



Moolort and Strathlea Broiler Farms

Odour Assessment

ProTen Victoria Pty Ltd

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→ The Power of Commitment



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1. Introduction

ProTen Victoria Pty Ltd (ProTen) currently operates two farms at 1480 Rodborough Road, Moolort. It is understood that in addition to purchasing Grandview 3 (GV3) site at 141 Clarkes Road, Strathlea, ProTen intends to build additional sheds and change the number of permitted bird numbers at the new site and to the existing Grandview 1 farm at 1480 Rodborough Road, Moolort, which are located north of the proposed GV3.

A summary of the proposed planning amendments is described below:

Grandview 1 (GV1), existing eastern farm at 1,480 Rodborough Road

GV1 has a permitted capacity of 384,000 birds in eight conventional poultry sheds. With the introduction of RSPCA farming standards, the capacity of farms has reduced to 319,288.

The amendment of existing permit for GV1 includes:

- Increase permitted shed numbers to eleven (additional three sheds)
- Increase permitted bird numbers from 384,000 to 486,377

Grandview 2 (GV2), existing western farm at 1,480 Rodborough Road

GV2 has a permitted capacity of 500,000 birds in eight conventional poultry sheds. With the introduction of RSPCA farming standards, the capacity of farms has reduced to 397,623.

The amendment of existing permit for GV2 includes:

- Reduce permitted bird numbers to 397,623

Grandview 3 (GV3), proposed farm at 141 Clarkes Road

GV3 has a permitted capacity of 325,000 birds in six conventional poultry sheds.

The amendment of existing permit for GV3 includes:

- Increase permitted shed numbers from six to eight conventional poultry sheds, which would also be free-range compatible
- Increase permitted bird numbers from 325,000 to 445,000

ProTen has engaged FocusCDS to support a planning permit application to amend the existing planning permit for the proposed changes. To support the amendment of existing planning permit, ProTen has requested an Odour Environmental Risk Assessment (OERA) to be undertaken to assess the resultant odour impacts on the surrounding areas.

1.1 Purpose of this report

The purpose of this report is to undertake an OERA in accordance with EPA Publication 1883 – *Guidance for assessing odour*, AgriFutures – *Planning and environment guideline for establishing meat chicken farms: Guide 1 – Assessment guide*, to support the proposed planning amendments described in Section 1 to understand odour risks associated with the proposed operations.

The findings, conclusions and recommendations of this assessment should be read in conjunction with the limitations presented in Section 1.3.

1.2 Scope of works

The scope of works is as follows:

- Request and review of information.
- Level 3 Odour Environmental Risk Assessment in line with EPA Victoria Publication 1883: Guidance for Assessing Odour, AgriFuture 2021. Planning and environment guideline for establishing meat chicken farms: Guide 1 – Assessment guide and The Victorian Code for Broiler farms 2009.
- Review odour surveillance undertaken at the current site by third party.
- Historical complaint data analysis within the area around the site.
- Undertake air dispersion modelling using CALPUFF model.
- Report detailing the findings of the above tasks including level of risk (or zone of risk) surrounding the site in the context of sensitive receptor impacts.

1.3 Limitations

This report has been prepared by GHD for ProTen Victoria Pty Ltd and may only be used and relied on by ProTen Victoria Pty Ltd for the purpose agreed between GHD and ProTen Victoria Pty Ltd as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than ProTen Victoria Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Assumptions

The following assumptions were utilised in the preparation of this report:

- Odour is the primary emission of concern from the broiler farm
- Odour generated from the broiler farms are linearly proportional to the throughput of the facilities
- GHD relied on EPA Publication 1883, AgriFutures 2021 to undertake air dispersion modelling
- All information provided is correct and representative of the proposed operations at the site
- Data obtained from the onsite monitoring station is deemed to be representative of the meteorology at the site
- Third party odour surveillance is representative and accurate of the farms operations

2. Legislation and guidelines

2.1 Environment Protection Act 2018 (amendment to Environment Protection Act 2017)

EPA Victoria released a new legal framework on 1 July 2021, with the intention for this framework to drive environmental improvements in industrial operations. The cornerstone of the Environment Protection Act 2017 (the EP Act) is the general environmental duty (GED), which requires Victorians to understand and minimise their risks of harm to human health and the environment, from pollution and waste.

Complying with the GED is about taking reasonable proactive steps and employing good environmental work practices. Compliance with the GED can be through following responsibilities under Occupational Health and Safety (OHS) laws, meeting industry standards, adopting industry better management practices, and following other relevant legislation related to the environment. In effect, the GED makes it clear that it is the individual businesses' responsibility to reduce risk to the environment and to protect it.

2.2 Environment Reference Standard

The EP Act's environment protection framework includes the Environment Reference Standard (ERS). This identifies environmental values, air indicators and objectives that set the benchmark for the quality of the air environment needed to protect environmental values. The environmental values identified include:

- Life, health and wellbeing of humans
- Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity
- Local amenity and aesthetic enjoyment
- Visibility
- The useful life and aesthetic appearance of buildings, structures, property and materials
- Climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity

The ERS is a reference standard, not a 'compliance standard' for businesses i.e. it relates to ambient air and not any individual facility. The ERS replaces SEPP (AQM) and generally adopts the objectives in the National Environment Protection Measure (Ambient Air Quality) (NEPM AAQ) with some modifications.

The following air quality indicators, and respective objectives, relevant to this assessment are outlined below:

- **Odour**
An air environment that is free from offensive odours from commercial, industrial, trade and domestic activities

As such, the 5 Odour Unit (OU) level is generally taken as the level that if the odour is offensive, it may lead to nuisance and resultant complaint. Hence, GHD has utilised the 5 OU level to assess the 99.9th percentile 3-minute average odour impact from the site.

2.3 Victorian Code for Broiler Farms – 2009

The Victorian Code for Broiler Farms 2009 (The Code) is the code of practice for the planning, design, assessment, approval, construction, operation and management of broiler farms in Victoria. It was developed to provide clear environmental standards for those wishing to establish new, or expand existing, broiler farms, and assurance for the surrounding landholders who may be impacted by broiler farming activities.

The 2018 amendments include:

- New definition for broiler farm to include free-range chicken meat farms
- A minimum farm size for which the Code applies (only applies to farms with more than 10,000 birds)

The Code details the method of calculating separation distances to assess whether a proposed broiler farm has sufficient separation to the nearest residences. However, where the farm capacity exceeds 400,000 birds, the farm is termed a Special Class and instead of using a separation distance criterion, an Odour Environmental Risk Assessment (OERA) must be conducted in accordance with the requirements outlined in Section 6 of the Code. The requirements are listed below:

Stage 1 – Odour dispersion modelling is required to assess the cumulative odour emissions from all the broiler farms within the site. The dispersion model will be used to calculate whether the predicted peak (99.9th percentile) odour levels exceed the 5 OU criterion at the site boundary¹. If the criterion is met at and beyond the broiler farm boundary, then the responsible authority should accept that the risk of odour amenity impact is low and no further assessment is required.

Stage 2 – When the odour modelling results do not meet the criterion, an analysis of the odour modelling results will be undertaken to determine the frequency (how often) of the odour impact, duration (the length of time) and extent (the number of odour units) on surrounding sensitive uses (that is for dwellings). This information can then be used to determine whether the risk of adverse odour impacts beyond the broiler farm boundary is acceptable.

Stage 3 – If, following Stage 2 analysis, the risk of adverse odour impacts beyond the broiler farm boundary is considered to be unacceptable, then the design of the broiler farm will need to be modified. This may include, for example, reducing the number of chickens and/or relocating the broiler sheds.

2.3.1 Project application

The OERA for this assessment will be conducted as follows:

Stage 1 – Odour dispersion modelling will be undertaken using CALPUFF, with odour emissions estimated using Ormerod and Holmes emissions method². The predicted cumulative odour emissions from all broiler farms for all scenarios will be assessed against the 99.9th percentile 3-minute average 5 OU odour criterion.

Stage 2 – At the time this assessment was undertaken, there are no established risk assessment for assessing odour impact using predicted results from odour dispersion model. GHD has therefore adopted the assessment for risk of odour exposure presented in Section 6.3 of EPA Publication 1883 – *Risk of Offensive Odour using Area Surveillance Method* to assess the likelihood of the identified receptors in experiencing offensive odour from the broiler farm.

2.4 New national guideline – Meat chicken farms

In November 2021, the first national planning and environmental guideline developed for Australia's chicken meat industry was released³. Two guides have been prepared by AgriFutures Australia and include (i) Planning and environment guideline for establishing meat chicken (broiler) farms (Guide 1 – Assessment guide) and (ii) its companion document (Guide 2 – Applicant guide).

The principal aim of these guidelines is to safeguard that the chicken meat industry's ongoing economic growth upholds the principles of environmentally sustainable and socially responsible development. This is to be achieved by confirming that future meat chicken farms are located, designed and managed sustainably and provide confidence for ongoing industry investment.

They have been developed through an extensive review of state environmental requirements and application guidance for meat chicken farms and other intensive animal industries. These guidelines were developed in collaboration and consultation with researchers and industry experts, as well as local government and state departments of planning, environment, primary industries, and agriculture.

¹ In accordance with SEPP (AQM) which is now superseded by the ERS.

² Ormerod and Holmes 2005. A study referenced in AgriFuture 2021 Guide – 1. However, the title and publisher of this study is not presented in Guide 1.

³ <https://agrifutures.com.au/product/planning-and-environment-guideline-for-establishing-meat-chicken-farms-guide-1-assessment-guide/>

2.4.1 Project application

For odour dispersion modelling, CALPUFF is selected as it is the model recommended in AgriFutures Guide 1 to be used to undertake poultry assessment. This assessment also utilised the K-factor method, also known as the Ormerod and Holmes emissions method (Ormerod and Holmes 2005)⁴. The K-factor emissions method is based on the relationship between the number of birds present, the stocking density of the birds, the ventilation rate and overall farm management.

The K-factor method estimates hourly varying odour emission rates (OER) from a poultry farm shed using the following equation:

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

Where:

OER	Hourly odour emission rate (OU.m ³ /s)
K	Scaling factor between 1 and 5, where a value of 1 represents a very well designed and managed shed operating with minimal odour emissions, and a value of 4 – 5 would represent a shed with serious odour management issues. For this assessment, a K factor of 1.9 has been selected. AgriFutures Guide 1 recommends that when modelling a 'greenfield' site that will be operated to best management practice, a K-factor of no less than 1.9 should be used as it represented the most recent test data from new farms.
A	Total shed floor area (m ²)
D	Average bird density (kg/m ²)
V	Ventilation rate (m ³ /s)

2.5 EPA Publication 1883 Guidance for assessing odour

EPA Publication 1883 provides guidance on how to assess the risk posed by odour emission sources and to understand the receiving environment where effects might occur. The guideline is to be utilised once an assessment of the separation distance has been undertaken to assess for any potential constraints. This is to evaluate the risk of harm in accordance with ERS objective for odour.

EPA Publication 1883 focuses on the assessment of odour under the provisions of the EP Act, including the GED, which requires all Victorians to take precautionary and reasonable actions to avoid hazards causing harm. The guideline is primarily intended for government, the planning sector, practitioners and specialists, who need to understand offensive odours that are associated with a development proposal, investigation or study where an odour assessment is required. The publication provides a framework for three levels of risk assessment, according to the odour impact potential of an industry or site. The three levels of assessment include:

- Level 1 – Gateway assessment of emissions duration, wind direction and cumulative odour sources
- Level 2 – Source-Pathway-Receptor assessment
- Level 3 – Detailed risk assessment that could include:
 - Comparisons with similar operations or case studies
 - Risk assessment using field odour surveillance data
 - Complaint assessment
 - Community odour surveys/questionnaires and odour diaries
 - The use of dispersion modelling

⁴ Ormerod and Holmes 2005. A study referenced in AgriFuture 2021 Guide – 1. However, the title and publisher of this study is not presented in Guide 1.

2.5.1 Project application

This assessment includes selected Level 3 tools to assess the overall odour risk from the broiler farm. The tasks associated with Level 3 assessments undertaken for this site are presented below:

- Complaint assessment
- Odour surveys
- Odour dispersion modelling

3. Site overview

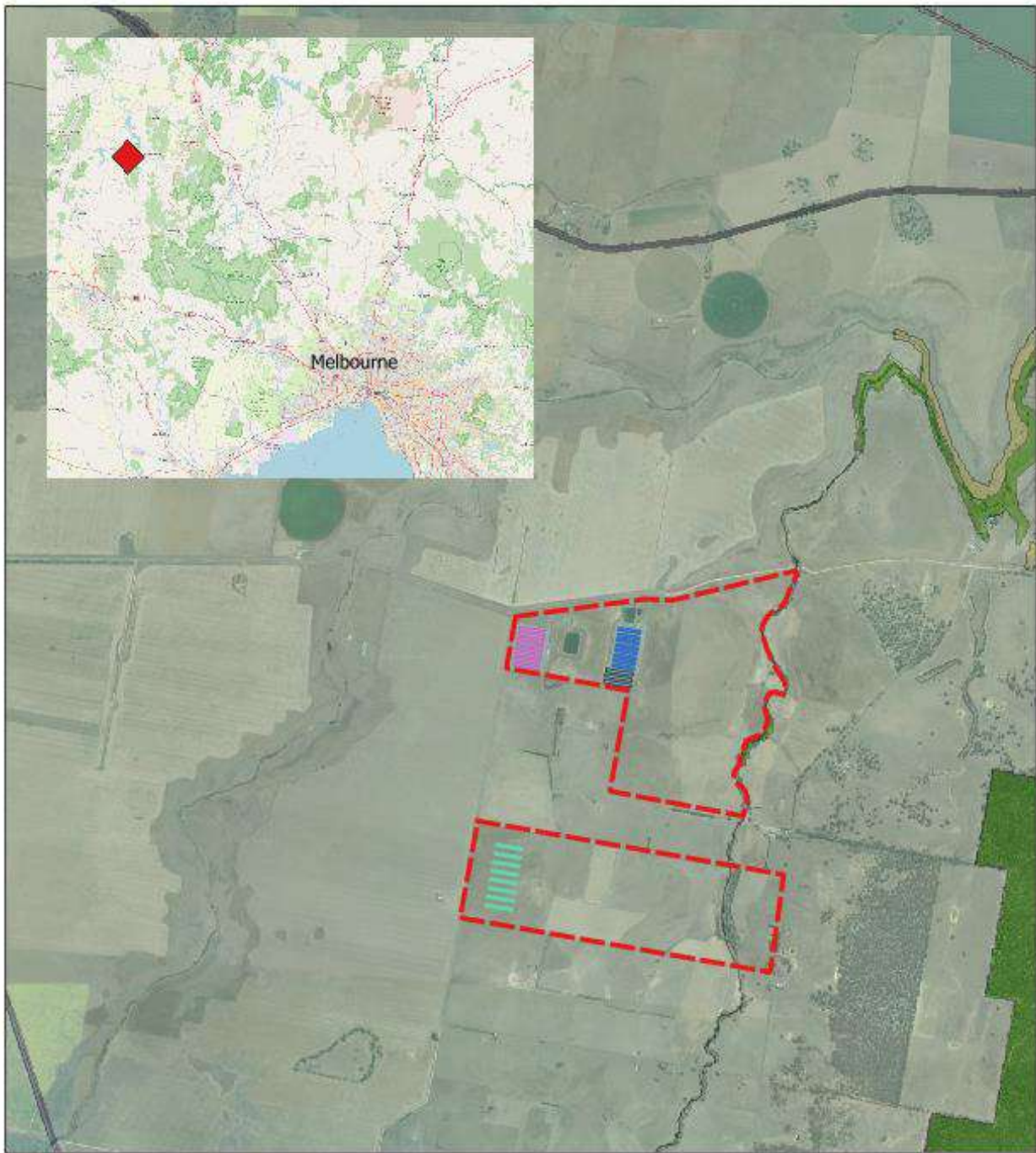
3.1 Site location

The proposed site is located at 141 Clarkes Road, Strathlea and 1480 Rodborough Road, Moolort. The site and its immediate surrounding are currently zoned as Farming Zone under the Central Goldfields Shire.

The township closest to the site is Newstead which is approximately 10 km to the east of the existing farms. The existing air quality in the area is considered to be typical of a rural area with mainly agricultural activities. An aerial image of the site relative to the township and land zoning are shown in Figure 1.

The two existing poultry farms (GV1, GV2) and the proposed poultry farm (GV3) are located at the site as follows:



- **GV1 and GV2**
1480 Rodborough Road, Moolort, Victoria, 3465. Located within parcels 6\LP5755 and 6A\LP5755
- **GV3**
141 Clarkes Road, Strathlea, Victoria, 3364. Located within parcel 3\PP3456, approximately 1 km south-southwest of the Rodborough Road farms.







Legend

-  Site Location
-  Site boundary

Planning Scheme Zones

-  FZ - Farming Zone
-  PCRZ - Public Conservation and Resource Zone

Sheds

-  GV1 Eastern Existing Sheds
-  GV1 Eastern Proposed Sheds
-  GV2 Western Existing Sheds
-  GV3 Southern Proposed Sheds

<p>Paper Size ISO A4</p> <p>0 0.25 0.5 km</p>  <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS84 - UTM Grid: UTM 55 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Site Location</p>	<p>Project No. 12627065 No. - Date. 07/02/2024</p>
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FIGURE 1

Document Path: I:\drive\ghd\W\Melbourne\Projects\112627065\Task\Air Quality\06_GSD\12627065_GrandviewFarm_ProTen.gpp
Print Date: 07/02/2024

Data Source: Google Earth Imagery 2024
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Figure 1 Site Location and Layout

3.2 Site operation

3.2.1 Bird numbers

Table 1 summarises the number of sheds within each farm, number of birds and the farm identifications for existing and proposed farms which GHD uses to determine odour emission rates from each shed.

Table 1 *Bird numbers in existing and proposed farms*

Farm ID	Description	Number of sheds	Number of birds per shed	Total birds
Existing operations				
GV1	Existing eastern farm	8	39,911	319,288
GV2	Existing Farm	8	49,703	397,623
Proposed operations				
GV1	Existing Farm with three additional new sheds	11	Existing sheds – 39,911 per shed Proposed sheds – 55,696 per shed	486,377
GV2	Existing Farm	8	49,703	397,623
GV3	Proposed Farm	8	55,625	445,000

3.2.2 Shed size

Table 2 summarises the existing and proposed shed sizes at GV1, GV2 and GV3.

Table 2 *Existing and proposed shed sizes*

Farm ID	Description	Shed area and dimension	Shed spacing
GV1	Existing shed	2,768 m ² (148 m X 18.7 m)	16 m
	Proposed additional shed	3,291 m ² (176 m X 18.7 m)	18 m
GV2	Existing shed	3,261 m ² (172 m X 18.7 m)	16 m
GV3	Proposed shed	3,291 m ² (176 m X 18.7 m)	37.4 m

3.2.3 Grow-out cycle

The typical grow-out cycle, or the production cycle, for the current farms are 9.5 weeks (67 days) in total, comprising:

- 53 days of bird occupation
- Seven days of litter removal and shed cleanout
- Seven days of new bedding and preparation work for the next batch of birds
- A delay of three weeks from stocking GV1 to stocking GV2. It is assumed that there will be a delay of three weeks from stocking GV2 to stocking GV3. Consequently, peak odour emissions from GV1 – GV3 do not occur at the same time due to a delay of three weeks between farm stockings.

