there are no additional risks or impacts over and above those previously assessed as part of the EIS.

Consequently, the only changes to the management and mitigation commitments are relatively minor additions responding to comments and requests from government agencies and the community. The Summary of Commitments provided in the EIS is reproduced below in **Table 24**, with the minor additions highlighted in grey.

Table 24 Updated Summary of 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 the EIS and RTS 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, include community and stakeholder consultation requirements 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 and RTS. • 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, include community and stakeholder consultation requirements 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%). • Stocking densities will comply with the RSPCA Standards (2013) specification of 34 kg/m2. • 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.~~ • The *Remedial Action Plan* (SLR 2019b) will be implemented prior to commencing construction to remediate arsenic impacted soil adjacent to the former sheep dip in Lot 165 DP 752169. • A site validation report will be prepared in accordance with *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011) for submission to Council within 30 days of completing the remediation works.
Drinking Water Supplies
• Quality assurance programs will be prepared and implemented in accordance with the *NSW Health Private Water Supply Guidelines* (NSW health 2014) for the drinking water supplies at the PPUs and farm managers' houses. These programs will be submitted to the HNELHD prior to commencing operation.
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 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.

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 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.
- 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 that will include, but not be limited to, the following:
  - A map of the primary transport route(s) highlighting critical locations;
  - Safety initiatives for transport through residential areas and/or school zones;
  - A driver induction process and regular toolbox talks (or similar);
  - A complaints resolution and disciplinary procedure;
  - A directive to drivers to slow down and provide right-of-way to any livestock and/or farm machinery on the transport routes; and
  - A directive to drivers to avoid the use of compression braking along Rushes Creek Road.

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.
- Signage will be installed on the two access driveways near their intersections with Rushes Creek Road instructing heavy vehicle drivers to avoid the use of compression braking within the Development Site and on Rushes Creek Road.

- 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 that will include, but not be limited to, the following:
  - A map of the primary transport route(s) highlighting critical locations;
  - Safety initiatives for transport through residential areas and/or school zones;
  - A driver induction process and regular toolbox talks (or similar);
  - A complaints resolution and disciplinary procedure;
  - A directive to drivers to slow down and provide right-of-way to any livestock and/or farm machinery on the transport routes; and
  - A directive to drivers to avoid the use of compression braking along Rushes Creek Road.
- Consultation will be undertaken with Council and the local traffic committee in relation to installing signage on Rushes Creek Road near the Development Site and near the Oxley Highway intersection instructing heavy vehicle drivers to avoid compression braking along Rushes Creek Road.

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 in the EIS).
- 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.

- Engineered surface water management systems 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 detention dams at each PPU will be visually inspected on an annual basis and, if necessary, will be desilted to ensure the dams maintain their design capacity.
- 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. Advice with be sought from an appropriate professional to ensure that the tree and shrub species selected for the vegetation screens can effectively cope with and utilise the anticipated nutrient loads within the irrigation water.
- The waste management systems listed in Section 4.18 of the EIS 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 of the EIS will be implemented for the storage of chemicals and fuels.

Mosquito Control

- The table drains and detention dams will be maintained free of vegetation.
- The vegetation screens around the PPUs will not be over-irrigated to avoid water collecting in any depressions for long periods of time.
- If it is identified that mosquitos have become an issue, a larvicide will be applied to the detention dams and surrounds to prevent mosquitoes from maturing to adults and/or the detention dams and surrounds will be fogged.

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.
- Engineered surface water management systems 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 of the EIS 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 of the EIS 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 in the EIS).
- Revegetation works and landscape plantings will be regularly inspected and assessed for maintenance requirements, including weed control.

Operation

- Engineered surface water management systems 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 in the EIS 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 in the EIS) will be implemented to prevent and control outbreaks.

Biodiversity Offset Strategy

- The Biodiversity Offset Strategy outlined in Section 8.6.5 of the EIS will be implemented to fulfil the offset requirements for the Development.
- The biodiversity offsetting actions and outcomes will be documented in an addendum to the Biodiversity Offset Strategy for submission to the DPE and OEH within 12 months of obtaining development consent.

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”. **Archaeological Excavation of Bondah-H1** • Consultation with the RAPs will be undertaken to determine the cultural appropriateness of excavating the Aboriginal hearth identified as Bondah-H1 during the preparation of the ACHMP. If the RAPs confirm the appropriateness and potential benefits, archaeological excavation of Bondah-H1 to determine if it is an Aboriginal oven will be included in the ACHMP. The excavation will also be used to determine whether in-situ charcoal remains beneath the cluster of stones for radio carbon C14 dating. **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 2010). • The three Aboriginal scarred trees identified within the Development Site will be further examined with reference to the *Aboriginal Scarred Trees in New South Wales, A Field Manual* (DEC 2005) should the Development’s disturbance footprint change in a manner that potentially threatens these trees. • 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.
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.

Road Traffic

- A directive to heavy vehicle drivers will be included in the Driver Code of Conduct to avoid the use of compression braking along Rushes Creek Road.
- Signage will be installed on the two access driveways near their intersections with Rushes Creek Road within the Development Site instructing heavy vehicle drivers to avoid the use of compression braking within the Development Site and on Rushes Creek Road.
- Consultation will be undertaken with Council and the local traffic committee in relation to installing signage on Rushes Creek Road near the Development Site and near the Oxley Highway intersection instructing heavy vehicle drivers to avoid compression braking along Rushes Creek Road.

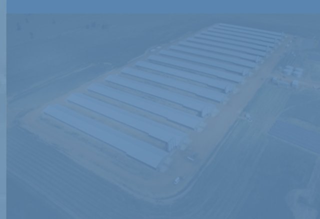
Hazard and Risk

- 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 chemical and fuel storage bunding will be constructed of material sufficiently impervious to the stored chemicals/fuel and be able to prevent the migration of any spillage or leakage to the surrounding environment. Where relevant, the bunding will comply with the relevant requirements of the following Australian Standards and will be approved by a structural engineer:
  - *AS/NZS 1596:2014 The Storage and Handling of LP Gas,* where applicable to the proposed LPG storage tanks;
  - *AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids*, where applicable to the proposed petrol and diesel storage tanks;
  - *AS 2507:1998 The Storage and Handling of Agricultural and Veterinary Chemicals*, where applicable to the proposed storage of chemicals comprising ADG Classes 3, 6.1, 8 and 9 and non-dangerous goods; and
  - *AS 3780:2008 The Storage and Handling of Corrosive Substances*, where applicable to the proposed storage of chemicals comprising ADG Class 8 substances.
- 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.

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 on a progressive basis as soon as practicable following bulk earthworks and construction at each PPU. • Advice with be sought from an appropriate professional to ensure that the tree and shrub species selected for the vegetation screens can effectively cope with and utilise the anticipated nutrient loads within the irrigation water. **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. • Community and stakeholder consultation commitments will be included in both the CEMP and OEMP, which will be publicly available on ProTen's website once approved. • 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. • 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 26

CONCLUSION



26 CONCLUSION

A total of 34 submissions were received following exhibition of the EIS (SLR 2018a) for the Rushes Creek Poultry Production Farm, including 11 from government agencies, 21 from the community (noting that two of these are from the same community member and two are essentially duplicate submissions) and two from special interest groups. The most common issues raised were in relation to odour, traffic, noise (traffic noise in particular), particulate matter and surface water.

This RTS responds to the issues raised within these submissions. The responses provided were prepared by ProTen and EME, with input and additional assessment work from specialists in relation to existing soil contamination, odour and particulate matter, traffic, biodiversity, Aboriginal heritage, noise and visual amenity. The various impact assessments undertaken for the EIS and RTS have been shown to be appropriately conservative and undertaken in accordance with the relevant guidelines and/or standards.

The Development remains as described in the exhibited EIS, with the exception of some minor adjustments at each PPU in response to the comments and requests from WaterNSW in relation to surface water management. These minor changes, which are described in **Section 2.3**, will ensure that any runoff from the ancillary infrastructure, vegetation screens and/or EMA at each PPU is captured in the controlled surface water management system and will not compromise the clean water flows and downstream environments. The disturbance footprint of the Development has increased by approximately 5.03 ha to a total of 92.81 ha (9.1% of the Development Site) as a result. However, there are no additional risks or impacts over and above those previously assessed as part of the EIS.

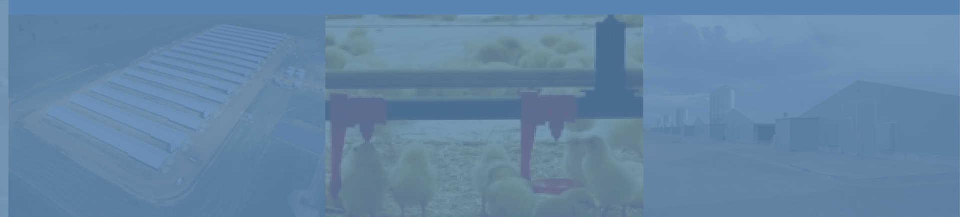
The detailed information presented in the EIS and this RTS demonstrates that the Development poses a low risk to the local environment and the surrounding populace. It also poses a low risk to surrounding farming and recreational activities. There will not be any significant or long-term impacts to the local area. ProTen has committed to appropriate development design features, best management practices and mitigation measures to ensure that any external impacts are within acceptable criteria/standards and that the Development can co-exist with the surrounding land uses. As listed in **Section 25**, additional management and mitigation commitments have been included in the Updated Summary of Commitments in response to comments and requests from government agencies and the community.

The Development is integral to the expansion of the poultry industry within the Tamworth region and will bring significant economic benefits (direct and derived) to the region during both the construction and operational phases though capital works, employment, consumables and other flow-on activities.

The Development is justified on environmental, social and economic grounds and it is consistent with the key objects of the EP&A Act. It 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 27

REFERENCES



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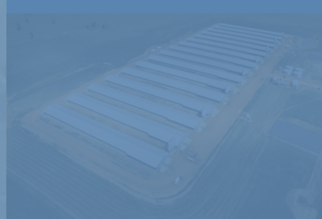
Section 28

ABBREVIATIONS



28 ABBREVIATIONS

AAQ NEPM	*National Environment Protection (Ambient Air Quality) Measure*
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
AEC	area of environmental concern
AEP	annual exceedance probability
AGRD4A-17	*Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*
AHA	Animal Health Australia
Approved Methods	*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*
AQA	Air Quality Assessment
ASD	Approach Sight Distance
Astute	Astute Environmental Consulting
ASC NEPM	*National Environmental Protection (Assessment of Site Contamination) Measure*
AS2890.2	*AS 2890.2 Part 2: Off-street commercial vehicle facilities*
AUL	auxiliary left
Australian Poultry CRC	Australian Poultry Cooperate Research Centre
AWD	available water determination
AWS	automated weather station
AWTS	aerated wastewater treatment system
Baiada	Baiada Poultry
BAR	*Biodiversity Assessment Report*
BAL	basic left turn
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
Clean Air Regulation	*Protection of the Environment Operations (Clean Air) Regulation 2010*
CLM Act	*Contaminated Land Management Act 1997*
CoPC	contaminants of potential concern
Council	Tamworth Regional Council
CTMP	Construction Traffic Management Plan
DAFF	(former) Department of Agriculture, Fisheries and Forestry
dB	decibel
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
DOS	Degree of Saturation
DP	Deposited Plan
DPE	Department of Planning and Environment

DPI	Department of Primary Industries
DSI	Detailed Site Investigation
EAD	emergency animal disease
EDD	extended design domain
EIS	Environmental Impact Statement
EMA	effluent management area
EME	EME Advisory
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979*
ESD	Ecologically Sustainable Development
GSC	Gunnedah Shire Council
Ha	hectare
HIL-A	soil health investigation level - residential land use, with garden/accessible soil
HNELHD	Hunter New England Local Health District
HVNL	Heavy Vehicle National Law
INP	*NSW Industrial Noise Policy*
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
L_{Aeq}	A-weighted equivalent noise level
L_{A1}	noise level exceeded for 1% of the sample period
L_{A90}	noise level exceeded for 90% of the sample period
LEP	Local Environmental Plan
LGA	local government area
LOR	laboratory limit of reporting
LPG	liquid petroleum gas
LRCE	Lance Ryan Consulting Engineers
L/p/d	litres per person per day
m	metre
m^2	square metre
m^3	cubic metre
m^3/s	cubic metre per second
mbgl	metres below ground level
MGSD	minimum gap sight distance
mg/L	milligrams per litre

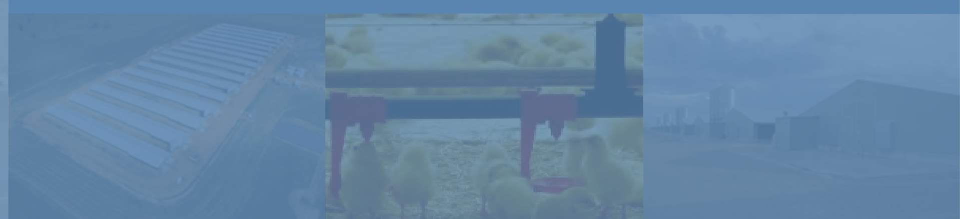
ML	megalitre
mm	millimetre
m/s	metres per second
NDD	normal design domain
NES	national environmental significance
NHVR	National Heavy Vehicle Regulator
NIA	Noise Impact Assessment
NRAR	Natural Resources Access Regulator
NSW	New South Wales
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
OER	odour emission rate
ou	odour unit
OzArk	OzArk Environmental and Heritage Management
PEA	Preliminary Environmental Assessment
PEL	Pacific Environment Limited (now part of ERM)
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POEO Act	*Protection of the Environment Operations Act 1997*
PPU	poultry production unit
ProTen	ProTen Tamworth Pty Limited
RAC	remedial action criterial
RAP	Remedial Action Plan
RAP	registered Aboriginal party
RAV	restricted access vehicle
RBL	rating background level
RFS	NSW Rural Fire Service
RIRDC	Rural Industries Research and Development Corporation
RMS	Roads and Maritime Services
RNP	*NSW Road Noise Policy*
RSPCA Standards	*RSPCA Approved Farming Scheme Standards – Meat Chickens*
RTS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
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
SSD	State significant development
Tamworth LEP	*Tamworth Regional Local Environmental Plan 2010*
TAPM	The Air Pollution Model
TIA	*Traffic Impact Assessment*
TRRRA	Tamworth Regional Residents and Ratepayers Association

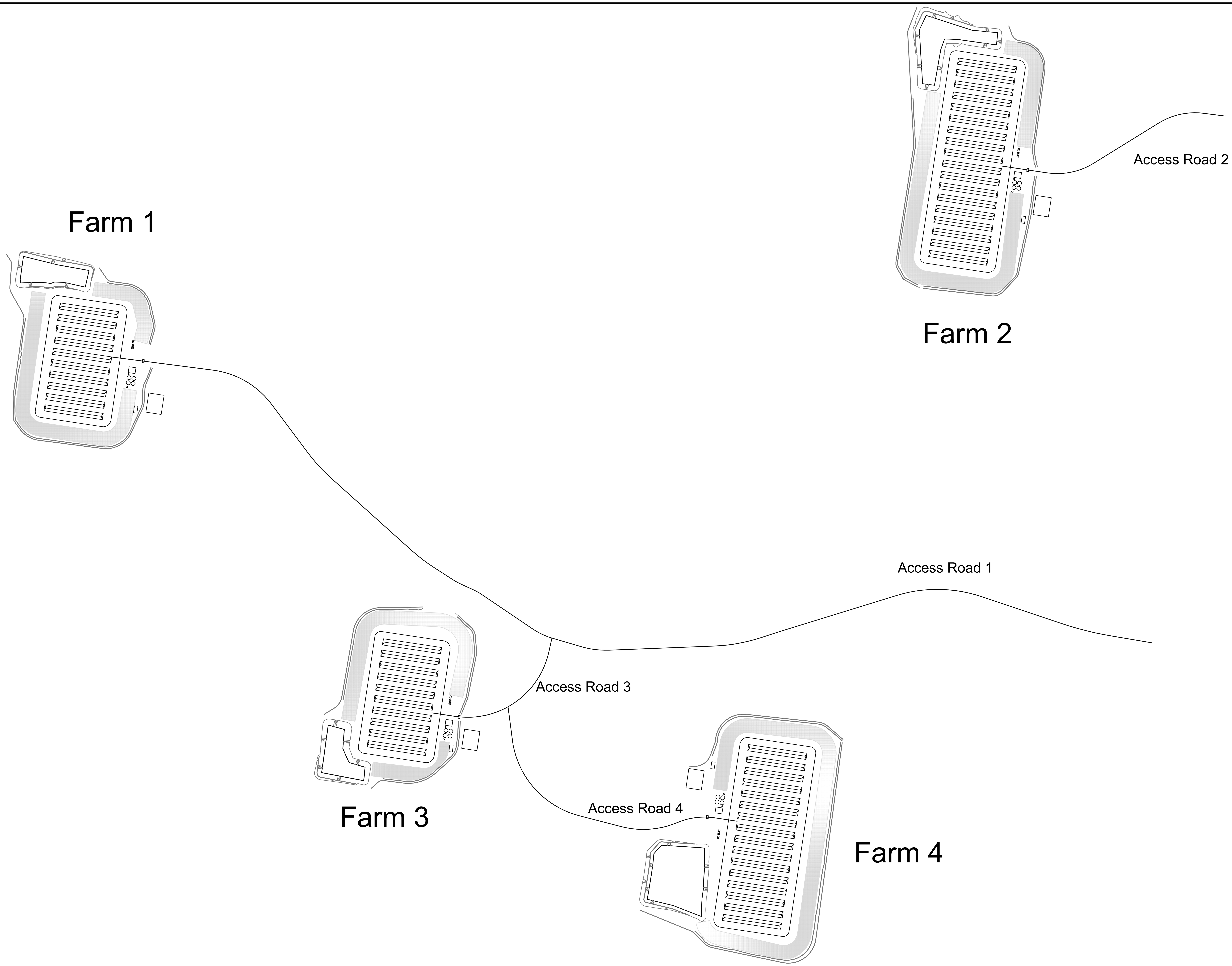
USPEA	United States Environmental Protection Agency
vpd	vehicles per day
vph	vehicles per hour
WAL	water access licence
WM Act	*Water Management Act 2000*
µg/m^3	microgram per cubic metre

Appendix A

Updated Preliminary Civil Engineering Design Drawings

(Lance Ryan Consulting Engineers)





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4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project	Drawing Title			
ProTen Poultry Sheds Rushes Creek Tamworth	Cover Sheet			
Client: ProTen	Scales: NTS		Client Project No.	
Architect / Project Manager: ProTen	Project Number: 17W003	Dwg. No.: C00	Sheet: 00 of 57	Revision: 4

A1 SHEET

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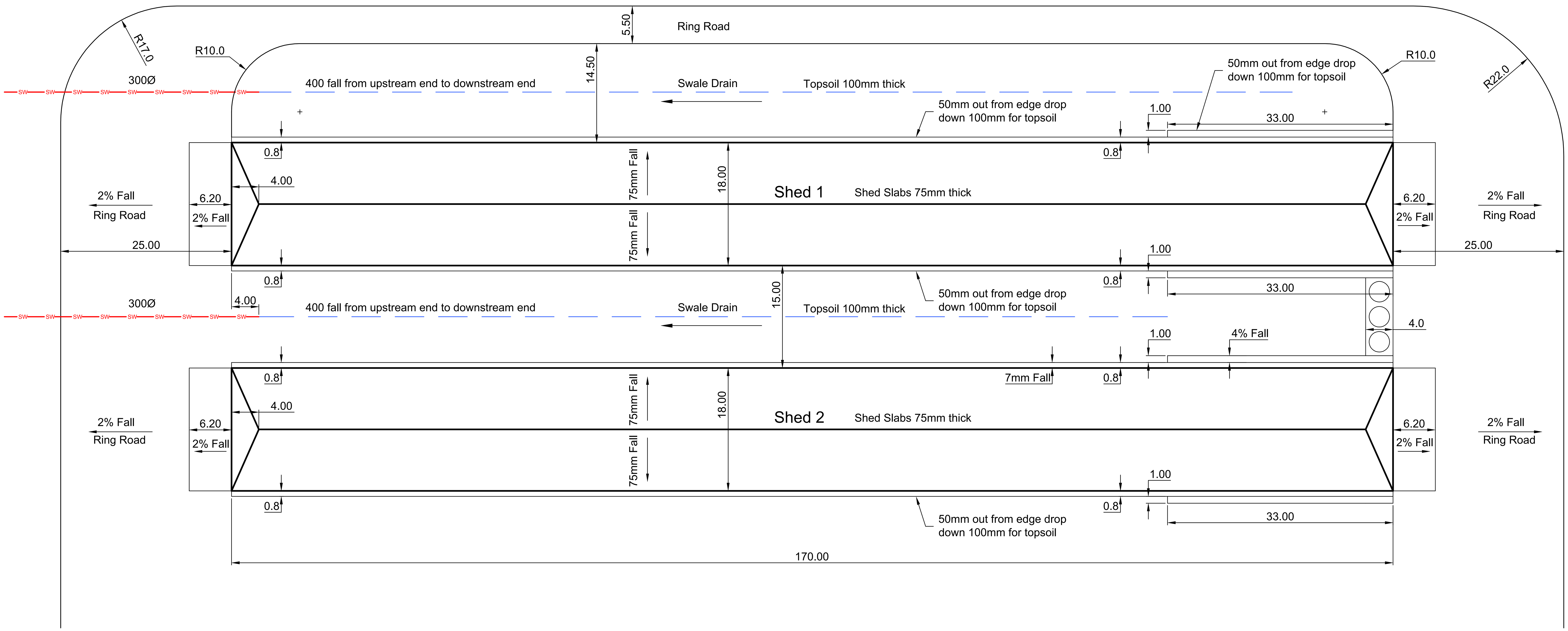

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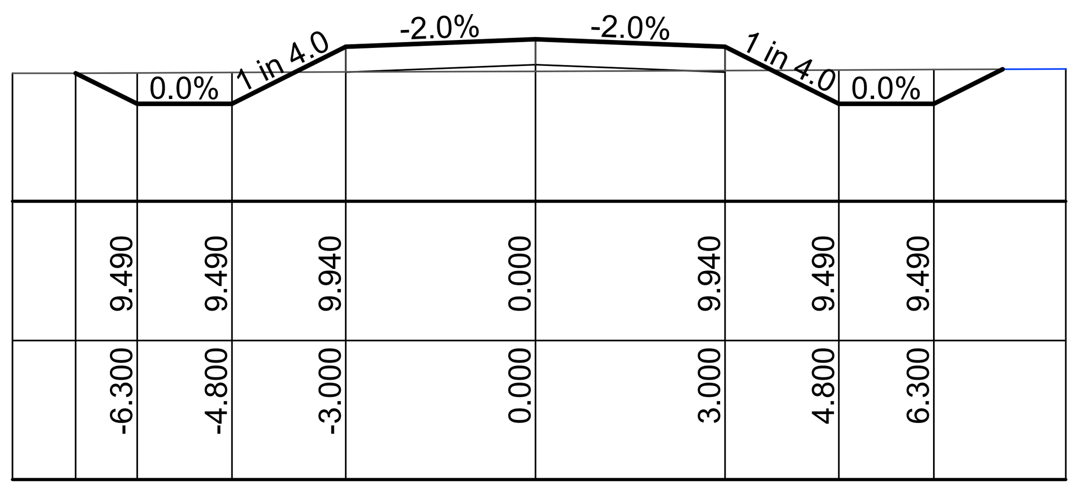
Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Typical Shed Setout

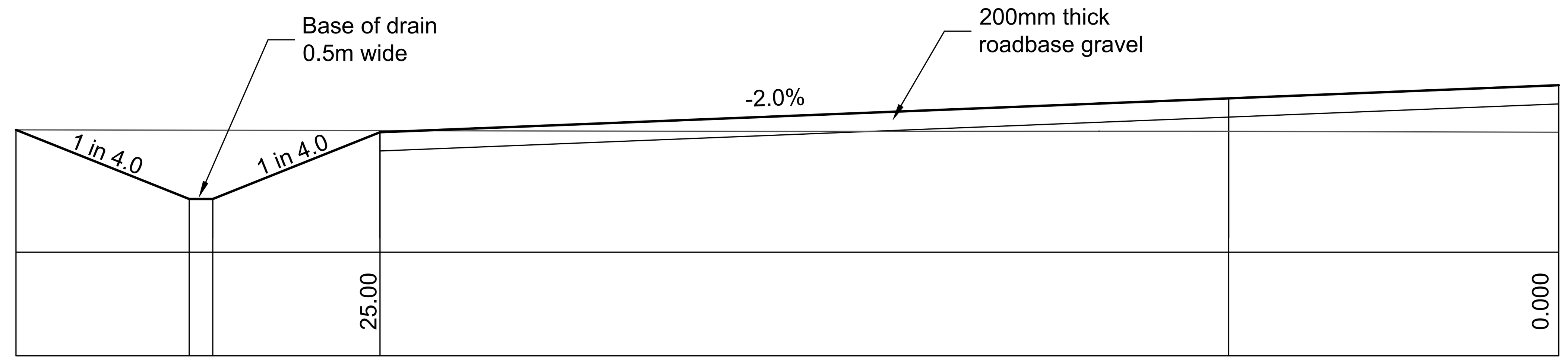
Client	Scales	Client Project No.		
ProTen	NTS			
Architect / Project Manager	**Project Number**	**Dwg. No.**	**Sheet**	**Revision**
ProTen	17W003	C01	01 of 57	4

0 100mm 200mm 300mm
A1 SHEET

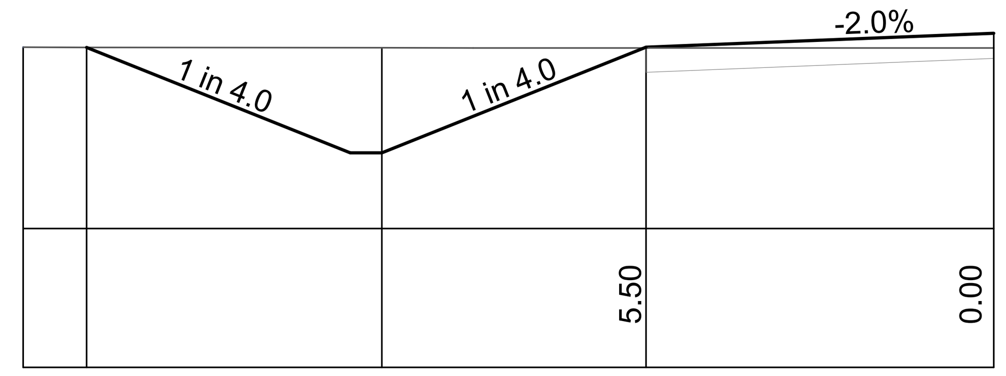


Typical Road Cross for all Internal Access Roads

Pavement to consist of 200mm of Road base Gravel.



TYPICAL CROSS SECTION RING ROAD AT FRONT



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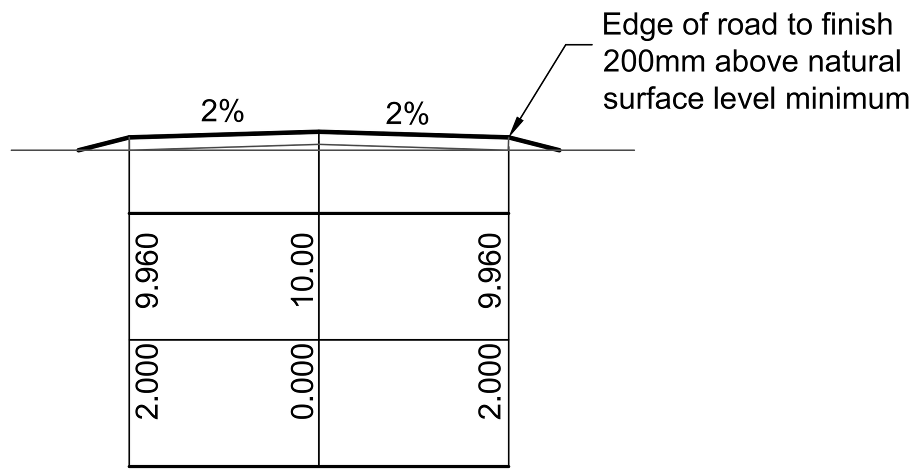
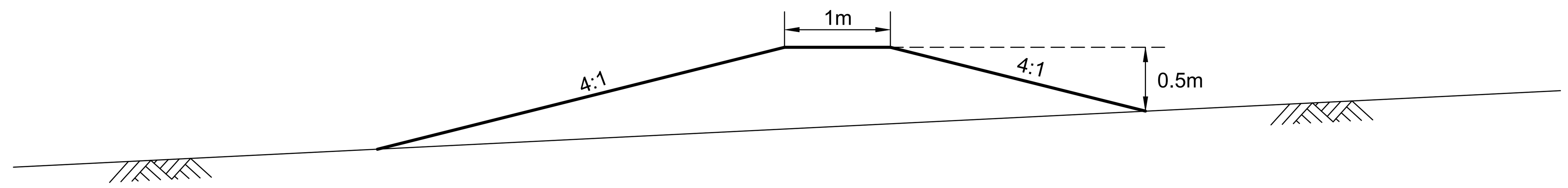
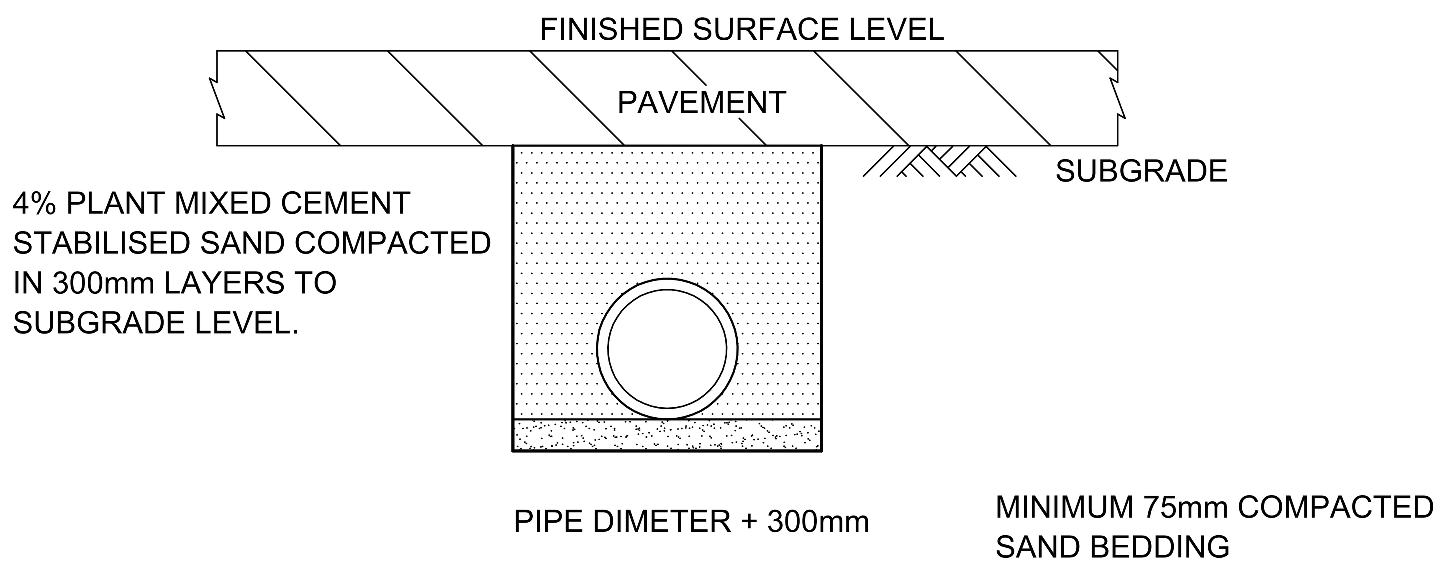


Scale Horizontal 1:100 Vertical 1:100

Typical Road Cross Section to Houses

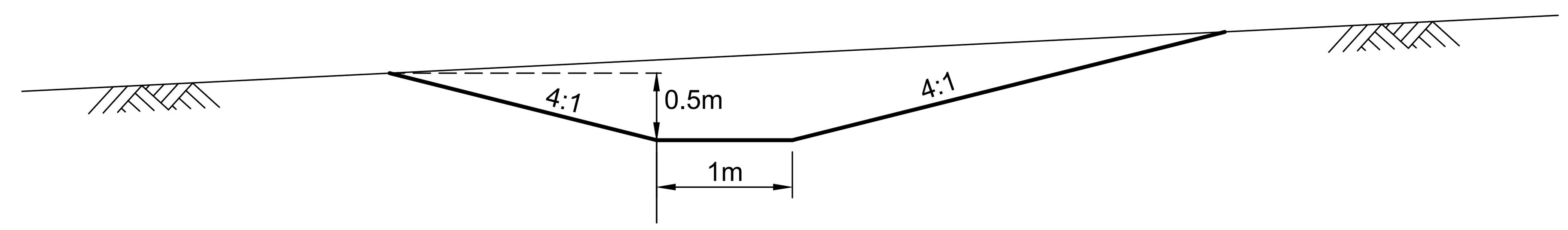


Typical Deflection Bank

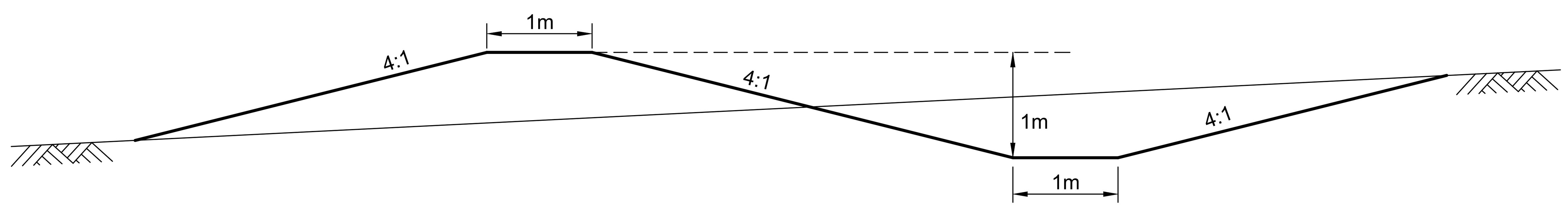


STORMWATER UNDER ROADS

SCALE 1:20



Typical Swale Drain



Typical Swale Drain / Deflection Bank

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project	ProTen Poultry Sheds Rushes Creek Tamworth
Drawing Title	Typical Details
Client	ProTen
Scales	1:500
Client Project No.	
Architect / Project Manager	ProTen
Project Number	17W003
Dwg. No.	C02
Sheet	02 of 57
Revision	4

A1 SHEET

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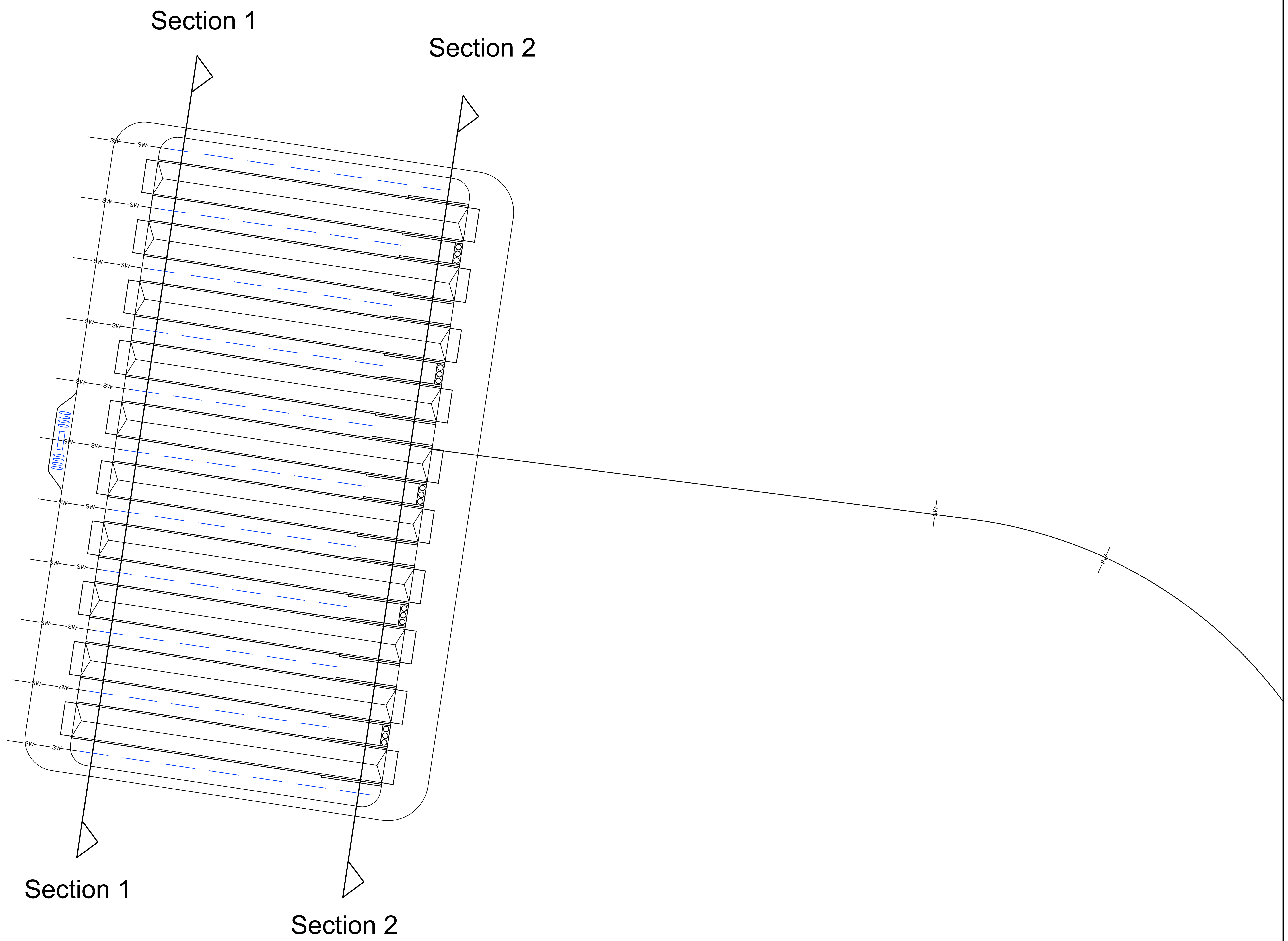

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 1 Sections Plan

Client
ProTen

Scales
1:1250

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C03

Sheet
03 of 57

Revision
4

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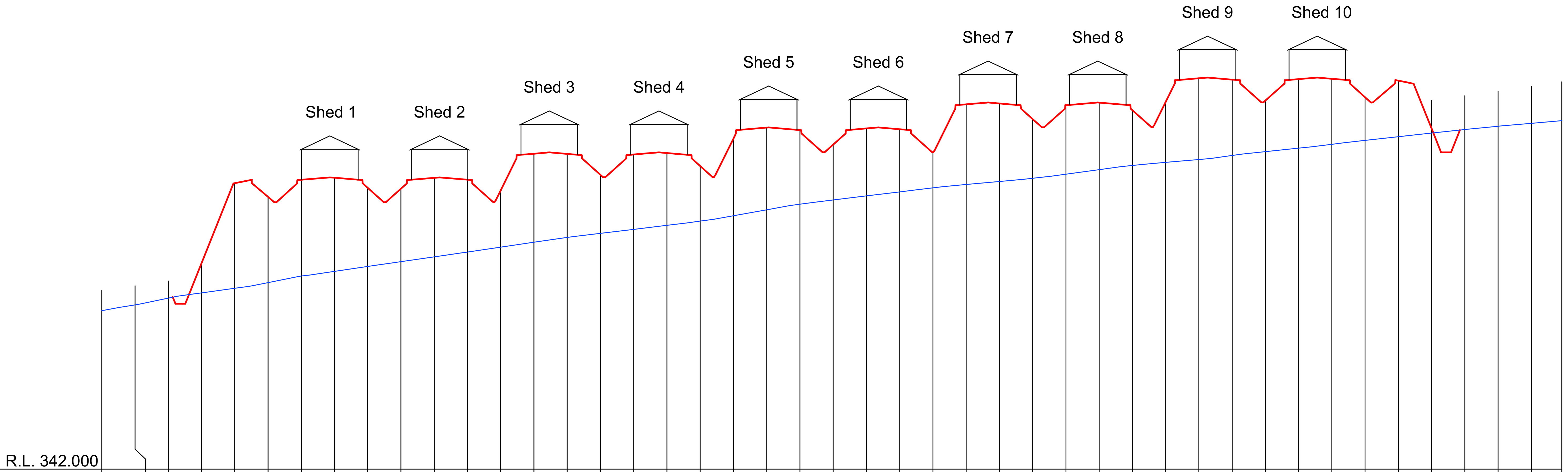

Chainage	Design Surface	Existing Surface
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10.000	346.944	346.936
20.000	347.140	347.140
30.000	348.184	347.297
40.000	350.593	347.435
50.000	350.183	347.607
60.000	350.698	347.803
70.000	350.758	347.946
80.000	350.454	348.094
90.000	350.432	348.237
100.000	350.757	348.381
110.000	350.700	348.525
120.000	350.378	348.671
130.000	351.482	348.819
140.000	351.475	348.965
150.000	350.843	349.089
160.000	351.457	349.208
170.000	351.500	349.327
180.000	351.111	349.454
190.000	351.936	349.617
200.000	352.265	349.796
210.000	352.192	349.962
220.000	351.753	350.091
230.000	352.240	350.212
240.000	352.217	350.333
250.000	351.523	350.455
260.000	352.965	350.556
270.000	352.992	350.647
280.000	352.522	350.743
290.000	352.940	350.864
300.000	353.017	351.001
310.000	352.789	351.126
320.000	353.032	351.219
330.000	353.748	351.306
340.000	353.708	351.427
350.000	353.078	351.543
360.000	353.723	351.647
370.000	353.733	351.764
380.000	353.176	351.881
390.000	353.677	351.994
400.000	352.236	352.102
410.000	352.208	352.208
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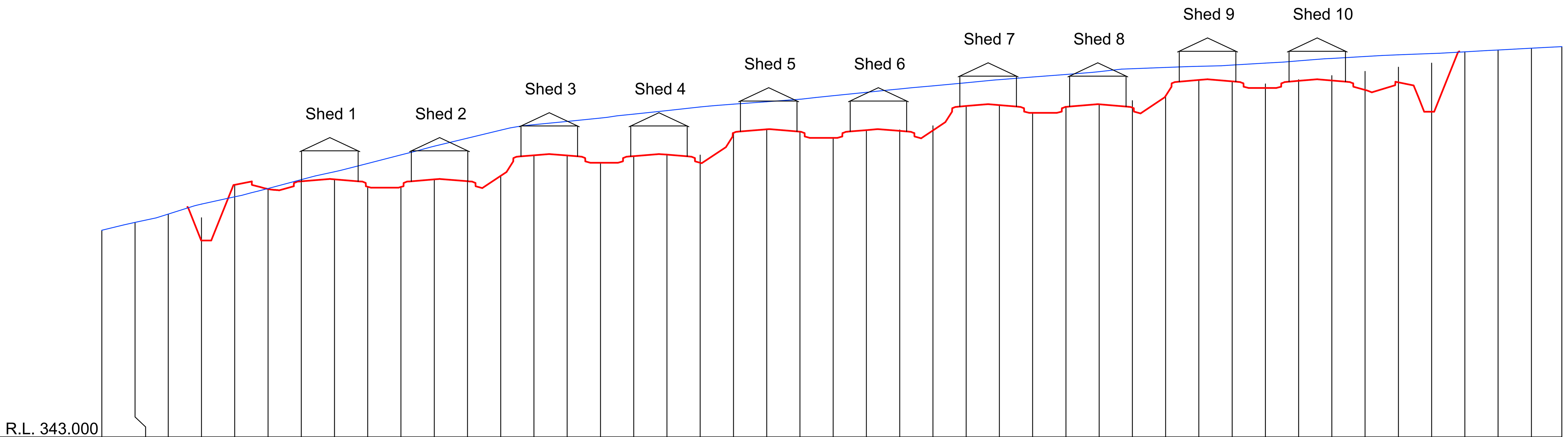
SCALES: HORIZONTAL 1:1000 VERTICAL 1:100



Chainage	Design Surface	Existing Surface
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20.000	349.712	349.712
30.000	348.916	350.010
40.000	350.593	350.230
50.000	350.466	350.483
60.000	350.698	350.749
70.000	350.758	350.986
80.000	350.533	351.236
90.000	350.528	351.493
100.000	350.757	351.754
110.000	350.700	351.996
120.000	350.862	352.239
130.000	351.482	352.403
140.000	351.475	352.503
150.000	351.257	352.602
160.000	351.457	352.722
170.000	351.500	352.829
180.000	351.256	352.935
190.000	352.156	353.020
200.000	352.265	353.095
210.000	352.192	353.170
220.000	352.007	353.276
230.000	352.240	353.378
240.000	352.217	353.479
250.000	352.229	353.574
260.000	352.965	353.667
270.000	352.992	353.759
280.000	352.757	353.838
290.000	352.940	353.916
300.000	353.017	354.001
310.000	352.914	354.089
320.000	353.268	354.127
330.000	353.748	354.162
340.000	353.708	354.198
350.000	353.507	354.256
360.000	353.723	354.324
370.000	353.733	354.399
380.000	353.450	354.457
390.000	353.677	354.506
400.000	352.793	354.544
410.000	354.601	354.597
420.000	354.649	354.653
430.000	354.704	354.705
439.179	354.753	354.753

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Client: ProTen

Architect / Project Manager: ProTen

Drawing Title: Farm 1 Sections

Scales: H1:1000, V1:100

Client Project No.:

Project Number: 17W003

Dwg. No.: C04

Sheet: 04 of 57

Revision: 4

A1 SHEET

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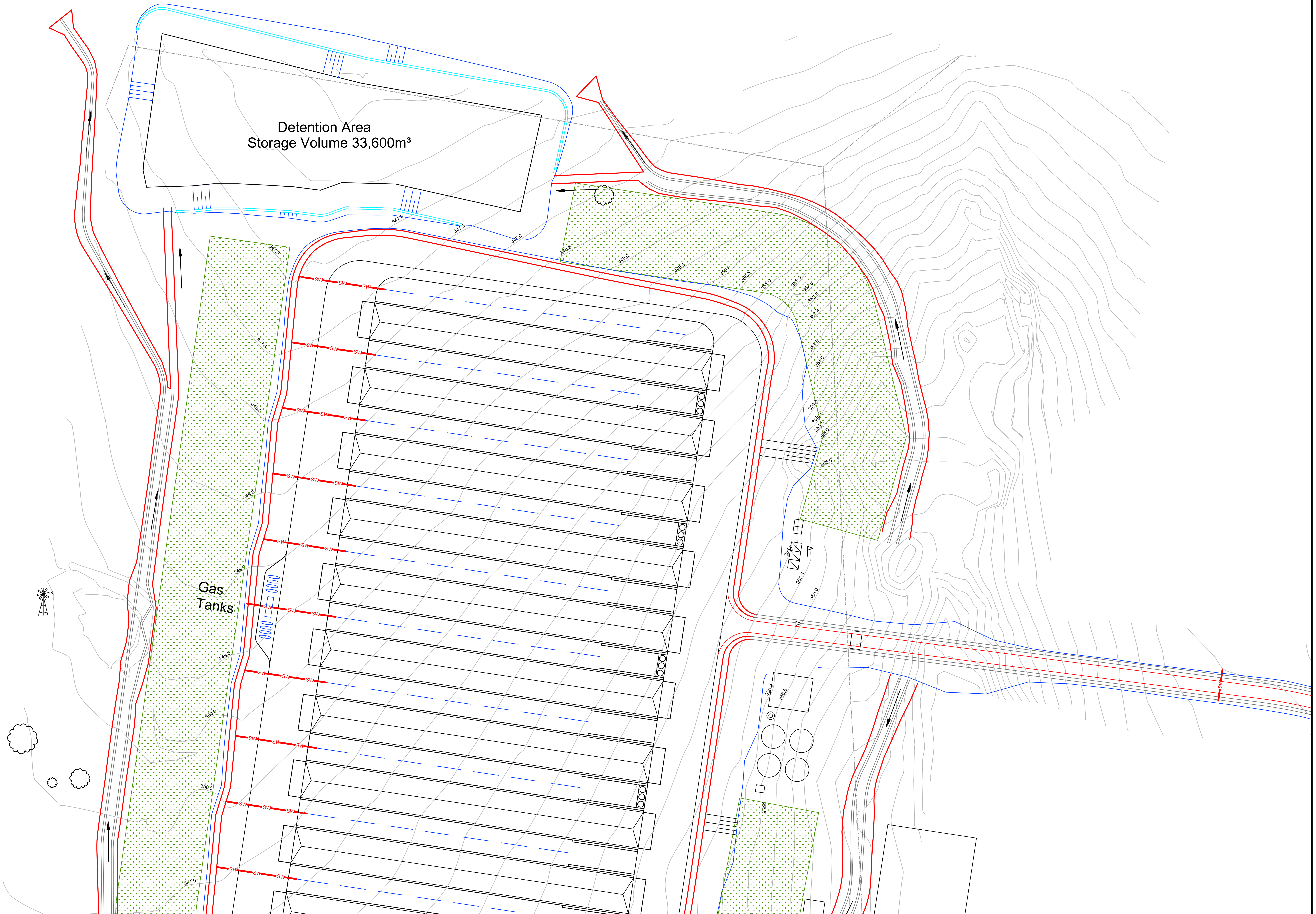

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth	Drawing Title: Farm 1		
Client: ProTen	Scales: 1:1000	Client Project No.	
Architect / Project Manager: ProTen	Project Number: 17W003	Dwg. No.: C05	Sheet: 05 of 57 / Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 1

Client
ProTen

Scales
1:1000

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C06

Sheet
06 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 1

Client: ProTen

Scales: 1:500

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C07

Sheet: 07 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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EMAIL: lancevryan@gmail.com

Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 1

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C08

Sheet
08 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

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4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 1

Client: ProTen

Scales: 1:500

Client Project No.

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C09

Sheet: 09 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 1

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C10

Revision
4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 1

Client
ProTen

Architect / Project Manager
ProTen

Scales
1:500

Client Project No.

Project Number
17W003

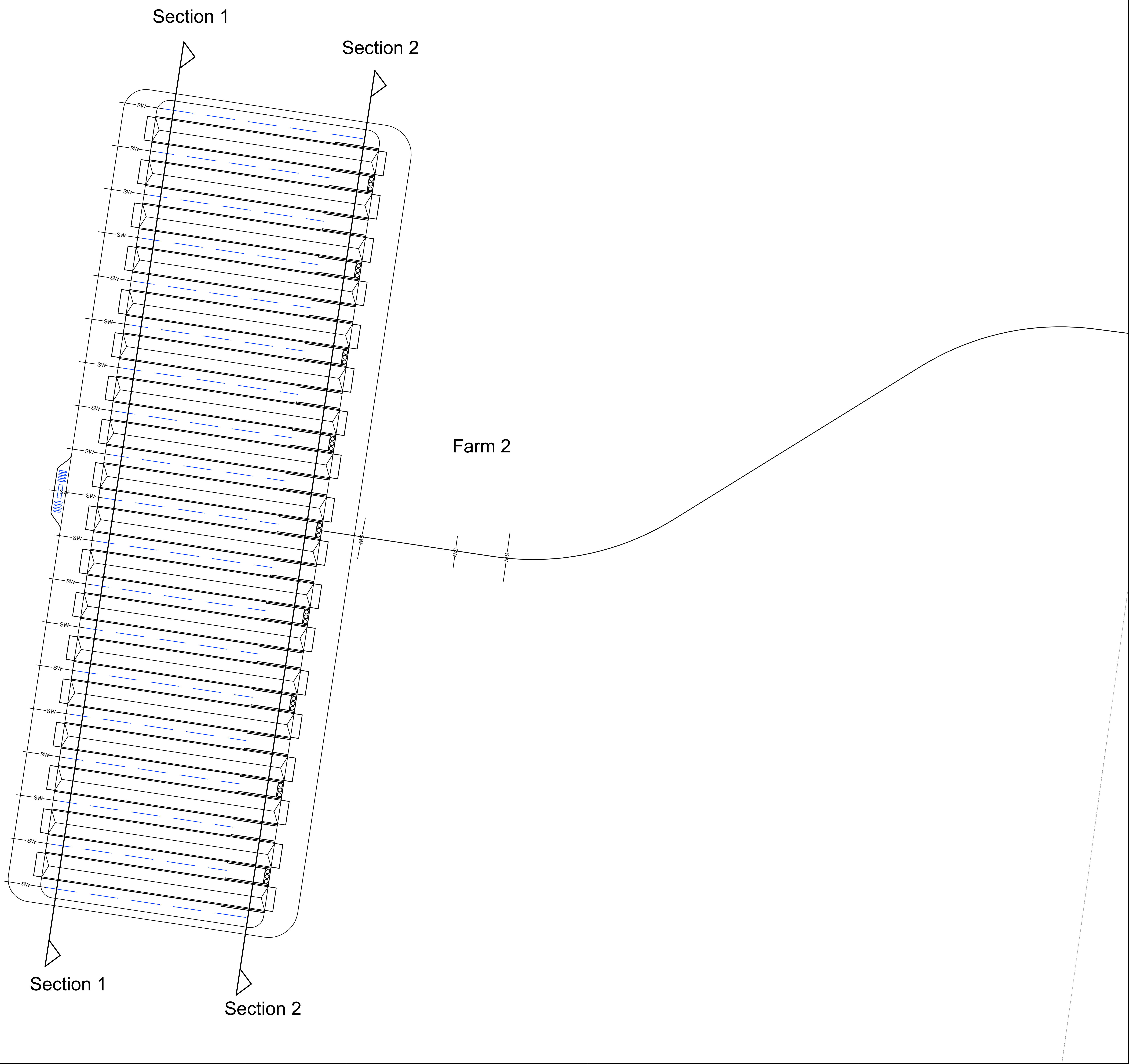
Dwg. No.
C11

Sheet
11 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm



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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Farm 2 Sections Plan

Scales
NTS

Client Project No.

Project Number
17W003

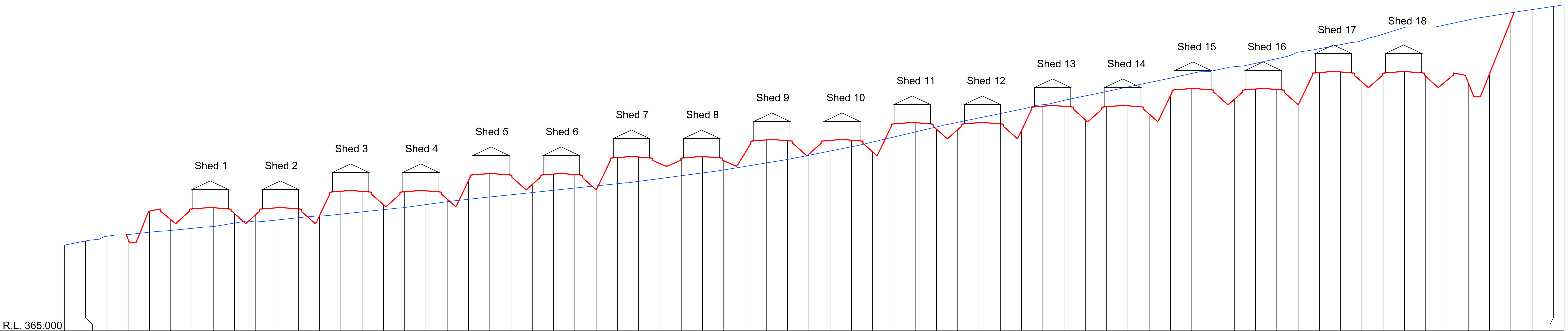
Dwg. No.
C12

Sheet
12 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm



Chainage	Design Surface	Existing Surface
0.000	369.027	369.027
10.000	369.221	369.221
20.000	369.315	369.445
30.000	369.305	369.526
40.000	370.623	369.632
50.000	370.230	369.717
60.000	370.728	369.817
70.000	370.788	369.904
80.000	370.515	370.065
90.000	370.462	370.118
100.000	370.787	370.210
110.000	370.730	370.316
120.000	370.422	370.389
130.000	371.562	370.483
140.000	371.555	370.589
150.000	370.923	370.696
160.000	371.537	370.799
170.000	371.580	370.934
180.000	371.191	371.070
190.000	372.060	371.185
200.000	372.395	371.293
210.000	372.322	371.397
220.000	371.883	371.501
230.000	372.370	371.607
240.000	372.347	371.711
250.000	371.653	371.814
260.000	373.145	371.918
270.000	373.172	372.027
280.000	372.862	372.159
290.000	373.120	372.291
300.000	373.197	372.423
310.000	372.994	372.565
320.000	373.365	372.728
330.000	373.978	372.892
340.000	373.938	373.058
350.000	373.305	373.255
360.000	373.953	373.454
370.000	373.963	373.654
380.000	373.413	373.876
390.000	374.728	374.114
400.000	374.788	374.351
410.000	374.480	374.588
420.000	374.462	374.802
430.000	374.787	375.009
440.000	374.730	375.216
450.000	374.422	375.422
460.000	375.562	375.634
470.000	375.555	375.834
480.000	374.923	376.046
490.000	375.537	376.252
500.000	375.580	376.468
510.000	375.191	376.676
520.000	376.060	376.884
530.000	376.395	377.102
540.000	376.322	377.228
550.000	375.883	377.418
560.000	376.370	377.578
570.000	376.347	377.796
580.000	375.653	378.104
590.000	377.145	378.265
600.000	377.172	378.458
610.000	376.702	378.649
620.000	377.120	378.950
630.000	377.197	379.269
640.000	376.969	379.288
650.000	376.779	379.403
660.000	376.666	379.618
670.000	377.084	379.796
680.000	379.584	379.953
690.000	380.107	380.107
700.000	380.257	380.257
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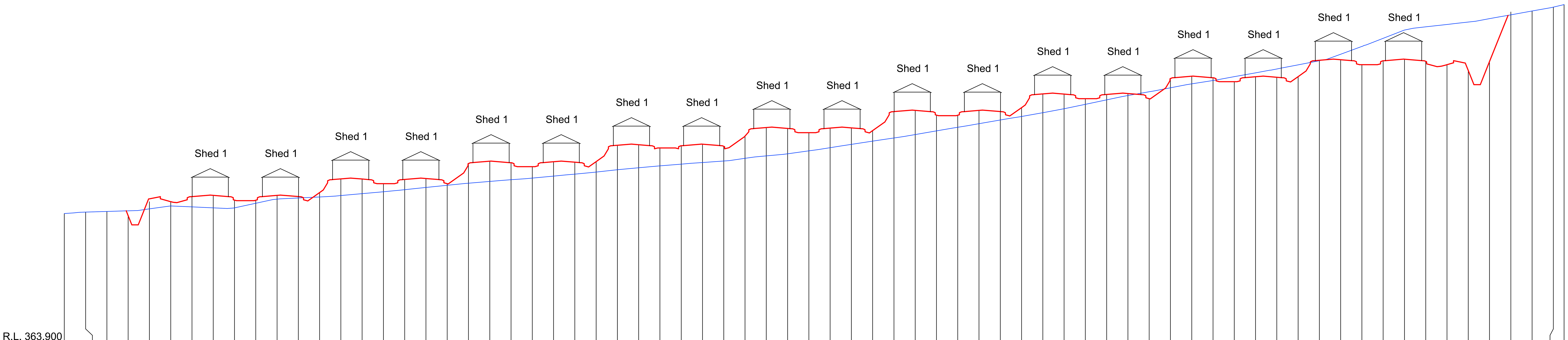
SCALES: HORIZONTAL 1:1000 VERTICAL 1:100



Chainage	Design Surface	Existing Surface
0.000	369.930	369.930
10.000	369.999	369.999
20.000	370.026	370.029
30.000	369.831	370.058
40.000	370.623	370.150
50.000	370.489	370.286
60.000	370.728	370.243
70.000	370.788	370.198
80.000	370.563	370.199
90.000	370.558	370.416
100.000	370.787	370.609
110.000	370.730	370.664
120.000	370.916	370.712
130.000	371.562	370.777
140.000	371.555	370.867
150.000	371.337	370.956
160.000	371.537	371.055
170.000	371.580	371.158
180.000	371.336	371.261
190.000	372.286	371.360
200.000	372.395	371.442
210.000	372.322	371.521
220.000	372.137	371.601
230.000	372.370	371.695
240.000	372.347	371.788
250.000	372.375	371.884
260.000	373.145	371.994
270.000	373.172	372.085
280.000	373.017	372.174
290.000	373.120	372.257
300.000	373.197	372.332
310.000	373.094	372.403
320.000	373.575	372.529
330.000	373.978	372.644
340.000	373.938	372.743
350.000	373.737	372.882
360.000	373.953	373.032
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380.000	373.833	373.338
390.000	374.728	373.488
400.000	374.788	373.650
410.000	374.563	373.823
420.000	374.558	373.993
430.000	374.787	374.161
440.000	374.730	374.333
450.000	374.916	374.498
460.000	375.562	374.679
470.000	375.555	374.865
480.000	375.337	375.072
490.000	375.537	375.283
500.000	375.580	375.485
510.000	375.336	375.662
520.000	376.286	375.852
530.000	376.395	376.036
540.000	376.322	376.192
550.000	376.137	376.373
560.000	376.370	376.555
570.000	376.347	376.736
580.000	376.375	376.932
590.000	377.145	377.126
600.000	377.172	377.431
610.000	376.937	377.797
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630.000	377.197	378.568
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650.000	376.938	378.832
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670.000	377.084	379.104
680.000	379.283	379.285
690.000	379.464	379.464
700.000	379.648	379.648
705.017	379.766	379.766

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 2 Sections

Client: ProTen

Scales: H1:1000, V1:100

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C13

Sheet: 13 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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Project	ProTen Poultry Sheds Rushes Creek Tamworth
Drawing Title	Farm 2
Client	ProTen
Scales	1:1000
Client Project No.	
Architect / Project Manager	ProTen
Project Number	17W003
Dwg. No.	C14
Sheet	14 of 57
Revision	4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client
ProTen

Scales
1:1000

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C15

Sheet
15 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C16

Sheet
16 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

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Project	Drawing Title			
ProTen Poultry Sheds Rushes Creek Tamworth	Farm 2			
Client: ProTen	Scales: 1:500		Client Project No.	
Architect / Project Manager: ProTen	Project Number: 17W003	Dwg. No.: C17	Sheet: 17 of 57	Revision: 4

A1 SHEET

0 100mm 200mm 300mm

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C18

Sheet
18 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C19

Sheet
19 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C20

Sheet
20 of 57

Revision
4

0 100mm 200mm 300mm
A1 SHEET

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 2

Client	Scales	Client Project No.		
ProTen	1:500			
Architect / Project Manager	**Project Number**	**Dwg. No.**	**Sheet**	**Revision**
ProTen	17W003	C21	21 of 57	4

A1 SHEET

0 100mm 200mm 300mm

4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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EMAIL: lancevryan@gmail.com

Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 3 Sections Plan

Client
ProTen

Scales
1:1250

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

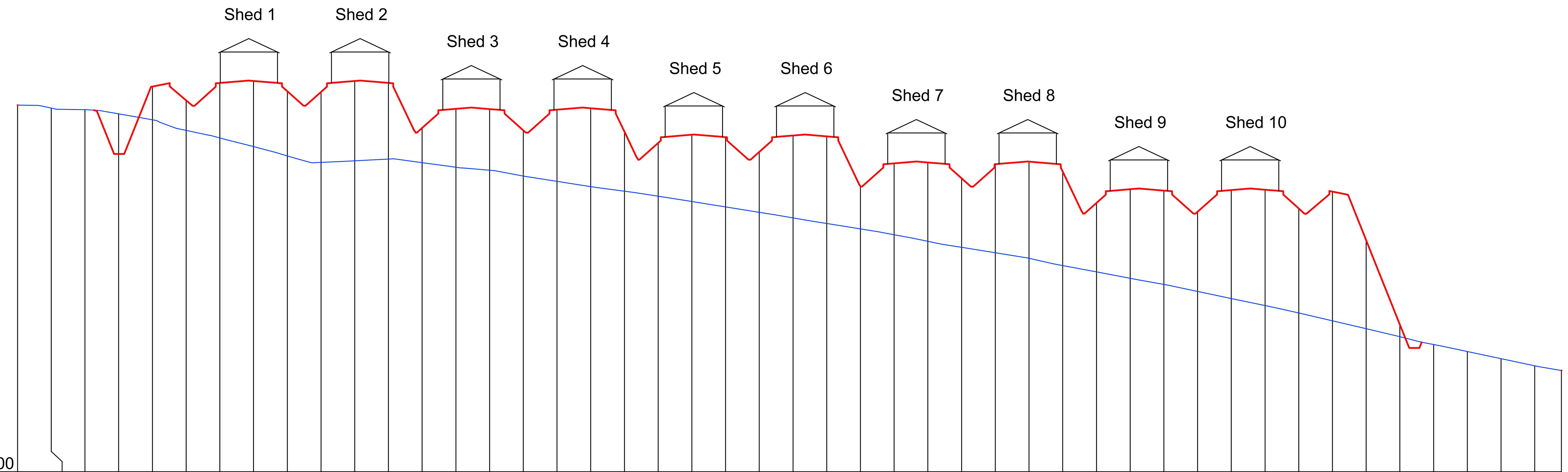
Dwg. No.
C22

Sheet
22 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm



R.L. 355.500

Chainage	Design Surface	Existing Surface
0.000	366.372	366.372
10.000	366.283	366.283
20.000	366.238	366.238
30.000	364.925	366.112
40.000	366.923	365.937
50.000	366.513	365.621
60.000	367.028	365.399
70.000	367.088	365.143
80.000	366.784	364.866
90.000	366.762	364.674
100.000	367.087	364.720
110.000	367.030	364.772
120.000	365.694	364.666
130.000	366.262	364.529
140.000	366.255	364.443
150.000	365.623	364.270
160.000	366.237	364.112
170.000	366.280	363.955
180.000	365.585	363.817
190.000	365.251	363.669
200.000	365.495	363.514
210.000	365.422	363.353
220.000	364.983	363.193
230.000	365.470	363.028
240.000	365.447	362.862
250.000	363.968	362.701
260.000	364.645	362.528
270.000	364.672	362.334
280.000	364.202	362.154
290.000	364.620	361.993
300.000	364.697	361.830
310.000	364.404	361.615
320.000	363.472	361.426
330.000	363.878	361.237
340.000	363.838	361.054
350.000	363.208	360.848
360.000	363.853	360.638
370.000	363.863	360.428
380.000	363.306	360.206
390.000	363.807	359.974
400.000	362.366	359.741
410.000	359.866	359.506
420.000	359.267	359.272
430.000	359.056	359.065
440.000	358.846	358.853
450.000	358.640	358.641
457.914	358.500	358.500

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100

R.L. 357.600

Chainage	Design Surface	Existing Surface
0.000	371.674	371.674
10.000	371.302	371.514
20.000	368.802	371.221
30.000	366.302	370.966
40.000	366.923	370.772
50.000	366.784	370.588
60.000	367.028	370.441
70.000	367.088	370.345
80.000	366.863	370.158
90.000	366.858	369.892
100.000	367.087	369.609
110.000	367.030	369.262
120.000	366.148	368.891
130.000	366.262	368.598
140.000	366.255	368.310
150.000	366.037	368.075
160.000	366.237	367.843
170.000	366.280	367.610
180.000	365.817	367.407
190.000	365.386	367.112
200.000	365.495	366.817
210.000	365.422	366.634
220.000	365.237	366.562
230.000	365.470	366.529
240.000	365.447	366.501
250.000	364.689	366.238
260.000	364.645	366.159
270.000	364.672	365.611
280.000	364.437	364.993
290.000	364.620	364.647
300.000	364.697	364.408
310.000	364.594	364.133
320.000	363.631	363.819
330.000	363.878	363.513
340.000	363.838	363.287
350.000	363.637	363.048
360.000	363.853	362.789
370.000	363.863	362.548
380.000	363.580	362.317
390.000	363.807	362.095
400.000	362.366	361.893
410.000	361.557	361.707
420.000	361.519	361.521
430.000	361.314	361.314
440.000	361.093	361.093
450.000	360.868	360.868
457.914	360.690	360.690

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100

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4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 3 Sections

Client
ProTen

Architect / Project Manager
ProTen

Scales
H1:1000, V1:100

Client Project No.

Project Number
17W003

Dwg. No.
C23

Sheet
23 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds Rushes Creek Tamworth

Drawing Title: Farm 3

Client: ProTen

Scales: 1:1000

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C24

Sheet: 24 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project	ProTen Poultry Sheds Rushes Creek Tamworth
Drawing Title	Farm 3
Client	ProTen
Scales	1:1000
Client Project No.	
Architect / Project Manager	ProTen
Project Number	17W003
Dwg. No.	C25
Sheet	25 of 57
Revision	4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 3

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C26

Sheet
26 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 3

Client: ProTen

Scales: 1:500

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C27

Sheet: 27 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 3

Client	Scales	Client Project No.		
ProTen	1:500			
Architect / Project Manager	**Project Number**	**Dwg. No.**	**Sheet**	**Revision**
ProTen	17W003	C28	28 of 57	4

0 100mm 200mm 300mm
A1 SHEET

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 3

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

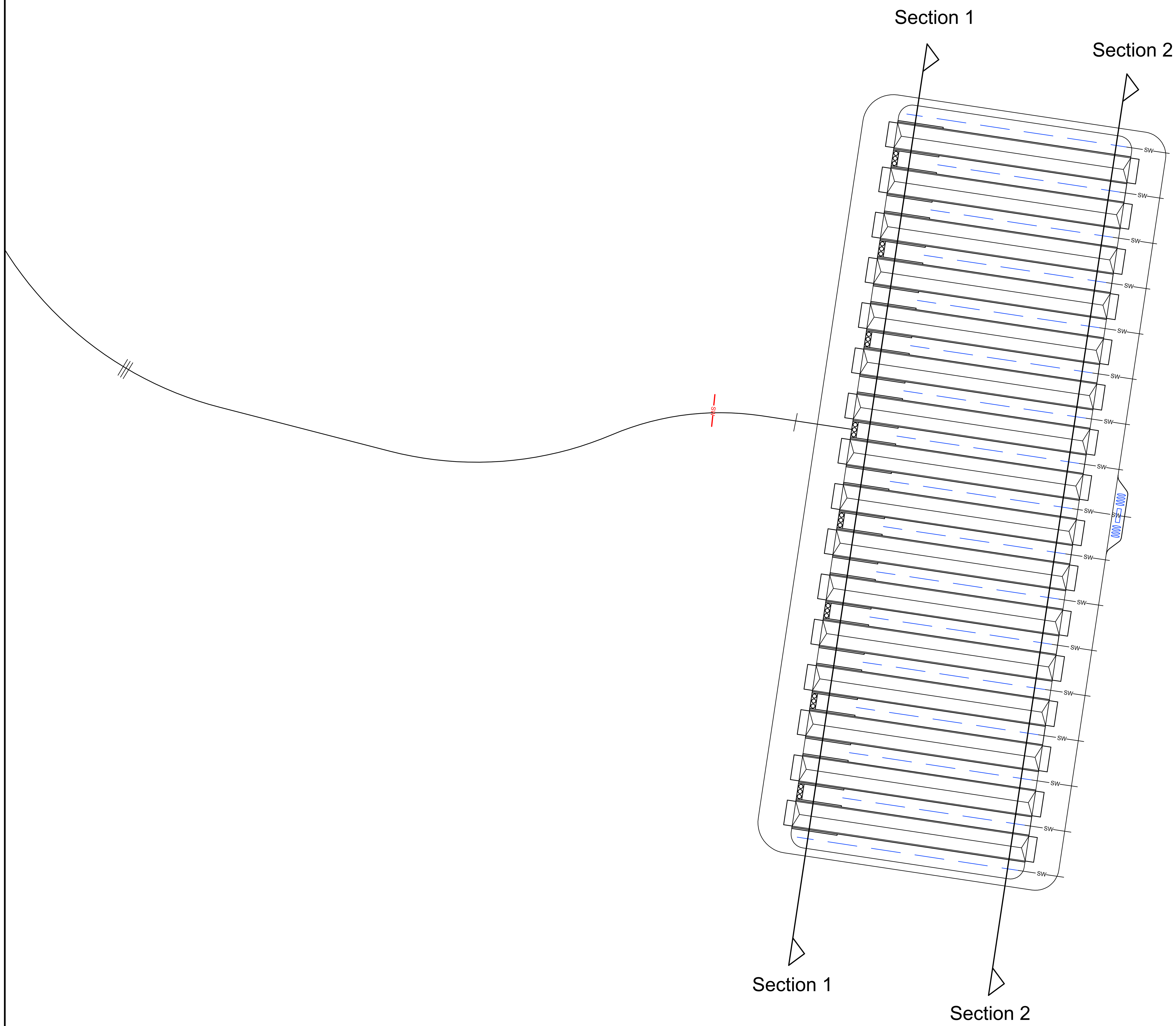
Dwg. No.
C29

Sheet
29 of 57

Revision
4

0 100mm 200mm 300mm

A1 SHEET



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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 4 Sections Plan

Client: ProTen

Scales: NTS

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

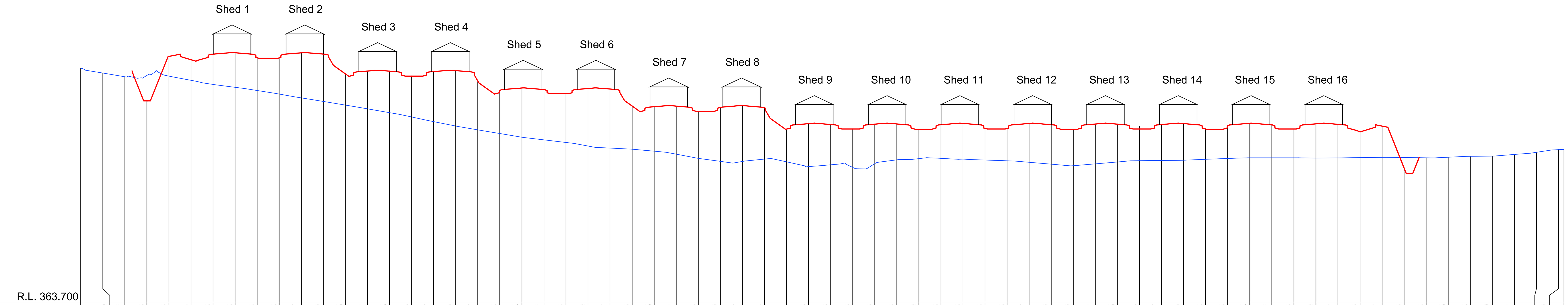
Dwg. No.: C30

Sheet: 30 of 57

Revision: 4

0 100mm 200mm 300mm

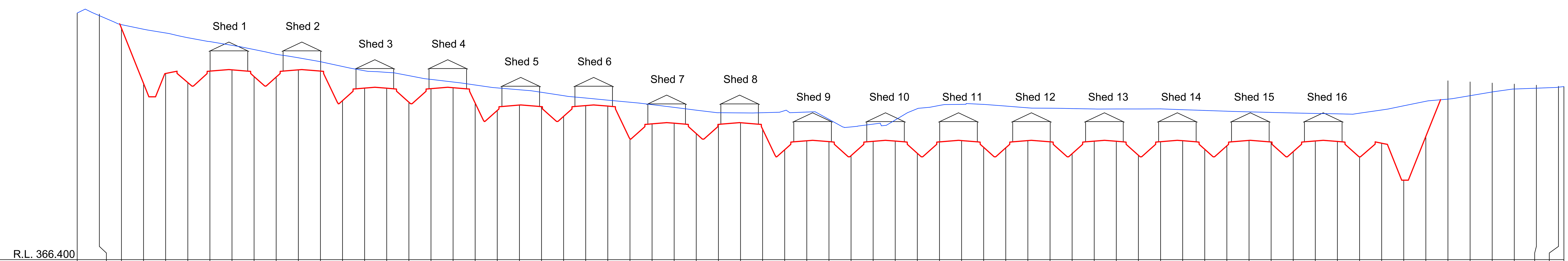
A1 SHEET



R.L. 363.700

Chainage	Design Surface	Existing Surface
0.000	374.291	374.291
10.000	374.069	374.069
20.000	373.902	373.902
30.000	372.808	373.961
40.000	374.823	373.930
50.000	374.674	373.742
60.000	374.928	373.556
70.000	374.988	373.424
80.000	374.763	373.279
90.000	374.758	373.117
100.000	374.987	372.945
110.000	374.930	372.783
120.000	374.035	372.618
130.000	374.162	372.450
140.000	374.155	372.278
150.000	373.933	372.080
160.000	374.137	371.870
170.000	374.180	371.670
180.000	373.717	371.499
190.000	373.286	371.330
200.000	373.395	371.163
210.000	373.322	371.043
220.000	373.133	370.926
230.000	373.370	370.765
240.000	373.347	370.672
250.000	372.576	370.619
260.000	372.545	370.530
270.000	372.572	370.395
280.000	372.333	370.207
290.000	372.520	370.069
300.000	372.597	370.065
310.000	372.494	370.174
320.000	371.531	370.048
330.000	371.778	369.831
340.000	371.738	369.915
350.000	371.533	369.796
360.000	371.753	369.966
370.000	371.763	370.139
380.000	371.520	370.195
390.000	371.728	370.206
400.000	371.788	370.170
410.000	371.563	370.129
420.000	371.558	370.094
430.000	371.787	370.028
440.000	371.730	369.941
450.000	371.520	369.873
460.000	371.762	369.956
470.000	371.755	370.043
480.000	371.533	370.099
490.000	371.737	370.109
500.000	371.780	370.123
510.000	371.536	370.162
520.000	371.686	370.201
530.000	371.795	370.232
540.000	371.722	370.231
550.000	371.533	370.230
560.000	371.770	370.218
570.000	371.747	370.229
580.000	371.406	370.239
590.000	371.667	370.251
600.000	369.766	370.244
610.000	370.233	370.233
620.000	370.265	370.258
630.000	370.298	370.298
640.000	370.309	370.309
650.000	370.382	370.382
660.000	370.481	370.481
670.000	370.600	370.600
672.426	370.611	370.611

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100



R.L. 366.400

Chainage	Design Surface	Existing Surface
0.000		377.558
10.000		377.440
20.000		377.030
30.000		376.826
40.000		376.654
50.000		376.441
60.000		376.264
70.000		376.094
80.000		375.905
90.000		375.691
100.000		375.531
110.000		375.354
120.000		375.139
130.000		374.946
140.000		374.874
150.000		374.723
160.000		374.554
170.000		374.435
180.000		374.300
190.000		374.170
200.000		374.087
210.000		373.970
220.000		373.817
230.000		373.711
240.000		373.616
250.000		373.521
260.000		373.412
270.000		373.288
280.000		373.164
290.000		373.046
300.000		373.040
310.000		373.048
320.000		373.142
330.000		373.078
340.000		372.748
350.000		372.405
360.000		372.531
370.000		372.719
380.000		373.232
390.000		373.377
400.000		373.426
410.000		373.424
420.000		373.347
430.000		373.270
440.000		373.251
450.000		373.236
460.000		373.216
470.000		373.217
480.000		373.219
490.000		373.220
500.000		373.184
510.000		373.149
520.000		373.116
530.000		373.087
540.000		373.059
550.000		373.036
560.000		373.014
570.000		372.995
580.000		373.025
590.000		373.172
600.000		373.359
610.000		373.563
620.000		373.664
630.000		373.817
640.000		373.986
650.000		374.120
660.000		374.157
670.000		374.202
672.426		374.231

SCALES: HORIZONTAL 1:1000 VERTICAL 1:100

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4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 4 Sections

Client
ProTen

Scales
H1:1000, V1:100

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C31

Sheet
31 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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FAX: (02) 6921 7415
EMAIL: lancevryan@gmail.com

Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 4

Client: ProTen

Scales: 1:1000

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C32

Sheet: 32 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
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EMAIL: lancevryan@gmail.com

Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 4

Client: ProTen

Scales: 1:1000

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C33

Sheet: 33 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project	ProTen Poultry Sheds Rushes Creek Tamworth
Drawing Title	Farm 4
Client	ProTen
Scales	1:500
Client Project No.	
Architect / Project Manager	ProTen
Project Number	17W003
Dwg. No.	C34
Sheet	34 of 57
Revision	4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 4

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C35

Sheet
35 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm

4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	
Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 4

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

Dwg. No.
C36

Sheet
36 of 57

Revision
4

0 100mm 200mm 300mm
A1 SHEET

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project	ProTen Poultry Sheds Rushes Creek Tamworth
Drawing Title	Farm 4
Client	ProTen
Scales	1:500
Client Project No.	
Architect / Project Manager	ProTen
Project Number	17W003
Dwg. No.	C37
Sheet	37 of 57
Revision	4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth
Drawing Title: Farm 4
Client: ProTen
Scales: 1:500
Client Project No.:
Architect / Project Manager: ProTen
Project Number: 17W003
Dwg. No.: C38
Sheet: 38 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 4

Client: ProTen

Scales: 1:500

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C39

Sheet: 39 of 57

Revision: 4

0 100mm 200mm 300mm

A1 SHEET

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 4

Client: ProTen

Scales: 1:500

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C40

Sheet: 40 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Farm 4

Client
ProTen

Scales
1:500

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

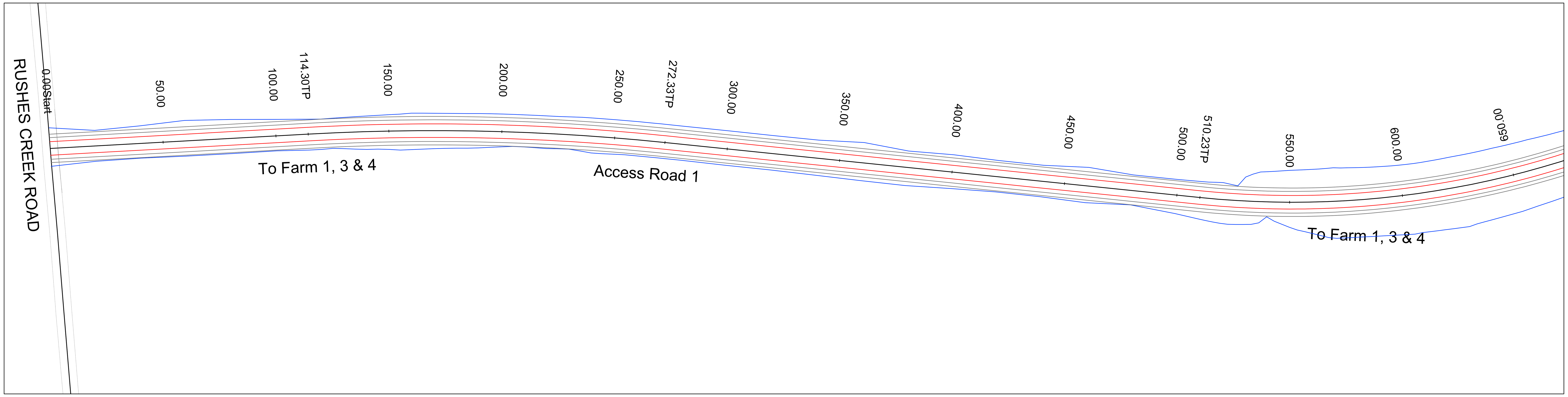
Dwg. No.
C41

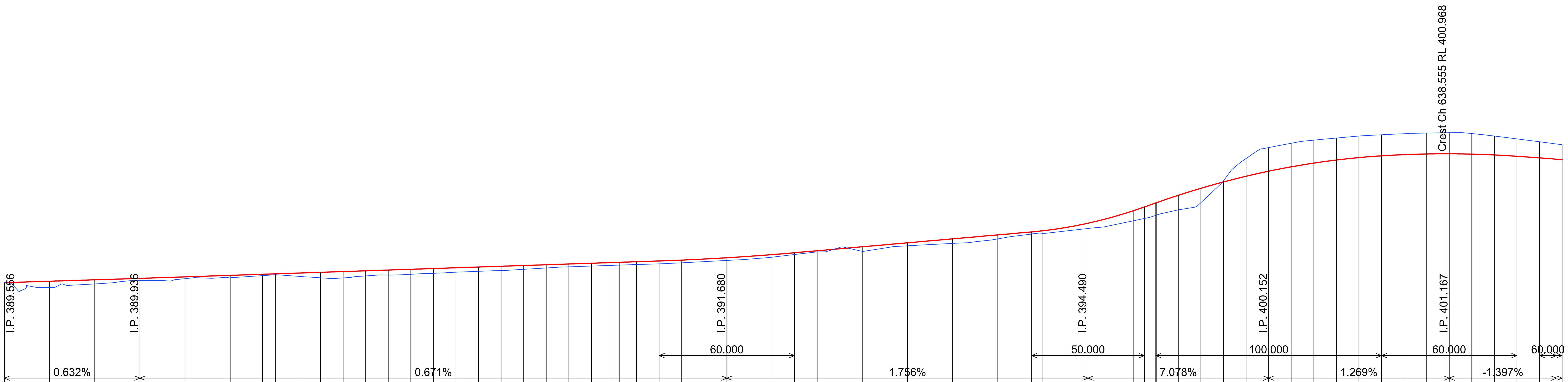
Sheet
41 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm





R.L. 377.100

Chainage	Design Surface	Existing Surface
0.000	389.556	389.556
20.000	389.683	389.136
40.000	389.809	389.442
60.000	389.936	389.738
80.000	390.070	389.910
100.000	390.204	390.046
114.302	390.300	390.180
120.000	390.338	390.259
130.000	390.405	390.121
140.000	390.472	389.985
150.000	390.540	389.976
160.000	390.607	390.153
170.000	390.674	390.227
180.000	390.741	390.299
190.000	390.808	390.385
200.000	390.875	390.486
210.000	390.942	390.562
220.000	391.009	390.630
230.000	391.076	390.737
240.000	391.143	390.859
250.000	391.210	390.959
260.000	391.278	391.028
270.000	391.345	391.097
272.325	391.360	391.113
280.000	391.412	391.164
290.000	391.479	391.224
300.000	391.555	391.316
320.000	391.761	391.522
340.000	392.040	391.810
350.000	392.207	392.047
360.000	392.383	392.277
380.000	392.734	392.334
400.000	393.085	392.818
420.000	393.436	393.035
440.000	393.787	393.433
455.000	394.051	393.944
460.000	394.152	393.898
480.000	394.822	394.351
500.000	395.919	395.034
505.000	396.259	395.242
510.000	396.613	395.515
510.230	396.630	395.530
520.000	397.292	396.001
530.000	397.913	396.638
540.000	398.475	398.580
550.000	398.980	400.549
560.000	399.426	401.515
570.000	399.815	401.902
580.000	400.145	402.174
590.000	400.417	402.363
600.000	400.631	402.543
610.000	400.787	402.650
620.000	400.891	402.745
630.000	400.952	402.809
638.555	400.968	402.832
640.000	400.967	402.835
650.000	400.939	402.757
660.000	400.866	402.539
670.000	400.748	402.290
680.000	400.609	402.035
690.000	400.439	401.775

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 1 From 0.000 to 690.000

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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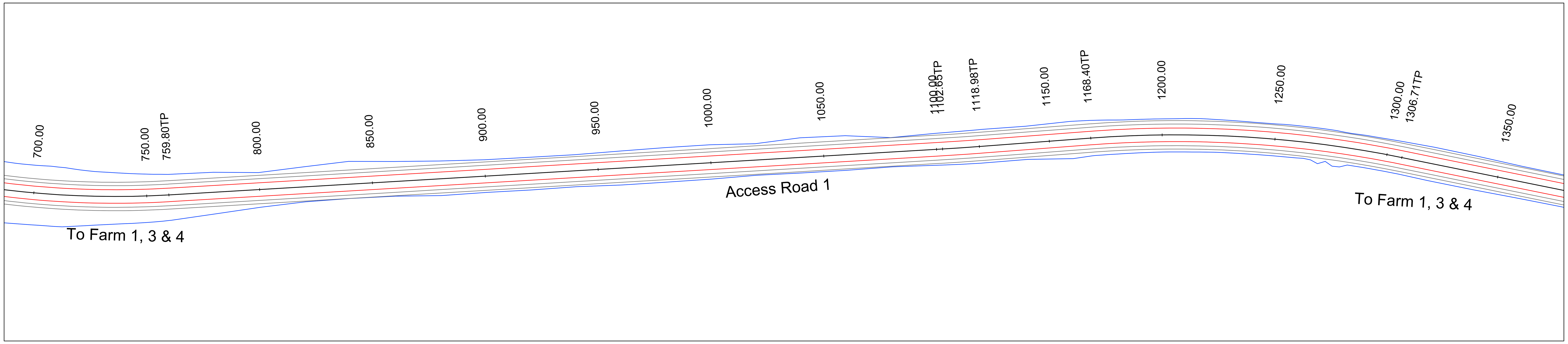
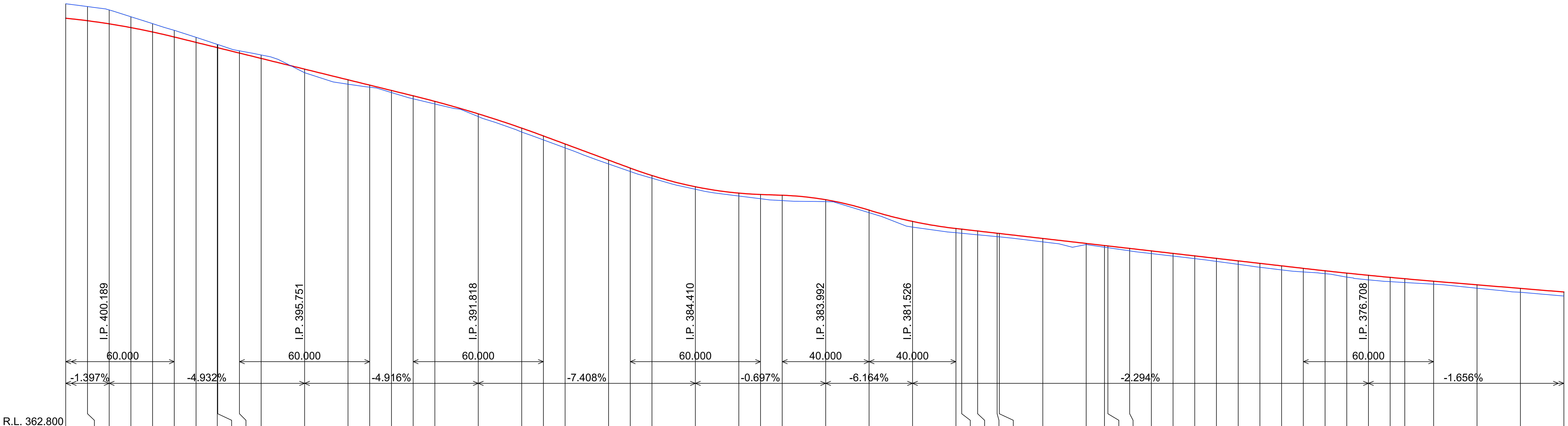
Project: ProTen Poultry Sheds, Rushes Creek, Tamworth
Client: ProTen
Architect / Project Manager: ProTen

Drawing Title: Access Road 1 Plan and Longsections
Scales: H:1000, V1:200
Client Project No.:
Project Number: 17W003
Dwg. No.: C42
Sheet: 42 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm





Chainage	Design Surface	Existing Surface
690.000	400.439	401.775
700.000	400.211	401.517
710.000	399.924	401.203
720.000	399.578	400.580
730.000	399.174	399.940
740.000	398.710	399.327
750.000	398.217	398.678
759.797	397.734	398.031
760.000	397.724	398.017
770.000	397.230	397.438
780.000	396.737	397.056
800.000	395.752	395.424
820.000	394.768	394.367
830.000	394.276	394.088
840.000	393.785	393.590
850.000	393.293	393.015
860.000	392.781	392.539
880.000	391.631	391.379
900.000	390.316	389.952
910.000	389.596	389.228
920.000	388.855	388.492
940.000	387.373	387.015
950.000	386.633	386.319
960.000	385.948	385.704
980.000	384.914	384.683
1000.000	384.327	384.063
1010.000	384.201	383.812
1020.000	384.131	383.640
1040.000	383.719	383.546
1060.000	382.759	382.524
1080.000	381.720	381.196
1100.000	381.067	380.682
1102.654	381.006	380.631
1110.000	380.838	380.490
1118.978	380.632	380.316
1120.000	380.608	380.296
1140.000	380.150	379.834
1160.000	379.691	379.590
1168.401	379.498	379.346
1170.000	379.461	379.299
1180.000	379.232	379.009
1190.000	379.002	378.761
1200.000	378.773	378.527
1210.000	378.543	378.292
1220.000	378.314	378.039
1230.000	378.085	377.766
1240.000	377.855	377.495
1250.000	377.626	377.253
1260.000	377.396	377.066
1270.000	377.172	376.908
1280.000	376.959	376.591
1290.000	376.756	376.333
1300.000	376.564	376.171
1306.715	376.441	376.093
1320.000	376.211	375.938
1340.000	375.880	375.570
1360.000	375.548	375.193
1380.000	375.217	374.844

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 1 From 690.000 to 1380.000

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 1
Plan and Longsections

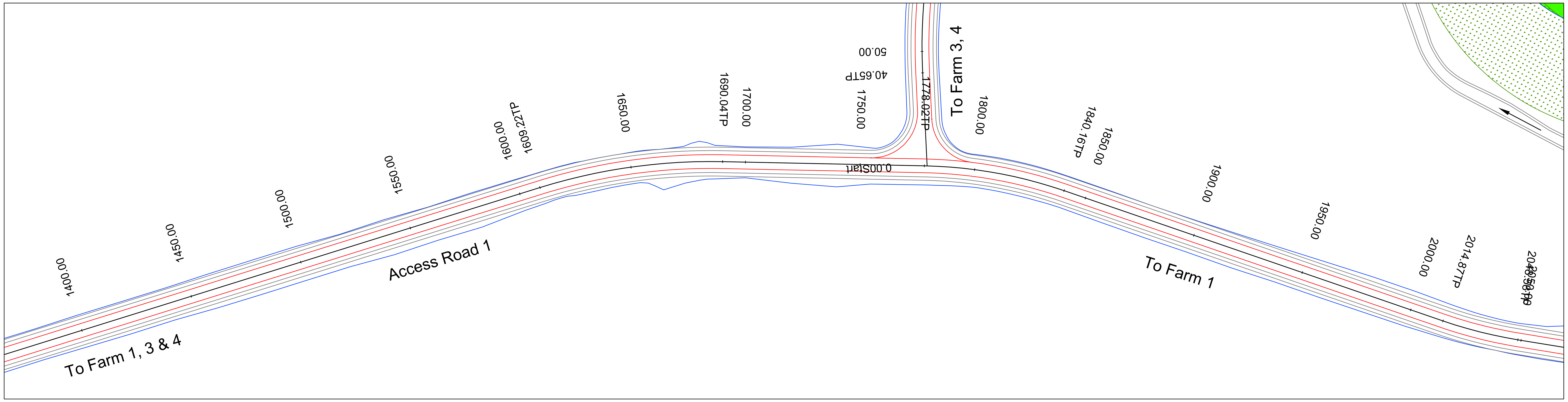
Scales
H:1000, V1:200

Client Project No.