The typical bird live weight over the growth cycle used in this assessment to estimate odour emission rates is summarised in Table 3.

Table 3 Typical bird live weight over the growth cycle

Day in growth cycle	Typical bird live weight (grams)
0	42
7	190
14	480
21	910
28	1,350
35	1,900
42	2,400
49	3,100
53	3,437

3.2.4 Bird thinning

The RSPCA Approved Farming Scheme Standard for Meat Chicken⁵ (RSPCA 2020), the recommended stocking density for tunnel ventilated or extractive systems to be less than 34 kg/m². The current farms have a placement density of 16.9 birds/m².

Bird thinning is carried out to maintain the stocking density below the RSPCA 2020 standard of 34 kg/m². It is understood that the current site generally removes approximately 40-50% of the total birds on Day 28 (end of week 4). This would give a maximum bird mass density of 26 kg/ m² at the end of the growing cycle before birds are removed from the shed. It is assumed that the new sheds in GV1 and GV3 will have the same placement density and thinning regime as the existing sheds.

Table 4 Bird thinning and maximum bird mass density at each shed

Bird age days	% Removal	Number of birds per shed			
		GV1		GV2	GV3
		Shed 1 – 8	Shed 9 – 11	Shed 1 – 8	Shed 1 – 8
0 – 27	-	39,911	55,696	49,703	55,625
28 – 35	40-50	19,956	27,848	24,852	27,813
53	All birds harvested from shed	0	0	0	0

3.2.5 Shed temperature

The shed temperature in a shed is controlled. Generally, the shed temperature is held at approximately 31°C at the start of the growing cycle as this is the optimum temperature for baby chick comfort, health and survival. As bird mass increases, the internal shed temperatures required for optimum bird performance decreases. The shed temperature is gradually lowered by about 0.5°C each day after the first two days, down to 20°C by week 6.

3.2.6 Ventilation

Ventilation is used to managed internal shed temperatures. Changes in ventilation that are required to achieve the target effective temperature are a function of ambient temperature. Each shed will have eight tunnel ventilation fans. The tunnel ventilation capacity used for this assessment is a typical value of 10 m³/hr/bird.

⁵ RSPCA Approved Farming Scheme Standard for Meat Chicken, v1.1, published in August 2020 by RSPCA Australia

3.3 Sensitive receptors

The definition of a sensitive receptor or sensitive land use is defined by EPA⁶ as:

‘Any land use that requires a focus on protecting human health and wellbeing, local amenity and aesthetic enjoyment.’ Examples of such sensitive land uses include but not limited to, *‘dwellings, hospitals, aged care facilities, education centres, childcare centres, places of worship, corrective institutions’*.

Based on the above, sensitive receptors were identified within 2 km of radius from the site as this is generally considered the distance at which sensitive receptors are likely to experience odour nuisance from an odour source. A total of 11 receptors have been identified within 2 km of the site boundary to be included in this assessment. All receptors were identified to be residential receptors.

All sensitive receptors identified are located on lands zoned as Farming Zone and are presented in Table 5 and graphed in Figure 2. The nearest existing sensitive receptors are R5 and R6 which are located 38 m and 95 m from the site boundary.

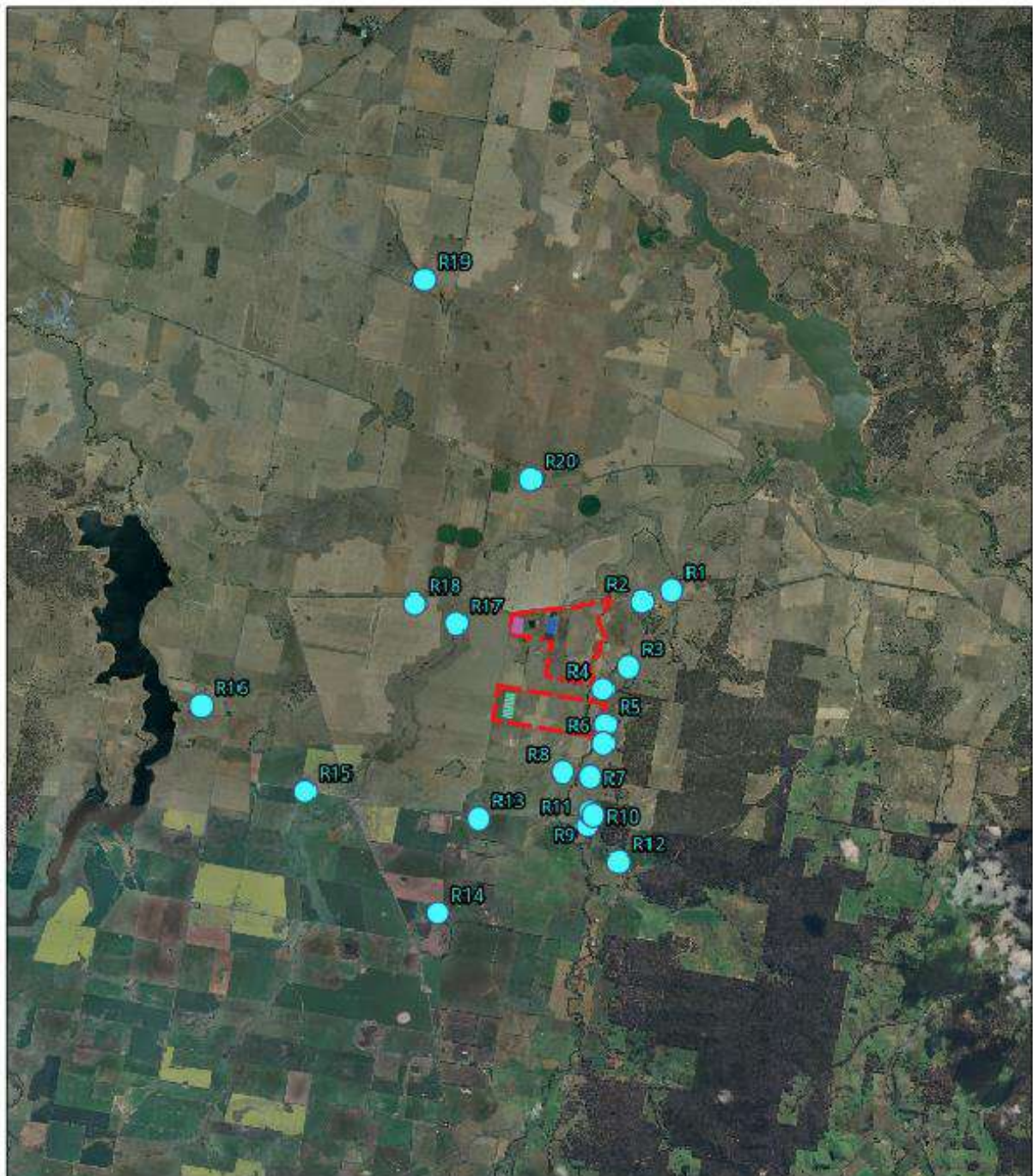
It should be noted that the sensitive receptors are identified based on publicly available aerial imagery provided in Google Earth and Google Maps at the time this assessment is undertaken. The receptor addresses are verified using VicPlan⁷.

Table 5 Sensitive receptors identified within approximately 2 km radius from the site boundary

Receptor ID	Address	Type of receptors	UTM 54 S		Approximate distance from site boundary (m)	Direction relative to the site boundary
			x	y		
R1	326 Rodborough Road	Residential	764,682	588,9624	1,145	E
R2	381 Rodborough Road	Residential	764,138	588,9413	592	E
R3	159 Strathlea Road	Residential	763,882.3	588,8206	696	E
R4	Strathlea Road	Residential	763,415	588,7794	227	SE
R5	321 Strathlea Road	Residential	763,460	588,7141	38	E
R6	355 Strathlea Road	Residential	763,424	588,6790	95	SE
R7	9 Hurns Road	Residential	763,174	588,6178	722	SE
R8	63 Hurns Road	Residential	762,679	588,6268	723	S
R9	444 Strathlea Road	Residential	763,167	588,5527	1,370	SE
R10	457 Strathlea Road	Residential	763,232	588,5465	1,425	SE
R11	472 Strathlea Road	Residential	763,120	588,5282	1,621	SE
R12	557 Strathlea Road	Residential	763,707	588,4597	2,311	SE
R13	375 Clarkes Road	Residential	761,113	588,5398	1,848	SW
R14	80 Whites Lane	Residential	760,355	588,3656	3,721	SW
R15	174 Nicholls Bridge Road	Residential	757,913	588,5910	3,719	SW
R16	44 Connor Lane	Residential	755,997	588,7488	5,393	W
R17	1366 Rodborough Road	Residential	760,707	588,9011	975	W
R18	1290 Rodborough Road	Residential	759,942	588,9373	1,800	W
R19	85 Keystone Mine Road	Residential	760,115	589,5362	6,371	NW
R20	2580 Pyrenees Highway	Residential	762,079	589,1680	2,435	N

⁶ EPA Publication 1949, Separation distance guideline (2022)

⁷ <https://mapshare.vic.gov.au/vicplan/> - Last access July 2023



Legend

Location of Sensitive Receptors

● Receptors

Existing Sheds

■ GV1 Existing Sheds
■ GV2 Existing Sheds

Proposed Sheds

■ GV1 Proposed Sheds
■ GV3 Proposed Sheds

Property Boundaries

■ 1480 Rodborough Road
■ 141 Clarks Road

<p>Paper Size: ISO A4</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Sensitive Receptors</p>	<p>Project No. 12627065 No. - Date. 19/02/2024</p> <p>FIGURE 2</p>
<p><small>Document Path: I:\gdrive\gdn\Melbourn\Projects\12627065\Tech\Map Quality\08_05-12627065_SensitiveReceptors_Prelim.mxd</small></p> <p><small>©2024. While GHD has taken care to ensure the accuracy of this product, GHD and DATA CUSTODIAN(S) make no representations or warranties about its accuracy, completeness or suitability for any particular purpose. GHD and DATA CUSTODIAN(S) cannot accept liability of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred as a result of the product being inaccurate, incomplete or unsuitable in any way and for any reason.</small></p>				<p><small>Data Source: Google Earth Imagery 2024 Created By: Cheng Yi Shi</small></p>

Figure 2 Sensitive receptor locations

4. Meteorology

The characterisation of local wind patterns generally requires accurate site-representative hourly recordings of wind direction and speed over a period of at least a year.

The nearest Bureau of Meteorology (BoM) meteorological stations to the site is Ballarat Aerodrome⁸ (45 km southwest of the site) and Bendigo Airport⁹ (50 km northeast of the site). Given that the terrain is complex between each of these sites and too far away to be representative of wind conditions at the broiler farms, this data was not considered in the assessment. An on-site automatic weather station (AWS) was installed at a representative location and the details are presented in Section 4.1 of this report.

4.1 Onsite weather data

The on-site weather station was installed according to the standards outlined in the Australian Standard AS 3580.14.2014 - *Methods for sampling and analysis of ambient air – Part 14: Meteorological monitoring for ambient air quality monitoring applications*. The map coordinates for the location of the onsite meteorological mast are at approximately 761,777 m E and 5,887,787 m S (WGS 84 UTM 54S). Figure 3 below shows the weather station that was installed. All data was recorded in 10-minute intervals and the period of data provided for this assessment is from October 2016 to June 2019. The following hourly averaged parameters are included in the data set provided:

- Wind speed measured at 10 m (m/s)
- Wind direction measured at 10 m (degrees)
- Sigma theta (degrees)
- Temperature measured at ~10 m (°C)
- Temperature measured at ~2 m (°C)
- Global solar radiation (W/m²)

As there are no other nearby local surface observations from the BoM near the site providing information such as cloud data, pressure and relative humidity data, meteorological data representative of the site is generated using TAPM and CALMET, with surface observation data input from the onsite weather data. In summary, TAPM was utilised to produce a three-dimensional hourly wind field for the site. Results of the TAPM model run were then utilised as initial guess field for modelling in CALMET in the “Hybrid” mode. Detailed information on the setup of TAPM and CALMET, as well as model validation, are presented in Appendix A. GHD selected the period between 1 January 2017 and 31 December 2018 (two years) to model as the surface observation data was provided by ProTen.

The effects of wind on dispersion patterns can be examined using the general wind climate and atmospheric stability class distributions. The general wind climate at a site is displayed by means of wind rose plots, giving the incidence of winds from different directions for various wind speed ranges. In this assessment, the prevailing wind directions and the relative incidence of more stable light wind conditions are of particular interest. These are assessed and presented in Section 4.2 and 4.3.

⁸ BoM station ID 89002

⁹ BoM station ID 81123

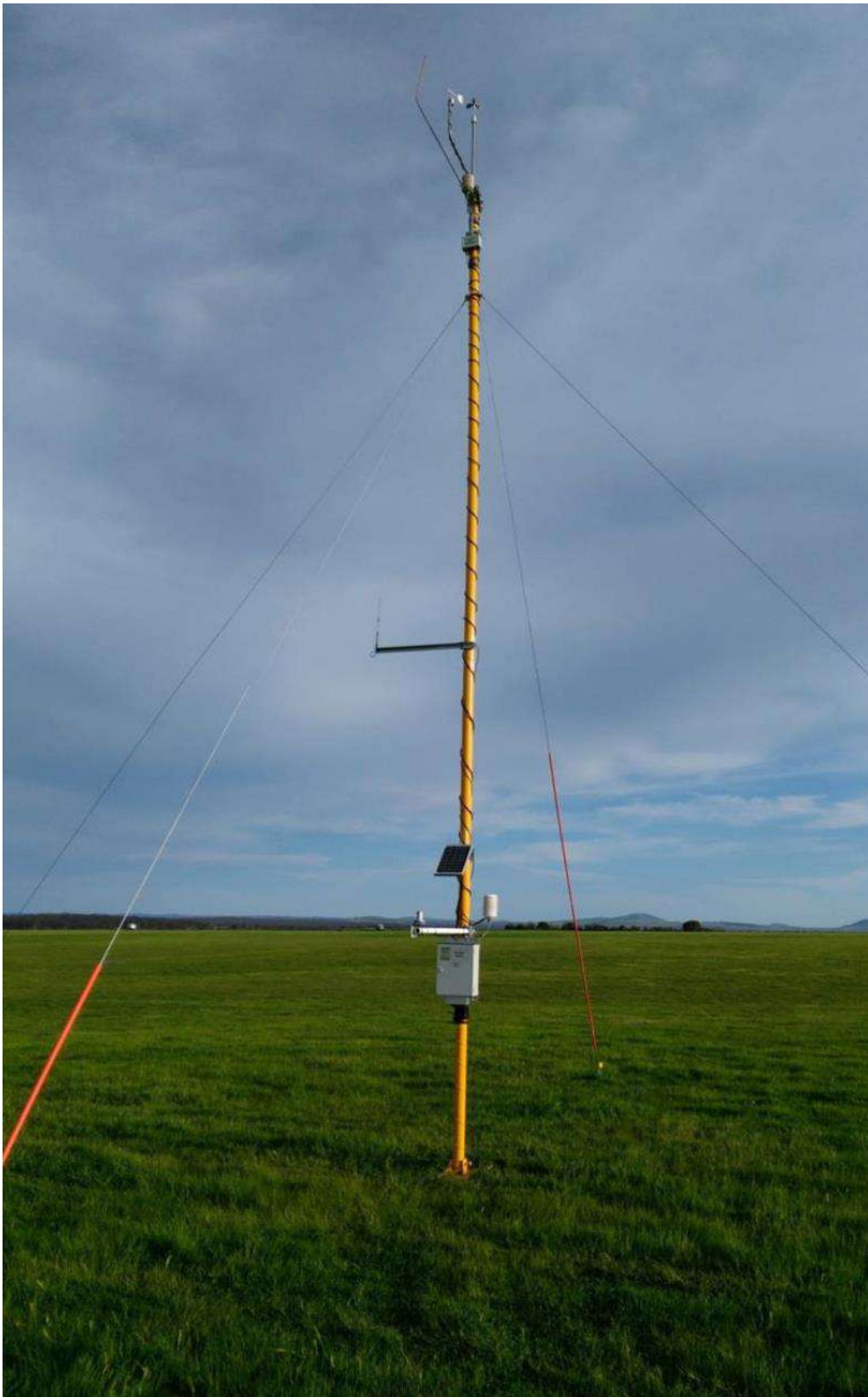


Figure 3 *Moolort Broiler Farm on-site weather station as installed*

4.2 Wind pattern

4.2.1 Long term pattern in wind

The average wind rose for the data period is shown in Figure 4 and it shows the following features:

- The predominant annual average wind direction is from the south-southwest comprising 14% of all incident winds, followed by winds from the south (12%) and the south-southeast (7%).
- The average wind speed is at 4.1 m/s.
- Winds from the east-southeast, southeast, west-southwest and west occur less than 5% of the time for each direction.
- The observed wind speed distribution indicates that the largest proportion of light winds (less than 2 m/s) are from the east (5%) and east-northeast (4%). This indicate poor dispersion conditions dispersion which odour is likely to disburse to the west and west-southwest than other directions.
- Figure 5 presents the annual wind roses between 1 January 2017 and 31 December 2018. The annual average wind speed ranged between 3.9 m/s and 4.2 m/s, and the predominant wind directions (south-southwest, south and south-southeast) were similar between the years.

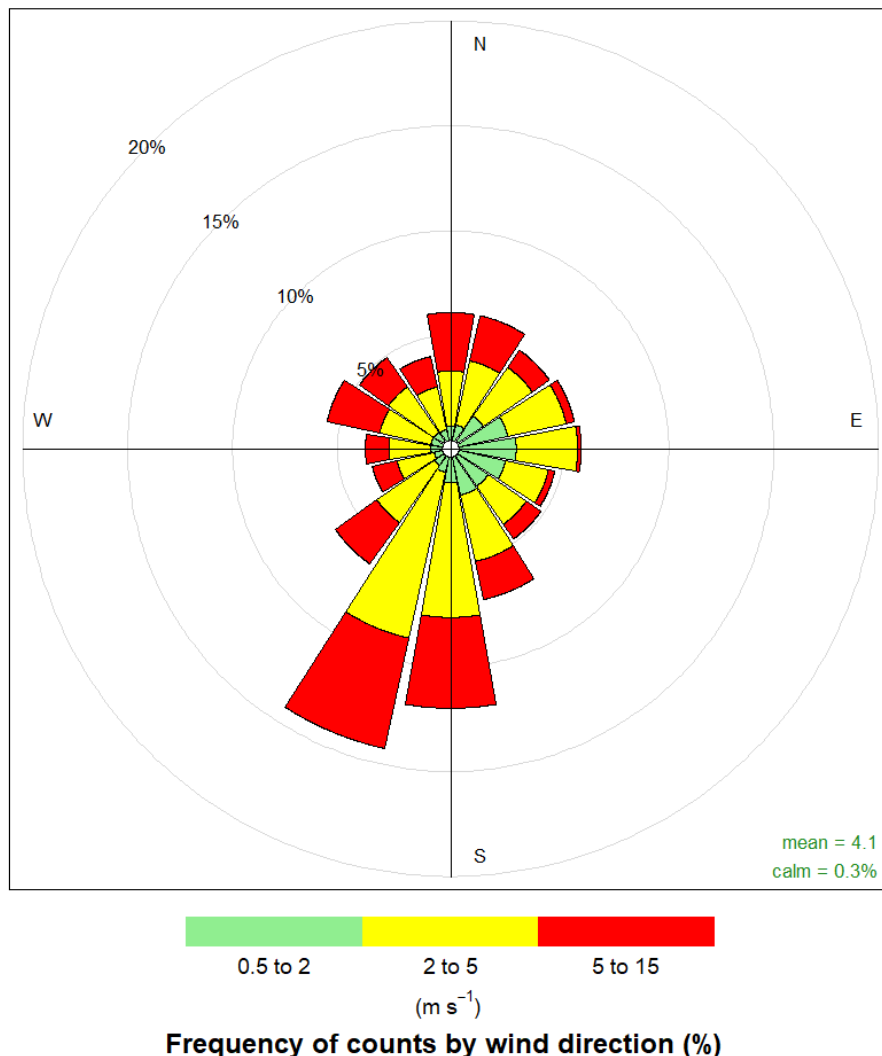


Figure 4 CALMET extracted wind at the site for the period between 1 January 2017 and 31 December 2018

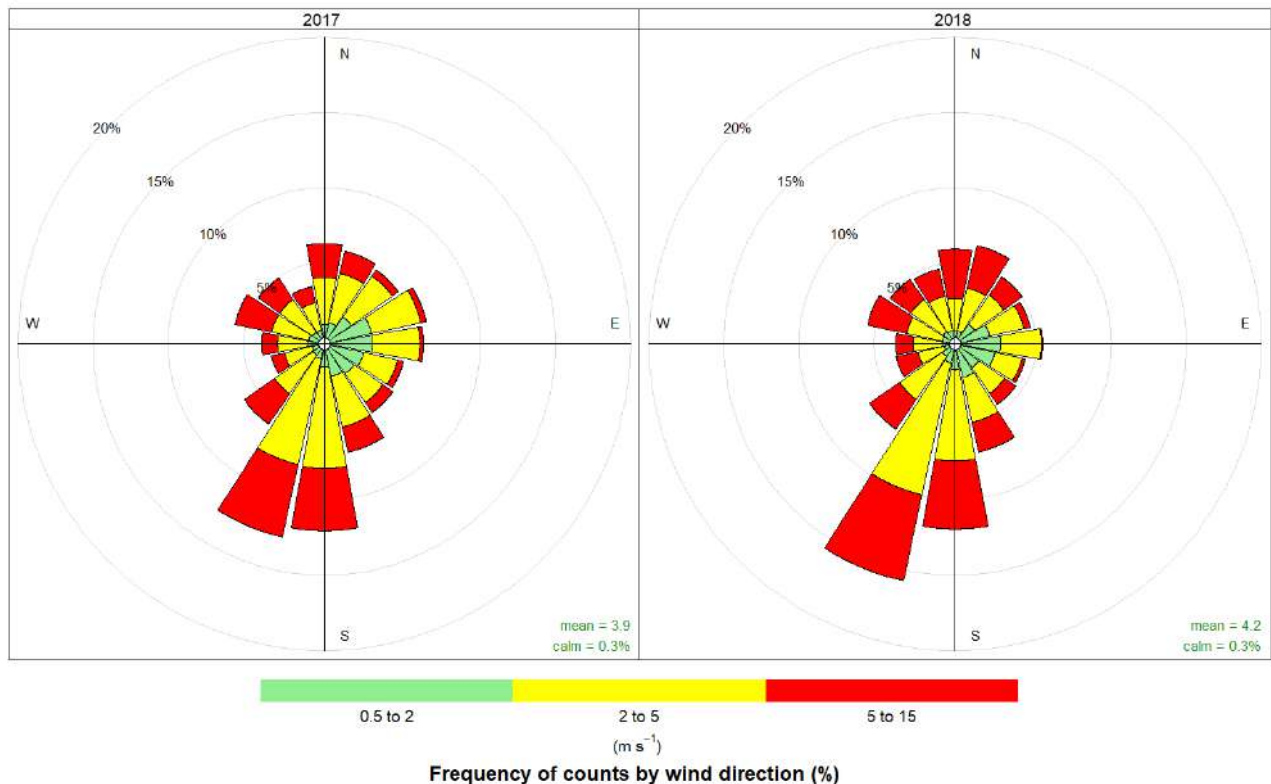
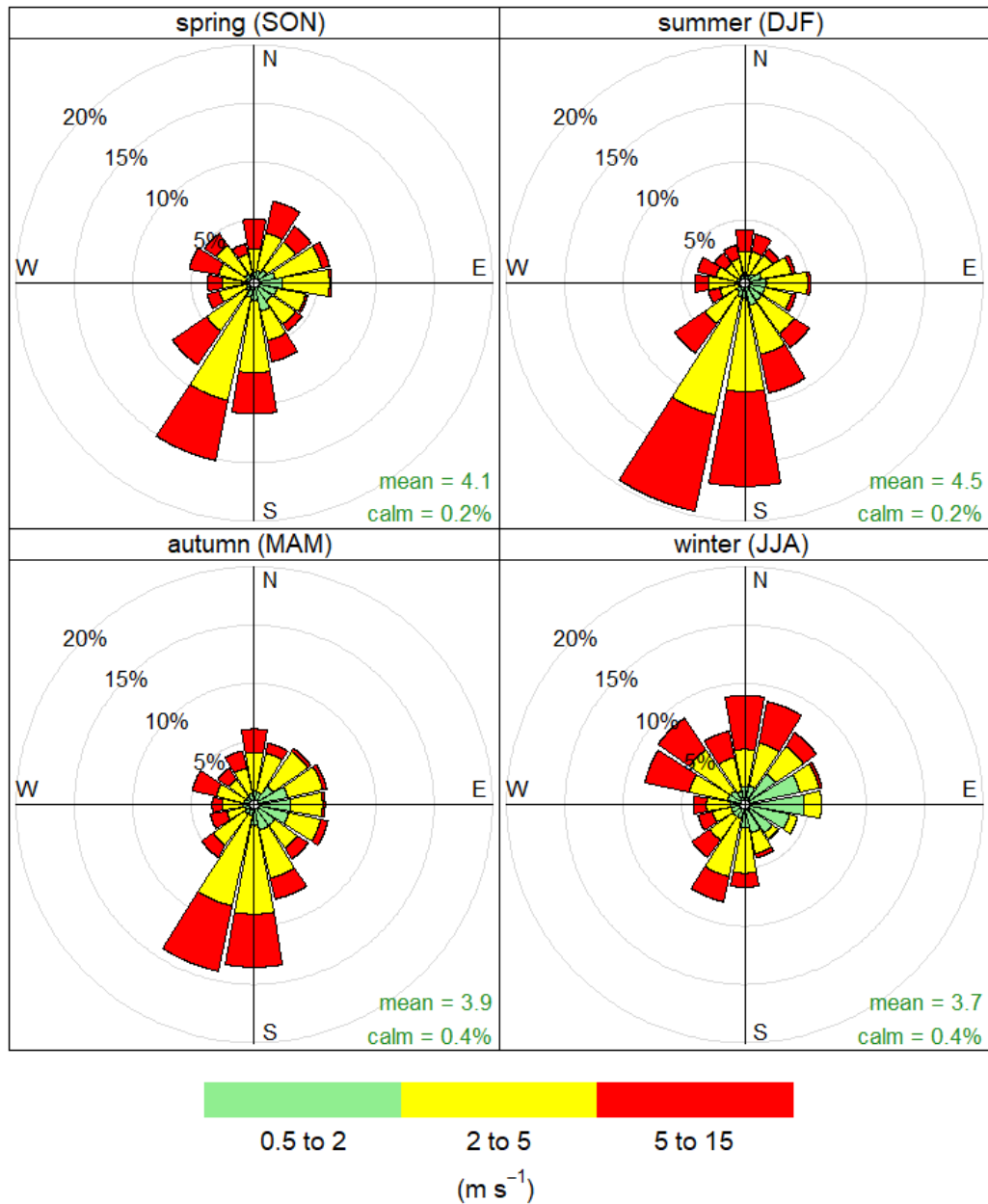


Figure 5 Annual windroses extracted at the site

4.2.2 Seasonal pattern in wind

The seasonal wind roses for the same period are presented in Figure 6 and show that:

- The predominant wind direction in summer is south-southwest occurring approximately 20% of the time, followed by winds from the south (17%).
Light winds (< 2 m/s) occur approximately 11 % of the time.
- The predominant wind direction in winter is north occurring approximately 9% of the time, followed by winds from the north-northeast (8.7%).
Light winds (< 2 m/s) occur approximately 30% of the time.
- The predominant wind direction in spring is south-southwest comprising 15% of all incident winds, followed by winds from the south (10%).
Light winds occur approximately 15% of the time.
- The predominant wind direction in autumn is south-southwest comprising 14% of all incident winds, followed by south (13%).
Light winds (< 2 m/s) occur approximately 20% of the time.
- The incidents of light winds (< 2 m/s) are greatest in winter, followed by autumn.



Frequency of counts by wind direction (%)

Figure 6 Seasonal windroses

4.3 Pattern of atmospheric stability

Atmospheric stability substantially affects the capacity of a pollutant such as gas, particulate matter or odour to disperse into the surrounding atmosphere upon discharge and is a measure of the amount of turbulent energy in the atmosphere.

There are generally six Pasquill – Gifford classes (A – F) used to describe atmospheric stability, and these classes are grouped into three stability categories:

- Unstable (classes A – C)
- Neutral (class D)
- Stable (classes E – F)

Under unstable conditions, dispersions of emissions from near-ground sources are good due to convectively vertical turbulent mixing. Neutral stability (Class D) denotes neutral atmospheric conditions, with stronger winds in moderate temperatures or lighter winds on overcast to partly cloudy days. Classes E and F denote slightly and moderately stable atmospheres when dispersion is poorest, as vertical mixing of air is suppressed.

4.3.1 Atmospheric stability

Figure 7 shows the frequency distribution of stability classes at the site as predicted by CALMET. The figure shows that stable atmospheres (E and F) occur for approximately 42.2%, unstable atmospheres (A, B and C) occur 24.1% and neutral conditions (D) occur 33.7% of the 2017 – 2018 model year.

Worst case pollutant dispersion typically occurs during stability class E and F conditions due to relatively low amounts of turbulence and therefore low levels of pollutant dispersion and mixing with ambient air. Stability class E and F conditions generally occur during calm periods at night and early in the morning.

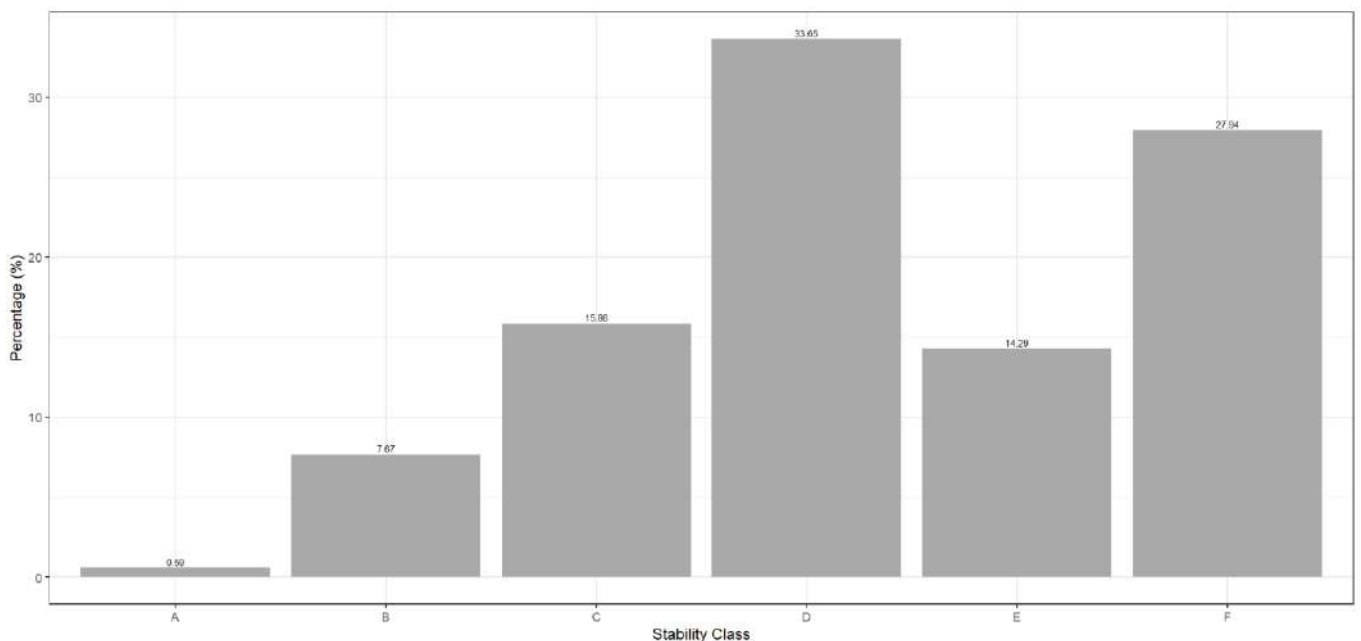


Figure 7 Stability class distribution predicted by CALMET for the site

4.3.2 Mixing height

Mixing height signifies the height above the surface of the earth throughout which a pollutant can be disperse. It is often associated with a sharp increase in temperature with height (inversion), and a sharp decrease in pollutant concentration.

A box plot of CALMET predicted mixing heights for the site is shown in Figure 8. During the night and early morning hours, mixing heights are lower with an average of approximately 100 m (7:00 pm to 7:00 am), which then increase after sunrise to an average of approximately 1,100 m during the day (7:00 am to 7:00 pm).

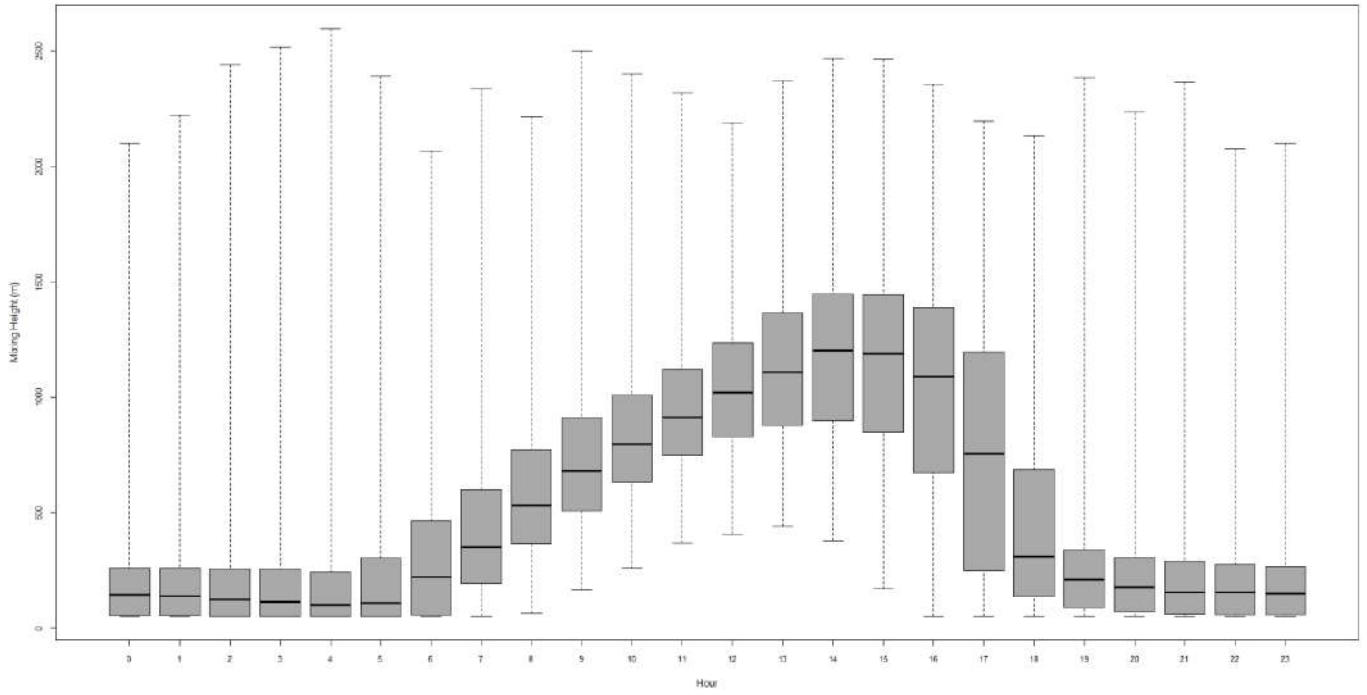


Figure 8 *Mixing heights predicted by CALMET at the site*

5. Odour Dispersion Modelling

As recommended in the EPA Publication 1883, dispersion modelling is one of the Level 3 detailed risk assessment tools which can be used to support the evidence of odour risks of an activity and predict the likelihood of complaint. The purpose of odour dispersion modelling for this assessment is to provide an indication on the potential emission dispersion pattern from the proposed broiler farm and the likelihood of odour exposure for the nearby receptors. Modelling can also show the expected change in emissions for a proposed change or upgrade to a premises (relative modelling to determine how impacts from the existing use will change with the upgraded use).

For this assessment, the dispersion model CALPUFF (v7) was used to simulate the dispersion characteristics of odour generated from the farms at the site. CALPUFF is a non-steady state, Lagrangian Gaussian puff model recommended in AgriFutures Guide 1 for poultry farm assessments.

5.1 CALPUFF configuration

The model parameters and inputs were:

- Three-dimensional wind field from CALMET as described in Appendix A-2
- CALPUFF computational domain size of 18 km x 18 km with 0.3 km spacing, and a sampling grid of 15 km x 15 km with 0.3 km spacing
- CALPUFF model settings were selected based on *The Generic Guidance and Optimum Model Settings for the CALPUFF modelling System 2011* and the recommended settings in Appendix B of AgriFutures Guide 1
- The tunnel ventilation of each shed was modelled as time varying volume source at the end of each shed
- Stub stacks fitted to the duty fans on each shed were modelled as a volume source at height of 6 m above ground

5.2 Odour emission rates

This assessment utilised the K-factor method, also known as the Ormerod and Holmes emissions method (Ormerod and Holmes 2005)¹⁰. This method is one of the odour emission models recommended in AgriFutures Guide 1.

The K-factor emissions method is based on the relationship between the number of birds present, the stocking density of the birds, the ventilation rate and overall farm management. The K-factor method estimates hourly varying odour emission rates (OER) from a poultry farm shed using the following equation:

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

The parameters used for the estimation of odour emissions rates from each shed are summarised in Table 6. The hourly varying bird density (D) and ventilation rate (V) for a year of typical bird growth cycles, approximately five cycles in a year, are shown in Appendix B for all existing and proposed sheds. Based on the parameters in Table 6, the modelled odour emission rate for each shed for a year is shown in Appendix C. To predict the potential worst case odour emissions, it is assumed that the birds are placed at the same time for all sheds.

¹⁰ Ormerod and Holmes 2005. A study referenced in AgriFuture 2021 Guide – 1. However, the title and publisher of this study is not presented in Guide 1.