Project Number: 17W003
Dwg. No.: C43
Sheet: 43 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm



Design Surface	375.217	374.886	374.555	374.223	373.892	373.561	373.230	372.898	372.693	372.567
Existing Surface	374.844	374.584	374.293	373.903	373.618	373.353	372.947	372.891	372.541	372.321
Chainage	1380.000	1400.000	1420.000	1440.000	1460.000	1480.000	1500.000	1520.000	1532.400	1540.000

Design Surface	372.401	372.243	371.974	371.766	371.691	371.685	371.612	371.538	371.465	371.392
Existing Surface	372.262	371.936	371.609	371.347	371.265	371.260	371.188	371.104	371.021	370.968
Chainage	1550.000	1560.000	1580.000	1600.000	1609.223	1610.000	1620.000	1630.000	1640.000	1650.000

Design Surface	371.319	371.246	371.176	371.115	371.115	371.062	370.980	370.951	370.927	370.890
Existing Surface	370.874	371.177	371.140	370.666	370.665	370.534	370.796	370.916	370.881	371.040
Chainage	1660.000	1670.000	1680.000	1690.000	1690.041	1700.000	1720.000	1730.000	1740.000	1754.591

Design Surface	370.877	370.852	370.839	370.838	370.838	370.845	370.867	370.873	370.922	370.992
Existing Surface	370.895	370.583	370.548	370.536	370.525	370.490	370.523	370.535	370.605	370.682
Chainage	1760.000	1770.000	1778.017	1780.000	1781.766	1790.000	1798.470	1800.000	1810.000	1820.000

Design Surface	371.083	371.185	371.186	371.388	371.592	371.795	371.999	372.100	372.188	372.275
Existing Surface	370.748	370.823	370.824	371.018	371.195	371.397	371.671	371.824	371.949	372.074
Chainage	1830.000	1840.000	1840.165	1860.000	1880.000	1900.000	1920.000	1930.000	1940.000	1960.000

Design Surface	372.278	372.245	372.187	372.114	372.006	371.968	371.896	371.823	371.760	371.750	371.659
Existing Surface	372.088	372.069	371.990	371.937	371.732	371.660	371.509	371.362	371.250	371.235	371.284
Chainage	1964.964	1980.000	1990.000	2000.000	2014.873	2020.000	2030.000	2040.000	2048.582	2050.000	2060.000

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 1 From 1380.000 to 2060.000

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
Warning: Unless there is an authorised Lance Ryan Consulting Engineers Pty. Ltd. signature at * , this drawing is not authorised for issue.

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Client: ProTen

Architect / Project Manager: ProTen

Drawing Title: Access Road 1 Plan and Longsections

Scales: H:1000, V1:200

Client Project No.:

Project Number: 17W003

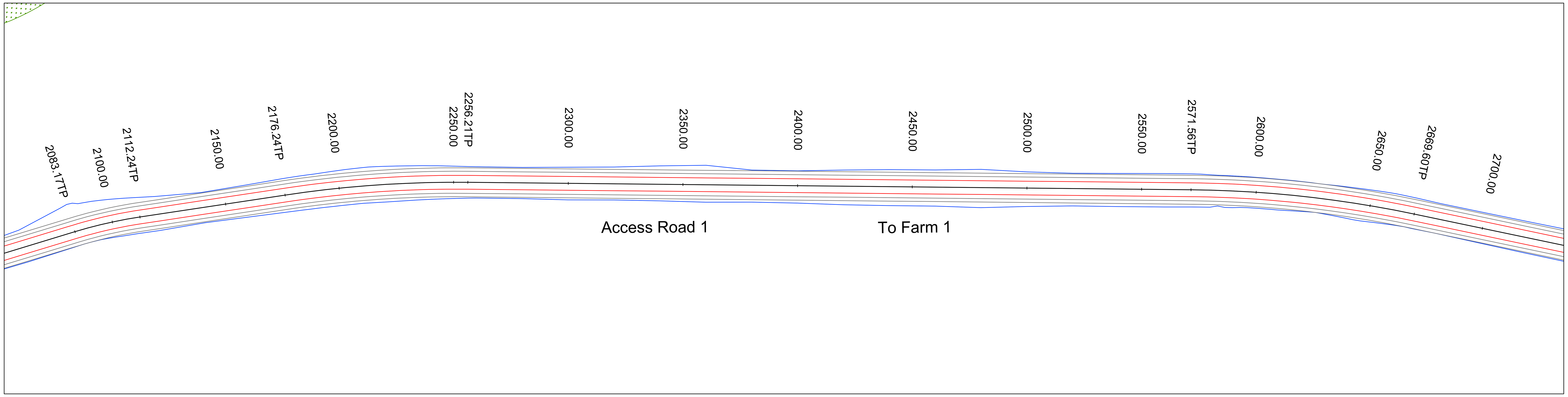
Dwg. No.: C44

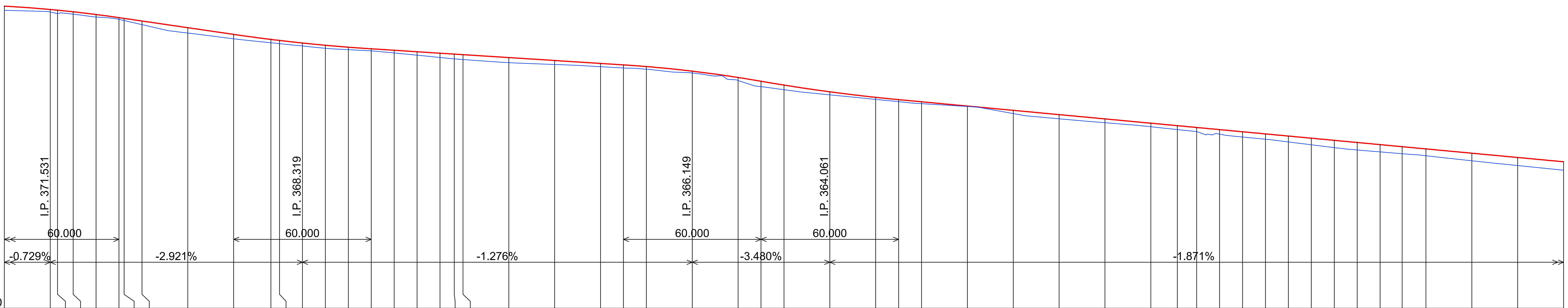
Sheet: 44 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm





Chainage	Design Surface	Existing Surface
2060.000	371.659	371.284
2080.000	371.367	371.149
2083.170	371.307	371.005
2090.000	371.166	370.960
2100.000	370.929	370.710
2110.000	370.655	370.502
2112.240	370.590	370.400
2120.000	370.363	370.044
2140.000	369.779	369.314
2160.000	369.195	368.814
2176.241	368.757	368.464
2180.000	368.665	368.387
2190.000	368.442	368.181
2200.000	368.246	367.979
2210.000	368.077	367.861
2220.000	367.936	367.756
2230.000	367.808	367.574
2240.000	367.680	367.377
2250.000	367.553	367.180
2256.206	367.473	367.059
2260.000	367.425	366.995
2280.000	367.170	366.729
2300.000	366.914	366.565
2320.000	366.659	366.376
2330.000	366.531	366.267
2340.000	366.385	366.155
2360.000	365.983	365.824
2380.000	365.434	365.163
2390.000	365.105	364.632
2400.000	364.770	364.366
2420.000	364.181	363.919
2440.000	363.700	363.519
2450.000	363.499	363.321
2460.000	363.312	363.145
2480.000	362.938	362.902
2500.000	362.564	362.286
2520.000	362.190	361.828
2540.000	361.816	361.483
2560.000	361.442	361.131
2571.558	361.225	360.889
2580.000	361.067	360.708
2590.000	360.880	360.486
2600.000	360.693	360.236
2610.000	360.506	360.042
2620.000	360.319	359.804
2630.000	360.132	359.557
2640.000	359.945	359.313
2650.000	359.758	359.104
2660.000	359.571	358.938
2669.597	359.391	358.781
2680.000	359.197	358.600
2700.000	358.823	358.162
2720.000	358.448	357.742
2740.000	358.074	357.341

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 1 From 2060.000 to 2740.000

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 1
Plan and Longsections

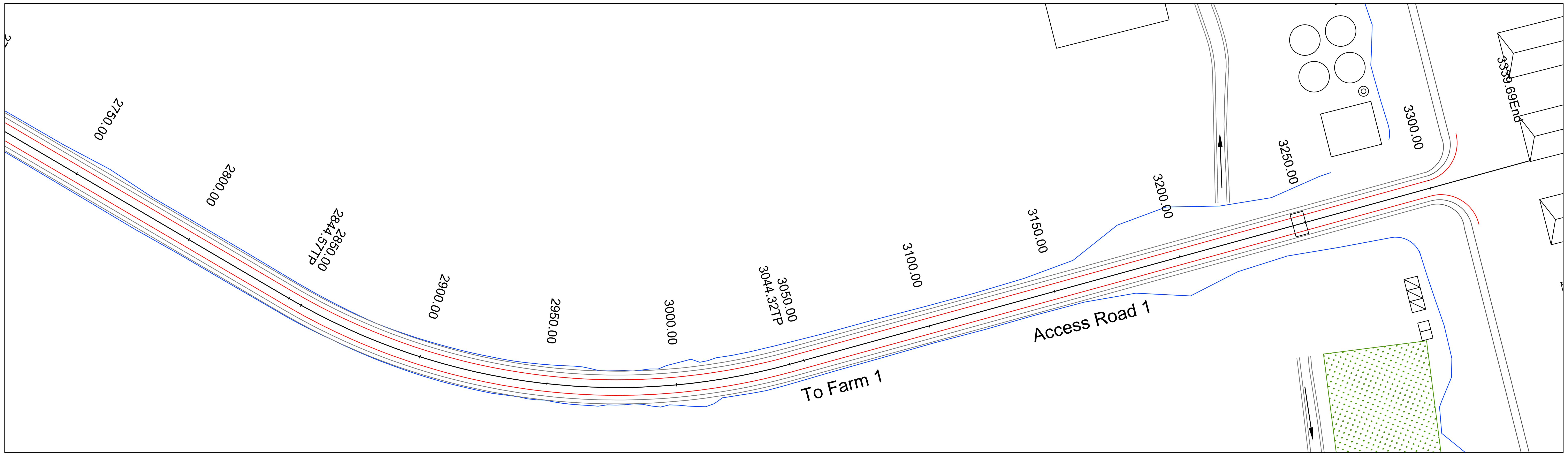
Scales
H:1000, V1:200

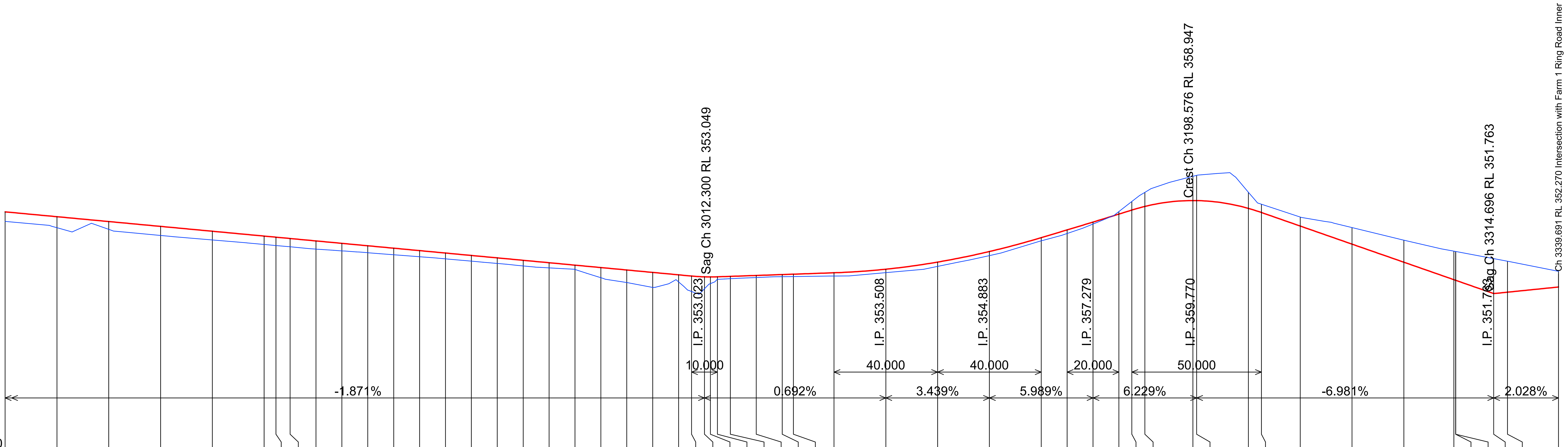
Client Project No.

Project Number: 17W003
Dwg. No.: C45
Sheet: 45 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm





Chainage	Design Surface	Existing Surface
2740.000	358.074	357.341
2760.000	357.700	356.852
2780.000	357.326	356.722
2800.000	356.952	356.254
2820.000	356.578	355.902
2840.000	356.204	355.556
2844.569	356.118	355.473
2850.000	356.016	355.375
2860.000	355.829	355.195
2870.000	355.642	355.061
2880.000	355.455	354.919
2890.000	355.268	354.764
2900.000	355.081	354.607
2910.000	354.894	354.446
2920.000	354.707	354.267
2930.000	354.520	354.089
2940.000	354.333	353.899
2950.000	354.146	353.749
2960.000	353.959	353.626
2970.000	353.772	352.990
2980.000	353.585	352.615
2990.000	353.397	352.235
3000.000	353.210	352.664
3005.000	353.117	351.924
3010.000	353.055	352.134
3012.300	353.049	352.537
3015.000	353.058	352.862
3020.000	353.093	352.913
3030.000	353.162	353.003
3040.000	353.231	353.066
3044.323	353.261	353.077
3060.000	353.369	353.118
3080.000	353.645	353.380
3100.000	354.195	353.859
3120.000	355.011	354.696
3140.000	356.081	355.840
3150.000	356.680	356.400
3160.000	357.285	357.133
3170.000	357.902	358.100
3175.000	358.213	358.876
3180.000	358.492	359.581
3198.576	358.947	360.821
3200.000	358.945	360.895
3220.000	358.341	359.591
3225.000	358.025	358.665
3240.000	356.978	357.672
3260.000	355.582	356.862
3280.000	354.185	355.885
3299.329	352.836	355.038
3300.000	352.789	355.013
3300.057	352.785	355.011
3314.696	351.763	354.463
3320.000	351.871	354.262
3339.691	352.270	353.484

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 1 From 2740.000 to 3339.691

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 1
Plan and Longsections

Scales: H:1000, V1:200
Client Project No.:
Project Number: 17W003
Dwg. No.: C46
Sheet: 46 of 57
Revision: 4

A1 SHEET

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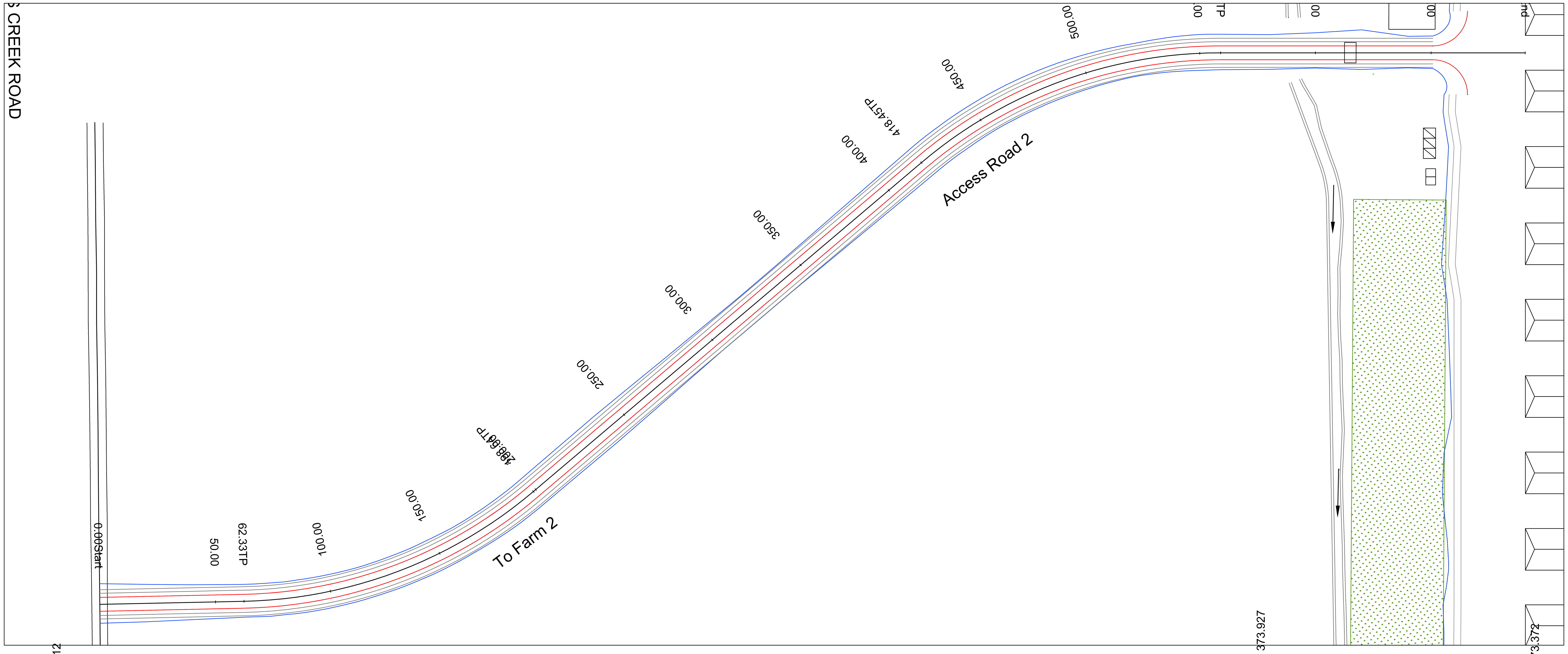

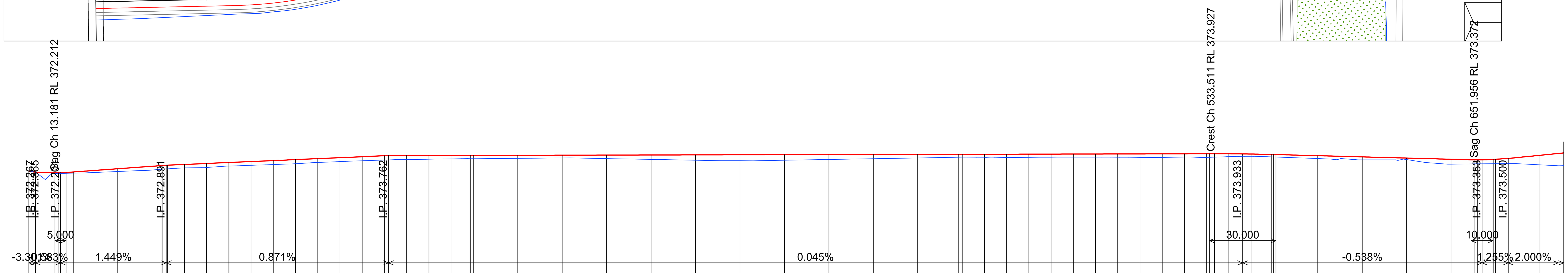

Chainage	Design Surface	Existing Surface
0.000	372.365	372.365
2.964	372.267	372.267
11.748	372.216	372.146
13.181	372.212	372.152
14.248	372.214	372.157
16.748	372.238	372.168
20.000	372.285	372.182
40.000	372.575	372.326
60.000	372.864	372.534
61.823	372.891	372.559
62.326	372.895	372.566
70.000	372.962	372.651
80.000	373.049	372.688
90.000	373.136	372.814
100.000	373.223	372.883
110.000	373.310	372.950
120.000	373.398	373.025
130.000	373.485	373.139
140.000	373.572	373.221
150.000	373.659	373.292
160.000	373.746	373.359
161.793	373.762	373.370
170.000	373.765	373.409
180.000	373.770	373.434
190.000	373.774	373.461
198.637	373.778	373.481
200.000	373.779	373.480
220.000	373.788	373.508
240.000	373.796	373.545
260.000	373.805	373.489
280.000	373.814	373.415
300.000	373.823	373.342
320.000	373.832	373.297
340.000	373.841	373.342
360.000	373.850	373.410
380.000	373.859	373.478
400.000	373.868	373.547
418.446	373.876	373.611
420.000	373.877	373.617
430.000	373.881	373.609
440.000	373.886	373.589
450.000	373.890	373.601
460.000	373.894	373.616
470.000	373.899	373.623
480.000	373.903	373.623
490.000	373.908	373.615
500.000	373.912	373.600
510.000	373.917	373.577
520.000	373.921	373.547
530.000	373.926	373.597
531.220	373.926	373.606
533.511	373.927	373.622
540.000	373.923	373.666
546.220	373.911	373.695
550.000	373.900	373.699
559.070	373.863	373.645
560.000	373.858	373.638
561.220	373.852	373.629
580.000	373.751	373.491
600.000	373.643	373.374
620.000	373.536	373.398
640.000	373.428	372.988
648.954	373.380	373.013
650.707	373.373	373.016
651.956	373.372	373.018
653.954	373.375	373.020
658.954	373.415	373.027
660.000	373.429	373.029
665.707	373.500	373.036
680.000	373.786	372.930
690.697	374.000	372.848

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 2 From 0.000 to 690.697

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 2
Plan and Longsections

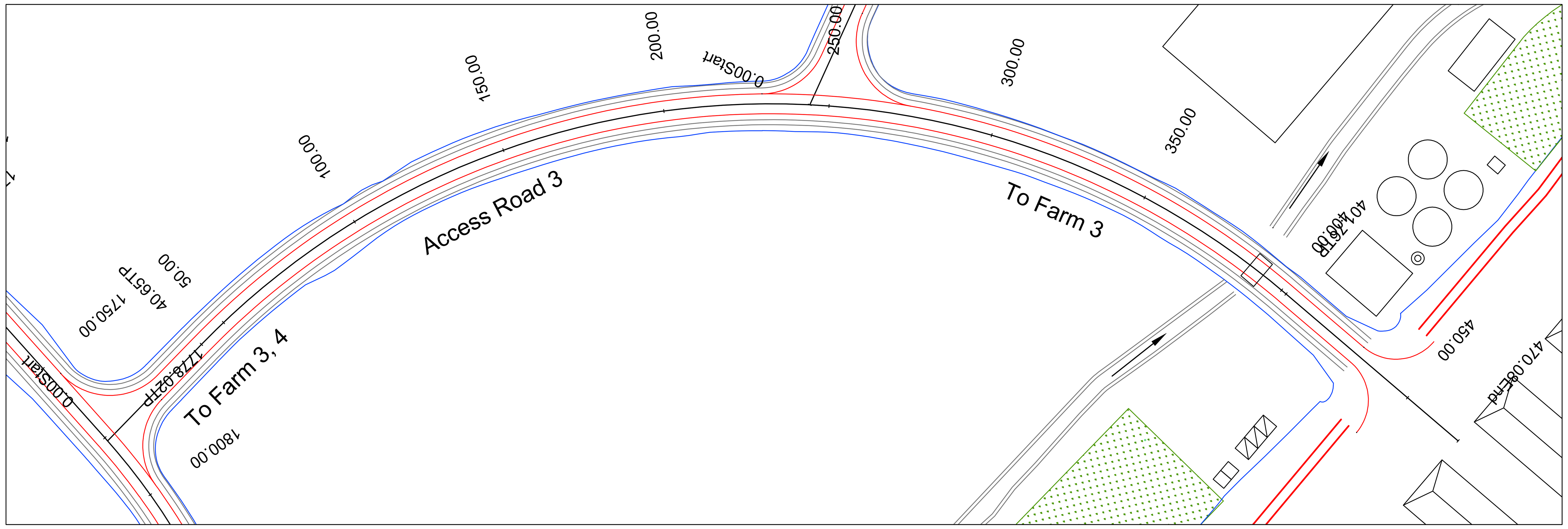
Scales
H:1000, V1:200

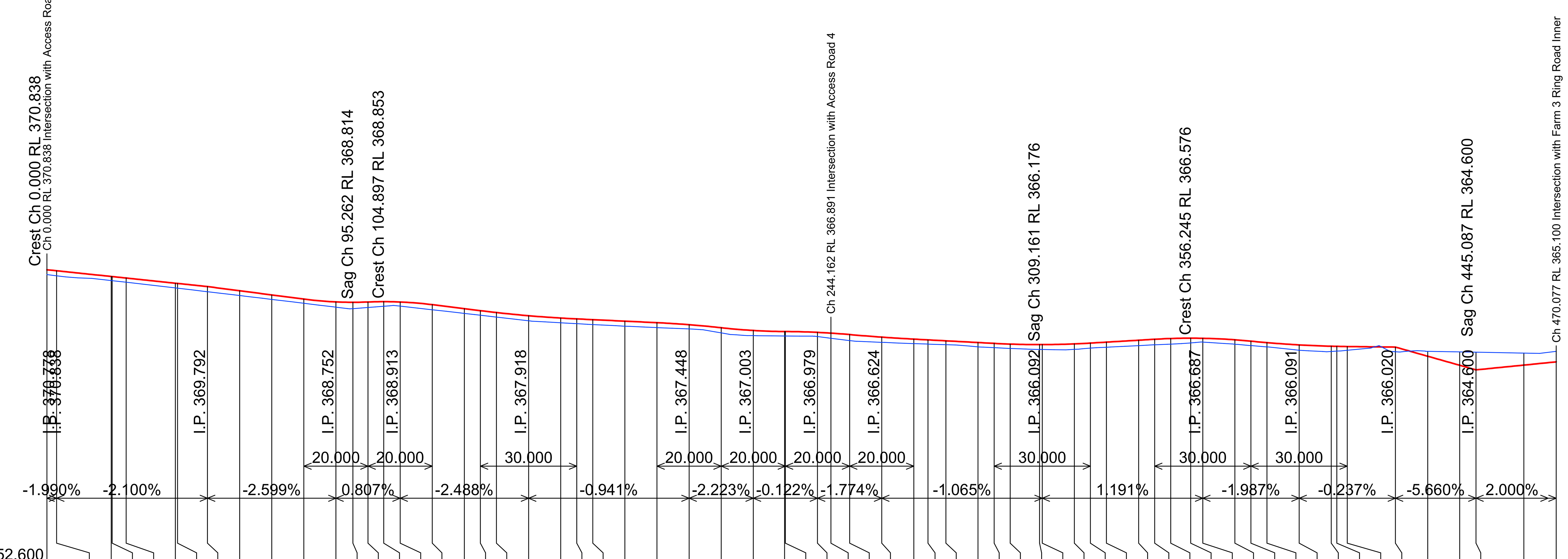
Client Project No.

Project Number 17W003 | Dwg. No. C47 | Sheet 47 of 57 | Revision 4

A1 SHEET

0 100mm 200mm 300mm





Design Surface	370.838	370.778	370.422	370.415	370.324	370.002	369.988	369.792	369.532	369.272	369.012	368.837	368.814	368.833	368.853	368.831	368.665	368.416	368.292	368.174	367.976
Existing Surface	370.540	370.465	370.167	370.160	370.062	369.708	369.692	369.472	369.233	368.993	368.752	368.509	368.418	368.487	368.565	368.571	368.348	368.122	368.008	367.893	367.662
Chainage	0.000	3.008	20.000	20.300	24.650	40.000	40.652	50.000	60.000	70.000	80.000	90.000	95.262	100.000	104.897	110.000	120.000	130.000	135.000	140.000	150.000

Design Surface	367.831	367.777	367.730	367.636	367.542	367.416	367.226	367.056	366.992	366.991	366.938	366.891	366.802	366.642	366.518	366.471	366.411	366.305	366.252	366.208	366.176
Existing Surface	367.534	367.479	367.426	367.326	367.234	367.151	366.904	366.735	366.713	366.713	366.676	366.569	366.423	366.317	366.239	366.208	366.170	366.035	365.983	365.938	365.874
Chainage	160.000	165.000	170.000	180.000	190.000	200.000	210.000	220.000	229.732	230.000	240.000	244.162	250.000	260.000	270.000	274.403	280.000	290.000	295.000	300.000	309.161

Design Surface	366.176	366.220	366.270	366.330	366.449	366.509	366.555	366.576	366.568	366.475	366.389	366.297	366.157	366.075	366.067	366.056	366.020	365.449	364.888	364.600	364.898	365.100
Existing Surface	365.871	365.881	365.960	366.011	366.111	366.165	366.208	366.283	366.334	366.200	366.115	366.032	365.827	365.748	365.770	365.823	365.732	365.757	365.721	365.702	365.648	365.756
Chainage	310.000	320.000	325.000	330.000	340.000	345.000	350.000	356.245	360.000	370.000	375.000	380.000	390.000	400.000	401.755	405.000	420.000	430.088	440.000	445.087	460.000	470.077

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 3 From 0.000 to 470.077

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
Warning: Unless there is an authorised Lance Ryan Consulting Engineers Pty. Ltd. signature at * , this drawing is not authorised for issue.

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Client: ProTen

Architect / Project Manager: ProTen

Drawing Title: Access Road 3 Plan and Longsections

Scales: H:1000, V1:200

Client Project No.:

Project Number: 17W003

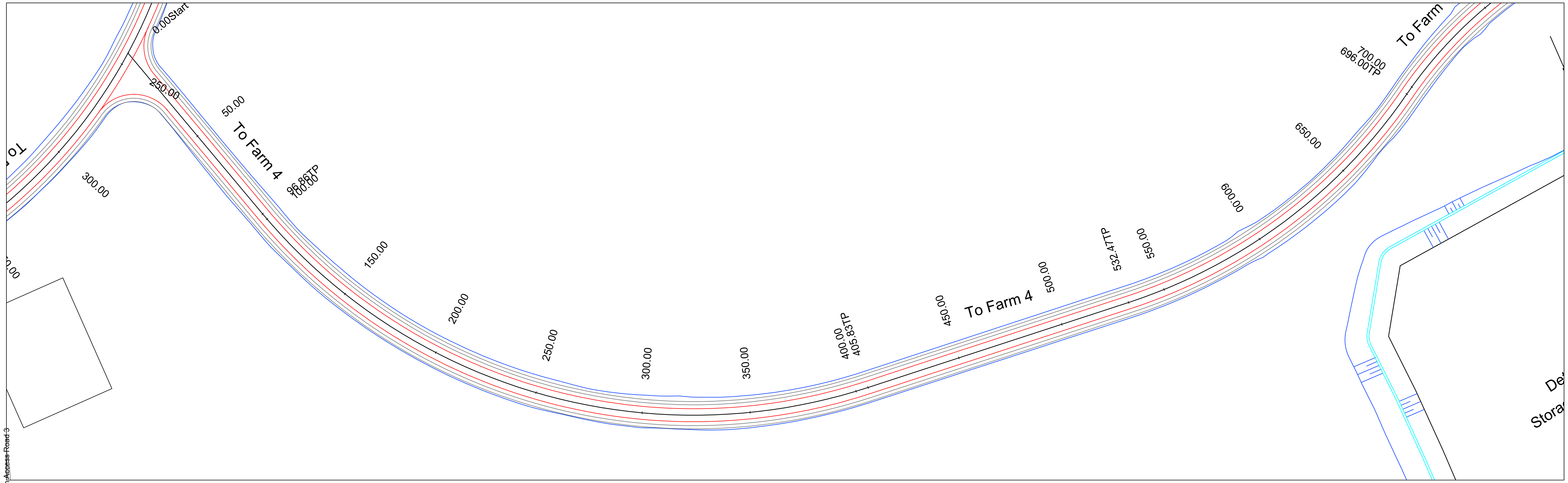
Dwg. No.: C48

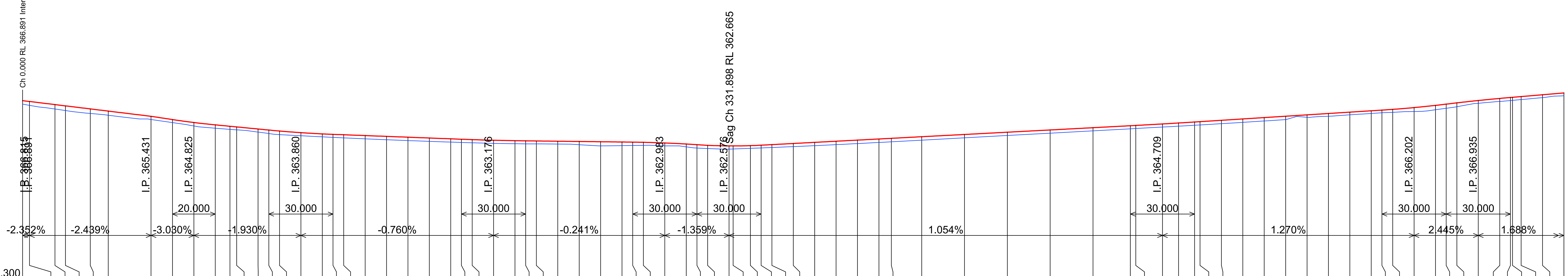
Sheet: 48 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm





Chainage	Design Surface	Existing Surface
0.000	366.891	366.569
3.224	366.815	366.456
15.103	366.526	366.112
20.000	366.406	365.967
31.636	366.122	365.698
40.000	365.919	365.531
60.000	365.431	365.134
70.000	365.128	364.846
80.000	364.852	364.527
90.000	364.632	364.322
96.861	364.499	364.210
100.000	364.439	364.167
110.000	364.246	363.957
115.000	364.149	363.824
120.000	364.058	363.719
130.000	363.904	363.613
140.000	363.789	363.512
145.000	363.746	363.464
150.000	363.708	363.417
160.000	363.632	363.327
170.000	363.556	363.242
180.000	363.480	363.163
190.000	363.404	363.089
200.000	363.328	363.021
205.000	363.290	362.989
210.000	363.254	362.959
220.000	363.195	362.903
230.000	363.154	362.871
235.000	363.140	362.859
240.000	363.128	362.855
250.000	363.104	362.839
260.000	363.080	362.775
270.000	363.056	362.668
280.000	363.032	362.692
285.000	363.019	362.706
290.000	363.003	362.722
300.000	362.941	362.672
310.000	362.843	362.576
315.000	362.780	362.467
320.000	362.722	362.422
330.000	362.666	362.364
331.898	362.665	362.378
340.000	362.691	362.438
345.000	362.734	362.476
350.000	362.786	362.516
360.000	362.892	362.600
370.000	362.997	362.689
380.000	363.103	362.783
390.000	363.208	362.882
400.000	363.313	362.986
405.832	363.375	363.049
420.000	363.524	363.203
440.000	363.735	363.421
460.000	363.945	363.638
480.000	364.156	363.856
500.000	364.367	364.074
517.475	364.551	364.264
520.000	364.578	364.291
532.475	364.717	364.427
540.000	364.807	364.510
547.475	364.900	364.595
550.000	364.932	364.625
560.000	365.059	364.744
570.000	365.186	364.867
580.000	365.313	364.994
590.000	365.440	365.125
600.000	365.567	365.342
610.000	365.694	365.437
620.000	365.821	365.569
630.000	365.948	365.699
635.000	366.011	365.762
640.000	366.080	365.799
650.000	366.246	365.880
660.000	366.451	366.044
665.000	366.568	366.181
670.000	366.687	366.324
680.000	366.907	366.643
690.000	367.101	366.820
695.000	367.188	366.902
696.002	367.205	366.918
700.000	367.273	366.995
710.000	367.441	367.177
720.000	367.610	367.347

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 4 From 0.000 to 720.000

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Irrigation Areas	15.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 4
Plan and Longsections

Scales
H:1000, V1:200

Client Project No.

Project Number
17W003

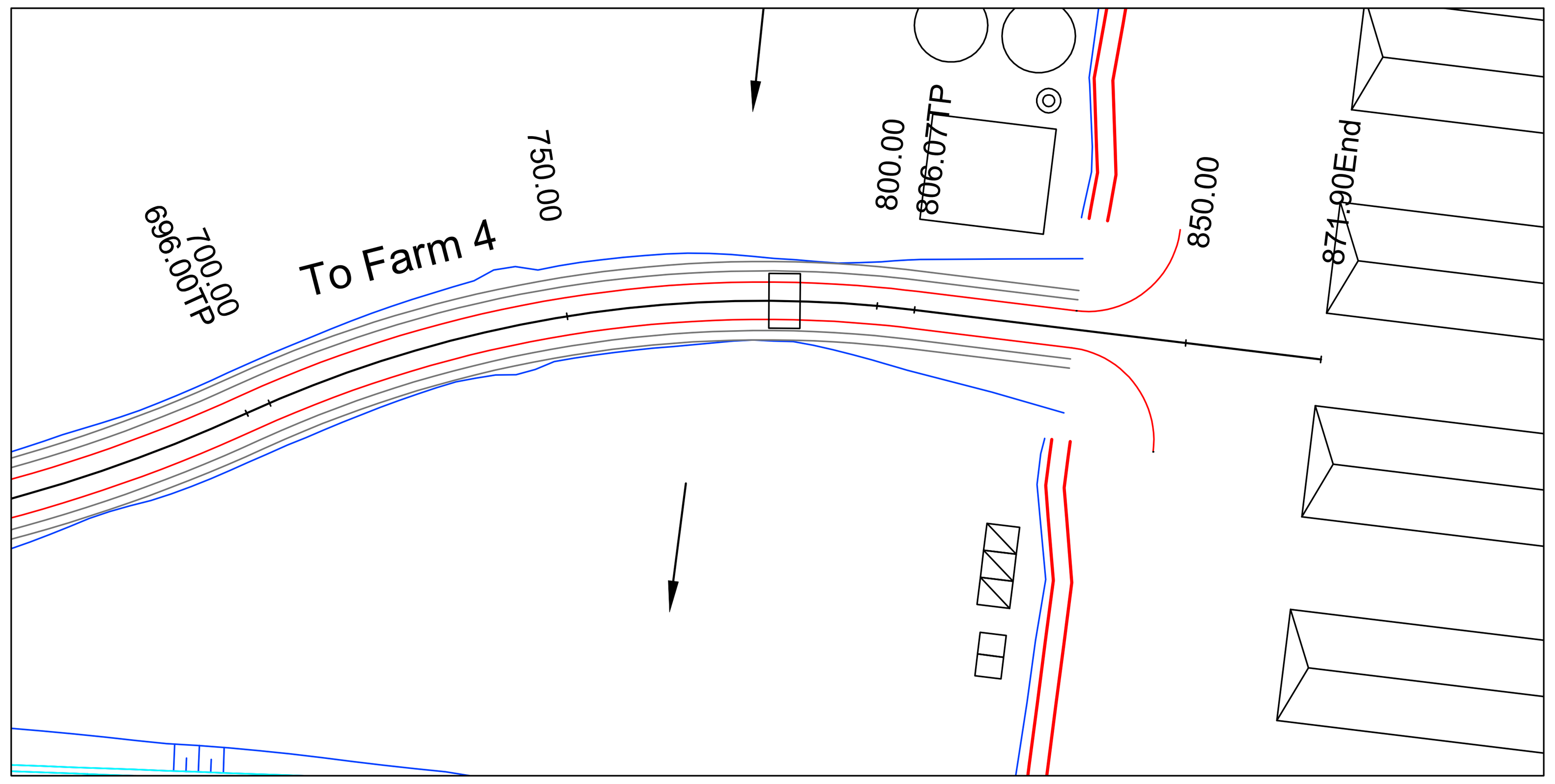
Dwg. No.
C49

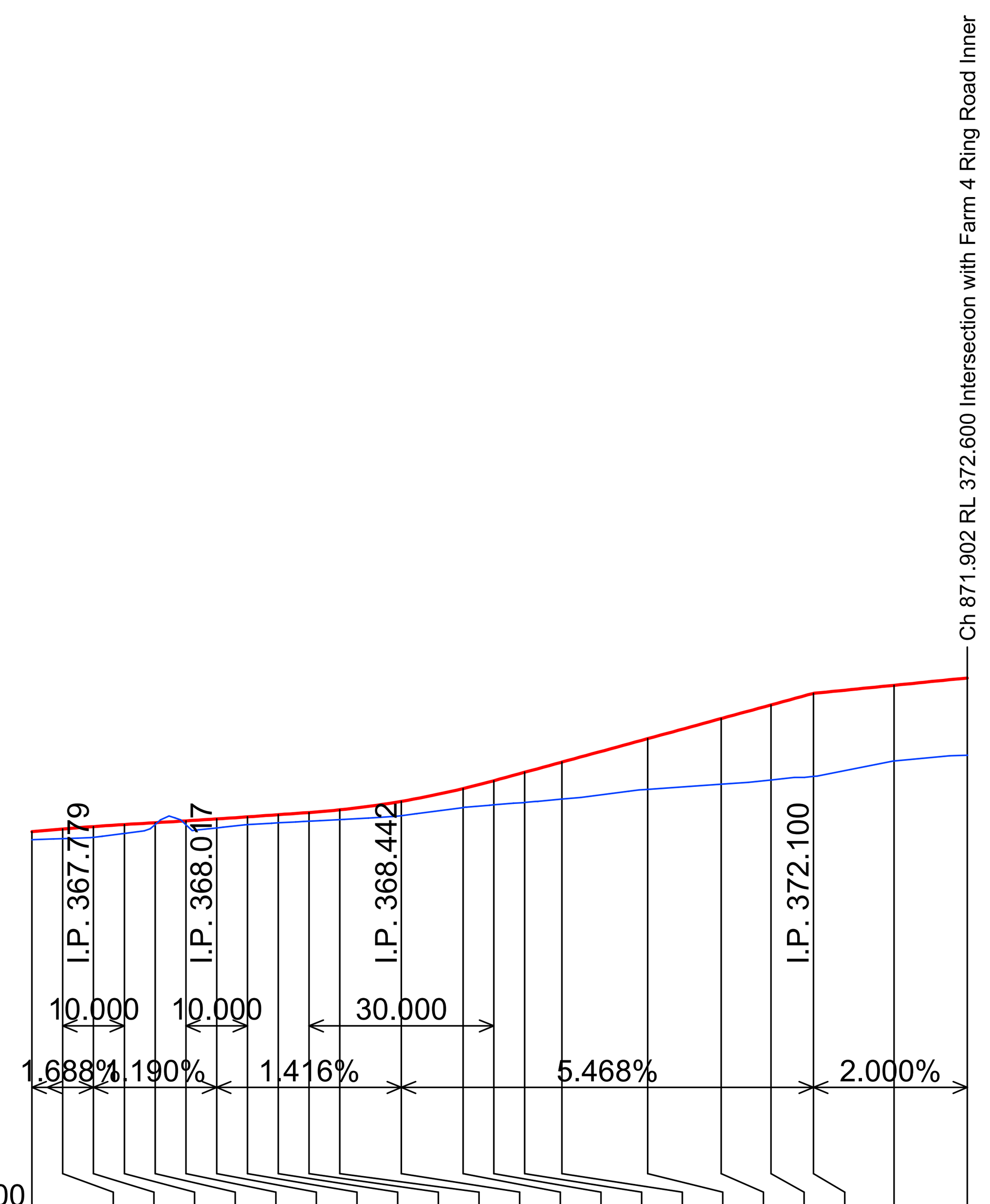
Sheet
49 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm





R.L. 355.300

Chainage	Design Surface	Existing Surface
720.000	367.610	367.347
725.000	367.695	367.382
730.000	367.773	367.425
735.000	367.838	367.552
740.000	367.898	367.839
745.000	367.957	367.831
750.000	368.020	367.732
755.000	368.088	367.837
760.000	368.159	367.894
765.000	368.229	367.949
770.000	368.317	368.002
780.000	368.594	368.127
790.000	369.005	368.392
795.000	369.262	368.478
800.000	369.535	368.555
806.066	369.867	368.665
820.000	370.629	368.980
831.913	371.280	369.148
840.000	371.722	369.288
846.912	372.100	369.401
860.000	372.362	369.908
871.902	372.600	370.089

SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

Access Road 4 From 720.000 to 871.902

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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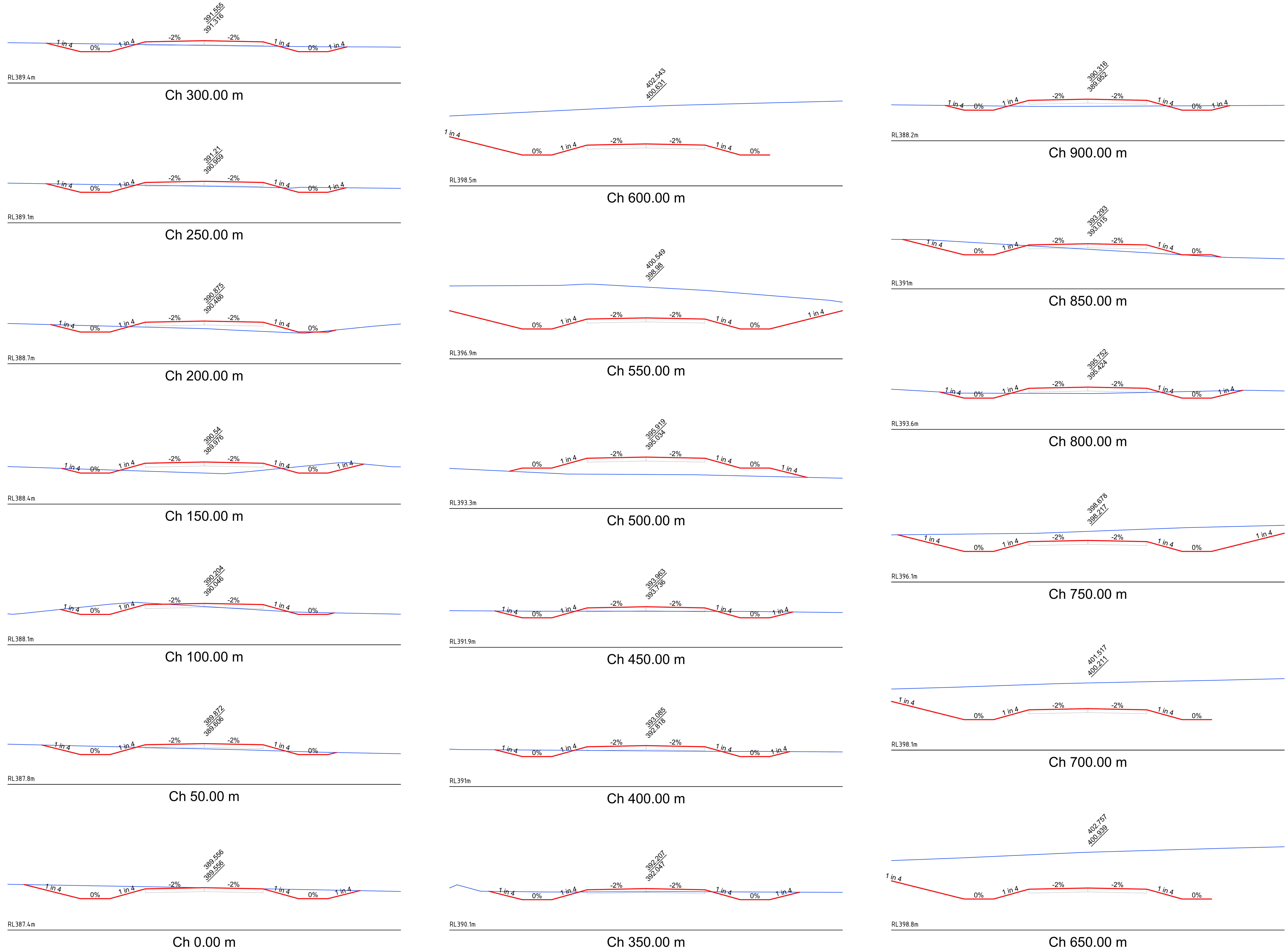
Project: ProTen Poultry Sheds, Rushes Creek, Tamworth
Client: ProTen
Architect / Project Manager: ProTen

Drawing Title: Access Road 4 Plan and Longsections
Scales: H:1000, V:1:200
Client Project No.:
Project Number: 17W003
Dwg. No.: C50
Sheet: 50 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm



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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 1
Cross Sections

Scales
H:100, V1:100

Client Project No.

Project Number
17W003

Dwg. No.
C51

Sheet
51 of 57

Revision
4

A1 SHEET

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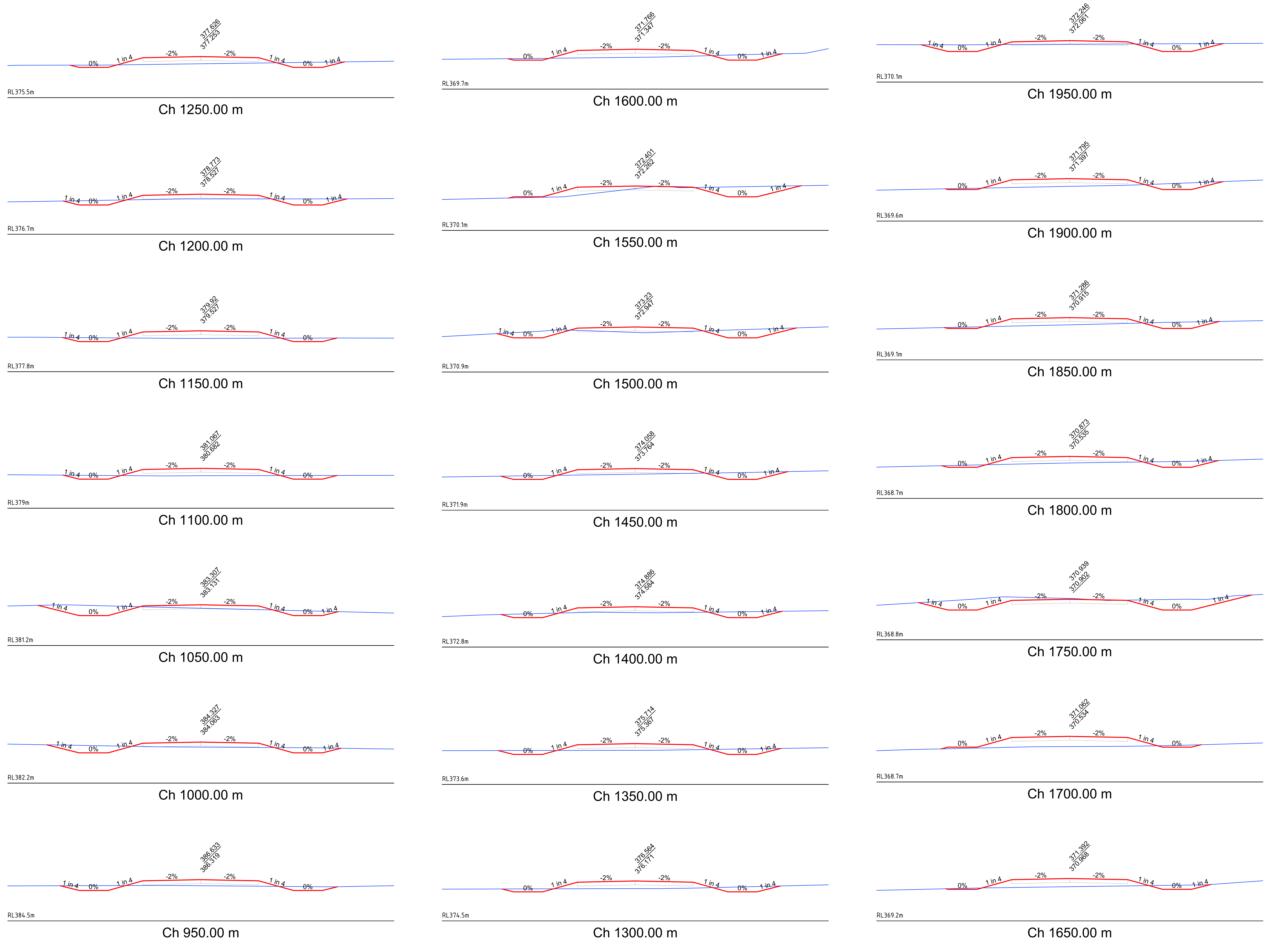

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Client
ProTen

Architect / Project Manager
ProTen

Drawing Title
Access Road 1
Cross Sections

Scales
H:100, V1:100

Client Project No.

Project Number	Dwg. No.	Sheet	Revision
17W003	C52	52 of 57	4

A1 SHEET

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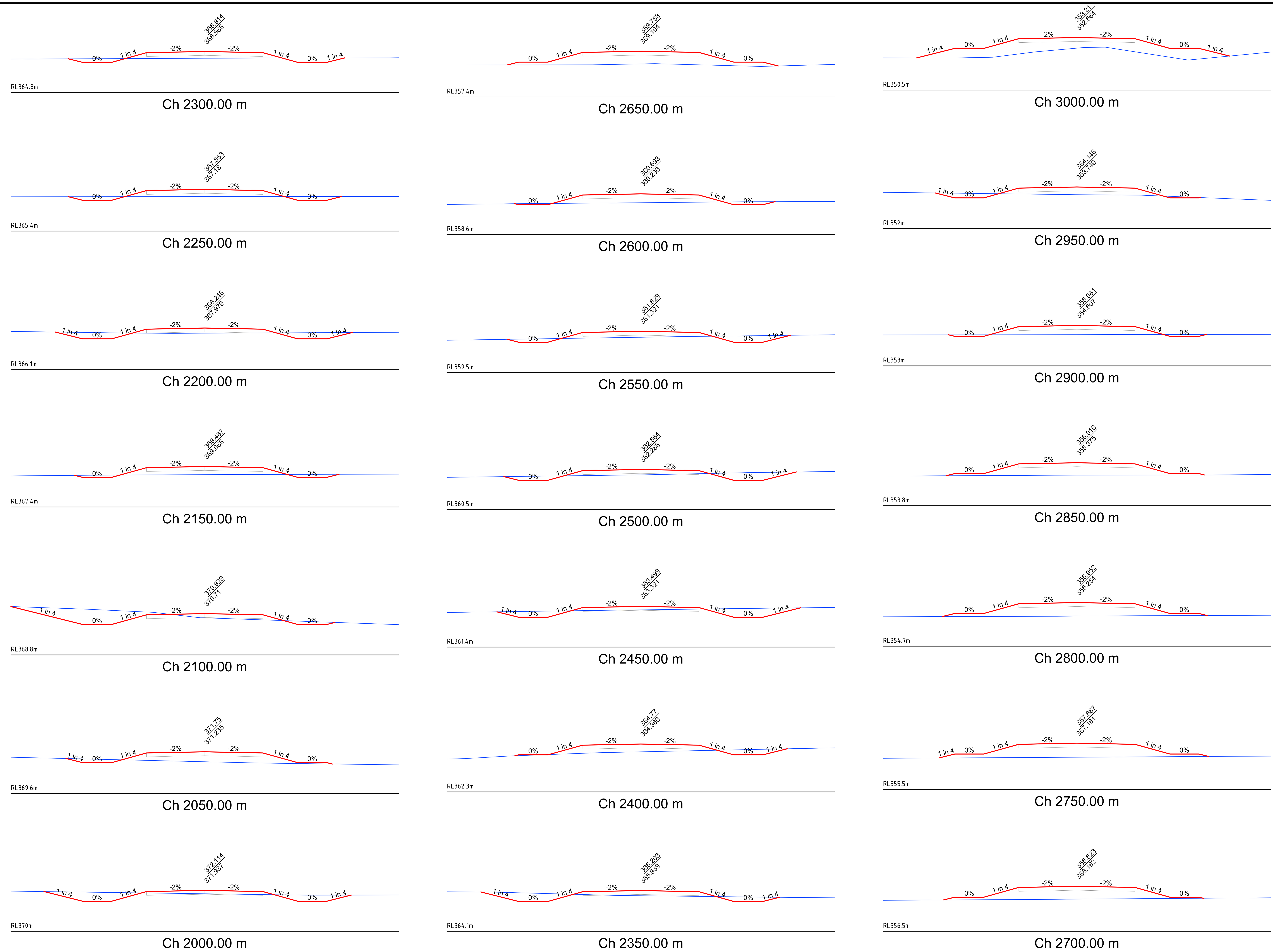

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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Client: ProTen

Architect / Project Manager: ProTen

Drawing Title: Access Road 1 Cross Sections

Scales: H:100, V1:100

Client Project No.:

Project Number: 17W003

Dwg. No.: C53

Sheet: 53 of 57

Revision: 4

A1 SHEET

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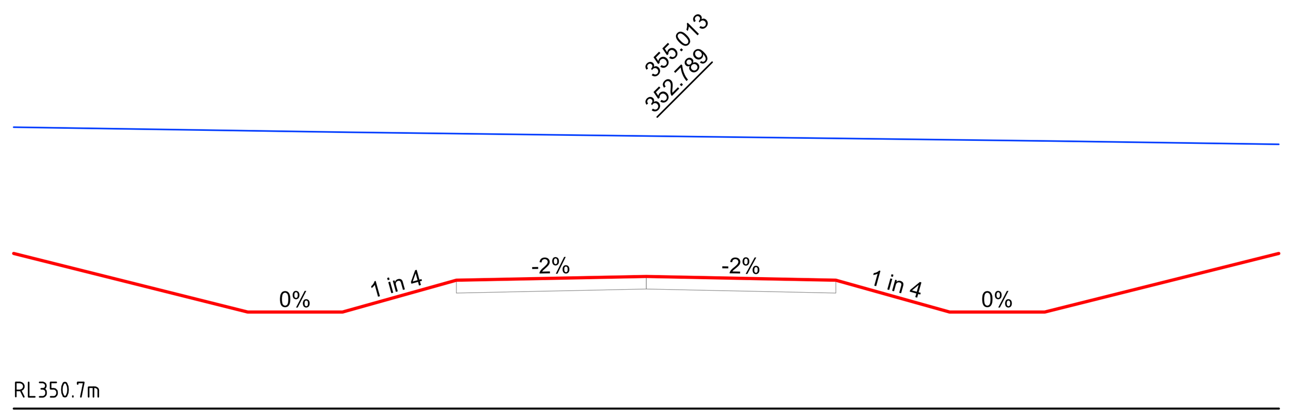
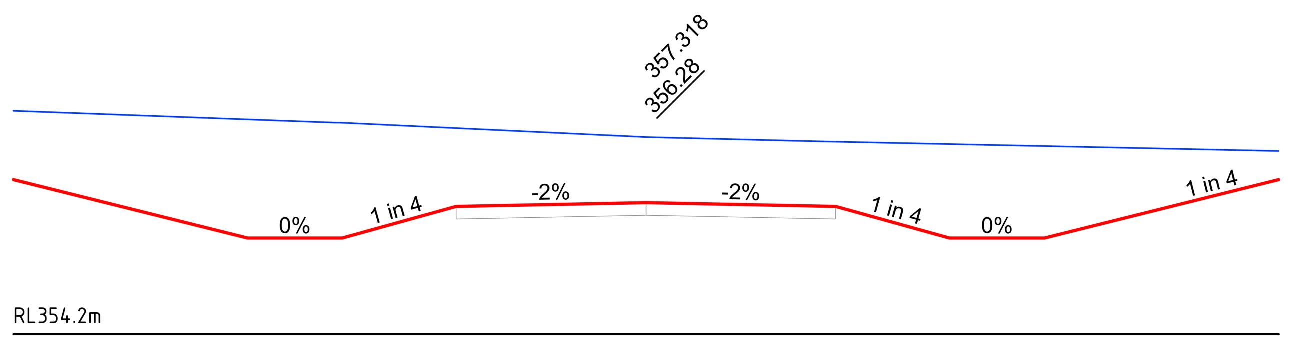
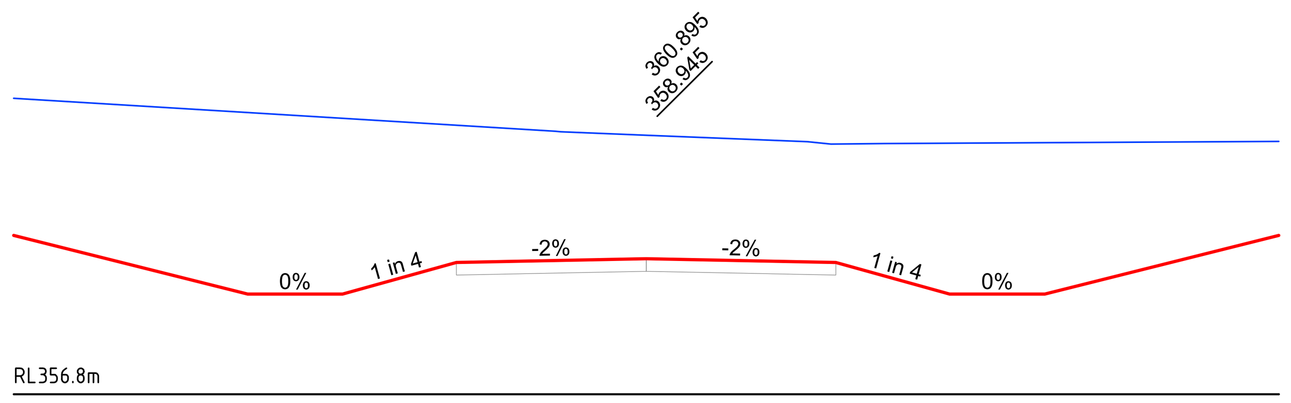


Ch 3300.00 m



Ch 3250.00 m



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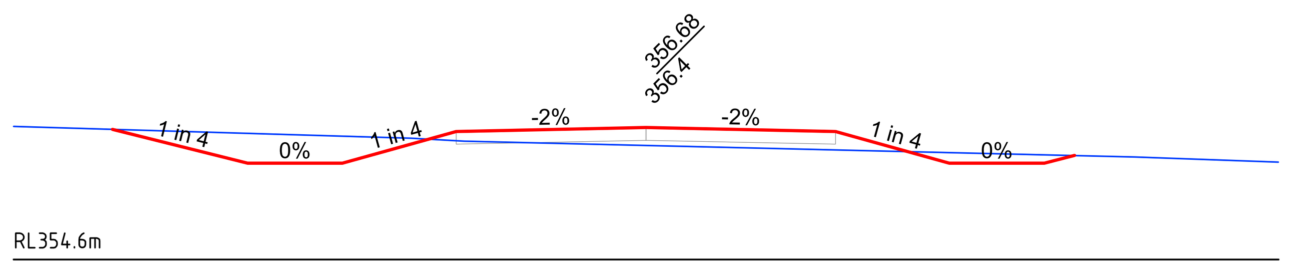

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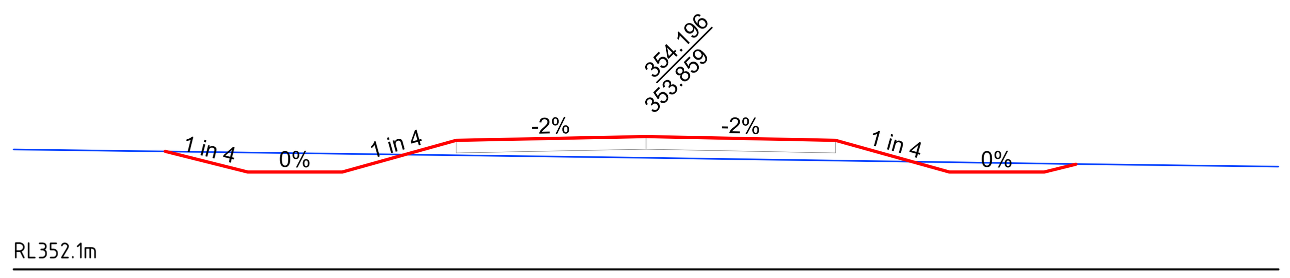
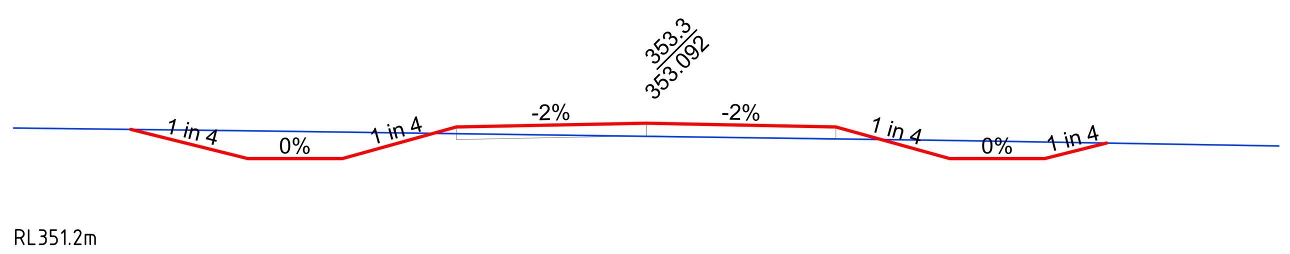


Ch 3100.00 m



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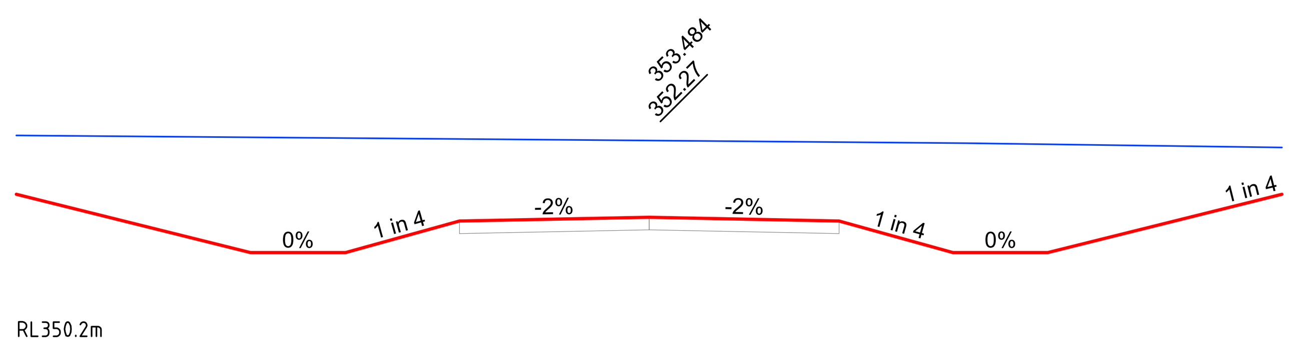

Ch 3339.69 m

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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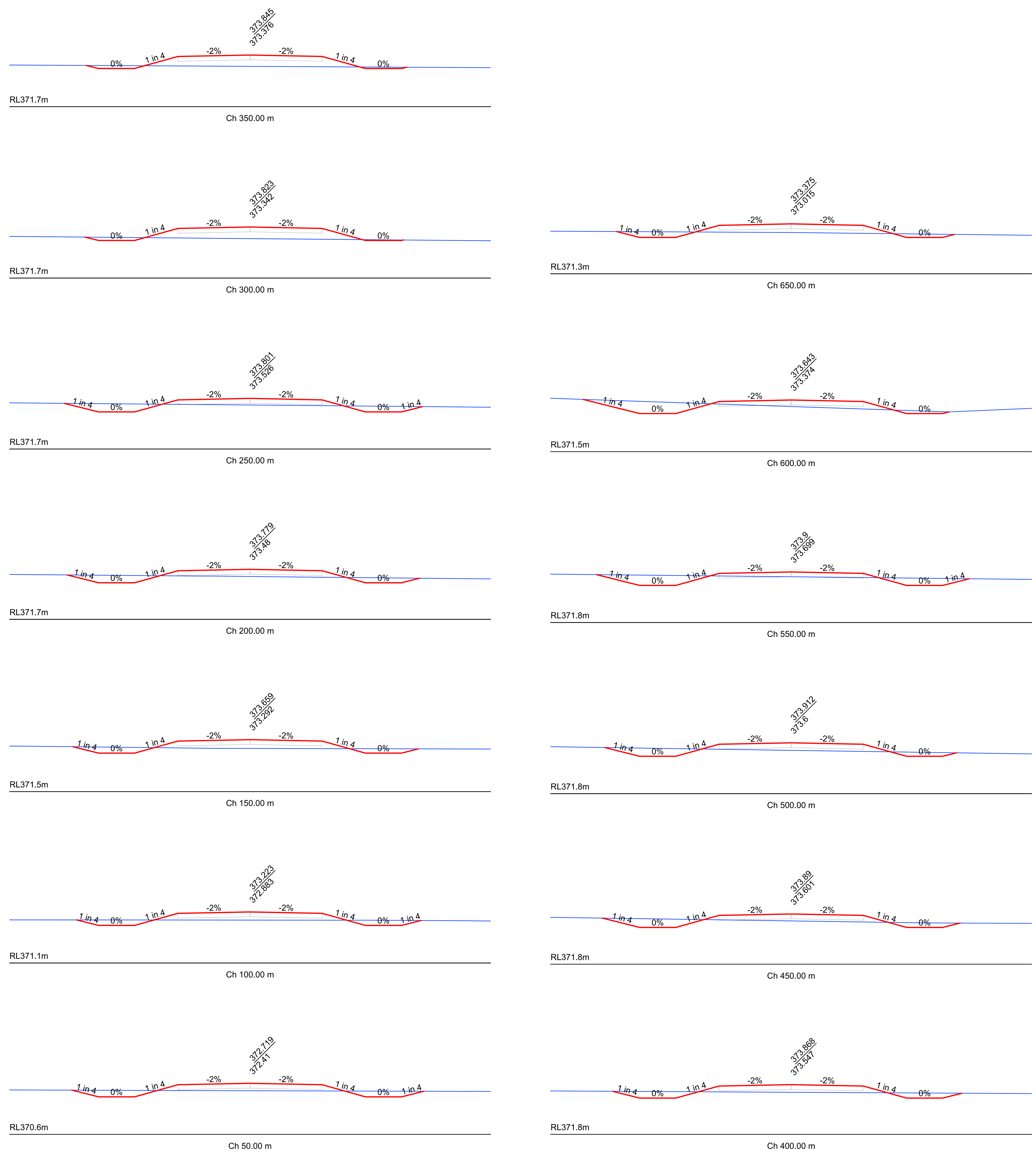
Project: ProTen Poultry Sheds, Rushes Creek, Tamworth
Drawing Title: Access Road 1 Cross Sections
Client: ProTen
Scales: H:100, V1:100
Client Project No.:
Architect / Project Manager: ProTen
Project Number: 17W003
Dwg. No.: C54
Sheet: 54 of 57
Revision: 4

A1 SHEET

0 100mm 200mm 300mm



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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project
ProTen Poultry Sheds
Rushes Creek
Tamworth

Drawing Title
Access Road 2
Cross Sections

Client
ProTen

Scales
H:100, V1:100

Client Project No.

Architect / Project Manager
ProTen

Project Number
17W003

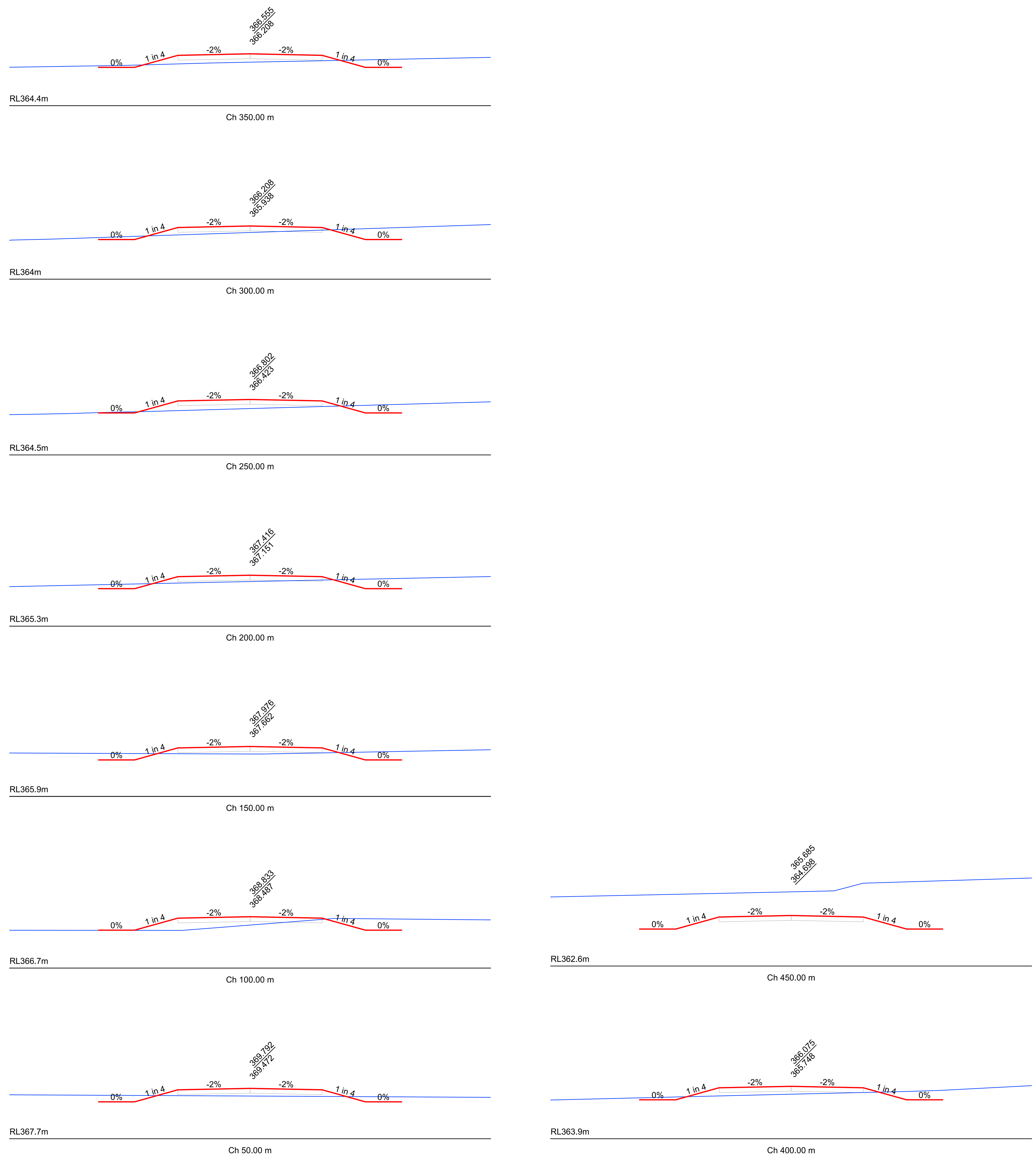
Dwg. No.
C55

Sheet
55 of 57

Revision
4

A1 SHEET

0 100mm 200mm 300mm



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4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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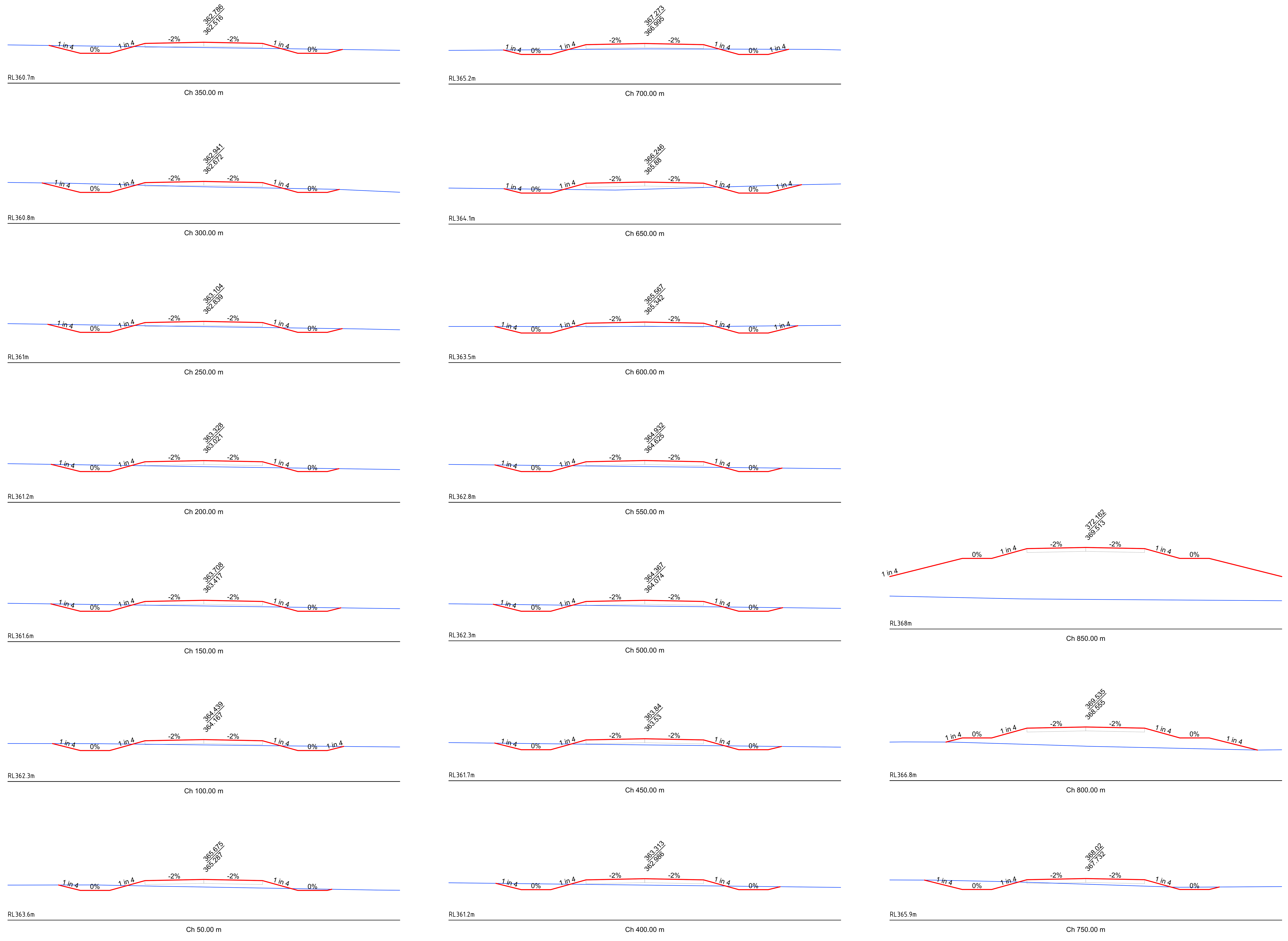
Project: ProTen Poultry Sheds, Rushes Creek, Tamworth
Client: ProTen
Architect / Project Manager: ProTen

Drawing Title: Access Road 3 Cross Sections
Scales: H:100, V1:100
Client Project No.:
Project Number: 17W003
Dwg. No.: C56
Sheet: 56 of 57
Revision: 4

A1 SHEET
0 100mm 200mm 300mm



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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Access Road 4 Cross Sections

Client: ProTen

Scales: H:100, V1:100

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: C57

Sheet: 57 of 57

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Quantities

- Farm 1 Sheds Cut = 9,090m³
- Farm 1 Sheds Fill = 56,014m³
- Farm 1 Ring Road Cut = 31,405m³
- Farm 1 Ring Road Fill = 29,110m³
- Farm 1 Retention Dam Cut = 28,424m³
- Farm 1 Retention Dam Fill = 2,666m³

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
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2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 1 - Quantities

Client: ProTen

Scales: NTS

Client Project No.