Table 6 Parameters used in estimating odour emissions rates for each shed

Parameter	Value	Unit	Description
K	1.9	-	A K-factor of 1.9 has been selected (Based on AgriFutures Guide 1)
A	Varies between farms	m ²	Calculated based on shed dimensions presented in Table 2 in Section 3.2.2 of this report.
D	Hourly varying	kg/m ²	Based on the number of birds and weight of each bird in the growth cycle
V	Hourly varying	m ³ /s	The estimated ventilation required for a tunnel ventilated shed is based on bird age, target temperature inside the shed and ventilation profile as a percentage of maximum ventilation provided in Appendix B of AgriFutures Guide 1.

5.3 Modelled results

This section presents the odour dispersion modelling results for this assessment.

The five odour unit (OU) 99.9th percentile 3-minute average of odour modelling results is generally used to assess the predicted downwind odour concentrations during short time worst-case, poor dispersive meteorological conditions. This 99.9th percentile is generally taken as the level that if the odour is obvious and has an offensive character, it may lead to nuisance and resultant complaint.

Table 7 presents the odour impact predicted at the twenty receptors identified in Section 3.3 of this report, showing the 99.9th percentile 3-minute average odour concentrations and the estimated increase in odour impact as a result of bird number increase. The predicted results are also plotted in Figure 9, showing contour plots for the modelled 99.9th percentile 3-minute average odour concentrations from the current and proposed farms, over two years of modelled meteorology.

The German standard VDI 3882/1 'Determination of Odour Intensity' is also presented in Table 6 which shows the link between odour level and perceived intensity (a subjective measure) for poultry odour. Note that the Weber Fechner Law has been used to find the line of best fit of the individual presentations.

Based on the modelling results presented in Table 5 and Figure 9, as well as Table 6 on perceived intensity, the following features of the predicted results are observed:

- From the current and proposed farms, the 99.9th percentile offsite concentrations are predicted to be above the 5 OU 99.9th percentile at receptors R2 – R6, R8, R13, R17 – R18 and R20 (total of ten receptors).
- Among the ten receptors which are predicted to experience offsite concentrations above 5 OU, the increase in odour impact is most prominent at R13, followed by R8.
- Other receptors which are predicted to experience offsite concentrations below 5 OU, the increase in odour impact is most prominent at R10.
- Receptors R1, R16 and R19 are least likely to be affected by the odour from the proposed farm.
- Table 7 shows that for poultry odour, the odour level needs to almost treble before an increase in perceived intensity is registered. This comparatively gradual response to increased odour level is a relevant factor when assessing predicted peak odour levels. Hence this suggests that the increase at all receptors including the largest increase of 4.5 OU at R13 will not be perceived as the factor of increase is below 2.7.

As the 99.9th percentile odour concentrations at R2 – R6, R8, R13, R17 – R18 and R20 (total of ten receptors) are predicted to be above 5 OU, it is important to consider the likelihood of adverse odour impact at the receptors. GHD has undertaken a risk assessment on the identified receptors, presented in Section 5.4.

Table 7 Predicted odour impact at nearby receptors

Receptor	Odour impact from current farms	Odour impact from current and proposed farms	Increase in odour impact as a result of bird number increase (OU)	Factor of increase
	99.9 th percentile, 3-min average (OU)	99.9 th percentile, 3-min average (OU)		(Increase / odour from current farms)
R1	2.0	2.7	0.7	0.4
R2	5.6	7.3	1.7	0.3
R3	5.8	8.4	2.5	0.4
R4	4.3	6.4	2.1	0.5
R5	3.7	6.0	2.3	0.6
R6	3.3	5.4	2.0	0.6
R7	2.1	4.2	2.1	1.0
R8	2.5	6.1	3.6	1.4
R9	1.7	4.5	2.8	1.7
R10	1.6	4.5	2.9	1.8
R11	1.4	3.8	2.4	1.8
R12	0.8	2.1	1.3	1.7
R13	2.9	7.4	4.5	1.6
R14	1.1	2.9	1.8	1.6
R15	1.3	3.0	1.7	1.3
R16	1.3	2.0	0.7	0.5
R17	14.2	17.1	2.9	0.2
R18	8.7	11.4	2.7	0.3
R19	0.8	1.3	0.5	0.7
R20	4.8	7.0	2.2	0.5

Table 8 Perceived Intensity vs Odour Level – Poultry Odour⁽¹⁾

Odour Strength	Intensity Level	Concentration ¹ OU	Ratio between Intensity levels
Extremely Strong	6	144	2.7:1
Very Strong	5	52	
Strong	4	19	
Distinct	3	7.0	
Weak	2	2.5	
Very weak	1	0.92	
Not Perceptible	0	0.34	

¹ WA DEP 2002, "Odour Methodology Guideline", Table 3 Department of Environmental Protection Perth March 2002

⁽¹⁾ WA DEP 2002, "Odour Methodology Guideline", Table 3 Department of Environmental Protection Perth March 2002

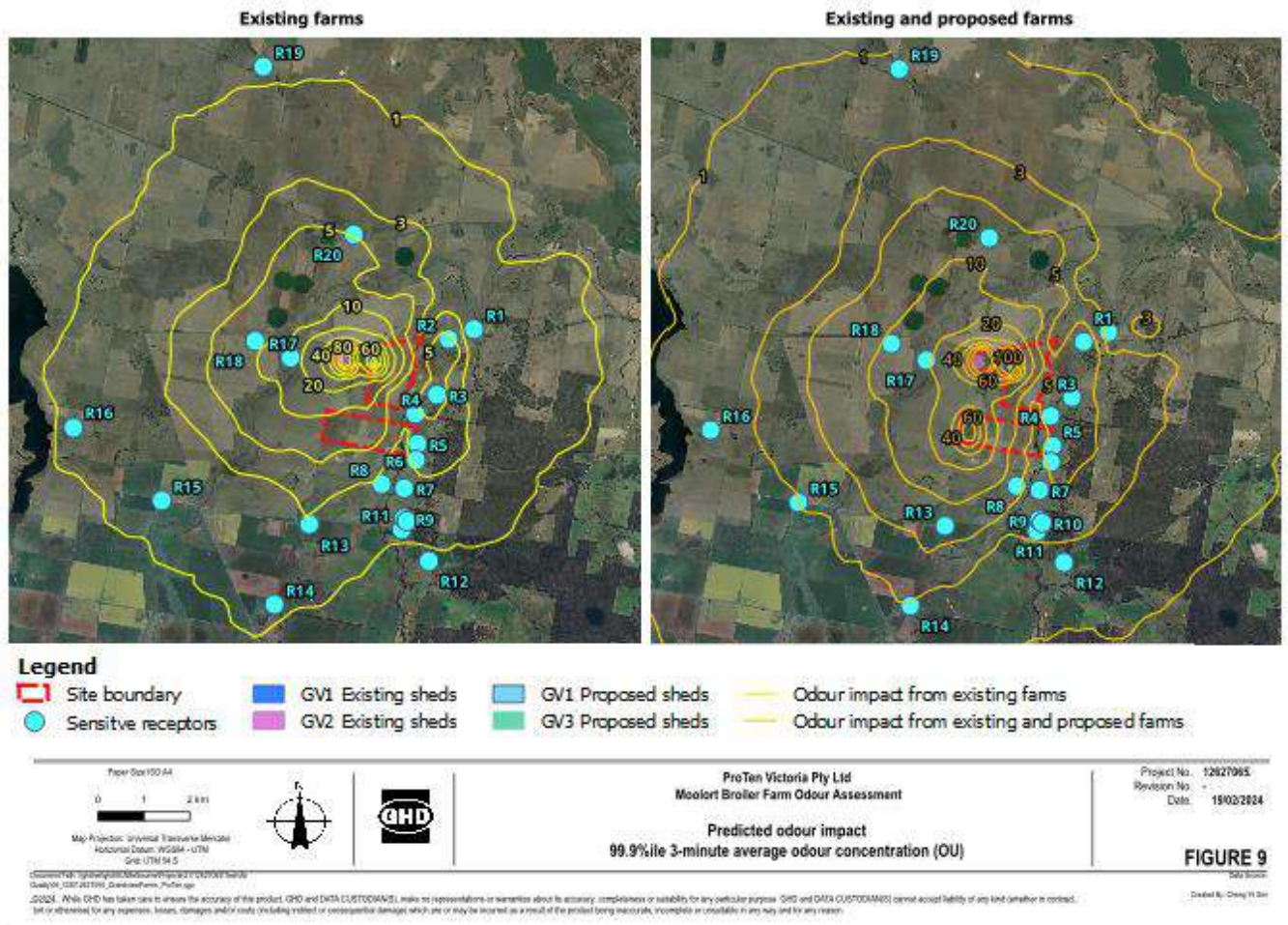


Figure 9 Predicted 99.9th percentile 3-minute average odour concentrations from the current and proposed farms (existing and proposed)

5.4 Risk assessment

As shown in Section 5.2, the predicted 99.9th percentile concentrations at R2, R4 – R8, R11 – R13 (total of nine receptors) are predicted to be above 5 OU. GHD has undertaken a risk assessment to assess the likelihood of adverse impact from the current and proposed farm on the identified receptors.

At the time this assessment was undertaken, there are no established risk assessment for assessing odour impact using predicted results from odour dispersion model. GHD has therefore adopted the assessment for risk of odour exposure presented in Section 6.3 of EPA Publication 1883 – *Risk of Offensive Odour using Area Surveillance Method* to assess the likelihood of the identified receptors in experiencing offensive odour from the poultry farm.

5.4.1 Method

The risk of offensive odour (area surveillance method) assessment outlined in EPA 1883 involves four steps when assessing the likelihood of the receiving environment in experiencing offensive odour. The description of each step, the method used and its application to this assessment are summarised in Table 9.

Table 9 Summary of recommended methods used when undertaking risk of offensive odour assessment

As described in EPA Publication 1883			Application to this assessment
Step	Description	Method	
1	Determining when source odours have been confirmed	This step is to determine if an odour was recognized, there are single or multiple odours and if the odours were obvious or subtle. The odour character is determined using Appendix B of EPA Publication 1883.	Based on Appendix B of EPA Publication 1883, the odour character from the chicken (sheds) is categorised to have an "Unwelcome character". GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9 th percentile 3-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 5 OU.
2	Determining the frequency at which source odours were confirmed for each odour character and its associated offensiveness potential	In EPA Publication 1883, the frequency of odour occurrence is determined from odour surveillance.	GHD determines the frequency of odour occurrence based on the number of hours the 99.9 th percentile 3-minute average maximum odour concentration has exceeded the 5 OU 99.9 th percentile at all identified receptors.
3	Combining odour frequency with odour character and intensity to determine the likelihood of odour exposure at a given point or series of points (for example in a suburb or a block)	This step involves determining the risk of odour exposure by combining odour character, intensity and frequency using Table 11, Table 12 and Table 13 from EPA Publication 1883. These tables are presented in this report as Figure 10, Figure 11, Figure 12, respectively.	As described in method. Note – Typically with odour risk assessments the main concern is obvious recognised odours with a clear source. However, there may be occasions where only subtle odour is occurring or obvious odour is rare (i.e., < 0.5 % of the time), in these cases we can assess the risk of odour exposure using subtle odours as in Table 13.
4	Combining the likelihood of odour exposure with the sensitivity of the receiving environment to determine the overall risk that there will be offensive odour impacts.	This step assesses the land use of the site where odour is observed and the associated beneficial uses. The overall risk of offensive odour is determined using Table 14 and Table 15 from EPA Publication 1883, based on the surrounding land use and the risk of odour exposure outcome determined in Step 3. Table 14 and Table 15 from EPA Publication 1883 are presented here as Figure 13 and Figure 14, respectively as a reference.	Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) groups, which are grouped into three categories. The dwellings surrounding the site boundary are single, isolated dwellings located in a Farming Zone so it can be assumed the receiving environment falls within the agriculture VPP land use term. The receiving environment is therefore classified as low sensitivity.

Negligible exposure	Almost no chance of odour exposure
Low exposure	Odour exposure unlikely
Moderate exposure	Likely chance of odour exposure
High exposure	Highly likely to have odour exposure
Very high exposure	Odour exposure near certain

Figure 10 Risk of odour exposure potential – colour key. This is Table 11 from EPA Publication 1883.

Frequency	Hours per year (indicative)	Obvious odour character		
		unsafe	unwelcome	innocuous
0.5 - 2.0%	< 200	Yellow	Yellow	Green
2.1% - 6.0%	200 to 525.	Orange	Orange	Green
6.1% - 10%	526 to 875	Red	Orange	Yellow
> 10%	(> 875 hrs/yr.)	Red	Red	Yellow

Figure 11 Risk of odour based on character, obvious odour intensity and frequency of predicted odour. This is Table 12 from EPA Publication 1883

Frequency	Hours per year (indicative)	Subtle odour character (Obvious odour is < 2%)		
		unsafe	unwelcome	innocuous
0 - 2.0%	< 200	Blue	Blue	Blue
2.1% - 6.0%	200 to 525.	Green	Blue	Blue
6.1% - 10%	526 to 875	Yellow	Green	Blue
> 10%	(> 875 hrs/yr.)	Orange	Yellow	Green

Figure 12 Risk of odour based on character, subtle odour intensity and frequency of predicted odour. This is Table 13 from EPA Publication 1883

Rating	Likelihood of offensive odour
Very high	Almost certain
High	Highly likely
Moderate	Likely
Low	Unlikely but still possible

Figure 13 Risk of offensive odour key. This is Table 14 from EPA Publication 1883

Risk of odour exposure	Receiving environment sensitivity		
	High	Medium	Low
Very high exposure	Very high	High	Moderate
High exposure	High	High	Moderate
Moderate exposure	High	Moderate	Low
Low exposure	Moderate	Moderate	Low
Negligible exposure	Low	Low	Low

Figure 14 Risk of offensive odour. This is Table 15 from EPA Publication 1883

5.4.2 Risk assessment outcome

The overall risk of offensive odour impact at the identified receptors are derived using the method described in Section 5.4.1. GHD assessed the overall risk of offensive odour impacts as shown below:

- Overall risk of offensive odour impacts from current farms, summarised in Table 10
- Overall risk of offensive odour impacts from current and proposed farms, summarised in Table 11

Based on Table 10, the risk of offensive odour is low at all the identified receptor locations. This means all identified receptors are unlikely to experience offensive odour from the current farms.

Based on Table 11, with the establishment of the proposed farm, the risk of offensive odour is moderate at R17. The risk of offensive odour is low at the other nineteen identified receptor locations. This means receptors R17 west of the site is likely to experience offensive odour from the current and proposed farms, while the other nineteen receptors are unlikely to experience offensive odour from the current and proposed farms.

Table 10 Risk of offensive odour from current farms

Receptor	Land use sensitivity	99.9 th percentile, 3-min average (OU)	Odour intensity ¹	Number of 5 OU exceedance over a year	Frequency (%)	Risk odour exposure potential	Risk of offensive odour
R1	Low	2.0	Subtle	0	0.00	Negligible	Low
R2	Low	5.6	Obvious	10	0.11	Low	Low
R3	Low	5.8	Obvious	13	0.14	Low	Low
R4	Low	4.3	Subtle	6	0.07	Negligible	Low
R5	Low	3.7	Subtle	4	0.05	Negligible	Low
R6	Low	3.3	Subtle	3	0.03	Negligible	Low
R7	Low	2.1	Subtle	2	0.02	Negligible	Low
R8	Low	2.5	Subtle	2	0.02	Negligible	Low
R9	Low	1.7	Subtle	1	0.01	Negligible	Low
R10	Low	1.6	Subtle	1	0.01	Negligible	Low
R11	Low	1.4	Subtle	0	0.00	Negligible	Low
R12	Low	0.8	Subtle	0	0.00	Negligible	Low
R13	Low	2.9	Subtle	0	0.00	Negligible	Low
R14	Low	1.1	Subtle	0	0.00	Negligible	Low
R15	Low	1.3	Subtle	0	0.00	Negligible	Low
R16	Low	1.3	Subtle	0	0.00	Negligible	Low
R17	Low	14.2	Obvious	145	1.65	Moderate	Low
R18	Low	8.7	Obvious	58	0.66	Moderate	Low
R19	Low	0.8	Subtle	0	0.00	Negligible	Low
R20	Low	4.8	Subtle	7	0.08	Negligible	Low

Note:

1. GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile 3-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 5 OU.

Table 11 Risk of offensive odour from current and proposed farms

Receptor	Land use sensitivity	99.9 th percentile, 3-min average (OU)	Odour intensity ¹	Number of 5 OU exceedance over a year	Frequency (%)	Risk odour exposure potential	Risk of offensive odour
R1	Low	2.7	Subtle	1	0.0	Negligible	Low
R2	Low	7.3	Obvious	17	0.2	Low	Low
R3	Low	8.4	Obvious	27	0.3	Moderate	Low
R4	Low	6.4	Obvious	18	0.2	Low	Low
R5	Low	6.0	Obvious	13	0.1	Low	Low
R6	Low	5.4	Obvious	11	0.1	Low	Low
R7	Low	4.2	Subtle	7	0.1	Negligible	Low
R8	Low	6.1	Obvious	12	0.1	Low	Low
R9	Low	4.5	Subtle	7	0.1	Negligible	Low
R10	Low	4.5	Subtle	6	0.1	Negligible	Low
R11	Low	3.8	Subtle	4	0.0	Negligible	Low
R12	Low	2.1	Subtle	1	0.0	Negligible	Low
R13	Low	7.4	Obvious	14	0.2	Low	Low
R14	Low	2.9	Subtle	3	0.0	Negligible	Low
R15	Low	3.0	Subtle	1	0.0	Negligible	Low
R16	Low	2.0	Subtle	0	0.0	Negligible	Low
R17	Low	17.1	Obvious	220	2.5	High	Moderate
R18	Low	11.4	Obvious	115	1.3	Moderate	Low
R19	Low	1.3	Subtle	0	0.0	Negligible	Low
R20	Low	7.0	Obvious	31	0.3	Moderate	Low

Note:

1. GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile 3-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 5 OU.

5.5 Model result summary

The odour modelling results show the following features:

- From the current and proposed farms, the 99.9th percentile offsite concentrations are predicted to be above the 5 OU 99.9th percentile at receptors R2 – R6, R8, R13, R17 – R18 and R20 (total of ten receptors).
- The increase in odour impact, as a result of increase in bird numbers, is most prominent at R13, followed by R8. However, the modelled increases are unlikely to be perceived as the odour level needs to almost treble before an increase in perceived intensity is registered.
- Receptors R1, R16 and R19 are least likely to be affected by the odour from the proposed farm.

Using the odour dispersion modelling results, GHD has undertaken a risk of offensive odour assessment to assess the likelihood of the identified receptors in experiencing offensive odour from the existing and proposed farms. GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile three-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 5 OU. The risk assessment results indicate that:

- All identified receptors are unlikely to experience offensive odour from the current farms.
- When the proposed farm is in place, receptors R17 is likely to experience offensive odour from the current and proposed farms, while the other nineteen receptors are unlikely to experience offensive odour from the current and proposed farms.

6. Model calibration using odour observations

In this section of the report, the odour dispersion model results are spot calibrated using the odour surveillance observations conducted by Air Odour and Compliance (AOC) Specialist – Jim Demetriou. The odour survey results are presented in the report “*Baseline Odour Assessment to Determine the Extent of Odour Plume*”, prepared by AOC Specialist for ProTen (attached as Appendix E).

The aim of this calibration is to compare and identify the likely modelled odour concentrations which could describe the ‘Obvious’ and ‘Subtle’ experienced by the surveyors. The identified odour concentrations for ‘Obvious’ and ‘Subtle’ odour is then used as the level which may lead to nuisance and resultant complaint to undertake another risk assessment with the methodology as described in Section 5.4.1.

6.1 Summary and findings

The odour surveillance was undertaken on four separate days around GV2, prior to first and final pickups, listed as follows:

- **Odour survey 1 – 3** were undertaken on 14 November 2023 prior to first pick.
 - Odour survey 1 undertaken between 10:20 – 11:50.
 - Odour survey 2 undertaken between 13:00 – 13:40
 - Odour survey 3 undertaken between 14:20 – 15:00
- **Odour survey 4 – 5** were undertaken on 15 November 2023 prior to first pick.
 - Odour survey 4 undertaken between 08:15 – 09:00
 - Odour survey 5 undertaken between 10:15 – 11:15
- **Odour survey 6 – 8** were undertaken on 27 November 2023 prior to final pick¹¹.
 - Odour survey 6 undertaken between 10:15 – 11:15
 - Odour survey 7 undertaken between 12:00 – 12:40
 - Odour survey 8 undertaken between 13:30 – 14:40
- **Odour survey 9 – 10** were undertaken on 28 November 2023 prior to final pick.
 - Odour survey 9 undertaken between 07:45 – 08:45
 - Odour survey 10 undertaken between 09:30 – 10:45

Note that GV1 was unoccupied during Odour survey 1 – 5 and housed 1 – 2 day old birds during Odour survey 6 – 10.

The odour surveys were conducted under worst-case operational and meteorological conditions, accounting for temporal fluctuations. These evaluations occurred at various times throughout the day, including early morning, mid-morning, early afternoon, and late afternoon, while considering changes in wind direction and velocity. This approach provides an understanding of odour dispersion across diverse meteorological conditions.

Although no discernible trend was identified, it was observed that the distance covered by the odour plume was at its highest immediately after an increase in the air ventilation rate, typically early to mid-morning. Overall, the distance at which the odour plume travelled remained consistent for both events, ranging from 470-630 m for event 1 and 320-600 m for event 2. The distance has been calculated from the centroid of the shed sources to the outermost red dot (representing obvious odour).

It was notable that there were no cumulative odour effects from Grandview 1. The absence of detectable odour from Grandview 1, coupled with staggered grow cycles, contributes to low odour emissions from one farm when the other is at its peak.

¹¹ Note that 3,892 birds were removed from shed 1 on the 26 November between 14:30 and 15:00.

6.2 Calibration methodology

The odour dispersion model is updated and run based on the following:

- The number and age of birds present at GV2 during the four days when odour surveys were undertaken
- Average temperature, wind speed, wind direction, relative humidity and cloud amount observed on those days

A summary of the above data used to update the odour dispersion model is summarised in Table 12. The updated odour dispersion model results are then compared with the odour survey results to identify odour concentrations for 'Obvious' and 'Subtle' odour.

Table 12 Summary of data used to update odour dispersion model

Odour survey number	GV2 bird		Average temperature	Average wind speed	Average wind direction	Relative humidity	Cloud amount ¹²
	Maximum Age	Number	°C	m/s	°	%	tenths
1 – 2	29	385,350	13	3	203 – 225	66	10
3 – 4			13	2.5	158 – 180	66	10
5			16	2.5	248	57	10
6	42	246,919	17	1.5	180	38	5
7 – 8			25	3.5	225	38	1
9			13	2	203	67	7
10			23	1.5	158	67	7

6.3 Calibrated results

The odour dispersion model, updated with the data presented in Table 12, are plotted with the odour intensities recorded during the odour surveys and are presented in Appendix D. Using figures presented in Appendix D, odour concentration which could be described as 'Obvious' is determined as follows:

- 'Obvious' odour – Identifying the lowest contour areas of odour concentrations where the odour intensity was still observed as obvious.

Table 13 presents the derivation of odour concentrations identified as 'Obvious' odours. It shows that the odour concentration which could describe 'Obvious' odour is 10 OU.

Table 13 Determining odour concentrations which could be described as 'Obvious'

Odour survey	The lowest contour areas of odour concentrations where the odour intensity was still observed as obvious (OU)
1	4
2	5
3	15
4	15
5	9
6	19
7	7
8	7
9	9
10	70 (outlier, excluded from assessment)
Average	10

¹² Based on Bendigo Airport data which is measured in eighths

6.4 Updated risk assessment

As shown in Section 5.3, the predicted 99.9th percentile concentrations at receptors R2 – R6, R8, R13, R17 – R18 and R20 (total of ten receptors) are predicted to be above 5 OU and GHD has undertaken a risk assessment to assess the likelihood of adverse impact from the current and proposed farm on the identified receptors, as shown in Section 5.4.2. In this section of the report, another risk assessment is undertaken using the odour concentrations which could be described as 'Obvious' odour, determined in Section 6.3.

The overall risk of offensive odour impact at the identified receptors are derived using the method described in Section 5.4.1. GHD assessed the overall risk of offensive odour impacts as shown below:

- Overall risk of offensive odour impacts from current farms, summarised in Table 14.
- Overall risk of offensive odour impacts from current and proposed farms, summarised in Table 15.

Based on Table 14, the risk of offensive odour is low at all the identified receptor locations. This means all identified receptors are unlikely to experience offensive odour from the current farms.

Based on Table 15, with the establishment of the proposed farm, the risk of offensive odour is low at all the identified receptors. This means all identified receptors are unlikely to experience offensive odour from the current and proposed farms. Figure 15 presents the risk of offensive odour plot around the current and proposed farm which shows the area of medium and low offensive odour risks.

Table 14 Risk of offensive odour from current farms – Updated assessment

Receptor	Land use sensitivity	99.9 th percentile, 3-min average (OU)	Odour intensity ¹	Number of 10 OU exceedance over a year	Frequency (%)	Risk odour exposure potential	Risk of offensive odour
R1	Low	2.0	Subtle	0	0.00	Negligible	Low
R2	Low	5.6	Subtle	1	0.01	Negligible	Low
R3	Low	5.8	Subtle	1	0.01	Negligible	Low
R4	Low	4.3	Subtle	0	0.00	Negligible	Low
R5	Low	3.7	Subtle	0	0.00	Negligible	Low
R6	Low	3.3	Subtle	0	0.00	Negligible	Low
R7	Low	2.1	Subtle	0	0.00	Negligible	Low
R8	Low	2.5	Subtle	0	0.00	Negligible	Low
R9	Low	1.7	Subtle	0	0.00	Negligible	Low
R10	Low	1.6	Subtle	0	0.00	Negligible	Low
R11	Low	1.4	Subtle	0	0.00	Negligible	Low
R12	Low	0.8	Subtle	0	0.00	Negligible	Low
R13	Low	2.9	Subtle	0	0.00	Negligible	Low
R14	Low	1.1	Subtle	0	0.00	Negligible	Low
R15	Low	1.3	Subtle	0	0.00	Negligible	Low
R16	Low	1.3	Subtle	0	0.00	Negligible	Low
R17	Low	14.2	Obvious	28	0.32	Low	Low
R18	Low	8.7	Subtle	4	0.04	Negligible	Low
R19	Low	0.8	Subtle	0	0.00	Negligible	Low
R20	Low	4.8	Subtle	0	0.00	Negligible	Low

Note:

1. GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile 3-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 10 OU.

Table 15 Risk of offensive odour from current and proposed farms – Updated assessment

Receptor	Land use sensitivity	99.9 th percentile, 3-min average (OU)	Odour intensity ¹	Number of 5 OU exceedance over a year	Frequency (%)	Risk odour exposure potential	Risk of offensive odour
R1	Low	2.7	Subtle	0	0.0	Negligible	Low
R2	Low	7.3	Subtle	4	0.0	Negligible	Low
R3	Low	8.4	Subtle	6	0.1	Negligible	Low
R4	Low	6.4	Subtle	2	0.0	Negligible	Low
R5	Low	6.0	Subtle	2	0.0	Negligible	Low
R6	Low	5.4	Subtle	1	0.0	Negligible	Low
R7	Low	4.2	Subtle	0	0.0	Negligible	Low
R8	Low	6.1	Subtle	2	0.0	Negligible	Low
R9	Low	4.5	Subtle	0	0.0	Negligible	Low
R10	Low	4.5	Subtle	0	0.0	Negligible	Low
R11	Low	3.8	Subtle	0	0.0	Negligible	Low
R12	Low	2.1	Subtle	0	0.0	Negligible	Low
R13	Low	7.4	Subtle	5	0.1	Negligible	Low
R14	Low	2.9	Subtle	0	0.0	Negligible	Low
R15	Low	3.0	Subtle	0	0.0	Negligible	Low
R16	Low	2.0	Subtle	0	0.0	Negligible	Low
R17	Low	17.1	Obvious	58	0.7	Moderate	Low
R18	Low	11.4	Obvious	19	0.2	Low	Low
R19	Low	1.3	Subtle	0	0.0	Negligible	Low
R20	Low	7.0	Subtle	3	0.0	Negligible	Low

Note:

1. GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile 3-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 10 OU.

6.5 Updated risk assessment summary

Using the odour dispersion modelling results presented in Section 5.3 of this report, GHD has undertaken a second risk of offensive odour assessment incorporating the peak odour survey results to assess the likelihood of the identified receptors in experiencing offensive odour from the existing and proposed farms.

GHD has categorised the intensity of odour experienced at each receptor based on the maximum 99.9th percentile three-minute average odour concentration predicted at the receptor. Obvious odours are odour concentrations predicted to be above 10 OU based on the peak odour survey results. The risk assessment results indicate that:

- All identified receptors are unlikely to experience offensive odour from the current farms at the site.
- When the proposed farm is in place, all identified receptors are unlikely to experience offensive odour from the current and proposed farms.

7. Complaint Data Analysis

GHD requested historical complaints from 2018 – 2023 from the Central Goldfield Shire Council and FOIs from EPA Victoria. However, Council received no complaints related to odour for that area during that time, and there was no response from EPA.

The data that was used for this analysis were complaints received by the Central Goldfields Shire Council in 2016 and 2017, Mount Alexander Shire Council in 2016, and EPA in 2016 and 2017.

Between 2016 and 2017, a total of 91 odour complaints were received and alleged the source to be Grandview Poultry PTY LTD. Figure 16 presents a histogram of complaints received over this period, per year. There was a greater number of complaints received in 2016 compared to 2017.

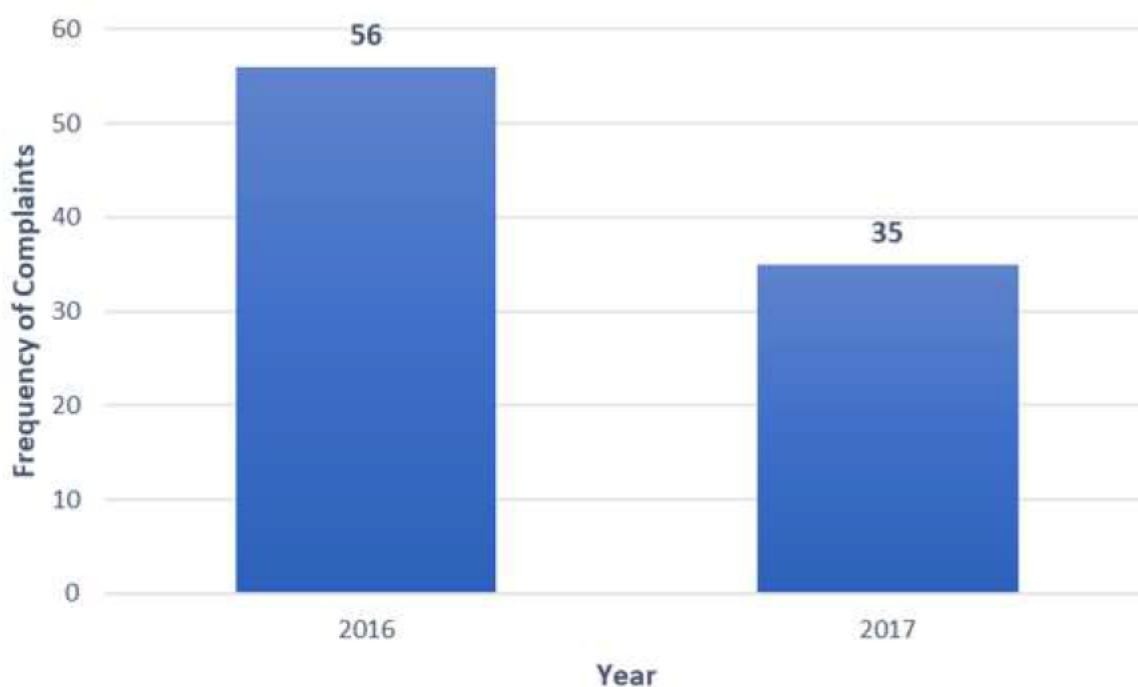


Figure 16 Histogram of complaints received by ProTen in 2016 and 2017

Of the complaints with a pollution reporter address, there were four streets where complaints were made against Grandview Poultry as shown in Table 16. The majority of the complaints were made from Strathlea Road (7) which sits to the east and southeast of the farm, and Clarkes Road (6) to the west and southwest. Figure 17 also shows the complaint locations relative to the level of risk of offensive odour plot.

Table 16 Address and frequency of received complaints

Address	Frequency of complaints	Direction from farm
Clarkes Road	6	W, SW
Rodborough Road	1	N
Strathlea Road	7	E, SE
Hurns Road	2	S



Legend

- Site boundary
- Sensitive receptors
- GV1 Existing sheds
- GV2 Existing sheds
- GV1 Proposed sheds
- GV3 Proposed sheds
- Risk of offensive odour - Low risk
- Risk of offensive odour - Moderate risk
- Number and location of complaints (2016 -2017)

Paper Size ISO A4
 0 1 2 km
 Map Projector: Universal Transverse Mercator
 Horizontal Datum: WGS84 - UTM
 Grid: UTM 54 S



ProTen Victoria Pty Ltd
 Moolort Broiler Farm Odour Assessment

Complaints made against ProTen Poultry Farms

Project No. 12627065
 Revision No. -
 Date. 19/02/2024

FIGURE 18

Source Path: g:\drt\ghd\AL\Moolort\Project\12627065\fig18.mxd
 Quality/6. 02/12/2024, G:\drt\ghd\AL\Moolort\Project\12627065\fig18.mxd

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Data Source:

Created By: Cheng Yi Sim

Figure 17 Number and location of complaints made against the site (2016 – 2017)

7.1 Observations

Based on Figure 17, the following observations were drawn:

- The nearest identified receptors along Strathlea Road are receptors R3 – R6. However, they are not located within the Moderate Risk area. There is also a lack of westerly winds placing these receptors down wind of the farm.
- The nearest identified receptors along Clarkes Road is receptor R13. However, it is not located within the Moderate Risk area. There is also a lack of southerly winds placing these receptors down wind of the farm.
- The nearest identified receptors along Rodborough Road is receptor R17. It is located at the boundary of the Moderate Risk area.
- The nearest identified receptors along Hurns Road are receptor R8 and R9. However, they are not located within the Moderate Risk area. There is also a lack of northerly winds placing these receptors down wind of the farm.
- There have been no complaints from 2018 and onwards provided to GHD.

8. Summary and conclusion

ProTen Victoria Pty Ltd (ProTen) currently operates two farms at 1480 Rodborough Road, Moolort. It is understood that in addition to purchasing Grandview 3 (GV3) site at 141 Clarkes Road, Strathlea, ProTen intends to build additional sheds and change the number of permitted bird numbers at the new site and to the existing Grandview 1 farm at 1480 Rodborough Road, Moolort, which are located north of the proposed GV3. To support the proposed expansion, ProTen has requested an Odour Environmental Risk Assessment (OERA) to be undertaken to assess the resultant odour impacts on the surrounding areas.

This report presents the OERA undertaken in accordance with EPA Publication 1883 – *Guidance for assessing odour* and AgriFutures – *Planning and environment guideline for establishing meat chicken farms: Guide 1 – Assessment guide* for the proposed expansion of the existing broiler farm at 1480 Rodborough Road, Moolort and 141 Clarkes Road, Strathlea, to understand odour risks associated with proposed operations.

Odour dispersion modelling results

The odour impact from the proposed expansion of the current farms was assessed using CALPUFF model. The predicted 99.9th percentile 3-minute average of off-site odour concentrations over two years of modelled meteorology were assessed against the five odour unit (OU) level to understand the predicted downwind odour concentrations during short time worst-case, poor dispersive meteorological conditions. The five odour unit is generally taken as the level that if the odour is obvious and has an offensive character, it may lead to nuisance and resultant complaint.

The 99.9th percentile offsite concentrations are predicted to be above the 5 OU 99.9th percentile at receptors R2 – R6, R8, R13, R17 – R18 and R20 (total of ten receptors). The increase in odour impact, as a result of increase in bird numbers, is most prominent at R13, followed by R8. However, the modelled increases are unlikely to be perceived as the odour level needs to almost treble before an increase in perceived intensity is registered. Receptors R1, R16 and R19 are least likely to be affected by the odour from the proposed farm.

Risk of offensive odour assessment

GHD calibrated the odour dispersion model and compared the modelled results with odour survey observations, GHD identified the likely modelled odour concentrations which could describe the 'Obvious' odour experienced by the surveyors to be 10 OU. The identified odour concentrations for 'Obvious' odour is then used as the level which may lead to nuisance and resultant complaint to update the risk assessment with the methodology. The updated risk assessment results indicate that the risk of offensive odour is low at all identified receptor locations.

Complaint Analysis

GHD requested complaint history between 2019 – 2023 from the Central Goldfield Shire Council and EPA Victoria. However, Council received no complaints related to odour for that area during that time, and there was no response from EPA. The data that was used for this analysis were complaints received by the Central Goldfields Shire Council in 2016 and 2017, Mount Alexander Shire Council in 2016, and EPA in 2016 and 2017.

The majority of the complaints were made from Strathlea Road which sits to the east and southeast of the farm, and Clarkes Road to the west and southwest.

Comparing complaint history and Risk of offensive odour assessment, the identified receptors along Rodborough Road is receptor R17 is located at the boundary of the Moderate Risk area. Other complaints from Clarkes Road, Strathlea Road and Hurns Road are not supported by the odour surveillance, modelling or local wind patterns.

Conclusion

For the proposed additional farm, the risk assessment indicates that odour from the proposed expansion is low at all identified receptor locations.

Based on the odour surveillance and odour modelling results the proposed third farm is considered to not adversely impact the surrounding areas and be acceptable with regards to odour impacts.

Appendices

Appendix A

TAPM and CALMET setup

A-1 TAPM

The Air Pollution Model (TAPM) Version 4 is a prognostic model developed in Australia by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The TAPM prognostic model was run to obtain a three-dimensional meteorological gridded dataset for the site for the modelled period between 1 January 2017 and 31 December 2018 (two years).