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: Q01

Sheet: 01 of 04

Revision: 4

A1 SHEET

0 100mm 200mm 300mm

Quantities

Red	Farm 1 Sheds Cut = 28,087m³
Blue	Farm 1 Sheds Fill = 59,446m³
Green	Farm 1 Ring Road Cut = 27,573m³
Orange	Farm 1 Ring Road Fill = 12,081m³
Magenta	Farm 1 Retention Dam Cut = 49,365m³
Cyan	Farm 1 Retention Dam Fill = 4,737m³

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 2 - Quantities

Client: ProTen

Architect / Project Manager: ProTen

Scales: NTS

Client Project No.:

Project Number: 17W003

Dwg. No.: Q02

Sheet: 02 of 04

Revision: 4

0 | 100mm | 200mm | 300mm

A1 SHEET

Quantities

Red	Farm 1 Sheds Cut = 27,811m³
Blue	Farm 1 Sheds Fill = 56,670m³
Green	Farm 1 Ring Road Cut = 35,960m³
Orange	Farm 1 Ring Road Fill = 34,484m³
Magenta	Farm 1 Retention Dam Cut = 50,402m³
Cyan	Farm 1 Retention Dam Fill = 1,041m³

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
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2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

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Project: ProTen Poultry Sheds, Rushes Creek, Tamworth

Drawing Title: Farm 3 - Quantities

Client: ProTen

Architect / Project Manager: ProTen

Scales: NTS

Client Project No.:

Project Number: 17W003

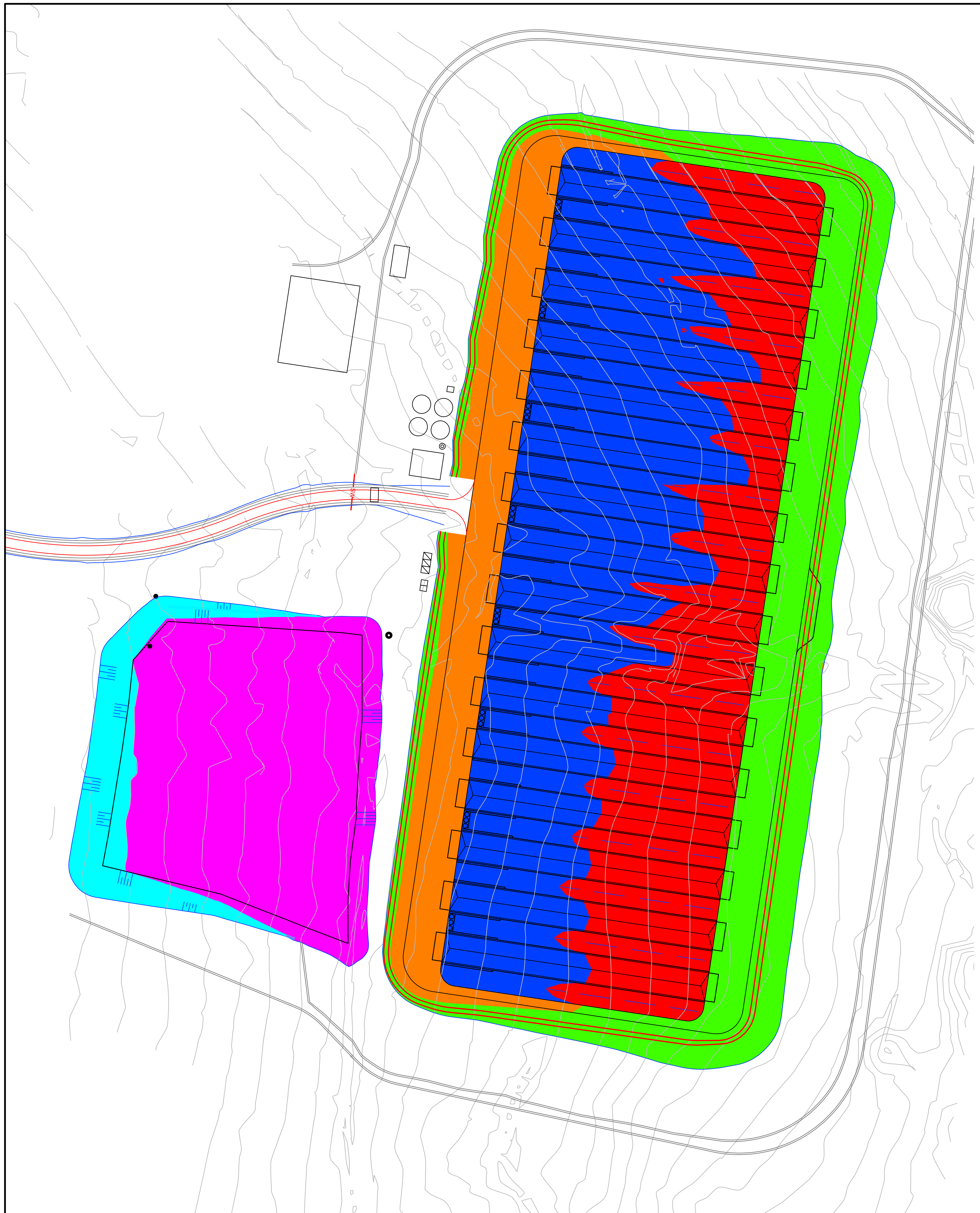
Dwg. No.: Q03

Sheet: 03 of 04

Revision: 4

A1 SHEET

0 100mm 200mm 300mm



Quantities

Red	Farm 1 Sheds Cut = 27,207m³
Blue	Farm 1 Sheds Fill = 64,977m³
Green	Farm 1 Ring Road Cut = 53,792m³
Orange	Farm 1 Ring Road Fill = 33,211m³
Magenta	Farm 1 Retention Dam Cut = 44,506m³
Cyan	Farm 1 Retention Dam Fill = 7,232m³

Revision	Amendment or reason for issue	Issue date	Drawing completed by	Designed & dwg. checked by	Verified by X = Not verified	Issue authorised (*)
4	Issued for Information	26.03.2019	L.V.R.	L.V.R.	L.V.R.	
3	Issued for Information - Cut and Fill	19.02.2019	L.V.R.	L.V.R.	L.V.R.	
2	Issued for Information - Road 3 and 4 Amended	23.08.2018	L.V.R.	L.V.R.	L.V.R.	
1	Issued for Information	15.05.2018	L.V.R.	L.V.R.	L.V.R.	

* Drawing Status
Warning: Unless there is an authorised Lance Ryan Consulting Engineers Pty. Ltd. signature at * , this drawing is not authorised for issue.

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Drawing Title: Farm 4 - Quantities

Client: ProTen

Scales: NTS

Client Project No.:

Architect / Project Manager: ProTen

Project Number: 17W003

Dwg. No.: Q04

Sheet: 04 of 04

Revision: 4

A1 SHEET

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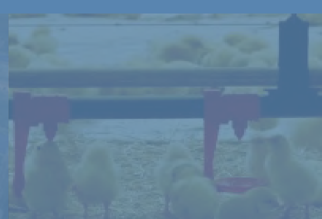
Appendix B

Detailed Site Investigation

(SLR Consulting Australia 2019a)



DETAILED SITE INVESTIGATION

Proposed Poultry Production Farm
Rushes Creek Road, Rushes Creek, NSW

Prepared for:

ProTen Tamworth Pty Ltd
PO Box 1746
North Sydney, NSW 2060

SLR Ref: 610.18456-R01
Version No: -v1.2
February 2019

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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 Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18456-R01-v1.1	29 January 2019	Junaidi Ibrahim	Ben Dewhurst	Ben Dewhurst
R10.18456-R01-v1.2	4 February 2019	Junaidi Ibrahim	Ben Dewhurst	

EXECUTIVE SUMMARY

SLR Consulting Pty Ltd (SLR) was engaged by ProTen Tamworth Pty Limited (ProTen) to undertake a Detailed Site Investigation (DSI) for the proposed poultry production farm located at Rushes Creek Road, Rushes Creek, NSW (the site). The investigation area within the site is currently vacant and is located beside an old abandoned sheep holding shed. The investigation area covers approximately 800 m^2, occupying a small portion of Lot 165 of Deposited Plan (DP) 752169.

Development on the site is proposed to include four individual poultry farms, eight new residential houses, and various other support/servicing infrastructure items. The Preliminary Site Investigation (PSI) report conducted by SLR (SLR 2018) concluded that an area of environmental concern (AEC) had been identified for the site (former sheep dip) and recommended that further investigation works be undertaken. Following exhibition of the Environmental Impact Statement (EIS) for the proposed poultry development, the Department of Planning and Environment (DPE) and the Environment Protection Authority (EPA) requested that a DSI be undertaken to assess the identified AEC prior to determination of the Development Application (DA).

The objectives of this DSI were as follows:

- To assess whether contamination is present within the vicinity of the former dip site at concentrations that could potentially impact human health and/or the environment and therefore preclude the use of the site for the proposed development;
- Where contamination is identified, delineate the extent; and
- To obtain sufficient information to develop a remedial action pan (RAP), if warranted.

To address the project objectives, SLR completed the following scope of works:

Initial round of intrusive works

- Excavation of 4 test-pits to confirm the location of the former sheep dip site;
- Collection of soil samples at each investigation location at near soil surface and at approximate 0.5m intervals to a maximum depth of 1.6 metres below ground level (mbgl);
- Backfilling of each test-pit in the reverse order of excavation;
- Analysis of selected soil samples for the identified contaminants of potential concern (pesticides and arsenic) at National Association of Testing Authorities (NATA) accredited laboratories; and
- Assessment of laboratory results.

Second round of intrusive works

- Following confirmation of the location of the former sheep dip (based on field observations and the detection of an elevated arsenic concentration in one sample from the initial assessment), excavation of an additional 17 test-pits within the vicinity of the former sheep dip to delineate potential contamination. Soil samples were collected at each investigation location at near soil surface (0.1-0.2 mbgl), at an intermediate depth (0.5-0.8 mbgl) and at the test pit base (0.9-1.3 mbgl);
- Backfilling of each test-pit in the reverse order of excavation;
- Analysis of selected soil samples for the identified contaminants of potential concern (pesticides and arsenic) at NATA accredited laboratories; and
- Assessment of laboratory results and preparation of this DSI report.

EXECUTIVE SUMMARY

Analytical results from this DSI indicate that arsenic in soil, likely to be associated with the former sheep dip, is elevated above the relevant soil health investigation level (HIL) for standard residential with garden/accessible soil (HIL-A) guideline value in the National Environmental Protection Council's *National Environmental Protection (Assessment of Site Contamination) Measure*, as amended in 2013 (NEPM 2013). Sampling has delineated the arsenic contamination to the north and south of the sheep dip, with low concentrations still exceeding the HIL-A guideline extending beyond the limit of the assessment to the east (assessment limited by the site shed) and to the west (with concentrations not expected to extend more than 10 metres west given the reducing concentrations from the source).

Based on the guidance provided in NEPM 2013, SLR considers that the arsenic in soils contamination at the site presents an unacceptable risk to present and future site users, particularly during the proposed site redevelopment. Therefore, the arsenic identified in soils at the site is considered to warrant remedial action.

On this basis, a remedial action plan (RAP) has been developed to accompany this DSI to guide the site's remediation in a manner that mitigates potential human health risks that may arise from development of the site. The RAP will ensure that remediation of the identified arsenic contamination at the site is undertaken in accordance with applicable legislation, codes of practice, and guidelines and ensure that the site is considered suitable for the proposed use.

CONTENTS

CONTENTS

DOCUMENT REFERENCES

FIGURES

TABLES

CONTENTS

APPENDICES

1 Introduction

SLR Consulting Pty Ltd (SLR) was engaged by ProTen Tamworth Pty Limited (ProTen) to undertake a Detailed Site Investigation (DSI) for the proposed poultry production farm located at Rushes Creek Road, Rushes Creek, NSW (the site).

The investigation area within the site is currently vacant and is beside an old abandoned sheep holding shed. The surface is unsealed with patches of grass and shrubs. The site is bounded by Rushes Creek Road to the east and Ski Gardens Road to the north. The investigation area covers approximately 800 m^2, occupying a small portion of Lot 165 of Deposited Plan (DP) 752169, which is one of the fourteen freehold lots comprising the proposed development site.

The site locality and site investigation area have been identified in **Figure 1** and **Figure 2**, respectively.

2 Background

SLR understands the following with respect to the proposed development:

- The development site is comprised of 14 registered freehold lots (or part lots) and one section of unformed Council public road; and
- Development on the site is proposed to include:
  - Four individual poultry farms, each comprising between 10 and 18 poultry sheds (total of 54 poultry sheds) and associated support/servicing infrastructure;
  - Eight new residential houses; and
  - Various other support/servicing infrastructure items.

The PSI report conducted by SLR titled '*Stage 1 Preliminary Site Investigation Proposed Poultry Production Farm Rushes Creek Road, Rushes Creek' dated July 2018* (SLR 2018) concluded that:

- An area of environmental concern (AEC) has been identified for the site (former sheep dip at Bundah); and
- Further investigation works are required.

Following exhibition of the Environmental Impact Statement (EIS), the Department of Planning and Environment (DPE) and the Environment Protection Authority (EPA) requested that a DSI be undertaken to assess the identified AEC prior to determination of the Development Application (DA).

3 Objectives

The objectives of this DSI were as follows:

- To assess whether contamination is present within the vicinity of the former dip site at concentrations that could potentially impact human health and/or the environment and therefore preclude the use of the site for the proposed development;
- Where contamination is identified, to delineate the extent; and
- To obtain sufficient information to develop a remedial action pan (RAP), if warranted.

4 Environmental Setting

4.1 Geology

The NSW Government *Manilla 1: 100,000 Geological Sheet 9036*, First edition, 2013, indicates that the site is likely to be underlain primarily by Upper Devonian Mandowa Mudstone, comprising thinly bedded laminated and massive mudstone with subordinate, thin siltstone and fine-grained sandstone beds.

4.2 Hydrogeology

The nearest significant surface water features to the AEC are:

- Rushes Creek, located approximately 614m to the east;
- Namoi River, located approximately 3.7km to the west and 2.3km to the north; and
- Lake Keepit, located approximately 3.1km to the west (dam full supply level).

A search of the NSW Government's online groundwater works database identified five registered groundwater bores within 500m of the AEC. The groundwater bore search and documents are presented in **Appendix B**, and the details are summarised in the table below.

Table 1 Groundwater boreholes within 500m of the investigation area

Borehole Number	Authorised/Intended Purpose	Final Depth	Salinity	Standing Water Level
GW009093	Not Known	8.5m	Brackish	-
GW011498	Not Known	24.4m	-	-
GW038206	Not Known	12.8m	-	-
GW967028	Stock	55m	-	17.3m
GW967889	Stock, Domestic	67m	-	14m

4.3 Topography

A review of the site's topography conducted using Google Earth topographical data suggests that the site is relatively flat, ranging between around 325 m Australian Height Datum (AHD) and 410m AHD, with typical grades of 2% (2m in every 100m). The investigation area has an elevation of approximately 373-374m AHD.

4.4 Acid Sulfate Soils

A review of the Australia Soil Resource Information System (ASRIS) indicated that there was no known occurrence of acid sulfate soils at or within the immediate vicinity of the site.

5 Conceptual Site Model

5.1 Site History

According to the PSI report on the property conducted by SLR (SLR 2018), prior to the recent purchase by ProTen, Ray Doyle owned the “Bundah” property, including Lot 165 in which the AEC is located, since around 1965. The property has been used for raising sheep and cattle, and growing wheat. A small number of free-range pigs were kept on the property, but not to the extent or practice of a piggery.

Former sheds on site were constructed from timber and iron. Fibrous cement sheeting was not used.

There is no anecdotal evidence to suggest that the sheep dip has been used after 1965, however, it is likely that it was used by a previous owner.

5.2 Area of Environmental Concern

Based on the findings from the PSI (SLR 2018), SLR considers the former sheep dip adjacent to the sheep holding yard as an AEC.

5.3 Contaminants of Potential Concern

Based on the findings from the PSI (SLR 2018), the following contaminants of potential concern (CoPC) were identified:

- Organochlorine and organophosphorus pesticides (OCP/OPP);
- Triazine pesticides, carbamate pesticides, and synthetic pyrethroids; and
- Arsenic.

5.4 Receptors and Pathways

5.4.1 Proposed Land Use Scenario

The proposed development in the vicinity of the AEC includes two new residential houses and 18 poultry sheds with associated ancillary servicing and support infrastructure. Based on this proposed land use scenario, it is considered reasonable to adopt guidance in relation to a residential with access to soil land use (considered the most conservative approach).

5.4.2 Human Health – Direct Contact

Given the potential surficial nature of the identified contamination, it is considered appropriate to assess whether a direct contact exposure risk for future land users may be present on the site.

5.4.3 Human Health – Inhalation/ Vapour Intrusion

The CoPC listed in **Section 5.3** above are not typically considered volatile in the context of land contamination and vapour inhalation/ intrusion. Further assessment of vapour inhalation/ intrusion exposure risk for future land users at the site is therefore not considered warranted.

5.4.4 Aesthetics

Visual evidence of widespread or significant staining or olfactory evidence of odours were not observed in the immediate vicinity of the sheep dip area.

6 Investigation Guidelines

To assess the significance of potential contamination concentrations in soil, reference will primarily be made to the National Environmental Protection Council's *National Environmental Protection (Assessment of Site Contamination) Measure*, as amended in 2013 (NEPM 2013) 'Schedule B1 – *Guideline on Investigation Levels for Soil and Groundwater*'. The NEPM 2013 guidelines provides a framework for the use of investigation and screening levels based on human health and ecological risks.

Soil health investigation levels (HILs) are scientifically based, generic assessment criteria designed to be used in the initial screening of data for assessment of potential risks to human health from chronic exposure to contaminants. The following HILs are referenced in the NEPM (2013) guidelines:

- HIL/HSL-A includes standard residential with garden/accessible soil;
- HIL/HSL-B includes residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
- HIL/HSL-C includes developed open space such as parks, playground, playing fields (e.g. ovals), secondary schools and footpaths; and
- HIL/HSL-D includes commercial/industrial premises such as shops, offices, factories and industrial sites.

In consideration of the site's proposed land use, soil investigation guideline values were selected based upon a residential (HIL-A) land use, which is considered to be the most conservative approach.

7 Scope of Works

7.1 Project Preliminaries

Prior to intrusive works at the site, SLR completed the following preliminary tasks:

- Preparation of a Safe Work Method Statement (SWMS) for the fieldwork undertaken;
- Completion of a Dial Before You Dig (DBYD) search for the site; and
- Service location of underground services using electromagnetic technology and/or non-destructive digging at each contamination assessment location.

7.2 Intrusive Works

Intrusive works at the site were undertaken in two separate mobilisations. The initial round of intrusive works was undertaken to identify and confirm the location of sheep dip and to provide an initial assessment of soils at the site. The second round of intrusive works was undertaken to delineate any identified soil contamination emanating from the former sheep dip.

7.2.1 Initial Round of Intrusive Works

The initial round of assessment included the following scope of works:

- Excavation of 4 test-pits across the investigation area, identified in **Figure 2**;
- Collection of soil samples at each investigation location at near soil surface and at approximate 0.5m intervals to a maximum depth of 1.6 metres below ground level (mbgl);
- Backfilling of each test-pit in the reverse order of excavation;
- Analysis of selected soil samples for the identified CoPC at National Association of Testing Authorities (NATA) accredited laboratories; and
- Assessment of laboratory results.

7.2.2 Second Round of Intrusive Works

The second round of intrusive works included the following scope of works:

- Excavation of 17 test-pits within the vicinity of the identified former sheep dip, as indicated on **Figure 2**. Test pits were located as follows:
  - Five test pits were located to the north of the identified sheep dip location (TP01-TP05);
  - Five test pits were located to the south of the identified sheep dip location (TP06-TP10);
  - Five test pits were located to the west of the identified sheep dip location (TP11-TP15); and
  - Two test pits were located to the east of the identified sheep dip location (TP16 and TP17). Only 2 test pits were able to be excavated to the east of the sheep dip location due to access restrictions caused by the site shed**.**

- Collection of soil samples at each investigation location at the near soil surface and at regular intervals thereafter. Samples were generally collected from surface (0.0-0.2 mbgl), mid depth (0.5-0.8 mbgl and base of the test pit (1.0-1.2 mbgl);
- Backfilling of each test-pit in the reverse order of excavation;
- Analysis of selected soil samples for the identified CoPC at NATA accredited laboratories. Analysis was undertaken as follows;
  - Initially, analysis was undertaken on samples from the 2 test pits located to the north (TP01 and TP02), to the south (TP06 and TP07), to the west (TP11 and TP12) and the 1 test pit closest to the east (TP16) for the full suite of CoCP listed in **Section 5.3**;
  - Following receipt of analytical results for these samples, additional arsenic analysis was undertaken on samples from the next test pit located to the north (TP03), to the south (TP08), to the west (TP13) and to the east (TP17) to assist in delineation of the identified arsenic;
  - Following receipt of analytical results for these samples, additional arsenic analysis was undertaken on samples from the next test pit located to the north (TP04), to the south (TP09) and to the west (TP14) to assist in delineation of the identified arsenic and
  - Following receipt of analytical results for these samples, additional arsenic analysis was undertaken on samples from the next test pit located to the north (TP05) and to the west (TP15) to assist in delineation of the identified arsenic.
- Assessment of laboratory results and preparation of this DSI report.

8 Quality Assurance and Quality Control

8.1 Location Records

The location of each sampling point was recorded by hand on a site plan and the sampling points have been presented in **Figure 2**.

8.2 Sample Identification, Storage and Transport Procedures

Samples were identified using unique sampling point identifiers and sample depth intervals (e.g. TP01_0.2).

Samples were placed in laboratory prepared containers, and sample containers were then placed directly into an insulated chest containing ice, for transportation to the laboratory with the chain of custody (COC) form recording the following information:

- Project number;
- Date of sampling;
- Sample identifier;
- Sample matrix and container type;
- Preservation methods used;
- Analysis requirements for each sample;
- Turnaround times required for analysis; and
- Names and signatures of sender and receiving laboratory.

Samples were transported to the laboratory with sufficient time to perform analysis within the applicable holding period.

8.3 Fieldwork Quality Assurance/Quality Control

8.3.1 Decontamination Procedures

Non-disposable sampling equipment was decontaminated before and between sampling events to reduce the potential for cross contamination to occur between samples. Decontamination included the following procedures:

- Washing non-disposable sampling equipment in a solution of phosphate free detergent (e.g. Decon 90) and potable water; and
- Rinsing with deionised water.

8.3.2 Intra-laboratory Duplicates

Intra-laboratory field duplicates were collected on an average frequency of one sample per twenty samples collected (5%), with a minimum of one per batch (excluding samples collected for asbestos analysis). The analytical results of the two spilt samples were compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The relative percentage difference (RPD) acceptance limits are summarised in **Table 2**.

8.3.3 Inter-laboratory Duplicates

Inter-laboratory field duplicates were collected on an average frequency of one sample per twenty samples collected (5%) with a minimum of one per batch (excluding samples collected for asbestos analysis). The analytical results of the two spilt samples were compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The RPD acceptance limits are summarised in **Table 2**.

8.3.4 Rinsate Samples

A rinsate sample was collected and analysed for each day of fieldwork carried out, where non-disposable sampling equipment has been used. The rinsate sample was analysed for generally the same contaminants of potential concern that the samples are being analysed for.

8.4 Laboratory Quality Assurance/Quality Control

8.4.1 Laboratory Selection

The primary (Eurofins Environmental Testing) and secondary (ALS Environmental) laboratories used for this project are NATA accredited for the analyses undertaken.

8.4.2 Laboratory Data Quality Indicators

The laboratory data quality was assessed by checking the following:

- Laboratory methods used are NATA accredited;
- Laboratory limits of reporting are less than adopted assessment criteria;
- Samples are extracted and analysed within holding times; and
- Results of method blanks, surrogate, lab control sample, spike recoveries, RPDs between primary and duplicate laboratory samples.

Data Quality Indicators (DQI) that were adopted for quality control samples have been outlined in the table below.

Table 2 Adopted DQIs for the Investigation

DQI Method	Accepted Results/Limits
Method Blank	Analytical Results < laboratory limit of reporting (LOR)
Surrogate % Recovery	50% - 150%
Lab Control Sample % Recovery	70% - 130%
Spike % Recovery	(70%-130% inorganics) & (60%-140% organics)
Relative Percentage Difference (RPD)	No limit – Analytical Results <10 times LOR, 50% Analytical Results, 10-20 times LOR, 30% Analytical Results >20 times LOR

Where results of laboratory quality control samples exceed the relevant adopted control limit, the laboratory is requested to assess the significance of the exceedance on the quality of the laboratory analytical data for the relevant batch.

9 Results

9.1 Field Observations

Field observations where intrusive works were undertaken have been summarised in the following sections. The lithology encountered is presented in soil test pit logs presented in **Appendix E**. Photographs taken during the assessment have been presented in **Appendix A**.

9.2 Sub-surface Lithology

The generalised lithology encountered at the site can be described as:

- Topsoil: Dark brown loam topsoil was generally encountered from surface to approximately 0.1m in depth. The topsoil was generally described to be soft, dry, with low plasticity, and with vegetation present at the surface;
- Silty Clay: From depths of 0.1m to 0.7m, silty clay soil was present and can be generally described as brown to reddish brown, soft, dry, with low plasticity, with presence of angular to sub-angular shale (10-30mm) at lower depths (0.5-0.7m); and
- Shale: From depths of 0.6m to 1.3m is the presence of angular to sub-angular shale (20-50mm). It is noted that excavator refusal was typically encountered at depths of 0.9m to 1.3m due to very stiff shale.

9.3 Soil Analytical Results

9.3.1 Initial Round of Intrusive Works

A tabulated summary of soil analytical results in comparison to adopted guideline values for the initial round of intrusive works has been presented in **Table 3** in **Appendix C**.

Analytical results from the initial round of sampling indicated the following:

- Organochlorine pesticides, organophosphorus pesticides, triazine pesticides, carbamate pesticides and synthetic pyrethroids were not detected above the laboratory limit of reporting (LOR); and
- Elevated arsenic was detected in sample TP04_0.1-0.2 (2,600 mg/kg) which exceeded the relevant HIL-A guideline value (100 mg/kg).

Based on the results of the initial round of sampling, the sheep dip location was confirmed as being adjacent to location TP04 (as indicated on **Figure 2**).

9.3.2 Second Round of Intrusive Works

Tabulated summaries of soil analytical results in comparison to adopted guideline values for the second round of intrusive works have been presented in **Tables 4-7** in **Appendix C**. Arsenic concentrations adjacent to the former sheep dip have been presented as concentration contours for the shallow, intermediate and deep ranges sampled on **Figures 3, 4** and **5** respectively.

As outlined in **Section 7.2.2**, analysis during the second round of intrusive works was initially undertaken on samples from the 2 test pits located to the north (TP01 and TP02), to the south (TP06 and TP07), to the west (TP11 and TP12) and the 1 test pit closest to the east (TP16) for the full suite of CoCP listed in **Section 5.3**. Analytical results from this round of analysis have been presented in **Table 4** in **Appendix C** and can be summarised as follows:

- Organochlorine pesticides, organophosphorus pesticides, triazine pesticides, carbamate pesticides and synthetic pyrethroids were not detected above the laboratory LOR with the exception of a trace concentration of a-BHC in sample TP06_0.2 (0.06 mg/kg); and
- Arsenic concentrations above the HIL-A guideline value (100 mg/kg) were detected in 15 of the 21 samples analysed with the highest concentration detected in surface sample TP11_0.2 (1,400 mg/kg).

Analytical results for additional arsenic analysis undertaken on samples from the next test pit located to the north (TP03), to the south (TP08), to the west (TP13) and to the east (TP17) have been presented in **Table 5** in **Appendix C** and can be summarised as follows;

- Arsenic concentrations above the HIL-A guideline value (100 mg/kg) were detected in 5 of the 12 samples analysed with the highest concentration detected in surface sample TP13_0.2 (790 mg/kg).

Analytical results for additional arsenic analysis undertaken on samples from the next test pit located to the north (TP04), to the south (TP09) and to the west (TP14) have been presented in **Table 6** in **Appendix C** and can be summarised as follows:

- Arsenic concentrations above the HIL-A guideline value (100 mg/kg) were detected in 3 of the 9 samples analysed with the highest concentration detected in surface sample TP14_0.2 (490 mg/kg); and
- Arsenic concentrations in the samples analysed from the test pit to the south (TP10) were below the HIL-A guideline value.

Analytical results for additional arsenic analysis undertaken on samples from the next test pit located to the north (TP05) and to the west (TP15) have been presented in **Table 7** in **Appendix C** and can be summarised as follows:

- An arsenic concentration above the HIL-A guideline value (100 mg/kg) was detected in 1 of the 6 samples analysed with 190 mg/kg detected in surface sample TP15_0.2; and
- Arsenic concentrations in the samples analysed from the test pit to the north (TP15) were below the HIL-A guideline value.

9.4 Quality Assurance and Quality Control

Tabulated results for all quality assurance and quality control samples have been presented as follows:

- **Table 8** and **Table 10** in **Appendix C** present quality QAQC data on laboratory duplicate and triplicate results for the first and second rounds of the intrusive assessments, respectively; and
- **Table 9** and **Table 11** in **Appendix C** provide the analytical results for the rinsate blank analysis undertaken for the first and second rounds of the intrusive assessments, respectively.

A review of all QAQC results did not identify any exceedances of the DQIs provided in **Table 2**. Therefore, the data is considered suitable to address the objectives of the assessment.

10 Conclusions and Recommendations

Analytical results from this DSI indicate that arsenic in soil, likely to be associated with the former sheep dip, is elevated above the relevant HIL-A guideline value. Sampling has delineated the arsenic contamination to the north and south of the sheep dip, with low concentrations still exceeding the HIL-A guideline extending beyond the limit of the assessment to the east (assessment limited by the site shed) and to the west (with concentrations not expected to extend more than 10 metres west given the reducing concentrations from the source).

Based on the guidance provided in NEPM 2013, SLR considers that the arsenic in soils contamination at the site presents an unacceptable risk to present and future site users, particularly during the proposed site redevelopment. Therefore, the arsenic identified in soils at the site is considered to warrant remedial action.

On this basis, a remedial action plan (RAP) has been developed to accompany this DSI to guide the site's remediation in a manner that mitigates potential human health risks that may arise from development of the site. The RAP will ensure that remediation of the identified arsenic contamination at the site is undertaken in accordance with applicable legislation, codes of practice, and guidelines and ensure that the site is considered suitable for the proposed use.

11 Limitations

This report is for the exclusive use of ProTen Tamworth Pty Limited. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR Consulting.

This report has been prepared based on the scope of services (see below). SLR Consulting cannot be held responsible to the Client and/or others for any matters outside the agreed scope of services. Other parties should not rely upon this report and should make their own enquiries and obtain independent advice in relation to such matters.

This report has been prepared by SLR Consulting with reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected (data, surveys, analyses, designs, plans and other information), which has been accepted in good faith as being accurate and valid.

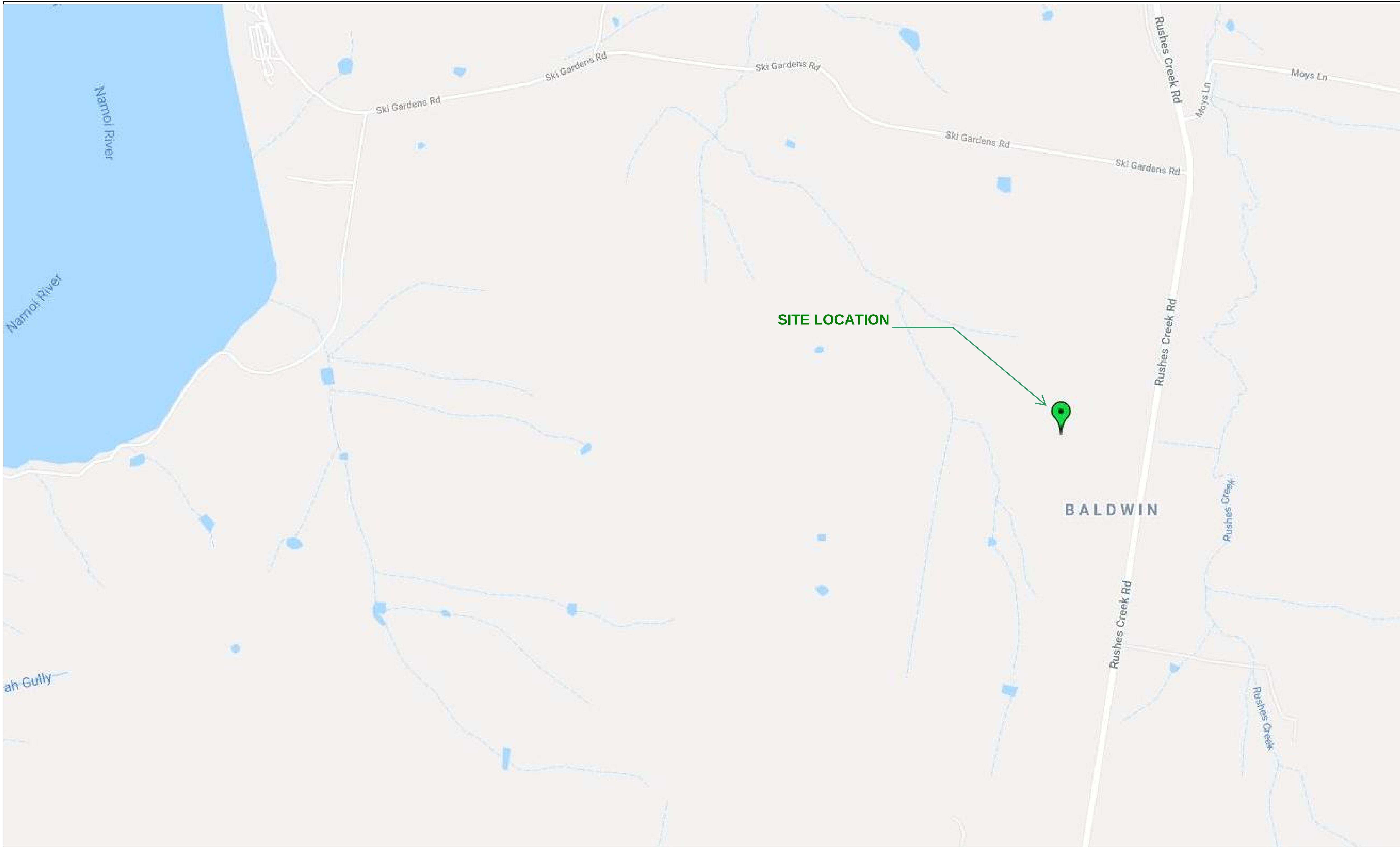
It should be noted that many investigations are based upon an assessment of potentially contaminating processes which may have occurred historically on the site. This assessment is based upon historical records associated with the site. Such records may be inaccurate, absent or contradictory. In addition documents may exist which are not readily available for public viewing.

Except where it has been stated in this report, SLR Consulting has not verified the accuracy or completeness of the data relied upon. Statements, opinions, facts, information, conclusions and/or recommendations made in this report (“conclusions”) are based in whole or part on the data obtained, those conclusions are contingent upon the accuracy and completeness of the data. SLR Consulting cannot be held liable should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to SLR Consulting leading to incorrect conclusions.

Should the report be reviewed for any reason, the report must be reviewed in its entirety and in conjunction with the associated Scope of Services. It should be understood that where a report has been developed for a specific purpose, for example a due diligence report for a property vendor, it may not be suitable for other purposes such as satisfying the needs of a purchaser or assessing contamination risks for classifying the site. The report should not be applied for any purpose other than that originally specified at the time the report was issued.

Report logs, figures, laboratory data, drawings, etc. are generated for this report by SLR consultants (unless otherwise stated) based on their individual interpretation of the site conditions at the time the site visit was undertaken. Although SLR consultants undergo training to achieve a standard of field reporting, individual interpretation still varies slightly. Information should not under any circumstances be redrawn for inclusion in other documents or separated from this report in any way.

FIGURES



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Detailed Site Investigation
Ref: 610.18456.00000

Proposed Poultry Production Farm
Rushes Creek Road, Rushes Creek, NSW

February 2019

N

Figure 1
Site Locality

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Detailed Site Investigation** Ref: 610.18456.00000	**Proposed Poultry Production Farm** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 2** **Site Layout**

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Detailed Site Investigation** Ref: 610.18456.00000	**Proposed Poultry Production Farm** **Rushes Creek Road, Rushes Creek, NSW**	February 2019		**Figure 3** **Site Contamination Delineation (0.1 - 0.2 metres)**

SLR

2 Lincoln Street,
Lane Cove,
NSW 2066
Australia

T: +61 2 9428 8100
sydney@slrconsulting.com
www.slrconsulting.com

Detailed Site Investigation

Ref: 610.18456.00000

Proposed Poultry Production Farm

Rushes Creek Road, Rushes Creek, NSW

February 2019

N

Figure 4
Site Contamination Delineation (0.6 – 0.8 metres)

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	Detailed Site Investigation Ref: 610.18456.00000	Proposed Poultry Production Farm Rushes Creek Road, Rushes Creek, NSW	February 2019	N	Figure 5 Site Contamination Delineation (0.9 – 1.3 metres)

APPENDIX A

Observation Photographs

Photograph 1 –View of sheep holding shed

Photograph 2 – View of potential sheep dip

Photograph 3 – View of potential sheep dip with reference to sheep holding shed

Photograph 4 – View of test-pit

Photograph 5 – Backfilling of test-pit

Photograph 6 – View of shed near the sheep holding shed

Notes:

SLR

610.18456.00000 Soil Contamination Assessment

Site:	RUSHES CREEK ROAD, RUSHES CREEK
Project:	DETAILED SITE INVESTIGATION
Date:	FEBRUARY 2019
Drawing:	**OBSERVATION PHOTOGRAPHS**

Appendix A

7

Photograph 7 – View of sheep dip location beside sheep holding shed

Photograph 8 – View of sheep dip

Photograph 9 – Test-pit to the west of sheep dip with high Arsenic concentration

Photograph 10 – Excavator working on test-pit between sheep dip and sheep holding shed

Photograph 11 – Excavated soil from test-pit

Photograph 12 – View of location of former sheep dip beside sheep holding shed after backfilling

Notes:

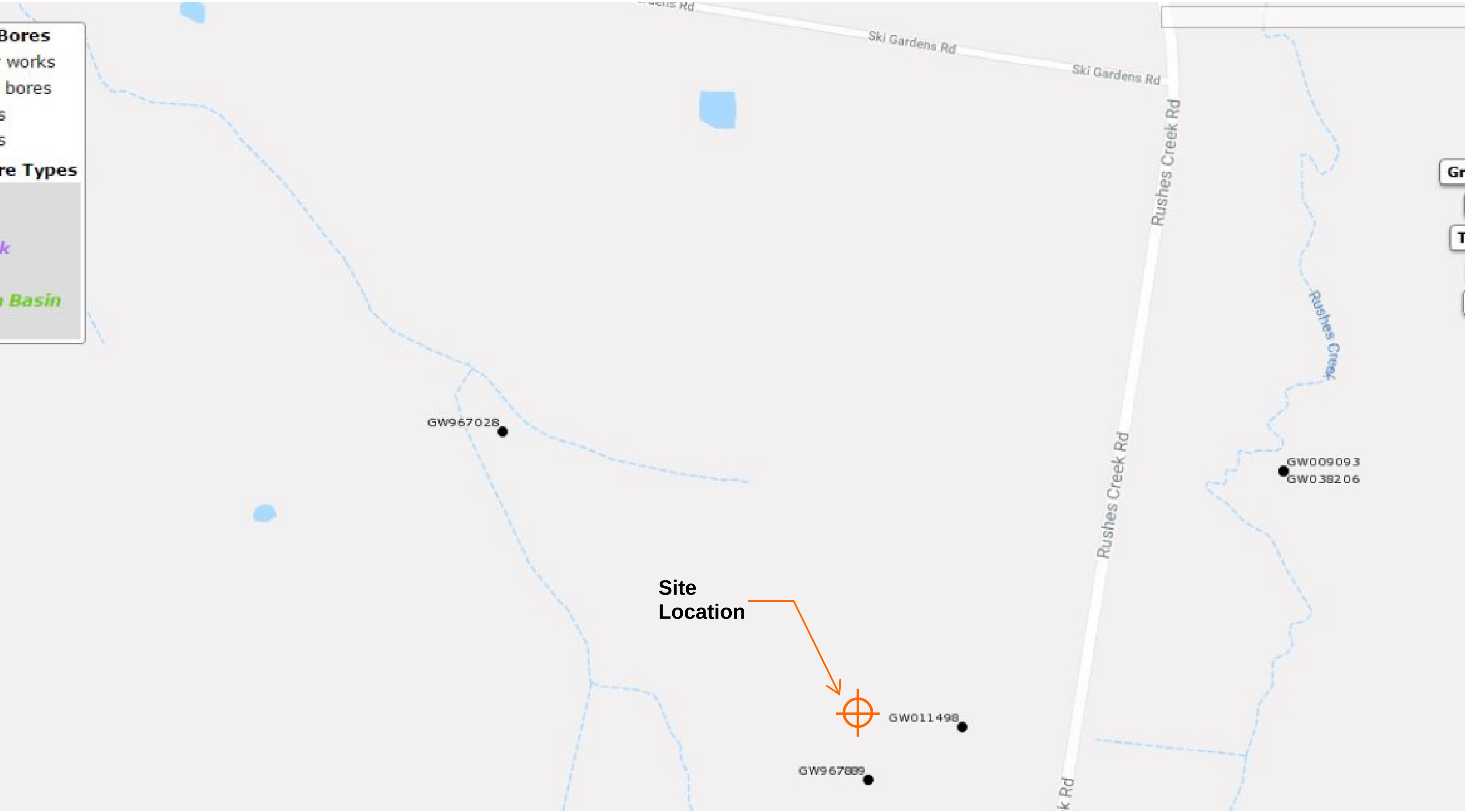
610.18456.00000 Soil Contamination Assessment

Site:	RUSHES CREEK ROAD, RUSHES CREEK
Project:	DETAILED SITE INVESTIGATION
Date:	FEBRUARY 2019
Drawing:	OBSERVATION PHOTOGRAPHS

Appendix A

APPENDIX B

Groundwater Borehole Search


Bores
works
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re Types
k
Basin
Ski Gardens Rd
Ski Gardens Rd
Rushes Creek Rd
Rushes Creek Rd
Rushes Creek
GW967028
GW009093
GW038206
Site Location
GW011498
GW967889

WaterNSW
Work Summary

GW009093

Licence:

Licence Status:

Authorised Purpose (s):
Intended Purpose(s): NOT KNOWN

Work Type: Well
Work Status:
Construct.Method:
Owner Type:

Commenced Date:
Completion Date:

Final Depth: 8.50 m
Drilled Depth:

Contractor Name: (None)
Driller:
Assistant Driller:

Property:
GWMA:
GW Zone:

Standing Water Level (m):
Salinity Description: Brackish
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	DARLING	BALDWIN	173
Licensed:			

Region: 90 - Barwon
CMA Map: 9036-3N

River Basin: 419 - NAMOI RIVER
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6588960.000
Easting: 270877.000
Latitude: 30°48'37.3"S
Longitude: 150°36'18.1"E

GS Map: -
MGA Zone: 56
Coordinate Source: GD.,ACC.MAP

***** End of GW009093 *****

WaterNSW
Work Summary

GW011498

Licence:

Licence Status:

Authorised Purpose (s):
Intended Purpose(s): NOT KNOWN

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Cable Tool
Owner Type: Private

Commenced Date:
Completion Date: 01/01/1954

Final Depth: 24.40 m
Drilled Depth:

Contractor Name: (None)
Driller:
Assistant Driller:

Property:
GWMA:
GW Zone:

Standing Water Level (m):
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	DARLING	BALDWIN	165
Licensed:			

Region: 90 - Barwon
River Basin: 419 - NAMOI RIVER
Area/District:

CMA Map: 9036-3N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)

Northing: 6588549.000
Easting: 270381.000

Latitude: 30°48'50.3"S
Longitude: 150°35'59.1"E

GS Map: -
MGA Zone: 56
Coordinate Source: GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1	1	Casing	Threaded Steel	0.00	24.40	152			Suspended in Clamps

***** End of GW011498 *****

WaterNSW
Work Summary

GW038206

Licence:

Licence Status:

Authorised Purpose (s):

Intended Purpose(s): NOT KNOWN

Work Type:

Work Status:

Construct.Method:

Owner Type:

Commenced Date:

Completion Date:

Final Depth:

Drilled Depth: 12.80 m

Contractor Name: (None)

Driller:

Assistant Driller:

Property:

GWMA:

GW Zone:

Standing Water Level (m):

Salinity Description:

Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	DARLING	BALDWIN	173
Licensed:			

Region: 90 - Barwon

CMA Map: 9036-3N

River Basin: 419 - NAMOI RIVER

Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)

Elevation Source: (Unknown)

Northing: 6588960.000

Easting: 270877.000

Latitude: 30°48'37.3"S

Longitude: 150°36'18.1"E

GS Map: -

MGA Zone: 56

Coordinate Source: GD.,ACC.MAP

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	10.97	10.97	Driller	(Unknown)	
10.97	12.80	1.83	Rock	Rock	

***** End of GW038206 *****

NSW Office of Water
Work Summary

GW967028

Licence: 90BL252504

Licence Status: CONVERTED

Authorised Purpose (s): STOCK
Intended Purpose(s): STOCK

Work Type: Bore
Work Status:
Construct.Method: Rotary - Percussion (Down Hole Hammer)
Owner Type:

Commenced Date:
Completion Date: 14/03/2005

Final Depth: 55.00 m
Drilled Depth: 55.00 m

Contractor Name: Mannion Drilling Pty Ltd
Driller: Leonard George Mannion
Assistant Driller:

Property: BUNDAH BUNDAH RUSHES CREEK ROAD MANILLA 2346
GWMA: -
GW Zone: -

Standing Water Level: 17.300
Salinity:
Yield: 1.250

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	DARLI	DARLI.2	171 752169
Licensed:	DARLING	BALDWIN	Whole Lot 171//752169

Region: 90 - Barwon
River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6588995.0
Easting: 269648.0

Latitude: 30�48'35.3"S
Longitude: 150�35'31.9"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	55.00	152			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	Pvc Class 9	-0.30	55.00	152	138		Seated on Bottom, Glued
1	1	Opening	Slots - Vertical	49.00	55.00	152		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 200.0mm, A: 3.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
45.00	45.30	0.30	Unknown	17.30		0.12			
47.00	48.00	1.00	Unknown	17.30		0.50			
51.00	52.00	1.00	Unknown	17.30		0.63		01:00:00	

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	topsoil	Topsoil	
0.30	2.00	1.70	blacksoil	Invalid Code	
2.00	5.00	3.00	clay	Clay	
5.00	15.00	10.00	shale/brown	Shale	
15.00	40.00	25.00	basalt/blue	Basalt	
40.00	43.00	3.00	limestone	Invalid Code	
43.00	45.00	2.00	basalt/blue	Basalt	
45.00	45.30	0.30	water bearing	Invalid Code	
45.30	47.00	1.70	basalt/blue	Basalt	
47.00	48.00	1.00	water bearing	Invalid Code	
48.00	51.00	3.00	basalt/blue	Basalt	
51.00	52.00	1.00	water bearing	Invalid Code	
52.00	55.00	3.00	basalt/blue	Basalt	

Remarks

14/03/2005: Form A Remarks:
Sump Installed from 52m to 55m
1m of Steel Casing Protector cemented in place

***** End of GW967028 *****

NSW Office of Water
Work Summary

GW967889

Licence: 90BL253750
Licence Status: CONVERTED

Authorised Purpose (s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary - Percussion (Down Hole Hammer)
Owner Type:

Commenced Date:
Completion Date: 17/01/2007
Final Depth: 67.00 m
Drilled Depth: 67.00 m

Contractor Name: GEORGE MANNION DRILLING
Driller: Randall George Mannion
Assistant Driller:

Property: BUNDAH RUSHES CREEK ROAD MANILLA 2346
GWMA: 024 - MISCELLANEOUS FRACTURED ROCK OF THE BARWON REGION
GW Zone: -
Standing Water Level: 14.000
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	DARLI	DARLI.2	165 752169
Licensed:	DARLING	BALDWIN	Whole Lot 165//752169

Region: 90 - Barwon
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6588462.0
Easting: 270236.0
Latitude: 30�48'53.0"S
Longitude: 150�35'53.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	67.00	152			Rotary - Percussion (Down Hole Hammer)
1	1	Casing	Pvc Class 9	-0.30	67.00	152			Seated on Bottom, Glued
1	1	Opening	Slots - Vertical	59.00	65.00	152		1	Casing - Hand Sawn Slot, PVC Class 9, SL: 200.0mm, A: 0.30mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
62.40	63.00	0.60	Unknown	14.00	62.00			02:00:00	

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	topsoil	Topsoil	
0.30	0.90	0.60	clay	Clay	
0.90	11.30	10.40	shale	Shale	
11.30	62.40	51.10	basalt	Basalt	
62.40	63.00	0.60	water bearing basalt	Invalid Code	
63.00	67.00	4.00	basalt	Basalt	

Remarks

***** End of GW967889 *****

APPENDIX C

Laboratory Analytical Summary Tables

			Metals								Synthetic Pyrethroids							
			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Allethrin	Baythroid	Phenothrin	Tetramethrin	Cypermethrins(total)	Fenvalerate	Permethrin	Resmethrin
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG	mg/kg	MG/KG	MG/KG	mg/kg	mg/kg	mg/kg	mg/kg
EQL			2	0.4	5	5	5	0.1	5	5	2	2	2	2	2	2	2	2
NEPM 2013 Table 1A(1) HILs Res A Soil			100	20		6,000	300	40	400	7,400								
Field ID	Date	Matrix																
TP01_0.2-0.4	30-10-2018	soil	14	<0.4	19	60	15	<0.1	22	80	<2	<2	<2	<2	<2	<2	<2	<2
TP01_0.5-0.6	30-10-2018	soil	9.7	<0.4	11	44	11	<0.1	14	70	<2	<2	<2	<2	<2	<2	<2	<2
TP01_1.3-1.5	30-10-2018	soil	7.4	<0.4	11	49	12	<0.1	15	80	<2	<2	<2	<2	<2	<2	<2	<2
TP02_0.2-0.3	30-10-2018	soil	28	<0.4	19	67	17	<0.1	22	91	<2	<2	<2	<2	<2	<2	<2	<2
TP02_0.4-0.5	30-10-2018	soil	9.9	<0.4	18	68	14	<0.1	23	100	<2	<2	<2	<2	<2	<2	<2	<2
TP02_0.9-1.0	30-10-2018	soil	2.2	<0.4	<5	21	5.0	<0.1	7.2	35	<2	<2	<2	<2	<2	<2	<2	<2
TP03_0.1-0.2	30-10-2018	soil	14	<0.4	17	52	14	<0.1	18	70	<2	<2	<2	<2	<2	<2	<2	<2
TP03_0.4-0.5	30-10-2018	soil	6.2	<0.4	10	42	10	<0.1	13	68	<2	<2	<2	<2	<2	<2	<2	<2
TP03_0.9-1.0	30-10-2018	soil	8.3	<0.4	12	52	11	<0.1	15	81	<2	<2	<2	<2	<2	<2	<2	<2
TP04_0.1-0.2	30-10-2018	soil	2,600	<0.4	17	55	25	0.2	14	270	<2	<2	<2	<2	<2	<2	<2	<2

			Triazines										Carbamate Pesticides						
			Ametryn	Atraton	Atrazine	Prometon	Prometryn	Propazine	Simazine	Simetryn	Terbutylazine	Terbutryn	Aldicarb	Bendiocarb	Carbaryl	Carbofuran	Methomyl	Oxamyl	Thiobencarb
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	2	2	2	2	2	2
NEPM 2013 Table 1A(1) HILs Res A Soil					320														
Field ID	Date	Matrix																	
TP01_0.2-0.4	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP01_0.5-0.6	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP01_1.3-1.5	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP02_0.2-0.3	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP02_0.4-0.5	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP02_0.9-1.0	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP03_0.1-0.2	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP03_0.4-0.5	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP03_0.9-1.0	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2
TP04_0.1-0.2	30-10-2018	soil	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2	<2	<2	<2	<2	<2

			Organochlorine Pesticides																								
			4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	d-BHC	chlordane	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endrin aldehyde	Endosulfan sulphate	Endrin ketone	Endrin	Heptachlor epoxide	Hexachlorobenzene	g-BHC (Lindane)	Heptachlor	Methoxychlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	1
NEPM 2013 Table 1A(1) HILs Res A Soil						6			50			240							10		10		6	300			20
Field ID	Date	Matrix																									
TP01_0.2-0.4	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP01_0.5-0.6	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP01_1.3-1.5	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_0.2-0.3	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_0.4-0.5	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_0.9-1.0	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP03_0.1-0.2	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP03_0.4-0.5	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP03_0.9-1.0	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP04_0.1-0.2	30-10-2018	soil	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1

			Organophosphorous Pesticides																
			Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 Table 1A(1) HILs Res A Soil						160													
Field ID	**Date**	**Matrix**																	
TP01_0.2-0.4	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_0.5-0.6	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_1.3-1.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.2-0.3	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.4-0.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.9-1.0	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.1-0.2	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.4-0.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.9-1.0	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP04_0.1-0.2	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

			Organophosphorous Pesticides																
			Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pirimiphos-methyl	Parathion	Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 Table 1A(1) HILs Res A Soil																			
Field ID	**Date**	**Matrix**																	
TP01_0.2-0.4	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_0.5-0.6	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_1.3-1.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.2-0.3	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.4-0.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.9-1.0	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.1-0.2	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.4-0.5	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP03_0.9-1.0	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP04_0.1-0.2	**30-10-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

SLR

			Metals							
			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			2	0.4	5	5	5	0.1	5	5
NEPM 2013 Table 1A(1) HILs Res A Soil			100	20		6,000	300	40	400	7,400
Field ID	Date	Matrix Type								
TP01_0.1	06-12-2018	soil	860	1.6	14	53	83	0.6	11	940
TP01_0.7	06-12-2018	soil	280	<0.4	12	46	12	<0.1	14	97
TP01_1.2	06-12-2018	soil	230	<0.4	9.4	46	15	<0.1	12	160
TP02_0.2	06-12-2018	soil	380	0.4	15	46	63	0.3	14	390
TP02_0.7	06-12-2018	soil	43	<0.4	9.8	39	8.5	<0.1	12	62
TP02_1.2	06-12-2018	soil	43	<0.4	9.4	28	14	<0.1	10	52
TP06_0.2	06-12-2018	soil	390	<0.4	14	53	42	0.3	13	220
TP06_0.6	06-12-2018	soil	26	<0.4	9.0	41	8.6	<0.1	12	68
TP06_1.1	06-12-2018	soil	25	<0.4	8.5	40	11	<0.1	12	73
TP07_0.2	06-12-2018	soil	310	<0.4	16	56	47	0.1	15	360
TP07_0.6	06-12-2018	soil	40	<0.4	13	47	12	<0.1	14	80
TP07_1.1	06-12-2018	soil	14	<0.4	9.4	46	12	<0.1	13	70
TP11_0.2	06-12-2018	soil	1,400	<0.4	18	53	22	<0.1	14	240
TP11_0.6	06-12-2018	soil	210	<0.4	12	53	12	<0.1	23	210
TP11_1.1	06-12-2018	soil	310	<0.4	11	46	15	<0.1	13	110
TP12_0.2	06-12-2018	soil	1,000	<0.4	16	49	22	0.3	13	190
TP12_0.6	06-12-2018	soil	120	<0.4	9.4	42	10	<0.1	15	77
TP12_1.1	06-12-2018	soil	460	<0.4	12	45	12	<0.1	13	110
TP16_0.2	06-12-2018	soil	780	<0.4	15	48	18	0.3	15	330
TP16_0.6	06-12-2018	soil	250	<0.4	13	53	12	0.2	14	95
TP16_1.1	06-12-2018	soil	180	<0.4	11	46	10	<0.1	12	81

	Synthetic Pyrethroids							
	Allethrin	Baythroid	Phenothrin	Tetramethrin	Cypermethrins(total)	Fenvalerate	Permethrin	Resmethrin
	MG/KG	mg/kg	MG/KG	MG/KG	mg/kg	mg/kg	mg/kg	mg/kg
EQL	2	2	2	2	2	2	2	2
NEPM 2013 Table 1A(1) HILs Res A Soil								
Field ID								
TP01_0.1	<2	<2	<2	<2	<2	<2	<2	<2
TP01_0.7	<2	<2	<2	<2	<2	<2	<2	<2
TP01_1.2	<2	<2	<2	<2	<2	<2	<2	<2
TP02_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP02_0.7	<2	<2	<2	<2	<2	<2	<2	<2
TP02_1.2	<2	<2	<2	<2	<2	<2	<2	<2
TP06_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP06_0.6	<2	<2	<2	<2	<2	<2	<2	<2
TP06_1.1	<2	<2	<2	<2	<2	<2	<2	<2
TP07_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP07_0.6	<2	<2	<2	<2	<2	<2	<2	<2
TP07_1.1	<2	<2	<2	<2	<2	<2	<2	<2
TP11_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP11_0.6	<2	<2	<2	<2	<2	<2	<2	<2
TP11_1.1	<2	<2	<2	<2	<2	<2	<2	<2
TP12_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP12_0.6	<2	<2	<2	<2	<2	<2	<2	<2
TP12_1.1	<2	<2	<2	<2	<2	<2	<2	<2
TP16_0.2	<2	<2	<2	<2	<2	<2	<2	<2
TP16_0.6	<2	<2	<2	<2	<2	<2	<2	<2
TP16_1.1	<2	<2	<2	<2	<2	<2	<2	<2

	Carbamate Pesticides						
	Aldicarb	Bendiocarb	Carbaryl	Carbofuran	Methomyl	Oxamyl	Thiobencarb
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	2	2	2	2	2	2	2
NEPM 2013 Table 1A(1) HILs Res A Soil							
Field ID							
TP01_0.1	<2	<2	<2	<2	<2	<2	<2
TP01_0.7	<2	<2	<2	<2	<2	<2	<2
TP01_1.2	<2	<2	<2	<2	<2	<2	<2
TP02_0.2	<2	<2	<2	<2	<2	<2	<2
TP02_0.7	<2	<2	<2	<2	<2	<2	<2
TP02_1.2	<2	<2	<2	<2	<2	<2	<2
TP06_0.2	<2	<2	<2	<2	<2	<2	<2
TP06_0.6	<2	<2	<2	<2	<2	<2	<2
TP06_1.1	<2	<2	<2	<2	<2	<2	<2
TP07_0.2	<2	<2	<2	<2	<2	<2	<2
TP07_0.6	<2	<2	<2	<2	<2	<2	<2
TP07_1.1	<2	<2	<2	<2	<2	<2	<2
TP11_0.2	<2	<2	<2	<2	<2	<2	<2
TP11_0.6	<2	<2	<2	<2	<2	<2	<2
TP11_1.1	<2	<2	<2	<2	<2	<2	<2
TP12_0.2	<2	<2	<2	<2	<2	<2	<2
TP12_0.6	<2	<2	<2	<2	<2	<2	<2
TP12_1.1	<2	<2	<2	<2	<2	<2	<2
TP16_0.2	<2	<2	<2	<2	<2	<2	<2
TP16_0.6	<2	<2	<2	<2	<2	<2	<2
TP16_1.1	<2	<2	<2	<2	<2	<2	<2

	Triazenes									
	Ametryn	Atraton	Atrazine	Prometon	Prometryn	Propazine	Simazine	Simetryn	Terbutylazine	Terbutryn
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 Table 1A(1) HILs Res A Soil			320							
Field ID										
TP01_0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_0.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_1.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

			Organochlorine Pesticides																								
			4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	d-BHC	chlordane	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endrin aldehyde	Endosulfan sulphate	Endrin ketone	Endrin	Heptachlor epoxide	Hexachlorobenzene	g-BHC (Lindane)	Methoxychlor	Heptachlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	1
NEPM 2013 Table 1A(1) HILs Res A Soil						6			50			240							10		10		300	6			20
Field ID	**Date**	**Matrix Type**																									
TP01_0.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP01_0.7	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP01_1.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_0.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_0.7	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP02_1.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP06_0.2	**06-12-2018**	**soil**	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP06_0.6	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP06_1.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP07_0.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP07_0.6	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP07_1.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP11_0.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP11_0.6	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP11_1.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP12_0.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP12_0.6	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP12_1.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP16_0.2	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP16_0.6	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1
TP16_1.1	**06-12-2018**	**soil**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1

			Organophosphorous Pesticides																																	
			Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pirimiphos-methyl	Pyrazophos	Parathion	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 Table 1A(1) HILs Res A Soil						160																														
Field ID	**Date**	**Matrix Type**																																		
TP01_0.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_0.7	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP01_1.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_0.7	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP02_1.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_0.6	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP06_1.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_0.6	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP07_1.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_0.6	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_1.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_0.6	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_1.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_0.2	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_0.6	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_1.1	**06-12-2018**	**soil**	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Table 5: Round 2 of the 2nd Round of Intrusive Works

			Metals
			Arsenic
			mg/kg
EQL			2
NEPM 2013 Table 1A(1) HILs Res A Soil			100
Field ID	**Date**	**Matrix Type**	
TP03_0.2	**06-12-2018**	**soil**	290
TP03_0.6	**06-12-2018**	**soil**	17
TP03_1.1	**06-12-2018**	**soil**	17
TP08_0.1	**06-12-2018**	**soil**	130
TP08_0.5	**06-12-2018**	**soil**	30
TP08_1.0	**06-12-2018**	**soil**	13
TP13_0.2	**06-12-2018**	**soil**	790
TP13_0.6	**06-12-2018**	**soil**	100
TP13_1.0	**06-12-2018**	**soil**	130
TP17_0.1	**06-12-2018**	**soil**	570
TP17_0.8	**06-12-2018**	**soil**	35
TP17_1.2	**06-12-2018**	**soil**	15

Table 6: Round 3 of the 2nd Round of Intrusive Works

			Metals
			Arsenic
			mg/kg
EQL			2
NEPM 2013 Table 1A(1) HILs Res A Soil			100
Field ID	**Date**	**Matrix Type**	
TP04_0.2	**06-12-2018**	**soil**	140
TP04_0.7	**06-12-2018**	**soil**	20
TP04_1.1	**06-12-2018**	**soil**	3.6
TP09_0.1	**06-12-2018**	**soil**	39
TP09_0.5	**06-12-2018**	**soil**	7.2
TP09_0.9	**06-12-2018**	**soil**	2.3
TP14_0.2	**06-12-2018**	**soil**	490
TP14_0.6	**06-12-2018**	**soil**	140
TP14_1.1	**06-12-2018**	**soil**	21

Table 7: Round 4 of 2nd Round of Intrusive Works

			Metals
			Arsenic
			mg/kg
EQL			2
NEPM 2013 Table 1A(1) HILs Res A Soil			100
Field ID	**Date**	**Matrix Type**	
TP05_0.2	**06-12-2018**	**soil**	62
TP05_0.6	**06-12-2018**	**soil**	6.3
TP05_1.1	**06-12-2018**	**soil**	5.0
TP15_0.2	**06-12-2018**	**soil**	190
TP15_0.7	**06-12-2018**	**soil**	19
TP15_1.2	**06-12-2018**	**soil**	19

Field or Interlab Duplicates

				Inorganics	Metals								Synthetic Pyrethroids								
				Moisture Content (dried @ 103°C)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Allethrin	Baythroid	Deltamethrin & Tralomethrin	Phenothrin	Tau-fluvalinate	Tetramethrin	Transfluthrin	Chlordane (trans)	Chlordane (cis)
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG	mg/kg	mg/kg	MG/KG	mg/kg	MG/KG	mg/kg	mg/kg	mg/kg
EQL				1	2	0.4	2	5	5	0.1	2	5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	16	14	<0.4	17	52	14	<0.1	18	70	<2	<2	-	<2	-	<2	-	-	-
625300	**QC1**	**soil**	**30-10-2018**	16	17	<0.4	20	67	16	<0.1	23	96	<2	<2	-	<2	-	<2	-	-	-
RPD				0	19	0	16	25	13	0	24	31	0	0	-	0	-	0	-	-	-
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	16	14	<0.4	17	52	14	<0.1	18	70	<2	<2	-	<2	-	<2	-	-	-
ES1832597	**QC2**	**soil**	**30-10-2018**	-	7	<1	17	48	13	<0.1	16	63	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	67	0	0	8	7	0	12	11	0	0	-	0	-	0	-	-	-

Field or Interlab Duplicates

				Organochlorine Pesticides																	
				Endosulfan	**4,4-DDE**	**a-BHC**	**Aldrin + Dieldrin**	**Aldrin**	**b-BHC**	**chlordane**	**d-BHC**	**DDD**	**DDT**	**DDT+DDE+DDD**	**Dieldrin**	**Endosulfan I**	**Endosulfan II**	**Endrin aldehyde**	**Endosulfan sulphate**	**Endrin ketone**	**Endrin**
				mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
EQL				0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
625300	**QC1**	**soil**	**30-10-2018**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1832597	**QC2**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field or Interlab Duplicates

Lab Report Number	Field ID	Matrix Type	Date	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene	Bromophos-ethyl	Carbophenothion	Prothiofos	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.05	0.05	0.05	0.1	0.1	1	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	2	0.2	0.2
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
625300	**QC1**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				0	0	0	0	0	0	0	-	-	-	0	0	0	0	0	0	0	0
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
ES1832597	**QC2**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	<0.2	-	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	-	-
RPD				0	0	0	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-

Field or Interlab Duplicates

				Organophosphorous Pesticides																	
				Diazinon	**Dichlorvos**	**Dimethoate**	**Disulfoton**	**EPN**	**Ethion**	**Ethoprop**	**Fenitrothion**	**Fensulfothion**	**Fenthion**	**Malathion**	**Merphos**	**Methyl parathion**	**Mevinphos (Phosdrin)**	**Monocrotophos**	**Naled (Dibrom)**	**Omethoate**	**Phorate**
				mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
EQL				0.05	0.05	0.05	0.2	0.2	0.05	0.2	0.2	0.2	0.05	0.05	0.2	0.2	0.2	0.2	0.2	2	0.2
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
625300	**QC1**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
ES1832597	**QC2**	**soil**	**30-10-2018**	<0.05	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	<0.05	-	<0.2	-	<0.2	-	-	-
RPD				0	0	0	-	-	0	-	-	-	0	0	-	0	-	0	-	-	-

Field or Interlab Duplicates

										Herbicides										Halogenated Benzenes
				Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate	Ametryn	Atraton	Atrazine	Prometon	Prometryn	Propazine	Simazine	Simetryn	Terbutryn	Thiobencarb	Hexachlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.05	0.2	0.2	0.2	0.05	0.2	0.2	2	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																	
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
625300	**QC1**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
ES1832597	**QC2**	**soil**	**30-10-2018**	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05
RPD				-	-	-	-	-	-	-	-	0	-	-	-	0	-	-	-	0

Field or Interlab Duplicates

				Pesticides																	
				3-Hydroxy Carbofuran	Aldicarb	Bendiocarb	Bifenthrin	Bioresmethrin	Carbaryl	Carbofuran	Cyhalothrin/Karate	Cypermethrins(total)	Fenvalerate	Fenvalverate & Esfenvalerate	Methomyl	Oxamyl	Permethrin	Resmethrin	Thiodicarb	Demeton-S-methyl	Fenamiphos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.05	0.05	2	0.05	0.02	0.02	0.05	2	0.02	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
625300	**QC1**	**soil**	**30-10-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	0	0	-	-	0	0	-	0	0	-	0	0	0	0	-	-	-
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
ES1832597	**QC2**	**soil**	**30-10-2018**	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	-	<0.05	<0.02	<0.02	<0.05	-	<0.02	<0.05	<0.05
RPD				-	0	0	-	-	0	0	-	0	-	-	0	0	0	-	-	-	-

Field or Interlab Duplicates

							Carbamates	Organic	SVOCs
				Pirimphos-ethyl	Parathion	Pirimiphos-methyl	Methiocarb	Terbutylazine	Piperonyl butoxide
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.2	0.2	0.02	0.2	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**						
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<0.2	<0.2	-	<0.2	-
625300	**QC1**	**soil**	**30-10-2018**	-	<0.2	<0.2	-	<0.2	-
RPD				-	0	0	-	0	-
625300	**TP03_0.1-0.2**	**soil**	**30-10-2018**	-	<0.2	<0.2	-	<0.2	-
ES1832597	**QC2**	**soil**	**30-10-2018**	<0.05	<0.2	-	<0.02	-	<0.05
RPD				-	0	-	-	-	-

Field Blanks

				Metals								Synthetic Pyrethroids									
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Allethrin	Baythroid	Phenothrin	Tetramethrin	4,4-DDE	a-BHC	Aldrin + Dieldrin	Aldrin	b-BHC	chlordane
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**R01**	**water**	**30-10-2018**	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<200	<200	<200	<200	<0.1	<0.1	<0.1	<0.1	<0.1	<1

Field Blanks

				Organochlorine Pesticides																	
				d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endrin aldehyde	Endosulfan sulphate	Endrin ketone	Endrin	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**R01**	**water**	**30-10-2018**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.01

Field Blanks

				Organophosphorous Pesticides																	
				Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion
				µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
625300	**R01**	**water**	**30-10-2018**	<2	<2	<2	<20	<0.002	<20	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

Field Blanks

Lab Report Number	Field ID	Matrix Type	Date	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate	Ametryn	Atraton	Atrazine	Prometon
				µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	µg/L
625300	R01	water	30-10-2018	<2	<0.002	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.002	<0.002	<2	<0.002	<0.002	<0.002	<2

Field Blanks

				Herbicides						Halogenated Benzenes	Pesticides										
				Prometryn	Propazine	Simazine	Simetryn	Terbutryn	Thiobencarb	Hexachlorobenzene	Aldicarb	Bendiocarb	Carbaryl	Carbofuran	Cypermethrins(total)	Fenvalerate	Methomyl	Oxamyl	Permethrin	Resmethrin
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																	
625300	R01	water	30-10-2018	<0.002	<0.002	<0.002	<0.002	<0.002	<0.01	<0.1	<10	<100	<10	<0.1	<200	<200	<0.05	<10	<200	<200

Field Blanks

Lab Report Number	Field ID	Matrix Type	Date	Parathion	Pirimiphos-methyl	Organic Terbutylazine
				µg/L	mg/L	mg/L
625300	R01	water	30-10-2018	<2	<0.02	<0.002

Field or Interlab Duplicates

				Inorganics	Metals								Synthetic Pyrethroids								
				Moisture Content (dried @ 103°C)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Allethrin	Baythroid	Deltamethrin & Tralomethrin	Phenothrin	Tau-fluvalinate	Tetramethrin	Transfluthrin	Chlordane (trans)	Chlordane (cis)
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG	mg/kg	mg/kg	MG/KG	mg/kg	MG/KG	mg/kg	mg/kg	mg/kg
EQL				1	2	0.4	2	5	5	0.1	2	5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	**TP01_0.1**	**soil**	**06-12-2018**	20	860	1.6	14	53	83	0.6	11	940	<2	<2	-	<2	-	<2	-	-	-
631838	**QC1**	**soil**	**06-12-2018**	20	770	2.0	14	56	110	0.8	11	910	<2	<2	-	<2	-	<2	-	-	-
RPD				0	11	22	0	6	28	29	0	3	0	0	-	0	-	0	-	-	-
631838	**TP01_0.1**	**soil**	**06-12-2018**	20	860	1.6	14	53	83	0.6	11	940	<2	<2	-	<2	-	<2	-	-	-
ES1837035	**QC2**	**soil**	**06-12-2018**	-	623	2	11	44	107	0.8	8	839	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	32	22	24	19	25	29	32	11	0	0	-	0	-	0	-	-	-
631838	**TP06_0.2**	**soil**	**06-12-2018**	14	390	<0.4	14	53	42	0.3	13	220	<2	<2	-	<2	-	<2	-	-	-
631838	**QC5**	**soil**	**06-12-2018**	14	400	<0.4	14	50	36	0.3	13	180	<2	<2	-	<2	-	<2	-	-	-
RPD				0	3	0	0	6	15	0	0	20	0	0	-	0	-	0	-	-	-
631838	**TP06_0.2**	**soil**	**06-12-2018**	14	390	<0.4	14	53	42	0.3	13	220	<2	<2	-	<2	-	<2	-	-	-
ES1837035	**QC6**	**soil**	**06-12-2018**	-	354	<1	11	43	43	0.3	11	243	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	10	0	24	21	2	0	17	10	0	0	-	0	-	0	-	-	-
633738	**TP08_0.5**	**soil**	**06-12-2018**	9.2	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**QC7**	**soil**	**06-12-2018**	8.1	36	<0.4	11	43	9.8	<0.1	12	65	<2	<2	-	<2	-	<2	-	-	-
RPD				13	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**TP11_0.2**	**soil**	**06-12-2018**	15	1,400	<0.4	18	53	22	<0.1	14	240	<2	<2	-	<2	-	<2	-	-	-
631838	**QC3**	**soil**	**06-12-2018**	16	1,300	<0.4	17	50	19	<0.1	13	240	<2	<2	-	<2	-	<2	-	-	-
RPD				6	7	0	6	6	15	0	7	0	0	0	-	0	-	0	-	-	-
634849	**TP15_0.2**	**soil**	**06-12-2018**	11	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**QC4**	**soil**	**06-12-2018**	7.3	180	<0.4	9.8	43	11	<0.1	17	81	<2	<2	-	<2	-	<2	-	-	-
RPD				40	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field or Interlab Duplicates

				Organochlorine Pesticides																	
				Endosulfan	4,4-DDE	a-BHC	Aldrin + Dieldrin	Aldrin	b-BHC	chlordane	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endrin aldehyde	Endosulfan sulphate	Endrin ketone	Endrin
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	TP01_0.1	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
631838	QC1	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP01_0.1	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1837035	QC2	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP06_0.2	soil	06-12-2018	-	<0.05	0.06	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
631838	QC5	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP06_0.2	soil	06-12-2018	-	<0.05	0.06	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ES1837035	QC6	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
633738	TP08_0.5	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC7	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	TP11_0.2	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
631838	QC3	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
634849	TP15_0.2	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC4	soil	06-12-2018	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field or Interlab Duplicates

Lab Report Number	Field ID	Matrix Type	Date	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene	Bromophos-ethyl	Carbophenothion	Prothiofos	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.05	0.05	0.05	0.1	0.1	1	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	2	0.2	0.2
631838	TP01_0.1	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
631838	QC1	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				0	0	0	0	0	0	0	-	-	-	0	0	0	0	0	0	0	0
631838	TP01_0.1	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
ES1837035	QC2	soil	06-12-2018	<0.05	<0.05	<0.05	<0.2	-	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	-	-
RPD				0	0	0	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-
631838	TP06_0.2	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
631838	QC5	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				0	0	0	0	0	0	0	-	-	-	0	0	0	0	0	0	0	0
631838	TP06_0.2	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
ES1837035	QC6	soil	06-12-2018	<0.05	<0.05	<0.05	<0.2	-	-	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	-	-
RPD				0	0	0	0	-	-	-	-	-	-	0	-	0	0	0	-	-	-
633738	TP08_0.5	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC7	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	TP11_0.2	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
631838	QC3	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				0	0	0	0	0	0	0	-	-	-	0	0	0	0	0	0	0	0
634849	TP15_0.2	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC4	soil	06-12-2018	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field or Interlab Duplicates

				Organophosphorous Pesticides																	
				Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.05	0.05	0.2	0.2	0.05	0.2	0.2	0.2	0.05	0.05	0.2	0.2	0.2	0.2	0.2	2	0.2
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	TP01_0.1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
631838	QC1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP01_0.1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
ES1837035	QC2	soil	06-12-2018	<0.05	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	<0.05	-	<0.2	-	<0.2	-	-	-
RPD				0	0	0	-	-	0	-	-	-	0	0	-	0	-	0	-	-	-
631838	TP06_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
631838	QC5	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP06_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
ES1837035	QC6	soil	06-12-2018	<0.05	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	<0.05	-	<0.2	-	<0.2	-	-	-
RPD				0	0	0	-	-	0	-	-	-	0	0	-	0	-	0	-	-	-
633738	TP08_0.5	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC7	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	TP11_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
631838	QC3	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
634849	TP15_0.2	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC4	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field or Interlab Duplicates

										Herbicides										Halogenated Benzenes
				Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate	Ametryn	Atraton	Atrazine	Prometon	Prometryn	Propazine	Simazine	Simetryn	Terbutryn	Thiobencarb	Hexachlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																	
631838	TP01_0.1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
631838	QC1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP01_0.1	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
ES1837035	QC2	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
631838	TP06_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
631838	QC5	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631838	TP06_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
ES1837035	QC6	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
633738	TP08_0.5	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC7	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	TP11_0.2	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
631838	QC3	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
634849	TP15_0.2	soil	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	QC4	soil	06-12-2018	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.05
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field or Interlab Duplicates

				Pesticides																	
				3-Hydroxy Carbofuran	Aldicarb	Bendiocarb	Bifenthrin	Bioresmethrin	Carbaryl	Carbofuran	Cyhalothrin/Karate	Cypermethrins(total)	Fenvalerate	Fenvalerate & Esfenvalerate	Methomyl	Oxamyl	Permethrin	Resmethrin	Thiodicarb	Demeton-S-methyl	Fenamiphos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.05	0.05	2	0.05	0.02	0.02	0.05	2	0.02	0.05	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	**TP01_0.1**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
631838	**QC1**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	0	0	-	-	0	0	-	0	0	-	0	0	0	0	-	-	-
631838	**TP01_0.1**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
ES1837035	**QC2**	**soil**	**06-12-2018**	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	-	<0.05	<0.02	<0.02	<0.05	-	<0.02	<0.05	<0.05
RPD				-	0	0	-	-	0	0	-	0	-	-	0	0	0	-	-	-	-
631838	**TP06_0.2**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
631838	**QC5**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	0	0	-	-	0	0	-	0	0	-	0	0	0	0	-	-	-
631838	**TP06_0.2**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
ES1837035	**QC6**	**soil**	**06-12-2018**	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.02	<0.05	<0.05	-	<0.18	<0.02	<0.02	<0.05	-	<0.02	<0.05	<0.05
RPD				-	0	0	-	-	0	0	-	0	-	-	0	0	0	-	-	-	-
633738	**TP08_0.5**	**soil**	**06-12-2018**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**QC7**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**TP11_0.2**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
631838	**QC3**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	0	0	-	-	0	0	-	0	0	-	0	0	0	0	-	-	-
634849	**TP15_0.2**	**soil**	**06-12-2018**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	**QC4**	**soil**	**06-12-2018**	-	<2	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SLR

Field or Interlab Duplicates

							Carbamates	Organic	SVOCs
				Pirimphos-ethyl	Parathion	Pirimiphos-methyl	Methiocarb	Terbutylazine	Piperonyl butoxide
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.05	0.2	0.2	0.02	0.2	0.05
Lab Report Number	**Field ID**	**Matrix Type**	**Date**						
631838	TP01_0.1	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
631838	QC1	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
RPD				-	0	0	-	0	-
631838	TP01_0.1	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
ES1837035	QC2	soil	06-12-2018	<0.05	<0.2	-	<0.02	-	<0.05
RPD				-	0	-	-	-	-
631838	TP06_0.2	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
631838	QC5	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
RPD				-	0	0	-	0	-
631838	TP06_0.2	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
ES1837035	QC6	soil	06-12-2018	<0.05	<0.2	-	<0.02	-	<0.05
RPD				-	0	-	-	-	-
633738	TP08_0.5	soil	06-12-2018	-	-	-	-	-	-
631838	QC7	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
RPD				-	-	-	-	-	-
631838	TP11_0.2	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
631838	QC3	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
RPD				-	0	0	-	0	-
634849	TP15_0.2	soil	06-12-2018	-	-	-	-	-	-
631838	QC4	soil	06-12-2018	-	<0.2	<0.2	-	<0.2	-
RPD				-	-	-	-	-	-

Field Blanks

				Metals								Synthetic Pyrethroids									
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Allethrin	Baythroid	Phenothrin	Tetramethrin	4,4-DDE	a-BHC	Aldrin + Dieldrin	Aldrin	b-BHC	chlordane
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	R01	water	06-12-2018	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	-	-	-	-	-	-	-	-	-	-
631838	R02	water	06-12-2018	-	-	-	-	-	-	-	-	<200	<200	<200	<200	<0.1	<0.1	<0.1	<0.1	<0.1	<1

Field Blanks

				Organochlorine Pesticides																	
				d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endrin aldehyde	Endosulfan sulphate	Endrin ketone	Endrin	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	Toxaphene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	R01	water	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	R02	water	06-12-2018	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.01

Field Blanks

				Organophosphorous Pesticides																	
				Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion
				µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																		
631838	R01	water	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	R02	water	06-12-2018	<2	<2	<2	<20	<0.002	<20	<2	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

Field Blanks

Lab Report Number	Field ID	Matrix Type	Date	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate	Ametryn	Atraton	Atrazine	Prometon
				µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	µg/L
631838	R01	water	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	R02	water	06-12-2018	<2	<0.002	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.002	<0.002	<2	<0.002	<0.002	<0.002	<2

Field Blanks

				Herbicides						Halogenated Benzenes	Pesticides									
				Prometryn	Propazine	Simazine	Simetryn	Terbutryn	Thiobencarb	Hexachlorobenzene	Aldicarb	Bendiocarb	Carbaryl	Carbofuran	Cypermethrins(total)	Fenvalerate	Methomyl	Oxamyl	Permethrin	Resmethrin
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**																	
631838	R01	water	06-12-2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
631838	R02	water	06-12-2018	<0.002	<0.002	<0.002	<0.002	<0.002	<0.01	<0.1	<10	<10	<10	<0.01	<200	<200	<0.01	<10	<200	<200

Field Blanks

						Organic
				Parathion	Pirimiphos-methyl	Terbutylazine
				µg/L	mg/L	mg/L
Lab Report Number	**Field ID**	**Matrix Type**	**Date**			
631838	R01	water	06-12-2018	-	-	-
631838	R02	water	06-12-2018	<2	<0.02	<0.002

APPENDIX D

Laboratory Reports

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Attention: **Junaidi Ibrahim**

Report **625300-S**
Project name DSI PROTEN TAMWORTH
Project ID 610.18456
Received Date Oct 31, 2018

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**TP01_0.2-0.4** **Soil** **S18-Oc38411** **Oct 30, 2018**	**TP01_0.5-0.6** **Soil** **S18-Oc38412** **Oct 30, 2018**	**TP02_0.2-0.3** **Soil** **S18-Oc38413** **Oct 30, 2018**	**TP02_0.4-0.5** **Soil** **S18-Oc38414** **Oct 30, 2018**
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	119	111	123	111
Tetrachloro-m-xylene (surr.)	1	%	114	100	105	101
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP01_0.2-0.4	TP01_0.5-0.6	TP02_0.2-0.3	TP02_0.4-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc38411	S18-Oc38412	S18-Oc38413	S18-Oc38414
Date Sampled			Oct 30, 2018	Oct 30, 2018	Oct 30, 2018	Oct 30, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	72	97	75	95
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2

Client Sample ID			TP01_0.2-0.4	TP01_0.5-0.6	TP02_0.2-0.3	TP02_0.4-0.5
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-Oc38411**	**S18-Oc38412**	**S18-Oc38413**	**S18-Oc38414**
Date Sampled			**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**
Test/Reference	LOR	Unit				
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	14	9.7	28	9.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	11	19	18
Copper	5	mg/kg	60	44	67	68
Lead	5	mg/kg	15	11	17	14
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	22	14	22	23
Zinc	5	mg/kg	80	70	91	100
% Moisture	1	%	18	7.4	16	12

Client Sample ID			TP02_0.9-1.0	TP03_0.1-0.2	TP03_0.4-0.5	TP03_0.9-1.0
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-Oc38415**	**S18-Oc38416**	**S18-Oc38417**	**S18-Oc38418**
Date Sampled			**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			TP02_0.9-1.0	TP03_0.1-0.2	TP03_0.4-0.5	TP03_0.9-1.0
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-Oc38415**	**S18-Oc38416**	**S18-Oc38417**	**S18-Oc38418**
Date Sampled			**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**	**Oct 30, 2018**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	90	125	115	135
Tetrachloro-m-xylene (surr.)	1	%	84	110	101	122
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	91	84	89	78
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP02_0.9-1.0	TP03_0.1-0.2	TP03_0.4-0.5	TP03_0.9-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc38415	S18-Oc38416	S18-Oc38417	S18-Oc38418
Date Sampled			Oct 30, 2018	Oct 30, 2018	Oct 30, 2018	Oct 30, 2018
Test/Reference	LOR	Unit				
Triazines						
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	2.2	14	6.2	8.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	17	10	12
Copper	5	mg/kg	21	52	42	52
Lead	5	mg/kg	5.0	14	10	11
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	7.2	18	13	15
Zinc	5	mg/kg	35	70	68	81
% Moisture	1	%	5.6	16	10	7.8

Client Sample ID			TP04_0.1-0.2	QC1	TP01_1.3-1.5
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc38419	S18-Oc38420	S18-Oc38429
Date Sampled			Oct 30, 2018	Oct 30, 2018	Oct 30, 2018
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled			TP04_0.1-0.2 Soil S18-Oc38419 Oct 30, 2018	QC1 Soil S18-Oc38420 Oct 30, 2018	TP01_1.3-1.5 Soil S18-Oc38429 Oct 30, 2018
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	135	141	113
Tetrachloro-m-xylene (surr.)	1	%	117	129	103
Organophosphorus Pesticides					
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2

Client Sample ID			TP04_0.1-0.2	QC1	TP01_1.3-1.5
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc38419	S18-Oc38420	S18-Oc38429
Date Sampled			Oct 30, 2018	Oct 30, 2018	Oct 30, 2018
Test/Reference	LOR	Unit			
Organophosphorus Pesticides					
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	94	82	80
Triazines					
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Carbamate Pesticides					
Aldicarb	2	mg/kg	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2
Synthetic Pyrethroids*					
Allethrin*	2	mg/kg	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2
Heavy Metals					
Arsenic	2	mg/kg	2600	17	7.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	20	11
Copper	5	mg/kg	55	67	49
Lead	5	mg/kg	25	16	12
Mercury	0.1	mg/kg	0.2	< 0.1	< 0.1
Nickel	5	mg/kg	14	23	15
Zinc	5	mg/kg	270	96	80
% Moisture	1	%	18	16	5.7

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Nov 02, 2018	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Nov 02, 2018	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Triazines	Melbourne	Nov 02, 2018	14 Day
- Method: LTM-ORG-2080			
Carbamate Pesticides	Melbourne	Nov 02, 2018	14 Day
- Method: LTM-ORG-2290 Carbamates in waters and soils by HPLC			
Synthetic Pyrethroids*	Melbourne	Nov 02, 2018	14 Day
- Method: LTM-ORG-2170 Synthetic Pyrethroids by HPLC-UV			
Metals M8	Melbourne	Nov 02, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Oct 31, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Oct 31, 2018 9:45 AM
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	625300	**Due:**	Nov 7, 2018
		Phone:	02 9428 8100	**Priority:**	5 Day
		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	DSI PROTEN TAMWORTH				
Project ID:	610.18456				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X		X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217							X						
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	TP01_0.2-0.4	Oct 30, 2018		Soil	S18-Oc38411			X	X	X	X	X	X
2	TP01_0.5-0.6	Oct 30, 2018		Soil	S18-Oc38412			X	X	X	X	X	X
3	TP02_0.2-0.3	Oct 30, 2018		Soil	S18-Oc38413			X	X	X	X	X	X
4	TP02_0.4-0.5	Oct 30, 2018		Soil	S18-Oc38414			X	X	X	X	X	X
5	TP02_0.9-1.0	Oct 30, 2018		Soil	S18-Oc38415			X	X	X	X	X	X
6	TP03_0.1-0.2	Oct 30, 2018		Soil	S18-Oc38416			X	X	X	X	X	X
7	TP03_0.4-0.5	Oct 30, 2018		Soil	S18-Oc38417			X	X	X	X	X	X
8	TP03_0.9-1.0	Oct 30, 2018		Soil	S18-Oc38418			X	X	X	X	X	X
9	TP04_0.1-0.2	Oct 30, 2018		Soil	S18-Oc38419			X	X	X	X	X	X

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Oct 31, 2018 9:45 AM
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	625300	**Due:**	Nov 7, 2018
		Phone:	02 9428 8100	**Priority:**	5 Day
		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	DSI PROTEN TAMWORTH				
Project ID:	610.18456				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X		X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217							X						
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
10	QC1	Oct 30, 2018		Soil	S18-Oc38420			X	X	X	X	X	X
11	R01	Oct 30, 2018		Water	S18-Oc38421			X	X	X	X	X	
12	TS	Oct 30, 2018		Water	S18-Oc38422	X							
13	TB	Oct 30, 2018		Water	S18-Oc38423	X							
14	TS	Oct 30, 2018		Soil	S18-Oc38424		X						
15	TB	Oct 30, 2018		Soil	S18-Oc38425		X						
16	LAB SPIKE	Oct 30, 2018		Soil	S18-Oc38426		X						
17	TP01_1.3-1.5	Oct 30, 2018		Soil	S18-Oc38429			X	X	X	X	X	X
Test Counts						5	5	12	12	12	12	12	11

eurofins | mgt

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Triazines							
Ametryn	mg/kg	< 0.2			0.2	Pass	
Atraton	mg/kg	< 0.2			0.2	Pass	
Atrazine	mg/kg	< 0.2			0.2	Pass	
Prometon	mg/kg	< 0.2			0.2	Pass	
Prometryn	mg/kg	< 0.2			0.2	Pass	
Propazine	mg/kg	< 0.2			0.2	Pass	
Simazine	mg/kg	< 0.2			0.2	Pass	
Simetryn	mg/kg	< 0.2			0.2	Pass	
Terbuthylazine	mg/kg	< 0.2			0.2	Pass	
Terbutryne	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Carbamate Pesticides							
Aldicarb	mg/kg	< 2			2	Pass	
Bendiocarb	mg/kg	< 2			2	Pass	
Carbaryl	mg/kg	< 2			2	Pass	
Carbofuran	mg/kg	< 2			2	Pass	
Methomyl	mg/kg	< 2			2	Pass	
Oxamyl	mg/kg	< 2			2	Pass	
Thiobencarb	mg/kg	< 2			2	Pass	
Method Blank							
Synthetic Pyrethroids*							
Allethrin*	mg/kg	< 2			2	Pass	
Cyfluthrin*	mg/kg	< 2			2	Pass	
Cypermethrin (total)*	mg/kg	< 2			2	Pass	
Fenvalerate*	mg/kg	< 2			2	Pass	
Permethrin	mg/kg	< 2			2	Pass	
Phenothrin*	mg/kg	< 2			2	Pass	
Resmethrin*	mg/kg	< 2			2	Pass	
Tetramethrin*	mg/kg	< 2			2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	119			70-130	Pass	
4.4'-DDE	%	117			70-130	Pass	
4.4'-DDT	%	129			70-130	Pass	
a-BHC	%	99			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aldrin			%	110			70-130	Pass	
b-BHC			%	98			70-130	Pass	
d-BHC			%	101			70-130	Pass	
Dieldrin			%	114			70-130	Pass	
Endosulfan I			%	111			70-130	Pass	
Endosulfan II			%	114			70-130	Pass	
Endosulfan sulphate			%	110			70-130	Pass	
Endrin			%	125			70-130	Pass	
Endrin aldehyde			%	115			70-130	Pass	
Endrin ketone			%	116			70-130	Pass	
g-BHC (Lindane)			%	98			70-130	Pass	
Heptachlor			%	111			70-130	Pass	
Heptachlor epoxide			%	105			70-130	Pass	
Hexachlorobenzene			%	94			70-130	Pass	
Methoxychlor			%	115			70-130	Pass	
LCS - % Recovery									
Organophosphorus Pesticides									
Diazinon			%	83			70-130	Pass	
Dimethoate			%	71			70-130	Pass	
Ethion			%	106			70-130	Pass	
Fenitrothion			%	94			70-130	Pass	
Methyl parathion			%	92			70-130	Pass	
Mevinphos			%	103			70-130	Pass	
LCS - % Recovery									
Triazines									
Prometryn			%	92			75-125	Pass	
LCS - % Recovery									
Carbamate Pesticides									
Aldicarb			%	117			70-130	Pass	
Bendiocarb			%	119			70-130	Pass	
Carbaryl			%	124			70-130	Pass	
Carbofuran			%	119			70-130	Pass	
Methomyl			%	114			70-130	Pass	
Oxamyl			%	144			70-130	Fail	
Thiobencarb			%	115			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	111			80-120	Pass	
Cadmium			%	112			80-120	Pass	
Chromium			%	110			80-120	Pass	
Copper			%	118			80-120	Pass	
Lead			%	119			80-120	Pass	
Mercury			%	113			75-125	Pass	
Nickel			%	117			80-120	Pass	
Zinc			%	114			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M18-No00361	NCP	%	103			70-130	Pass	
Dimethoate	M18-No00361	NCP	%	97			70-130	Pass	
Ethion	M18-No00361	NCP	%	101			70-130	Pass	
Fenitrothion	M18-No00361	NCP	%	83			70-130	Pass	
Methyl parathion	M18-No00361	NCP	%	73			70-130	Pass	
Mevinphos	M18-No00361	NCP	%	70			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Synthetic Pyrethroids*				Result 1					
Cyfluthrin*	M18-Oc20554	NCP	%	91			70-130	Pass	
Cypermethrin (total)*	M18-Oc20554	NCP	%	93			70-130	Pass	
Permethrin	M18-Oc20554	NCP	%	89			70-130	Pass	
Resmethrin*	M18-Oc20554	NCP	%	93			70-130	Pass	
Tetramethrin*	M18-Oc20554	NCP	%	93			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	S18-Oc38412	CP	%	108			70-130	Pass	
4.4'-DDE	S18-Oc38412	CP	%	107			70-130	Pass	
4.4'-DDT	S18-Oc38412	CP	%	122			70-130	Pass	
a-BHC	S18-Oc38412	CP	%	90			70-130	Pass	
Aldrin	S18-Oc38412	CP	%	97			70-130	Pass	
b-BHC	S18-Oc38412	CP	%	90			70-130	Pass	
d-BHC	S18-Oc38412	CP	%	95			70-130	Pass	
Dieldrin	S18-Oc38412	CP	%	104			70-130	Pass	
Endosulfan I	S18-Oc38412	CP	%	101			70-130	Pass	
Endosulfan II	S18-Oc38412	CP	%	105			70-130	Pass	
Endosulfan sulphate	S18-Oc38412	CP	%	102			70-130	Pass	
Endrin	S18-Oc38412	CP	%	127			70-130	Pass	
Endrin aldehyde	S18-Oc38412	CP	%	104			70-130	Pass	
Endrin ketone	S18-Oc38412	CP	%	107			70-130	Pass	
g-BHC (Lindane)	S18-Oc38412	CP	%	90			70-130	Pass	
Heptachlor	S18-Oc38412	CP	%	108			70-130	Pass	
Heptachlor epoxide	S18-Oc38412	CP	%	97			70-130	Pass	
Hexachlorobenzene	S18-Oc38412	CP	%	85			70-130	Pass	
Methoxychlor	S18-Oc38412	CP	%	113			70-130	Pass	
Spike - % Recovery									
Carbamate Pesticides				Result 1					
Aldicarb	S18-Oc38412	CP	%	174			70-130	Fail	Q08
Bendiocarb	S18-Oc38412	CP	%	107			70-130	Pass	
Carbaryl	S18-Oc38412	CP	%	108			70-130	Pass	
Carbofuran	S18-Oc38412	CP	%	107			70-130	Pass	
Methomyl	S18-Oc38412	CP	%	110			70-130	Pass	
Oxamyl	S18-Oc38412	CP	%	118			70-130	Pass	
Thiobencarb	S18-Oc38412	CP	%	113			70-130	Pass	
Spike - % Recovery									
Synthetic Pyrethroids*				Result 1					
Allethrin*	S18-Oc38412	CP	%	90			70-130	Pass	
Fenvalerate*	S18-Oc38412	CP	%	79			70-130	Pass	
Phenothrin*	S18-Oc38412	CP	%	88			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-Oc38412	CP	%	104			75-125	Pass	
Cadmium	S18-Oc38412	CP	%	106			75-125	Pass	
Chromium	S18-Oc38412	CP	%	105			75-125	Pass	
Copper	S18-Oc38412	CP	%	103			75-125	Pass	
Lead	S18-Oc38412	CP	%	106			75-125	Pass	
Mercury	S18-Oc38412	CP	%	113			70-130	Pass	
Nickel	S18-Oc38412	CP	%	106			75-125	Pass	
Zinc	S18-Oc38412	CP	%	97			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-Oc38411	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S18-Oc38411	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S18-Oc38411	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Ronnel	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atraton	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atrazine	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometon	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometryn	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Propazine	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simazine	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simetryn	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbuthylazine	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbutryne	S18-Oc38411	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Carbamate Pesticides				Result 1	Result 2	RPD			
Aldicarb	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Bendiocarb	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Carbaryl	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Carbofuran	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Methomyl	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Oxamyl	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Thiobencarb	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Duplicate									
Synthetic Pyrethroids*				Result 1	Result 2	RPD			
Allethrin*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cyfluthrin*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cypermethrin (total)*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Fenvalerate*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Permethrin	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phenothrin*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Resmethrin*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tetramethrin*	S18-Oc38411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc38411	CP	mg/kg	14	13	7.0	30%	Pass	
Cadmium	S18-Oc38411	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc38411	CP	mg/kg	19	17	7.0	30%	Pass	
Copper	S18-Oc38411	CP	mg/kg	60	54	11	30%	Pass	
Lead	S18-Oc38411	CP	mg/kg	15	13	12	30%	Pass	
Mercury	S18-Oc38411	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc38411	CP	mg/kg	22	19	14	30%	Pass	
Zinc	S18-Oc38411	CP	mg/kg	80	73	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-Oc38411	CP	%	18	18	2.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc38412	CP	mg/kg	9.7	10.0	3.0	30%	Pass	
Cadmium	S18-Oc38412	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc38412	CP	mg/kg	11	11	2.0	30%	Pass	
Copper	S18-Oc38412	CP	mg/kg	44	45	2.0	30%	Pass	
Lead	S18-Oc38412	CP	mg/kg	11	11	<1	30%	Pass	
Mercury	S18-Oc38412	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc38412	CP	mg/kg	14	14	1.0	30%	Pass	
Zinc	S18-Oc38412	CP	mg/kg	70	71	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-Oc38429	CP	%	5.7	6.0	5.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

SLR Consulting
2 Lincoln St
Lane Cove West
NSW 2066

Attention: **Junaidi Ibrahim**

Report	**625300-W**
Project name	DSI PROTEN TAMWORTH
Project ID	610.18456
Received Date	Oct 31, 2018

Client Sample ID			**R01**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S18-Oc38421**
Date Sampled			**Oct 30, 2018**
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Aldrin and Dieldrin (Total)*	0.0001	mg/L	< 0.0001
DDT + DDE + DDD (Total)*	0.0001	mg/L	< 0.0001
Vic EPA IWRG 621 OCP (Total)*	0.001	mg/L	< 0.001
Vic EPA IWRG 621 Other OCP (Total)*	0.001	mg/L	< 0.001
Dibutylchlorendate (surr.)	1	%	98
Tetrachloro-m-xylene (surr.)	1	%	62
Organophosphorus Pesticides			
Azinphos-methyl	0.002	mg/L	< 0.002
Bolstar	0.002	mg/L	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002
Coumaphos	0.02	mg/L	< 0.02
Demeton-S	0.02	mg/L	< 0.02

Client Sample ID			R01
Sample Matrix			Water
Eurofins | mgt Sample No.			S18-Oc38421
Date Sampled			Oct 30, 2018
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
EPN	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Omethoate	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02
Pyrazophos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Terbufos	0.002	mg/L	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	58
Triazines			
Ametryn	0.002	mg/L	< 0.002
Atraton	0.002	mg/L	< 0.002
Atrazine	0.002	mg/L	< 0.002
Prometon	0.002	mg/L	< 0.002
Prometryn	0.002	mg/L	< 0.002
Propazine	0.002	mg/L	< 0.002
Simazine	0.002	mg/L	< 0.002
Simetryn	0.002	mg/L	< 0.002
Terbuthylazine	0.002	mg/L	< 0.002
Terbutryne	0.002	mg/L	< 0.002
Carbamate Pesticides			
Aldicarb	0.01	mg/L	< 0.01
Bendiocarb	0.01	mg/L	< 0.1
Carbaryl	0.01	mg/L	< 0.01
Carbofuran	0.01	mg/L	< 0.1
Methomyl	0.01	mg/L	< 0.05
Oxamyl	0.01	mg/L	< 0.01
Thiobencarb	0.01	mg/L	< 0.01

Client Sample ID			R01
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S18-Oc38421**
Date Sampled			**Oct 30, 2018**
Test/Reference	LOR	Unit	
Synthetic Pyrethroids*			
Allethrin*	0.2	mg/L	< 0.2
Cyfluthrin*	0.2	mg/L	< 0.2
Cypermethrin (total)*	0.2	mg/L	< 0.2
Fenvalerate*	0.2	mg/L	< 0.2
Permethrin	0.2	mg/L	< 0.2
Phenothrin*	0.2	mg/L	< 0.2
Resmethrin*	0.2	mg/L	< 0.2
Tetramethrin*	0.2	mg/L	< 0.2
Heavy Metals			
Arsenic	0.001	mg/L	< 0.001
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Copper	0.001	mg/L	< 0.001
Lead	0.001	mg/L	< 0.001
Mercury	0.0001	mg/L	< 0.0001
Nickel	0.001	mg/L	< 0.001
Zinc	0.005	mg/L	< 0.005

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Nov 01, 2018	7 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Nov 01, 2018	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Triazines	Melbourne	Nov 01, 2018	7 Day
- Method: LTM-ORG-2080			
Carbamate Pesticides	Melbourne	Nov 01, 2018	7 Day
- Method: LTM-ORG-2290 Carbamates in waters and soils by HPLC			
Synthetic Pyrethroids*	Melbourne	Nov 01, 2018	7 Day
- Method: LTM-ORG-2170 Synthetic Pyrethroids by HPLC-UV			
Metals M8	Melbourne	Nov 01, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name: SLR Consulting (Sydney)
Address: 2 Lincoln St
Lane Cove West
NSW 2066

Project Name: DSI PROTEN TAMWORTH
Project ID: 610.18456

Order No.:
Report #: 625300
Phone: 02 9428 8100
Fax:

Received: Oct 31, 2018 9:45 AM
Due: Nov 7, 2018
Priority: 5 Day
Contact Name: Junaidi Ibrahim

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X		X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217							X						
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	TP01_0.2-0.4	Oct 30, 2018		Soil	S18-Oc38411			X	X	X	X	X	X
2	TP01_0.5-0.6	Oct 30, 2018		Soil	S18-Oc38412			X	X	X	X	X	X
3	TP02_0.2-0.3	Oct 30, 2018		Soil	S18-Oc38413			X	X	X	X	X	X
4	TP02_0.4-0.5	Oct 30, 2018		Soil	S18-Oc38414			X	X	X	X	X	X
5	TP02_0.9-1.0	Oct 30, 2018		Soil	S18-Oc38415			X	X	X	X	X	X
6	TP03_0.1-0.2	Oct 30, 2018		Soil	S18-Oc38416			X	X	X	X	X	X
7	TP03_0.4-0.5	Oct 30, 2018		Soil	S18-Oc38417			X	X	X	X	X	X
8	TP03_0.9-1.0	Oct 30, 2018		Soil	S18-Oc38418			X	X	X	X	X	X
9	TP04_0.1-0.2	Oct 30, 2018		Soil	S18-Oc38419			X	X	X	X	X	X

eurofins mgt

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NATA # 1261
Site # 23736

Company Name: SLR Consulting (Sydney)
Address: 2 Lincoln St
Lane Cove West
NSW 2066

Project Name: DSI PROTEN TAMWORTH
Project ID: 610.18456

Order No.:
Report #: 625300
Phone: 02 9428 8100
Fax:

Received: Oct 31, 2018 9:45 AM
Due: Nov 7, 2018
Priority: 5 Day
Contact Name: Junaidi Ibrahim

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X		X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217							X						
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
10	QC1	Oct 30, 2018		Soil	S18-Oc38420			X	X	X	X	X	X
11	R01	Oct 30, 2018		Water	S18-Oc38421			X	X	X	X	X	
12	TS	Oct 30, 2018		Water	S18-Oc38422	X							
13	TB	Oct 30, 2018		Water	S18-Oc38423	X							
14	TS	Oct 30, 2018		Soil	S18-Oc38424		X						
15	TB	Oct 30, 2018		Soil	S18-Oc38425		X						
16	LAB SPIKE	Oct 30, 2018		Soil	S18-Oc38426		X						
17	TP01_1.3-1.5	Oct 30, 2018		Soil	S18-Oc38429			X	X	X	X	X	X
Test Counts						5	5	12	12	12	12	12	11

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Triazines							
Ametryn	mg/L	< 0.002			0.002	Pass	
Atraton	mg/L	< 0.002			0.002	Pass	
Atrazine	mg/L	< 0.002			0.002	Pass	
Prometon	mg/L	< 0.002			0.002	Pass	
Prometryn	mg/L	< 0.002			0.002	Pass	
Propazine	mg/L	< 0.002			0.002	Pass	
Simazine	mg/L	< 0.002			0.002	Pass	
Simetryn	mg/L	< 0.002			0.002	Pass	
Terbuthylazine	mg/L	< 0.002			0.002	Pass	
Terbutryne	mg/L	< 0.002			0.002	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	102			70-130	Pass	
4.4'-DDD	%	99			70-130	Pass	
4.4'-DDE	%	126			70-130	Pass	
4.4'-DDT	%	89			70-130	Pass	
a-BHC	%	121			70-130	Pass	
Aldrin	%	104			70-130	Pass	
b-BHC	%	123			70-130	Pass	
d-BHC	%	114			70-130	Pass	
Dieldrin	%	119			70-130	Pass	
Endosulfan I	%	125			70-130	Pass	
Endosulfan II	%	124			70-130	Pass	
Endosulfan sulphate	%	92			70-130	Pass	
Endrin	%	115			70-130	Pass	
Endrin aldehyde	%	82			70-130	Pass	
Endrin ketone	%	115			70-130	Pass	
g-BHC (Lindane)	%	113			70-130	Pass	
Heptachlor	%	115			70-130	Pass	
Heptachlor epoxide	%	105			70-130	Pass	
Hexachlorobenzene	%	120			70-130	Pass	
Methoxychlor	%	71			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	84			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dimethoate			%	74			70-130	Pass	
Ethion			%	78			70-130	Pass	
Fenitrothion			%	72			70-130	Pass	
Methyl parathion			%	78			70-130	Pass	
Mevinphos			%	90			70-130	Pass	
LCS - % Recovery									
Triazines									
Prometryn			%	80			75-125	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	95			80-120	Pass	
Cadmium			%	95			80-120	Pass	
Chromium			%	92			80-120	Pass	
Copper			%	94			80-120	Pass	
Lead			%	92			80-120	Pass	
Mercury			%	89			75-125	Pass	
Nickel			%	94			80-120	Pass	
Zinc			%	98			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M18-Oc34276	NCP	%	80			70-130	Pass	
4.4'-DDD	M18-Oc34276	NCP	%	73			70-130	Pass	
4.4'-DDE	M18-Oc34276	NCP	%	90			70-130	Pass	
4.4'-DDT	M18-Oc34276	NCP	%	74			70-130	Pass	
a-BHC	M18-Oc34276	NCP	%	81			70-130	Pass	
Aldrin	M18-Oc34276	NCP	%	72			70-130	Pass	
b-BHC	M18-Oc34276	NCP	%	80			70-130	Pass	
d-BHC	M18-Oc34276	NCP	%	91			70-130	Pass	
Dieldrin	M18-Oc34276	NCP	%	92			70-130	Pass	
Endosulfan I	M18-Oc34276	NCP	%	93			70-130	Pass	
Endosulfan II	M18-Oc34276	NCP	%	98			70-130	Pass	
Endosulfan sulphate	M18-Oc33704	NCP	%	85			70-130	Pass	
Endrin	M18-Oc34276	NCP	%	81			70-130	Pass	
Endrin aldehyde	M18-Oc34276	NCP	%	71			70-130	Pass	
Endrin ketone	M18-Oc34276	NCP	%	86			70-130	Pass	
g-BHC (Lindane)	M18-Oc34276	NCP	%	95			70-130	Pass	
Heptachlor	M18-Oc34276	NCP	%	71			70-130	Pass	
Heptachlor epoxide	M18-Oc34276	NCP	%	82			70-130	Pass	
Hexachlorobenzene	M18-Oc34276	NCP	%	75			70-130	Pass	
Methoxychlor	M18-Oc33704	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M18-Oc37832	NCP	%	109			70-130	Pass	
Dimethoate	M18-Oc37832	NCP	%	79			70-130	Pass	
Ethion	M18-Oc37832	NCP	%	84			70-130	Pass	
Fenitrothion	M18-Oc37832	NCP	%	95			70-130	Pass	
Methyl parathion	M18-Oc37832	NCP	%	89			70-130	Pass	
Mevinphos	M18-Oc37832	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-Oc37667	NCP	%	98			75-125	Pass	
Cadmium	M18-Oc37667	NCP	%	98			75-125	Pass	
Chromium	M18-Oc37667	NCP	%	97			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Copper	M18-Oc37667	NCP	%	98			75-125	Pass	
Lead	M18-Oc37667	NCP	%	95			75-125	Pass	
Mercury	M18-Oc37667	NCP	%	93			70-130	Pass	
Nickel	M18-Oc37667	NCP	%	99			75-125	Pass	
Zinc	M18-Oc37667	NCP	%	101			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M18-Oc37831	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M18-Oc37831	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Bolstar	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorfenvinphos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorpyrifos	M18-Oc37831	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Chlorpyrifos-methyl	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Coumaphos	M18-Oc37831	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-S	M18-Oc37831	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-O	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Diazinon	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dichlorvos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dimethoate	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Disulfoton	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
EPN	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethoprop	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethyl parathion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenitrothion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fensulfothion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenthion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Malathion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Merphos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Methyl parathion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Mevinphos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Monocrotophos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Naled	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Omethoate	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Phorate	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Pirimiphos-methyl	M18-Oc37831	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Pyrazophos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ronnel	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbufos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tetrachlorvinphos	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tokuthion	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Trichloronate	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Atraton	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Atrazine	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Prometon	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Prometryn	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Propazine	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Simazine	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Simetryn	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbuthylazine	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbutryne	M18-Oc37831	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-Oc37667	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M18-Oc37667	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M18-Oc37667	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M18-Oc37667	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	M18-Oc37667	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	M18-Oc37667	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M18-Oc37667	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	M18-Oc37667	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

SLR Consulting
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NSW 2066

Attention: **Junaidi Ibrahim**

Report **631838-S**
Project name PROTEN TAMWORTH SCA
Project ID 610.18456.00100
Received Date Dec 07, 2018

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**TP01_0.1** **Soil** **S18-De08338** **Dec 06, 2018**	**TP01_0.7** **Soil** **S18-De08339** **Dec 06, 2018**	**TP01_1.2** **Soil** **S18-De08340** **Dec 06, 2018**	**TP16_0.2** **Soil** **S18-De08341** **Dec 06, 2018**
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	70	72	89	134
Tetrachloro-m-xylene (surr.)	1	%	110	116	66	77
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP01_0.1	TP01_0.7	TP01_1.2	TP16_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08338	S18-De08339	S18-De08340	S18-De08341
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	85	84	114	113
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2

Client Sample ID			TP01_0.1	TP01_0.7	TP01_1.2	TP16_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08338	S18-De08339	S18-De08340	S18-De08341
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	860	280	230	780
Cadmium	0.4	mg/kg	1.6	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	12	9.4	15
Copper	5	mg/kg	53	46	46	48
Lead	5	mg/kg	83	12	15	18
Mercury	0.1	mg/kg	0.6	< 0.1	< 0.1	0.3
Nickel	5	mg/kg	11	14	12	15
Zinc	5	mg/kg	940	97	160	330
% Moisture	1	%	20	12	8.6	16

Client Sample ID			TP16_0.6	TP16_1.1	TP02_0.2	TP02_0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08342	S18-De08343	S18-De08406	S18-De08407
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			TP16_0.6	TP16_1.1	TP02_0.2	TP02_0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08342	S18-De08343	S18-De08406	S18-De08407
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	134	129	129	95
Tetrachloro-m-xylene (surr.)	1	%	70	78	90	66
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	103	111	119	127
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP16_0.6 Soil S18-De08342 Dec 06, 2018	TP16_1.1 Soil S18-De08343 Dec 06, 2018	TP02_0.2 Soil S18-De08406 Dec 06, 2018	TP02_0.7 Soil S18-De08407 Dec 06, 2018
Triazines						
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	250	180	380	43
Cadmium	0.4	mg/kg	< 0.4	< 0.4	0.4	< 0.4
Chromium	5	mg/kg	13	11	15	9.8
Copper	5	mg/kg	53	46	46	39
Lead	5	mg/kg	12	10	63	8.5
Mercury	0.1	mg/kg	0.2	< 0.1	0.3	< 0.1
Nickel	5	mg/kg	14	12	14	12
Zinc	5	mg/kg	95	81	390	62
% Moisture	1	%	11	7.9	11	9.0

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP02_1.2 Soil S18-De08408 Dec 06, 2018	TP06_0.2 Soil S18-De08409 Dec 06, 2018	TP06_0.6 Soil S18-De08410 Dec 06, 2018	TP06_1.1 Soil S18-De08411 Dec 06, 2018
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	0.06	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			TP02_1.2	TP06_0.2	TP06_0.6	TP06_1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08408	S18-De08409	S18-De08410	S18-De08411
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	92	94	85	80
Tetrachloro-m-xylene (surr.)	1	%	59	116	114	116
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP02_1.2	TP06_0.2	TP06_0.6	TP06_1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08408	S18-De08409	S18-De08410	S18-De08411
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	75	121	111	91
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	43	390	26	25
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	9.4	14	9.0	8.5
Copper	5	mg/kg	28	53	41	40
Lead	5	mg/kg	14	42	8.6	11
Mercury	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1
Nickel	5	mg/kg	10	13	12	12
Zinc	5	mg/kg	52	220	68	73
% Moisture	1	%	9.9	14	6.4	6.1

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP07_0.2 Soil S18-De08412 Dec 06, 2018	TP07_0.6 Soil S18-De08413 Dec 06, 2018	TP07_1.1 Soil S18-De08414 Dec 06, 2018	TP11_0.2 Soil S18-De08415 Dec 06, 2018
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	82	72	101	122
Tetrachloro-m-xylene (surr.)	1	%	117	114	99	110
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP07_0.2	TP07_0.6	TP07_1.1	TP11_0.2
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08412**	**S18-De08413**	**S18-De08414**	**S18-De08415**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	112	89	74	69
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	310	40	14	1400
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	16	13	9.4	18
Copper	5	mg/kg	56	47	46	53
Lead	5	mg/kg	47	12	12	22
Mercury	0.1	mg/kg	0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			TP07_0.2	TP07_0.6	TP07_1.1	TP11_0.2
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08412**	**S18-De08413**	**S18-De08414**	**S18-De08415**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Nickel	5	mg/kg	15	14	13	14
Zinc	5	mg/kg	360	80	70	240
% Moisture	1	%	15	8.2	8.0	15

Client Sample ID			TP11_0.6	TP11_1.1	TP12_0.2	TP12_0.6
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08416**	**S18-De08417**	**S18-De08418**	**S18-De08419**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	64	107	71	74
Tetrachloro-m-xylene (surr.)	1	%	91	107	109	123
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP11_0.6	TP11_1.1	TP12_0.2	TP12_0.6
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08416**	**S18-De08417**	**S18-De08418**	**S18-De08419**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	95	83	83	83
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2

Client Sample ID			TP11_0.6	TP11_1.1	TP12_0.2	TP12_0.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08416	S18-De08417	S18-De08418	S18-De08419
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	210	310	1000	120
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	12	11	16	9.4
Copper	5	mg/kg	53	46	49	42
Lead	5	mg/kg	12	15	22	10
Mercury	0.1	mg/kg	< 0.1	< 0.1	0.3	< 0.1
Nickel	5	mg/kg	23	13	13	15
Zinc	5	mg/kg	210	110	190	77
% Moisture	1	%	8.6	8.0	14	5.9

Client Sample ID			TP12_1.1	QC1	QC3	QC4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08420	S18-De08421	S18-De08422	S18-De08423
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			TP12_1.1	QC1	QC3	QC4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De08420	S18-De08421	S18-De08422	S18-De08423
Date Sampled			Dec 06, 2018	Dec 06, 2018	Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	114	93	106	111
Tetrachloro-m-xylene (surr.)	1	%	55	98	56	62
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	88	88	99	80
Triazines						
Ametryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			TP12_1.1	QC1	QC3	QC4
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08420**	**S18-De08421**	**S18-De08422**	**S18-De08423**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Triazines						
Simetryn	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Carbamate Pesticides						
Aldicarb	2	mg/kg	< 2	< 2	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2	< 2	< 2
Synthetic Pyrethroids*						
Allethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2	< 2	< 2
Heavy Metals						
Arsenic	2	mg/kg	460	770	1300	180
Cadmium	0.4	mg/kg	< 0.4	2.0	< 0.4	< 0.4
Chromium	5	mg/kg	12	14	17	9.8
Copper	5	mg/kg	45	56	50	43
Lead	5	mg/kg	12	110	19	11
Mercury	0.1	mg/kg	< 0.1	0.8	< 0.1	< 0.1
Nickel	5	mg/kg	13	11	13	17
Zinc	5	mg/kg	110	910	240	81
% Moisture	1	%	9.0	20	16	7.3

Client Sample ID			QC5	QC7
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De08424**	**S18-De08425**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit		
Organochlorine Pesticides				
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	QC5 Soil S18-De08424 Dec 06, 2018	QC7 Soil S18-De08425 Dec 06, 2018
Organochlorine Pesticides				
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	96	82
Tetrachloro-m-xylene (surr.)	1	%	51	99
Organophosphorus Pesticides				
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2

Client Sample ID			QC5	QC7
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			S18-De08424	S18-De08425
Date Sampled			Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit		
Organophosphorus Pesticides				
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	86	61
Triazines				
Ametryn	0.2	mg/kg	< 0.2	< 0.2
Atraton	0.2	mg/kg	< 0.2	< 0.2
Atrazine	0.2	mg/kg	< 0.2	< 0.2
Prometon	0.2	mg/kg	< 0.2	< 0.2
Prometryn	0.2	mg/kg	< 0.2	< 0.2
Propazine	0.2	mg/kg	< 0.2	< 0.2
Simazine	0.2	mg/kg	< 0.2	< 0.2
Simetryn	0.2	mg/kg	< 0.2	< 0.2
Terbuthylazine	0.2	mg/kg	< 0.2	< 0.2
Terbutryne	0.2	mg/kg	< 0.2	< 0.2
Carbamate Pesticides				
Aldicarb	2	mg/kg	< 2	< 2
Bendiocarb	2	mg/kg	< 2	< 2
Carbaryl	2	mg/kg	< 2	< 2
Carbofuran	2	mg/kg	< 2	< 2
Methomyl	2	mg/kg	< 2	< 2
Oxamyl	2	mg/kg	< 2	< 2
Thiobencarb	2	mg/kg	< 2	< 2
Synthetic Pyrethroids*				
Allethrin*	2	mg/kg	< 2	< 2
Cyfluthrin*	2	mg/kg	< 2	< 2
Cypermethrin (total)*	2	mg/kg	< 2	< 2
Fenvalerate*	2	mg/kg	< 2	< 2
Permethrin	2	mg/kg	< 2	< 2
Phenothrin*	2	mg/kg	< 2	< 2
Resmethrin*	2	mg/kg	< 2	< 2
Tetramethrin*	2	mg/kg	< 2	< 2
Heavy Metals				
Arsenic	2	mg/kg	400	36
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	14	11
Copper	5	mg/kg	50	43
Lead	5	mg/kg	36	9.8
Mercury	0.1	mg/kg	0.3	< 0.1
Nickel	5	mg/kg	13	12
Zinc	5	mg/kg	180	65
% Moisture	1	%	14	8.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Triazines	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2080			
Carbamate Pesticides	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2290 Carbamates in waters and soils by HPLC			
Synthetic Pyrethroids*	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2170 Synthetic Pyrethroids by HPLC-UV			
Metals M8	Melbourne	Dec 13, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Dec 07, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
Address:	2 Lincoln St	**Report #:**	631838	**Due:**	Dec 14, 2018
	Lane Cove West	**Phone:**	02 9428 8100	**Priority:**	5 Day
	NSW 2066	**Fax:**		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	TP01_0.1	Dec 06, 2018		Soil	S18-De08338		X	X	X	X	X	X
2	TP01_0.7	Dec 06, 2018		Soil	S18-De08339		X	X	X	X	X	X
3	TP01_1.2	Dec 06, 2018		Soil	S18-De08340		X	X	X	X	X	X
4	TP16_0.2	Dec 06, 2018		Soil	S18-De08341		X	X	X	X	X	X
5	TP16_0.6	Dec 06, 2018		Soil	S18-De08342		X	X	X	X	X	X
6	TP16_1.1	Dec 06, 2018		Soil	S18-De08343		X	X	X	X	X	X
7	TP02_0.2	Dec 06, 2018		Soil	S18-De08406		X	X	X	X	X	X
8	TP02_0.7	Dec 06, 2018		Soil	S18-De08407		X	X	X	X	X	X
9	TP02_1.2	Dec 06, 2018		Soil	S18-De08408		X	X	X	X	X	X

eurofins mgt

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
10	TP06_0.2	Dec 06, 2018		Soil	S18-De08409		X	X	X	X	X	X
11	TP06_0.6	Dec 06, 2018		Soil	S18-De08410		X	X	X	X	X	X
12	TP06_1.1	Dec 06, 2018		Soil	S18-De08411		X	X	X	X	X	X
13	TP07_0.2	Dec 06, 2018		Soil	S18-De08412		X	X	X	X	X	X
14	TP07_0.6	Dec 06, 2018		Soil	S18-De08413		X	X	X	X	X	X
15	TP07_1.1	Dec 06, 2018		Soil	S18-De08414		X	X	X	X	X	X
16	TP11_0.2	Dec 06, 2018		Soil	S18-De08415		X	X	X	X	X	X
17	TP11_0.6	Dec 06, 2018		Soil	S18-De08416		X	X	X	X	X	X
18	TP11_1.1	Dec 06, 2018		Soil	S18-De08417		X	X	X	X	X	X
19	TP12_0.2	Dec 06, 2018		Soil	S18-De08418		X	X	X	X	X	X
20	TP12_0.6	Dec 06, 2018		Soil	S18-De08419		X	X	X	X	X	X
21	TP12_1.1	Dec 06, 2018		Soil	S18-De08420		X	X	X	X	X	X

Company Name:	SLR Consulting (Sydney)	**Order No.:**	
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		Fax:	
Project Name:	PROTEN TAMWORTH SCA	**Received:**	Dec 7, 2018 2:21 PM
Project ID:	610.18456.00100	**Due:**	Dec 14, 2018
		Priority:	5 Day
		Contact Name:	Junaidi Ibrahim

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
22	QC1	Dec 06, 2018		Soil	S18-De08421		X	X	X	X	X	X
23	QC3	Dec 06, 2018		Soil	S18-De08422		X	X	X	X	X	X
24	QC4	Dec 06, 2018		Soil	S18-De08423		X	X	X	X	X	X
25	QC5	Dec 06, 2018		Soil	S18-De08424		X	X	X	X	X	X
26	QC7	Dec 06, 2018		Soil	S18-De08425		X	X	X	X	X	X
27	R01	Dec 06, 2018		Water	S18-De08426					X		
28	R02	Dec 06, 2018		Water	S18-De08427		X	X	X		X	
29	TP17_0.1	Dec 06, 2018		Soil	S18-De08428	X						
30	TP17_0.8	Dec 06, 2018		Soil	S18-De08429	X						
31	TP17_1.2	Dec 06, 2018		Soil	S18-De08430	X						
32	TP03_0.2	Dec 06, 2018		Soil	S18-De08431	X						
33	TP03_0.6	Dec 06, 2018		Soil	S18-De08432	X						

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	Lane Cove West	**Phone:**	02 9428 8100	**Priority:**	5 Day
	NSW 2066	**Fax:**		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
34	TP03_1.1	Dec 06, 2018		Soil	S18-De08433	X						
35	TP04_0.2	Dec 06, 2018		Soil	S18-De08434	X						
36	TP04_0.7	Dec 06, 2018		Soil	S18-De08435	X						
37	TP04_1.1	Dec 06, 2018		Soil	S18-De08436	X						
38	TP05_0.2	Dec 06, 2018		Soil	S18-De08437	X						
39	TP05_0.6	Dec 06, 2018		Soil	S18-De08438	X						
40	TP05_1.1	Dec 06, 2018		Soil	S18-De08439	X						
41	TP08_0.1	Dec 06, 2018		Soil	S18-De08440	X						
42	TP08_0.5	Dec 06, 2018		Soil	S18-De08441	X						
43	TP08_1.0	Dec 06, 2018		Soil	S18-De08442	X						
44	TP09_0.1	Dec 06, 2018		Soil	S18-De08443	X						
45	TP09_0.5	Dec 06, 2018		Soil	S18-De08444	X						

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
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	Lane Cove West	**Phone:**	02 9428 8100	**Priority:**	5 Day
	NSW 2066	**Fax:**		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
46	TP09_0.9	Dec 06, 2018		Soil	S18-De08445	X						
47	TP10_0.1	Dec 06, 2018		Soil	S18-De08446	X						
48	TP10_0.4	Dec 06, 2018		Soil	S18-De08447	X						
49	TP10_0.8	Dec 06, 2018		Soil	S18-De08448	X						
50	TP13_0.2	Dec 06, 2018		Soil	S18-De08449	X						
51	TP13_0.6	Dec 06, 2018		Soil	S18-De08450	X						
52	TP13_1.0	Dec 06, 2018		Soil	S18-De08451	X						
53	TP14_0.2	Dec 06, 2018		Soil	S18-De08452	X						
54	TP14_0.6	Dec 06, 2018		Soil	S18-De08453	X						
55	TP14_1.1	Dec 06, 2018		Soil	S18-De08454	X						
56	TP15_0.2	Dec 06, 2018		Soil	S18-De08455	X						
57	TP15_0.7	Dec 06, 2018		Soil	S18-De08456	X						

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Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	631838	**Due:**	Dec 14, 2018
		Phone:	02 9428 8100	**Priority:**	5 Day
		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
58	TP15_1.2	Dec 06, 2018		Soil	S18-De08457	X						
59	TS	Dec 06, 2018		Soil	S18-De08522	X						
60	TB	Dec 06, 2018		Soil	S18-De08523	X						
61	LAB SPIKE	Dec 06, 2018		Soil	S18-De08524	X						
Test Counts						33	27	27	27	27	27	26

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Triazines							
Ametryn	mg/kg	< 0.2			0.2	Pass	
Atraton	mg/kg	< 0.2			0.2	Pass	
Atrazine	mg/kg	< 0.2			0.2	Pass	
Prometon	mg/kg	< 0.2			0.2	Pass	
Prometryn	mg/kg	< 0.2			0.2	Pass	
Propazine	mg/kg	< 0.2			0.2	Pass	
Simazine	mg/kg	< 0.2			0.2	Pass	
Simetryn	mg/kg	< 0.2			0.2	Pass	
Terbuthylazine	mg/kg	< 0.2			0.2	Pass	
Terbutryne	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Carbamate Pesticides							
Aldicarb	mg/kg	< 2			2	Pass	
Bendiocarb	mg/kg	< 2			2	Pass	
Carbaryl	mg/kg	< 2			2	Pass	
Carbofuran	mg/kg	< 2			2	Pass	
Methomyl	mg/kg	< 2			2	Pass	
Oxamyl	mg/kg	< 2			2	Pass	
Thiobencarb	mg/kg	< 2			2	Pass	
Method Blank							
Synthetic Pyrethroids*							
Allethrin*	mg/kg	< 2			2	Pass	
Cyfluthrin*	mg/kg	< 2			2	Pass	
Cypermethrin (total)*	mg/kg	< 2			2	Pass	
Fenvalerate*	mg/kg	< 2			2	Pass	
Permethrin	mg/kg	< 2			2	Pass	
Phenothrin*	mg/kg	< 2			2	Pass	
Resmethrin*	mg/kg	< 2			2	Pass	
Tetramethrin*	mg/kg	< 2			2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	77			70-130	Pass	
4.4'-DDD	%	71			70-130	Pass	
4.4'-DDE	%	119			70-130	Pass	
4.4'-DDT	%	73			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
a-BHC	%	124			70-130	Pass	
Aldrin	%	112			70-130	Pass	
b-BHC	%	101			70-130	Pass	
d-BHC	%	123			70-130	Pass	
Dieldrin	%	115			70-130	Pass	
Endosulfan I	%	121			70-130	Pass	
Endosulfan II	%	123			70-130	Pass	
Endosulfan sulphate	%	113			70-130	Pass	
Endrin	%	104			70-130	Pass	
Endrin aldehyde	%	118			70-130	Pass	
Endrin ketone	%	101			70-130	Pass	
g-BHC (Lindane)	%	117			70-130	Pass	
Heptachlor	%	86			70-130	Pass	
Heptachlor epoxide	%	116			70-130	Pass	
Hexachlorobenzene	%	128			70-130	Pass	
Methoxychlor	%	99			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	86			70-130	Pass	
Dimethoate	%	76			70-130	Pass	
Ethion	%	104			70-130	Pass	
Fenitrothion	%	100			70-130	Pass	
Methyl parathion	%	100			70-130	Pass	
Mevinphos	%	84			70-130	Pass	
LCS - % Recovery							
Carbamate Pesticides							
Aldicarb	%	110			70-130	Pass	
Bendiocarb	%	98			70-130	Pass	
Carbaryl	%	125			70-130	Pass	
Carbofuran	%	98			70-130	Pass	
Methomyl	%	110			70-130	Pass	
Oxamyl	%	98			70-130	Pass	
Thiobencarb	%	107			70-130	Pass	
LCS - % Recovery							
Synthetic Pyrethroids*							
Allethrin*	%	88			70-130	Pass	
Cyfluthrin*	%	93			70-130	Pass	
Cypermethrin (total)*	%	95			70-130	Pass	
Fenvalerate*	%	96			70-130	Pass	
Permethrin	%	103			70-130	Pass	
Phenothrin*	%	119			70-130	Pass	
Resmethrin*	%	125			70-130	Pass	
Tetramethrin*	%	104			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	103			80-120	Pass	
Cadmium	%	99			80-120	Pass	
Chromium	%	112			80-120	Pass	
Copper	%	110			80-120	Pass	
Lead	%	113			80-120	Pass	
Mercury	%	99			75-125	Pass	
Nickel	%	105			80-120	Pass	
Zinc	%	105			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Hexachlorobenzene	S18-De11597	NCP	%	130			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M18-De14369	NCP	%	74			70-130	Pass	
4.4'-DDE	M18-De10670	NCP	%	79			70-130	Pass	
4.4'-DDT	M18-De10670	NCP	%	79			70-130	Pass	
Dieldrin	M18-De10670	NCP	%	96			70-130	Pass	
Heptachlor	M18-De10670	NCP	%	98			70-130	Pass	
Methoxychlor	M18-De10670	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Dimethoate	M18-De16675	NCP	%	73			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S18-De08343	CP	%	96			70-130	Pass	
Ethion	S18-De08343	CP	%	114			70-130	Pass	
Fenitrothion	S18-De08343	CP	%	86			70-130	Pass	
Methyl parathion	S18-De08343	CP	%	75			70-130	Pass	
Mevinphos	S18-De08343	CP	%	91			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S18-De08409	CP	%	120			70-130	Pass	
a-BHC	S18-De08409	CP	%	116			70-130	Pass	
Aldrin	S18-De08409	CP	%	101			70-130	Pass	
b-BHC	S18-De08409	CP	%	111			70-130	Pass	
d-BHC	S18-De08409	CP	%	110			70-130	Pass	
Endosulfan I	S18-De08409	CP	%	116			70-130	Pass	
Endosulfan II	S18-De08409	CP	%	122			70-130	Pass	
Endosulfan sulphate	S18-De08409	CP	%	103			70-130	Pass	
Endrin	S18-De08409	CP	%	109			70-130	Pass	
Endrin aldehyde	S18-De08409	CP	%	108			70-130	Pass	
Endrin ketone	S18-De08409	CP	%	92			70-130	Pass	
g-BHC (Lindane)	S18-De08409	CP	%	112			70-130	Pass	
Heptachlor epoxide	S18-De08409	CP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-De08409	CP	%	113			75-125	Pass	
Cadmium	S18-De08409	CP	%	95			75-125	Pass	
Chromium	S18-De08409	CP	%	108			75-125	Pass	
Copper	S18-De08409	CP	%	110			75-125	Pass	
Lead	S18-De08409	CP	%	111			75-125	Pass	
Mercury	S18-De08409	CP	%	102			70-130	Pass	
Nickel	S18-De08409	CP	%	107			75-125	Pass	
Zinc	S18-De08409	CP	%	130			75-125	Fail	Q08
Spike - % Recovery									
Carbamate Pesticides				Result 1					
Aldicarb	S18-De08412	CP	%	98			70-130	Pass	
Bendiocarb	S18-De08412	CP	%	93			70-130	Pass	
Carbaryl	S18-De08412	CP	%	118			70-130	Pass	
Carbofuran	S18-De08412	CP	%	93			70-130	Pass	
Methomyl	S18-De08412	CP	%	97			70-130	Pass	
Oxamyl	S18-De08412	CP	%	81			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Thiobencarb	S18-De08412	CP	%	103			70-130	Pass	
Spike - % Recovery									
Synthetic Pyrethroids*				Result 1					
Cyfluthrin*	S18-De08412	CP	%	92			70-130	Pass	
Cypermethrin (total)*	S18-De08412	CP	%	94			70-130	Pass	
Permethrin	S18-De08412	CP	%	98			70-130	Pass	
Resmethrin*	S18-De08412	CP	%	99			70-130	Pass	
Tetramethrin*	S18-De08412	CP	%	110			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-De08419	CP	%	113			75-125	Pass	
Cadmium	S18-De08419	CP	%	93			75-125	Pass	
Chromium	S18-De08419	CP	%	107			75-125	Pass	
Copper	S18-De08419	CP	%	115			75-125	Pass	
Lead	S18-De08419	CP	%	104			75-125	Pass	
Mercury	S18-De08419	CP	%	97			70-130	Pass	
Nickel	S18-De08419	CP	%	113			75-125	Pass	
Zinc	S18-De08419	CP	%	116			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-De08558	NCP	%	13	13	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-De08342	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S18-De08342	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-De08342	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Diazinon	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-De08342	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-De08342	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atraton	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atrazine	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometon	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometryn	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Propazine	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simazine	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simetryn	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbuthylazine	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbutryne	S18-De08342	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-De08408	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endrin ketone	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S18-De08408	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-De08408	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-De08408	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-De08408	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atraton	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atrazine	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometon	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometryn	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Propazine	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simazine	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simetryn	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbuthylazine	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbutryne	S18-De08408	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De08408	CP	mg/kg	43	36	18	30%	Pass	
Cadmium	S18-De08408	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De08408	CP	mg/kg	9.4	8.9	5.0	30%	Pass	
Copper	S18-De08408	CP	mg/kg	28	34	17	30%	Pass	
Lead	S18-De08408	CP	mg/kg	14	12	14	30%	Pass	
Mercury	S18-De08408	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-De08408	CP	mg/kg	10	11	9.0	30%	Pass	
Zinc	S18-De08408	CP	mg/kg	52	60	14	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De08409	CP	mg/kg	390	400	2.0	30%	Pass	
Cadmium	S18-De08409	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De08409	CP	mg/kg	14	14	2.0	30%	Pass	
Copper	S18-De08409	CP	mg/kg	53	54	1.0	30%	Pass	
Lead	S18-De08409	CP	mg/kg	42	43	1.0	30%	Pass	
Mercury	S18-De08409	CP	mg/kg	0.3	0.3	6.0	30%	Pass	
Nickel	S18-De08409	CP	mg/kg	13	14	1.0	30%	Pass	
Zinc	S18-De08409	CP	mg/kg	220	220	1.0	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-De08410	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S18-De08410	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-De08410	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
EPN	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-De08410	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-De08410	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atraton	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Atrazine	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometon	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Prometryn	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Propazine	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simazine	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Simetryn	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbuthylazine	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbutryne	S18-De08410	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Carbamate Pesticides				Result 1	Result 2	RPD			
Aldicarb	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Bendiocarb	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Carbaryl	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Carbofuran	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Methomyl	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Oxamyl	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Thiobencarb	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Duplicate									
Synthetic Pyrethroids*				Result 1	Result 2	RPD			
Allethrin*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cyfluthrin*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cypermethrin (total)*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Fenvalerate*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Permethrin	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phenothrin*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Resmethrin*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tetramethrin*	S18-De08411	CP	mg/kg	< 2	< 2	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De08418	CP	mg/kg	1000	1100	4.0	30%	Pass	
Cadmium	S18-De08418	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De08418	CP	mg/kg	16	16	<1	30%	Pass	
Copper	S18-De08418	CP	mg/kg	49	47	5.0	30%	Pass	
Lead	S18-De08418	CP	mg/kg	22	23	2.0	30%	Pass	
Mercury	S18-De08418	CP	mg/kg	0.3	0.3	14	30%	Pass	
Nickel	S18-De08418	CP	mg/kg	13	13	1.0	30%	Pass	
Zinc	S18-De08418	CP	mg/kg	190	190	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De08419	CP	mg/kg	120	120	3.0	30%	Pass	
Cadmium	S18-De08419	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De08419	CP	mg/kg	9.4	9.9	6.0	30%	Pass	
Copper	S18-De08419	CP	mg/kg	42	45	6.0	30%	Pass	
Lead	S18-De08419	CP	mg/kg	10	11	5.0	30%	Pass	
Mercury	S18-De08419	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-De08419	CP	mg/kg	15	16	6.0	30%	Pass	
Zinc	S18-De08419	CP	mg/kg	77	81	5.0	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

SLR Consulting
2 Lincoln St
Lane Cove West
NSW 2066

Attention: **Junaidi Ibrahim**

Report	**631838-W**
Project name	PROTEN TAMWORTH SCA
Project ID	610.18456.00100
Received Date	Dec 07, 2018

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**R01** **Water** **S18-De08426** **Dec 06, 2018**	**R02** **Water** **S18-De08427** **Dec 06, 2018**
Organochlorine Pesticides				
Chlordanes - Total	0.001	mg/L	-	< 0.001
4.4'-DDD	0.0001	mg/L	-	< 0.0001
4.4'-DDE	0.0001	mg/L	-	< 0.0001
4.4'-DDT	0.0001	mg/L	-	< 0.0001
a-BHC	0.0001	mg/L	-	< 0.0001
Aldrin	0.0001	mg/L	-	< 0.0001
b-BHC	0.0001	mg/L	-	< 0.0001
d-BHC	0.0001	mg/L	-	< 0.0001
Dieldrin	0.0001	mg/L	-	< 0.0001
Endosulfan I	0.0001	mg/L	-	< 0.0001
Endosulfan II	0.0001	mg/L	-	< 0.0001
Endosulfan sulphate	0.0001	mg/L	-	< 0.0001
Endrin	0.0001	mg/L	-	< 0.0001
Endrin aldehyde	0.0001	mg/L	-	< 0.0001
Endrin ketone	0.0001	mg/L	-	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	-	< 0.0001
Heptachlor	0.0001	mg/L	-	< 0.0001
Heptachlor epoxide	0.0001	mg/L	-	< 0.0001
Hexachlorobenzene	0.0001	mg/L	-	< 0.0001
Methoxychlor	0.0001	mg/L	-	< 0.0001
Toxaphene	0.01	mg/L	-	< 0.01
Aldrin and Dieldrin (Total)*	0.0001	mg/L	-	< 0.0001
DDT + DDE + DDD (Total)*	0.0001	mg/L	-	< 0.0001
Vic EPA IWRG 621 OCP (Total)*	0.001	mg/L	-	< 0.001
Vic EPA IWRG 621 Other OCP (Total)*	0.001	mg/L	-	< 0.001
Dibutylchlorendate (surr.)	1	%	-	53
Tetrachloro-m-xylene (surr.)	1	%	-	91
Organophosphorus Pesticides				
Azinphos-methyl	0.002	mg/L	-	< 0.002
Bolstar	0.002	mg/L	-	< 0.002
Chlorfenvinphos	0.002	mg/L	-	< 0.002
Chlorpyrifos	0.02	mg/L	-	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	-	< 0.002
Coumaphos	0.02	mg/L	-	< 0.02
Demeton-S	0.02	mg/L	-	< 0.02

Client Sample ID			R01	R02
Sample Matrix			Water	Water
Eurofins | mgt Sample No.			S18-De08426	S18-De08427
Date Sampled			Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit		
Organophosphorus Pesticides				
Demeton-O	0.002	mg/L	-	< 0.002
Diazinon	0.002	mg/L	-	< 0.002
Dichlorvos	0.002	mg/L	-	< 0.002
Dimethoate	0.002	mg/L	-	< 0.002
Disulfoton	0.002	mg/L	-	< 0.002
EPN	0.002	mg/L	-	< 0.002
Ethion	0.002	mg/L	-	< 0.002
Ethoprop	0.002	mg/L	-	< 0.002
Ethyl parathion	0.002	mg/L	-	< 0.002
Fenitrothion	0.002	mg/L	-	< 0.002
Fensulfothion	0.002	mg/L	-	< 0.002
Fenthion	0.002	mg/L	-	< 0.002
Malathion	0.002	mg/L	-	< 0.002
Merphos	0.002	mg/L	-	< 0.002
Methyl parathion	0.002	mg/L	-	< 0.002
Mevinphos	0.002	mg/L	-	< 0.002
Monocrotophos	0.002	mg/L	-	< 0.002
Naled	0.002	mg/L	-	< 0.002
Omethoate	0.002	mg/L	-	< 0.002
Phorate	0.002	mg/L	-	< 0.002
Pirimiphos-methyl	0.02	mg/L	-	< 0.02
Pyrazophos	0.002	mg/L	-	< 0.002
Ronnel	0.002	mg/L	-	< 0.002
Terbufos	0.002	mg/L	-	< 0.002
Tetrachlorvinphos	0.002	mg/L	-	< 0.002
Tokuthion	0.002	mg/L	-	< 0.002
Trichloronate	0.002	mg/L	-	< 0.002
Triphenylphosphate (surr.)	1	%	-	58
Triazines				
Ametryn	0.002	mg/L	-	< 0.002
Atraton	0.002	mg/L	-	< 0.002
Atrazine	0.002	mg/L	-	< 0.002
Prometon	0.002	mg/L	-	< 0.002
Prometryn	0.002	mg/L	-	< 0.002
Propazine	0.002	mg/L	-	< 0.002
Simazine	0.002	mg/L	-	< 0.002
Simetryn	0.002	mg/L	-	< 0.002
Terbuthylazine	0.002	mg/L	-	< 0.002
Terbutryne	0.002	mg/L	-	< 0.002
Carbamate Pesticides				
Aldicarb	0.01	mg/L	-	< 0.01
Bendiocarb	0.01	mg/L	-	< 0.01
Carbaryl	0.01	mg/L	-	< 0.01
Carbofuran	0.01	mg/L	-	< 0.01
Methomyl	0.01	mg/L	-	< 0.01
Oxamyl	0.01	mg/L	-	< 0.01
Thiobencarb	0.01	mg/L	-	< 0.01

Client Sample ID			R01	R02
Sample Matrix			Water	Water
Eurofins | mgt Sample No.			S18-De08426	S18-De08427
Date Sampled			Dec 06, 2018	Dec 06, 2018
Test/Reference	LOR	Unit		
Synthetic Pyrethroids*				
Allethrin*	0.2	mg/L	-	< 0.2
Cyfluthrin*	0.2	mg/L	-	< 0.2
Cypermethrin (total)*	0.2	mg/L	-	< 0.2
Fenvalerate*	0.2	mg/L	-	< 0.2
Permethrin	0.2	mg/L	-	< 0.2
Phenothrin*	0.2	mg/L	-	< 0.2
Resmethrin*	0.2	mg/L	-	< 0.2
Tetramethrin*	0.2	mg/L	-	< 0.2
Heavy Metals				
Arsenic	0.001	mg/L	< 0.001	-
Cadmium	0.0002	mg/L	< 0.0002	-
Chromium	0.001	mg/L	< 0.001	-
Copper	0.001	mg/L	< 0.001	-
Lead	0.001	mg/L	< 0.001	-
Mercury	0.0001	mg/L	< 0.0001	-
Nickel	0.001	mg/L	< 0.001	-
Zinc	0.005	mg/L	< 0.005	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Dec 12, 2018	7 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Dec 12, 2018	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Triazines	Melbourne	Dec 12, 2018	7 Day
- Method: LTM-ORG-2080			
Carbamate Pesticides	Melbourne	Dec 18, 2018	7 Day
- Method: LTM-ORG-2290 Carbamates in waters and soils by HPLC			
Synthetic Pyrethroids*	Melbourne	Dec 08, 2018	7 Day
- Method: LTM-ORG-2170 Synthetic Pyrethroids by HPLC-UV			
Metals M8	Melbourne	Dec 08, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	631838	**Due:**	Dec 14, 2018
		Phone:	02 9428 8100	**Priority:**	5 Day
		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	TP01_0.1	Dec 06, 2018		Soil	S18-De08338		X	X	X	X	X	X
2	TP01_0.7	Dec 06, 2018		Soil	S18-De08339		X	X	X	X	X	X
3	TP01_1.2	Dec 06, 2018		Soil	S18-De08340		X	X	X	X	X	X
4	TP16_0.2	Dec 06, 2018		Soil	S18-De08341		X	X	X	X	X	X
5	TP16_0.6	Dec 06, 2018		Soil	S18-De08342		X	X	X	X	X	X
6	TP16_1.1	Dec 06, 2018		Soil	S18-De08343		X	X	X	X	X	X
7	TP02_0.2	Dec 06, 2018		Soil	S18-De08406		X	X	X	X	X	X
8	TP02_0.7	Dec 06, 2018		Soil	S18-De08407		X	X	X	X	X	X
9	TP02_1.2	Dec 06, 2018		Soil	S18-De08408		X	X	X	X	X	X

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		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
10	TP06_0.2	Dec 06, 2018		Soil	S18-De08409		X	X	X	X	X	X
11	TP06_0.6	Dec 06, 2018		Soil	S18-De08410		X	X	X	X	X	X
12	TP06_1.1	Dec 06, 2018		Soil	S18-De08411		X	X	X	X	X	X
13	TP07_0.2	Dec 06, 2018		Soil	S18-De08412		X	X	X	X	X	X
14	TP07_0.6	Dec 06, 2018		Soil	S18-De08413		X	X	X	X	X	X
15	TP07_1.1	Dec 06, 2018		Soil	S18-De08414		X	X	X	X	X	X
16	TP11_0.2	Dec 06, 2018		Soil	S18-De08415		X	X	X	X	X	X
17	TP11_0.6	Dec 06, 2018		Soil	S18-De08416		X	X	X	X	X	X
18	TP11_1.1	Dec 06, 2018		Soil	S18-De08417		X	X	X	X	X	X
19	TP12_0.2	Dec 06, 2018		Soil	S18-De08418		X	X	X	X	X	X
20	TP12_0.6	Dec 06, 2018		Soil	S18-De08419		X	X	X	X	X	X
21	TP12_1.1	Dec 06, 2018		Soil	S18-De08420		X	X	X	X	X	X

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Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
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		Phone:	02 9428 8100	**Priority:**	5 Day
		Fax:		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
22	QC1	Dec 06, 2018		Soil	S18-De08421		X	X	X	X	X	X
23	QC3	Dec 06, 2018		Soil	S18-De08422		X	X	X	X	X	X
24	QC4	Dec 06, 2018		Soil	S18-De08423		X	X	X	X	X	X
25	QC5	Dec 06, 2018		Soil	S18-De08424		X	X	X	X	X	X
26	QC7	Dec 06, 2018		Soil	S18-De08425		X	X	X	X	X	X
27	R01	Dec 06, 2018		Water	S18-De08426					X		
28	R02	Dec 06, 2018		Water	S18-De08427		X	X	X		X	
29	TP17_0.1	Dec 06, 2018		Soil	S18-De08428	X						
30	TP17_0.8	Dec 06, 2018		Soil	S18-De08429	X						
31	TP17_1.2	Dec 06, 2018		Soil	S18-De08430	X						
32	TP03_0.2	Dec 06, 2018		Soil	S18-De08431	X						
33	TP03_0.6	Dec 06, 2018		Soil	S18-De08432	X						

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Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
34	TP03_1.1	Dec 06, 2018		Soil	S18-De08433	X						
35	TP04_0.2	Dec 06, 2018		Soil	S18-De08434	X						
36	TP04_0.7	Dec 06, 2018		Soil	S18-De08435	X						
37	TP04_1.1	Dec 06, 2018		Soil	S18-De08436	X						
38	TP05_0.2	Dec 06, 2018		Soil	S18-De08437	X						
39	TP05_0.6	Dec 06, 2018		Soil	S18-De08438	X						
40	TP05_1.1	Dec 06, 2018		Soil	S18-De08439	X						
41	TP08_0.1	Dec 06, 2018		Soil	S18-De08440	X						
42	TP08_0.5	Dec 06, 2018		Soil	S18-De08441	X						
43	TP08_1.0	Dec 06, 2018		Soil	S18-De08442	X						
44	TP09_0.1	Dec 06, 2018		Soil	S18-De08443	X						
45	TP09_0.5	Dec 06, 2018		Soil	S18-De08444	X						

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 7, 2018 2:21 PM
Address:	2 Lincoln St	**Report #:**	631838	**Due:**	Dec 14, 2018
	Lane Cove West	**Phone:**	02 9428 8100	**Priority:**	5 Day
	NSW 2066	**Fax:**		**Contact Name:**	Junaidi Ibrahim
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
46	TP09_0.9	Dec 06, 2018		Soil	S18-De08445	X						
47	TP10_0.1	Dec 06, 2018		Soil	S18-De08446	X						
48	TP10_0.4	Dec 06, 2018		Soil	S18-De08447	X						
49	TP10_0.8	Dec 06, 2018		Soil	S18-De08448	X						
50	TP13_0.2	Dec 06, 2018		Soil	S18-De08449	X						
51	TP13_0.6	Dec 06, 2018		Soil	S18-De08450	X						
52	TP13_1.0	Dec 06, 2018		Soil	S18-De08451	X						
53	TP14_0.2	Dec 06, 2018		Soil	S18-De08452	X						
54	TP14_0.6	Dec 06, 2018		Soil	S18-De08453	X						
55	TP14_1.1	Dec 06, 2018		Soil	S18-De08454	X						
56	TP15_0.2	Dec 06, 2018		Soil	S18-De08455	X						
57	TP15_0.7	Dec 06, 2018		Soil	S18-De08456	X						

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NATA # 1261 Site # 20794

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Kewdale WA 6105
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NATA # 1261
Site # 23736

Company Name:	SLR Consulting (Sydney)	**Order No.:**	
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	631838
		Phone:	02 9428 8100
		Fax:	
Project Name:	PROTEN TAMWORTH SCA		
Project ID:	610.18456.00100		

Received:	Dec 7, 2018 2:21 PM
Due:	Dec 14, 2018
Priority:	5 Day
Contact Name:	Junaidi Ibrahim

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Triazines	Carbamate Pesticides	Synthetic Pyrethroids*	Metals M8	Eurofins | mgt Suite B14	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
58	TP15_1.2	Dec 06, 2018		Soil	S18-De08457	X						
59	TS	Dec 06, 2018		Soil	S18-De08522	X						
60	TB	Dec 06, 2018		Soil	S18-De08523	X						
61	LAB SPIKE	Dec 06, 2018		Soil	S18-De08524	X						
Test Counts						33	27	27	27	27	27	26

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Triazines							
Ametryn	mg/L	< 0.002			0.002	Pass	
Atraton	mg/L	< 0.002			0.002	Pass	
Atrazine	mg/L	< 0.002			0.002	Pass	
Prometon	mg/L	< 0.002			0.002	Pass	
Prometryn	mg/L	< 0.002			0.002	Pass	
Propazine	mg/L	< 0.002			0.002	Pass	
Simazine	mg/L	< 0.002			0.002	Pass	
Simetryn	mg/L	< 0.002			0.002	Pass	
Terbuthylazine	mg/L	< 0.002			0.002	Pass	
Terbutryne	mg/L	< 0.002			0.002	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	90			70-130	Pass	
4.4'-DDD	%	91			70-130	Pass	
4.4'-DDE	%	113			70-130	Pass	
4.4'-DDT	%	93			70-130	Pass	
a-BHC	%	101			70-130	Pass	
Aldrin	%	104			70-130	Pass	
b-BHC	%	104			70-130	Pass	
d-BHC	%	108			70-130	Pass	
Dieldrin	%	95			70-130	Pass	
Endosulfan I	%	98			70-130	Pass	
Endosulfan II	%	89			70-130	Pass	
Endosulfan sulphate	%	71			70-130	Pass	
Endrin	%	83			70-130	Pass	
Endrin aldehyde	%	77			70-130	Pass	
Endrin ketone	%	72			70-130	Pass	
g-BHC (Lindane)	%	106			70-130	Pass	
Heptachlor	%	84			70-130	Pass	
Heptachlor epoxide	%	89			70-130	Pass	
Hexachlorobenzene	%	112			70-130	Pass	
Methoxychlor	%	77			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	84			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dimethoate			%	73			70-130	Pass	
Ethion			%	109			70-130	Pass	
Fenitrothion			%	94			70-130	Pass	
Methyl parathion			%	94			70-130	Pass	
Mevinphos			%	83			70-130	Pass	
LCS - % Recovery									
Triazines									
Prometryn			%	113			75-125	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	87			80-120	Pass	
Cadmium			%	83			80-120	Pass	
Chromium			%	85			80-120	Pass	
Copper			%	87			80-120	Pass	
Lead			%	86			80-120	Pass	
Mercury			%	102			75-125	Pass	
Nickel			%	87			80-120	Pass	
Zinc			%	88			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-De10416	NCP	%	89			75-125	Pass	
Cadmium	M18-De10416	NCP	%	94			75-125	Pass	
Chromium	M18-De10416	NCP	%	93			75-125	Pass	
Copper	M18-De10416	NCP	%	92			75-125	Pass	
Lead	M18-De10416	NCP	%	94			75-125	Pass	
Mercury	M18-De10416	NCP	%	92			70-130	Pass	
Nickel	M18-De10416	NCP	%	92			75-125	Pass	
Zinc	M18-De10416	NCP	%	94			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De10416	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M18-De10416	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M18-De10416	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M18-De10416	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	M18-De10416	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	M18-De10416	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M18-De10416	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	M18-De10416	NCP	mg/L	0.028	0.030	5.0	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-De04616	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endosulfan sulphate	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	S18-De04616	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Bolstar	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorfenvinphos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorpyrifos	B18-De12402	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Chlorpyrifos-methyl	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Coumaphos	B18-De12402	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-S	B18-De12402	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-O	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Diazinon	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dichlorvos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dimethoate	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Disulfoton	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
EPN	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethoprop	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethyl parathion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenitrothion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fensulfothion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenthion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Malathion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Merphos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Methyl parathion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Mevinphos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Monocrotophos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Naled	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Omethoate	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Phorate	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Pirimiphos-methyl	B18-De12402	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Pyrazophos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ronnel	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbufos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tetrachlorvinphos	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tokuthion	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Trichloronate	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Duplicate									
Triazines				Result 1	Result 2	RPD			
Ametryn	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Atraton	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Atrazine	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Prometon	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Prometryn	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Propazine	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Simazine	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	

Duplicate									
Triazines				Result 1	Result 2	RPD			
Simetryn	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbuthylazine	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbutryne	B18-De12402	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

SLR Consulting
2 Lincoln St
Lane Cove West
NSW 2066

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: **Ben Dewhurst**

Report **633738-S**
Project name PROTEN TAMWORTH SCA
Project ID 610.18456.00100
Received Date Dec 19, 2018

Client Sample ID			**TP03_0.2**	**TP03_0.6**	**TP03_1.1**	**TP08_0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De25159**	**M18-De25160**	**M18-De25161**	**M18-De25162**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	290	17	17	130
% Moisture	1	%	14	12	8.5	16

Client Sample ID			**TP08_0.5**	**TP08_1.0**	**TP13_0.2**	**TP13_0.6**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De25163**	**M18-De25164**	**M18-De25165**	**M18-De25166**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	30	13	790	100
% Moisture	1	%	9.2	9.7	16	7.8

Client Sample ID			**TP13_1.0**	**TP17_0.1**	**TP17_0.8**	**TP17_1.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De25167**	**M18-De25168**	**M18-De25169**	**M18-De25170**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	130	570	35	15
% Moisture	1	%	7.8	12	7.7	7.3

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 19, 2018	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Dec 19, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: SLR Consulting (Sydney)
Address: 2 Lincoln St
Lane Cove West
NSW 2066

Project Name: PROTEN TAMWORTH SCA
Project ID: 610.18456.00100

Order No.:
Report #: 633738
Phone: 02 9428 8100
Fax:

Received: Dec 19, 2018 10:43 AM
Due: Dec 21, 2018
Priority: 2 Day
Contact Name: Ben Dewhurst

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP03_0.2	Dec 06, 2018		Soil	M18-De25159	X	X
2	TP03_0.6	Dec 06, 2018		Soil	M18-De25160	X	X
3	TP03_1.1	Dec 06, 2018		Soil	M18-De25161	X	X
4	TP08_0.1	Dec 06, 2018		Soil	M18-De25162	X	X
5	TP08_0.5	Dec 06, 2018		Soil	M18-De25163	X	X
6	TP08_1.0	Dec 06, 2018		Soil	M18-De25164	X	X
7	TP13_0.2	Dec 06, 2018		Soil	M18-De25165	X	X
8	TP13_0.6	Dec 06, 2018		Soil	M18-De25166	X	X
9	TP13_1.0	Dec 06, 2018		Soil	M18-De25167	X	X

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 19, 2018 10:43 AM
Address:	2 Lincoln St Lane Cove West NSW 2066	**Report #:**	633738	**Due:**	Dec 21, 2018
		Phone:	02 9428 8100	**Priority:**	2 Day
		Fax:		**Contact Name:**	Ben Dewhurst
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
10	TP17_0.1	Dec 06, 2018		Soil	M18-De25168	X	X
11	TP17_0.8	Dec 06, 2018		Soil	M18-De25169	X	X
12	TP17_1.2	Dec 06, 2018		Soil	M18-De25170	X	X
Test Counts						12	12

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/kg	< 2			2	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	93			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-De25162	CP	%	94			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-De25159	CP	%	14	13	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De25161	CP	mg/kg	17	17	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De25162	CP	mg/kg	130	130	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-De25169	CP	%	7.7	7.3	5.0	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

eurofins mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

SLR Consulting
2 Lincoln St
Lane Cove West
NSW 2066

Attention: **Ben Dewhurst**

Report **634417-S**
Project name PROTEN TAMWORTH SCA
Project ID 610.18456.00100
Received Date Dec 21, 2018

Client Sample ID			**TP04_0.2**	**TP04_0.7**	**TP04_1.1**	**TP09_0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De30955**	**M18-De30956**	**M18-De30957**	**M18-De30958**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	140	20	3.6	39
% Moisture	1	%	14	12	5.6	16

Client Sample ID			**TP09_0.5**	**TP09_0.9**	**TP14_0.2**	**TP14_0.6**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De30959**	**M18-De30960**	**M18-De30961**	**M18-De30962**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	7.2	2.3	490	140
% Moisture	1	%	8.8	6.1	13	6.2

Client Sample ID			**TP14_1.1**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**M18-De30963**
Date Sampled			**Dec 06, 2018**
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic	2	mg/kg	21
% Moisture	1	%	6.7

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 27, 2018	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Dec 27, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: SLR Consulting (Sydney)
Address: 2 Lincoln St
Lane Cove West
NSW 2066

Project Name: PROTEN TAMWORTH SCA
Project ID: 610.18456.00100

Order No.:
Report #: 634417
Phone: 02 9428 8100
Fax:

Received: Dec 21, 2018 11:45 AM
Due: Jan 2, 2019
Priority: 3 Day
Contact Name: Ben Dewhurst

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP04_0.2	Dec 06, 2018		Soil	M18-De30955	X	X
2	TP04_0.7	Dec 06, 2018		Soil	M18-De30956	X	X
3	TP04_1.1	Dec 06, 2018		Soil	M18-De30957	X	X
4	TP09_0.1	Dec 06, 2018		Soil	M18-De30958	X	X
5	TP09_0.5	Dec 06, 2018		Soil	M18-De30959	X	X
6	TP09_0.9	Dec 06, 2018		Soil	M18-De30960	X	X
7	TP14_0.2	Dec 06, 2018		Soil	M18-De30961	X	X
8	TP14_0.6	Dec 06, 2018		Soil	M18-De30962	X	X
9	TP14_1.1	Dec 06, 2018		Soil	M18-De30963	X	X

Company Name:	SLR Consulting (Sydney)	**Order No.:**		**Received:**	Dec 21, 2018 11:45 AM
Address:	2 Lincoln St	**Report #:**	634417	**Due:**	Jan 2, 2019
	Lane Cove West	**Phone:**	02 9428 8100	**Priority:**	3 Day
	NSW 2066	**Fax:**		**Contact Name:**	Ben Dewhurst
Project Name:	PROTEN TAMWORTH SCA				
Project ID:	610.18456.00100				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail	Arsenic	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X
Sydney Laboratory - NATA Site # 18217		
Brisbane Laboratory - NATA Site # 20794		
Perth Laboratory - NATA Site # 23736		
Test Counts	9	9

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
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TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

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Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/kg	< 2			2	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	114			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-De30959	CP	%	133			75-125	Fail	Q08
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-De30957	CP	%	5.6	6.2	10	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De30958	CP	mg/kg	39	40	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De30959	CP	mg/kg	7.2	7.8	8.0	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

SLR Consulting
2 Lincoln St
Lane Cove West
NSW 2066

Attention: **Ben Dewhurst**

Report **634849-S**
Project name PROTEN TAMWORTH SCA
Project ID 610.18456.00100
Received Date Jan 07, 2019

Client Sample ID			**TP05_0.2**	**TP05_0.6**	**TP05_1.1**	**TP15_0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M19-Ja01585**	**M19-Ja01586**	**M19-Ja01587**	**M19-Ja01588**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	62	6.3	5.0	190
% Moisture	1	%	15	9.0	6.9	11

Client Sample ID			**TP15_0.7**	**TP15_1.2**
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**M19-Ja01589**	**M19-Ja01590**
Date Sampled			**Dec 06, 2018**	**Dec 06, 2018**
Test/Reference	LOR	Unit		
Heavy Metals				
Arsenic	2	mg/kg	19	19
% Moisture	1	%	8.3	7.9

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Jan 08, 2019	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Jan 07, 2019	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: SLR Consulting (Sydney)
Address: 2 Lincoln St
Lane Cove West
NSW 2066

Project Name: PROTEN TAMWORTH SCA
Project ID: 610.18456.00100

Order No.:
Report #: 634849
Phone: 02 9428 8100
Fax:

Received: Jan 7, 2019 9:54 AM
Due: Jan 10, 2019
Priority: 3 Day
Contact Name: Ben Dewhurst

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP05_0.2	Dec 06, 2018		Soil	M19-Ja01585	X	X
2	TP05_0.6	Dec 06, 2018		Soil	M19-Ja01586	X	X
3	TP05_1.1	Dec 06, 2018		Soil	M19-Ja01587	X	X
4	TP15_0.2	Dec 06, 2018		Soil	M19-Ja01588	X	X
5	TP15_0.7	Dec 06, 2018		Soil	M19-Ja01589	X	X
6	TP15_1.2	Dec 06, 2018		Soil	M19-Ja01590	X	X
Test Counts						6	6

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/kg	< 2			2	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	100			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M19-Ja01588	CP	%	173			75-125	Fail	Q08
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M19-Ja01559	NCP	%	26	27	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M19-Ja01587	CP	mg/kg	5.0	5.0	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M19-Ja01588	CP	mg/kg	190	200	2.0	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CERTIFICATE OF ANALYSIS

Work Order	: **ES1837035**	Page	: 1 of 6
Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: JUNAIDI IBRAHIM	Contact	: Tyler Cachia
Address	: PO BOX 176 2/2 LINCOLN ST LANECOVE NSW, AUSTRALIA 1595	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 610.18456.00100 PoTen Tamworth SCA	Date Samples Received	: 10-Dec-2018 11:18
Order number	:	Date Analysis Commenced	: 21-Dec-2018
C-O-C number	: ----	Issue Date	: 03-Jan-2019 15:42
Sampler	: ----		
Site	: ----		
Quote number	: EN/333 Secondary work BQ		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP094: The LOR for 'QC6' has been raised due to spectral interference.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	QC6	----	----	----
			Client sampling date / time	06-Dec-2018 00:00	06-Dec-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1837035-001	ES1837035-002	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	19.4	13.3	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	623	354	----	----	----
Cadmium	7440-43-9	1	mg/kg	2	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	11	11	----	----	----
Copper	7440-50-8	5	mg/kg	44	43	----	----	----
Lead	7439-92-1	5	mg/kg	107	43	----	----	----
Nickel	7440-02-0	2	mg/kg	8	11	----	----	----
Zinc	7440-66-6	5	mg/kg	839	243	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.8	0.3	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	QC2	QC6	----	----	----
			Client sampling date / time	06-Dec-2018 00:00	06-Dec-2018 00:00	----	----	----
				ES1837035-001	ES1837035-002	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.05	mg/kg	<0.05	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	----	----	----
EP094A: Synthetic Pyrethroids								
Bioresmethrin	28434-01-07	0.05	mg/kg	<0.05	<0.05	----	----	----
Bifenthrin	82657-04-3	0.05	mg/kg	<0.05	<0.05	----	----	----
Phenothrin	26002-80-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Lambda-cyhalothrin	68085-85-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Permethrin	52645-53-1	0.05	mg/kg	<0.05	<0.05	----	----	----
Cyfluthrin	68359-37-5	0.05	mg/kg	<0.05	<0.05	----	----	----
Cypermethrin	52315-07-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Fenvalerate & Esfenvalerate	51630-58-1/66230-04-	0.05	mg/kg	<0.05	<0.18	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	QC6	----	----	----
			Client sampling date / time	06-Dec-2018 00:00	06-Dec-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1837035-001	ES1837035-002	--------	--------	--------
				Result	Result	----	----	----
EP094A: Synthetic Pyrethroids - Continued								
Deltamethrin & Tralomethrin	62229-77-0/66841-25-	0.05	mg/kg	<0.05	<0.05	----	----	----
Allethrin	584-79-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Transfluthrin	118712-89-3	0.05	mg/kg	<0.05	<0.05	----	----	----
Tetramethrin	7696-12-0	0.05	mg/kg	<0.05	<0.05	----	----	----
Tau-fluvalinate	102851-06-9	0.05	mg/kg	<0.05	<0.05	----	----	----
EP094B: Synergist								
Piperonyl Butoxide	63993-73-7	0.05	mg/kg	<0.05	<0.05	----	----	----
EP201: Carbamate Pesticides by LCMS								
Oxamyl	23135-22-0	0.02	mg/kg	<0.02	<0.02	----	----	----
Methomyl	16752-77-5	0.02	mg/kg	<0.02	<0.02	----	----	----
3-Hydroxy Carbofuran	16655-82-6	0.02	mg/kg	<0.02	<0.02	----	----	----
Aldicarb	116-06-3	0.02	mg/kg	<0.02	<0.02	----	----	----
Bendiocarb	22781-23-3	0.02	mg/kg	<0.02	<0.02	----	----	----
Thiodicarb	59669-26-0	0.02	mg/kg	<0.02	<0.02	----	----	----
Carbofuran	1563-66-2	0.02	mg/kg	<0.02	<0.02	----	----	----
Carbaryl	63-25-2	0.02	mg/kg	<0.02	<0.02	----	----	----
Methiocarb	2032-65-7	0.02	mg/kg	<0.02	<0.02	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**64.8**	**85.2**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**62.9**	**83.8**	----	----	----
EP094S: Pesticide Surrogate								
DEF	78-48-8	0.05	%	**108**	**108**	----	----	----
EP201S: Carbamate Surrogate								
4-Bromo-3.5-dimethylphenyl-N-methylcarbamate	672-99-1	0.02	%	**82.5**	**92.1**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP094S: Pesticide Surrogate			
DEF	78-48-8	10	110
EP201S: Carbamate Surrogate			
4-Bromo-3.5-dimethylphenyl-N-methylcarbamate	672-99-1	59	137

CERTIFICATE OF ANALYSIS

Work Order	: **ES1832597**	Page	: 1 of 6
Client	: **SLR Consulting Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: JUNAIDI IBRAHIM	Contact	: Tyler Cachia
Address	: PO BOX 176 2/2 LINCOLN ST LANECOVE NSW, AUSTRALIA 1595	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 610.18456 DSI ProTen Tamworth	Date Samples Received	: 01-Nov-2018 15:23
Order number	:	Date Analysis Commenced	: 05-Nov-2018
C-O-C number	: ----	Issue Date	: 08-Nov-2018 16:30
Sampler	: Junaidi Ibrahim		
Site	:		
Quote number	: EN/032/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	30-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1832597-001	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**16.3**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**7**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**17**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**48**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**13**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**16**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**63**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	30-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1832597-001	--------	--------	--------	--------
				Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP068C: Triazines								
Atrazine	1912-24-9	0.05	mg/kg	<0.05	----	----	----	----
Simazine	122-34-9	0.05	mg/kg	<0.05	----	----	----	----
EP094A: Synthetic Pyrethroids								
Bioresmethrin	28434-01-07	0.05	mg/kg	<0.05	----	----	----	----
Bifenthrin	82657-04-3	0.05	mg/kg	<0.05	----	----	----	----
Phenothrin	26002-80-2	0.05	mg/kg	<0.05	----	----	----	----
Lambda-cyhalothrin	68085-85-8	0.05	mg/kg	<0.05	----	----	----	----
Permethrin	52645-53-1	0.05	mg/kg	<0.05	----	----	----	----
Cyfluthrin	68359-37-5	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	30-Oct-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1832597-001	--------	--------	--------	--------
				Result	----	----	----	----
EP094A: Synthetic Pyrethroids - Continued								
Cypermethrin	52315-07-8	0.05	mg/kg	<0.05	----	----	----	----
Fenvalverate & Esfenvalerate	51630-58-1/66230-04-	0.05	mg/kg	<0.05	----	----	----	----
Deltamethrin & Tralomethrin	62229-77-0/66841-25-	0.05	mg/kg	<0.05	----	----	----	----
Allethrin	584-79-2	0.05	mg/kg	<0.05	----	----	----	----
Transfluthrin	118712-89-3	0.05	mg/kg	<0.05	----	----	----	----
Tetramethrin	7696-12-0	0.05	mg/kg	<0.05	----	----	----	----
Tau-fluvalinate	102851-06-9	0.05	mg/kg	<0.05	----	----	----	----
EP094B: Synergist								
Piperonyl Butoxide	63993-73-7	0.05	mg/kg	<0.05	----	----	----	----
EP201: Carbamate Pesticides by LCMS								
Oxamyl	23135-22-0	0.02	mg/kg	<0.02	----	----	----	----
Methomyl	16752-77-5	0.02	mg/kg	<0.02	----	----	----	----
3-Hydroxy Carbofuran	16655-82-6	0.02	mg/kg	<0.02	----	----	----	----
Aldicarb	116-06-3	0.02	mg/kg	<0.02	----	----	----	----
Bendiocarb	22781-23-3	0.02	mg/kg	<0.02	----	----	----	----
Thiodicarb	59669-26-0	0.02	mg/kg	<0.02	----	----	----	----
Carbofuran	1563-66-2	0.02	mg/kg	<0.02	----	----	----	----
Carbaryl	63-25-2	0.02	mg/kg	<0.02	----	----	----	----
Methiocarb	2032-65-7	0.02	mg/kg	<0.02	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**71.6**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**74.8**	----	----	----	----
EP094S: Pesticide Surrogate								
DEF	78-48-8	0.05	%	**117**	----	----	----	----
EP201S: Carbamate Surrogate								
4-Bromo-3.5-dimethylphenyl-N-m ethylcarbamate	672-99-1	0.02	%	**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP094S: Pesticide Surrogate			
DEF	78-48-8	10	110
EP201S: Carbamate Surrogate			
4-Bromo-3.5-dimethylphenyl-N-methylcarbamate	672-99-1	59	137

APPENDIX E

Test Pit Logs

ENVIRONMENTAL BOREHOLE / TESTPIT TP01 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.5m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP01_0.2-0.4	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP01_0.5-0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP01_1.3-1.5	Y		Shale: (0.60 - 1.50 mBGL) Angular to sub-angular shale (20-80mm)	
1.5				Termination Depth at: 1.5m Mechanical refusal on very shale bed	

Disclaimer This log is intended for environmental not geotechnical purposes.