The configuration of the TAPM model was in accordance with the guidance outlined in EPA Publication 1550 and is presented in Table A.1. The setup is also consistent with the TAPM setup prepared for the assessment undertaken in July 2017.

Table A.1 TAPM model setup

Parameter	Value
Modelled Period	27 December 2016 – 01 January 2019 (Spin up days of 5 days before the selected period)
Domain centre	UTM 54S Easting – 761,398 m UTM 54S Northing – 5,889,059 m Latitude – 37° -6.5' S Longitude – 143° 56.5' E
Number of vertical levels	35
Number of Easting Grid Points	50
Number of Northing Grid Points	50
Outer Grid Spacing	25,000 m x 25,000 m
Number of Grid Levels	5
Grid Level Horizontal Resolution	Level 2 – 10,000 m Level 3 – 3,000 m Level 4 – 1,000 m Level 5 – 300 m
Local met assimilation	None
Surface vegetation database	Default TAPM V4 database at 3-minute grid spacing – Australian vegetation soil type data provided by CSIRO Wildlife and Ecology
Terrain database	Default TAPM V4 database at 9-second grid spacing – Australian terrain height data from Geoscience Australia

A-2 CALMET

CALMET is a meteorological model that develops hourly winds and other meteorological fields on a three-dimensional gridded domain as required as inputs to CALPUFF dispersion model. Associated two-dimensional fields such as surface characteristics and dispersion properties are also included. The interpolated wind field is then modified within the model to account for the influence of topography, sea breezes, as well as differential heating and surface roughness associated with different land uses across modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final hourly varying wind field thus reflects the influences of local topography and land uses.

Upon completion of TAPM modelling, a CALMET simulation was set up to run for the model period (1 January 2017 – 31 December 2019), combining the three-dimensional gridded data output from the TAPM model and site-specific surface data. Local topography and land use information were used in CALMET to refine the wind field predetermined by TAPM output. This approach is consistent with the New South Wales (NSW) Approved Methods 2022¹³. The CALMET model domain of 21 km x 21 km is selected to include the influence of the Great Dividing Range and EPA Rosedale South monitoring station as surface station data.

CALMET was run using the “Hybrid” mode (NOOBS = 1) with the Grid 4 TAPM data (Grid resolution of 1 km) as initial guess field. All model settings (except TERRAD, Kinematic effects and O’Brien adjustment for vertical smoothing) were selected based on the guidance document, Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System¹⁴ (Generic Guidance) referenced in the NSW Approved Method 2022, for “Hybrid” mode. The CALMET model parameters selected for this assessment are summarised in Table A.2. Terrain and land use data for the CALMET modelling are presented in Figure A.1 and Figure A.2, respectively.

Table A.2 Summary of CALMET model parameters

Parameters	Value
Modelled period	01 January 2017 – 31 December 2018
Mode	Hybrid (NOOBS = 1)
UTM Zone	54
Domain Origin	Easting: 761.777 km Northing: 5,887.787 km
Domain size	60 X 60 at 0.3 km resolution (18 km x 18 km)
Number of vertical levels	12
Vertical levels (m)	20, 40, 60, 90, 120, 180, 250, 500, 1000, 2000, 3000
TERRAD	6 km.
Kinematics effects (IKINE)	1 (ON) A better representation of the vertical velocity was required by setting IKINE = 1 to maintain mass consistency and to more accurately represent the situations of “plume diversion” around elevated terrain.
Other CALMET settings	Slope flow effects (ISLOPE) = On Froude Adjustment (IFRADJ) = On Vertical velocity adjustment (IOBR) = On
R1, R2, RMAX1, RMAX2	R1 – 5km RMAX1 – 4km R2 and RMAX2 – 5 km (Kept consistent with 2017 assessment. No Upper air station included in assessment)
Initial guess field	TAPM.m3d file derived from Grid 4 (1 km spacing, 50 X 50 Grid points)

¹³ New South Wales Environment Protection Authority – Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, August 2022.

¹⁴ Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the “Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia”, March 2011.

Parameters	Value
Surface station data	1480 Rodborough Road, Moolort, onsite surface station data. Easting: 761.777 km Northing: 5,887.787 km Cloud, relative humidity and surface pressure data for the surface station data file are extracted from TAPM.
Upper air data	No site-specific upper air data was used (up.dat). Upper air data is included within the TAPM .m3d initial guess field.
Land use data	The land use data for the modelling domain was derived from the Global Land Cover Characterization Version 2 for Australia Pacific, with a resolution of approximately 1 km. Land use data code: 20 – Agricultural Land 30 – Rangeland 40 – Forrest Land 51 – Streams and canals
Terrain data	The terrain data was extracted from 1 arc-second (~30 m) spaced elevation data obtained via NASA's Shuttle Topography Radar Missions (STRM1 – Version 3).

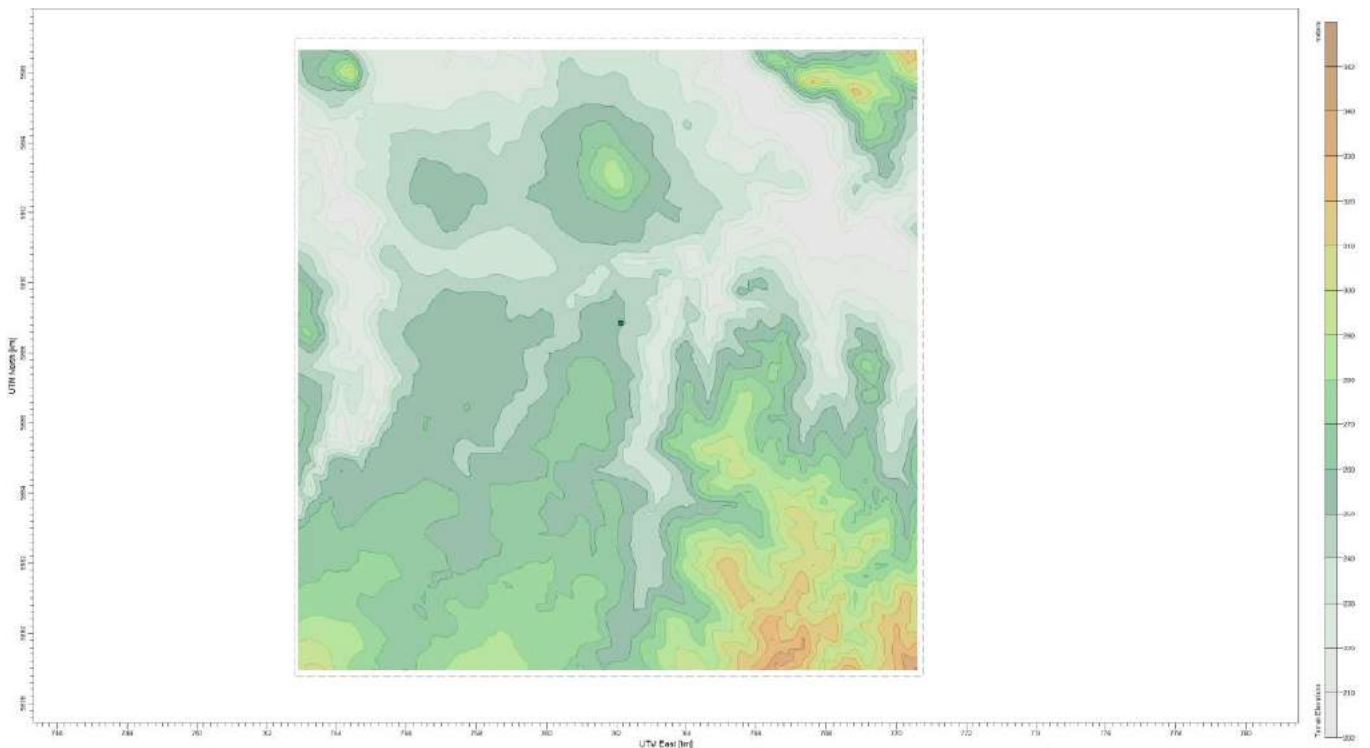


Figure A.1 Terrain data used for CALMET modelling (18 km X 18 km, centred at the site). Square marker indicates location of the weather station.

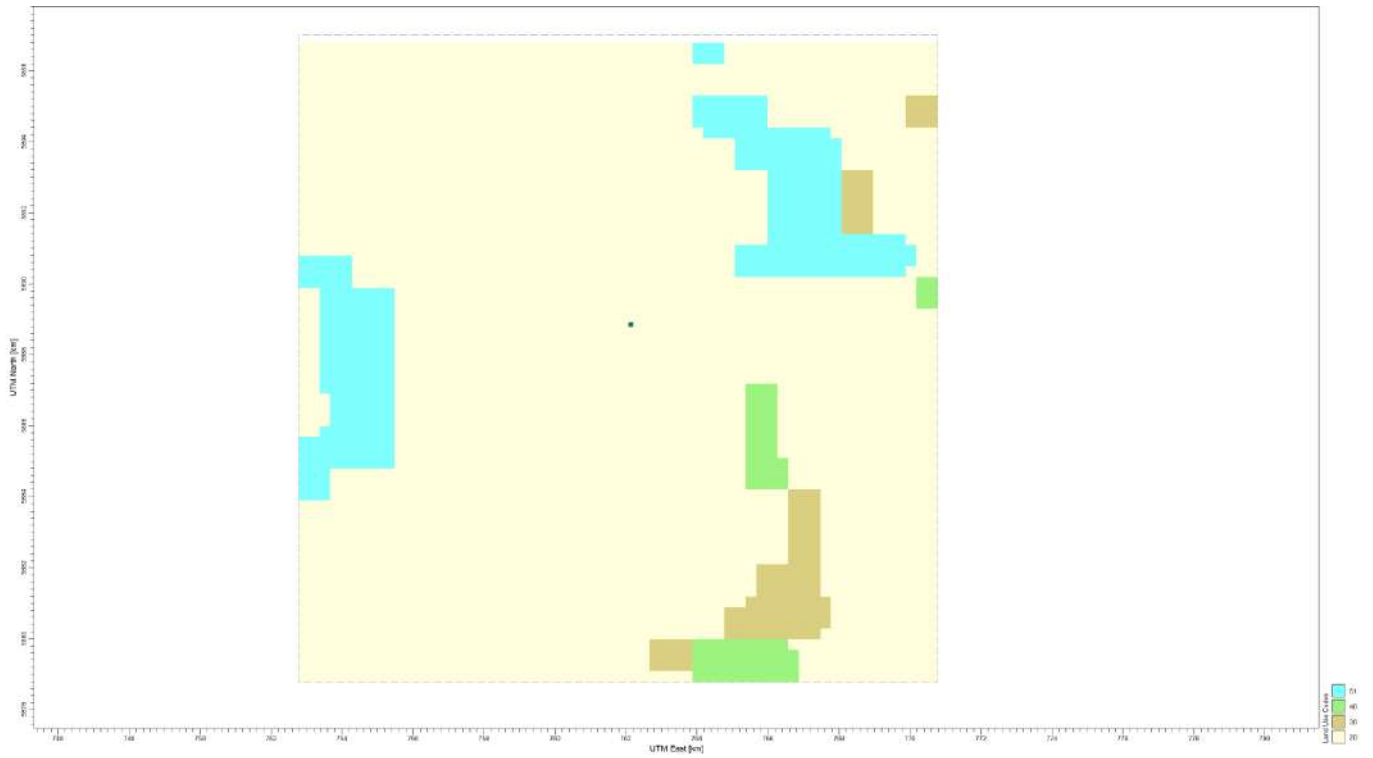


Figure A.2 Land use data for CALMET (18 km X 18 km, centred at the site). Square marker indicates location of the surface station (onsite weather station)

A-3 Model validation

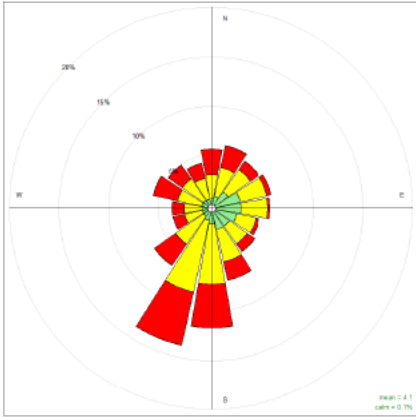
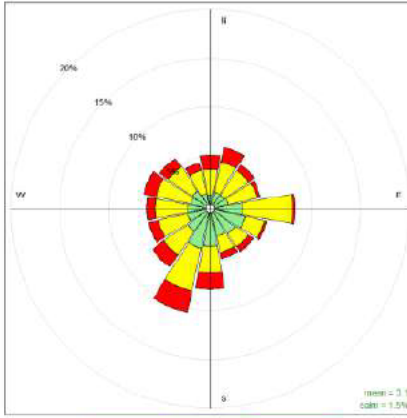
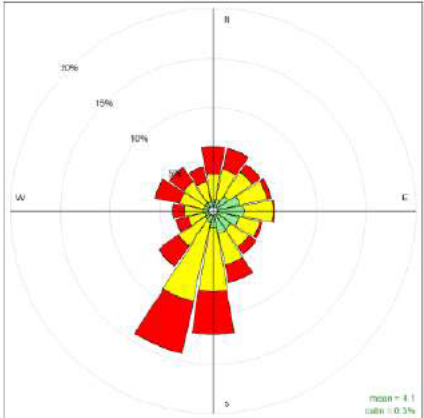
TAPM and CALMET simulated winds at EPA Rosedale South station are provided below to assess the validity of using TAPM as 'first-guess' wind field for CALMET, and validity of CALMET simulated winds at the site.

For the simulated meteorological year (1 January 2017 and 31 December 2018), the following is observed:

- Overall, TAPM simulated winds captured the winds along the La Trobe Valley and coastal influence from the east. However, it underpredicts wind speeds and overpredicted calm winds.

TAPM predicted predominant winds from south-southwest and south, however, it underpredicts the overall wind speeds. TAPM was considered acceptable to be used as the 'first-guess' wind field for CALMET 'Hybrid' mode run. The CALMET simulated wind extracted at the site weather station produces very similar wind patterns, wind speed and calms when compared to the winds observed at the weather station.

Table A.2 Extracted TAPM and CALMET winds at the onsite weather station (2017 – 2018)

Onsite weather station (2017 – 2018)	TAPM extracted	CALMET extracted
 <p data-bbox="263 1153 512 1205">Frequency of counts by wind direction (%)</p> <p data-bbox="172 1245 344 1305">Mean = 4.1 m/s Calm = 0.1%</p>	 <p data-bbox="703 1153 968 1205">Frequency of counts by wind direction (%)</p> <p data-bbox="624 1245 796 1305">Mean = 3.1 m/s Calm = 1.5%</p>	 <p data-bbox="1155 1153 1420 1205">Frequency of counts by wind direction (%)</p> <p data-bbox="1075 1245 1248 1305">Mean = 4.1 m/s Calm = 0.3%</p>

A-4 Onsite weather station data (2017 – 2018)

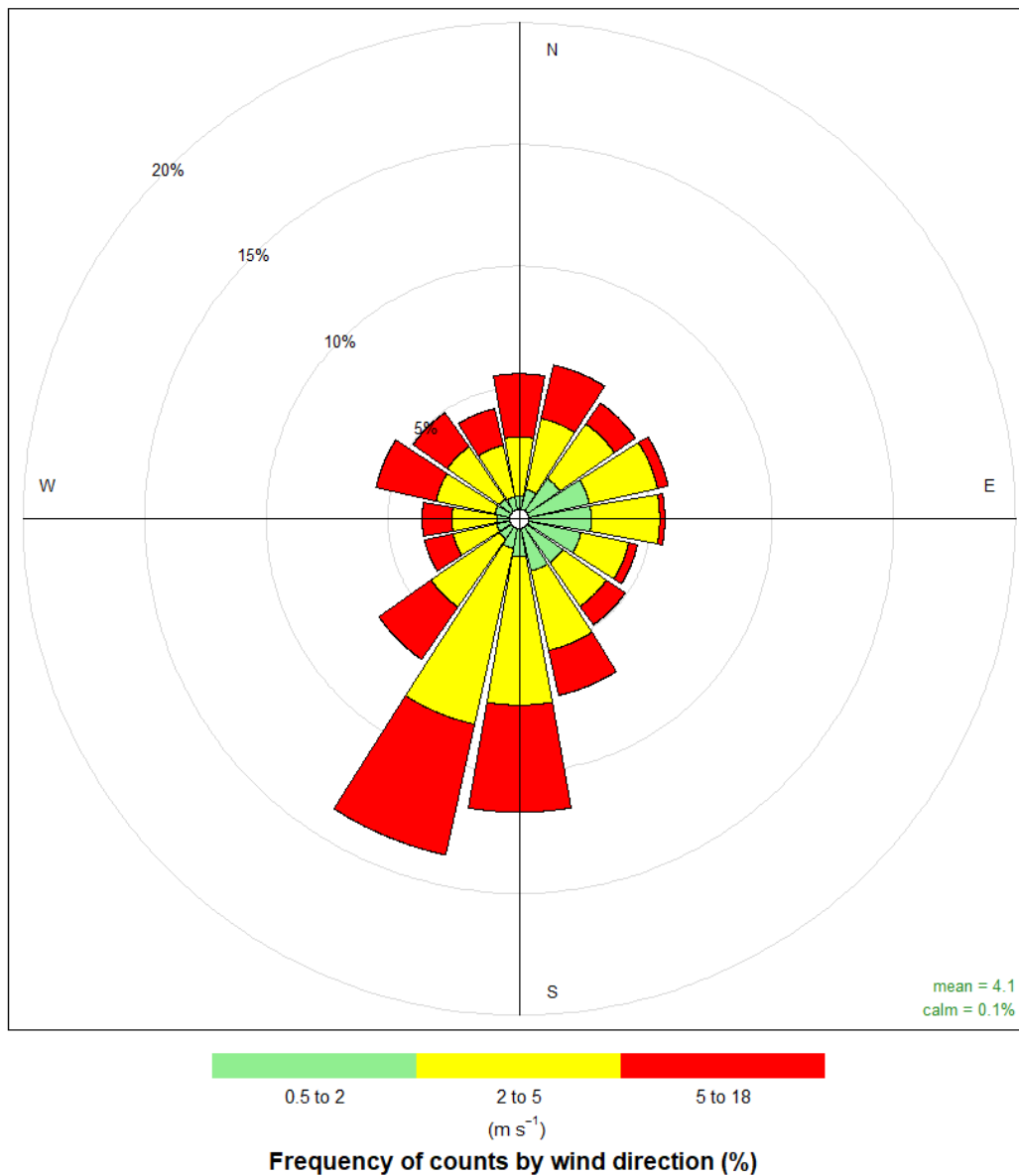


Figure A.3 Annual Windroses from onsite weather station, between 2017 and 2018

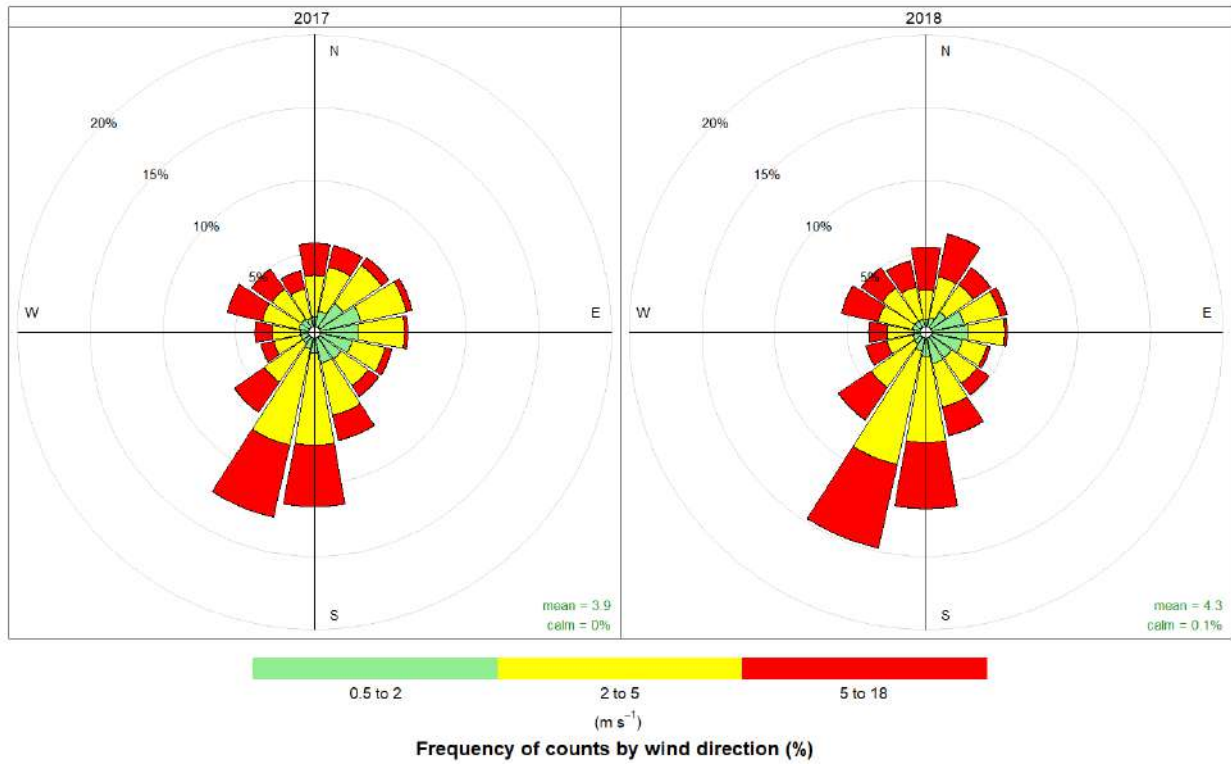


Figure A.4 Annual windroses onsite weather station

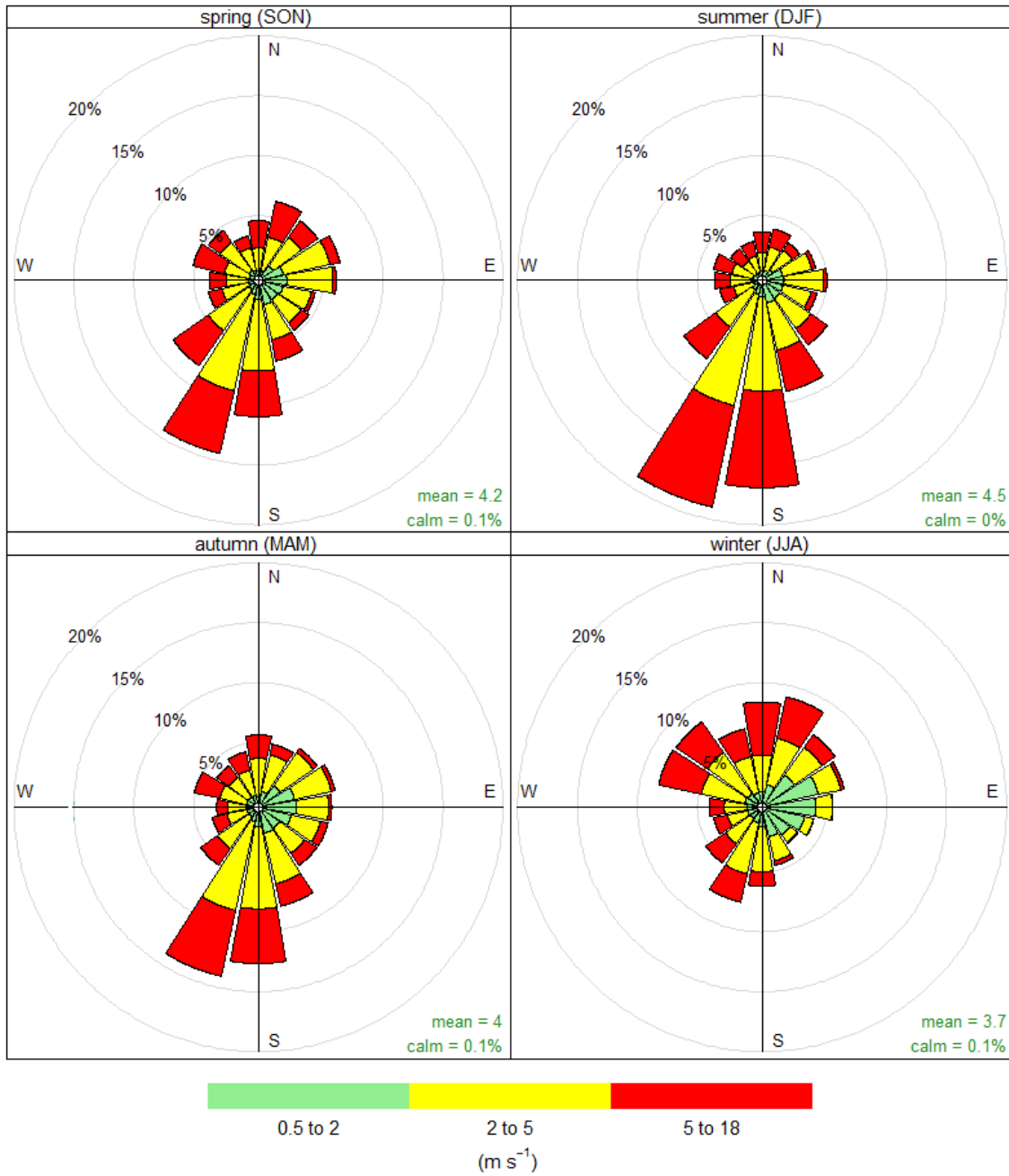


Figure A.5 Seasonal windroses at onsite weather station

Appendix B

Hourly varying bird density (D) and ventilation rate (V) for a year of typical bird growth cycles