ENVIRONMENTAL BOREHOLE / TESTPIT TP02 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.0m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP02_0.2-0.3	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP02_0.4-0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
0.5	TP02_0.9-1.0	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-80mm)	
1				Termination Depth at: 1.0m Mechanical refusal on very stiff shale bed	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP03 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.0m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP03_0.1-0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP03_0.4-0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
0.5	TP03_0.9-1.0	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-50mm)	
1				Termination Depth at: 1.0m Mechanical refusal on very stiff shale bed	

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produced by ESlog.ESdat.net on 30 Jan 2019

ENVIRONMENTAL BOREHOLE / TESTPIT TP04 (round 1)

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 30/10/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 0.20m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP04_0.1-0.2	Y		SILTY CLAY (0.10 - 0.20 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5					
1					

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ENVIRONMENTAL BOREHOLE / TESTPIT TP01

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.3m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP01_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP01_0.7	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP01_1.2	Y		Shale: (0.60 - 1.20 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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produced by ESlog.ESdat.net on 16 Jan 2019

ENVIRONMENTAL BOREHOLE / TESTPIT TP02

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.3m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP02_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP02_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP02_1.2	Y		Shale: (0.70 - 1.3 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP03

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP03_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP03_0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP03_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (20-50mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP04

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP04_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP04_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP04_1.1	Y		Shale: (0.70 - 1.2 mBGL) Angular to sub-angular shale (20-50mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP05

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP05_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP05_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP05_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (20-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP06

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP06_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP06_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-10mm)	
1	TP06_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP07

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP07_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP07_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
1	TP07_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP08

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.1m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP08_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP08_0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP08_1.0	Y		Shale: (0.50 - 1.1 mBGL) Angular to sub-angular shale (20-30mm)	
				Termination Depth at: 1.1m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP09

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.0m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP09_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP09_0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
0.5	TP09_0.9	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-30mm)	
1				Termination Depth at: 1.0m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP10

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 0.9m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP10_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP10_0.4	Y		SILTY CLAY (0.30 - 0.40 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
0.5	TP10_0.8	Y		Shale: (0.40 - 0.90 mBGL) Angular to sub-angular shale (20-30mm)	
1				Termination Depth at: 0.90m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP11

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP11_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP11_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
1	TP11_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (10-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP12

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP12_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP12_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP12_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (10-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP13

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.1m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP13_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP13_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP13_1.0	Y		Shale: (0.60 - 1.1 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.1m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP14

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP14_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP14_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP14_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP15

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.3m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP15_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP15_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP15_1.2	Y		Shale: (0.70 - 1.3 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP16

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP16_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP16_0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP16_1.1	Y		Shale: (0.60 - 1.20 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP17

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.3m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP17_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP17_0.8	Y		SILTY CLAY (0.40 - 0.80 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP17_1.2	Y		Shale: (0.80 - 1.30 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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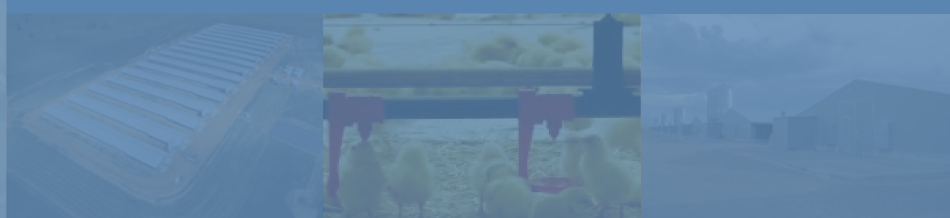
Appendix C

Remedial Action Plan

(SLR Consulting Australia 2019b)



REMEDIAL ACTION PLAN

Proposed Poultry Production Farm
Rushes Creek Road, Rushes Creek, NSW

Prepared for:

ProTen Tamworth Pty Ltd
PO Box 1746
North Sydney, NSW 2060

SLR Ref: 610.18456-R01
Version No: -v1.0
February 2019

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 Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18456-R01-v0.1	14 February 2019	Ben Dewhurst	Mo Daud	
610.18456-R01-v0.2	15 February 2019	Ben Dewhurst	Mo Daud	
610.18456-R01-v0.3	21 February 2019	Ben Dewhurst	Mo Daud	
610.18456-R01-v1.0	21 February 2019	Ben Dewhurst	Mo Daud	Mo Daud

EXECUTIVE SUMMARY

SLR Consulting Pty Ltd (SLR) was engaged by ProTen Tamworth Pty Limited (ProTen) to prepare a remedial action plan (RAP) for the proposed poultry production farm located at Rushes Creek Road, Rushes Creek, NSW (the site). The proposed remedial area within the site is currently vacant and is located beside an old abandoned sheep holding shed. The remedial area covers approximately 650 m^2, occupying a small portion of Lot 165 of Deposited Plan (DP) 752169.

Development on the site is proposed to include four individual poultry farms, eight new residential houses, and various other support/servicing infrastructure items.

This RAP has been developed based upon data acquired and recommendations made in SLR's Detailed Site Investigation (DSI) prepared for the site which identified arsenic contamination above applicable human health screening/investigation levels adjacent to a former sheep dip.

The primary remedial goal for this site is to remediate the identified arsenic impacted soil to a level that does not present an unacceptable human health exposure risk and to render the site suitable for the proposed land use. Therefore, the key objectives of the RAP are to effectively remediate arsenic impacted soil to HIL-A (ie. standard residential with garden/accessible soil) and to ensure remedial works will generally comply with the NSW EPA 2017 *Guidelines for the NSW Site Auditor Scheme*.

Following a review of feasible remedial options for the site and the agreement with the client, the preferred remedial strategy is to excavate the arsenic contaminated soil and dispose of this material off-site at a facility licenced to receive the waste.

Based on a statistical analysis of analytical results from the DSI (SLR 2019), it is estimated that approximately 80 m^3 of material will require off-site disposal as restricted solid waste (RSW) when classified as per NSW EPA (2014). The remainder of material exceeding the HIL-A guideline value, estimated to be approximately 250 m^3, will require disposal as general solid waste (GSW) when classified as per NSW EPA (2014).

Remaining soils will be validated by soil sampling and analysis and a validation report will be prepared detailing all remediation activities undertaken.

Based on the information available in the contamination assessment reports, SLR considers that soils on the site can be made suitable for the proposed land use, subject to implementation of the measures outlined in this RAP.

CONTENTS

CONTENTS

DOCUMENT REFERENCES

FIGURES

TABLES

APPENDICES

1 Introduction

SLR Consulting Pty Ltd (SLR) was engaged by ProTen Tamworth Pty Limited (ProTen) to prepare a remedial action plan (RAP) for soil impacted by arsenic near a former sheep dip at the proposed poultry production farm located at Rushes Creek Road, Rushes Creek, NSW (the site). The site is bounded by Rushes Creek Road to the east and Ski Gardens Road to the north.

The site locality and site layout have been identified in **Figure 1** and **Figure 2**. Photographs of the area and material assessed have been presented in **Appendix A**.

2 Background

SLR understands the following with respect to the proposed development:

- The development site is comprised of 14 registered freehold lots (or part lots) and one section of unformed Council public road; and
- Development on the site is proposed to include:
  - Four individual poultry farms, each comprising between 10 and 18 poultry sheds (total of 54 poultry sheds) and associated support/servicing infrastructure;
  - Eight new residential houses; and
  - Various other support/servicing infrastructure items.

Environmental assessments have been undertaken to support the proposed development, with a preliminary site investigation (PSI) and a detailed site investigation (DSI) being undertaken by SLR.

2.1 Previous Investigations

2.1.1 Preliminary Site Investigation

The PSI undertaken by SLR titled '*Stage 1 Preliminary Site Investigation Proposed Poultry Production Farm Rushes Creek Road, Rushes Creek'* dated July 2018 (SLR 2018) concluded that:

- An area of environmental concern (AEC) has been identified for the site (former sheep dip at Bundah); and
- Further investigation works are required.

Following exhibition of the Environmental Impact Statement (EIS), the Department of Planning and Environment (DPE) and the Environment Protection Authority (EPA) requested that a DSI be undertaken to assess the identified AEC prior to determination of the Development Application (DA).

2.1.2 Detailed Site Investigation

The DSI undertaken by SLR titled '*Detailed Site Investigation Proposed Poultry Production Farm Rushes Creek Road, Rushes Creek NSW'* dated February 2019 (SLR 2019) concluded the following

- Analytical results indicate that arsenic in soil, likely to be associated with the former sheep dip, is elevated above the relevant soil health investigation level (HIL) for standard residential with garden/accessible soil (HIL-A) guideline value in the National Environmental Protection Council's *National Environmental Protection (Assessment of Site Contamination) Measure*, as amended in 2013 (NEPM 2013);
- Soil sampling undertaken as part of the DSI has delineated the arsenic contamination to the north and south of the sheep dip, with low concentrations still exceeding the HIL-A guideline extending beyond the limit of the assessment to the east (assessment limited by the site shed) and to the west (with concentrations not expected to extend more than 10 metres west given the reducing concentrations from the source); and
- Based on the guidance provided in NEPM 2013, SLR considers that the arsenic in soils contamination at the site presents an unacceptable risk to present and future site users, particularly during the proposed site redevelopment. Therefore, the arsenic identified in soils at the site is considered to warrant remedial action.

A groundwater assessment was not included in the DSI due to the limited leaching potential of the identified arsenic (confirmed with toxicity characteristic leaching procedure analysis), the observed reduction in concentration within a shallow depth and the anticipated depth of groundwater.

3 Objectives

Based on the findings of the PSI (SLR 2018) and the DSI (SLR 2019), this RAP has been developed to guide the site's remediation in a manner that mitigates potential human health risks that may arise from development of the site. This RAP has been prepared to ensure that remediation of the identified arsenic contamination at the site is undertaken in accordance with applicable legislation, codes of practice, and guidelines and ensure that the site is considered suitable for the proposed use.

Specifically, the key remediation objectives are as follows:

- To ensure remedial works are undertaken in a manner that:
  - Is safe, with remediation works to be protective of human health and the environment;
  - Prevents potential cross contamination with the implementation of appropriate controls;
  - Adheres to applicable legislative requirements, including but not exclusively, the contaminated land planning guidelines and any guidelines in force under the *Contaminated Land Management Act* 1997; and
  - Confirms that materials entering and leaving the site are tracked accordingly and material to be disposed of is classified in accordance with the NSW EPA 2014 *Waste Classification Guidelines (*NSW EPA 2014*).*
- To effectively remediate arsenic in soil contamination present at the site, allowing the site to be utilised for its proposed land use; and
- To ensure that the site is remediated and environmental documentation is kept to a standard that will generally comply with the NSW EPA *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme, 3rd edition* (2017).

4 Scope of Works

SLR undertook the following scope of work to address the project objectives:

- Review of available contamination related information pertaining to the remedial area;
- Appraisal of applicable remediation options, in consideration of factors such as, but not limited to, costs, timing, and impact on proposed development work and the potential impact on the value of the development;
- Identification of the preferred remediation option;
- Consideration of the steps and processes to be followed, to successfully implement the preferred remediation option;
- Identification of the validation requirements for the preferred remediation option, to demonstrate that the remediation works have been conducted satisfactorily; and
- Preparation of this RAP.

5 Site Identification

The site locality and proposed remediation area have been identified in **Figure 1** and **Figure 2**, respectively.

The larger development site comprises the following land parcels:

- Lot 1 in DP 44215;
- Part Lot 1 in DP 1108119;
- Lot 1 in DP 1132298;
- Lots 26, 85, 86, 101, 118, 165, 166 and 171 in DP 752169;
- Part Lot 143 in DP 752189;
- Lot 1 in DP 1132078;
- Lot 1 in DP 1141148; and
- A section of unformed Council public road traversing through Lot 171 DP 752169.

The development site is irregular in shape and occupies an area of approximately 1,016 hectares. The area requiring remediation is an unsealed area of the site adjacent to the former sheep dip, located beside an old abandoned sheep holding shed. The area requiring remediation covers approximately 650 m^2, occupying a small portion of Lot 165 of Deposited Plan (DP) 752169.

5.1 Regional Geology

The NSW Government *Manilla 1: 100,000 Geological Sheet 9036*, First edition, 2013, indicates that the site is likely to be underlain primarily by Upper Devonian Mandowa Mudstone, comprising thinly bedded laminated and massive mudstone with subordinate, thin siltstone and fine-grained sandstone beds.

5.2 Site Lithology

The generalised lithology encountered at the site during the DSI (SLR 2019) can be described as:

- Topsoil: Dark brown loam topsoil was generally encountered from surface to approximately 0.1m in depth. The topsoil was generally described to be soft, dry, with low plasticity, and with vegetation present at the surface;
- Silty Clay: From depths of 0.1m to 0.7m, silty clay soil was present and can be generally described as brown to reddish brown, soft, dry, with low plasticity, with presence of angular to sub-angular shale (10-30mm) at lower depths (0.5-0.7m); and
- Shale: From depths of 0.6m to 1.3m is the presence of angular to sub-angular shale (20-50mm). It is noted that excavator refusal was typically encountered at depths of 0.9m to 1.3m due to very stiff shale.

Details of the lithology encountered during the DSI (SLR 2019) have been presented in logs and included in **Appendix B**.

5.3 Hydrogeology

The nearest significant surface water features to the remedial area are:

- Rushes Creek, located approximately 614m to the east;
- Namoi River, located approximately 3.7km to the west and 2.3km to the north; and
- Lake Keepit, located approximately 3.1km to the west (dam full supply level).

A search of the NSW Government's online groundwater works database as part of the DSI (SLR 2019) identified five registered groundwater bores within 500m of the former sheep dip location. The groundwater bore search information has been summarised in the table below.

Table 1 Groundwater boreholes within 500m of the proposed remediation area

Borehole Number	Authorised/Intended Purpose	Final Depth	Salinity	Standing Water Level
GW009093	Not Known	8.5m	Brackish	-
GW011498	Not Known	24.4m	-	-
GW038206	Not Known	12.8m	-	-
GW967028	Stock	55m	-	17.3m
GW967889	Stock, Domestic	67m	-	14m

Groundwater has not been assessed during previous investigations due to the limited leaching potential of the identified arsenic (confirmed with toxicity characteristic leaching procedure analysis), the observed reduction in concentration within a shallow depth and the anticipated depth of groundwater.

5.4 Topography

A review of the overall development site's topography conducted using Google Earth topographical data suggests that the site is relatively flat, ranging between around 325 m Australian Height Datum (AHD) and 410m AHD, with typical grades of 2% (2m in every 100m). The proposed remediation area has an elevation of approximately 373-374m AHD.

5.5 Acid Sulfate Soils

A review of the Australia Soil Resource Information System (ASRIS) indicated that there was no known occurrence of acid sulfate soils at or within the immediate vicinity of the proposed remediation area.

6 Remedial Action Plan

6.1 Remedial Goal

The primary remedial goal for this site is to remediate the identified arsenic impacted soil to a level that does not present an unacceptable human health exposure risk and to render the site suitable for the proposed development.

Given the proposed development includes residential housing (considered to be low density), the criteria applied to the remediation would be the National Environmental Protection Council's *National Environmental Protection (Assessment of Site Contamination) Measure*, as amended in 2013 (NEPM 2013) 'Schedule B1 – *Guideline on Investigation Levels for Soil and Groundwater*'. The NEPM 2013 guidelines provides a framework for the use of investigation and screening levels based on human health and ecological risks.

The soil health investigation levels (HILs) detailed in the NEPM (2013) are scientifically based, generic assessment criteria designed to be used in the initial screening of data for assessment of potential risks to human health from chronic exposure to contaminants. The following HILs are referenced in the NEPM (2013) guidelines:

- HIL-A includes standard residential with garden/accessible soil;
- HIL-B includes residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
- HIL-C includes developed open space such as parks, playground, playing fields (e.g. ovals), secondary schools and footpaths; and
- HIL-D includes commercial/industrial premises such as shops, offices, factories and industrial sites.

In consideration of the site's proposed land use, the remedial action criterial (RAC) has been selected based upon a residential (HIL-A) land use, which is considered to be the most conservative approach.

Soils exceeding the adopted RAC will require to be remediated such that the resultant contaminant concentrations are reduced to below the adopted RAC.

6.2 Extent of Remediation Required

Soil remediation is required for the arsenic impacted soil material within the vicinity of the former sheep dip.

The lateral extent of elevated arsenic detected during the DSI (SLR 2019) has been presented on **Figure 3** (upper portion of the remedial area 0.1-0.2 mbgl), **Figure 4** (intermediate portion of the remedial area 0.6-0.8 mbgl) and **Figure 5** (deep portion of the remedial area 0.9-1.3 mbgl) with the extent presented based on exceedance of the adopted HIL-A guideline value of 100 mg/kg.

The maximum depth of elevated arsenic contamination detected during the DSI (SLR 2019) was at 1.2 mbgl, however, this was the depth of practical refusal (on weathered shale) with the small excavator utilised. Given the low leachability of the arsenic contamination detected and the reducing concentrations with depth, the vertical extent is not considered to extend beyond 1.4 mbgl.

Therefore, the extent of remediation required can be summarised as follows:

- The volume of soil requiring remediation in the upper portion (surface to 0.4 mbgl) is estimated to be 200 m^3;
- The volume of soil requiring remediation in the intermediate portion (0.4 to 0. 9 mbgl) is estimated to be 70 m^3; and
- The volume of soil requiring remediation in the deeper portion (0.9 to 1.4 mbgl) is estimated to be 60 m^3.

Based on a statistical analysis of analytical results from the DSI (SLR 2019), it is estimated that approximately 80 m^3 of the upper portion of material will require off-site disposal as restricted solid waste (RSW) when classified as per NSW EPA (2014), with the lateral extent of RSW indicated on **Figure 6**.

The remainder of material exceeding the HIL-A guideline value, estimated to be approximately 250 m^3, will require disposal as general solid waste (GSW) when classified as per NSW EPA (2014).

Details of the waste classification statistical analysis undertaken (95% upper confidence level [UCL]) have been included in **Appendix C**.

The extent of shallow arsenic contamination may also extend beneath the former sheep holding shed located immediately to the east of the former sheep dip site.

Given that demolition of the site shed has not been proposed as part of the overall site development works, care will be required not to undermine the structure during remedial excavations. Therefore, hand excavation may be required for impacted soil within close proximity to the shed.

6.3 Remedial Options

In consideration of the proposed land use and fiscal viability, the remedial options outlined in the following sections are considered appropriate to remediate the site.

6.3.1 Excavation and Off-Site Disposal

Excavation of arsenic contaminated soil and disposal of soil off-site at a suitably licensed landfill facility, noting soils will require waste classification in accordance with the NSW EPA 2014 *Waste Classification Guidelines* (NSW EPA 2014) prior to off-site disposal.

The walls and base of the excavation would require validation to ensure that arsenic contamination has been adequately removed. This remedial option would not require long-term management, such as an Environmental Management Plan (EMP).

As indicated in Section 6.2, a total of 330 m^3 of excavated soil material would require off-site disposal.

6.3.2 On-Site Management – Cap and Contain

Arsenic contaminated soil identified at the site could be excavated and treated using cap and contain methodology, with the construction of a suitable containment cell to mitigate potential leaching of arsenic to underlying soil, followed by capping the impacted soils with an impermeable layer and validated clean back-fill material.

To achieve this remedial option, an adequately sized containment cell would need to be excavated and constructed at the site. Given the need for ongoing management of a containment cell, via an EMP and the potential for inclusion on the site's Section 10.7 council planning certificate, a cap and contain methodology was not considered to be the preferred remedial option.

6.4 Remedial Strategy

Based on the discussions with the client and in consideration of the proposed development, the preferred remedial strategy is excavation and off-site disposal of arsenic contaminated soil.

6.5 Remedial Sequence of Works

6.5.1 Approvals and Notifications

The remediation of soil impacted with arsenic is considered Category 2 remediation works.

As outlined in the *State Environment Planning Policy No 55 – Remediation of Land*, where Category 2 remediation work is proposed to be carried out on any land, notice of the proposed work must be issued to the council for the local government area in which the land is situated.

The notice must be given at least 30 days before the commencement of the work and must include the following:

- be in writing, and provide the name, address and telephone number of the person who has the duty of ensuring that the notice is given;
- briefly describe the remediation work;
- show why the person considers that the work is Category 2 remediation work;
- specify, by reference to its property description and street address (if any), the land on which the work is to be carried out;
- provide a map of the location of the land; and
- provide estimates of the dates for the commencement and completion of the work.

A notice of completion of remediation work on any land must be given to the council for the local government area in which the land is situated within 30 days after the completion of the work. A validation report, detailing the works undertaken will also be issued to the council within 30 days of completion of remediation work. Details to be included in the validation report have been outlined in **Section 7.3**.

6.5.2 Site Establishment

The remediation contractor will mobilise plant and equipment appropriate to the nature and extent of the project.

Site establishment will include the setup of remediation works zones with appropriate fencing, barriers and signage to delineate the zone from other work areas and set up and implementation of the environmental controls specified in this RAP.

6.5.3 Underground and Overhead Services

All services on the site will be identified prior to excavation and terminated or re-directed (as appropriate). Based on service clearance activities undertaken during the DSI, it is not anticipated that services will require termination.

6.5.4 Excavation of Arsenic Contaminated Soil

The identified arsenic impacted soil will be excavated under the supervision of an environmental consultant, in accordance with this RAP.

The remedial methodology adopted for the site will be to:

- Excavate approximately 80 m^3 of soil classified as RSW within the upper portion of the remedial area to the lateral extent indicated on **Figure 6**, to an estimated depth of 0.4 mbgl;
- Dispose of the RSW with an accompanying waste classification letter to a facility licensed to accept such waste;
- Excavate the remainder of soil that exceeds the HIL-A criteria (classified as GSW) within the upper portion of the remedial area to a depth of 0.4 mbgl to the lateral extent indicated on **Figure 3**, estimated to be approximately 120 m^3;
- Excavate soil within the intermediate portion of the remedial area (classified as GSW) to a depth of 0.9 mbgl to the lateral extent indicated on **Figure 4**, estimated to be approximately 70 m^3;
- Excavate soil within the deep portion of the remedial area (classified as GSW) to a depth of 1.4 mbgl to the lateral extent indicated on **Figure 5**, estimated to be approximately 60 m^3;
- Dispose of the GSW with an accompanying waste classification letter to a facility licensed to accept that waste;
- Validate the walls and base of the remedial excavation to ensure that all material exceeding the HIL-A guideline value has been removed from site;
- Backfill and contour the remedial area (if required).

The final extent of remediation required will be guided by laboratory analysis of validation samples, taken on the walls and base of the remedial excavation. The remediation excavations will be extended as required until the selected validation criteria are satisfied.

6.5.5 Backfilling

Backfilling is likely to be required following the remedial excavations at the site, depending on the depths of the excavation and requirements of the client (site recontouring may also be considered).

Backfilling can be undertaken using virgin excavated natural material (VENM) sourced from within the site or from an off-site source. Imported VENM from an off-site source is to be accompanied by a certificate prepared by a suitably qualified consultant verifying that the material is VENM. The VENM certificate should be reviewed and approved by a suitably qualified environmental consultant and the VENM material should be inspected by a suitably qualified environmental consultant prior to placement.

6.6 Unexpected Finds Protocol

The assessments to date have not indicated the presence of significant soil contamination that would preclude the proposed remedial activities and methodology. However, it is possible that yet unidentified contamination is present within the fill material/subsurface of the site.

Potentially hazardous substances could include, but are not limited to:

- Underground storage tanks;
- Buried containers and drums;
- Phase separated hydrocarbons;
- Powders and other suspicious buried material; and
- Evidence of contamination including significant staining, odours and discolouration.

In the event that any material suspected of containing potentially hazardous substances is found during remediation works, the following steps will be followed:

1. The environmental consultant will be consulted immediately for assessment and advice.
2. The area of concern will be cordoned off.
3. Appropriate environmental management measures will be implemented until the assessment is completed and further advice is received from the consultant.
4. The environmental consultant will undertake any necessary assessment and provide advice on a strategy to manage the identified unexpected contamination.
5. The RAP may require revision depending on the findings and proposed management strategy.

6.7 Remediation Contingency Plan

Based on likely uncertainties associated with soil remediation works of this nature, the situations and contingencies presented in **Table 2** will be considered during remediation works.

Table 2 Remediation Contingency Measures

Situation	Contingency Measure	Potential for Occurrence
Encountering yet unidentified contamination	The identified contamination (the nature and extent) will be assessed by a qualified and experienced environmental consultant, such that it can be appropriately remediated	Low potential to encounter yet unidentified contamination
Volumes of contaminated material being significantly greater than anticipated, causing the remediation works to be financially unviable	Consideration of on-site containment	Low potential to occur based on the delineation data from DSI (SLR 2019)

7 Validation

7.1 Validation Sampling

A systematic assessment of the walls and base of the remedial excavation will be undertaken by the environmental consultant.

Validation soil samples will be collected from the excavation walls and base of the remedial area at a rate of one sample per 5 linear metres along the walls (per each vertical metre of wall face equating to 2 wall samples per 5 linear metres) and one sample per 25 m^2 across the base of the excavation.

Sample will be collected and submitted to a NATA accredited laboratory for analysis for arsenic.

If the RAC for arsenic is not met by any validation sample, the remediation excavation will be extended in a manner determined by the environmental consultant and revalidated accordingly.

7.1.1 Soil Sampling and Analysis

Soil samples will be collected from each sampling point directly from the walls and base of the remedial excavation.

Observations of the materials encountered during sampling will be recorded on the relevant field observation sheet by the environmental consultant. Detailed records of validation sampling, validation failures and extension of remediation excavations will be made by the environmental consultant and included in the validation report.

7.2 Validation Criteria

7.2.1 Health Screening Levels – Arsenic

To ensure that remaining soil following remedial excavations is considered suitable for the proposed development, reference will primarily be made to the NEPM 2013 HIL-A guideline as outlined in **Section 6.1**.

Soils exceeding the adopted RAC will require to be remediated such that the resultant contaminant concentrations are reduced to below the adopted RAC.

7.2.2 Aesthetics

The NEPM (2013) requires that aesthetic quality of accessible soils be considered even if testing suggests that the concentrations of contaminants of concern are within acceptable limits.

No specific numerical guidelines have been assigned for aesthetics. However, NEPM (2013) indicates that professional judgement with regard to quantity, type and distribution of foreign material and/or odours in relation to the specific land use and its sensitivity will be employed.

The following circumstances are considered likely to trigger further aesthetic assessment:

- Highly malodorous soils (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in soil or extracted groundwater, organo-sulfur compounds);
- Discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature;

- Large monolithic deposits of otherwise low risk material, e.g. gypsum as powder or plasterboard, cement kiln dust;
- Presence of putrescible refuse including material that may generate hazardous levels of methane; and
- Soils containing residue from animal burial.

In arriving at a balanced assessment, the presence of small quantities of non-hazardous inert material and low odour residue (for example, weak petroleum hydrocarbon odours) that will decrease over time, should not be a cause of concern or limit the use of a site in most circumstances. Similarly, sites with large quantities of well-covered known inert materials that present no health hazards such as brick fragments and cement wastes (for example, broken cement blocks) are usually of low concern for both non-sensitive and sensitive land uses.

Given the results from the DSI, it is considered highly unlikely that soil will require additional remediation based on aesthetic observations.

7.3 Validation Reporting

Following the completion of all remediation activities, a validation report will be prepared in accordance with NSW OEH 2011, '*Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*'.

The validation report will include the following:

- Executive summary;
- Scope of work;
- Site identification;
- Summary of site history;
- Summary of site condition and surrounding environment;
- Summary of geology and hydrogeology;
- Information on remediation works, including site activities, waste documentation correlation and validation;
- Results of field and laboratory work;
- Field and laboratory quality assurance/control information and evaluation;
- Site validation discussion;
- Ongoing site monitoring requirements (if any); and
- Conclusions and recommendations.

8 Data Quality Objectives

Data quality objectives (DQO) have been developed using the seven step processes described in NSW EPA 2017, *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (*3rd edition*).

8.1 Step 1 – State the Problem

The objective is to assess whether the remedial goal has been achieved and whether the site presents an unacceptable human health exposure risk for the proposed land use scenario.

The main problems are:

- How the relevant site media should be assessed;
- What sampling strategy should be utilised; and
- What contaminants should be analysed for and by what method to be useful for assessment.

8.2 Step 2 – Identify the Decision

The decisions that need to be made during this project include:

- Is the field and laboratory analytical data suitable for assessing the quality of the media being assessed; and
- Does residual soil contamination remaining on site following remediation present an unacceptable exposure human health exposure risk for the proposed land use scenario.

8.3 Step 3 – Identify Inputs to the Decision

The primary inputs to assessing the above include:

- The site history;
- Location, distribution and intervals of sampling at the site;
- Data collected during previous assessments, including field measurements, field observations and laboratory analysis results;
- Outcomes of the assessment of the quality of collected data; and
- Adopted exposure risk assessment criteria.

Validation criteria will be adopted from NEPM (2013) as outlined in **Section 6.1**.

Sampling frequency will be based on information provided in NSW EPA '*Contaminated Sites: Sampling Design Guidelines'* (1995).

8.4 Step 4 – Define the Study Boundaries

The lateral extent of the soil requiring remediation has been defined in **Figures 3-5**.

The vertical boundary of the remedial excavation will be a depth of 1.4 mbgl. It is noted that the depth of excavation required will be dependent on validation results.

8.5 Step 5 – Develop a Decision Rule

The decision rules for the project will be as follows:

- If the results of the laboratory analytical data and QAQC samples are acceptable, the data will be considered suitable for the purposes of the project. Data will be assessed for completeness, comparability, representativeness, precision and accuracy;
- If the results of the laboratory analytical data are below the RAC, then the level of contamination in the media assessed will be considered an acceptable exposure risk; and
- If the results of laboratory analytical data exceed the RAC, then the level of contamination in the media assessed may require further assessment, management or remediation.

8.6 Step 6 – Specify Acceptable Limits on Decision Errors

There are two types of error:

- Deciding that contamination on the site is an acceptable risk for the proposed land use when it is not; and
- Deciding that contamination on the site is not an acceptable risk for the proposed land use when it is.

Confidence in the reliability of assessment methods (e.g. field observations, laboratory analysis and data review) will be based on appropriate levels of qualification and/or experience in the personnel undertaking the relevant task.

8.7 Step 7 – Optimise the Design for Obtaining Data

8.7.1 Photographic Records

Photographs will be taken of the remediation activities and the finished excavations.

8.7.2 Location Records

Each sampling location will be recorded using a handheld GPS unit with the depth of each sample to be recorded.

8.7.3 Sample Identification, Storage and Transport Procedures

Samples will be identified using unique sample identifiers and sample depths.

Samples will be placed in laboratory prepared containers and zip lock bags, as appropriate. The sample containers will then be placed directly into an insulated container with ice, for transportation to the NATA accredited analytical laboratory with the chain of custody (COC) form recording the following information:

- Project job number;
- Date of sampling;
- Sample identifier;
- Sample matrix and container type;
- Preservation methods used;

- Analysis requirements for each sample;
- Turnaround times required for analysis; and
- Names and signatures of sender and receiving laboratory.

A copy of the COC will be kept in the job file. Samples will be transported to the laboratory with sufficient time to perform analysis within the applicable holding period.

8.7.4 Quality Assurance / Quality Control

8.7.4.1 Intra-laboratory Duplicates

Intra-laboratory field duplicates will be collected on an average frequency of one sample per twenty samples collected (5%), with a minimum of one per batch. The analytical results of the two split samples will be compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The relative percentage difference (RPD) acceptance limits are as follows:

- No limit analytical results <10 times laboratory limit of reporting (LOR)
- 50% analytical results 10-20 times LOR
- 30% analytical results >20 times LOR

Any RPD exceedances are to be assessed to determine whether the project DQO's can still be addressed.

8.7.4.2 Inter-Laboratory Duplicates

Inter-laboratory field duplicates will be collected on an average frequency of one sample per twenty samples collected (5%) with a minimum of one per batch. The analytical results of the two split samples are to be compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The RPD acceptance limits are as follows:

- No limit analytical results <10 times LOR
- 50% analytical results 10-20 times LOR
- 30% analytical results >20 times LOR

Any RPD exceedances are to be assessed to determine whether the project DQO's can still be addressed.

8.7.4.3 Laboratory Data Quality Indicators

The laboratory data quality will be assessed by checking the following:

- Laboratory methods used are NATA accredited;
- Laboratory limits of reporting are less than adopted RAC;
- Samples are extracted and analysed within holding times; and
- Results of method blanks, surrogate, lab control sample, spike recoveries RPDs between primary and duplicate laboratory samples.

Where results of laboratory quality control samples exceed the relevant adopted control limit, the laboratory will be requested to assess the significance of the exceedance on the quality of the laboratory analytical data for the relevant batch. Based on the significance of the control limit exceedance, the data will be assessed against the project DQO’s.

8.7.4.4 Decontamination Procedures

Non-disposable sampling equipment will be decontaminated before and between sampling locations to reduce the potential for cross contamination to occur between samples. Decontamination will include the following procedure:

- Washing non-disposable sampling equipment in a solution of phosphate free detergent (e.g. Decon 90) and potable water; and
- Rinsing with distilled water.

9 Site Management

9.1 Register of Contacts

A register of contacts for the remedial works is presented in **Table 3**.

Table 3 Register of Contacts

Project Role	Person Assigned	Company	Contact Details
Project Manager	TBA	TBA	TBA
Environmental Consultant	TBA	TBA	TBA
Remediation Contractor	TBA	TBA	TBA

9.2 Hours of Operation

The remediation works will be conducted between the hours of 7:00am to 6:00pm Monday to Friday and 8:00am to 1:00pm on Saturdays (if required).

No work will be conducted on Sundays, public holidays or outside the hours specified above.

9.3 Site Signage and Contact Numbers

A sign displaying the contact details at which the remediation contractor may be contacted outside working hours (and site facilitator if different to the remediation contractor) will be displayed on the nominated remedial areas adjacent access to the areas. The signs will be displayed throughout the duration of the remediation works.

9.4 Site Security

The nominated remedial areas will be secured with appropriate fencing to prevent unauthorised access.

9.5 Soil and Water Management

9.5.1 Site Access

Vehicle access to the remedial area will be stabilised to prevent tracking of sediment onto roads and footpaths. Soil, earth, mud or similar materials will be removed from the roadway by shovelling or a means other than washing, that isn't anticipated to generate dust, on a daily basis or as required.

Trucks will be loaded adjacent to the remediation excavation. Spillages of excavated soil will be scraped / swept up and combined with the soil for off-site disposal.

Soil and sediment will be washed off vehicle/plant tyres and tracks, prior to vehicles/plant leaving the remediation area. This soil and sediment will be scraped / swept up and or disposed of depending on its contamination status.

A site-specific sediment and erosion control plan will be prepared and maintained by the remediation contractor. Erosion and sediment control measures will be maintained in a functional condition. Sediment laden stormwater runoff will be controlled using measures outlined in Landcom 2004, '*Managing Urban Stormwater - Soils and Construction*' (the Blue Book).

9.5.2 Stockpiles

It is not envisaged that stockpiling will be required. However, should stockpiling be undertaken as part of the remedial works, stockpiles of soil or other materials:

- Will be stored in a secure area;
- Will be covered. Covering of the stockpiles will be undertaken by the contractor, subject to site conditions, expected inclement weather and duration the stockpile is expected to remain on site;
- Will be placed on a level area as a low elongated mound; and
- Will be classified in accordance with the NSW EPA 2014 '*Waste Classification Guidelines'* prior to leaving site for off-site disposal (if required).

9.5.3 Groundwater and Surface Water

Given the distance between the remediation area and closest surface water body, it is considered highly unlikely that any surface water from the remedial excavation will discharge into a surface water receptor. There is also no reticulated stormwater or sewer infrastructure to receive surface water from the remedial area.

Given the likely depth of groundwater, it is considered highly unlikely that groundwater will be impacted by the proposed remedial works.

9.6 On-Site Trees

Based on the results of the DSI (SLR 2019) it is unlikely that remedial excavation will be required within the vicinity of trees. However, where excavation of fill material surrounding on-site trees is required, care and hand-tools will be utilised to clean impacted fill material from tree-root systems. The depth of excavation is not considered to have implications on the root-systems of established trees.

9.7 Noise and Vibration

Noise levels from the site during the project will not exceed the limits indicated in AS2436-1981.

No 'offensive noise' as defined under the *Protection of the Environment Operations Act 1997* will be created during remediation works/activities.

9.8 Air Quality

9.8.1 Dust

Dust may be generated during soil excavation, transport and placement activities. To prevent excessive dust generation on site and emissions beyond the site boundary, if applicable, consideration will be given to implementing following procedures:

- Securely covering all loads entering or exiting the site. All trucks carrying contaminated soil from the site must be covered securely by the contracted removalist;
- Use of water sprays across the site to suppress dust;
- Keeping excavation surfaces moist, where practical and deemed necessary;
- Wetting down of placed fill material during spreading (if required);
- Minimising soil disturbance works during windy days; and
- Maintaining stabilised site access/egress points for vehicles.

9.8.2 Odours

Given the findings of previous site assessments, generation of significant odours during the remediation works is considered to be highly unlikely.

9.9 Transport Vehicles

Haulage routes for trucks transporting soil, materials, equipment or machinery to and from the remedial area will be selected by the remediation contractor and will be meet the following objectives:

- Compliance with all traffic road rules;
- Minimisation of noise, vibration and odour to adjacent premises; and
- Utilisation of State roads and minimisation of use of local roads.

The remediation contractor will ensure that all site vehicles:

- Carrying contaminated soil from the site must be securely covered by the contracted removalist;
- Conduct deliveries of soil, materials, equipment or machinery during the hours of remediation work identified in **Section 9.2**;
- Exit the site in a forward direction; and
- Do not track soil, mud or sediment onto the road.

9.10 Waste Disposal

All contaminated soil shall be disposed of at a waste facility licensed by the NSW EPA to receive and manage the contaminated material. All disposal dockets will be retained for reconciliation against the material tracking records, and for inclusion in the validation report, to demonstrate that the waste was appropriately disposed to licensed facilities.

9.11 Importation of Fill

If soil is to be imported to the site it will be under-go a visual inspection and validation through soil sampling. If material is to be imported to the site it is recommended that the material be certified as VENM. Imported VENM material with appropriate certification will be sampled at a rate of one sample per 100 m^3 and one sample per 25 m^3 of imported material that does not have appropriate certification for a general suite of contaminants of potential concern being TRH, BTEX, PAH, OCP/OPP, metals and asbestos (presence/absence).

9.12 Occupational Health and Safety

9.12.1 Hazard Identification and Risk Assessment

Each party working within the remediation area will prepare a project specific safe work method statement (SWMS) or job safety analysis (JSA), which will include:

- Identification of hazards associated with work tasks;
- A risk assessment undertaken against each hazard identified; and
- Identification of control measures to mitigate or eliminate risks associated with the hazards identified.

9.12.2 Personnel Decontamination

Personnel working at the site are required to be decontaminated prior to leaving the remediation works zone. Decontamination will include:

- Cleaning down of boots;
- Removal and discarding of all disposable personal protection equipment (PPE) items including the coveralls and masks; and
- Washing of hands.

9.12.3 Personal Protective Equipment

The minimum PPE required to be worn by persons entering the site during remediation works will comprise of the following:

- Hard hats;
- Steel cap boots; and
- Hi-vis vest.

9.13 Emergency Preparedness

An emergency muster point will be established at the egress point of the site, to assemble workers in the event of an emergency. This muster point will be communicated to all workers during the project induction process.

Fire extinguishers and spill control kits will be available on site.

A register of contacts to be utilised in the event of an emergency is presented in Table 4.

Table 4 Emergency Response Contacts

Project Role	Person Assigned	Company	Contact Details
Emergency Services	-	Fire / Police / Ambulance	000
OH&S Regulatory Authority	-	SafeWork NSW	13 10 50
Environmental Regulatory Authority	-	NSW EPA Pollution Line	131 500
Project Manager	TBA	TBA	TBA
Remediation Contractor	TBA	TBA	TBA
Environmental Consultant	TBA	TBA	TBA

9.14 Community Relations

Given the remote location of the remediation area, it is highly unlikely that the remediation will impact on adjoining neighbours. However, in-line with the commitments made in the EIS, the surrounding residents will be notified of the remediation works at least two days prior to the commencement via a letter drop. The letter will provide an overview of planned remediation activities, advise expected works duration and hours, and advise relevant site contacts.

Communication and complaints received for the remediation works will be reported to the Project Manager. All communications and complaints will be assessed and an appropriate response, corrective and/or preventative action implemented (as necessary).

A communication and complaints register will be operated on site to ensure that concerns of local residences and businesses are recorded and addressed.

10 Conclusion

SLR considers that soils on the site can be made suitable for the proposed development, subject to:

- Implementation of the measures outlined in this RAP; and
- Preparation of a site validation report.

11 Limitations

This RAP is for the exclusive use of ProTen Tamworth Pty Limited. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR Consulting.

This report has been prepared based on the scope of services (see below). SLR Consulting cannot be held responsible to the Client and/or others for any matters outside the agreed scope of services. Other parties should not rely upon this report and should make their own enquiries and obtain independent advice in relation to such matters.

This report has been prepared by SLR Consulting with reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected (data, surveys, analyses, designs, plans and other information), which has been accepted in good faith as being accurate and valid.

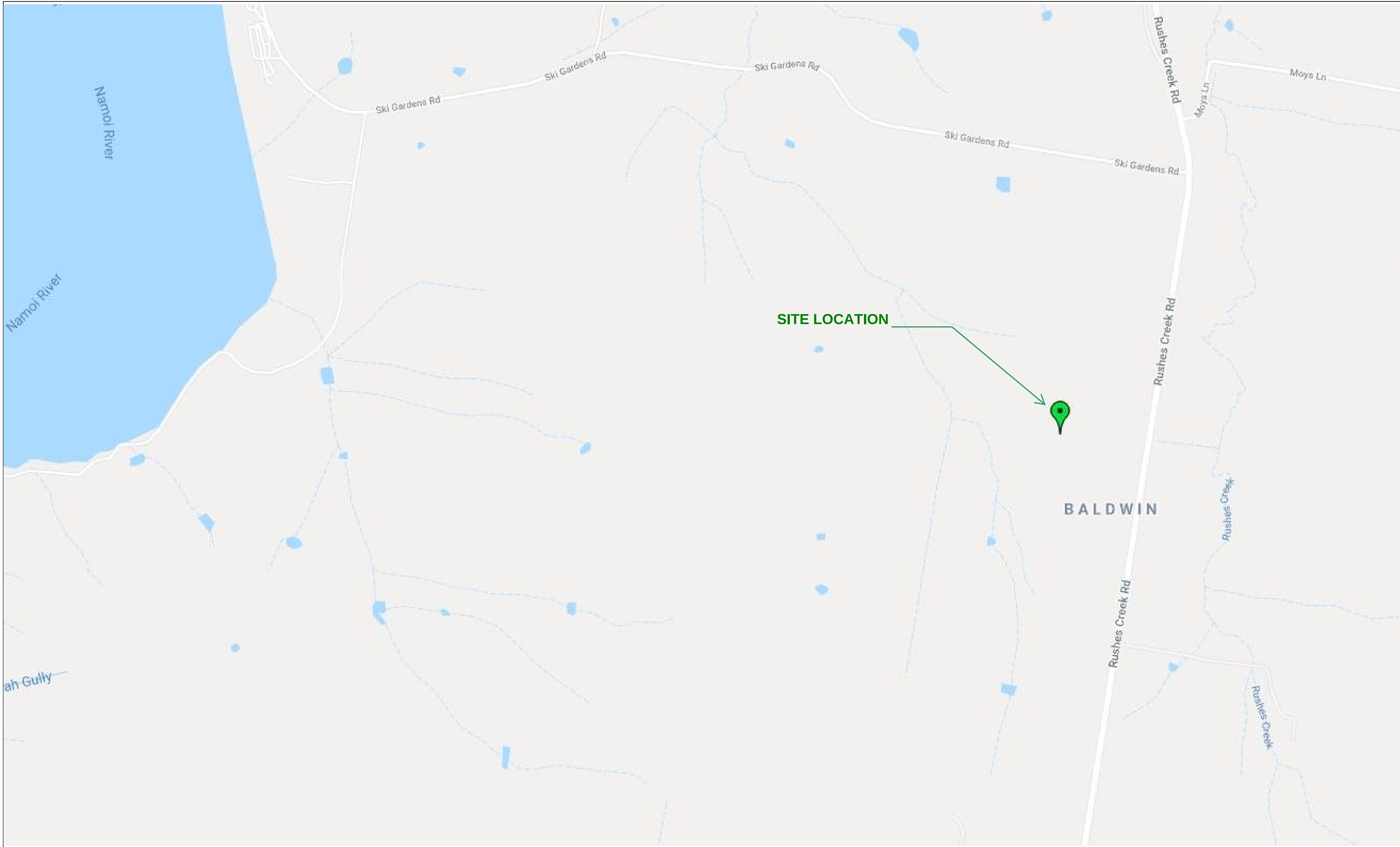
It should be noted that many investigations are based upon an assessment of potentially contaminating processes which may have occurred historically on the site. This assessment is based upon historical records associated with the site. Such records may be inaccurate, absent or contradictory. In addition documents may exist which are not readily available for public viewing.

Except where it has been stated in this report, SLR Consulting has not verified the accuracy or completeness of the data relied upon. Statements, opinions, facts, information, conclusions and/or recommendations made in this report ("conclusions") are based in whole or part on the data obtained, those conclusions are contingent upon the accuracy and completeness of the data. SLR Consulting cannot be held liable should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to SLR Consulting leading to incorrect conclusions.

Should the report be reviewed for any reason, the report must be reviewed in its entirety and in conjunction with the associated Scope of Services. It should be understood that where a report has been developed for a specific purpose, for example a due diligence report for a property vendor, it may not be suitable for other purposes such as satisfying the needs of a purchaser or assessing contamination risks for classifying the site. The report should not be applied for any purpose other than that originally specified at the time the report was issued.

Report logs, figures, laboratory data, drawings, etc. are generated for this report by SLR consultants (unless otherwise stated) based on their individual interpretation of the site conditions at the time the site visit was undertaken. Although SLR consultants undergo training to achieve a standard of field reporting, individual interpretation still varies slightly. Information should not under any circumstances be redrawn for inclusion in other documents or separated from this report in any way.

FIGURES



SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Remedial Action Plan** Ref: 610.18456.00000	**Proposed Poultry Production Complex** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 1** **Site Locality**

SLR

2 Lincoln Street,
Lane Cove,
NSW 2066
Australia

T: +61 2 9428 8100
sydney@slrconsulting.com
www.slrconsulting.com

Remedial Action Plan

Ref: 610.18456.00000

Proposed Poultry Production Complex

Rushes Creek Road, Rushes Creek, NSW

February 2019

N

Figure 2
Site Layout

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Remedial Action Plan** Ref: 610.18456.00100	**Proposed Poultry Production Complex** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 3** **Site Contamination Delineation (0.1-0.2 metres)**

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Remedial Action Plan** Ref: 610.18456.00100	**Proposed Poultry Production Complex** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 4 Site Contamination Delineation (0.6-0.8 metres)**

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Remedial Action Plan** Ref: 610.18456.00100	**Proposed Poultry Production Complex** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 5** **Site Contamination Delineation (0.9-1.3 metres)**

SLR	2 Lincoln Street, Lane Cove, NSW 2066 Australia	T: +61 2 9428 8100 sydney@slrconsulting.com www.slrconsulting.com	**Remedial Action Plan** Ref: 610.18456.00100	**Proposed Poultry Production Complex** **Rushes Creek Road, Rushes Creek, NSW**	February 2019	N	**Figure 6** **Extent of Restricted Solid Waste**

APPENDIX A

Site Photographs

Photograph 1 –View of sheep holding shed

Photograph 2 – View of potential sheep dip

Photograph 3 – View of potential sheep dip with reference to sheep holding shed

Photograph 4 – View of test-pit

Photograph 5 – Backfilling of test-pit

Photograph 6 – View of shed near the sheep holding shed

Notes:

SLR

610.18456.00000 Soil Contamination Assessment

Site:	RUSHES CREEK ROAD, RUSHES CREEK
Project:	REMEDIAL ACTION PLAN
Date:	FEBRUARY 2019
Drawing:	OBSERVATION PHOTOGRAPHS

Appendix A

7

Photograph 7 – View of sheep dip location beside sheep holding shed

Photograph 8 – View of sheep dip

Photograph 9 – Test-pit to the west of sheep dip with high Arsenic concentration

Photograph 10 – Excavator working on test-pit between sheep dip and sheep holding shed

Photograph 11 – Excavated soil from test-pit

Photograph 12 – View of location of former sheep dip beside sheep holding shed after backfilling

Notes:	610.18456.00000 Soil Contamination Assessment	Site: RUSHES CREEK ROAD, RUSHES CREEK
		Project: REMEDIAL ACTION PLAN
		Date: FEBRUARY 2019
		Drawing: **OBSERVATION PHOTOGRAPHS** — **Appendix A**

APPENDIX B

Detailed Site Investigation Test Pit Logs

ENVIRONMENTAL BOREHOLE / TESTPIT TP01 (round 1)

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 30/10/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.5m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP01_0.2-0.4	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP01_0.5-0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP01_1.3-1.5	Y		Shale: (0.60 - 1.50 mBGL) Angular to sub-angular shale (20-80mm)	
1.5				Termination Depth at: 1.5m Mechanical refusal on very shale bed	

Disclaimer This log is intended for environmental not geotechnical purposes.

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ENVIRONMENTAL BOREHOLE / TESTPIT TP02 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.0m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP02_0.2-0.3	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP02_0.4-0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
0.5	TP02_0.9-1.0	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-80mm)	
1				Termination Depth at: 1.0m Mechanical refusal on very stiff shale bed	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP03 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.0m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP03_0.1-0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP03_0.4-0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
0.5	TP03_0.9-1.0	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-50mm)	
1				Termination Depth at: 1.0m Mechanical refusal on very stiff shale bed	

ENVIRONMENTAL BOREHOLE / TESTPIT TP04 (round 1)

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 30/10/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 0.20m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP04_0.1-0.2	Y		SILTY CLAY (0.10 - 0.20 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5					
1					

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produced by ESlog.ESdat.net on 30 Jan 2019

ENVIRONMENTAL BOREHOLE / TESTPIT TP01

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.3m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP01_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP01_0.7	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP01_1.2	Y		Shale: (0.60 - 1.20 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP02

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.3m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP02_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP02_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP02_1.2	Y		Shale: (0.70 - 1.3 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP03

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP03_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP03_0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP03_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (20-50mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP04

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP04_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP04_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP04_1.1	Y		Shale: (0.70 - 1.2 mBGL) Angular to sub-angular shale (20-50mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP05

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP05_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP05_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP05_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (20-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP06

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP06_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP06_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-10mm)	
1	TP06_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP07

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP07_0.2	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP07_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
1	TP07_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP08

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.1m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP08_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP08_0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP08_1.0	Y		Shale: (0.50 - 1.1 mBGL) Angular to sub-angular shale (20-30mm)	
				Termination Depth at: 1.1m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP09

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.0m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP09_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP09_0.5	Y		SILTY CLAY (0.30 - 0.50 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP09_0.9	Y		Shale: (0.50 - 1.0 mBGL) Angular to sub-angular shale (20-30mm)	
				Termination Depth at: 1.0m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP10

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 0.9m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP10_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
	TP10_0.4	Y		SILTY CLAY (0.30 - 0.40 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
0.5	TP10_0.8	Y		Shale: (0.40 - 0.90 mBGL) Angular to sub-angular shale (20-30mm)	
1				Termination Depth at: 0.90m Mechanical refusal on very stiff shale	

Disclaimer This log is intended for environmental not geotechnical purposes.

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ENVIRONMENTAL BOREHOLE / TESTPIT TP11

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP11_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP11_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (5-15mm)	
1	TP11_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (10-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

Disclaimer This log is intended for environmental not geotechnical purposes.

ENVIRONMENTAL BOREHOLE / TESTPIT TP12

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP12_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP12_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP12_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (10-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

Disclaimer This log is intended for environmental not geotechnical purposes.

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ENVIRONMENTAL BOREHOLE / TESTPIT TP13

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.1m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP13_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP13_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP13_1.0	Y		Shale: (0.60 - 1.1 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.1m Mechanical refusal on very stiff shale	

Disclaimer This log is intended for environmental not geotechnical purposes.

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ENVIRONMENTAL BOREHOLE / TESTPIT TP14

PROJECT NUMBER 610.18456.00000
PROJECT NAME ProTen Tamworth DSI
CLIENT ProTen
ADDRESS Rushes Creek Road, Rushes Creek NSW

DRILLING DATE 06/12/2018
DRILLING COMPANY TPE Earthmoving & Civil
DRILLER
DRILLING METHOD Excavator
TOTAL DEPTH 1.2m

COORDINATES
COORD SYS
SURFACE ELEVATION
LOGGED BY Junaidi Ibrahim
CHECKED BY Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP14_0.2	Y		SILTY CLAY (0.10 - 0.30 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP14_0.6	Y		SILTY CLAY (0.30 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-15mm)	
1	TP14_1.1	Y		Shale: (0.60 - 1.2 mBGL) Angular to sub-angular shale (15-30mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP15

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.3m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP15_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP15_0.7	Y		SILTY CLAY (0.40 - 0.70 mBGL) Red/brown, stiff, dry, low plasticity, angular to sub-angular shale (10-20mm)	
1	TP15_1.2	Y		Shale: (0.70 - 1.3 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP16

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.2m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
				TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
	TP16_0.2	Y		SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP16_0.6	Y		SILTY CLAY (0.40 - 0.60 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP16_1.1	Y		Shale: (0.60 - 1.20 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.2m Mechanical refusal on very stiff shale	

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ENVIRONMENTAL BOREHOLE / TESTPIT TP17

PROJECT NUMBER 610.18456.00000	**DRILLING DATE** 06/12/2018	**COORDINATES**
PROJECT NAME ProTen Tamworth DSI	**DRILLING COMPANY** TPE Earthmoving & Civil	**COORD SYS**
CLIENT ProTen	**DRILLER**	**SURFACE ELEVATION**
ADDRESS Rushes Creek Road, Rushes Creek NSW	**DRILLING METHOD** Excavator	**LOGGED BY** Junaidi Ibrahim
	TOTAL DEPTH 1.3m	**CHECKED BY** Lachlan McWha

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	Material Description	Additional Observations
	TP17_0.1	Y		TOPSOIL: (0.00 - 0.10 mBGL) Dark brown, soft, dry, low plasticity, vegetation	
				SILTY CLAY (0.10 - 0.40 mBGL) Brown to red/brown, soft, dry, low plasticity	
0.5	TP17_0.8	Y		SILTY CLAY (0.40 - 0.80 mBGL) Red/brown, stiff, dry, low plasticity, bits of angular to sub-angular shale (5-15mm)	
1	TP17_1.2	Y		Shale: (0.80 - 1.30 mBGL) Angular to sub-angular shale (20-40mm)	
				Termination Depth at: 1.3m Mechanical refusal on very stiff shale	

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APPENDIX C

Arsenic in Soil Waste Classification 95 % UCL Statistical Analysis

	0	1	2
1	TP04a_0.1-	30-10-2018	2,600
2	TP01_0.1	06-12-2018	860
3	TP02_0.2	06-12-2018	380
4	TP06_0.2	06-12-2018	390
5	TP07_0.2	06-12-2018	310
6	TP11_0.2	06-12-2018	1,400
7	TP12_0.2	06-12-2018	1,000
8	TP16_0.2	06-12-2018	780
9	TP03_0.2	06-12-2018	290
10	TP08_0.1	06-12-2018	130
11	TP13_0.2	06-12-2018	790
12	TP17_0.1	06-12-2018	570
13	TP04_0.2	06-12-2018	140

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.113-Feb-2019 12:34:02 PM
From File	WorkSheet_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

C2

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	130	Mean	741.5
Maximum	2600	Median	570
SD	669.7	Std. Error of Mean	185.7
Coefficient of Variation	0.903	Skewness	1.97

Normal GOF Test

Shapiro Wilk Test Statistic	0.799	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1073	95% Adjusted-CLT UCL (Chen-1995)	1156
		95% Modified-t UCL (Johnson-1978)	1089

Gamma GOF Test

A-D Test Statistic	0.25	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.143	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.24	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.644	k star (bias corrected MLE)	1.316
Theta hat (MLE)	451.1	Theta star (bias corrected MLE)	563.6
nu hat (MLE)	42.74	nu star (bias corrected)	34.21
MLE Mean (bias corrected)	741.5	MLE Sd (bias corrected)	646.5
		Approximate Chi Square Value (0.05)	21.83
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	20.43

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1162	95% Adjusted Gamma UCL (use when n<50)	1242

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

58	Lognormal Statistics			
59	Minimum of Logged Data	4.868	Mean of logged Data	6.275
60	Maximum of Logged Data	7.863	SD of logged Data	0.867
61				
62	Assuming Lognormal Distribution			
63	95% H-UCL	1493	90% Chebyshev (MVUE) UCL	1318
64	95% Chebyshev (MVUE) UCL	1577	97.5% Chebyshev (MVUE) UCL	1937
65	99% Chebyshev (MVUE) UCL	2644		
66				
67	Nonparametric Distribution Free UCL Statistics			
68	Data appear to follow a Discernible Distribution at 5% Significance Level			
69				
70	Nonparametric Distribution Free UCLs			
71	95% CLT UCL	1047	95% Jackknife UCL	1073
72	95% Standard Bootstrap UCL	1043	95% Bootstrap-t UCL	1321
73	95% Hall's Bootstrap UCL	2557	95% Percentile Bootstrap UCL	1047
74	95% BCA Bootstrap UCL	1169		
75	90% Chebyshev(Mean, Sd) UCL	1299	95% Chebyshev(Mean, Sd) UCL	1551
76	97.5% Chebyshev(Mean, Sd) UCL	1901	99% Chebyshev(Mean, Sd) UCL	2590
77				
78	Suggested UCL to Use			
79	95% Student's-t UCL	1073		
80				
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
83				
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
85	Recommendations are based upon data size, data distribution, and skewness.			
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
88				

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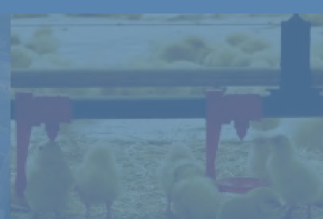
Appendix D

Response to Air Quality Issues

(Astute Environmental Consulting 2019)


Rushes Creek Poultry Production Farm SSD 7704

Response to Air Quality Issues

ProTen Tamworth Pty Limited

Job: 18-165

Date: 28 February 2019

Astute Environmental Consulting

TABLE OF CONTENTS

Project Title	Rushes Creek Poultry Production Farm SSD 7704 - Response to Air Quality Issues
Job Number	18-165
Client	ProTen Tamworth Pty Limited
Approved for release by	G. Galvin
Disclaimer and Copyright:	**This report is subject to the disclaimer and copyright statement located at www.astute-environmental.com.au.**

Document Control

Version	Date	Author	Reviewer
D1-1	05/02/19	G. Galvin	W. Shillito
D1-2	18/02/19	G. Galvin	G. Galvin
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R1-1	28/02/19	G. Galvin	G. Galvin

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1 INTRODUCTION

ProTen Tamworth (ProTen) engaged Astute Environmental (Astute) to prepare a response in relation to the air quality issues raised in the submissions received from the Environment Protection Authority (EPA), Hunter New England Local Health District (HNELHD), Gunnedah Shire Council (GSC), Animal Liberation and various community members following the exhibition of the Environmental Impact Statement (EIS) for the proposed Rushes Creek Poultry Production Farm. Many of the issues raised relate to the Pacific Environment Limited (PEL) report "ProTen Rushes Creek Poultry Production Complex – Air Quality Assessment" (AQU-QD-0006-21099, 22 June 2018) hereafter referred to as "the PEL report".

Note that two of the lead project consultants that worked on the PEL report have since left PEL (now ERM) and formed Astute.

Odour testing results from ProTen's Narrandera Poultry Production Farm and Astute's responses to the issues raised in the abovementioned submissions are provided below.

2 ODOUR TESTING

Prior to addressing the comments, recent odour test data from New South Wales is relevant. This is because it is critical to use an emission estimation methodology which reflects reality whilst still considering EPA's comments.

Additional data has been collected by ProTen since the finalisation of the PEL report. These data were collected at ProTen's relatively new Narrandera Poultry Production Farm (SSD 6882) in south western NSW, which was approved by the Department of Planning and Environment (DPE) in November 2015. The same odour impact assessment methodology used to gain approval for that site is being used here.

This site was selected as the poultry sheds and poultry production units (PPUs) at Narrandera are a very similar design, scale and layout to those proposed at Rushes Creek and have near identical operational and management procedures. Testing was performed by The Odour Unit in two sheds just before bird pickup during July 2018. Testing was performed at this point in time as both the bird numbers and bird density is at maximum.

The results are summarised in Table 2-1 and the test report is attached to this document. It can be seen in Table 2-1 that the measured K factors were significantly lower than the recommended K factor in PAEHolmes (2011) and significantly lower than the conservative K factor of 2.2 adopted in the odour assessment for Narrandera by Pacific Environment (2015). They are also significantly lower than the K factor of 2 adopted in the PEL report for Rushes Creek. This demonstrates that ProTen's newer farms are very well designed and managed and operate with minimal odour emissions, and therefore the adopted K factor of 2 at Rushes Creek is suitably conservative and represents a realistic worst case emission value.

Table 2-1: Narrandera Test Results

Location	Sample Number	Bird Age (days)	OER (ou/s)	Floor Area (m^2)	Number of Birds	Average Weight (kg)	Ventilation Rate (STP) (m^3/s)	K Factor
Farm 75 – Shed 1	1	29	10,677	2,720	46,298	1.6	49.7	0.8
	2	29	8,207	2,720	46,298	1.6	49.7	0.6
Farm 75 – Shed 2	1	29	8,297	2,720	46,332	1.6	49.3	0.7
	2	29	8,927	2,720	46,332	1.6	49.3	0.7
Average K Factor								**0.7**

The data above is consistent with odour testing at other farms in New South Wales and Queensland that have sheds holding more than 45,000 birds. Test results from farms collected by Astute from December 2017 to present are summarised below in Figure 2-1.

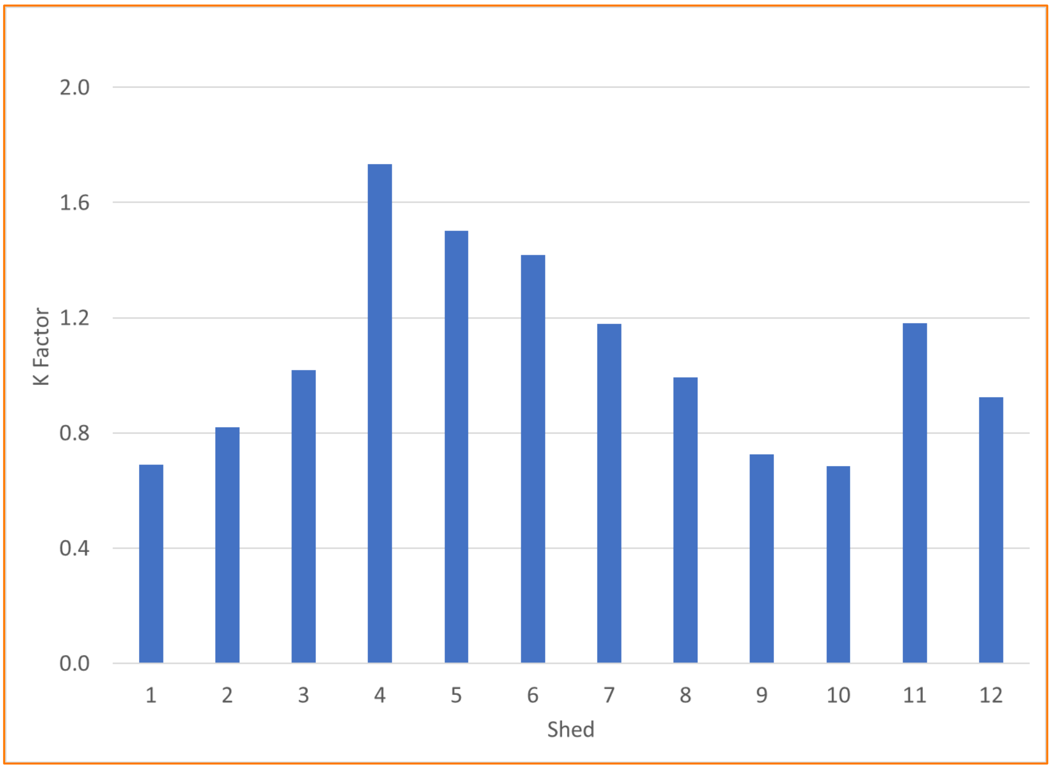


Figure 2-1: Average Queensland and NSW Farm Data –December 2017 to Present

With regard to Figure 2-1:

- All farms were less than 10 years old with most sheds being less than five years old;
- All sheds had more than 45,000 birds in them at testing;
- Testing performed in lead up to first thin or just after first thin (19-43 days, average of 30 days);
- All data points are an average K factor from two data points per shed;
- Data points 1-3, and 9-12 are for New South wales farms;
- Points 1-3 and 11-12 are from one farm with multiple units, points 5-8 are from a single farm with multiple production units;
- Data points 9 and 10 are the data shown in Table 2-1 above.
- The average K factor was 1.1 with a standard deviation of 0.3;
- Data 95th percentile was k = 1.6.

Again, the latest test data clearly shows that the adopted K factor of 2 for Rushes Creek is suitably conservative and represents an upper limit K factor.

3 EPA SUBMISSION

3.1 Odour Criterion

In their letter, EPA refer to the Lake Keepit Sport and Recreation Centre (temporary accommodation for 237 guests) and the prediction of odour concentrations in that area.

The EPA letter states:

> *The EPA notes that the highest odour prediction for the Lake Keepit Sport and Recreation Centre (237 guests) was 1.9OU. It is standard practice to round that to 2 OU. This means a small change to model parameters could result in the centre being included in the number of affected people for the purpose of the odour criterion and potentially 257 people would then be affected by odour from the proposal.*
>
> *Based on the modelling presented in the air quality assessment, the EPA considers a criterion of 3 OU may be more appropriate than the proposed 5 OU. If this was the case proposal would exceed the criterion at three additional sensitive receptors*.

The methodology used here is consistent with that required in the SEARS.

The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA, 2016)[1] lists the odour criteria to be used in New South Wales. Table 7.5 of the Approved Methods is reproduced below as Table 3-1. It can be seen in the table that as the population increases, the criteria become more stringent. As an example, a criterion of $C_{99\ 1sec}$ = 3 ou would be for a community with a population of ~500.

Table 3-1: Table 7.5 from the Approved Methods

Population of Community	Impact Criteria
Urban (~2000) 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

Whilst not included in the Approved Methods, the EPA's preferred approach is to have the proponent model the development, then count the number of dwellings within the 2 ou contour, and then determine the population based on this. This can result in an odour criterion based on an elevated population at the extremity of the model domain. In this case, assuming that the temporary visitors to the Sport & Rec Centre are the same people and continually present (i.e. permanent residents) would

[1] "the Approved Methods"

lead to a high population density being applied to a rural area which in reality is somewhat sparsely populated with permanent residents.

The EPA have highlighted a potential population in the area, including the Sport & Rec Centre, of 257 people. The 2016 Australian Bureau of Statistics (ABS) Census data is relevant with regard to this. The 2016 Census data for the Keepit and Rushes Creek areas/suburbs has a combined total population of 119 (in the area as a whole including those within the 2 ou contour). The population data from the Census website is shown in Figure 3-1 and Figure 3-2.

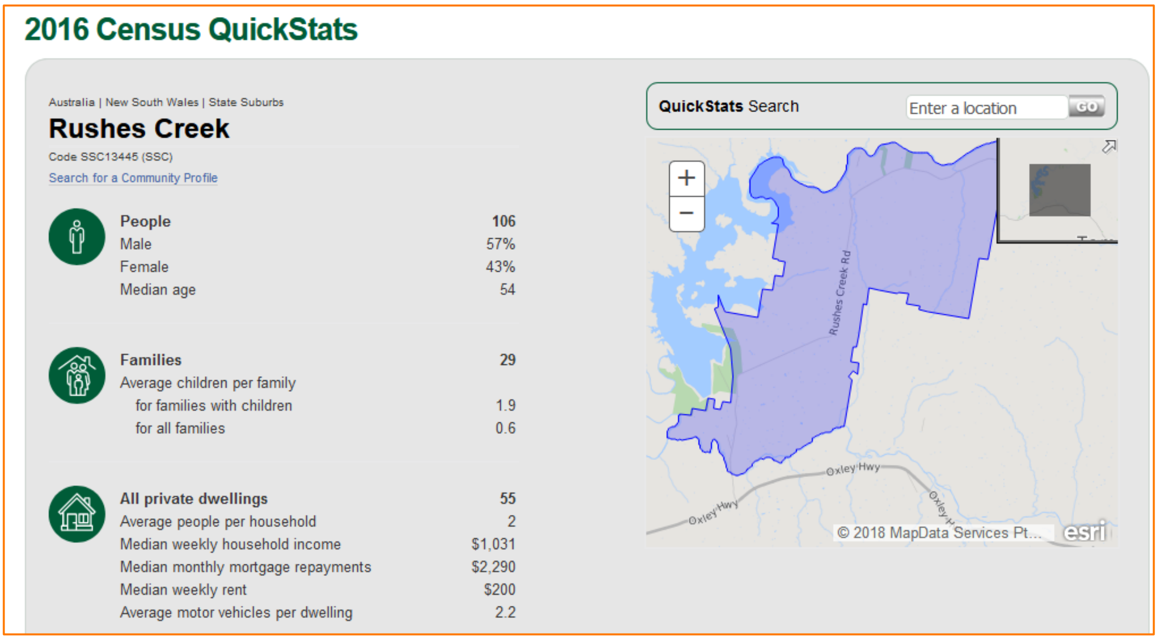
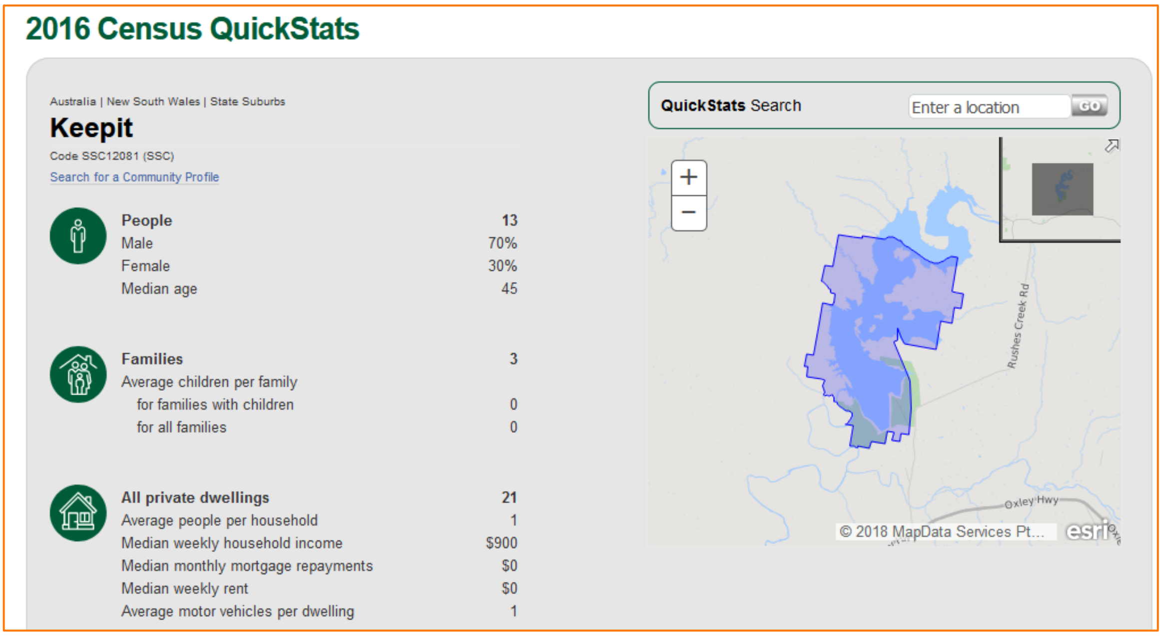


Figure 3-1: Rushes Creek Census Summary[2]

[2] http://quickstats.censusdata.abs.gov.au



2016 Census QuickStats

Australia | New South Wales | State Suburbs

Keepit

Code SSC12081 (SSC)

Search for a Community Profile

People	13
Male	70%
Female	30%
Median age	45
Families	3
Average children per family	
for families with children	0
for all families	0
All private dwellings	21
Average people per household	1
Median weekly household income	$900
Median monthly mortgage repayments	$0
Median weekly rent	$0
Average motor vehicles per dwelling	1

Figure 3-2: Keepit Census Summary

The permanent population within the 2 ou contour is far less than 119 people, as the 2 ou contour certainly does not cover the whole Lake Keepit and Rushes Creek areas. As shown in the PEL report, there are seven private residences surrounding the Development Site predicted to be within the 2 ou contour for one or more of the three modelled scenarios. While the ABS 2016 Census data for rural communities in NSW gave an average population per house of 2.4 people and Figure 3-1 and Figure 3-2show that the recorded average population per house was 2 for Rushes Creek and 1 for Lake Keepit, the PEL report conservatively adopted the EPA's elevated value of 2.8 people per house. This resulted in an estimated population potentially impacted by the Development of 20 people permanent residents. On this basis, and as previously discussed with the EPA, the applied odour criterion for the Development was 5 ou, which, according to the Approved Methods, is for a population of ~30.

If transient populations were a primary consideration for odorous operations, then, as an example, traffic on roads past odorous operations would count towards the population density, even though roads are normally not considered sensitive locations.

Given the points above, it is worthwhile considering the Sport & Rec Centre population in the context of nuisance. Nuisance is the cumulative effect on humans, of repeated events of annoyance caused by exposure to odours, over an extended period of time (DEHP, 2013; NZMfE, 2016)

For this reason, the odour criterion used for modelling (including those in New South Wales) is based on a percentile and an averaging time which assumes that the population is continually present (i.e. permanent residents). The concept of repeated exposures was also an underlying feature of the early research which lead to the use of odour modelling (for example see Miedema *et. al.* (2000)).

Another example is that of Winneke *et. al.* (2004). In their work, they showed that the percent of annoyed people within a static population around an odour source increased with the frequency of odour events. In the context of the Sport & Rec Centre the frequency of impacts would not be comparable to a fixed permanent population as the population is temporary and continually changing (i.e. staying for short periods).

Therefore, rather than assuming a static population at the Sport & Rec Centre, in the context of annoyance, based on the publications above, it would be more appropriate when considering an appropriate odour criterion to pro-rata the risk of nuisance based on the length of occupancy rather than unrealistically assuming a permanent population that is constantly impacted. Given that the guest population at the Sport & Rec Centre would be unlikely to stay months at a time, more likely a weekend or a 2-3 day stay up to a week, and the 2016 Census information in Figure 3-1 and Figure 3-2, the actual and pro-rated population would be significantly less and the appropriate odour criterion is still considered to be $C_{99\ 1sec}$ = 5 ou.

In the context of the method proposed by the EPA above for determining odour criterion for a given population, changes required to ensure that the criterion was 3 ou would limit the size of the proposed farm. The population-based approach here appears at odds with recent developments in other areas for both agricultural and non-agricultural operations in that there are numerous existing operational facilities that would not comply if assessed using the EPA's current preferred approach yet do not have a history of complaints or nuisance.

3.2 Cumulative Particulate Assessment to Approved Methods

3.2.1 Conservatism of Dust Predictions

Under Model Results and Control Options for Particulate Matter, EPA state:

"*It is not adequate to simply claim an assessment is conservative in order to disregard any predicted exceedances of a criterion*".

The conservative nature of the Mirrabooka emission method has been included in other reports for other farms previously submitted to EPA and approved, and was also included in the PEL report in Section 6.4 and shown clearly in the example provided as Figure 5-10 in the PEL report.

An updated figure has been prepared as part of this response. This is shown below in Figure 3-3 and contains data from Poultry CRC (2011) and PAEHolmes (2012) as well as the predicted emissions used in the modelling. In the figure, the blue markers show the modelled dust concentrations, the orange figures are the measured CRC data and the grey markers are measured concentrations from a farm in Queensland. It is important to note that the y axis is the mg/m^3/bird of PM_{10} present. The data was expressed this was as PAEHolmes (2012) only reported concentration data and not ventilation rates. Therefore, the data was standardised to µg/m^3/bird present at the exit of the shed and bird age as shown in the figure.

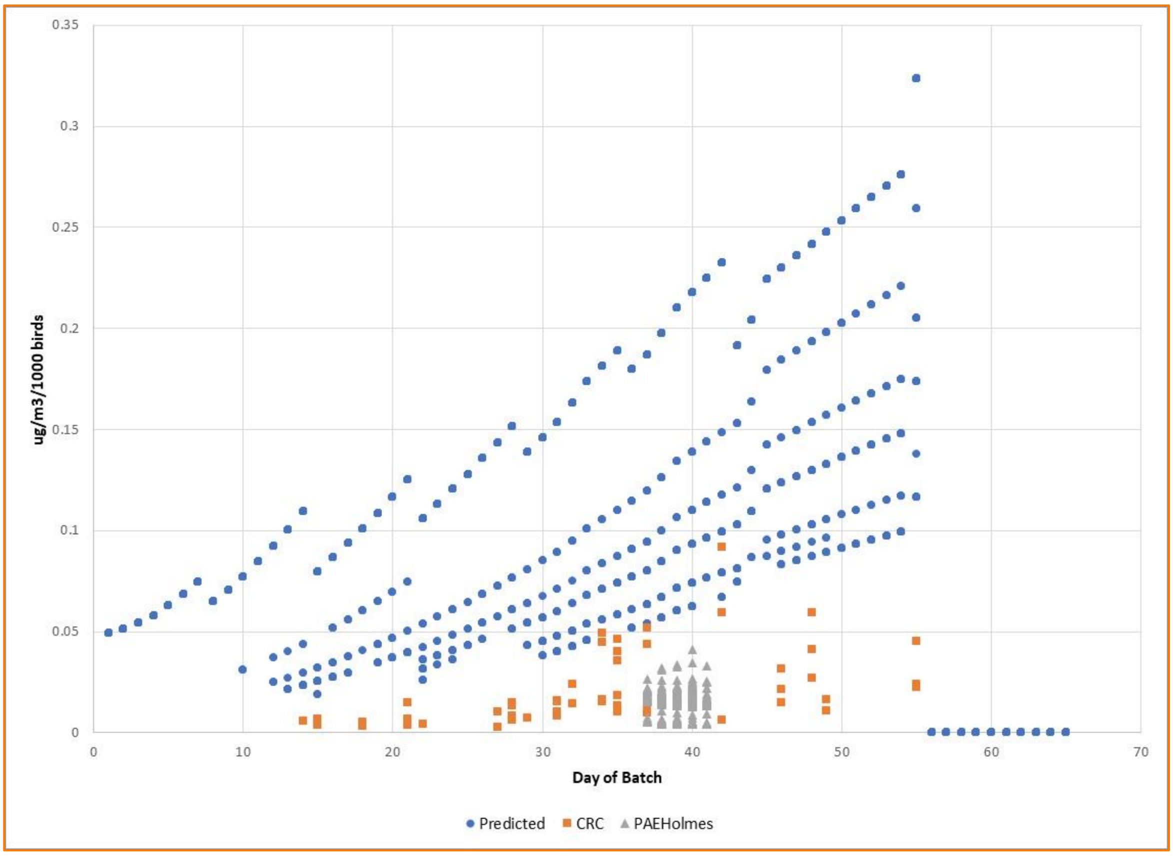


Figure 3-3: Predicted, Poultry CRC and PAEHolmes PM_{10} Emissions

Figure 3-3 shows that the Mirrabooka emission estimation method significantly overpredicts in shed dust concentrations compared to the more contemporary data. As an example, the Mirrabooka method predictions were divided by two (i.e. halved). This is shown in Figure 3-4 belowand the red arrow shows the upper predicted emissions, which would be expected to lead to the worst case impacts.

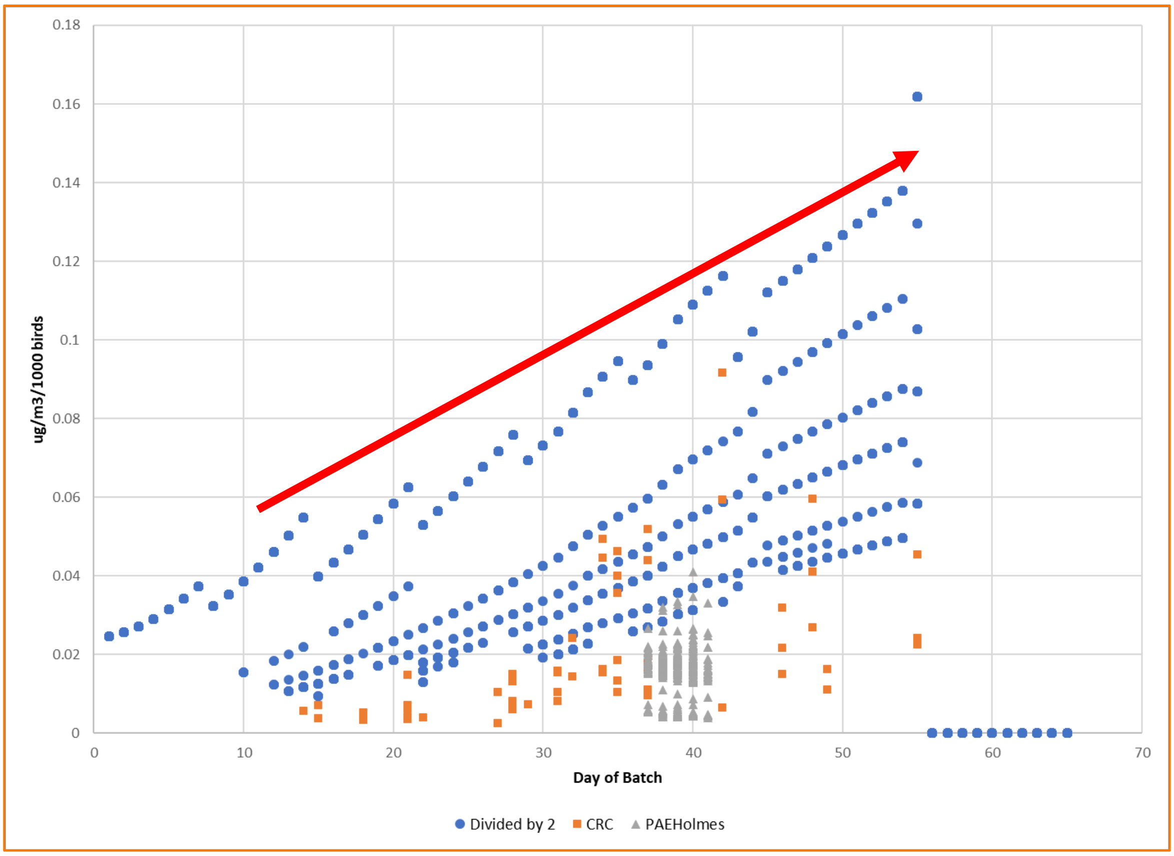


Figure 3-4: Predicted (divided by two), Poultry CRC and PAEHolmes PM_{10} Emissions

Figure 3-4 clearly shows that if the Mirrabooka predictions were divided by two, then the emissions would still be above (including outliers) the real-world data (i.e. Poultry CRC 2011 and PAEHolmes 2012). This is highlighted by the red arrow in Figure 3-4 which shows the maximum predicted in shed concentrations. The arrow highlights that the maximum emissions (which are commonly associated with worst case impacts predicted by the model) are well above the actual range of measured data (even when the concentrations are divided by two).

For the purposes of this response, we have divided the predicted emissions by two in line with the figures above. We also analysed the raw data for the Poultry CRC project (Appendix of Poultry CRC (2011)) and the data in PAEHolmes (2012)[3] where the data shows the daily average concentration. These data are shown below in Figure 3-5 with the predicted concentrations used for the modelling divided by two/halved. The units are µg/m³ per bird present. The figure shows, that even divided by two, the predicted emissions used in the modelling are well above the real-world data. Therefore, the modelling, as presented in the EIS, is suitably conservative.

[3] Real time PM_{10} concentrations calibrated against a high volume sampler recorded constantly for five days.

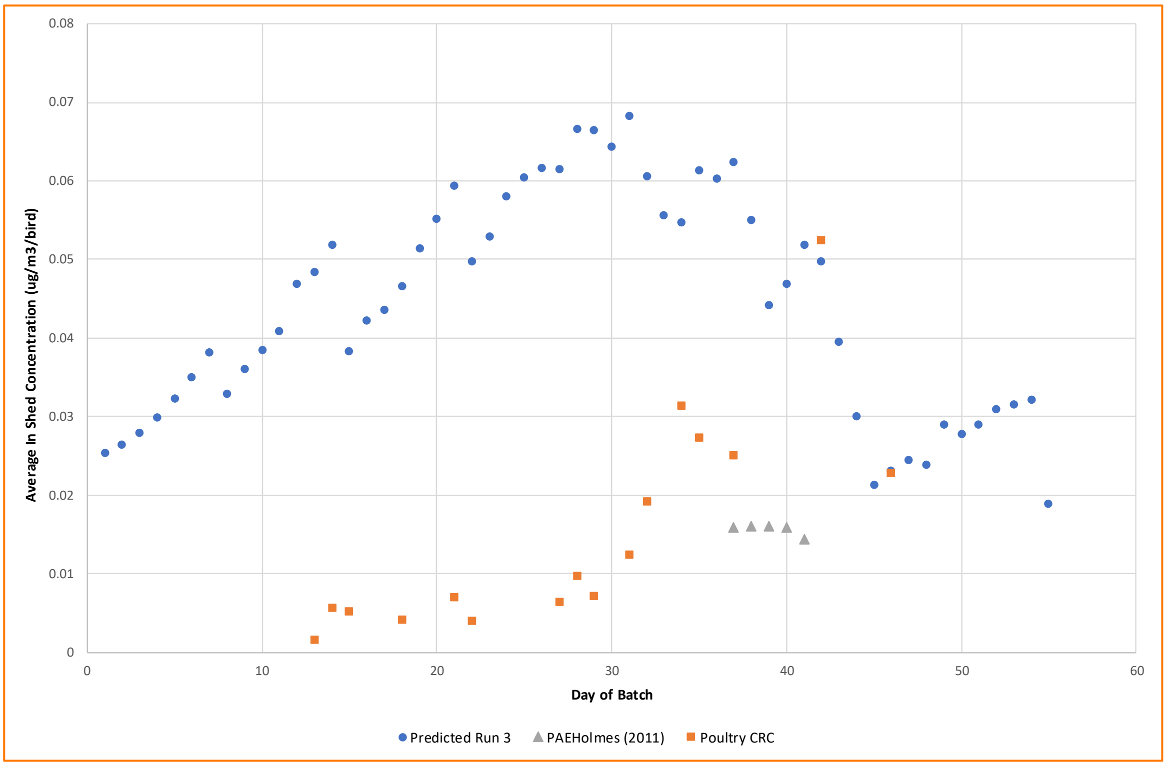


Figure 3-5: Average in Shed Concentration Predicted and Real World Data[4]

On this basis, the findings and conclusions report in the PEL report and the EIS remain correct. In summary, the modelling results 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 (compliance is achieved for the other two modelled scenarios). As detailed above, 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. 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 and compliance is expected.

3.2.2 PM_{10} Results

The particulate matter assessment was included in Sections 2.2, 3.4, 5.4, 6.2 and 8 of the PEL report. In the EPA letter, it was noted:

> *The cumulative particulate assessment presented in the EA has not been carried out in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA 2017) (Approved Methods). The applicant should revise the cumulative particulate assessment to conform to the Approved Methods.*

[4] Day 35 in the CRC data appears to be an outlier however this was not checked statistically.

Chapter 5 of the Approved Methods outlines how to use background concentrations of pollutants to assess the total impact of a proposal. Ambient monitoring data must be coincident in time with weather data used in dispersion modelling.

The air quality assessment included a Level 2 assessment where at each receptor, each individual model prediction was added to the corresponding measured background concentration to obtain an hourly prediction of cumulative particulate concentration.

The cumulative particulate assessment was not conducted in accordance with the Approved Methods, as the meteorological data (from 2005) used in dispersion modelling was not coincident in time with the ambient monitoring data from 2016.

The Approved Methods allow two methods to be used for background concentrations:

- Level 1 – Maximum background concentration for the averaging period in question added to the maximum concentration at each receptor; or
- Level 2 – Obtain background monitoring data for the averaging period required, add the background concentration for each hour at each receptor to the concentration predicted at each receptor. Determine the 100th percentile concentration at each receptor.

A downside to having to use maximum background concentration and maximum predicted concentrations is that if there is one period in the background dataset which is above the criterion, then the site "fails". Whilst there is a worked example in the Approved Methods, it does not show an exceedance event driven purely by the background concentration.

As noted in Section 4.1 of the Approved Methods, a Level 2 assessment should include "*at least one year of site-representative meteorological data*". If on site data is not used, then the year modelled should be "*correlated against a longer-duration site-representative meteorological database of at least five years (preferably five consecutive years) to be deemed acceptable. It must be clearly established that the data adequately describes the expected meteorological patterns at the site under investigation (e.g. wind speed, wind direction, ambient temperature, atmospheric stability class, inversion conditions and katabatic drift)".*

We note that katabatic[5] drift cannot be defined by the data, confirming the influence of katabatic drift is achieved by running a suitable model (in this case CALPUFF) with suitable model settings (i.e. SVMIN 0.2 and WSCALM matching the input data). The fact that the contours change with direction from the source, and the shape of the contours, as well as experience in using the model at a variety of sites indicates that this is being incorporated in the modelling.

The PEL report in Section 4.1.1 detailed the approach used to select a representative year. In line with the Approved Methods, weather data for the years 2005 to 2012 at Tamworth Airport BoM weather station were analysed and the year 2005 was selected as the most representative year. Furthermore, the wind roses presented in Figure 4-1 and Figure 4-2 in the PEL report showed little variation year to year.

[5] is a generic term used for downslope winds which move from high elevations downslope to the valleys or plains below.

As noted in the PEL report, the Tamworth OEH station is not considered to be representative for concentrations in rural areas, and therefore, EPA provided data from the Namoi Region Air Quality Monitoring Project site at Wil-gai. The data provided was summarised in Figure 3-6 of the PEL report for the period provided by EPA (July 2015 to September 2017). During this period the 24 hour concentrations were all low, with the exception of one event which was just above the 50 µg/m^3 criterion. As noted above, using this either as a background value or contemporaneously would result in a project failing.

As EPA has requested the same year to be used, the background data from the Tamworth OEH monitoring station for 2005 has been revisited. We note that the Tamworth data for 2005 (i.e. the representative meteorological year) was not used originally due to data gaps and it was considered relevant to use a more recent year. As a general rule, a representative full year of data is preferable to an incomplete dataset.

The data gaps were associated with instrument failures which led to data availability rates lower than the Ambient Air Quality NEPM goal at the site (Department of Environment and Conservation (NSW), 2006).

With regard to the available 2005 data, during this period there were two exceedances of the 24 hour standard due to dust storms and/or bushfires (Department of Environment and Conservation (NSW), 2006). Overall, the highest value was 68.2 µg/m^3 and the 6th highest was 33.4 µg/m^3.

Whilst the Approved Methods does not provide guidance with regard to exceedances the NEPM does define an exceptional event rule. This allows exceptional event data to be removed from compliance reports (Department of the Environment, 2016). Exceptional events are defined as follows:

> *Exceptional event means a fire or dust occurrence that adversely affects air quality at a particular location, and causes an exceedance of 1 day average standards in excess of normal historical fluctuations and background levels, and is directly related to: bushfire; jurisdiction authorised hazard reduction burning; or continental scale windblown dust.*

Therefore, the two events were removed from the Tamworth 2005 data leaving a maximum 24-hour average concentration of 39 µg/m^3. The remaining data is shown below in Figure 3-6. To supplement the gaps in the 2005 data, the average of 12 years of data for each missing day was placed into the dataset. This is shown in **Figure 3-7**.

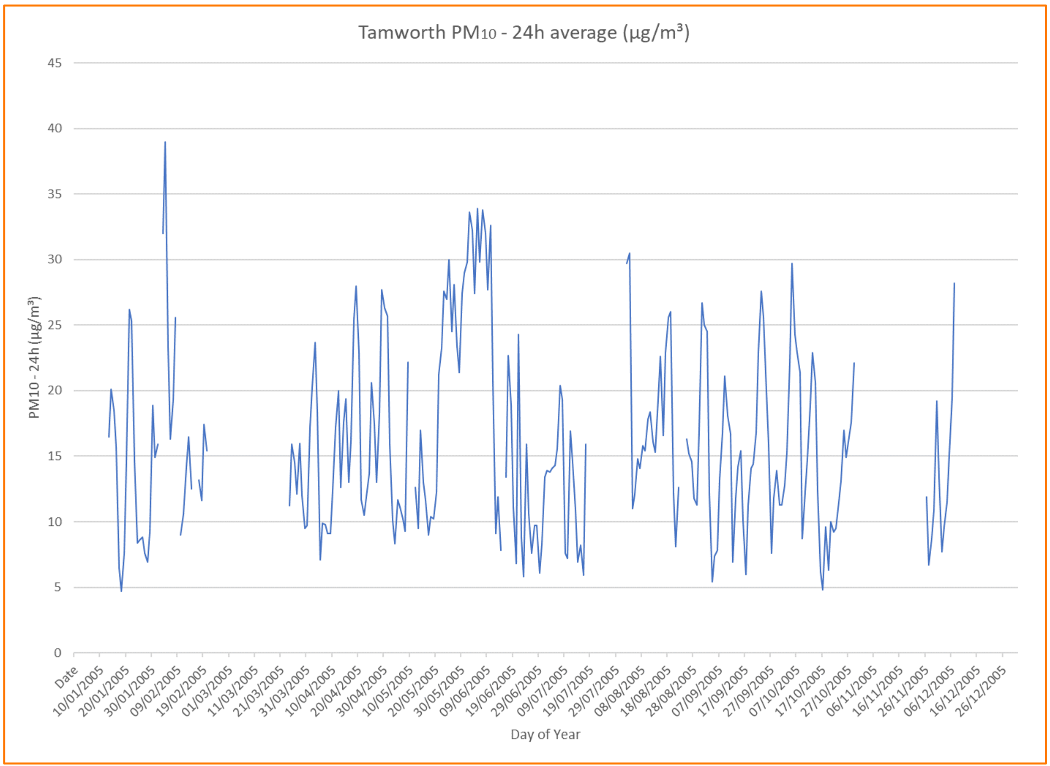


Figure 3-6: Tamworth PM_{10} 24-Hour Averages – 2005

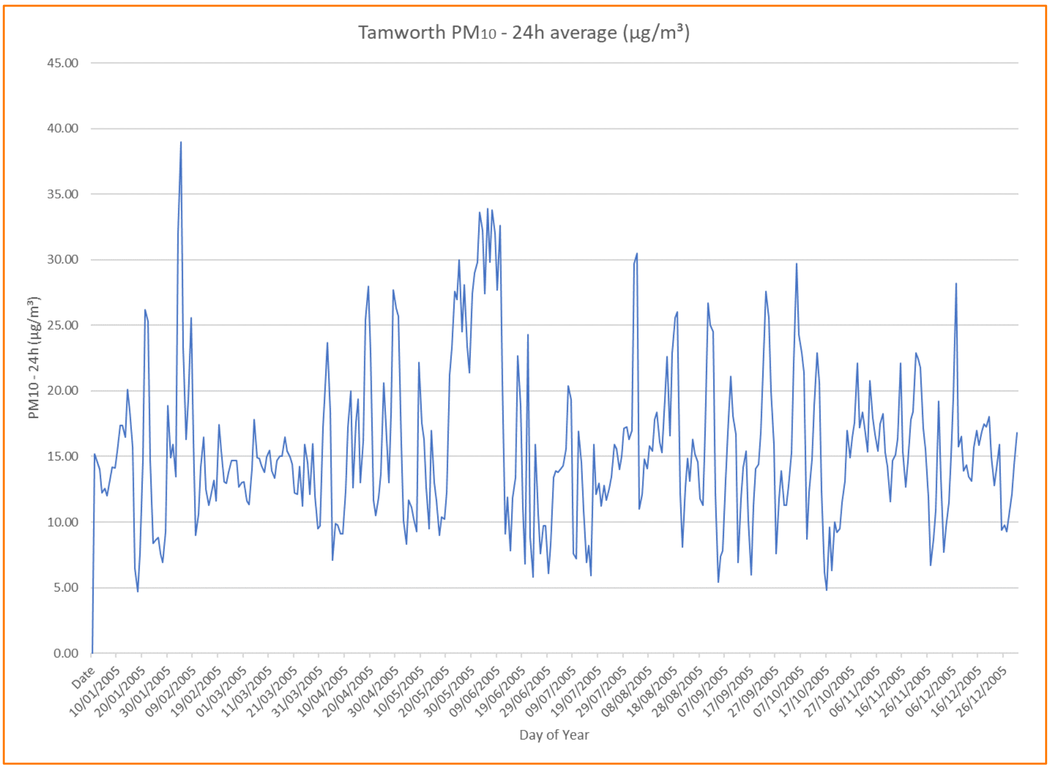


Figure 3-7: Tamworth PM_{10} 24-Hour Averages – 2005 with filled Gaps (2005-2017)

In the PEL report, there was one receptor predicted to exceed the 24 hour average criteria, which was receptor R25. For the three batch staging scenarios modelled, receptor R25 was predicted to experience the following 24-hour average PM_{10} concentrations([6]) when modelled in isolation (i.e. without existing background concentrations):

- Batch Scenario Day 4 – 41.6 µg/m^3;
- Batch Scenario Day 18 – 17.2 µg/m^3; and
- Batch Scenario Day 32 – 24.3 µg/m^3.

Note that these concentrations would decrease to approximately 20.8 µg/m^3, 8.6 µg/m^3 and 12.2 µg/m^3, respectively, if the emission rates were divided by two (i.e. halved) as discussed above in Section 3.2.

Of these, the Day 4 run was the only one to exceed the criterion with background included.

The 24-hour predicted concentrations at R25 for the Day 4 run are shown below in Figure 3-8. The peak event can be seen occurring on 30 October 2005.

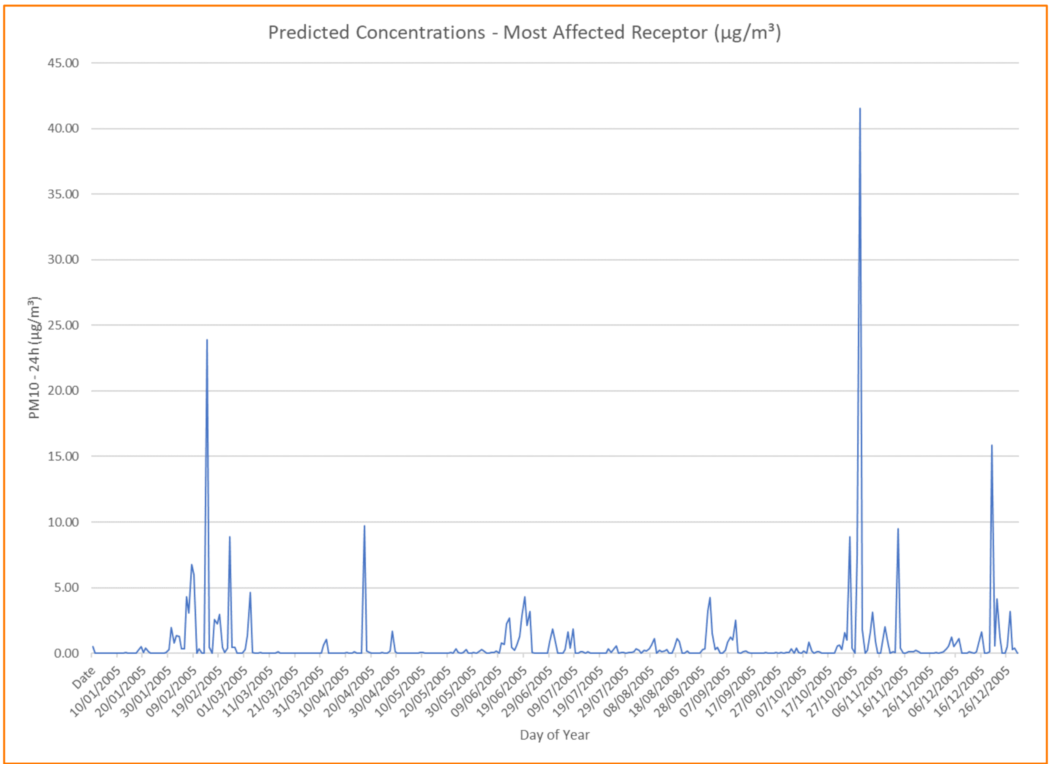


Figure 3-8: Most Affected Receptor Scenario 4 (original results)[7]

With regard to the results, they need to be looked at in the context of a) the background data, b) the degree of exceedance, c) the conservatism of the emission estimation methodology and d) possible mitigation measures.

[6] Concentrations of 20.8, 8.6 and 12.2 µg/m^3 when divided by two.
[7] Not divided by two.

With regard to the background data, **Figure 3-7** shows that when exceptional events and the data gaps are considered, the maximum background value of 39 µg/m^3 is conservative compared to the other hours in the year for a level 1 assessment.

When the contemporaneous data in **Figure 3-7** is compared to the worst case predicted concentration at R25 for the Day 4 batch scenario, this gives a concentration of 58.8 µg/m^3 (predicted 41.6 µg/m^3 plus a contemporaneous background of 17.2 µg/m^3). While this exceeds the criterion of 50 µg/m^3, the conservative nature of the emissions data used must be taken in to consideration as detailed above in Section 3.2. The emissions data has been proven to be above real-world measured emission rates even when divided by two/halved and therefore over-predicts the concentrations at surrounding receptors and provides an unrealistically conservative assessment.

If the emissions data was divided by two, remembering this would still be above measured emission rates and still be considered conservative (see Figure 3-4), the worst case predicted concentration at R25 for the Day 4 batch scenario would be 38 µg/m^3 (20.8 µg/m^3 (original divided by two) plus a contemporaneous background of 17.2 µg/m^3), which is compliant with the criterion of 50 µg/m^3.

Additionally, there has been no consideration of mitigation measures in the modelling. Various researcher have shown that dust from intensive livestock operations can be reduced by 35 to 65% with effective vegetation buffers (Malone, et al., 2008; Malone, et al., 2006; Parker, et al., 2012; Laird, 1997)., such as the vegetation screens proposed around each of the PPUs. Dust emissions can also be further mitigated via windbreak walls (see (Dunlop & Galvin, 2013)).

Critically, it is also worthwhile noting that research including Worley et. al. (2007; 2012) have shown that the concentration of dust emitted from poultry sheds drops back to background close to the sheds (within hundreds of metres) from which it is emitted which shows that dust concentrations may not travel as far as predicted by the models.

3.3 CALMET

The EPA letter requested that the application should:

"also evaluate CALMET using data from the same year and location as used from the weather station at "Moana".

The use of TAPM to drive CALMET at a site where no local or on-site data from an ultrasonic weather station exists, is consistent with the Approved Methods (NSW EPA, 2016) and OEH (2011).

As part of this review we were provided with hourly weather data for 2016 from the Moana weather station by Mr Guy Hebblewhite (the owner and operator of Moana). The location of the weather station with regard to the Moana farm sheds is shown in Figure 3-9 and with regard to the Rushes Creek site in Figure 3-10. The station sits on the lower portion of a large south east to north west slope with the Peel River sitting to the north and running roughly east to west.

It can be seen in Figure 3-9 that the station is located near large trees. We were unable to visit the site so cannot confirm if these would affect the readings and whether, with the growth of the trees, the station fully meets the siting requirements of the relevant standards. Experience at other sites has shown that large trees near a station can result in greater variably in measured directions especially in the direction upwind the tree sits, which is the case here.

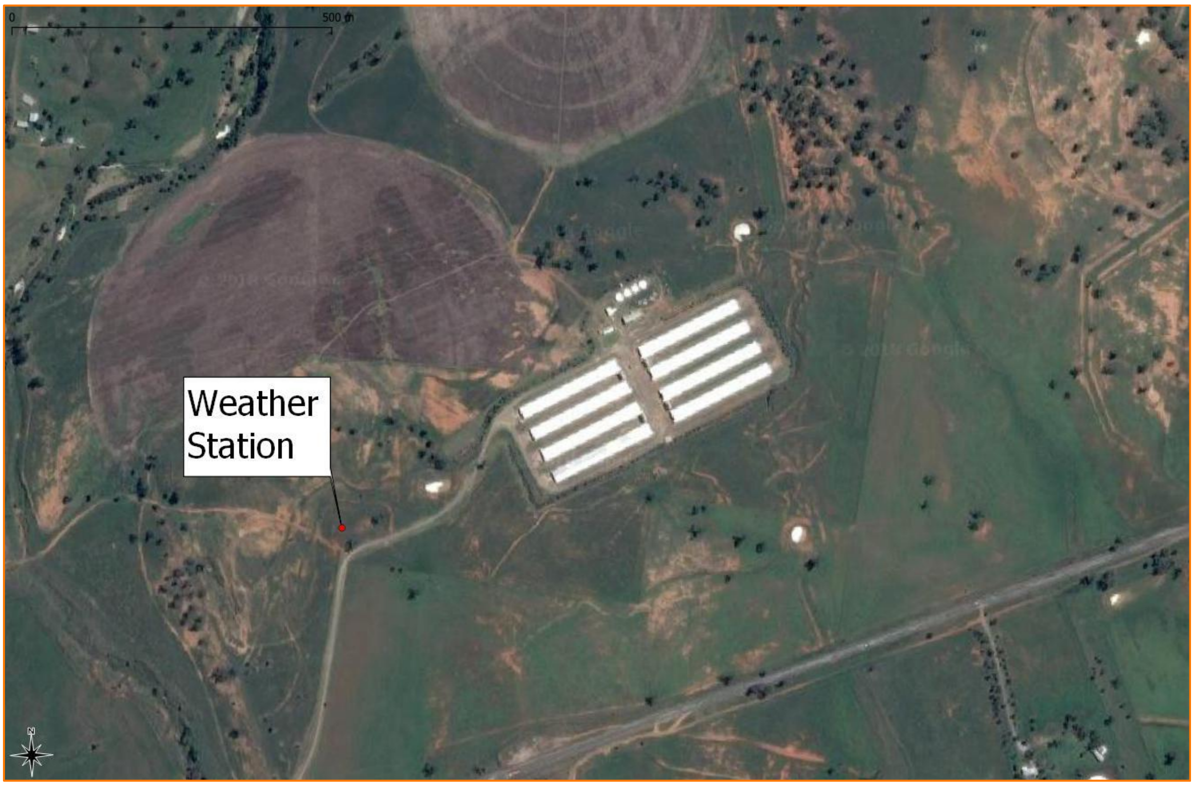


Figure 3-9: Moana Weather Station Location

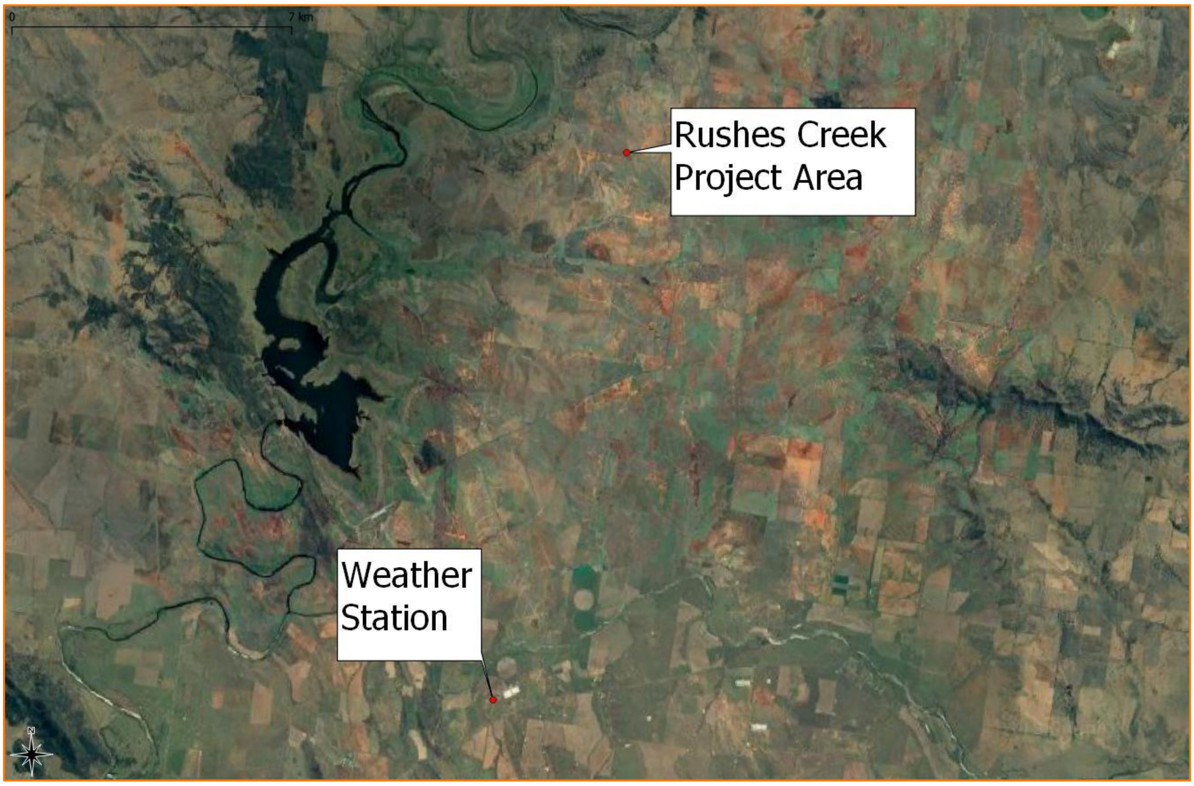


Figure 3-10: Moana Weather Station Location and Development Site

A comparison of TAPM and Moana data for 2016 is provided below in Table 3-2. The Moana data is the hourly data from the Moana weather station. The CALMET data was taken from a CALMET run which used TAPM as an input. The CALMET run was centred on the Moana site.

It is important to note that the TAPM run was extracted at 1km as this is the run that was used for the overall domain. When TAPM is used to drive CALMET, it is generally recommended that a larger grid be used and to let TAPM resolve finer terrain elements.

To test the performance of the model the hourly measured data was compared to the hourly modelled data (1km) and a series of statistical test performed. Standard benchmarks including those detailed in Hurley et. al. (2002) were used. The results of the statistical tests for the Moana and CALMET datasets are detailed below in Table 3-2.

Table 3-2: Summary of Analysis –Moana TAPM CALMET vs Moana Observed

Element	Test	Benchmark	Calculated	Compliance
Wind Speed	BIAS	+/- 0.5	0.1	Yes
	RMSE	<2	1.5	Yes
	IO	>0.6	0.8	Yes
Temperature	Bias	+/- 0.5	-0.3	Yes
	IO	>0.8	1.0	Yes
	GE	<2	1.2	Yes
Direction	Bias	+/-10	13.0	No
	Gross Error	<30	51.9	No

It can be seen in Table 3-2 that the model performed adequately for wind speed and temperature, however varied from the benchmarks of Bias and Gross Error for wind direction. To assess this further, a radar plot was prepared and is shown in Figure 3-11. The orange lines show the Moana data and the blue lines show the CALMET data.

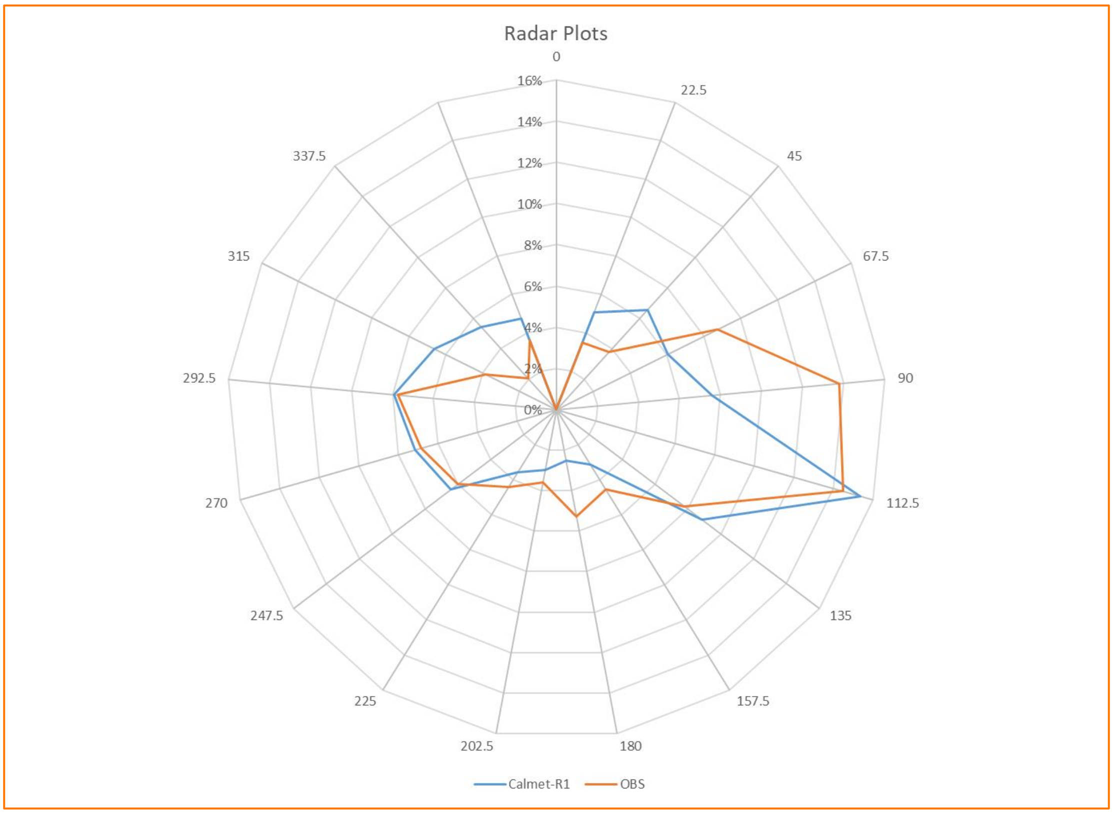


Figure 3-11: Radar Plot – Direction

With regard to Figure 3-11, it can be seen that the shapes generally agree indicating similar wind direction frequencies, but there is a discrepancy in the easterly direction. This could be a function of the location of trees near to the Moana weather station, however we were unable to confirm this. However, as noted elsewhere in areas with complex terrain, a suitable benchmark of 55° can be applied for gross error for wind direction (AECOM, 2013) which would explain some of the variation seen here.

As the modelling has used staging scenarios where peak emissions occur at different times during the year, and only the top 1% of events are examined (i.e. 99th percentile), variation in directions as shown above are not considered significant as the staging runs have enabled the modelling to repeatedly model scenarios where wind would have blown from each direction towards each receptor, and the model is concluded to adequately capture winds in the area.

3.3.1 Use of Moana Data in CALMET

The EPA's letter states that the PEL modelling used Moana data (page 4). It is assumed this refers to the comparison of the 2005 meteorology in the EIS (model inputs summarised in Table 4-2 of the PEL report) and the 2016 Moana data.

To check this further we modelled the Rushes Creek domain with and without observed data for Moana for 2016. A radius of influence (area in the model that the data is given weight) for TAPM of 5km was used and this was then input into CALMET. This is larger than what would typically be used given the terrain in the area. The results of a statistical analysis of the data are shown below in Table 3-3 for the centre of the Rushes Creek site. The analysis shows that the winds at the Rushes Creek site with and without observed data for Moana being included are similar. If weather data from Moana was used in CALMET the results at the subject site would be unlikely to change.

Table 3-3: Summary of Analysis – Rushes Creek CALMET with and without Moana Observed Data

Element	Test	Benchmark	Calculated	Compliance
Wind Speed	BIAS	+/- 0.5	0.0	Yes
	RMSE	<2	0.4	Yes
	IO	>0.6	1.0	Yes
Temperature	Bias	+/- 0.5	0.0	Yes
	IO	>0.8	1.0	Yes
	GE	<2	0.8	Yes
Direction	Bias	+/-10	-0.2	Yes
	Gross Error	<30	8.4	Yes

3.4 CALPUFF Set Up and Sensitivity Analysis

In the letter EPA stated that "The applicant should provide further information on their CALPUFF set up and do a sensitivity analysis to demonstrate the impact of assumed values, particularly sigma y and sigma z, on predicted concentrations."

With regard to the CALPUFF setup, this was summarised in the PEL report in Table 4-3..

We note that the sigma y and sigma z parameters are used to input the initial horizontal and vertical dispersion. As an example, if the values were 0, this would assume a small source with low flows. The model setup was done so in a way to reflect that the sources were relatively large (i.e. meat chicken sheds have a number of ventilation fans on the end). To check this, we modelled a number of scenarios. These are summarised in Table 3-4 and shown graphically in Figure 3-12. The scenarios were based on a single shed with varying source setup. For the purposes of the comparison, the contours shown in the figure are $C_{99\ 1sec}$ = 2 ou.

Figure 3-12 shows that even with an unrealistic sigma value (considering the size of chicken sheds) of 0, the change in the contours is insignificant.

Table 3-4: Summary of Scenarios – Sigma y and Sigma z

Scenario	Height	Sigma y	Sigma z	Line Colour
EIS / PEL Report	1	4.5	1	Red
1	1	9	1	Yellow
2	1	0	0	Black
3	2	0	0	Pink

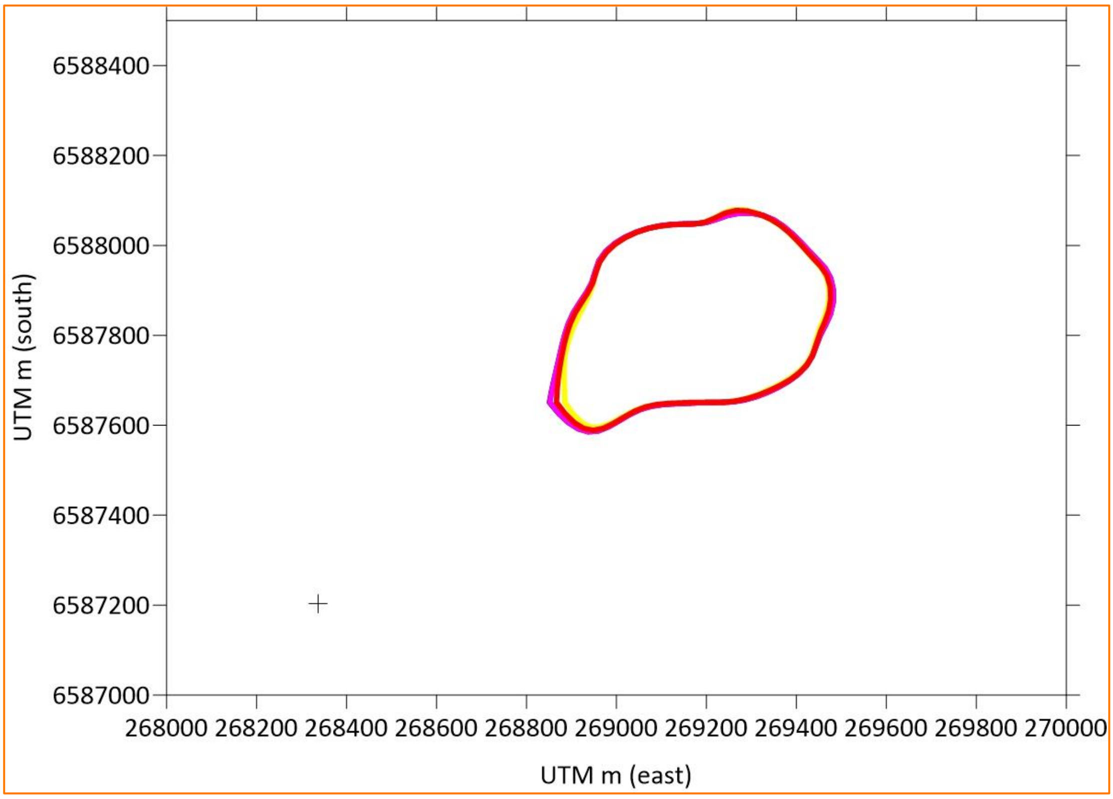


Figure 3-12: Sigma Scenarios – Single Shed

3.5 Odour Emissions

3.5.1 Background

Prior to discussing emissions, it is important to highlight how the K factor method works. The method, as noted in Ormerod and Holmes (2005), is based on real world test data and predicts emissions based on a series of inputs.

The odour emission rate at a point in time is predicted using the following equation:

$$OER = 0.025 \times K \times A \times D \times V^{0.5} \qquad \textbf{Equation 1}$$

Where ***OER*** = odour emission rate (ou/s), ***A*** = total shed floor area (m^2), ***D*** = average bird density (in kg/m^2), **V** is the ventilation rate in m^3/s and **K** if the K factor.

The emission rate increase is non linear. When calculating emissions, if the ventilation rate doubles, the emissions only increase by ~40%. As a further example, if the ventilation rate changes by 20%, the emissions only change by ~10%. Therefore, the K factor used is more critical than ventilation rate.

3.5.2 Response

EPA requires:

"The applicant should do either a further ventilation rate validation study which covers the range of environmental conditions at the site over the full growth cycle, or a sensitivity analysis using Dunlop and Duperouzel (2014) equations to demonstrate the range in potential odour impacts, as part of assessing the odour risk of the project".

The key point made by EPA with regard to odour emissions from poultry sheds is that the "The University of Georgia shed ventilation rate table is known to underestimate ventilation rate and therefore odour emission rates under certain conditions. This means the project may not be able to comply with Section 129 of the Protection of the Environment Operations Act 1997 which prohibits offensive odour".

To justify the underprediction statement, EPA refers to the publication footnoted as follows "Dunlop, M., E. Gallagher et al. (2010) Odour emissions from tunnel-ventilated broiler sheds: case study of nine Queensland farms. Animal Production Science 50(6): 546-551" (Dunlop & Gallagher, 2010). A copy is attached.

To check EPAs assertion, we searched the paper using Adobe Reader using the following terms:

- Underprediction;
- Georgia;
- Conditions;
- Airflow; and
- Ventilation.

None of these terms were included in the paper in a way which supported the EPA's statement above.

However, we do note that the emission rate data referred to in the paper are the same as those in Poultry CRC (2011) and that most of the data were collected by forcing the sheds through ventilation modes in quick succession (as noted in the report). This means that ventilation rates in the CRC dataset increased irrespective of temperature (i.e. overventilated during testing). This is noted in the report and means that the data is not representative of what would occur at a farm operating normally.

EPA refer to the Model 1 and Model 2 methods of Dunlop & Duperouzel (2014). As shown in Dunlop & Duperouzel (2014)the equations (models) are based on a large dataset which was turned into a single equation for a year. This simplified the methodology (which was the aim of the project, Project title was Monitoring mechanical and ventilation rates in poultry buildings: For the application of odour and dust control technologies) however, as shown in Figure 43 of Dunlop & Duperouzel, the equations predicted maximum ventilation rates far better than minimum rates. This means that the method is more likely to overpredict than underpredict ventilation rates and therefore emissions. As noted elsewhere, Dr Dunlop has stated that the models were never intended to be used for dispersion modelling.

With regard to this, the EPA stated in the letter:

- *The Dunlop and Duperouzel (2014) empirical equation (Model 2) should have been included in the assessment as it performed slightly better than Model 1;*
- *The validation study is extremely limited. It should have covered a wide range of environmental conditions (spring, summer, autumn and winter) and covered the whole growth cycle, not just four days; and*
- *The validation study design is not ideal as it appears to have used different years of data (2005 vs 2018).*

With regard to the above, it is critical to note that the methods used to estimate emissions, as noted in Dunlop and Gallagher (2010), should realistically estimate emissions. Whilst there is debate over what ventilation method to use, as emission rates are a key input, which means that unrealistically estimating emissions throughout a day will result in unrealistic model predictions. This is especially relevant considering the data in Table 2-1 and Figure 2-1 above.

With regard to Model 2 and Model 1, for Farm C (the Tamworth farm), Model 2 had a R^2 of 82.9 compared to Model 1 which had a R^2 of 82.6. These values are essentially identical. Across all farms however, Model 1 performed on average better and hence its use is considered more appropriate. Moreover, as shown in Figure 2-2 of the 1 June 2017 letter to the EPA (Draft Summary) Model 1 more often predicted higher ventilation rates than Model 2.

To examine this further, actual test data from ProTen's Narrandera farm and another farm in the Griffith area were analysed. These are shown below as Table 3-5 and Table 3-6 respectively. The temperature data in the tables is at the point in time testing was performed. Good practice is to arrive at the shed to be sampled and lock the operating fans on and then collect data. This reduces variability in the testing conditions in the event that an additional fan(s) turn on or off during testing. A downside to this approach is that the test conditions are consistent with the moment the testing team arrives, but may not perfectly match the in shed and ambient temperatures.

Table 3-5: ProTen Narrandera Poultry Test Data – Ventilation

Age	Target T[8] (°C)	Total Live weight (kg)	Kg/m^2	Ambient T (°C)	Predicted % Ventilation Model 1	Predicted % Ventilation Model2	Actual %	Georgia % from table[9]
29	19	74,077	27.2	17	76	72	30	7.6
29	19	74,077	27.2	17	76	72	30	7.6
29	21	74,131	27.3	20	72	80	30	7.6
29	21	74,131	27.3	20	72	80	30	7.6

It can be seen in Table 3-5 that for the data at hand for Narrandera:

- The Dunlop and Duperouzel methods over-predicts ventilation rates compared to the actual ventilation rates; and

[8] Based on Ross target temperatures in Dunlop and Douperouzel.
[9] Based on modelled ventilation rate.

- The Georgia method under-predicts ventilation rates compared to the actual ventilation rates.

Table 3-6: Griffith Poultry Test Data – Ventilation

Age	Target T (°C)	Total Live weight	Kg/m²	Ambient T (°C)	Predicted % Ventilation Model1	Predicted % Ventilation Model2	Actual %	Georgia % from table
27	19	77,758	25.5	28	100	100	54	63
27	19	77,758	25.5	28	100	100	54	63
23	21	53,940	17.7	28	92	100	54	63
23	21	53,940	17.7	28	92	100	54	63
19	22	44,690	14.7	28	77	95	46	38
19	22	44,690	14.7	28	77	95	46	38
30	18	76,961	22.6	24	100	100	92	63
30	18	76,961	22.6	24	100	100	92	63
27	19	79,689	23.4	24	95	100	94	38
27	19	79,689	23.4	24	95	100	94	38

It can be seen in Table 3-6 that for the data at hand for the Griffith farm:

- The Dunlop and Duperouzel methods significantly over-predicts ventilation rates compared to the actual ventilation rates for six of the data points and is similar for four of the data points; and
- The Georgia method predicts ventilation rates reasonably for six of the data points and under-predicts for four of the data points.

The limited data points above, and the sensitivity analysis performed on real world data highlight that the Dunlop and Duperouzel models 1 and 2 tend to over-predict ventilation rates whereas the Georgia method can, as noted by the EPA, under-predict ventilation rates on occiasion.

However, the key question is whether or not the method predicts realistic emission rates. Further calculations were performed and are summarised below in Table 3-7 and Table 3-8.

The tables should be read as follows:

- Column 1 – Bird Age from test data as reference point;
- Column 2 – Odour emission rate predicted using K factor method (Equation 1) based on odour test data in Table 3-5 and Table 3-6;
- Column 3 - Odour emission rate predicted using K factor method (Equation 1) and test data but with ventilation using Model 1;
- Column 4 - Odour emission rate predicted using K factor method (Equation 1) and test data but with ventilation using Model 2;
- Column 5 - Odour emission rate predicted using K factor method (Equation 1) and test data but with ventilation using Georgia method;
- Column 6 – Measured odour emission rate;
- Column 7 – Ratio of "Georgia" ventilation rate to measured;
- Column 8 – Ratio of Average of Models 1 and 2 to measured.

Table 3-7: ProTen Narrandera Poultry Test Data – Measured and Predicted Emissions – K=2 (ou/s)

Age	OER predicted based on Test data	OER based on Model 1	OER based on Model 2	OER based on Georgia	Actual OER	Ratio Georgia to Actual	Ratio Model 1/2 to Actual
29	26,389	41,857	40,798	13,322	10,677	1.2	3.9
29	26,389	41,857	40,798	13,322	8,244	1.6	5.0
29	26,318	40,617	43,096	13,286	8,927	1.5	4.7
29	26,318	40,617	43,096	13,286	8,927	1.5	4.7
Average						1.5	4.6

Table 3-8: Griffith Poultry Test Data – Measured and Predicted Emissions – K=2 (ou/s)

Age	OER predicted based on Test data	OER based on Model 1	OER based on Model 2	OER based on Georgia	Measured OER	Ratio Georgia to Actual	Ratio Model 1/2 to Actual
27	32,056	43,685	43,685	34,536	13,392	2.6	3.3
27	32,056	43,685	43,685	34,536	8,701	4.0	5.0
23	25,244	32,972	34,401	27,197	10,338	2.6	3.3
23	25,244	32,972	34,401	27,197	10,338	2.6	3.3
19	20,677	26,781	29,640	18,638	10,104	1.8	2.8
19	20,677	26,781	29,640	18,638	10,961	1.7	2.6
30	44,991	46,828	46,828	37,021	24,743	1.5	1.9
30	44,991	46,828	46,828	37,021	28,434	1.3	1.6
27	46,458	46,803	47,981	29,382	21,480	1.4	2.2
27	46,458	46,803	47,981	29,382	21,480	1.4	2.2
Average						2.1	2.8

In summary, the sensitivity analysis shown in the tables above show that the K factor method as used in the modelling predicts higher emissions than measured at modern farms similar to that proposed despite the ventilation rate method. This demonstrates that the K factor method used in modelling is conservative and appropriate.

In the event that Models 1 and 2 were to become a standard for modelling new poultry farms, given they appear to significantly over-estimate emissions, a new equation(s) would need to be developed to ensure that the predicted emissions were realistic. Moreover, we note that if high ventilation rates were used (i.e. Models 1 and 2), this could overpredict dispersion due to the conservation of plume mass compared to reality.

The findings above for emissions are consistent with the lack of complaints from new farms which have been assessed using the same method here including ProTen's Narrandera, Jeanella and Jeanella South farms as well as other new farms recently approved, such as the Tabbita farm near Griffith.

3.5.3 Odour Modelling Outputs

In the letter, EPA requested tables of predicted concentrations for each scenario at all receptors. Receptor concentrations for the staging runs based on the PEL modelling are provided below in Table 3-9.

Table 3-9: Predicted 99th percentile 1-second odour concentration (PEL model files)

Receptor	Batch Staging		
	Predicted 99th percentile 1-second odour concentration (C_{99} 1 second)		
	Day 4	Day 18	Day 32
1	0.9	0.8	0.8
2	1.0	1.0	1.2
3	0.7	0.7	0.8
4	0.8	0.7	0.9
5	0.8	0.8	1.0
6	0.8	0.8	1.3
7	1.0	1.0	1.7
8	1.3	1.1	1.6
9	0.9	1.0	1.2
10	0.8	0.9	1.1
11	0.9	1.0	1.1
12	0.9	1.0	1.0
13	1.2	1.3	1.2
14	1.4	1.4	1.7
15	1.2	1.2	1.4
16	1.5	1.6	1.9
17	1.1	1.1	1.2
18	2.0	2.1	2.4
19	1.6	1.4	3.3
20	1.1	1.1	1.3
21	1.7	1.7	2.1
22	2.1	2.0	3.7
23	2.0	2.0	3.6
24	3.4	4.0	4.2
25	2.7	3.0	2.8
26	1.3	1.5	1.2
27	1.3	1.4	1.1
28	1.4	1.5	1.6
29	1.4	1.4	1.5
30	1.4	1.5	1.5
31	1.0	1.0	0.8
32	1.9	1.7	1.6
33	2.0	1.9	2.4
34	1.2	1.3	1.3
35	1.2	1.2	1.3
36	0.9	1.0	1.1

3.6 Placement Schedule

The EPA highlighted that there was possibly a discrepancy between the shed placement modelled and that in the EIS.

We are informed by ProTen that the maximum number of birds that will be able to be placed is 636,000 (±6%), which is equal to a maximum of 12 sheds per day. In the Tamworth region, Baiada only hatches and places day-old chicks at broiler farms on Mondays, Tuesday, Thursdays and Fridays. Therefore, the modelled placement schedule, being birds placed over eight days with a maximum of two days in a row and not on weekends, is correct.

With regard to the EPA's comment, if the placement were to be different by a few days, this would not result in significant changes in the model predictions. This is because the average odour emission rate across the site with five day placement versus eight day placement (as an example) would not significantly change as opposed to a case where the shed pads were split, for example, by two weeks. Therefore, the predicted concentrations would not significantly change if the placement was different.

3.7 Worst Case Emissions

In addition to the above, the EPA required that worst case odour emissions be modelled.

As shown in Section 2 and Section 3.5.2 the emissions modelled are higher than those measured at modern farms and therefore the emissions modelled are considered the upper range of potential emissions from a modern well managed farm. This combined with the batch staging results confirm that an appropriately conservative assessment has been performed.

3.8 Assessing Risk

The purpose of an odour assessment performed by a specialist consultant is to assess the risk of odour impacts from a potentially odorous operation. The odour assessment performed for the Rushes Creek development has been performed in accordance with accepted and tested methodologies, the Approved Methods and OEH (2011).

EPA has noted that the risk should be evaluated with regard to:

- *the robustness and appropriateness of assessment input data*
- *the degree of compliance with the odour impact assessment criteria. Marginal compliance with the odour assessment criterion suggests a risk that actual impacts may not be acceptable;*
- *the level of uncertainty in dispersion model results*
- *the sensitivity of model results and the odour criterion to changes in source parameters and meteorological data;*
- *proposed odour mitigation measures and their reliability, and*

the availability of additional feasible mitigation measure should offensive odour occur once the project is in operation.

With regard to the input data, as detailed in the PEL report and as detailed in Sections 3.2 to 3.5, the assessment has used standard methods for modelling, and has used odour emission rate estimation methods which have been shown to overpredict odour emission rates compared to measured real world data.

As noted in OEH (2011), model uncertainty is significantly reduced by using proper input data as used here as well as using batch staging to test the effect of different meteorological periods and peak emission events. As shown above in Section 3.5, variability in results, including ventilation rate would not significantly change the predicted concentrations at surrounding sensitive receptors.

The above, combined with higher than expected emission rate data means that the predicted concentrations are conservative and compliance is expected. As noted above in Section 3.5.2, this is consistent with the lack of complaints for new farms elsewhere.

Overall, based on the additional odour testing and analysis performed for this response, we conclude that the assessment performed for the EIS was appropriate and suitably conservative. The predicted emissions modelled are higher than those measured at modern poultry farms and are considered the upper range of potential emissions from proposed farm. Farm management and profitability are directly related and because of this, ProTen has consistently incorporate best management practices. The K factor measurements at Narrandera in Section 2 demonstrate this. Based on the PEL report, which is considered conservative, field experience and the additional information in this response, we do not expect a decrease in farm management standards and therefore higher emissions are not expected. Since the adoption of RSPCA requirements for the management of meat chickens, industry management has in effect standardised across states and integrators.

Therefore the requirement to consider additional odour control options in addition to the current industry best practice is not considered warranted.

As shown by the test data, well managed newer farms are operating with significant lower K factors than K=2 and have lower emissions than older farms. As detailed above, farm management and profitability are directly related, with poorly performing farms making less profit per bird than well managed farms. On this basis, as well as the desire to minimise impact on neighbours and to maintain good neighbourly relations, best practice management should remain a top priority for ProTen.

While there are some technology options for odour control, these generally come from Europe where buffers likes those here are not possible. As noted by Dunlop (2009), it is generally accepted that the affordability of the options is a significant consideration. Therefore a combination of appropriate separation distances and vegetative buffers, such as those proposed, represents current best practice for poultry farm management.

As noted in the EIS, increasing the “surface roughness” and providing some filtering effect via establishing vegetative buffers will assist in reducing odour and dust levels. Vegetative buffers, particularly at the fan ends of the sheds, will induce additional turbulence as the ventilation air from the sheds passes through this permeable barrier and this enhances odour dispersion. Vegetation screens also act to partially remove fine dust from the ventilation air giving a corresponding percentage reduction in odour levels.

4 HUNTER NEW ENGLAND LOCAL HEALTH DISTRICT

4.1 Risk of Odour Emissions

The risk of odour emissions has been addressed in the previous sections.

4.2 Cumulative Particulate Assessment

This issue has been addressed above in Section 3.2.

4.3 $PM_{2.5}$ Emissions

While not considered necessary given the minimal risk of exceedance, to address the HNELHD's submission with regard to $PM_{2.5}$ we have performed a quantitative assessment.

To do this, the PM_{10} emission rates predicted using the Mirrabooka method were used as the basis of the assessment. To generate $PM_{2.5}$ emissions, the data in Poultry CRC (2011) was used. Correlation coefficients were used to compare the data with key factors including ventilation rate and birds age, however no relationship was found indicating a relatively constant relationship between the concentrations of $PM_{2.5}$ and PM_{10}. Therefore, the ratio between PM_{10} and $PM_{2.5}$ emission rate data in the appendix of Poultry CRC (2011) was analysed, yielding an average PM_{10}:$PM_{2.5}$ ratio of 4.2 and a median ratio of 3.9. The ratio of 3.9 was applied to the model outputs along with the (conservative) factor of 2 detailed above (Section 3.2.1).

As there is no local $PM_{2.5}$ background data for 2005, background data for 2005 was taken from the Beresfield EPA dataset. This is shown in Figure 4-1. As with the background data for PM_{10} (see Section 3.2.2), gaps were filled with the average of the available dataset for Beresfield for 2005. As evident, the highest recorded 24 hour concentration was 19.5 µg/m^3 and the annual average over the 12 month period was 6.8 µg/m^3. These data were used as the background concentrations.

The applicable maximum 24-hour average and annual average $PM_{2.5}$ criteria of 25 µg/m^3 and 8 µg/m3, respectively, was taken from the Approved Methods which refers to the National Environment Protection (Ambient Air Quality) Measure (DoE, 2016).

Figure 4-2 shows the predicted 24-hour average $PM_{2.5}$ concentrations at the most affected receptor, being R25, (i.e. without existing background levels) over the 12 month period. As evident, the highest predicted concentration of 24 hour $PM_{2.5}$ was 5.3 µg/m^3, indicating that the proposed poultry operation would not have $PM_{2.5}$ impacts. The same results with the existing background data included are shown in Figure 4-3. Figure 4-3 shows that the most affected receptor R25 (and therefore all other receptors) is predicted to experience maximum 24-hour average $PM_{2.5}$ concentrations below the assessment criterion of 25 µg/m^3, including when the development emissions are combined cumulatively with background concentrations. The highest predicted cumulative 24 hour concentration is 24.8 µg/m^3. Of this, 79% is associated with the background concentration.

Receptor concentrations for the three batch staging scenarios modelled (Days 4, 18 and 32) are shown in Table 4-1 and Table 4-2 for maximum 24-hour and annual average $PM_{2.5}$, respectively. The results are shown graphically in Figure 4-5 to Figure 4-6 for maximum 24-hour and Figure 4-7 to Figure 4-10 for annual average. As evident, the results show that all receptors are predicted to experience maximum 24-hour average and annual average $PM_{2.5}$ concentrations below the respective criterion for all scenarios, including with development emissions are combined cumulatively with background concentration and even with the conservative emission estimation methodology (see Section 3.2.1).

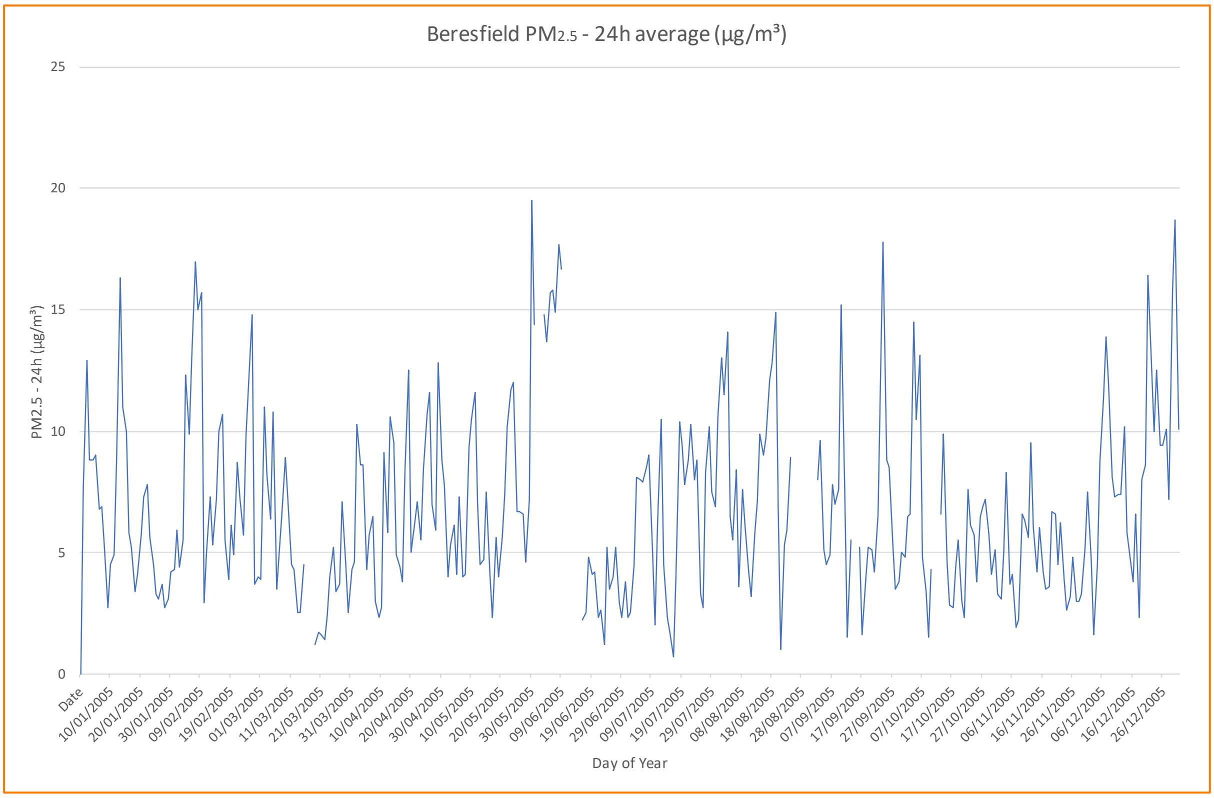


Figure 4-1: Beresfield $PM_{2.5}$ – 2005 – Background 24-Hour Averages – Not filled

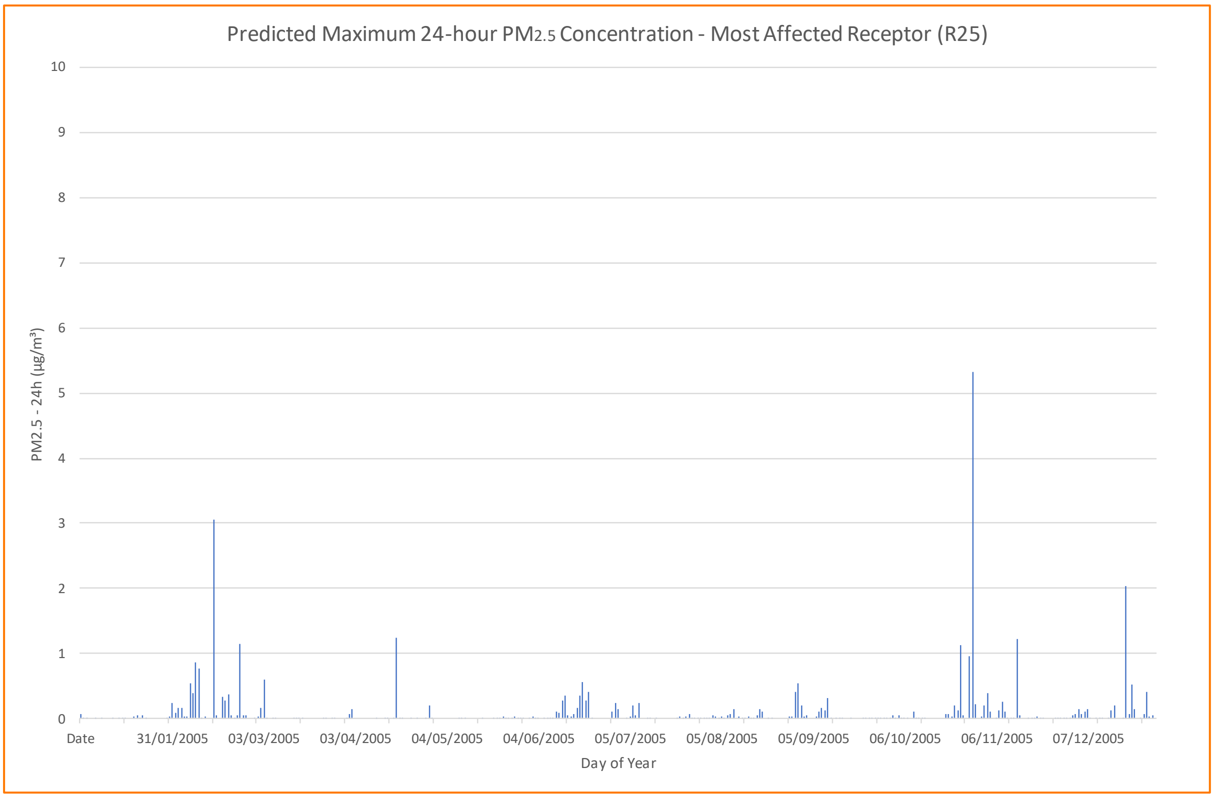


Figure 4-2: Day 4 - Predicted 24-Hour $PM_{2.5}$ Concentrations – Most affected receptor, no background[10]

[10] Adjusted by 2 as detailed above.

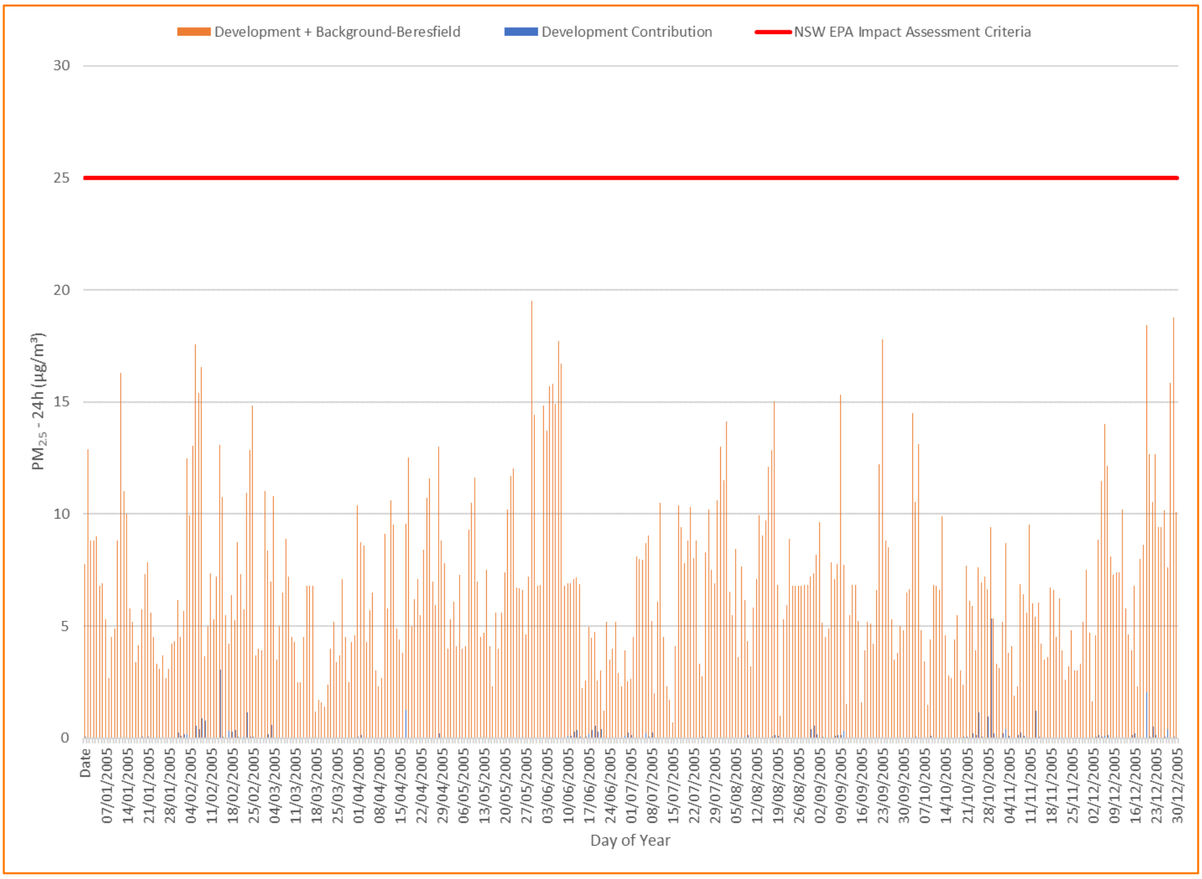


Figure 4-3: Day 4 - Predicted Maximum 24-Hour $PM_{2.5}$ – Most affected receptor, with contemporaneous background[11]

[11] Base emissions divided by two and contemporaneous background.

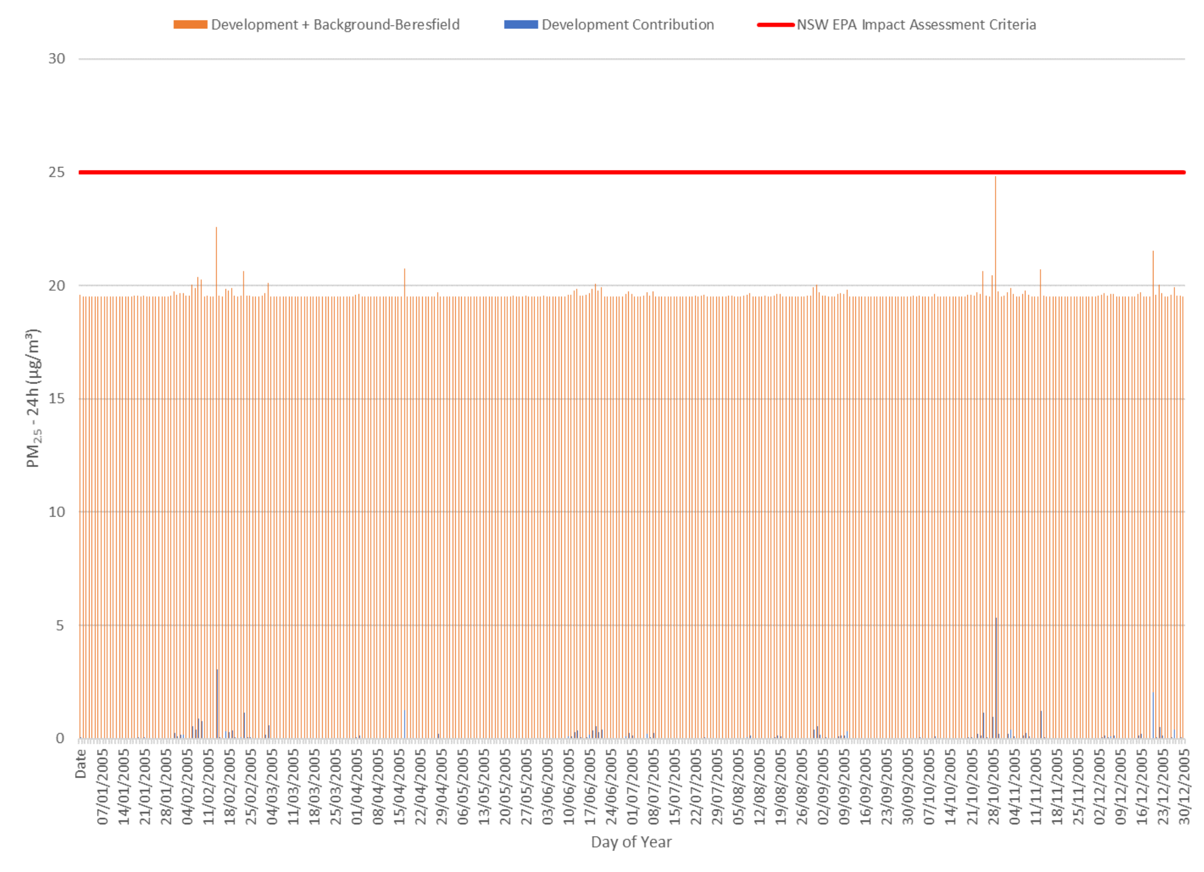


Figure 4-4: Day 4 - Predicted Maximum 24-Hour $PM_{2.5}$ – Most affected receptor, with maximum background[12]

[12] To match Table 4-1 below. Base emissions divided by two and maximum background.

Table 4-1: Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to Development alone and cumulatively

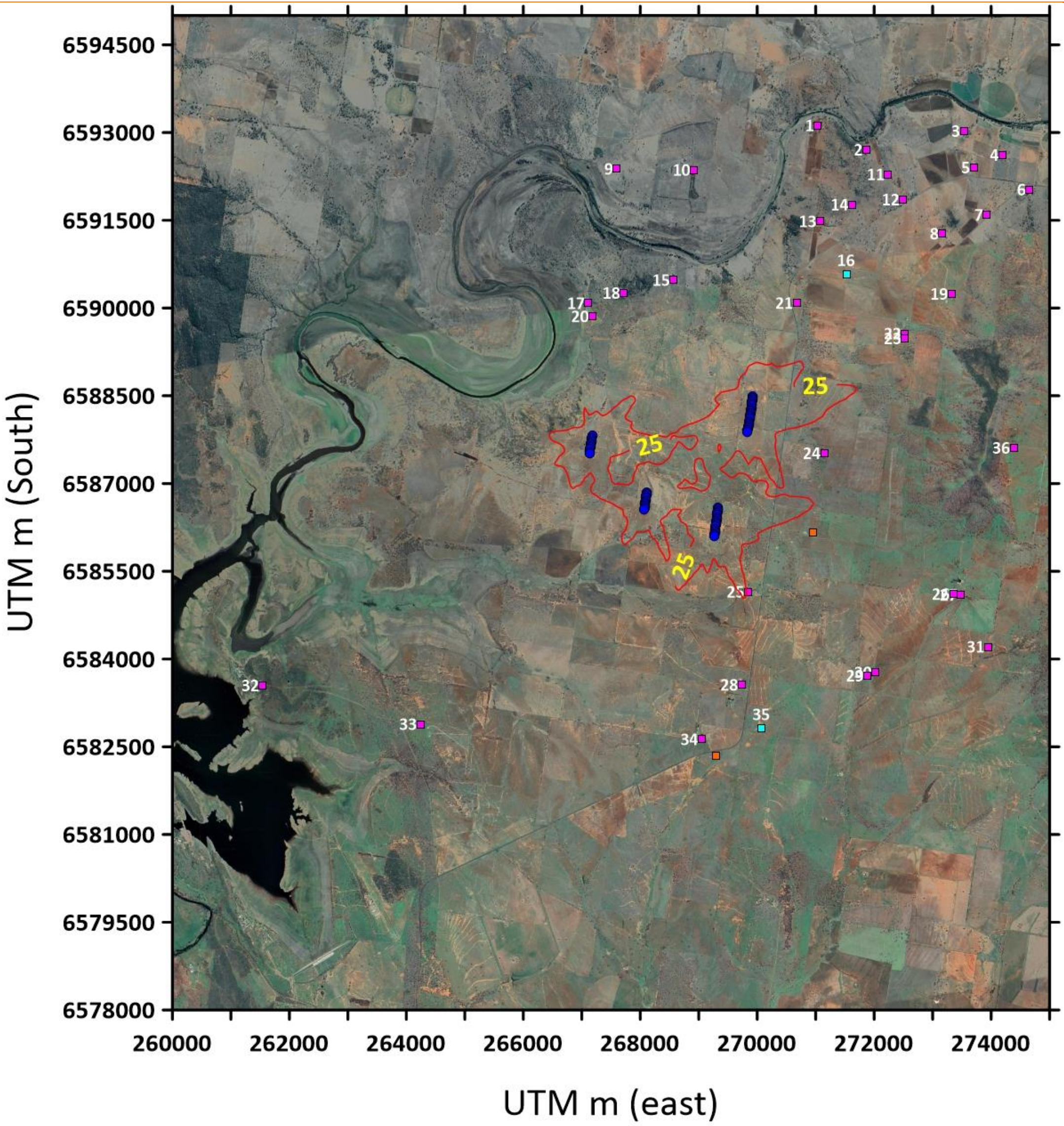
ID	Batch Staging					
	Day 4		Day 18		Day 32	
	Maximum 24-hour average concentration					
	Development alone	Cumulative	Development alone	Cumulative	Development alone	Cumulative
	Assessment criteria = NA	Assessment criteria = 25 µg/m³	Assessment criteria = NA	Assessment criteria = 25 µg/m³	Assessment criteria = NA	Assessment criteria = 25 µg/m³
1	1.0	20.5	0.5	20.0	0.7	20.2
2	1.1	20.6	1.2	20.7	1.6	21.1
3	1.0	20.5	0.7	20.2	0.9	20.4
4	0.8	20.3	0.7	20.2	0.5	20.0
5	0.8	20.3	0.9	20.4	0.6	20.1
6	0.7	20.2	0.4	19.9	0.7	20.2
7	0.9	20.4	0.5	20.0	1.0	20.5
8	1.2	20.7	0.9	20.4	1.3	20.8
9	0.9	20.4	0.9	20.4	0.4	19.9
10	1.1	20.6	0.8	20.3	0.5	20.0
11	1.1	20.6	1.1	20.6	1.3	20.8
12	1.3	20.8	1.0	20.5	0.8	20.3
13	1.2	20.7	1.7	21.2	2.2	21.7
14	1.3	20.8	1.3	20.8	1.6	21.1
15	1.4	20.9	1.3	20.8	1.7	21.2
16	1.9	21.4	1.7	21.2	1.2	20.7
17	1.3	20.8	0.7	20.2	0.5	20.0
18	1.8	21.3	1.1	20.6	0.8	20.3
19	0.8	20.3	1.1	20.6	1.4	20.9
20	1.4	20.9	0.8	20.3	0.6	20.1
21	1.9	21.4	1.4	20.9	1.4	20.9
22	1.2	20.7	1.4	20.9	1.8	21.3
23	1.2	20.7	1.4	20.9	1.8	21.3
24	2.0	21.5	2.4	21.9	2.5	22.0
25	5.3	24.8	2.2	21.7	3.1	22.6
26	0.9	20.4	0.8	20.3	1.1	20.6
27	0.8	20.3	0.8	20.3	1.0	20.5
28	1.1	20.6	1.3	20.8	1.3	20.8
29	1.2	20.7	0.8	20.3	1.1	20.6
30	0.9	20.4	0.7	20.2	1.1	20.6
31	0.6	20.1	0.6	20.1	0.6	20.1
32	0.6	20.1	0.8	20.3	0.6	20.1
33	1.1	20.6	0.7	20.2	0.6	20.1
34	1.4	20.9	1.0	20.5	0.6	20.1
35	1.0	20.5	1.1	20.6	0.8	20.3
36	0.7	20.2	0.5	20.0	0.4	19.9

Note: Cumulative concentrations dominated by background concentrations. Includes maximum measured $PM_{2.5}$ 24 hour concentration of 19.5 µg/m³ not contemporaneous.

Table 4-2: Predicted annual average $PM_{2.5}$ concentrations due to Development alone and cumulatively

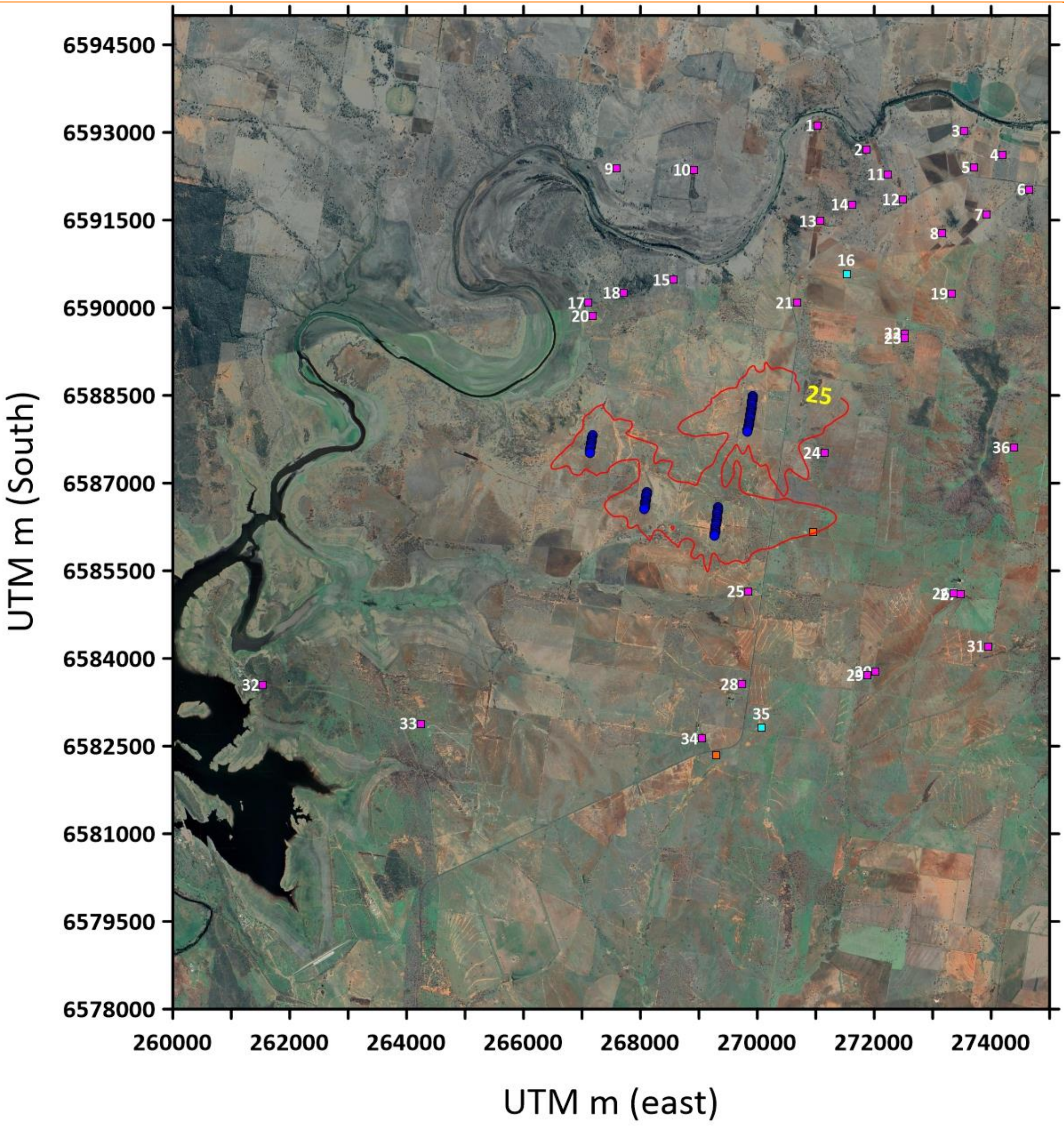
ID	Batch Staging					
	Day 4		Day 18		Day 32	
	Annual average concentration					
	Development alone Assessment criteria = NA	Cumulative Assessment criteria = 8 µg/m³	Development alone Assessment criteria = NA	Cumulative Assessment criteria = 8 µg/m³	Development alone Assessment criteria = NA	Cumulative Assessment criteria = 8 µg/m³
1	0.04	6.84	0.02	6.82	0.02	6.82
2	0.02	6.82	0.03	6.83	0.03	6.83
3	0.03	6.83	0.02	6.82	0.02	6.82
4	0.03	6.83	0.02	6.82	0.02	6.82
5	0.02	6.82	0.02	6.82	0.02	6.82
6	0.02	6.82	0.02	6.82	0.03	6.83
7	0.02	6.82	0.02	6.82	0.04	6.84
8	0.03	6.83	0.03	6.83	0.04	6.84
9	0.03	6.83	0.02	6.82	0.03	6.83
10	0.02	6.82	0.02	6.82	0.03	6.83
11	0.03	6.83	0.02	6.82	0.03	6.83
12	0.03	6.83	0.02	6.82	0.03	6.83
13	0.04	6.84	0.03	6.83	0.03	6.83
14	0.04	6.84	0.04	6.84	0.04	6.84
15	0.06	6.86	0.03	6.83	0.04	6.84
16	0.04	6.84	0.04	6.84	0.05	6.85
17	0.00	0.00	0.03	6.83	0.03	6.83
18	0.03	6.83	0.05	6.85	0.06	6.86
19	0.06	6.86	0.04	6.84	0.06	6.86
20	0.06	6.86	0.03	6.83	0.03	6.83
21	0.05	6.85	0.05	6.85	0.06	6.86
22	0.06	6.86	0.05	6.85	0.08	6.88
23	0.01	6.81	0.05	6.85	0.08	6.88
24	0.02	6.82	0.12	6.92	0.14	6.94
25	0.02	6.82	0.10	6.90	0.10	6.90
26	0.10	6.90	0.03	6.83	0.04	6.84
27	0.03	6.83	0.03	6.83	0.03	6.83
28	0.03	6.83	0.05	6.85	0.05	6.85
29	0.04	6.84	0.04	6.84	0.04	6.84
30	0.04	6.84	0.04	6.84	0.04	6.84
31	0.04	6.84	0.03	6.83	0.03	6.83
32	0.03	6.83	0.04	6.84	0.04	6.84
33	0.04	6.84	0.06	6.86	0.06	6.86
34	0.03	6.83	0.03	6.83	0.03	6.83
35	0.01	6.81	0.03	6.83	0.04	6.84
36	0.02	6.82	0.02	6.82	0.03	6.83

Note: Cumulative concentrations dominated by background concentrations. Background concentration of 6.8 µg/m³.



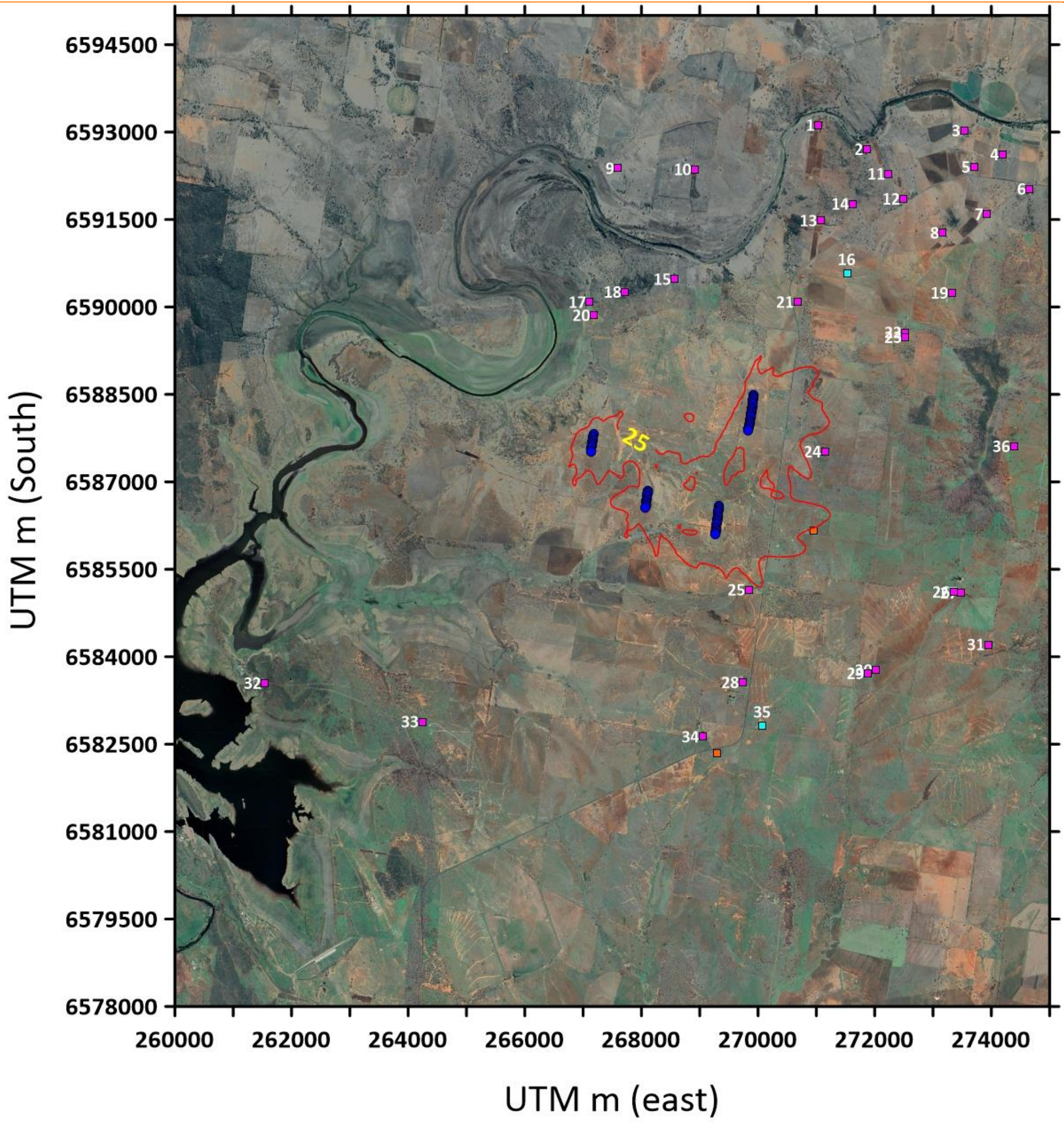
Species: PM2.5	**Site:** Rushes Creek	**Scenario:** Day 4	**Averaging Period:** 24-hour	**Percentile:** Maximum with maximum background
Criterion: 25 µg/m³	**Units:** µg/m³	**Meteorology:** 2005	**Model:** CALPUFF v 6.42	**Author:** W. Shillito

Figure 4-5: Predicted Maximum 24-hour $PM_{2.5}$ concentrations with background - Calendar Day 4



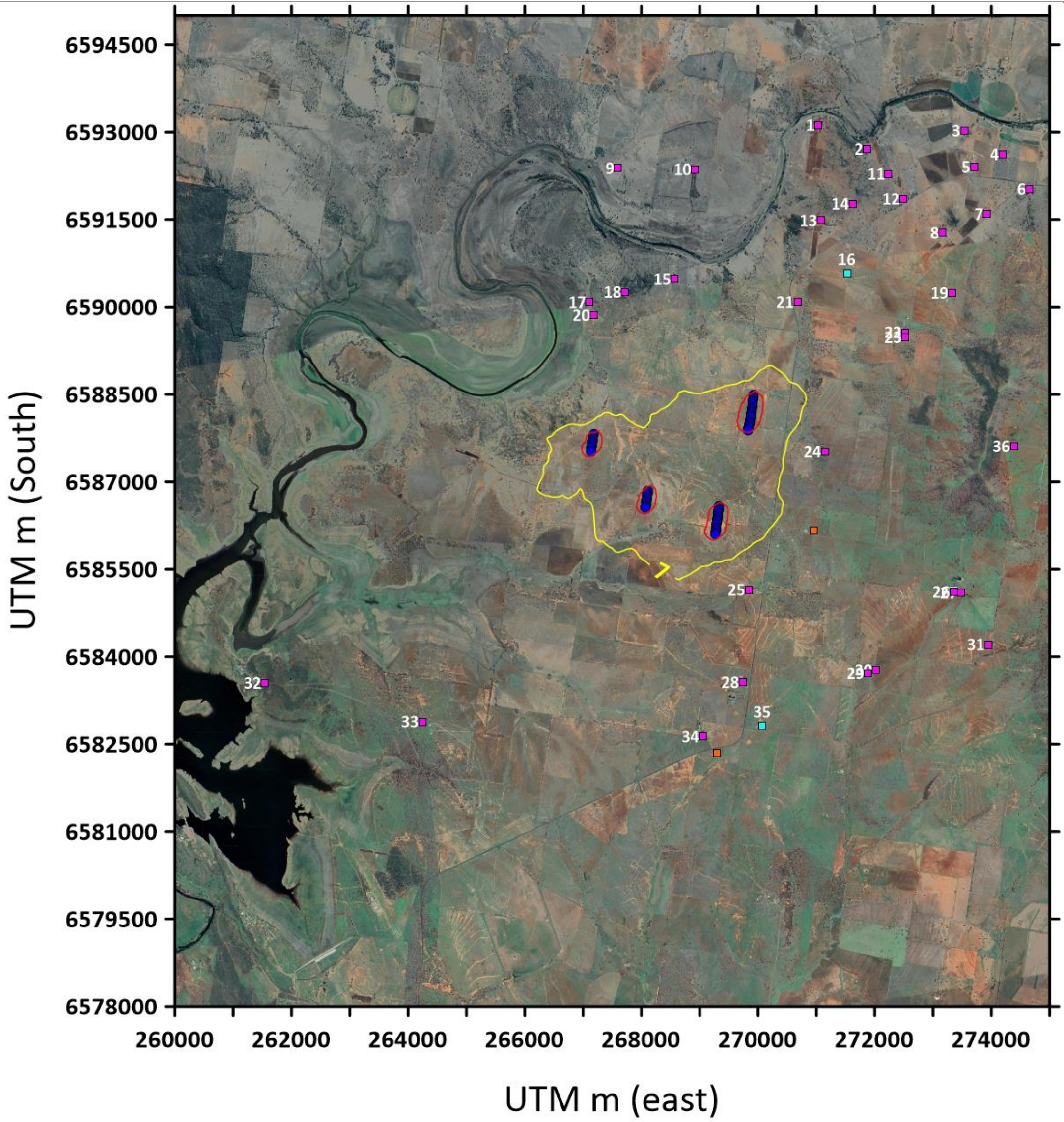
Species: PM2.5	**Site:** Rushes Creek	**Scenario:** Day 18	**Averaging Period:** 24-hour	**Percentile:** Maximum with maximum background
Criterion: 25 µg/m^3	**Units:** µg/m^3	**Meteorology:** 2005	**Model:** CALPUFF v 6.42	**Author:** W. Shillito

Figure 4-6: Predicted Maximum 24-hour $PM_{2.5}$ concentrations with background - Calendar Day 18



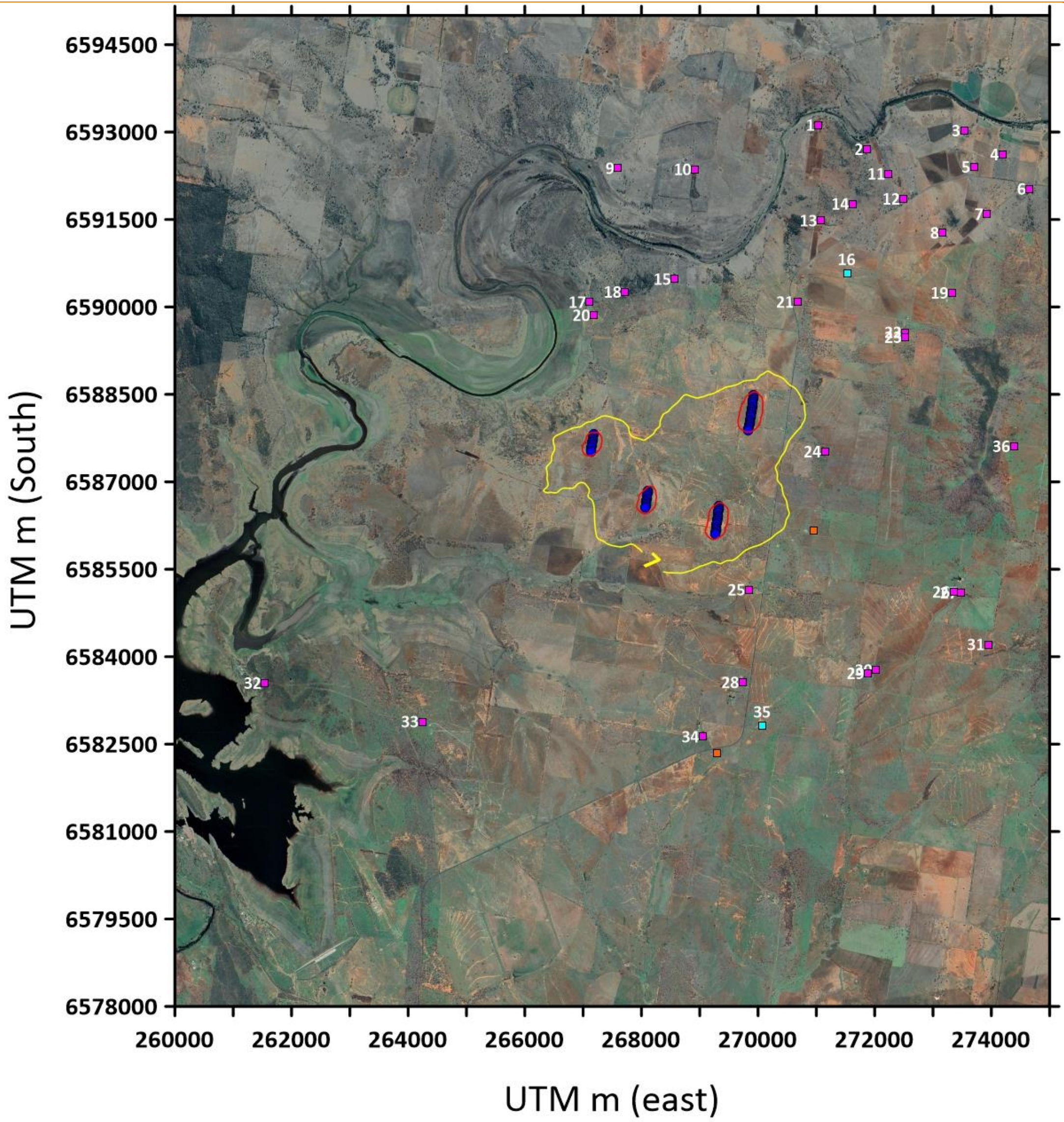
Species: PM2.5	Site: Rushes Creek	Scenario: Day 32	Averaging Period: 24-hour	Percentile: Maximum with maximum background
Criterion: 25 µg/m^3	Units: µg/m^3	Meteorology: 2005	Model: CALPUFF v 6.42	Author: W. Shillito

Figure 4-7: Predicted Maximum 24-hour $PM_{2.5}$ concentrations with background - Calendar Day 32



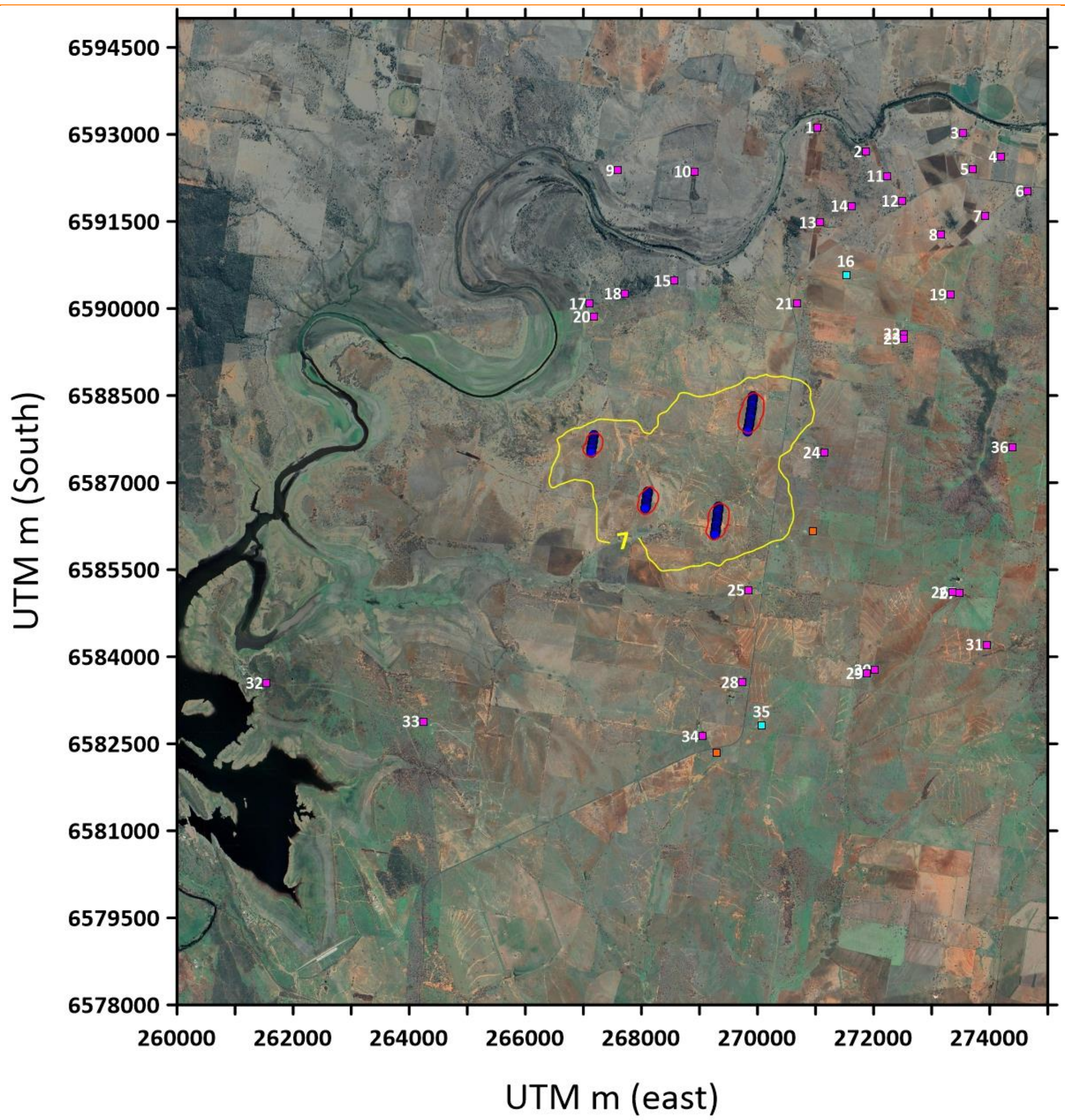
Species: PM2.5	**Site:** Rushes Creek	**Scenario:** Day 4	**Averaging Period:** Annual	**Percentile:** Average
Criterion: 8 µg/m³	**Units:** µg/m³	**Meteorology:** 2005	**Model:** CALPUFF v 6.42	**Author:** W. Shillito

Figure 4-8: Predicted annual average $PM_{2.5}$ concentrations with background - Calendar Day 4



Species: PM2.5	**Site:** Rushes Creek	**Scenario:** Day 18	**Averaging Period:** Annual	**Percentile:** Average
Criterion: 8 µg/m³	**Units:** µg/m³	**Meteorology:** 2005	**Model:** CALPUFF v 6.42	**Author:** W. Shillito

Figure 4-9: Predicted annual average $PM_{2.5}$ concentrations with background - Calendar Day 18



Species: PM2.5	**Site:** Rushes Creek	**Scenario:** Day 4	**Averaging Period:** Annual	**Percentile:** Average
Criterion: 8 µg/m³	**Units:** µg/m³	**Meteorology:** 2005	**Model:** CALPUFF v 6.42	**Author:** W. Shillito

Figure 4-10: Predicted annual average $PM_{2.5}$ concentrations with background - Calendar Day 32

4.4 Additional Emissions

4.4.1 Internal Road Emissions

As advised in the EIS, the PEL report did not assess the potential for wheel generated dust from the internal roads as the potential for emissions will be low as the roads will be formed to allow the travel of trucks. By forming the roads they will have a lower silt content (compared to using unformed tracks). This combined with the low speeds limits which will be imposed will reduce the potential for emissions. vehicles will travel on these roads. Based on previous assessments of multiple poultry operations, the PEL report 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 considered to be sufficient to ameliorate against potential impacts

On this basis, modelling of dust emissions from the internal roads is not considered warranted. In any case, an emissions generated will be mitigated and managed via appropriate mitigation measures during construction and operation, including limiting internal traffic speeds, road maintenance and the use of a water cart use (as required).

4.4.2 Combustion Emissions

As also advised in the EIS, the PEL report did not assess potential emissions from the diesel generators as they are not expected to be run often or long enough to exceed the relevant air quality criteria at any surrounding receptors. This was previously demonstrated by PEL in the Response to Submissions for ProTen's approved Narrandera Poultry Production Farm (SSD 6882).

We understand that there will be three emergency standby diesel generators installed at each PPU 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 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).

Given the emission standards, low frequency of use and the separation distances to surrounding receptors, the generators are not expected to exceed the relevant air quality criteria at any nearby receptor location and further assessment is not warranted.

With regard to on site vehicle use, the emissions are not expected to be significant compared to other sources in the region.

5 COUNCIL AND COMMUNITY SUBMISSIONS

5.1 Gunnedah Shire Council

5.1.1 Odour

With regard to odour, GSC stated:

> “*no consideration appears to be have made to the odour emissions over Lake Keepit. The contours on figure 25-27 appear to exclude areas over the water surface. The odour emissions from the development has the potential to significantly impact on users of the Lake Keepit area for recreational purposes and affect businesses within the local community, that rely on the use of this area”.*

The odour modelling was performed by PEL in accordance with the EPA’s requirements which were in line with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2016).

The area of Lake Keepit included in the model is shown in Figure 5-1. The blue areas were modelled as water in CALMET and the other areas modelled as predominantly rangeland. The area of the lake modelled assumed that the lake was full and, as such, the area had very little surface roughness (increased surface roughness increases odour dispersion), which means the results would be conservative compared to the case where the lake was grassland.

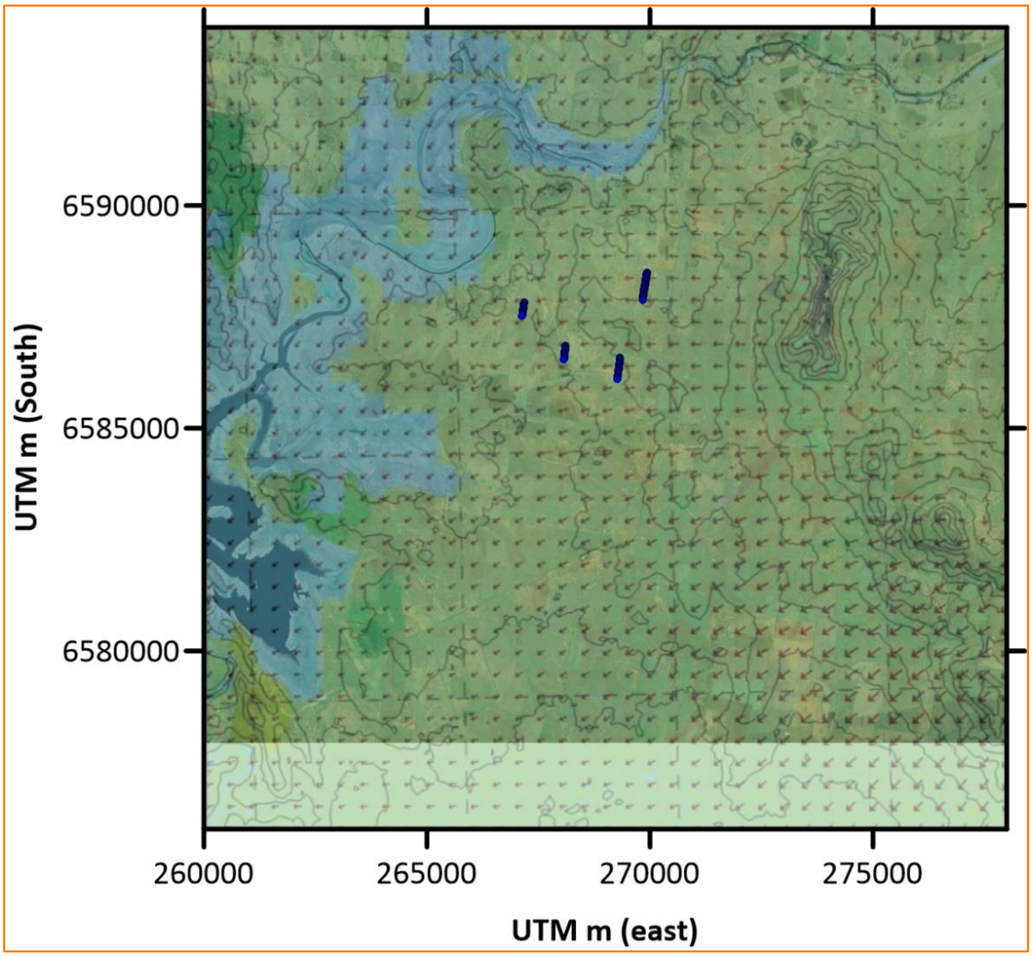


Figure 5-1: Modelled Lake Area and CALMET Land Use

When looking at the contours in the application material, it is important to note that the distance from the most westerly PPU (Farm 1) to Lake Keepit is 800m to the maximum water level. When odour disperses, the concentration drops. This is evident when looking at the 2, 3 and 5 ou contours in Figure 6-1 of the PEL report, with the gap between these being larger each time. The contours indicates that it is unlikely that odour would reach Lake Keepit at sufficient concentrations to lead to impact.

With regard to the contours, the 2 ou contour is the most stringent in New South Wales and is to be applied to areas with a high population density (more than 2,000 people) and the 2 ou contours shown in the figure indicate a very low risk of impact at Lake Keepit.

5.1.2 Particulate Matter

With regard to particulate matter Council noted:

"*the assessment does not appear to have any consideration as to the implication of suspended particles on water quality through dissolvent…. The assessment should be updated to include an investigation into the implication of presence of dissolvent from airborne particles not only surface water runoff, within the water catchment and settlement within the Lake Keepit water body. The presence of excessive amounts of particulates may have an implication on water quality, odour and aesthetic appearance of the water".*

As noted above in Section 3.2, the emission estimation methodology adopted in the PEL report is conservative with the PM_{10}. As shown in Table 6-3 of the PEL report, as well as information in this report, the contribution of the PPUs to dust in the area is unlikely to be significant especially when compared to existing background concentrations. There are two considerations here with regard to dust, the first being the large particles, and the second being the finer particles.

If elevated concentrations leave a shed, even with no controls in place, research including Visser et. al. (2006) has shown that for fine particles, concentrations drop to background levels within a ~30m of a group of chicken sheds. The larger particles (i.e. those greater in size than PM_{10}) as well as potentially elements of the PM_{10} fraction which theoretically due to their mass would be more likely to impact Lake Keepit, are heavier and drop out closer to the sheds meaning that the dust is unlikely to get anywhere near Lake Keepit and deposit out in a way to lead to impact. This is consistent with observations at many chicken farms, where a white dust can be seen around the fan end of the sheds, but not further afield. This is also consistent with other research that has shown that even slight impedance of airflow can result in dust dropping out of suspension, for example the use of windbreak walls (Dunlop & Galvin, 2013) and vegetative screens (both limited and extensive (Malone, et al., 2006; Malone, et al., 2008)) can reduce the travel of dust.

Therefore, the risk of impact from dust from the development is low, especially considering that rural areas where traditional agricultural operations occur have significant dust sources including ploughing activities and wind erosion especially during dry periods. An, example of this can be found in Galvin et. al. (2005) where dust fallout concentrations at a feedlot at background locations (as g/m^2/month) were often higher than the location immediately around the edge of the feedlot pen area and next to the feedlot pens. Observations made at the background location over time highlighted that cropping activities lead to higher concentrations during some periods of the year.

5.2 Community Submission

The various issues raised in the community submissions have been grouped to avoid repetition and responses are detailed below in Table 5-1.

Table 5-1: Responses to Community Submissions

Wind	Response	Relevant PEL Report Section
Issue 1 – one community submission notes that the data used for prevailing wind was sourced from weather stations far from the development site.	This statement is incorrect. The meteorological modelling was based on prognostic data without the use of data from weather stations. TAPM (Hurley, 2008a; Hurley, 2008c; Hurley, et al., 2008c), developed by the CSIRO, is an approved method in NSW (NSW EPA, 2016) and uses databases of terrain, vegetation, soil type, sea surface temperature and synoptic-scale meteorological data for Australia. TAPM is driven by 6-hourly synoptic measurements by the Bureau of Meteorology. This database is derived from Local Area Prediction System analysis data from the Bureau of Meteorology (NSW EPA, 2016). TAPM has been extensively validated and is considered appropriate for sites where no on site data exists.	4.1.2
Issue 2 – two community submissions assert that the odour modelling based on historical weather data collected at other sites in the region cannot be considered accurate as there has been no allowance for climate change and the potential for more extreme weather events.	The modelling is based on a year which is representative of long term trends. As outlined above, the use of TAPM means that site specific data has been used in the assessment. Eight years of data was analysed to determine a representative meteorological year from the Tamworth BoM weather station. This analysis included wind speed, temperature and humidity with 2005 found to be the most representative of long term observations.	4.1.1
Issue 3 – one community submission queries why over 100 years of weather data from the historical Manilla weather station, which is less than 15 km from the Development Site and closed in 2009, was ignored. The submission notes that there has been no comparison made of the	Air quality dispersion modelling requires hourly averaged data for climate statistics and modelling. There is no data available for Manilla that meets this requirement and therefore wasn't incorporated in this project. This was confirmed by searching the Climate Data Online page on the Bureau of Meteorology website for the Manilla area for both open and closed	

Wind	Response	Relevant PEL Report Section
similarity or difference between the two sites.	stations. There was however rainfall data for the Manilla area, which isn't used in the modelling and therefore wasn't considered.	
Issue 4 – a few of the community submissions claim that the modelled annual wind behaviour, which shows that the prevailing winds are from the northeast and east, is inaccurate. Most of these submissions assert that the prevailing winds are from the west and northwest. One notes that southwest winds have been experienced for the past 3 months.	As shown above in Section 3.3, the Moana data and TAPM data generally agree for 2016. The data shows the dominant winds are easterly and westerly which would also be a function of the location of the weather station. Given that the area is relatively open (compared to the large terrain elements further to the east and north) it would be expected that if north westerly through westerly winds dominated in the area elements of this would show up in the Moana data. This is not the case.	
Odour		
Issue 1 – one community submission asserts that the presented odour modelling contradicts wind modelling. Specifically, that the wind modelling shows northeast predominate winds yet odour modelling shows residents to northeast will be most affected by odour.	The shape of the odour contours are based on a) winds for each hour of the year across the area b) emissions across the year for the area, c) the dispersion occurring during each hour of the year and d) the predicted concentrations. The modelling makes use of percentiles, which look at the top 1% of impacts for a year (top 88 impacts). This means that even if the winds blow infrequently in one direction, the model output still considers the top 1% of these and the contours are based on this. This means that for some areas, the contour may be relatively large even with the wind frequency is low.	
Issue 2 – two community submissions assert that the prevailing winds are north westerly's meaning that odours will more often than not be blown in a south easterly	The modelling makes use of both terrain and weather data. Under light wind or calm conditions, local terrain can funnel flows/emissions from the farm, while moderate or	6.1.1

Wind	Response	Relevant PEL Report Section
direction towards their home (R25) and farm and they will be the most severely impacted. These submissions also assert that the natural southeast-northwest ridgeline running through the Development Site will direct odour carrying wind towards their home from Farms 1, 3 and 4.	stronger winds can overcome local terrain influences. Therefore, this has been taken into account in the modelling. By modelling a series of placement days, peak emission events have been moved through the year, which in turn produces a more conservative range of conditions compared to a single starting day. As shown in Table 3-9 there are some minor changes in the predicted concentrations associated with the batch staging, which is consistent with observations for staging at other locations. Also shown in Table 3-9 is that receptor R25 has the second highest predictions for odour of the receptors.	
Issue 3 – one community submission and the Animal Liberation submission claim that the proposed locations of the PPUs close to property boundaries contravenes best management practice, noting that maximising boundary setbacks by locating sheds near the centre of the site should be a key consideration. Animal Liberation claims that the development layout, specifically the proximity of the sheds to site boundaries, poses substantial threats to the enjoyment of neighbouring properties.	The selection of a location for meat chicken sheds is a function of many things, including biosecurity, prevailing winds, soil type, access to power and water, engineering/earthwork requirements and limitations, and other environmental limitations. With regard to odour and dust, property boundaries are not a primary consideration provided the odour and dust assessment shows compliance which is the case here. Furthermore, as explained in the EIS, while there is significant residual land available within the Development Site, the shed locations have been selected based on a number of factors including, areas of high conservation vegetation/woodland, Aboriginal heritage sites and the need to maximise the separation distances between the PPUs for biosecurity purposes. Each PPU has been separated from the others in line with ProTen and Baiada's biosecurity and bird welfare requirements.	
Issue 4 – two community submissions and the Animal Liberation claim that the proposal significantly fails the Level 1 odour impact assessment calculator and therefore should not be allowed. Specifically, that the	In New South Wales the level 1 assessment is a simple conservative assessment used as a first pass screening test. If a proposal fails a Level 1 screening due to its conservative nature, a proponent may wish to perform a more in-depth assessment. These are known as Level 2 or Level 3 assessments. In simple terms, Level 1 is conservative and produces	

Wind	Response	Relevant PEL Report Section
development does not provide adequate separation distances to R25 and also other surrounding residential receptors.	unrealistically large buffer distances compared to the more comprehensive, and accurate, model based assessments. Compliance with a more in depth and accurate assessment (Level 2/3) does not mean that a Level 1 assessment is more appropriate and should override the more realistic of the two assessment methods.	
These two community submissions go on to advise that level 2 and level 3 odour modelling is speculative due to the range of variables used and subjective input selection, which can lead to ambiguous outputs, and it is difficult to access accuracy without some kind of measurement to compare against. These submissions assert that the Level 1 separation distance formulas, in contrast, can rapidly estimate separation requirements using minimal inputs.	The methodology used here has been used extensively across New South Wales and Australia. Specifically, the methodology here is consistent with the Approved Methods (NSW EPA, 2016) and the CALPUFF modelling guidance (OEH, 2011). Moreover, the modelling has been performed in line with the methodology required in the SEARS. It is correct to say that Level 1 separation distances can rapidly estimate distances using minimal inputs. But it is also correct that these distances are known to be unrealistically conservative and a more accurate assessment should be performed by a proponent if they wish to have a larger number of birds than the Level 1 assessment allows.	
Issue 5 – numerous community submissions identify increased/excessive odour for locals and Lake Keepit users as a significant issue.	The modelling shown in the EIS indicates that the odour at Lake Keepit will be for the majority of time below 2 ou (i.e. 99% of the year). This is relevant as the emission rates are based on laboratory measurements in line with AS4323.3. If a sample of air was taken in a house, it may have a concentration in the order of 10-20 ou due to normal household smells. These are more easily differentiable in the clean laboratory. Moreover, recent odour intensity testing at a farm at Griffith gave an odour intensity of ~1.5 at 2 ou. 1.5 is less than a weak odour which shows that the odour at that concentration is unlikely to be at a concentration which would lead to nuisance.	

Wind	Response	Relevant PEL Report Section
Two community submissions claim that a predicted odour level of 4.2 ou at R24 will be "unbearable" / "intolerable".	The impact at Lake Keepit is therefore not expected to be significant. The 2 ou contour is the most stringent in New South Wales and is to be applied to areas with a high population density (more than 2,000 people) and the 2 ou contours therefore show a very low risk of impact at Lake Keepit. The concentration of 4.2 ou was predicted at the 99th percentile on a 1 second averaging time. This means that for 99% of the year, odour is unlikely to be detectable. Recent odour intensity testing at a farm at Griffith gave an VDI[13] intensity of ~2 at 4 ou. This is a weak odour and below distinct and that test indicated that poultry odour didn't register as distinct to around 8 ou above threshold. Whilst some detectable odour may occur from time to time, the assessment indicates that the majority of year the receptor will not have detectable odour.	
Issue 6 – one community submission claims that the odour modelling area appears to have been deliberately trimmed to a very small locality with no consideration outside of this area.	This statement is incorrect. The odour modelling has been presented for the 2 ou contour and shows a much greater area than that required to demonstrate the 5 ou contour compliance level. This is shown in Figure 5-1. The larger area was modelled to assess the EPA's definition of the affected population with regard to the Development Site.	
Issue 7 – a few community submissions and the Animal Liberation submission claim that the potential cumulative impact of the four farms comprising a total of 54 sheds has been inadequately addressed and the	The cumulative impact has been modelled by placing birds in line with Baiada's placement methodology. This means that the sheds are filled and the birds are grown. Once the sheds are emptied and cleaned, birds are placed again.	5.5 6.1.2

[13] See Determination of odorants in ambient air by field inspections intensity VDI3940 (VDI, 1993) and Pitt (2014).

Wind	Response	Relevant PEL Report Section
conclusion that any cumulative impacts would be negligible is not supported by any reliable data or evidence.	Cumulatively the four PPUs have been assessed together. This has been further assessed by changing the placement day of the birds. In total three placement schedules were modelled, which mean that peak emission events varied with regard to time of year. With regard to other potential odour sources in the area, unless the character of the odours is similar, or they are neighbouring the Development Site, they should be assessed separately rather than cumulatively.	
Issue 8 – one community submission claims that there has not be any consideration to the destination of odour laden air during cold air drainage events (calm cool nights) or to the topography that affects the passage and accumulation of this air overnight. The submission asserts that only odour dispersion during daytime convective periods has been modelled.	This statement is incorrect. A full year of meteorological data for 2005 has been modelled and assessed, incorporating a typical range of meteorological parameters including cold air drainage and topographically induced winds. The use of CALMET and CALPUFF ensures that light air drainage associated with topography has been included.	4.1.4
Similarly, two other community submissions assert that odour emissions have the potential to be drawn to the basin occupied by Keepit Dam as a result of temperature inversions and katabatic drifts and will linger there for some time during calm conditions.	The odour modelling indicates that dispersion between the PPUs and Lake Keepit would be significant enough to reduce the risk of impacts at Lake Keepit to negligible. If odour were to reach the lake, it would continue to disperse rather than fill the dam with air. It is highly unlikely that the odour would somehow condense and increase over time that distance from the source. Whilst odour can in effect pool during calm conditions where the terrain is directly below the source, the distance between the PPUs and Lake Keepit is significant enough that condensation of odour is unlikely to occur.	
Issue 9 – one community submission notes that the odour modelling has only been	The modelling has been performed assuming the lake was full (based on aerial imagery, see Figure 5-1). When this is modelled in CALPUFF, the lake surface is modelled as water	

Wind	Response	Relevant PEL Report Section
performed for the condition of Lake Keepit being full and queries whether suitable settings have been applied in CALPUFF to accurately model the movement of air over the "glassy smooth lake surface". The submission advises:	(i.e. minimal surface roughness), which means there is little turbulence associated with the lake and that the odour (if it were to reach the lake) is more likely to cross the lake towards receptors rather than be dispersed further by rougher landuses. In reality, if the lake is not full, the vegetation and grass would increase turbulence and odour dispersion. The amount of odour emitted by the sheds is unlikely to fill the lake at night with odour leading to nuisance, both due to the distance from the PPUs, as well as the size of the lake.	
At all lake levels air will accumulate overnight in the basin and, even under calm conditions, air movement of 0.4 m/s will carry the odour laden air more than 14 km during 10 hours.	The dispersion between the PPUs and Lake Keepit, as demonstrated by the modelling, is unlikely to lead to a situation where odour can accumulate in the lake overnight and increase in concentration where an impact would occur.	
At low lake levels there will be a very large volume of accumulation and during morning warming this air will be carried to every lakeside location, with potentially thousands of recipients.	See above.	
Issue 10 – one community submission notes the potential for impacts on tourism for operators around Lake Keepit and suggests that the odour modelling include the potential impact to thousands of visitors to Lake Keepit.	As addressed above in Section 3.1, temporary visitors and/or transient populations are not normally considered sensitive receptors for potentially odorous operations. The basis of the odour criterion used for modelling is the assumption that there is a continuously affected population. This is not the case here, and is not required under the Approved Methods. In any case, the impact at Lake Keepit is expected to be insignificant. The 2 ou contour is the most stringent in New South Wales and is to be applied to areas with a high population density (more than 2,000 people) and the 2 ou contours therefore show a very low risk of	

Wind	Response	Relevant PEL Report Section
	impact at Lake Keepit. The modelling shown in the EIS indicates that the odour at Lake Keepit will be for the majority of time below 2 ou (i.e. 99% of the year).	
Issue 11 – one community submission queries the conservativeness of the odour modelling and suggests it should be tested by comparing the daily modelled predictions using real time met data from Moana with the actual odour impact at a nominated location in the Peel basin.	As detailed above, the modelling performed by PEL is considered conservative, including the adopted K factor of 2 and the emission estimation methodology, and was performed in line with the relevant guidelines and Approved Methods. The Moana farm and the suggested monitoring location are sufficiently far from the proposed development site that they are not relevant.	
Issue 12 – two community submissions claim that odour will be more pronounced when the farms are being cleaned out between production cycles. These submissions assert that given the cleaning phase is 10 days per cycle and each farm will have 5.6 cycles per year, there will be 56 days of elevated odour emissions per year per farm, which equals 224 days per year for the development (61% of the year).	Unlike the growth cycle, cleanout of sheds can be managed in a way which reduces the risk of impacts. Firstly, cleanout only occurs during the day, which is when dispersion is the best, and the shed ventilation systems are not used the same way as when bird are present. Once the litter is removed from the sheds, it is placed in a covered truck and promptly removed from site. This reduces the risk of adverse impacts associated with cleanout. Moreover, it does not take 10 days to clean a shed. The removal of litter from a shed typically takes a day, and the rest of the cleanout is associated with washing down and disinfecting the shed and placing fresh litter.	
Issue 13 – two community submissions advise that in January 2014 the Victorian EPA replaced the air dispersion model AUSPLUME with the more advanced and current US EPA approved air dispersion model AERMOD. The submissions further advise that the Vic EPA has found	The use of CALPUFF, as noted in the Approved Methods, is consistent with best practice. AERMOD is a Gaussian Plume model which is a steady state model. The Approved Methods (NSW EPA, 2016) specifically state that steady state models (which would include AERMOD) are not approved where there is non steady state conditions (such as here) and where there is a high frequency of calm conditions (such as here).	

Wind	Response	Relevant PEL Report Section
AERMOD to generally result in the better prediction of air quality impacts and require increased separation distances and land areas.		
These submissions also advise that the Vic EPA requires assessment against five years (as opposed to one year) of meteorological data, with compliance required for all five years.	The methodology used here is consistent with the Approved Methods (NSW EPA, 2016). The use of five years of data dates to historical USEPA requirements that you have five years of offsite data or one year of onsite data. With the advent of Prognostic meteorological models, good practice in New South Wales and other areas of Australia requires the selection of a single representative year and to model this year with the prognostic model and then with the dispersion model.	
Issue 14 – two community submissions assert that the preliminary odour modelling was performed on ProTen's Bective poultry farm, which is some distance from the Development Site and only a fraction of the size of the proposed Development. These submissions query how this can be a credible source of information given (as they believe) the modelling was based on three days of sampling (days 27, 28 & 41) during one production cycle in 2011, with only 10 samples collected.	No preliminary modelling was performed on the Bective farm. These submissions are likely referring to the odour testing performed at Bective which was referenced in the earlier reports. The odour modelling in the EIS included: • Consideration of historical test data; and • Consideration of newer test data. In addition to the above, as outlined in Section 2, further testing has been performed at a number of farms since the publication of the EIS. The testing was over a number of days, but typically focussed around peak density in the sheds, as this is when the manure build-up is greatest and the mass of birds in the shed is greatest which is the period of peak emissions. The newer data have confirmed the conclusions regarding emissions in the earlier reports.	

Wind	Response	Relevant PEL Report Section
Issue 15 – two community submissions assert that odour emission rates for proposed new farms are unknown and the emission rates for new sheds are likely to differ from existing sheds at other locations. These submissions claim that the absence of broiler sheds at the Development Site means that model predictions cannot be verified and unforeseen odour impacts may be experienced once the facility is operational.	The odour emission rate data considered in the assessment has been based on over 10 years of testing, as well as recent testing at large farms in New South Wales. The use of the methodology here is therefore considered appropriate. The approval and successful complaint free operation of recent large farms including ProTen's Narrandera, Jeanella and Jeanella South operations, and also the Tabbita operation, highlights that the methodology used is appropriate.	
Issue 16 – two community submissions query how their home (R25) can be the closest receptor yet have the second highest predicted odour. These submissions believe that the predicted odour is grossly understated given the size of the Development and that the potential cumulative odour impacts of the four farms have not been taken into account in the modelling.	The predicted concentrations are a function of a) distance from the farm; b) winds for each hour of the year across the area; and c) emissions across the year for the area. This is further influenced by the use of percentiles in modelling, which look at the top 1% of impacts for a year (top 88 impacts). The highest predicted 99^{th} percentile odour concentration at receptor R25 is 3 ou, which is below the criterion of 5 ou. As noted above, cumulative impacts have been modelled, assessed and presented in the PEL report.	
Particulate Matter		
Issue 1 – several community submissions identify increased/excessive dust as a significant issue. Two community submissions claim that the predicted annual	The modelling results show that all receptors are predicted to experience annual average PM_{10} concentrations below the criterion, including when development emissions are	

Wind	Response	Relevant PEL Report Section
average PM_{10} level of 12.3 µg/m^3 at R24 is unacceptable.	combined cumulatively with background concentrations. The highest predicted cumulative annual average concentration of 12.3 µg/m^3 at R24 is well below the criterion. The modelling results also show that all receptors are predicted to experience maximum 24-hour average PM_{10} concentrations below the criterion of 50 µg/m^3, including when Development emissions are combined cumulatively with background concentrations, with the exception of R25 where a cumulative concentration of 55.2 µg/m^3 is predicted during the day 4 staging scenario (compliance is achieved for the other two modelled scenarios). As detailed above in Section 3.2.1, the emissions rate data used in the modelling has been proven to be 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 and no significant impacts are expected. Moreover, research shows that dust concentrations quickly drop to background levels within a few hundred metres of sheds (Worley, et al., 2007; Worley, et al., 2012). This is consistent with observations at other farms where white dust can be seen on the ground close to the sheds, but not further afield. The use of vegetative plantings (as proposed) will reduce the predicted concentrations further, as dust has been shown to impact and drop out on vegetative buffers.	
Issue 2 – three community submissions claim that dust produced by the Development will settle on the roofs of the houses and contaminate their drinking water in rainwater tanks.	The dust modelling and experience at other farms has shown that it is unlikely that dust from the PPUs will reach the dwellings within adjoining/surrounding properties. If it does happen to on occasion, it will be at a very low concentration and not a level which would lead to contamination.	

Wind	Response	Relevant PEL Report Section
Issue 3 – two community submissions assert that the prevailing winds are north westerly's meaning that their home (R25) and farm will be the most severely impacted by dust generated by the Development.	See response to Issue 1.	
Issue 4 – two community submissions assert that the dust modelling is not site-specific and it is based on predictions only. These submissions also query how modelling three batch staging scenarios to represent days 1, 14 and 28 bird placements of one production cycle in 2005 can be a credible source of information in determining the potential dust impacts for the life of the development.	The air quality modelling performed was site-specific in that it was specific to the design and layout of the proposed development and incorporated site-specific terrain and land use data. As shown in Section 3.2.1, the dust modelling is conservative compared to recent test data. As noted above, the year 2005 was selected as it was representative of long term trends in the area and the staging was performed to assess the influence of peak emissions across the year (bearing in mind that poultry emissions are cyclical). This methodology is consistent with the Approved Methods.	
Issue 5– two community submissions assert that dust emission rates for proposed new farms are unknown and unforeseen impacts may be experienced once the facility is operational.	See Section 3.2.	
Issue 6 – two community submissions point at that their home (R25) is predicted to experience the highest 24-hour average PM_{10} concentration (when development emissions are combined cumulatively with	As shown in Section 3.2.1, the dust modelling is unrealistically conservative compared to recent test data. The predicted concentrations are therefore conservative (even when the divided by two). Based on this, the greater risk to the dwelling is from dust events	

Wind	Response	Relevant PEL Report Section
background concentrations) above the criterion confirming that their home and farm will be the most severely impacted by dust generated by the Development.	associated with surrounding traditional farming (i.e. ploughing) and fire or dust storm events in the area.	

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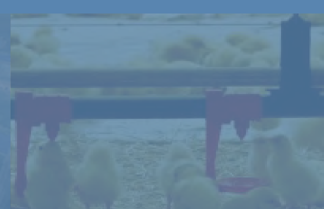
Appendix E

Response to Traffic Matters

(SLR Consulting Australia 2018e)

Supplementary Traffic Assessment

(SLR Consulting Australia 2018f)


20 December 2018

620.12837-L01-v1.0 Response to DPE Traffic Matters 20181220.docx

ProTen Tamworth Pty Ltd
PO Box 1746
North Sydney NSW 2060

Attention: Daniel Bryant

Dear Daniel

Rushes Creek Poultry Production Farm EIS
DPE Key Issues
Response to Traffic Matters

1 Context

Reference is made to the "Issues Letter" issued by the NSW Department of Planning and Environment (DPE) on 16 October 2018 in relation to the development application (DPE Reference: SSD 7704) for the proposed Rushes Creek Poultry Production Farm (the Development) located at Rushes Creek Road, Rushes Creek.

In response to the traffic matters raised in DPE's letter and also in many of the community submissions, a Supplementary Traffic Assessment has been prepared and is attached. This letter and the attached Supplementary Traffic Assessment should be read in conjunction with the Traffic Impact Assessment (TIA) previously undertaken in relation to the Development by RoadNet (*Traffic Impact Assessment: Rushes Creek Poultry Production Farm* dated 25 June 2018 - referred to herein as the 'RoadNet TIA').

The traffic matters raised in the DPE's letter and community submissions are addressed below.

2 DPE Traffic Matters

The traffic matters raised by the DPE have been reproduced below followed by a formal response to each matter. The DPE's Issues Letter can be viewed in full on the DPE's online major projects portal (available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7704).

DPE Item 3a: Traffic

"The AQIA notes that the Strathfield Poultry Broiler Complex has recently been approved by Tamworth Shire Council. This complex has approval to house up to 2.94 million birds. It is noted that in the EIS for Strathfield Farm 5, that once the new Baida processing plant on the Oxley Highway in Tamworth becomes operational, haulage routes for vehicles from the Strathfield complex to the processing plant will be via two routes, one being via Rushes Creek Road and Keepit Dam Road.

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The Traffic Impact Assessment (TIA) for the proposed development at Rushes Creek does not identify the Strathfield poultry farm development in its consideration of cumulative impacts. Consideration of cumulative traffic impacts from the Strathfield development should therefore be assessed as part of a future cumulative traffic scenario."

To inform DPE's assessment of the application, the following clarifications are provided:

- SLR has been provided with the following information by EME Advisory in relation to the Strathfield development and approved haulage routes:

  "While the EIS's (5) for Baiada's proposed Strathfield development (Farms 1 to 5) indicate that Rushes Creek Road could potentially form part of the haulage route from Strathfield to the new poultry processing plant (once established) at the company's Oakburn facility on the Oxley Highway to the west of Tamworth, there was some additional work and changes to the Strathfield development prior to final approval by the Land and Environment Court (following an appeal against the development consent determination).

  Importantly, and superseding the EISs, the five sets of "Conditions of Consent" for the five Strathfield farms specify the haulage routes that must be used and Rushes Creek Road does not form part of the specified routes. Specifically, condition 44 in each of the five determinations specifies the roads to be used for haulage to Oakburn:

  44) Haulage Routes – Manilla to Tamworth.

  Only the following roads are to be used as the haulage route from Manilla to the Out Street Processing Plant (located at 1 Out Street, Tamworth) or the Oakburn Processing Plant (located at 1154 Oxley Highway, Tamworth) or the Oakburn Rendering Plant (located at 1154 Oxley Highway, Tamworth):

  - ***Manilla Road (Fossickers Way) (South Manilla);***
  - ***Jewry Street, Tamworth;***
  - ***Ebsworth Street;***
  - ***Plain Street;***
  - ***Denison Street;***
  - ***Bridge Street; and***
  - ***Out Street (to the Out Street Processing Plant); or***
  - ***Gunnedah Road (to the Oakburn Processing Plant or the Oakburn Rendering Plant).***

  If in the future, a suitable alternate route is identified and designated as a Restricted Access Vehicle Route for B-Double trucks, that gazetted route will become the approved haulage route."

- Based on the above, Rushes Creek Road does not form part of the approved haulage route for the Strathfield development and therefore no further assessment of the cumulative traffic impacts of the Strathfield development is considered to be warranted;
- Furthermore, as detailed in *Section 4.5* (Future Design Year Volumes) of the RoadNet TIA, conservative background traffic volumes were utilised for the assessment of the subject development as follows:

  - Background traffic growth (2% p.a. linear) was conservatively applied to all traffic movements at the Oxley Highway/Rushes Creek Road intersection from the survey year of 2016 until the 10 year design horizon (2029);
  - The Rushes Creek Road traffic volumes immediately to the north of the Oxley Highway (i.e. as determined by the Oxley Highway/Rushes Creek Road intersection surveys) were applied to Rushes Creek Road in the vicinity of the subject site, which is a very conservative assumption.
- Based on the above, the traffic assessment documented in the RoadNet TIA included a conservative allowance for background traffic growth, representing additional traffic demand generated by other potential developments in the surrounding area, and therefore no further analysis is considered to be warranted.

DPE Item 3b: Traffic

"The TIA makes a number of recommendations regarding the Oxley Highway/Rushes Creek Road intersection and the access driveways to the development. The following recommendations must be undertaken prior to determination with the results of these analyses included in the RTS report:

- ***swept path assessments for B-doubles for both the Rushes Creek/Oxley Highway intersections and the access driveways***
- ***visibility splay investigations (as above) at the Rushes Creek/Oxley Highway intersection***
- ***review of line marking arrangements at the Rushes Creek Oxley Highway intersection."***

To inform DPE's assessment of the application, the following clarifications are provided:

- As demonstrated in *Section 2.2* (Linemarking and Geometry Review), *Section 4.3* (Swept Path Assessment) and *Appendix B* (Swept Path Assessment) of the attached Supplementary Traffic Assessment, appropriate allowances are made at the existing Oxley Highway/Rushes Creek Road intersection and proposed northern and southern site accesses to Rushes Creek Road in order to accommodate manoeuvring by 25m B-double design vehicles;
- The assessment documented in *Section 2.3* (Sight Distance Assessment) and *Appendix C* (Sight Distance Drawings) of the attached Supplementary Traffic Assessment demonstrates that adequate sight distance is currently provided at the Oxley Highway/Rushes Creek Road intersection to accommodate additional traffic generated by the Development;
- As detailed in *Section 2.2* (Linemarking and Geometry Review), of the attached Supplementary Traffic Assessment, the existing linemarking and signage provided in the vicinity of the Oxley Highway/Rushes Creek Road intersection is generally appropriate and compliant with current design standards. It is recommended that the give way hold line marking on the Rushes Creek Road approach to the intersection be replaced in accordance with the intersection concept plan provided at *Appendix A* (Recommended Linemarking) of the Supplementary Traffic Assessment. Given that the give way hold linemarking should be replaced regardless of the Development proceeding, it is recommended that the linemarking be replaced by the relevant road maintenance authority.

DPE Item 3c: Traffic

"It is stated that it is not possible to accurately determine construction traffic volumes at this point in time. Given the Applicant's experience in constructing other poultry farms, a conservative estimate of this information should be possible. A worst-case scenario should be evaluated."

To inform DPE's assessment of the application, the following clarifications are provided:

- To provide a reasonable estimate of the traffic volumes associated with the construction of the Development, the following information would be required at a minimum:
  - Construction methodologies, staging and timeframes;
  - Material types and quantities;
  - Location of suppliers, contractors and haulage routes;
  - Design vehicle types;
  - Workforce numbers and origins.
- At this point in time, detailed design has not been undertaken and hence accurate inputs to an assessment of the impacts of construction traffic associated with the Development are not available. Any assessment of construction traffic impacts at the concept design stage would be inefficient, as rework would likely be required as a result of design adjustments through the detailed design process;
- In relation to the potential operational impacts of construction traffic associated with the Development, the following is noted:
  - As detailed in *Section 7* (Construction Staging and Management) of the RoadNet TIA, construction activities are likely to occur over a 16 months period. Based on the details of the likely construction methodologies and timeframes, the traffic generated by construction activities are highly unlikely to significantly exceed the operational peak hour traffic volumes (i.e. up to 17 vehicles per hour [vph]) forecast for the Development;
  - The RoadNet TIA assessed the impacts of operational traffic associated with the Development at a 'design horizon' year of 2029. To provide a conservative estimate of the remaining capacity at the assessed Oxley Highway/Rushes Creek Road intersection, the typically adopted performance threshold in SIDRA Intersection for an unsignalised intersection is a Degree of Saturation (DOS) of 0.80 (i.e. 80%). The results of the SIDRA assessment for the Oxley Highway/Rushes Creek Road intersection presented in *Table 6.1* of the RoadNet TIA for the 'With Development' scenario at the 2029 design horizon (noting that at this stage, construction activities will likely occur during 2019/2020) indicated a maximum DOS of 11% during the PM peak hour period. This indicates that the Oxley Highway/Rushes Creek Road intersection has significant remaining capacity, and is therefore not sensitive to additional traffic movements;

    - *Table 8.1* of the Austroads *Guide to Traffic Engineering Practice Part 2: Roadway Capacity (1988)* (now superseded, but still relevant in this instance) identifies that capacity analysis is unnecessary for unsignalised intersections where the two-way traffic volume on the major road (two lane) is 400vph or less, and the turning volumes are 250vph or less on the minor leg. The traffic volumes detailed in *Table 4.4* of the RoadNet TIA for the 'With Development' scenario at the 2029 design horizon indicate a maximum two-way traffic volume of 89vph (AM peak period) along Rushes Creek Road between the subject site and the Oxley Highway. Given that the major road (i.e. Rushes Creek Road) traffic volumes are significantly lower than 400vph, turning movement volumes of a minimum of 250vph would be required at the site access or other intersections before any capacity analysis is warranted. Therefore, site access or other intersections with Rushes Creek Road are not sensitive to additional traffic movements (i.e. from an operational perspective);
    - Based on the above, no further operational assessment of the construction traffic impacts associated with the Development is considered to be warranted.
- An assessment of the construction traffic impacts of the Development would likely only need to consider movements of over-dimension vehicles (if proposed), potential pavement impacts, and the requirement for Traffic Control Plans (TCP) (i.e. which may be required at certain locations during intensive construction periods). These items can be addressed through provision of a Construction Traffic Management Plan at such a time that the detailed design for the Development has been undertaken, and all of the required assessment inputs are available;
- It is therefore recommended the Development be conditioned to submit a Construction Traffic Management Plan (CTMP) prior to any construction activities associated with the Development taking place. This condition would provide the relevant road authorities with an appropriate level of confidence that any traffic impacts of construction activities associated with the Development can be appropriately managed. It is noted that a CTMP is committed to in the EIS (SLR 2018).

3 Community Submissions

The traffic matters raised in the community submissions are summarised below by a formal response to each matter. The community submissions can be viewed in full on the DPE's online major projects portal (available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7704).

Submission Traffic Matter 1

A number of community submissions have raised concerns around the appropriateness of the existing form of Rushes Creek Road to accommodate additional heavy vehicle movements associated with the Development.

In response to the community submissions received relating to the above matter, the following clarifications are provided:

- The Development will utilise B-doubles, likely up to a 25m General Mass Limit (GML) size, along Rushes Creek Road between the Development Site and the Oxley Highway to the south for operational purposes. It is noted that the entire length of Rushes Creek Road is approved as a Higher Mass Limit (HML) 25/26m B-double route by the National Heavy Vehicle Regulator (NHVR), and as such, B-doubles associated with the Development are able to use Rushes Creek Road without the need to apply for a Class 2 heavy vehicle access permit;

- Based on the above, Rushes Creek Road has previously been assessed by both the NHVR and the relevant road manager, in this case being Tamworth Regional Council (TRC), as being appropriate for the use of B-doubles such as that proposed as part of the Development;
- SLR has carried out a review of the RoadNet TIA and assessment of Rushes Creek Road, and also undertook an independent site inspection and review of the existing conditions along Rushes Creek Road. As detailed in *Section 3* (Rushes Creek Road) of the attached Supplementary Traffic Assessment, based on the existing form and alignment of Rushes Creek Road observed during the site inspection, the low future traffic volumes forecast along Rushes Creek Road (~90vph at 2029 including Development traffic), the additional B-double movements likely to be generated by the Development (~4vph on average, 2vph in either direction) are not anticipated to be problematic;
- On the basis of the above, SLR agrees with the previous NHVR, TRC and RoadNet assessments indicating that the existing form of Rushes Creek Road is suitable to accommodate B-double movements such as that proposed as part of the Development.

Submission Traffic Matter 2

Community submissions have raised concerns around the appropriateness of the form of the proposed northern and southern site accesses to Rushes Creek Road to accommodate vehicle movements associated with the Development***, and assessment of the sight distance available at the proposed access locations.***

In response to the community submissions received relating to the above matter, the following clarifications are provided:

- *Section 4* (Site Access Review) of the attached Supplementary Traffic Assessment demonstrates that appropriate sight distance is provided at the proposed northern and southern site access locations to Rushes Creek Road;
- As detailed in *Section 4* (Site Access Review) and *Appendix D* (Turn Warrant Assessment) of the attached Supplementary Traffic Assessment, a turn warrant assessment indicates that Basic Left (BAL) turning treatments should be provided at both the northern site access and southern site access locations to Rushes Creek Road, which is committed to in the EIS (SLR 2018);
- Swept path assessments undertaken for indicative BAL turning treatments provided at the northern site access and southern site access locations to Rushes Creek Road, which are provided at *Appendix B* (Swept Path Assessment) of the attached Supplementary Traffic Assessment, demonstrate appropriate manoeuvring for 25m B-double design vehicles;
- Based on the above, the proposed form and location of the northern and southern site accesses to Rushes Creek Road are considered to be appropriate from a traffic engineering perspective.

4 Summary and Conclusions

Based on the assessment documented herein and in the attached Supplementary Traffic Assessment, SLR is satisfied that all of the Development traffic matters raised in the DPE's Issues Letter and the community submissions have been adequately addressed. It is therefore recommended that the Development be approved subject to the following approval conditions (or similar) of relevance from a traffic perspective:

- BAL turning treatments are to be provided at the proposed northern and southern site accesses to Rushes Creek Road;
- A Construction Traffic Management Plan is to be submitted prior to any construction activities associated with the Development taking place.

In addition to the above, it is recommended that the give way hold line marking on the Rushes Creek Road approach to the Oxley Highway/Rushes Creek Road intersection be replaced by the relevant road maintenance authority. As noted, this maintenance task would be recommended regardless of the Development proceeding.

Should you have any queries in relation to this response, please do not hesitate to contact the undersigned.

Yours sincerely

CHRIS LAWLOR
Associate - Transport Advisory

RUSHES CREEK POULTRY PRODUCTION FARM

Environmental Impact Statement
Supplementary Traffic Assessment

Prepared for:

ProTen Tamworth Pty Ltd
PO Box 1746
North Sydney NSW 2060

SLR Ref: 620.12837-R01
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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 Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

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

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
620.12837-R01-v1.0	20 December 2018	Chris Lawlor	Jeff Baczynski	Jeff Baczynski

CONTENTS

DOCUMENT REFERENCES

TABLES

FIGURES

CONTENTS

APPENDICES

1 Introduction

1.1 Context

SLR Consulting Australia Pty Ltd (SLR) has been engaged by ProTen Tamworth Pty Ltd (ProTen) to provide supplementary traffic engineering advice following exhibition of the Environmental Impact Statement (SLR 2018) (EIS) for the proposed Rushes Creek Poultry Production Farm (the Development), located at Rushes Creek Road, Rushes Creek.

This Supplementary Traffic Assessment has been prepared to assess a number of traffic matters in the "Issues Letter" issued by the NSW Department of Planning and Environment (DPE) on 16 October 2018 and also in the community submissions in relation to the Development. The DPE Issues Letter and the community submissions can be viewed on the DPE's online major projects portal (available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7704).

A TIA was previously undertaken by RoadNet (*Traffic Impact Assessment: Rushes Creek Poultry Production Farm* dated 25 June 2018 - referred to herein as the 'RoadNet TIA') to assess the traffic impacts of the Development. This document should be read in conjunction with the RoadNet TIA.

1.2 Assessment Scope

1.2.1 DPE Traffic Matters

Table 1 identifies which section of this document addresses each of the relevant traffic matters raised in the DPE RTS letter.

Table 1 DPE Traffic Matters

Item	Traffic Matter	Report Section
3	*'The TIA makes a number of recommendations regarding the Oxley Highway/Rushes Creek Road intersection and the access driveways to the development. The following recommendations must be undertaken prior to determination with the results for both these analysis included in the RTS report:'*	
(i)	*'Swept path assessments for B-doubles for both the Rushes Creek/Oxley Highway intersection and the access driveways'*	**Section 2.2** (Linemarking and Geometry Review), **Section 4.3** (Swept Path Assessment) and **Appendix B** (Swept Path Assessment)
(ii)	*'Visibility splay investigations (as above) at the Rushes Creek/Oxley Highway intersection'*	**Section 2.3** (Sight Distance Assessment) and **Appendix C** (Sight Distance Drawings)
(iii)	*'Review of linemarking arrangements at the Rushes Creek Oxley Highway intersection'*	**Section 2.2** (Linemarking and Geometry Review) and **Appendix A** (Recommended Linemarking)

It is noted that additional issues were raised by the DPE relating to cumulative traffic impacts of other developments and construction traffic impacts, however, these are addressed in a separate response which summarises responses to all of the DPE traffic matters. Further assessment of these additional traffic matters is not considered to be warranted herein.

1.2.2 Community Submissions

In addition to the DPE traffic matters, a number of community submissions received in relation to the Development raised potential traffic impacts. Table 2 identifies which section of this document addresses each of the relevant traffic matters raised in the community submissions.

Table 2 Community Submission Traffic Matters

Item	Traffic Matter	Report Section
S1	Appropriateness of the existing form of Rushes Creek Road to accommodate additional heavy vehicle movements associated with the Development.	**Section 3** (Rushes Creek Road)
S2	Appropriateness of the form of the proposed northern and southern site accesses to Rushes Creek Road to accommodate vehicle movements associated with the Development, and assessment of the sight distance available at the proposed access locations.	**Section 4** (Site Access Review), **Appendix B** (Swept Path Assessment) and **Appendix D** (Turn Warrant Assessment)

2 Oxley Highway/Rushes Creek Road Intersection

2.1 Existing Intersection Layout

In order to determine the appropriateness of the existing form of the Oxley Highway/Rushes Creek Road intersection form to accommodate additional vehicle movements associated with the Development, SLR obtained aerial imagery from NSW Government Spatial Services (dated October 2012) and attended a site inspection on Monday 19 November, 2018. The site inspection confirmed that the current intersection form is generally consistent with that shown on the aerial imagery from 2012.

The existing geometric form of the intersection and signage provided in the vicinity of the Oxley Highway/Rushes Creek Road intersection is shown on Figure 1 below, with photographs of signage at each location presented in Table 3 overleaf.

Figure 1 Oxley Highway/Rushes Creek Road - Existing Intersection Form and Signage

Source: NSW Government Spatial Services (2012). Note: locations and measurements are approximate only.

Table 3 Oxley Highway/Rushes Creek Road – Existing Signage

<table>
<tr><th>Location A – Oxley Highway (westbound)</th><th>Location B – Oxley Highway (westbound)</th></tr>
<tr><td>
</td><td></td></tr>
<tr><th>Location C – Oxley Highway (westbound)</th><th>Location D – Oxley Highway (westbound)</th></tr>
<tr><td></td><td></td></tr>
<tr><th>Location D – Rushes Creek Road (southbound)</th><th>Location E – Rushes Creek Road (southbound)</th></tr>
<tr><td></td><td></td></tr>
<tr><th>Location F – Rushes Creek Road (southbound)</th><th>Location G – Oxley Highway (eastbound)</th></tr>
<tr><td></td><td>
</td></tr>
</table>

Location H – Oxley Highway (eastbound)	Location I – Oxley Highway (eastbound)
	

Location D – Oxley Highway (eastbound)

Source: SLR, Google Maps.

2.2 Linemarking and Geometry Review

To inform the review of the existing Oxley Highway/Rushes Creek Road intersection form, the following of relevance is noted from the RoadNet TIA:

- As detailed in *Section 4.4.1* (Traffic Generating Sources) of the RoadNet TIA, it is proposed to use design vehicles of up to B-double size for operations associated with the Development. As detailed in *Section 8.1* (Oxley Highway and Rushes Creek Road) of the RoadNet TIA, all heavy vehicle movements will occur between the Oxley Highway to the east of the Rushes Creek Road intersection and the Development Site via Rushes Creek Road (i.e. B-doubles will turn right into and left out of Rushes Creek Road at the subject intersection);
- The turn warrants assessment presented on *Figure 6.1* of the RoadNet TIA demonstrates that Basic Left (BAL) and Channelised Right Short (CHR[S]) turn treatments are required for the 'With Development' traffic scenario at the 2029 design horizon;
- The SIDRA analysis summarised in *Section 6.1.1* (Operational Performance – SIDRA Analysis) and *Appendix E* (SIDRA Results) of the RoadNet TIA indicates the following 95th percentile vehicle queues on the Oxley Highway approaches of the Oxley Highway/Rushes Creek Road intersection for the 'With Development' traffic scenario at the 2029 design horizon:
    - AM peak hour:
        - Oxley Highway (westbound): 1m;
        - Oxley Highway (eastbound): 0m.

- PM peak hour:
  - Oxley Highway (westbound): 1m;
  - Oxley Highway (eastbound): 0m.

The following is noted in relation to the existing form of the Oxley Highway/Rushes Creek Road intersection:

- A significant amount of signage is installed to alert motorists on both the Oxley Highway and Rushes Creek Road as to the presence of the subject intersection;
- The existing AUL(S) treatment provided on the western Oxley Highway approach to the intersection is in excess of that required by the turn warrant assessment documented in the RoadNet TIA, and is therefore considered to be appropriate;
- The existing CHR(S) treatment provided on the eastern Oxley Highway approach to the intersection satisfies the minimum length requirements specified by Section 5.2 (Deceleration Lanes) *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD4A-17) in consideration of the following:
  - Design speed = posted speed + 10km/h = 100km/h + 10km/h = 110km/h;
  - Design speed for CHR(S) = 0.8 x design speed = 0.8 x 110km/h = 90km/h;
  - Deceleration (D) length (90km/h to stop @ 2.5m/s/s) = 125m;
  - Adjust for grade (4% upgrade) = 125m x 0.9 = 113m;
  - Storage (S) length = 25m (i.e. 1 x 25m B-double design vehicle);
  - Total length required = D + S = 113m + 25m = 138m;
  - 138m required < 155m CHR(S) provided (i.e. exceeds AGRD4A-17 minimum requirement).
- As determined by the site inspection, all linemarking in the vicinity of the subject intersection was generally observed to be in good condition and consistent with the requirements of AGRD4A-17. It is noted, however, that whilst a give way sign was present on the Rushes Creek Road approach to the intersection, there was no associated give way hold linemarking present. It is likely that this give way linemarking has faded over time, and it is recommended that the linemarking be replaced in accordance with layout shown on Figure 2 overleaf and also at Appendix A. Given that the give way hold linemarking should be replaced regardless of the Development proceeding, it is recommended that the linemarking be replaced by the relevant road maintenance authority.

Figure 2 Oxley Highway/Rushes Creek Road Intersection: Recommended Give Way Hold Linemarking

- A swept path assessment of turning movements anticipated to be performed by a 25m B-double design vehicle at the Oxley Highway/Rushes Creek Road intersection are provided at Appendix B. The swept path assessment demonstrates that turning manoeuvres can be performed whilst providing 0.5m clearance on either side of the design vehicles within the existing intersection footprint.

Based on the above, the existing layout of the Oxley Highway/Rushes Creek Road intersection is suitable to accommodate 25m B-double movements associated with the Development. The existing linemarking and signage provided in the vicinity of the intersection is generally appropriate and compliant with current design standards. It is recommended that the give way holdline marking on the Rushes Creek Road approach to the intersection be replaced in accordance with the intersection concept plan provided at Appendix A. Given that the give way hold linemarking should be replaced regardless of the Development proceeding, it is recommended that the linemarking be replaced by the relevant road maintenance authority.

2.3 Sight Distance Assessment

An assessment of the Oxley Highway/Rushes Creek Road intersection was undertaken to establish the sight distance currently available. Based on the requirements of Section 3 of the AGRD4A-17, the subject intersection would be required to provide sight distance in accordance with the following:

- Safe Intersection Sight Distance (SISD) on the major leg approaches (i.e. Oxley Highway);
- Approach Sight Distance (ASD) and Minimum Gap Sight Distance (MGSD) on the minor leg approach (i.e. Rushes Creek Road).

The following parameters were used for the assessment of the required sight distance:

- Reaction Time (R_T):
    - 2.5 seconds to calculate SISD and ASD.
- Critical acceptance gap (t_a): 5.0 seconds.
- Oxley Highway:
    - Design speed: 110km/h (i.e. posted speed plus 10km/h);
    - Western approach grade: 6% downgrade (measured from Nearmap LIDAR data);
    - Eastern approach grade: 4% upgrade (measured from Nearmap LIDAR data).
- Rushes Creek Road:
    - Design Speed: Unposted, assuming 110km/hr (i.e. 100km/h plus 10km/h);
    - Approach grade: 2% downgrade (measured from Nearmap LIDAR data).

SLR undertook a site inspection to establish the existing sight distance available at the subject intersection. Photographs looking in either direction along the Oxley Highway from Rushes Creek Road are presented on Figure 3 and Figure 4. Figure 5 shows the view south along Rushes Creek Road towards the Oxley Highway. The relevant requirements of Section 3 of AGRD4A-17 and the results of the sight distance assessment are summarised in Table 4.

Figure 3 Looking East along Oxley Highway

Figure 4 Looking West along Oxley Highway

Figure 5 Looking South along Rushes Creek Road

Table 4 Sight Distance Assessment

Road	Approach	Sight Distance Requirement	Distance Available	Compliant
Oxley Highway	Eastern	SISD: 281m (300m - 19m)	281m+	✓
	Western	SISD: 326m (300m + 26m)	~260m+	~66m shortfall
Rushes Creek Road	Northern	ASD: 217m (209m + 8m)	217m+	✓
		MGSD (to the east): 153m	153m+	✓
		MGSD (to the west): 153m	153m+	✓

Table 4 indicates that the existing Oxley Highway/Rushes Creek Road intersection satisfies all of the AGRD4A-17 sight distance requirements, with the exception of SISD from the Oxley Highway western approach, which is approximately 66m short of that recommended. The SISD shortfall is due the combination of the horizontal alignment of the Oxley Highway to the west of Rushes Creek Road, and the height of the batter on the northern side of the Oxley Highway, which is illustrated on Figure 6 overleaf.

Figure 6 Looking East along the Oxley Highway towards Rushes Creek Road

The following is noted in relation to the SISD shortfall on the western approach to the Oxley Highway/Rushes Creek Road intersection:

- This is an existing arrangement which would have significant costs associated with remediation (i.e. to lower the batter would require significant earthworks and vegetation removal to the northwest of the subject intersection);
- The review of crash data summarised in *Section 3.6* (Crash History) of the RoadNet TIA does not indicate any history of crashes at the Oxley Highway/Rushes Creek Road which are likely to be sight distance related;
- As detailed in *Section 4.4* (Development Traffic Generation) of the RoadNet TIA, the Development would likely result in up to 17 additional vehicle movements during peak hour periods compared with the existing situation. On this basis, the minor increase in traffic demand generated by the Development, which is equivalent to around one additional vehicle movement every three minutes during peak hour periods, is not expected to materially impact on the existing situation;
- It is noted that the Normal Design Domain (NDD) parameters on which the sight distance requirements in Table 4 have been calculated adopt a conservative 'Observation Time' of 3.0 seconds. Extended Design Domain (EDD) SISD requirements, as described in *Appendix A* (Extended Design Domain for Intersections) of AGRD4A-17 adopt lower observation time parameters. For reference, NDD design parameters are applied in the case of new intersections in greenfield situations, whereas EDD design parameters are sometimes applied in constrained situations or brownfield sites.

- *Table A8* of AGRD4A-17 indicates that an observation time of 2.0 seconds is suitable for a T-intersection on a single carriageway road where volumes are >4,000vpd on the major road and >400vpd on minor road (Note: the forecast daily traffic volumes at the 2029 design horizon indicated in Table 8.1 of the RoadNet TIA are >4,000vpd along the Oxley highway and >400vpd along Rushes Creek Road). Given the significant amount of signage which is currently installed prior to and at the Oxley Highway/Rushes Creek Road intersection, the adoption of this lower parameter is considered to be appropriate;
- The minimum EDD SISD requirement stipulated by Table A10 of AGRD4A-17 for a 2.0 second observation time is 257m (241m + 16m grade correction as per Table A5). The existing intersection form therefore satisfies the EDD requirements for SISD;
- Figure 7 below illustrates the approximate location from where SISD is currently available heading eastbound on the Oxley Highway. At the time of the site inspection, SISD could not be observed from further west of this location due to the long grass on the verge and some low hanging tree branches. It is noted that as periodic roadside maintenance is conducted by the relevant road authorities (e.g. trimming of grass, vegetation control etc.), the sight available at this location would improve further from that observed at the time of the site inspection.

Figure 7 Looking East along the Oxley Highway towards Rushes Creek Road

- Further to the above, it is noted that the field sight distance measurements were taken from 1.1m (driver's eye height) on the major road (Oxley Highway) to 1.25m (top of car) at the potential conflict point in line with Rushes Creek Road. Based on the traffic surveys documented in *Section 3.1* (Existing Traffic Volumes) of the RoadNet TIA, a reasonably high proportion of heavy vehicles were observed using both the Oxley highway and Rushes Creek Road (15 – 20% on all approaches), providing a higher vantage point (2.4m) and improving the available sight distance over that assessed herein.

On the basis of the above, the sight distance currently provided at the existing Oxley Highway/Rushes Creek Road intersection is considered adequate to accommodate the minor uplift in traffic demand likely to be generated by the Development compared with the existing situation.

Drawings illustrating the AGRD4A-17 SISD requirements in either direction along the Oxley Highway at the subject intersections have been prepared and are provided at Appendix C.

3 Rushes Creek Road Review

3.1 Overview

As detailed in the RoadNet TIA, it is proposed to use 25m B-doubles to perform operational activities associated with the Development. B-doubles will travel between the Development Site and the Oxley Highway to the south using Rushes Creek Road. The appropriateness of the existing form of Rushes Creek Road to accommodate additional B-double movements associated with the Development is assessed below.

3.2 Existing Heavy Vehicle Access Approvals

As per the Heavy Vehicle National Law (HVNL), a B-double is classified as a Class 2 Restricted Access Vehicle (RAV). RAVs are required to travel on networks/routes gazetted by the various State road authorities. Where an approved route or network does not exist for an RAV, an operator may apply for a permit via the National Heavy Vehicle Regulator (NHVR).

The NHVR website (available at: https://www.nhvr.gov.au/road-access/local-government-road-managers/guidelines-for-granting-access) provides the following information of relevance in the relation to the decision to grant access for an RAV to a particular route or network:

"NHVR – considers requests for access and makes the final decision to grant a mass or dimension authority. The NHVR can only grant access if:

- ***it is satisfied that the use of heavy vehicles under the authority will not pose a significant risk to public safety***
- ***each relevant road manager has consented to the grant***
- ***any other consents required by law have been obtained or given."***

The entire length of Rushes Creek Road between the Oxley Highway (Somerton) to the south of the Development Site and Manilla to the north is approved as a Higher Mass Limit (HML) 25/26m B-double route by the NHVR. This means that B-doubles associated with the Development, which are likely to be B-doubles of up to a 25m General Mass Limit (GML) size, are able to use Rushes Creek Road to access the Development Site from the Oxley Highway without the need to apply for a Class 2 heavy vehicle access permit.

Based on the above, Rushes Creek Road has previously been assessed by the NHVR, and consent has been given by the relevant road manager, in this case being Tamworth Regional Council (TRC), for the use of B-doubles such as that proposed as part of the Development. The existing route consent would typically provide sufficient confidence that the route is appropriate for use by the proposed vehicle type; however, given the numerous community submissions received in relation to this matter, SLR has carried out the following additional tasks:

- Reviewed the RoadNet TIA assessment of Rushes Creek Road; and
- Undertaken an independent site inspection and review of the existing conditions along Rushes Creek Road.

3.3 RoadNet Assessment

The following of relevance is summarised for the RoadNet TIA in relation to Rushes Creek Road:

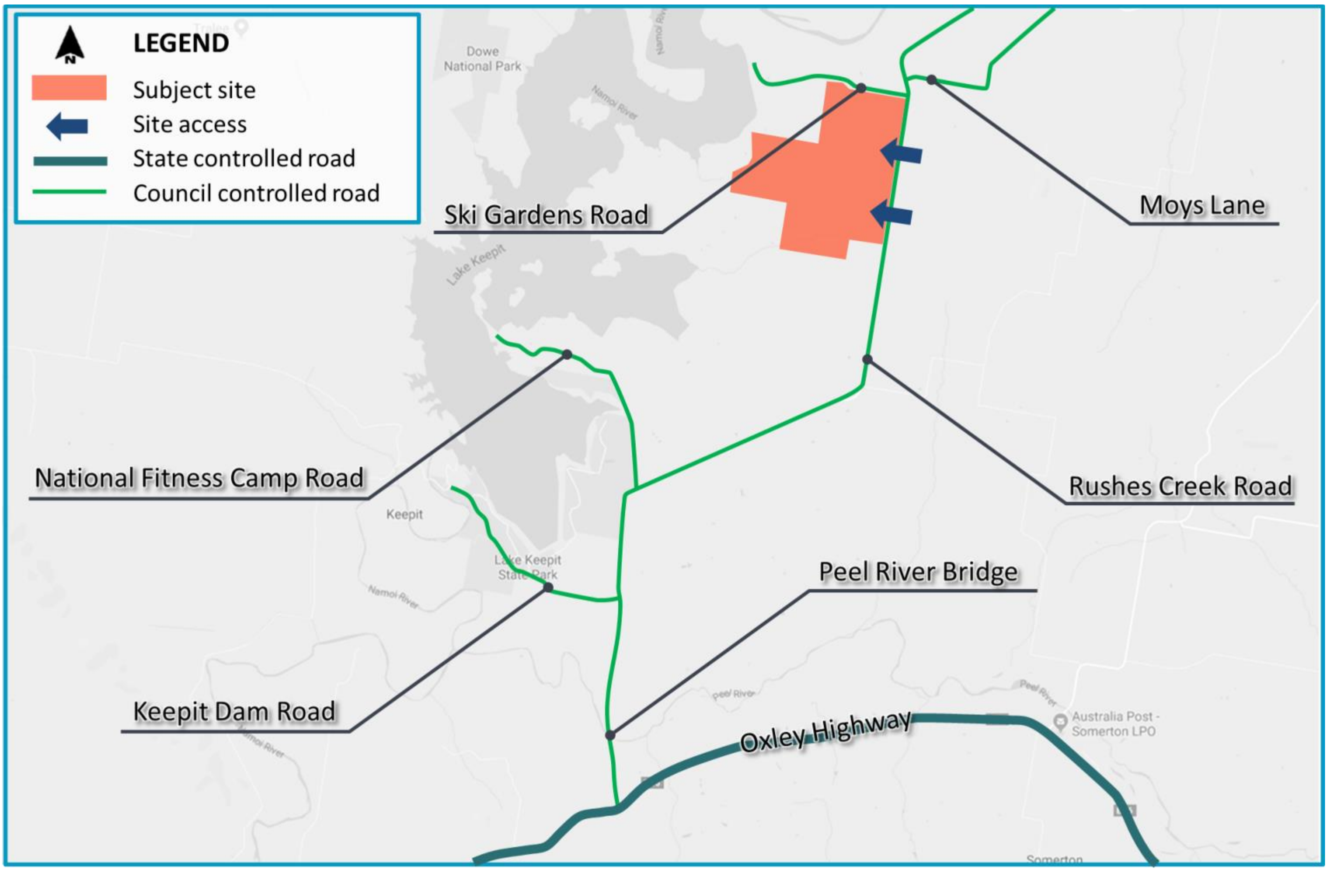
- *Section 2.3.2* (Rushes Creek Road):
    - Existing typical seal width of 6.5m – 7.0m;
    - Grass shoulders (gravel in certain locations) with a width of 0.5-1.5m are provided on either side of the carriageway;
    - Centre linemarking is provided along the entire length;
    - Guideposts are provided at regular intervals.
- Section 3.6 *(Oxley Highway/Rushes Creek Road intersection):*
    - RMS crash data for the most recent four year period (to September 2016) indicates that four crashes occurred along Rushes Creek Road between the Development Site and Oxley Highway. All crashes were single vehicle accidents whereby the vehicle left the carriageway, and involved either speed or fatigue.
- *Section 4.5* (Future Design Volumes):
    - Future traffic volumes (2029 'With Development') at the southern end of Rushes Creek Road:
        - AM Peak hour: 89vph;
        - PM peak hour: 67vph;
        - Daily: 683vpd.
- *Section 6.2* (Rushes Creek Road):
    - The Development is expected to generate an additional 46 heavy vehicle movements per day on average along Rushes Creek Road;
    - The existing cross-section of Rushes Creek Road is sufficient for B-doubles to pass in either direction.

Comments are provided in relation to the RoadNet assessment of Rushes Creek Road in the subsequent section of this document based on observations made by SLR during a site inspection.

3.4 SLR Review of Rushes Creek Road

SLR undertook a site inspection to investigate existing conditions along Rushes Creek Road between the Oxley Highway and the location of the proposed accesses to the Development Site. The proposed northern site access is located approximately 18.5 km along Rushes Creek Road to the north of the Oxley Highway. The configuration of the existing road network is presented on Figure 8 below, illustrating the existing alignment of Rushes Creek Road between the Oxley Highway and the Development Site.

Figure 8 Existing Road Network



Source: Google Maps. Note: Site bounds indicative only.

Based on observations made during the site inspection, and in consideration of the relevant material presented in the RoadNet TIA, the following is noted in relation to existing conditions along Rushes Creek Road:

- Centre linemarking is provided along the entire length and guideposts are provided at regular intervals along Rushes Creek Road between the Oxley Highway and the Development Site as per the RoadNet TIA;
- Measurements taken at various locations along Rushes Creek Road confirm that the carriageway is generally 6.5m – 7.0m in paved width with grass shoulders, consistent the RoadNet assessment. Based on the width of a B-double design vehicle (2.5m), the minimum pavement width of 6.5m provides sufficient width for two B-doubles to pass with a minimum of 0.5m of clearance on both sides of either vehicle (i.e. 1m between vehicles);

- Shoulders (i.e. the portion of the carriageway beyond the traffic lanes which is flush with the pavement surface) would typically be provided to accommodate stopped vehicles, support pavement layers, and if sealed, accommodate cyclists. It is noted that the existing grassed shoulders would accommodate a stopped vehicle along the majority of Rushes Creek Road between the Oxley Highway and the Development Site. Whilst desirable, the construction of sealed shoulders would likely provide limited safety benefits relative to significant cost associated with construction along the route (i.e. this would likely to be several $million over the 18.5km) in consideration of the following:
  - The low existing and future traffic volumes along Rushes Creek Road (i.e. <100vph, <1,000vpd);
  - The low existing crash rate along Rushes Creek Road and nature of crashes reported (i.e. which do not appear to be related to carriageway width).
- The following is noted in relation to the existing alignment and visibility along Rushes Creek Road:
  - As indicated on Figure 8 above, the top (i.e. northern) two thirds of Rushes Creek Road between the Oxley Highway and the Development Site are relatively straight in horizontal alignment (i.e. with the exception of the horizontal curve between the two straight sections). Furthermore, the vertical alignment along Rushes Creek Road in this section is relatively flat, and roadside areas are largely clear of trees and vegetation (i.e. due to farming uses adjacent to the road). The combination of the above conditions provides excellent inter-visibility between vehicles travelling in either direction, allowing drivers to adjust the position of their vehicle within the lane (i.e. move towards the shoulder if required) or slow down marginally for the safe passing of a heavy vehicle travelling in the other direction;
  - The lower third (i.e. southern) of Rushes Creek Road between the Oxley Highway and the Development Site is still relatively straight (i.e. with slight undulations in horizontal alignment) and flat, generally has more roadside vegetation, however, still provides good inter-visibility between vehicles, and thus allows for safe passing of heavy vehicles travelling in the other direction.
- As detailed in the RoadNet TIA, the Development is expected to generate an additional 46 heavy vehicle movements per day on average along Rushes Creek Road. Based on the proportions detailed in *Table 4.2* (Development Traffic Generation) of the RoadNet TIA, around 84% of heavy vehicle movements are likely to be B-double or semi-trailer vehicles. Using a typically adopted daily to peak hour conversion factor of 10%, there is likely to be up to three to four (0.1 X 0.84 X 46 = 3.9) B-double/semi-trailer movements on average along Rushes Creek Road during peak hours, or two movements in either direction. Based on the above commentary relating to the existing form and alignment of Rushes Creek Road, combined with the low forecast future (2029 'With Development') bidirectional traffic volumes of around 90vph (i.e. maximum during AM peak) along Rushes Creek Road, the additional B-double movements generated by the Development are not anticipated to be problematic;
- The condition of the pavement along Rushes Creek Road was generally observed to be in good condition. There were minor maintenance issues observed in various locations (e.g. potholes and shoulders of pavement worn), however, this is typical of a rural type road of this nature, whereby the local government authority has a large road network to maintain relative to the size of the population living within the jurisdiction;
- It is noted that heavy vehicles movements associated with the operational phase of the Development are likely to accelerate pavement wear along Rushes Creek Road. Given that the Development will be required to pay appropriate Section 94/94A contributions to TRC, the costs of any maintenance or repair to the pavement along Rushes Creek Road which has a nexus to the Development will be adequately funded.

On the basis of the above, SLR agrees with the previous RoadNet assessment and the NHVR and TRC consents indicating that Rushes Creek Road is of suitable existing form to accommodate B-double movements such as that proposed as part of the Development.

4 Site Access Review

4.1 Access Sight Distance Assessment

The proposed northern and southern site access locations to Rushes Creek Road were assessed to establish the sight distance currently available. Access sight distance was assessed against the requirements of *Figure 3.3* (Sight distance requirements at access driveway exits) of the Australian Standards for Parking facilities *Part 2: Off-street commercial vehicle facilities* (AS2890.2) for a frontage road speed of 100km/h.

SLR undertook a site inspection to establish the sight currently distance available at the proposed access locations. The GPS coordinates of the access locations were recorded prior to the site inspection from a geo-referenced site layout drawing. The locations of the proposed accesses along Rushes Creek Road were established on site using the GPS coordinates and a mobile phone application.

Photographs looking in either direction along Rushes Creek Road from both the northern site access and southern site access are presented on Figure 9 and Figure 10. The relevant requirements of AS2890.2 and the results of the sight distance assessment are summarised in Table 5.

Figure 9 Northern Site Access

Looking north along Rushes Creek Road	Looking south along Rushes Creek Road
	

Figure 10 Southern Site Access

Looking north along Rushes Creek Road	Looking south along Rushes Creek Road
	

Table 5 Site Access Site Distance Assessment

Access	Direction	AS2890.2 Sight Distance Requirement (5s gap)	Sight Distance Available	Compliant
Rushes Creek Road/ Northern Site Access	To the north	139m	139m++	✓
	To the south	139m	139m++	✓
Rushes Creek Road/ Southern Site Access	To the north	139m	139m++	✓
	To the south	139m	139m++	✓

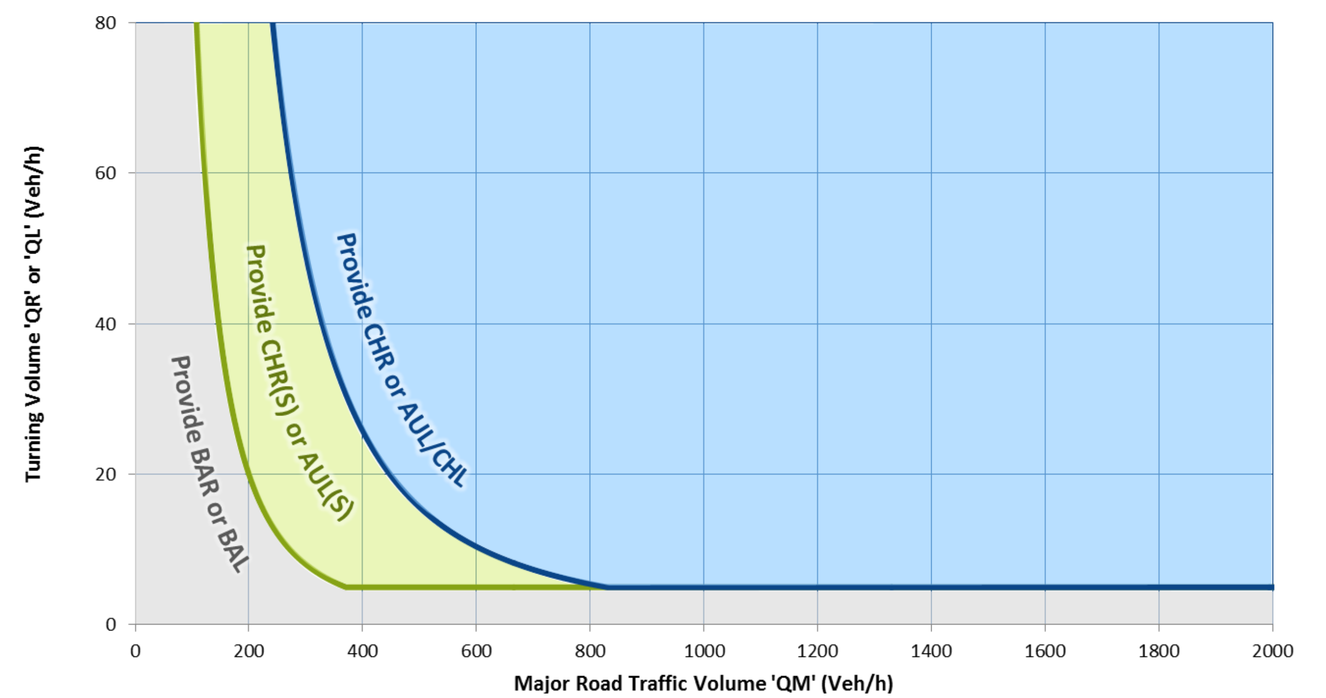
Table 5 indicates that the proposed site access locations to Rushes Creek Road satisfy the AS2890.2 sight distance requirements. The photographs provided at Figure 9 and Figure 10 demonstrate that Rushes Creek Road is straight and flat in the vicinity of the proposed access locations, and several hundred meters of sight distance is available either direction at both access locations.

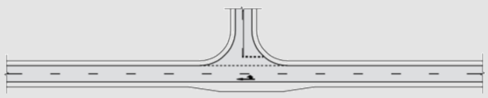
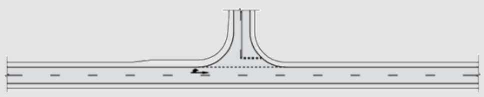
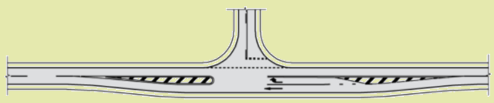
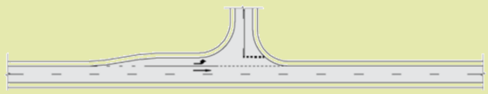
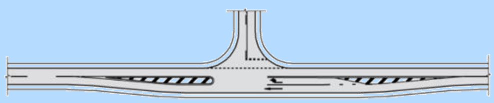
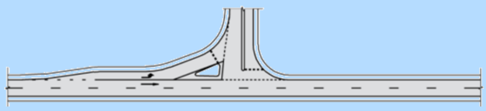
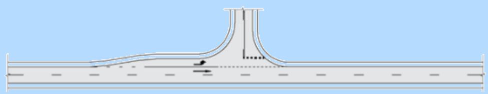
Based on the above, the proposed site access locations provide appropriate sight distance in accordance with the requirements of AS2890.2.

4.2 Access Turn Warrant Assessment

A turn lane warrant assessment has been undertaken to establish the desirable form of the proposed site accesses to Rushes Creek Road in accordance with the industry research summarised within AGRD4A-17. The warrants provide guidance where turning lanes should be provided based on the design traffic volumes. To aid reader interpretation of the assessment, Figure 11 provides a pictorial description of the various turn treatments considered.

Figure 11 Turn Treatment Types



Acronym	Right Turn Treatment	Left Turn Treatment
BAR or BAL	 **BAR** (Basic Right Turn)	 **BAL** (Basic Left Turn)
CHR(S) or AUL(S)	 **CHR(S)** (Channelised Right Turn [Short])	 **AUL(S)** (Auxiliary Left Turn [Short])
CHR or AUL/CHL	 **CHR** (Channelised Right Turn)	 **CHL** (Channelised Left Turn)  **AUL** (Auxiliary Left Turn)

Source: AGRD4A-17

The turn warrants for greenfield sites have been adopted in determining the required turning treatment types at the proposed access locations to Rushes Creek Road. The design traffic volumes were adopted from *Table 4.4* (Design Year [2029] Peak Hour Traffic Volumes with/without Development) of the RoadNet TIA.

Figure 12 and Figure 13 summarise the turn warrant assessment undertaken for northern site access to Rushes Creek Road at the 2029 design horizon year for background plus development traffic, whilst Figure 14 and Figure 15 summarise the assessment undertaken for the southern site access to Rushes Creek Road. A detailed summary of the turn warrant assessment is included at Appendix D.

Figure 12 Northern Site Access Turn Warrant Assessment – AM Peak Hour Period (2029 Design Horizon)

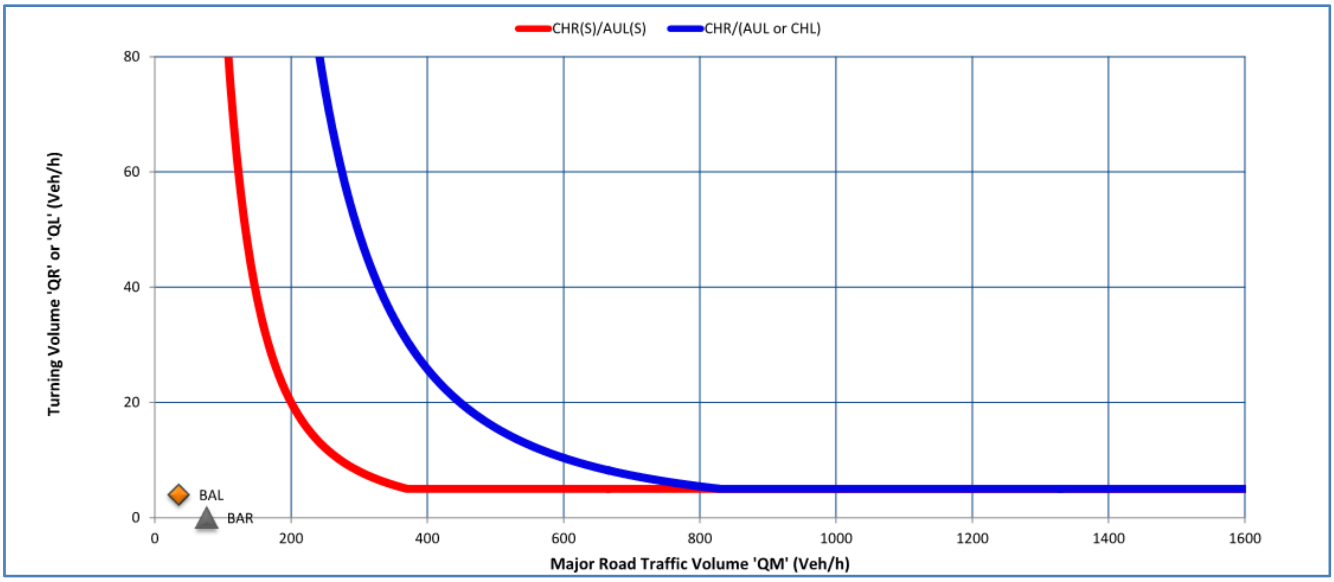


Figure 13 Northern Site Access Turn Warrant Assessment – PM Peak Hour Period (2029 Design Horizon)

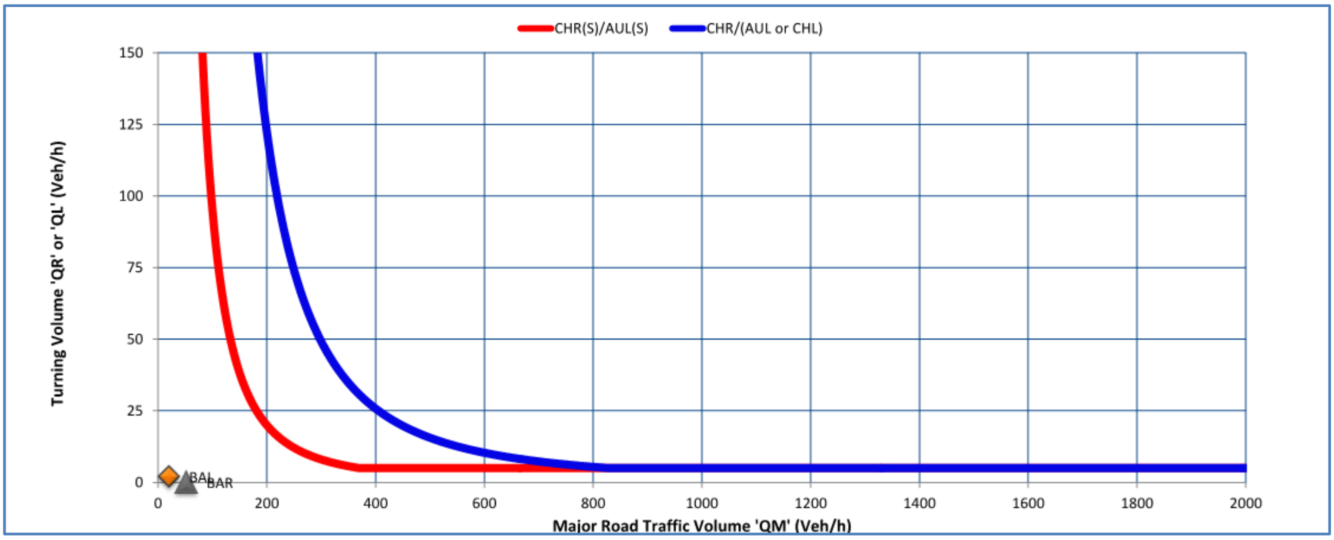


Figure 14 Southern Site Access Turn Warrant Assessment – AM Peak Hour Period (2029 Design Horizon)

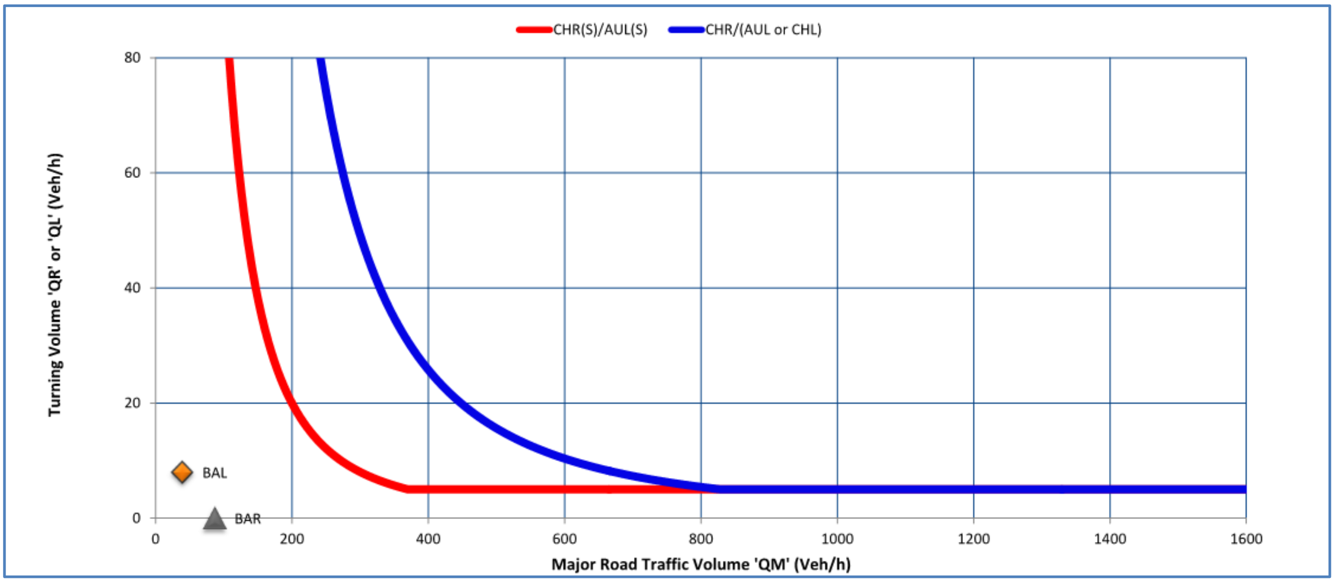
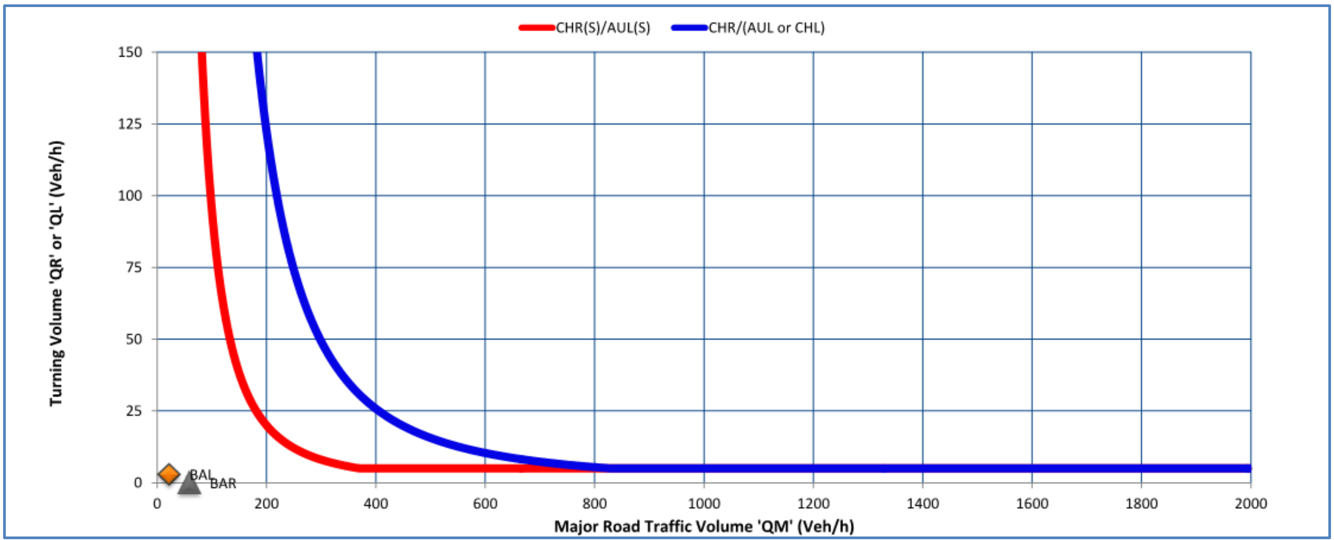


Figure 15 Southern Site Access Turn Warrant Assessment – PM Peak Hour Period (2029 Design Horizon)



Figures 12 through to 15 indicate that Basic Left (BAL) turning treatments should be provided at both the northern site access and southern site access locations to Rushes Creek Road. Given that negligible (if any) Development vehicle traffic will arrive at either site access from Rushes Creek Road to the north, Basic Right (BAR) turn treatments at the site access locations are not considered to be warranted. It is noted that the EIS (SLR 2018) commits to BAL treatments at both site accesses.

4.3 Swept Path Assessment

A swept path assessment of the proposed northern and southern site accesses to Rushes Creek Road has been undertaken for the largest anticipated design vehicle and is included at Appendix B. Drawing SK22 (Northern site access) and drawing SK23 (Southern site access) illustrate indicative BAL turning treatments, and demonstrate that a 25m B-double can enter and exit the site with 0.5m clearance on either side of the vehicle in accordance with the requirements of AS2890.2. The proposed northern and southern site accesses to Rushes Creek Road are therefore considered to be appropriate.

5 Summary and Recommendations

SLR has been engaged by ProTen to provide supplementary traffic engineering advice following exhibition of the EIS (SLR 2018) for the Development, located on Rushes Creek Road, Rushes Creek. This Supplementary Traffic Assessment has been prepared to assess a number of traffic matters raised in the DPE's Issues Letter dated 16 October 2018 and also in the community submissions in relation to the Development.

Based on the assessment documented herein, the following is concluded:

- The existing linemarking and signage provided in the vicinity of the Oxley Highway/Rushes Creek Road intersection is generally appropriate and compliant with current design standards;
- It is recommended that the give way hold line marking on the Rushes Creek Road approach to the intersection be replaced. Given that the give way hold linemarking should be replaced regardless of the Development proceeding, it is recommended that the linemarking be replaced by the relevant road maintenance authority;
- Appropriate allowances are available at the existing Oxley Highway/Rushes Creek Road intersection in order to accommodate manoeuvring for 25m B-double design vehicles;
- The sight distance currently provided at the Oxley Highway/Rushes Creek Road intersection meets Austroads EDD sight distance parameters, the adoption of which is considered to be appropriate in this instance;
- SLR agrees with the previous RoadNet assessment, and the NHVR and TRC consents, indicating that Rushes Creek Road is of suitable existing form to accommodate B-double movements such as that proposed as part of the Development;
- Appropriate sight distance is provided at the proposed northern and southern site access locations to Rushes Creek Road;
- A turn warrant assessment indicates that BAL turning treatments should be provided at both the northern site access and southern site access locations to Rushes Creek Road, as committed to in the EIS (SLR 2018);
- Swept path assessments undertaken for indicative BAL turning treatments provided at the northern site access and southern site access locations to Rushes Creek Road demonstrate appropriate manoeuvring for 25m B-double design vehicles.

APPENDIX A

Recommended Linemarking

620.12837-SK00.dwg

SLR
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SPRING HILL
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Project No:	620.12837
Date:	11.12.2018
Drawn by:	OR
Scale:	AS SHOWN
Sheet Size:	A3
Projection:	-

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM
NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 5.0 10 15 20
METRES
SCALE 1:500

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

RUSHES CREEK RD / OXLEY HWY INT.
SIGNAGE AND LINEMARKING PLAN

620.12837-SK01 Rev. A

APPENDIX B

Swept Path Assessment

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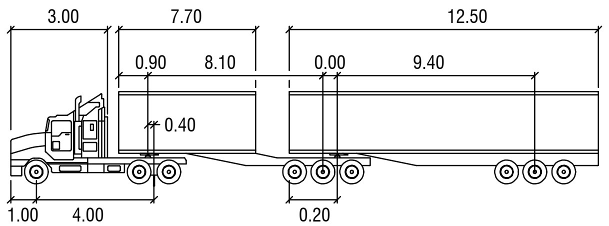
Sheet Size:	A3
Projection:	-

SWEPT PATH LEGEND

- VEHICLE BODY
- VEHICLE PATH
- VEHICLE CLEARANCE (500mm)
- VEHICLE



B-DOUBLE 25M

meters

Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 20.7
Articulating Angle	: 70.0

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 5.0 10 15 20 METRES

SCALE 1:500

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

B-DOUBLE - RUSHES CREEK RD / OXLEY HWY INT.
SWEPT PATH ASSESSMENT

620.12837-SK21 Rev. A

620.12837-SK00.dwg

620.12837-SK00.dwg

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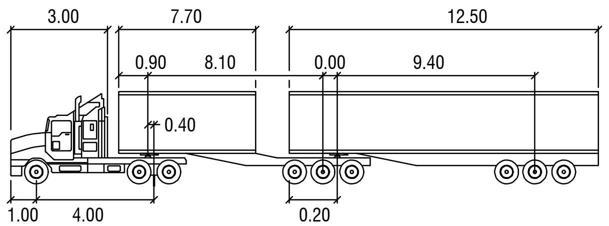
Scale:	AS SHOWN
Sheet Size:	A3
Projection:	-

SWEPT PATH LEGEND

- VEHICLE BODY
- VEHICLE PATH
- VEHICLE CLEARANCE (500mm)
- VEHICLE



B-DOUBLE 25M

	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 20.7
Articulating Angle	: 70.0

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 5.0 10 15 20
METRES
SCALE 1:500

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

B-DOUBLE - RUSHES CREEK RD / SOUTHERN SITE ACCESS SWEPT PATH ASSESSMENT

620.12837-SK22 Rev. A

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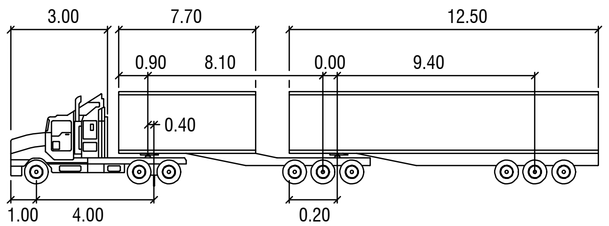
Sheet Size:	A3
Projection:	-

SWEPT PATH LEGEND

- VEHICLE BODY
- VEHICLE PATH
- VEHICLE CLEARANCE (500mm)
- VEHICLE



B-DOUBLE 25M

meters

Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 20.7
Articulating Angle	: 70.0

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 5.0 10 15 20 METRES

SCALE 1:500

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

B-DOUBLE - RUSHES CREEK RD / NORTHERN SITE ACCESS SWEPT PATH ASSESSMENT

620.12837-SK23 Rev. A

620.12837-SK00.dwg

APPENDIX C

Sight Distance Drawings

620.12837-SK00.dwg

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Scale:	AS SHOWN
Sheet Size:	A3
Projection:	-

LEGEND

SIGHT ENVELOPE

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 10 20 30 40
METRES
SCALE 1:1000

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

SAFE INT. SIGHT DISTANCE (WESTBOUND)

620.12837-SK11 Rev. A

620.12837-SK00.dwg

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Project No:	620.12837
Date:	11.12.2018
Drawn by:	OR
Scale:	AS SHOWN
Sheet Size:	A3
Projection:	-

LEGEND

SIGHT ENVELOPE

NOTE:
BACKGROUND SATELLITE IMAGE SOURCED FROM NSW GOV SPATIAL SERVICES (OCTOBER 2012).

N

0.0 10 20 30 40
METRES
SCALE 1:1000

RUSHES CREEK POULTRY PRODUCTION FARM

PROTEN TAMWORTH PTY LTD

EXTENDED DESIGN DOMAIN SAFE
INT. SIGHT DISTANCE (EASTBOUND)

620.12837-SK12 Rev. A

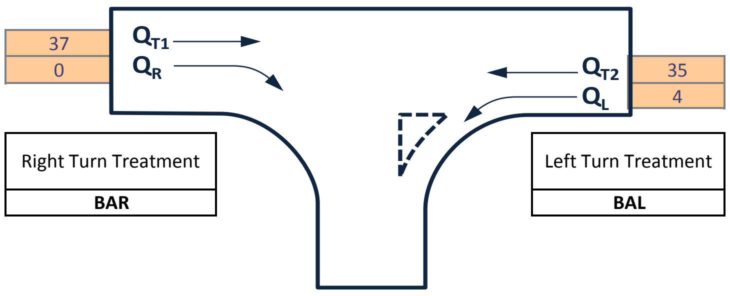
APPENDIX D

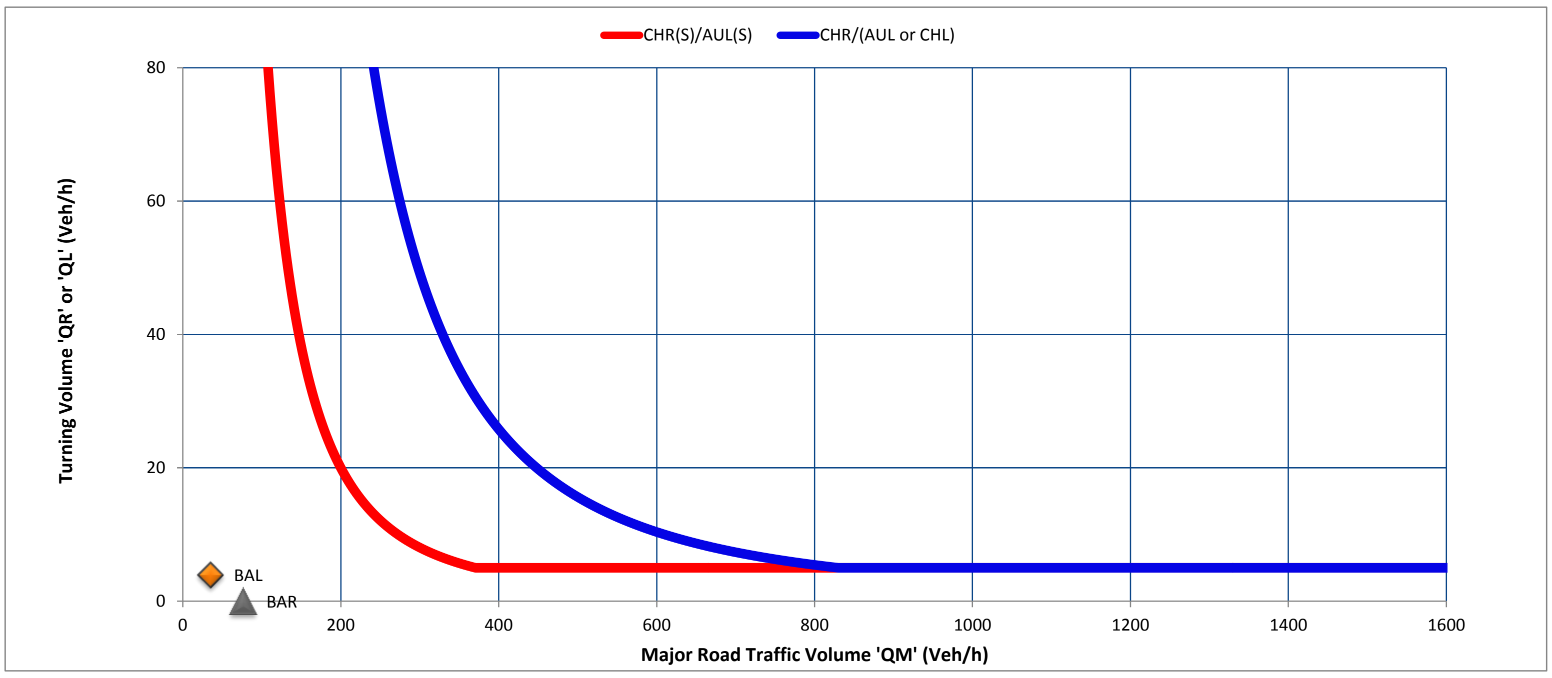
Turn Warrant Assessment

Assessment Year	2029
Peak Period	AM
Scenario	Background + Dev

Design Domain	Normal Design Domain
Design Year	10
Lane Count	2L2W
Design Speed	>=100km/h
Splitter Island?	No

Q_M	Q_R/Q_L	
76	0	Right
35	4	Left

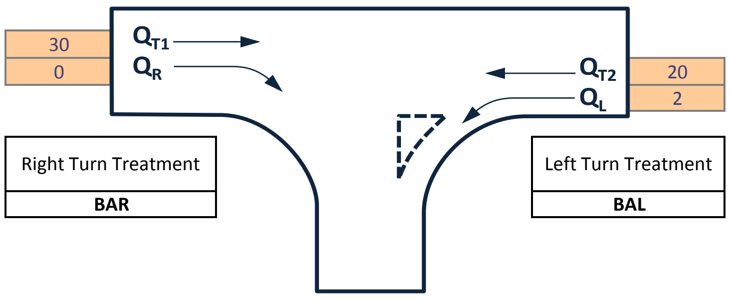


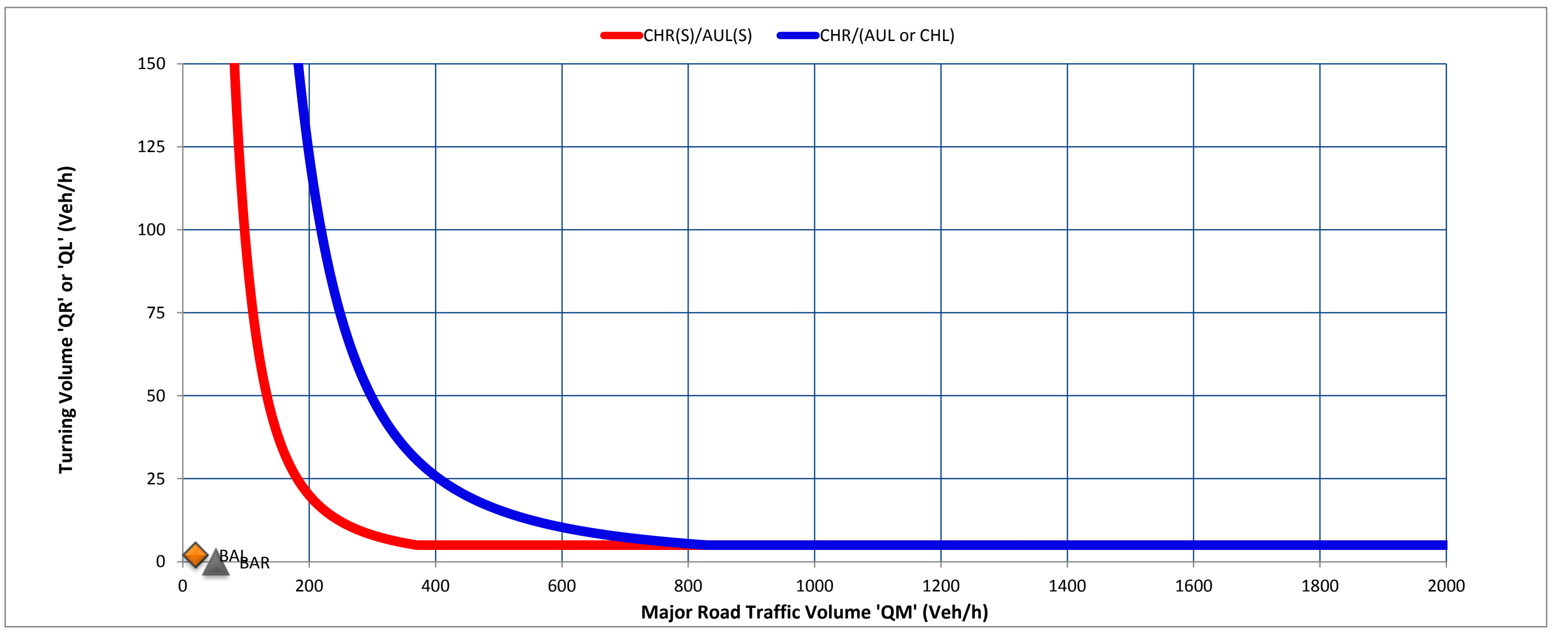


Assessment Year	2029
Peak Period	PM
Scenario	Background + Dev

Design Domain	Normal Design Domain
Design Year	10
Lane Count	2L2W
Design Speed	>=100km/h
Splitter Island?	No

Q_M	Q_R/Q_L	
52	0	Right
20	2	Left





Reflects changes made in RPDM (Ed2: Vol3) Supplement to Austroads Part 4A (DTMR - August, 2014)

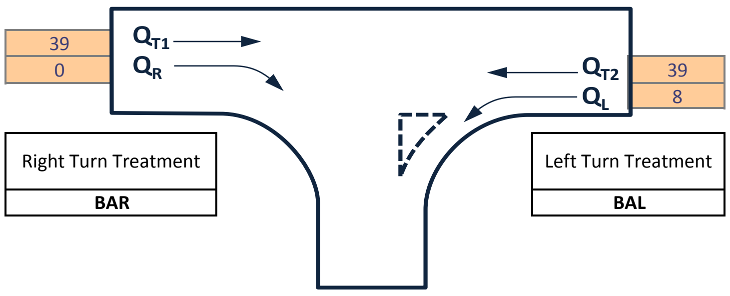
Turn Warrant Assessment

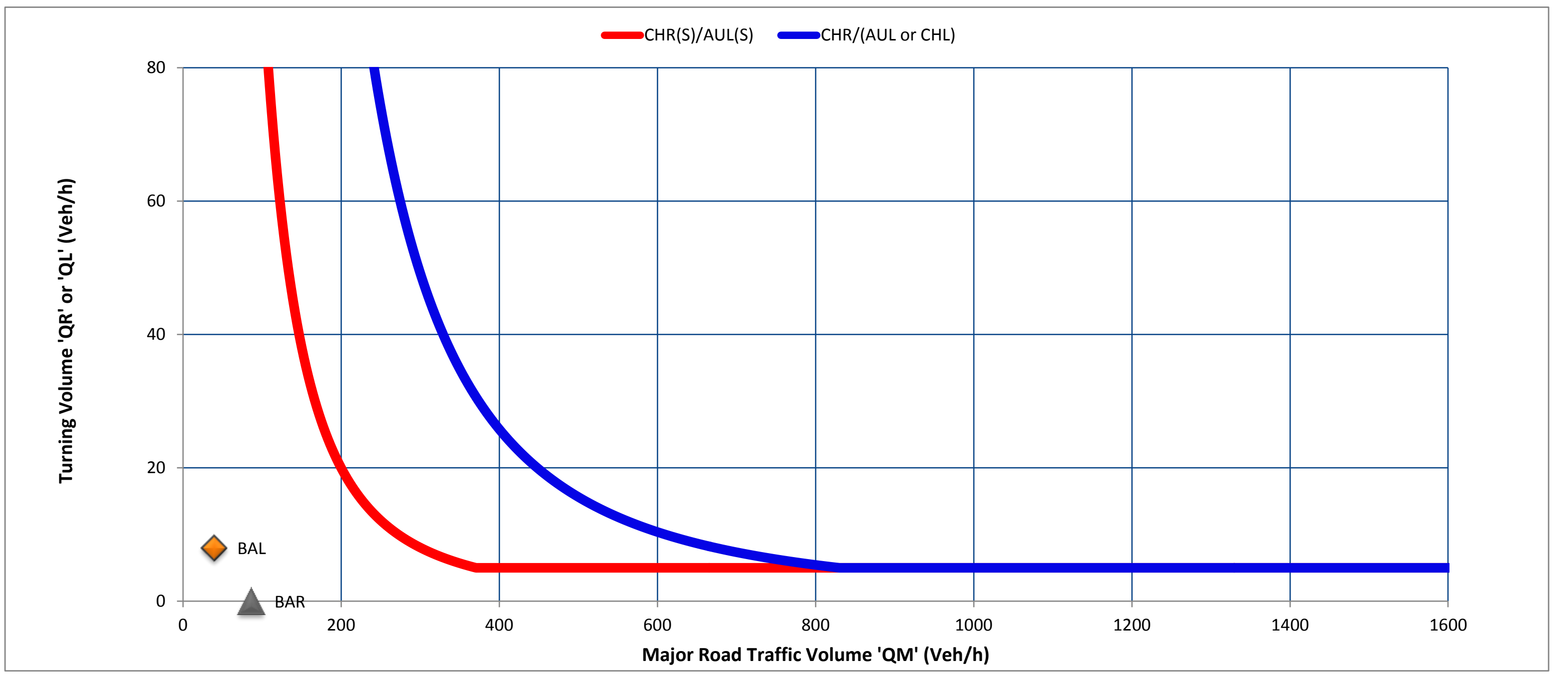
Rushes Creek Road/ Northern Site Access
620.12837
Rushes Creek Poultry Production Farm
07-12-2018

Assessment Year	2029
Peak Period	AM
Scenario	Background + Dev

Design Domain	Normal Design Domain
Design Year	10
Lane Count	2L2W
Design Speed	>=100km/h
Splitter Island?	No

Q_M	Q_R/Q_L	
86	0	Right
39	8	Left

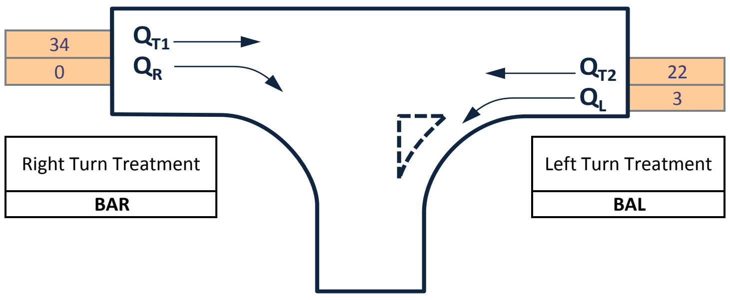


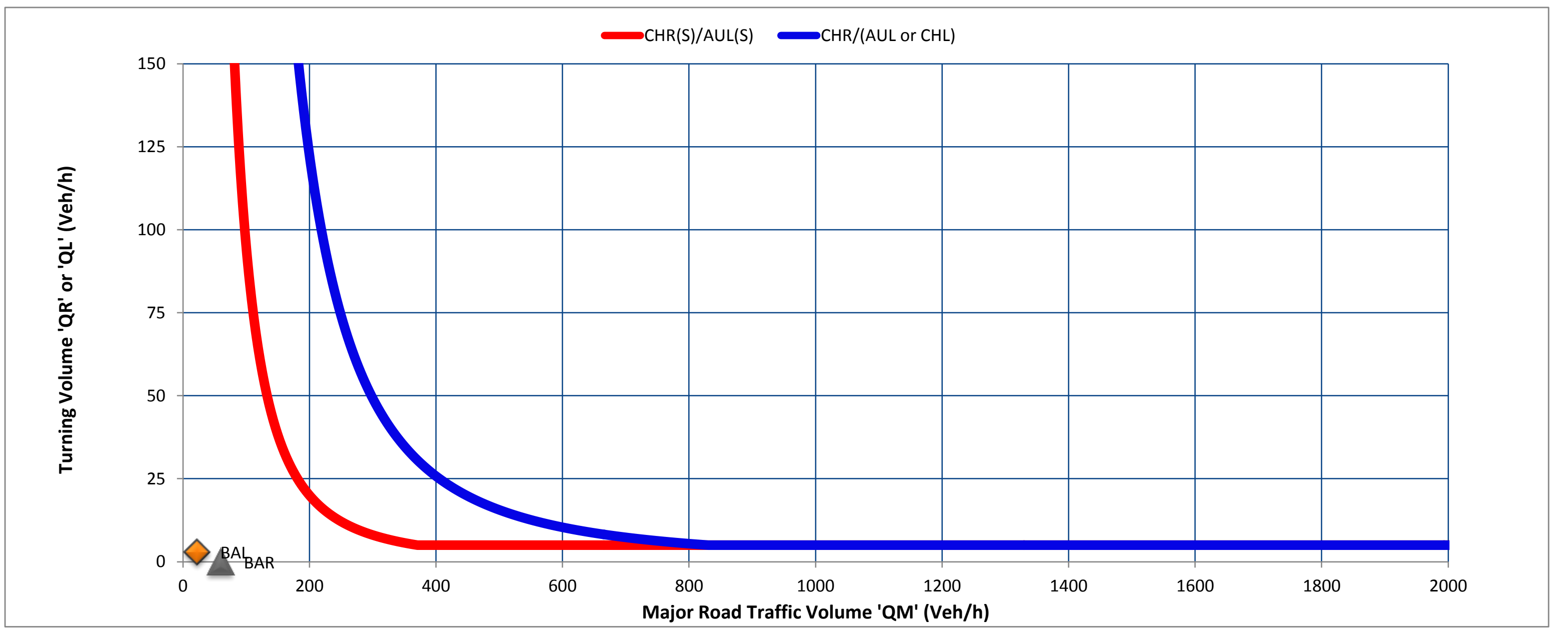


Assessment Year	2029
Peak Period	PM
Scenario	Background + Dev

Design Domain	Normal Design Domain
Design Year	10
Lane Count	2L2W
Design Speed	>=100km/h
Splitter Island?	No

Q_M	Q_R/Q_L	
59	0	Right
22	3	Left





Reflects changes made in RPDM (Ed2: Vol3) Supplement to Austroads Part 4A (DTMR - August, 2014)

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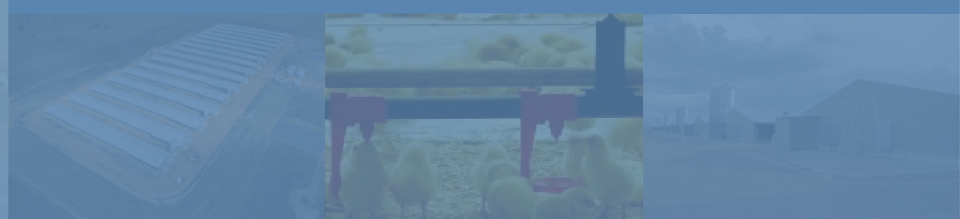
Appendix F

Biodiversity Assessment Report Addendum

(SLR Consulting Australia 2019c)



4 April 2019

610.16117-L01-v0.2_BAR Addendum_20190404.docx

ProTen Tamworth Pty Limited
PO Box 1746
NORTH SYDNEY NSW 2060

Attention: Daniel Bryant

Dear Daniel,

Proposed Poultry Facility, Rushes Creek, NSW
Biodiversity Assessment Report Addendum Letter

1 Project Background

ProTen Tamworth Pty Limited (ProTen) is seeking development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for development of an intensive poultry broiler production farm, known as the Rushes Creek Poultry Production Farm (the Development). The Development Site is located within an area known as Rushes Creek, approximately 43 kilometres northwest of Tamworth and 33 kilometres northeast of Gunnedah, in the Nandewar bioregion of New South Wales (NSW) and within the Tamworth local government area.

A Biodiversity Assessment Report (BAR) was prepared for the Environmental Impact Statement (EIS) by SLR Consulting Pty Ltd in 2018. Following review of the BAR, the Office of Environment and Heritage (OEH) advised the following in its submission:

- Office of Environment and Heritage (OEH) recognises the efforts of the proponent to locate infrastructure in areas that have been previously disturbed so that the proposal largely avoids impacts to biodiversity;
- The biodiversity assessment has followed the Framework for Biodiversity Assessment (FBA) in accordance with the NSW Biodiversity Offsets Policy for Major Project; and
- OEH supports the intended biodiversity offset strategy as presented in Section 7.7 of the BAR.

No submissions were received that warranted any additional specialist biodiversity assessment work.

2 Scope

The BAR was prepared by SLR accredited assessors Jeremy Pepper (#0107), Principal Ecologist and Andrew Carty (#087), Associate Ecologist. This addendum letter has been prepared to address the potential for biodiversity impacts associated with minor changes to the development design. Jeremy Pepper, Principle Ecologist, has assisted in the preparation of and has authorised issue of this letter.

3 Development Design Changes

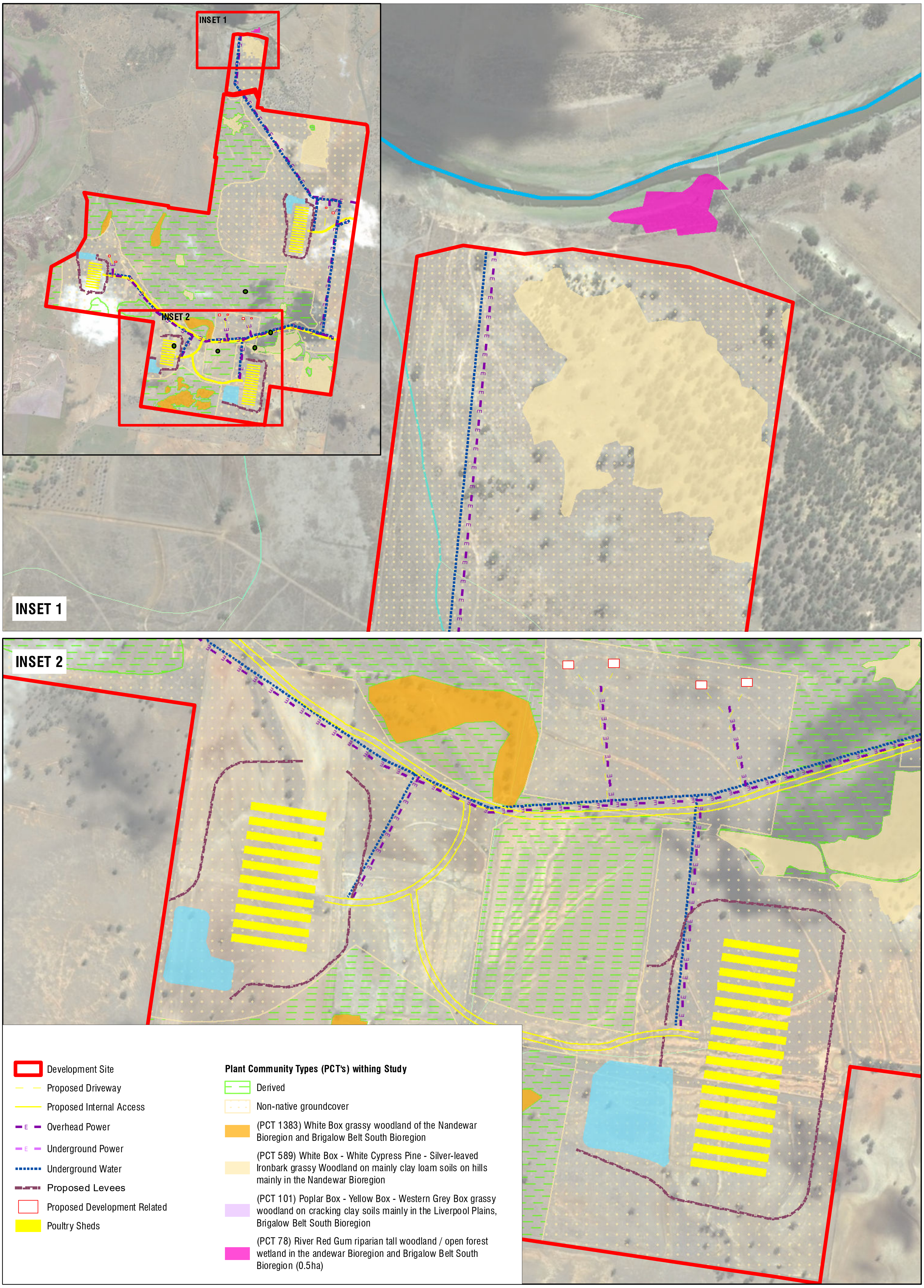
The Development remains as described in the exhibited EIS, with the exception of some minor adjustments at each of the Poultry Production Units (PPUs) in response to the comments and requests from WaterNSW in relation to surface water management. The adjustments are as follows:

- The office and amenities building, water storage tanks, fuel storage tanks, diesel generators and aerated wastewater treatment system (AWTS) at each PPU have been moved a short distance closer to the poultry sheds just outside of the table drain around the perimeter of each PPU;
- The vegetation screens surrounding each PPU have also been moved closer to the poultry sheds just outside of the table drain around the perimeter of each PPU;
- The effluent management area (EMA) required for the disposal of the treated effluent from the AWTS at each PPU has been positioned slightly away from the main ancillary infrastructure area to avoid any potential employee and vehicle interaction; and
- The upstream clean water diversions at each PPU have been realigned to ensure that all of the ancillary infrastructure (with the exception of the solar panels), the vegetation screens and the EMA are located inside of the diversions.

The adjustments at each PPU will ensure that any runoff from the ancillary infrastructure, vegetation screens or EMA is captured in the controlled surface water management system, which will essentially operate as a closed water system, and will not compromise the clean water flows and downstream environments. The solar panels will remain outside of the clean water diversions at each PPU as there is no risk of dirty or contaminated runoff from the solar panel area (appropriate erosion and sediment control will be implemented during construction).

Realignment of the upstream clean water diversions increased the catchment area for the detention dams at each PPU. To maintain the design capacity of each detention dam (1% AEP 72-hour event), and also to balance the cut and fill across the Development Site, sizing adjustments (dimensions and volumes) have been made to the dams. The increased dimensions and storage capacities are shown on the updated preliminary civil design drawings (appended to the Response to Submissions) and the updated conceptual layout of the Development provided in **Figure 1**.

There is no other change to the position or size of any other infrastructure item and/or operational area at the PPUs, and no change to the operation and management of the PPUs. The surface water management system at each PPU will operate and be maintained as described in the exhibited EIS.



0 50 100 150 200 m

Scale: Inset 1:1:4,000 Inset 2: 1:8,000
GDA 1994 MGA Zone 56

04-Apr-2019
610.16117

*Note: Proposed residences are an approximate indication of location and do not represent actual scale or final footprint.

Sheet Size : A3

SLR
www.slrconsulting.com
PH: 02 4037 3200

Potential Impacts

FIGURE 1

4 Biodiversity Impact Summary

The BAR (SLR 2018) identified five native vegetation zones and one non-native zone within the Development Site. The original impact assessment determined that the majority of the development footprint is dominated by exotic pasture, with an estimated 86.61 ha of Non-native Groundcover to be removed. A total of 1.17 ha of VZ1 White Box grassy woodland - Derived Native Grassland will be permanently removed by the Development. Removal of this vegetation will require offsets in accordance with the FBA, as detailed in the BAR (SLR 2018).

The minor adjustments to the layout of each PPU, as described in **Section 3**, will result in the removal of an additional 5.03 ha of Non-native Groundcover (91.64 ha total). The changes will result in a no additional impacts to native vegetation. A summary of these impacts is presented in **Table 1**.

Table 1 Vegetation Zones Requiring Offset

Code	Vegetation Zone Name	Impact Area (ha) Original Development Design	Impact Area (ha) Modified Development Design
1383	White Box grassy woodland (moderate to good condition)	0.0	0.0
589	White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland (moderate to good condition)	0.0	0.0
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland (moderate to good condition)	0.0	0.0
78	River Red Gum riparian tall woodland / open forest (moderate to good condition)	0.0	0.0
1383	White Box grassy woodland - Derived Native Grassland	1.17	1.17
N/A	Non-native Groundcover	86.61	91.64
Total		**87.78**	**92.81**

5 Conclusion

Due to the minor scale of the changes in the development design, no additional impacts to biodiversity values are identified beyond those previously assessed and reported in the BAR (SLR 2018). The updated development footprint will avoid areas containing native vegetation and habitat for threatened species. On this basis, there is also no change to the areas requiring offsets, as identified in Section 6.3 of the BAR (SLR 2018), and there are no implications for the offsetting strategy detailed in Section 7 of the BAR (SLR 2018).

If you have any questions regarding this assessment, please get in touch at your earliest convenience.

Yours sincerely

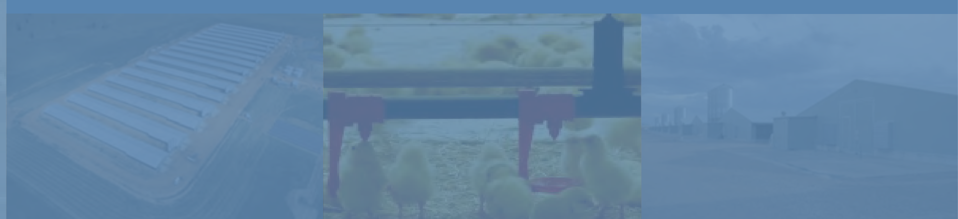
GILBERT WHYTE
Associate Ecologist

JEREMY PEPPER
Principle Ecologist

Appendix G

Addendum Aboriginal Heritage Assessment Letter

(OzArk Environmental and Heritage Management 2019)



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5 April 2019

Eryn Bath
Principle Consultant
EME Advisory
eryn@emeadvisory.com

ADDENDUM ABORIGINAL HERITAGE ASSESSMENT LETTER: RUSHES CREEK DEVELOPMENT UPDATE AND MINOR MODIFICATION, TAMWORTH LGA.

1 PROJECT BACKGROUND

SLR Consulting engaged (SLR) engaged OzArk Environment & Heritage (OzArk) in 2016 to undertake the Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Rushes Creek Poultry Production Farm; a large-scale intensive poultry broiler production farm with associated infrastructure. The Development is classified as State Significant Development (SSD) and is being assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* in accordance with the *State Environmental Planning Policy (State and Regional Development) 2011.*

In February 2018 an alteration to the development footprint, which slightly increased the required area of land disturbance, was proposed. With the inclusion of this additional area, the total number of Aboriginal sites to be impacted by the Development is seven[1].

2 ADDENDUM OVERVIEW

EME Advisory have since taken on the Development to progress it through the SSD approval stages. A further minor modification to the Development has now been proposed (March 2019) that includes minor adjustments at each of the four poultry production units (PPU) in response to the comments and requests from WaterNSW in relation to surface water management to ensure that all ancillary infrastructure (except solar panels) are within the upstream clean water diversions. The adjustments at each PPU will ensure that any runoff from the ancillary infrastructure, vegetation screens or effluent management area (EMA) is captured in the controlled surface water management system, which will operate as a closed water system and will not compromise the clean water flows and downstream environments.

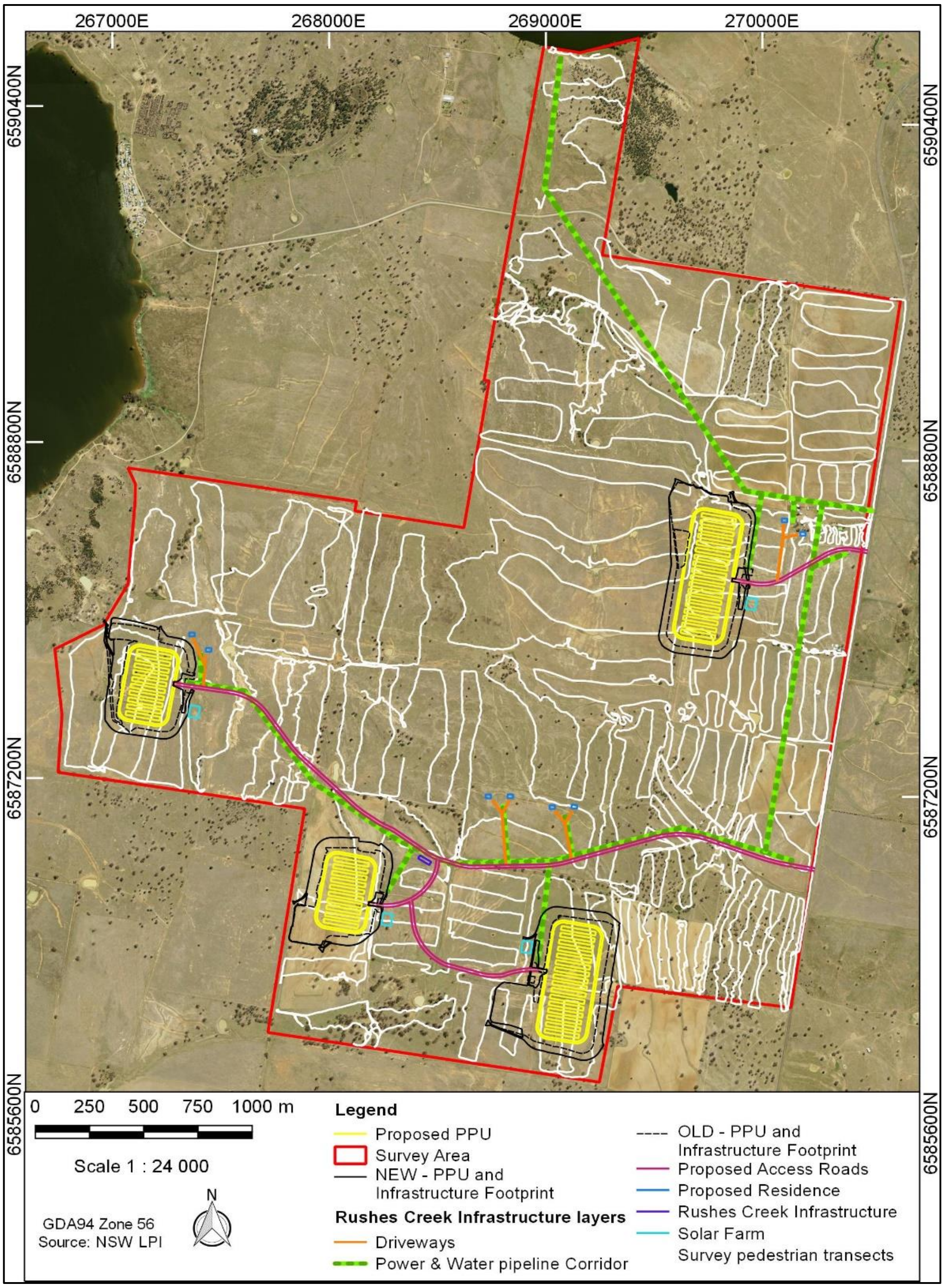
A review of the minor modifications to the Development's footprint in relation to the assessed Aboriginal cultural heritage values and archaeological sites of the expanded PPU impact footprints, is further detailed in this document.

[1] An additional three sites, from the initially confirmed four sites, were then proposed to be impacted. The additional sites were two isolated finds (Bondah-IF8 and Happy Hills-IF3) and one artefact scatter (Bondah-OS11).

3 MINOR PROJECT MODIFICATIONS

The minor changes to the layout of each PPU in response to the requests from WaterNSW have increased the disturbance footprint of the Development from approximately 87.78 hectares to 92.81 hectares, an increase of approximately 5.03 hectares. **Figure 1** shows the old and new PPU footprints and associated infrastructure. The increase in size of the new PPU impact footprints is shown as a solid line and the old impact footprint as a dashed line. Additionally, the pedestrian transects from fieldwork that supported the ACHAR (OzArk 2018), have been added to **Figure 1** which shows that the expanded PPU footprints were adequately assessed during the field survey, and consequently no further field effort is warranted.

Figure 1: View of the old and new PPU footprints and the pedestrian survey transects.



4 ABORIGINAL HERITAGE

A total of 35 Aboriginal sites were recorded during the field survey (shown below in **Figure 1** and detailed completely in OzArk 2018; **Figures 5-4** and **5-22**). A total of seven sites were determined as likely to be impacted by the Development (shown in Figure 3 as Bondah-IF1, Bondah-IF2, Bondah-IF7, Bondah-IF8, Bondah-OS11, Happy Hills-IF3, and Happy Hills-OS3). Review of the locations of the Aboriginal cultural heritage sites in relation to the expanded PPU impact footprints (**Figure 2)** shows no new Aboriginal sites will be impacted as a result of the expanded PPU impact areas.

Figure 2: All 35 Aboriginal sites recorded during the field survey in relation to the Development.

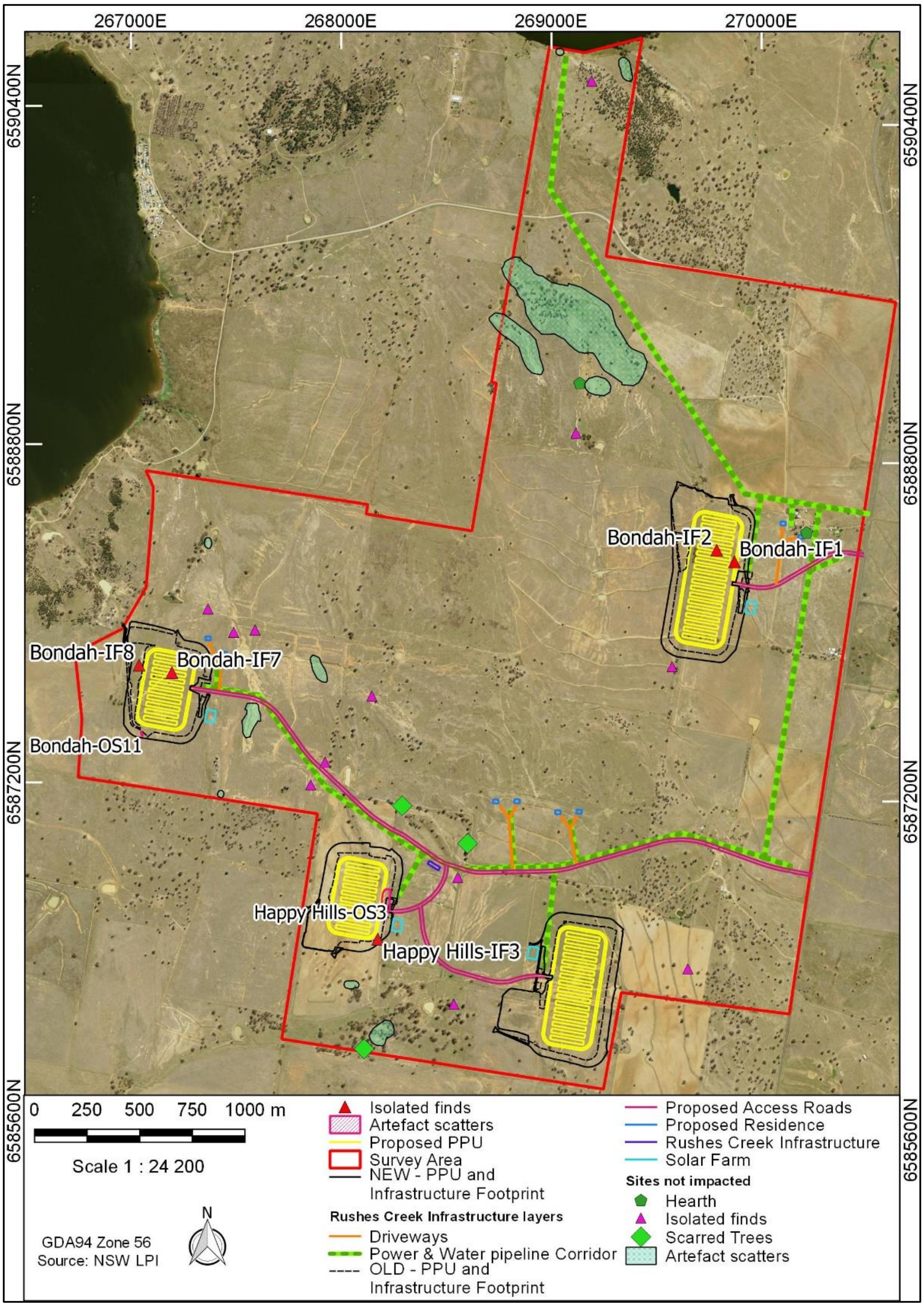
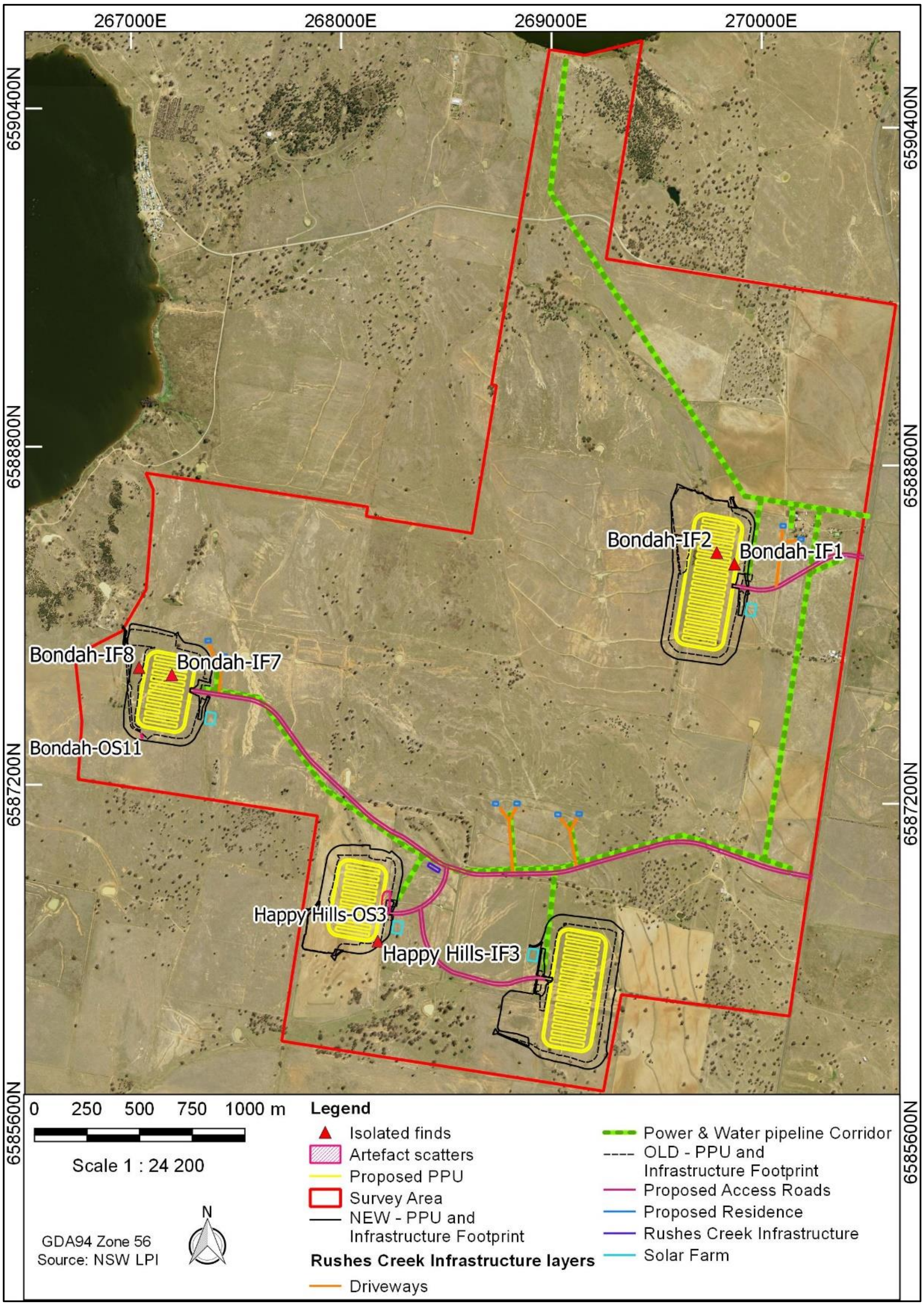


Figure 3: View of the updated PPU infrastructure footprint in relation to the seven recorded Aboriginal sites to be impacted.



5 IMPACT ASSESSMENT

Sections 3 and 4 of this Addendum Letter have demonstrated that the additional impact areas have been adequately assessed and that no new Aboriginal cultural heritage sites are at risk of being harmed by the proposed minor changes to the layout and footprint of the proposed PPUs. The seven sites identified in the

ACHAR (OzArk 2018) to be impact by the Development remain consistent (seven sites only) in light of the minor changes.

6 SUMMARY

In summary, the minor changes to the layout and footprint of the four proposed PPUs have not changed the likely impacts of the Development to Aboriginal heritage as previously documented in the 2018 OzArk ACHAR. Only seven Aboriginal sites (five isolated finds and two low density artefact scatters consisting of four artefacts and two artefacts per site) are within the impact footprint of the Development and are liable to be harmed by the Development.

For transparency, the Registered Aboriginal Parties (RAPs) have been sent a project update letter detailing the minor changes to the Development and confirming no additional impacts over and above those previously assessed and reported in the ACHAR (OzArk 2018).

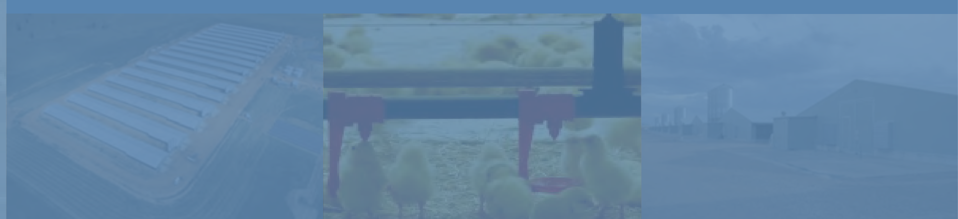
REFERENCES

OzArk Environmental & Heritage Management, 2018. *Aboriginal Cultural Heritage Assessment Report: Rushes Creek Poultry Production Farm, Rushes Creek.* Report to SLR Consulting Australia Pty Ltd on behalf of ProTen Tamworth Pty Limited.

Appendix H

NIA Regulator and Community Response

(Global Acoustics 2019)



Global Acoustics

Noise and Vibration Analysis and Solutions

1 February 2019

EME Advisory Pty Ltd
Greenwich NSW 2085
Attention: Eryn Bath

Dear Eryn,

Regarding: ProTen Rushes Creek Poulty Production Complex NIA regulator and community response

1 INTRODUCTION

This letter addresses submissions relating to potential noise impacts generated by the proposed Rushes Creek Poultry Production Farm (the Development) and should be read in conjunction with the Noise Impact Assessment (the NIA) undertaken in January 2018 (Global Acoustics report 16285_R01.pdf).

Section 2 below addresses government agency submissions, and Section 3 addresses community submissions. To avoid repetition, submissions are grouped together where the same issue is raised by more than one stakeholder.

2 REGULATOR SUBMISSIONS

2.1 Operational Noise Sources included in Scenario 3

The NSW Department of Planning and Environment (DPE) submission, in relation to noise, said:

> *'The NIA has assessed three operating scenarios…. it is not clear if Scenario 3 includes the continuous noise sources in Scenario 1 in addition to noise impacts from bird collection. The NIA must assess the worst-case operational scenario of continuous operation and bird collection on noise sensitive receptors. This should include an assessment of sleep disturbance.'*

Three operational scenarios were considered in the NIA:

Scenario 1 assessed the worst-case continuous noise when all 20 tunnel ventilation fans on the poultry sheds are running.

Scenario 2 assessed feed silo refilling combined with the worst-case continuous noise source operations (i.e. Scenario 1).

Scenario 3 assessed worst-case intermittent noise from bird collection.

As queried by the DPE, Scenario 3 did not include the worst-case continuous noise source operations (i.e. scenario 1). ProTen has subsequently advised that the ventilation fans will operate during bird collection, with the fans on individual sheds being switched only off once the shed has been emptied of livestock.

On this basis, to ensure the assessment of worst-case intermittent noise combined with worst-case continuous noise, Scenario 3 has been remodelled including the bird collection sources and all 20 ventilation fans on each shed operating continuously as per Scenario 1 (this is a conservative approach as not all ventilation fans will operate during bird collection - as one shed is emptied the fans will cease operating). Table 1 presents revised operational Scenario 3 model predictions for neutral and enhancing atmospheric conditions. No exceedances of the noise criterion are predicted.

Table 1: CALCULATED $L_{Aeq,15minute}$ OPERATIONAL NOISE LEVELS - SCENARIO 3 (dB)

Receptor ID	Neutral	Source to Receiver Wind	Inversion	Criterion	Exceedance
R15	<20	22	22	35	Nil
R16	<20	<20	<20	35	Nil
R17	21	24	24	35	Nil
R20	22	26	26	35	Nil
R21	24	28	29	35	Nil
R22	<20	<20	<20	35	Nil
R23	<20	<20	<20	35	Nil
R24	28	33	31	35	Nil
R25	29	34	29	35	Nil

Note:
1. *Results in bold type exceed the operational noise criterion (if applicable).*

One sleep disturbance scenario was assessed for night time bird collection. The sleep disturbance assessment included all operational sources from Scenario 3 combined with revving engines/impact noise. The sleep disturbance scenario has been remodelled including all 20 ventilation fans on each shed operating continuously as per Scenario 1 (again, this is a conservative approach as not all ventilation fans will operate during bird collection - as one shed is emptied the fans will cease operating). Table 2 presents sleep disturbance model predictions for neutral and enhancing atmospheric conditions. No exceedances of the sleep disturbance criterion are predicted.

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Noise and Vibration Analysis and Solutions

Table 2: CALCULATED $L_{A1,1minute}$ SLEEP DISTURBANCE NOISE LEVELS (dB)

Receptor ID	Neutral	Source to Receiver Wind	Inversion	Criterion	Exceedance
R15	20	22	22	45	Nil
R16	<20	<20	<20	45	Nil
R17	21	25	25	45	Nil
R20	22	27	27	45	Nil
R21	27	32	33	45	Nil
R22	<20	<20	<20	45	Nil
R23	<20	<20	<20	45	Nil
R24	32	37	35	45	Nil
R25	35	40	35	45	Nil

Note:

1. *Results in bold type exceed the sleep disturbance noise criterion (if applicable).*

The results in Table 2.1 and Table 2.2 present predicted worst-case noise impact for bird collection activities and also include worst-case continuous noise sources. It should be noted that while some ventilation fans will be operating during bird collection it will typically be far fewer than the number modelled. The sheds that have been emptied of livestock will have their ventilation turned off, and other sheds may have only some ventilation fans operating on an on-demand basis depending on the stage of the production cycle and weather. Therefore, model predictions are considered conservative.

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2.2 Emergency Generators

Gunnedah Shire Council have asked for the noise implication of emergency generators to be considered. Generators were not considered in any of the operational scenarios in the NIA. The client has advised that:

> *'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 generators will only be used on site for emergency backup power. Each PPU will be powered by solar and grid electricity and only when these sources fail will the emergency backup generators be required. The client has advised this is likely to only be between one and a maximum of five days per year.

Technical data provided by the generator supplier reports a sound power (L_{WA}) of 97 dB for a generator with the acoustic enclosure. This sound power needs to be considered in relation to the modelled continuous noise sources for each PPU. Each shed within a PPU will have up to 20 ventilation fans operating during regular operation. Given one ventilation fan has a sound power of 87 dB, each shed (20 fans) will have a sound power of 100 dB which is double the sound power of one generator (in logarithmic units a source that is 3dB higher has twice the acoustic energy).

Each PPU will have an average of 14 sheds which have a total sound power of 111 dB. The total sound power for three generators operating at one PPU (i.e. 102 dB) will cause an increase of less than 0.5 dB to the sound power of each PPU, and to offsite noise levels.

An increase in PPU sound power levels of less than 0.5 dB will not be noticeable offsite and noise levels will remain in compliance with operational noise criteria at each receptor considered in the NIA. On this basis, and given the fact that the generators will only be used on the rare occasion when power from the electricity grid is lost (anticipated to be between one and a maximum of five days per year), no further assessment is warranted.

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3 COMMUNITY SUBMISSIONS

3.1 Operational Noise

Several community responses related to operational noise from site including continuous and intermittent noise sources, the size of the farm and the modelling methodology.

While noise modelling is a predictive tool it is widely used and is the accepted method for assessing noise impacts from proposed developments. Where possible modelling should be based on actual noise measurements of similar operations or equipment.

The 2018 NIA including modeling undertaken using CadnaA, noise prediction software developed by DataKustic. Modelling considered the height and location of each source and receiver and takes into account topography, meteorological effects, ground type, air absorption and barrier effects. The model was set up using the specific design of the Development including the layout, type and number of noise sources and location of Noise Sensitive Receivers (NSR).

Measurements were undertaken at the existing ProTen Bective Poultry Production Farm to measure sound power data for equipment that will also be used at the Development. Sound power measurements of existing noise sources allows for accurate predictive modeling. For example the sound power can be measured directly for a single (or bank) of ventilation fans on one development site and this data can then be used to predict noise levels based on the number and location of ventilation fans on another development site.

Modelled results in the NIA predict that operational noise level will comply with relevant noise limits at NSR considered. The continuous operation of ventilation fans are predicted to be the highest contributor to operational noise levels. This is primarily due to the number and location of ventilation fans

3.2 Road traffic noise

Numerous community responses related to road traffic noise, particularly related to 'accelerating' and 'compression braking'. Particular areas of concern were traffic entering/exiting the site onto Rushes Creek Road and the 70 degree bend approximately 4km south of the site entrance road. One resident also stated that:

> *'The consultant incorrectly advises "that the increase in traffic would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed."'*

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Global Acoustics

Noise and Vibration Analysis and Solutions

The NIA considered road traffic noise impact for traffic generated on the Oxley Highway and Rushes Creek Road. In relation to road traffic noise impact on the existing arterial road, the Oxley Highway, the NIA stated that:

> *'Traffic generated by the Development is predicted to increase heavy vehicles on Oxley Highway by up to 8% and total traffic counts by up to 2%. Considering traffic generated by the Development is predicted to be evenly spread across the production cycle, this increase in traffic would likely cause an insignificant increase in road traffic noise levels and is unlikely to be noticed.'*

This is a justification for no further assessment for the impact on the Oxley Highway and should not be confused with assessment of traffic impacts on Rushes Creek Road.

Road traffic modelling for Rushes Creek Road in the NIA predicts that the Development will increase existing day period noise levels by 1dB and night period noise levels by 3 dB. A 3 dB increase represents a doubling of noise which reflects the approximate doubling of heavy vehicle movements assessed for the night period. Model predictions from the road traffic assessment demonstrate compliance with relevant criteria from the NSW Road Noise Policy.

While the majority of activities will be carried out between 7:00 am and 7:00 pm, live bird collection and transport from the Development Site may occur any time between 7:00 pm and 4:00 pm. While attempts will be made to transport the birds during cooler times of the day/night, given the very large number of birds to be collected and transported from this Development and also the numerous other boiler production farms in the region, transport contractors cannot guarantee transport times. For this reason it is not possible to restrict heavy vehicle movement to the day period only.

Given the proximity of a few houses to Rushes Creek Road, heavy vehicle drivers should be asked to be aware of their impact on the surrounding area and limit compression braking where possible.

We trust this information meets your requirements. If you have any questions or need further details please contact me.

Regards,

Ryan Bruniges
Consultant