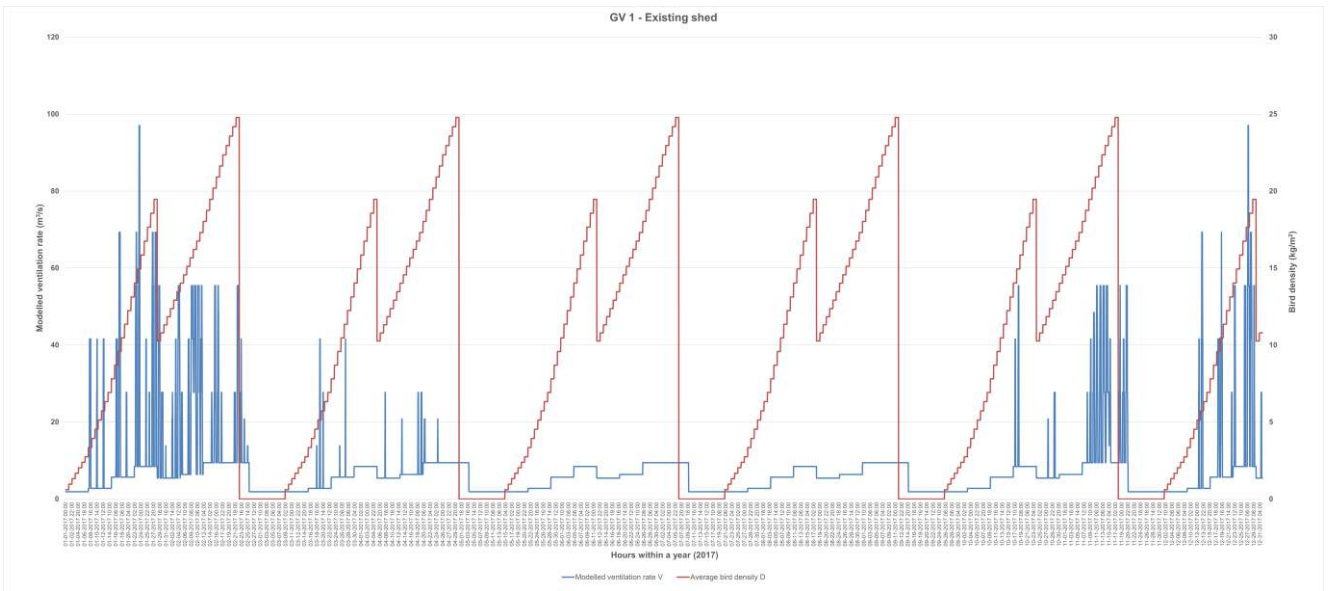


Figure B.1 GV1 – Existing shed

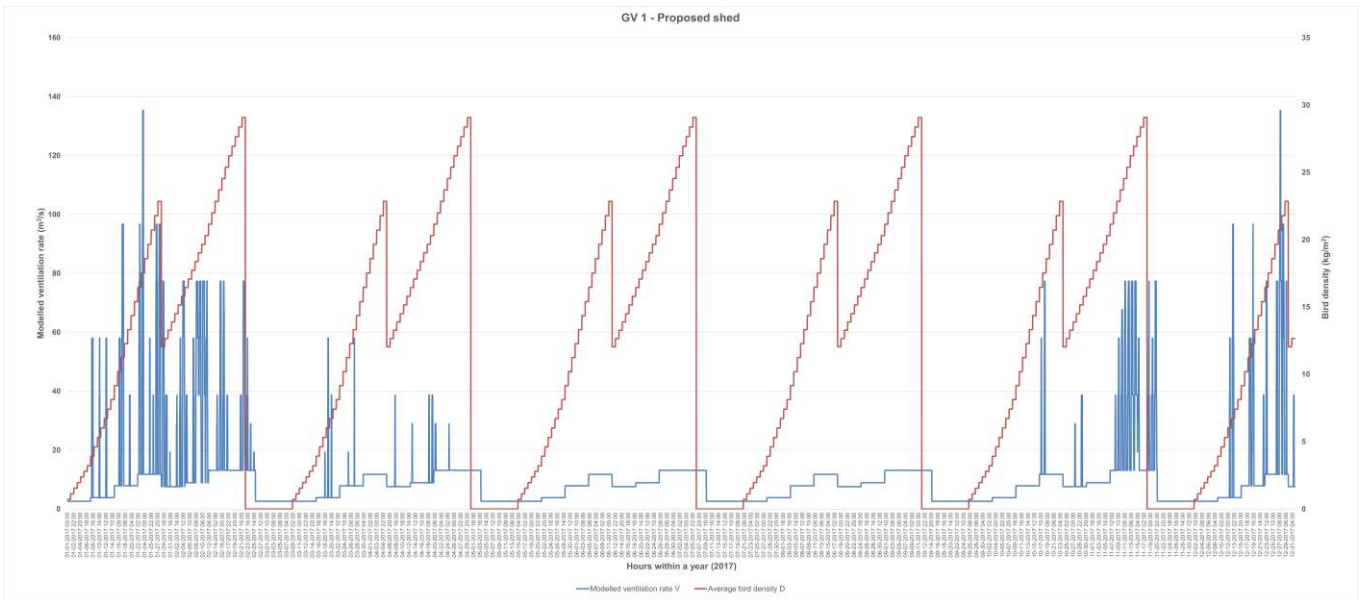


Figure B.2 GV1 – Proposed shed

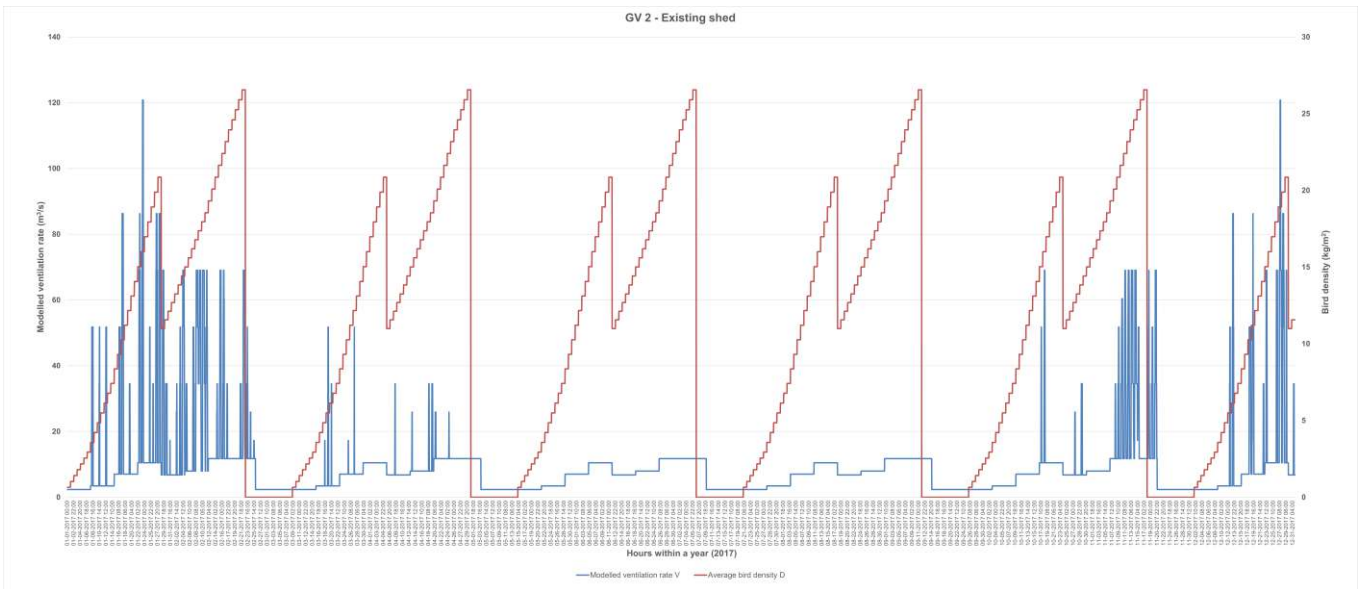


Figure B.3 GV2 – Existing shed

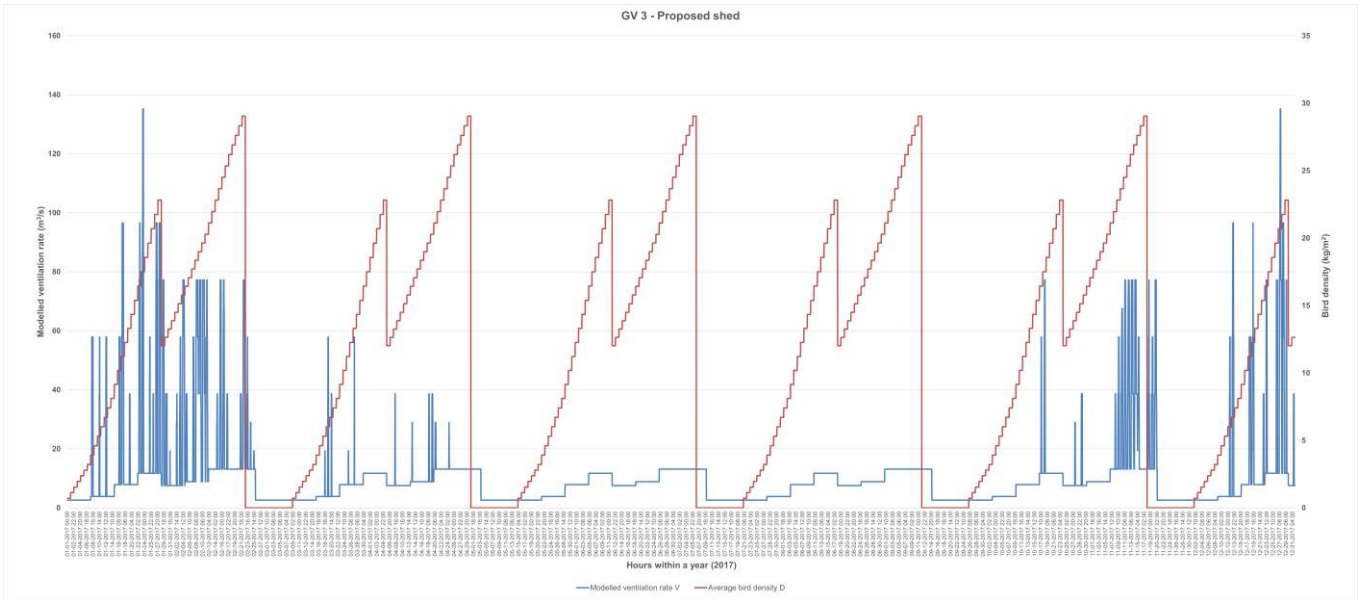


Figure B.4 GV3 – Proposed shed

Appendix C

**Modelled odour emission rates
throughout a year**

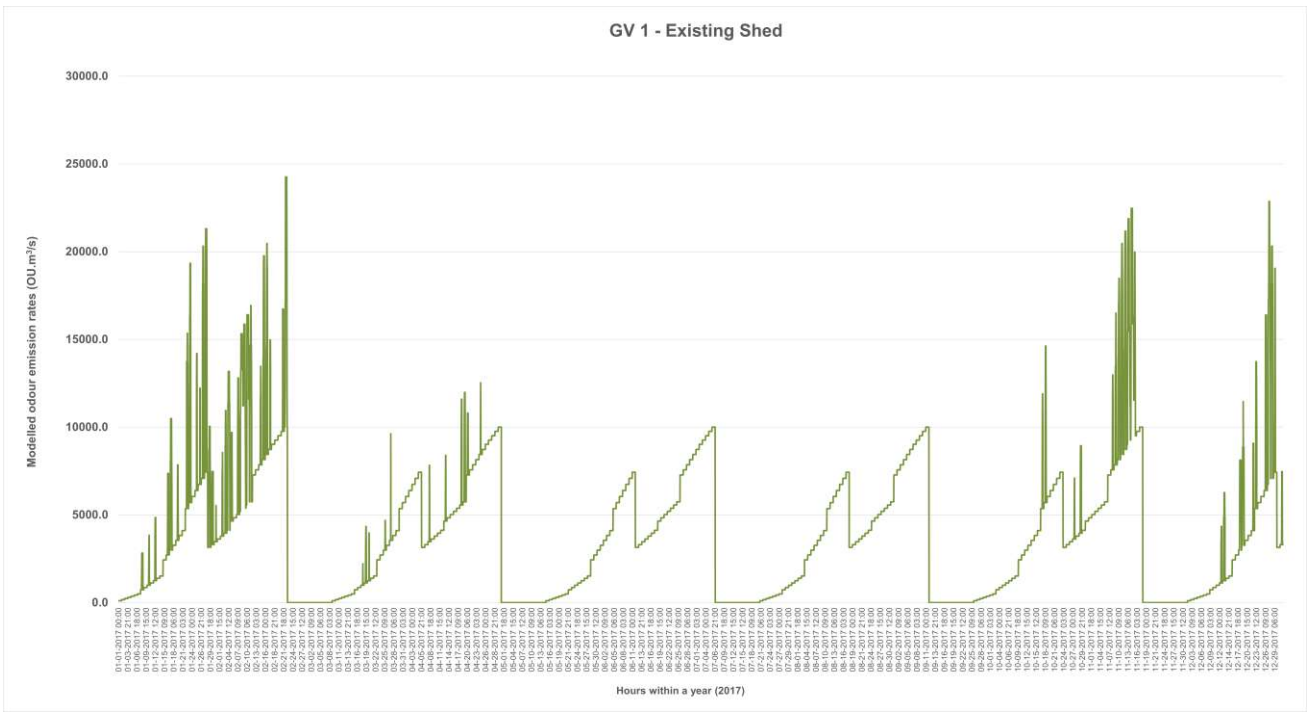


Figure C.1 GV1 – Existing shed

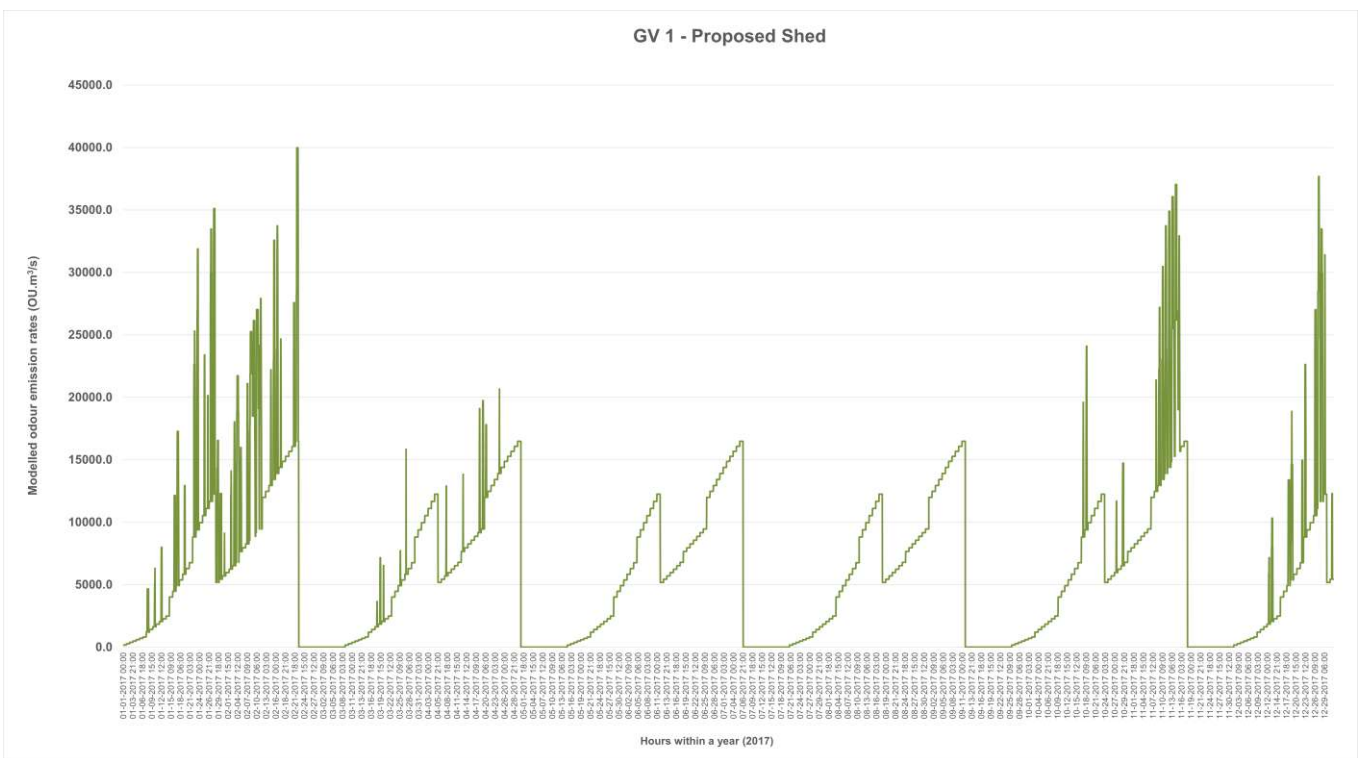


Figure C.2 GV1 – Proposed shed

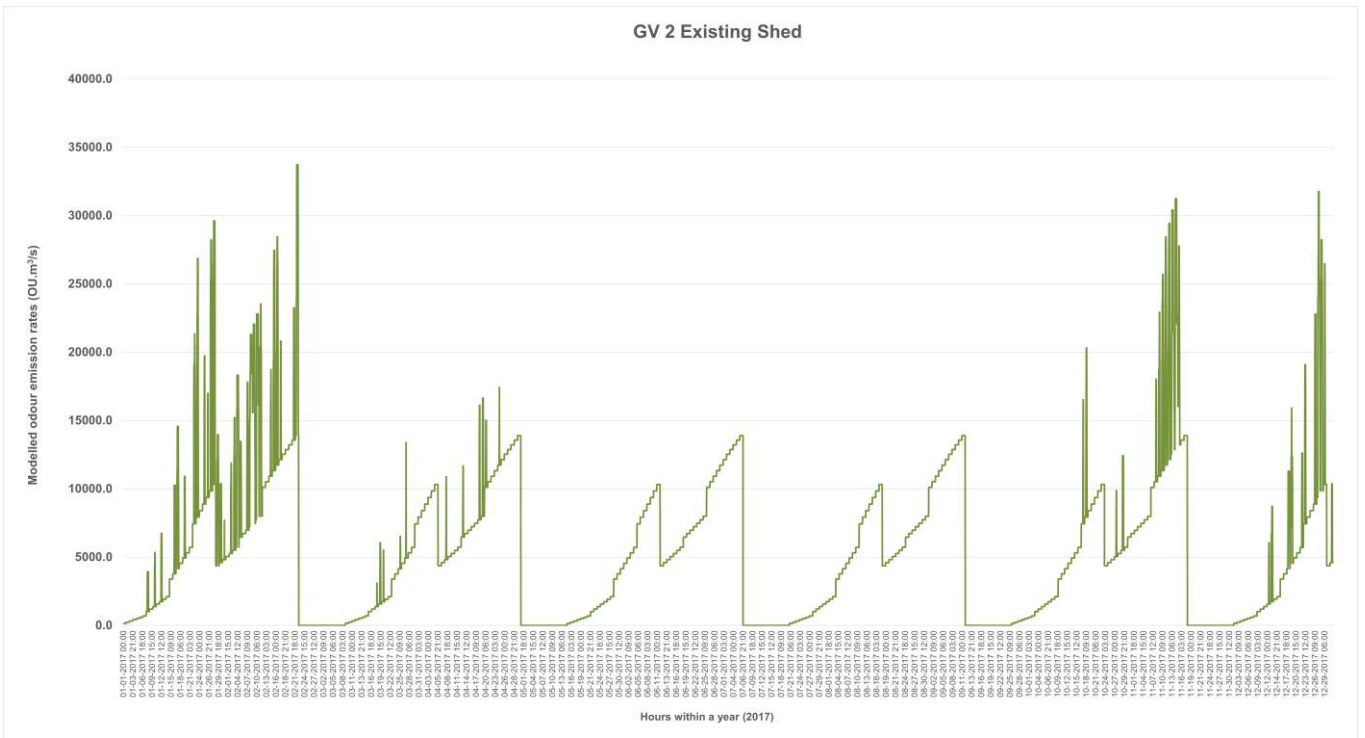


Figure C.3 GV2 – Existing shed

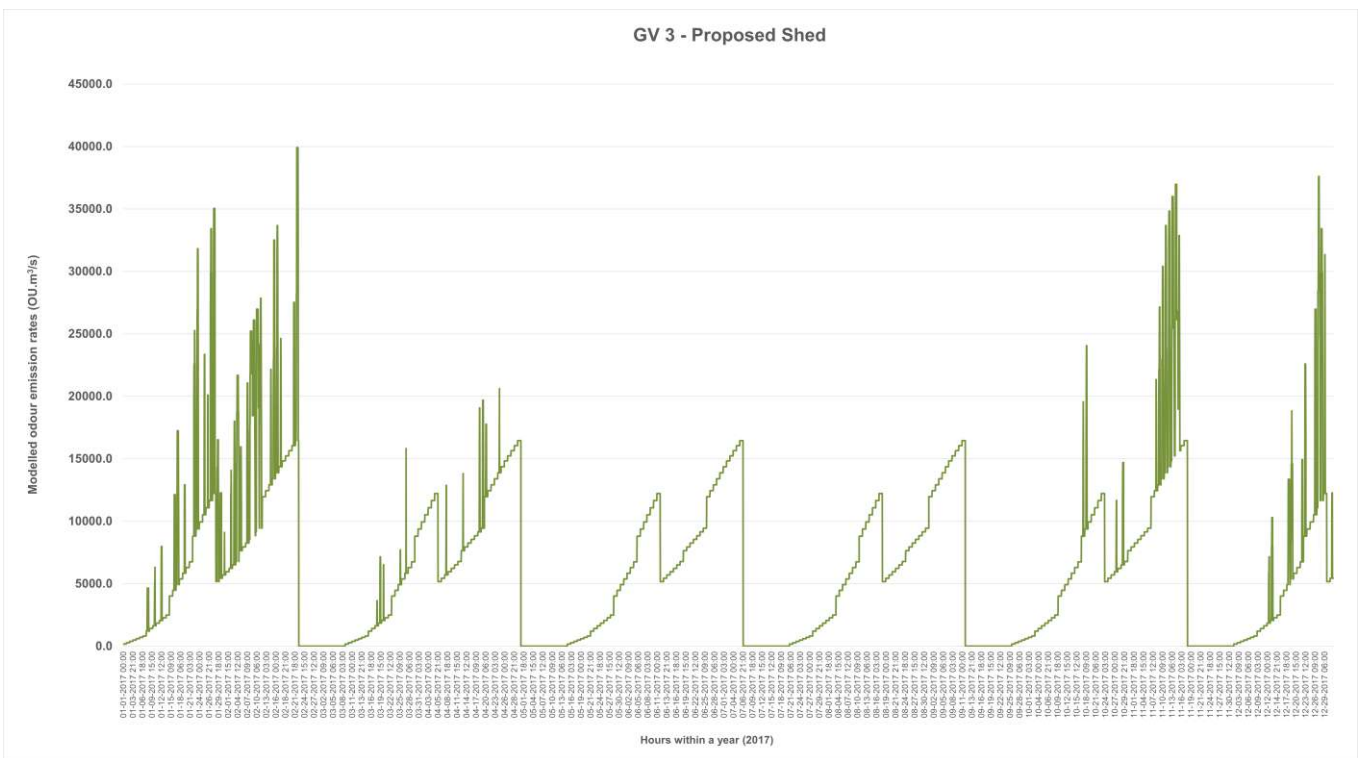
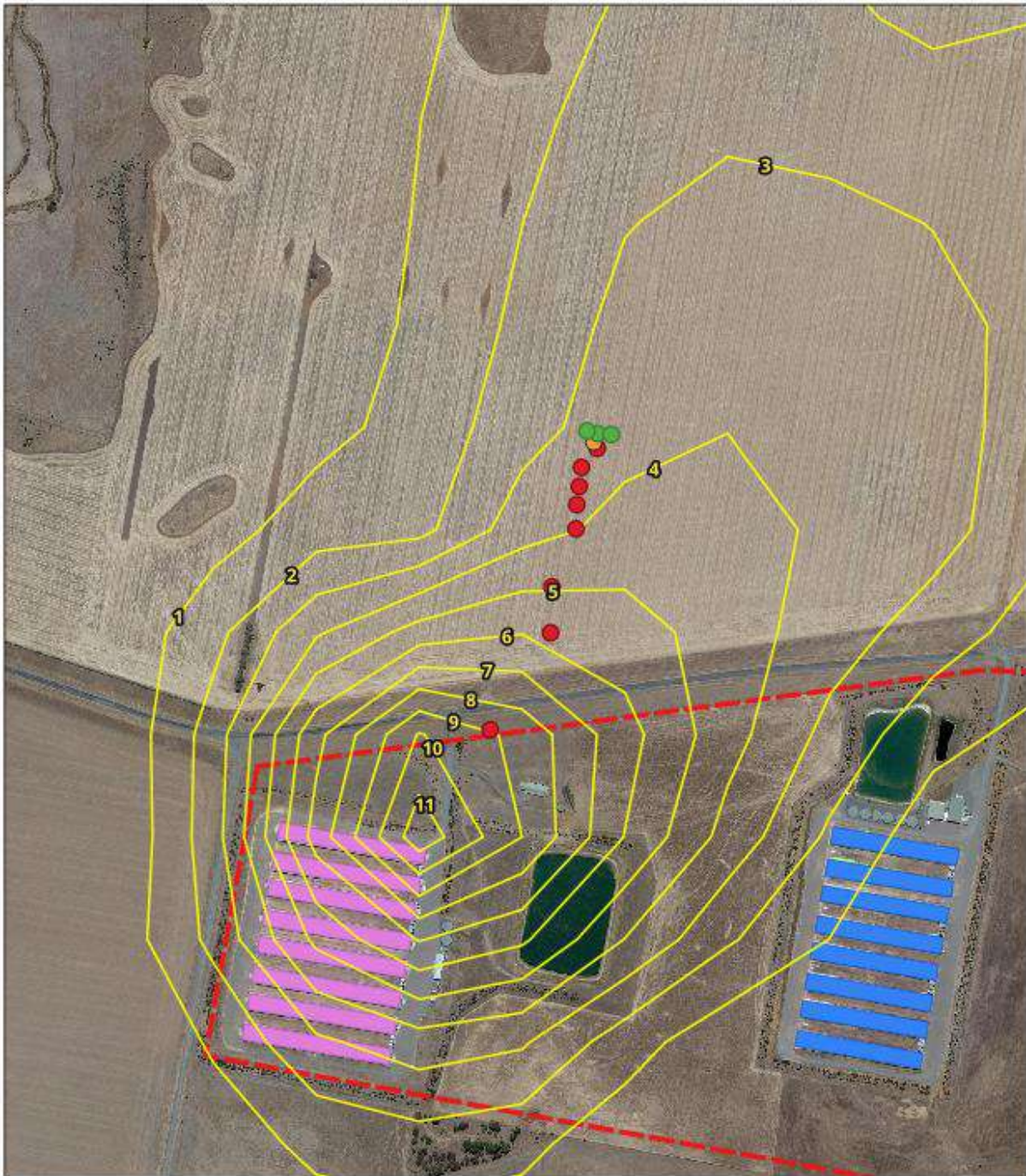


Figure C.4 GV3 – Proposed shed

Appendix D

Calibrated odour impact compared with odour surveys



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- Subtle
- No Odour

<p>Paper Size ISO A4</p> <p>0 100 200 m</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 1</p>	<p>Project No. 12627065</p> <p>Revision No. -</p> <p>Date. 19/02/2024</p>
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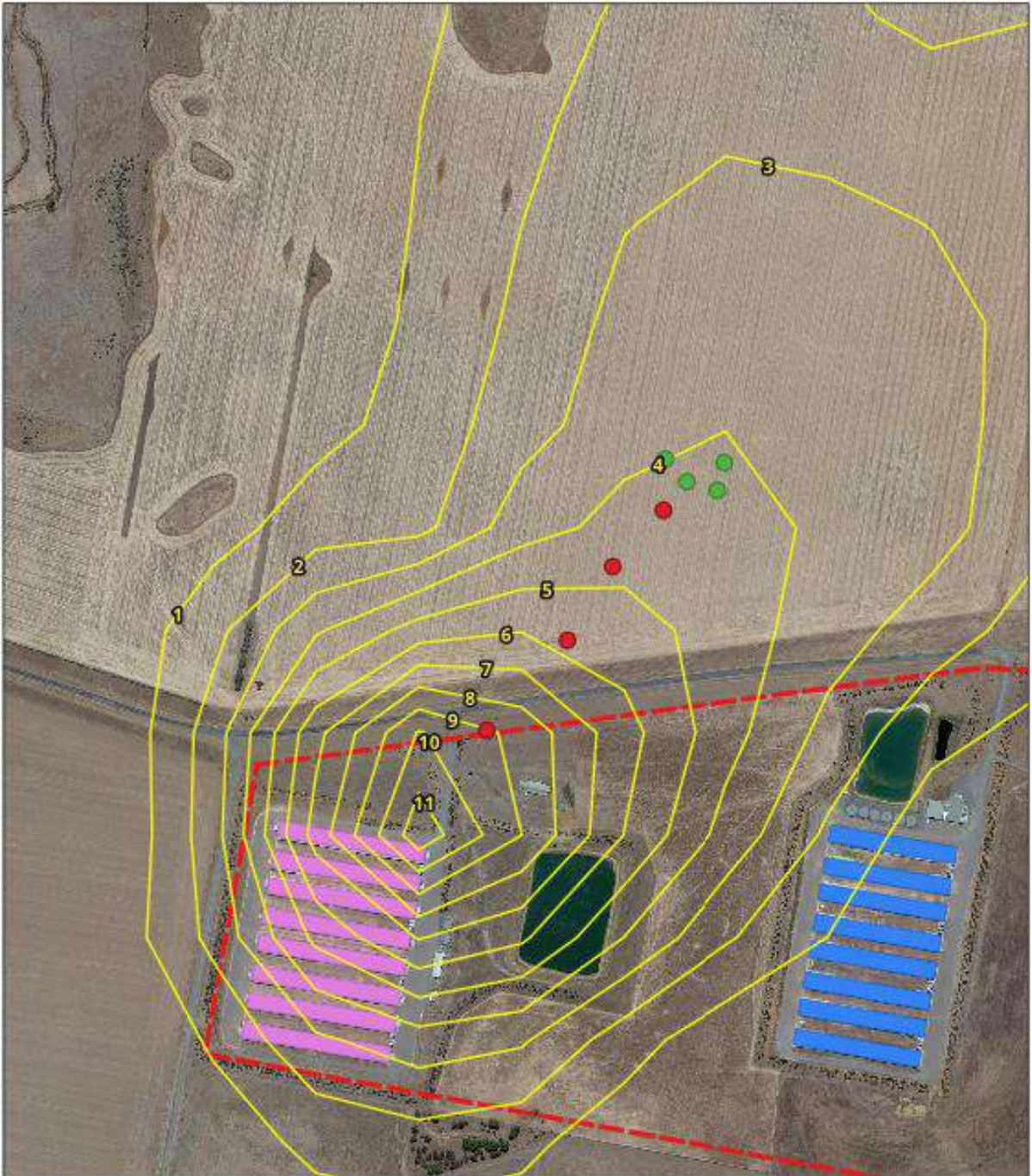
FIGURE D1

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Figure D.1 Calibrated odour impact compared with Odour Survey 1



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- No odour

<p>Paper Size ISO A4</p> <p>0 100 200 m</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 2</p>	<p>Project No. 12627065 Revision No. - Date 19/02/2024</p>
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FIGURE D2

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Quality\05_GD\12627065_GrandviewFarm_ProTen.apx

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Figure D.2 Calibrated odour impact compared with Odour Survey 2

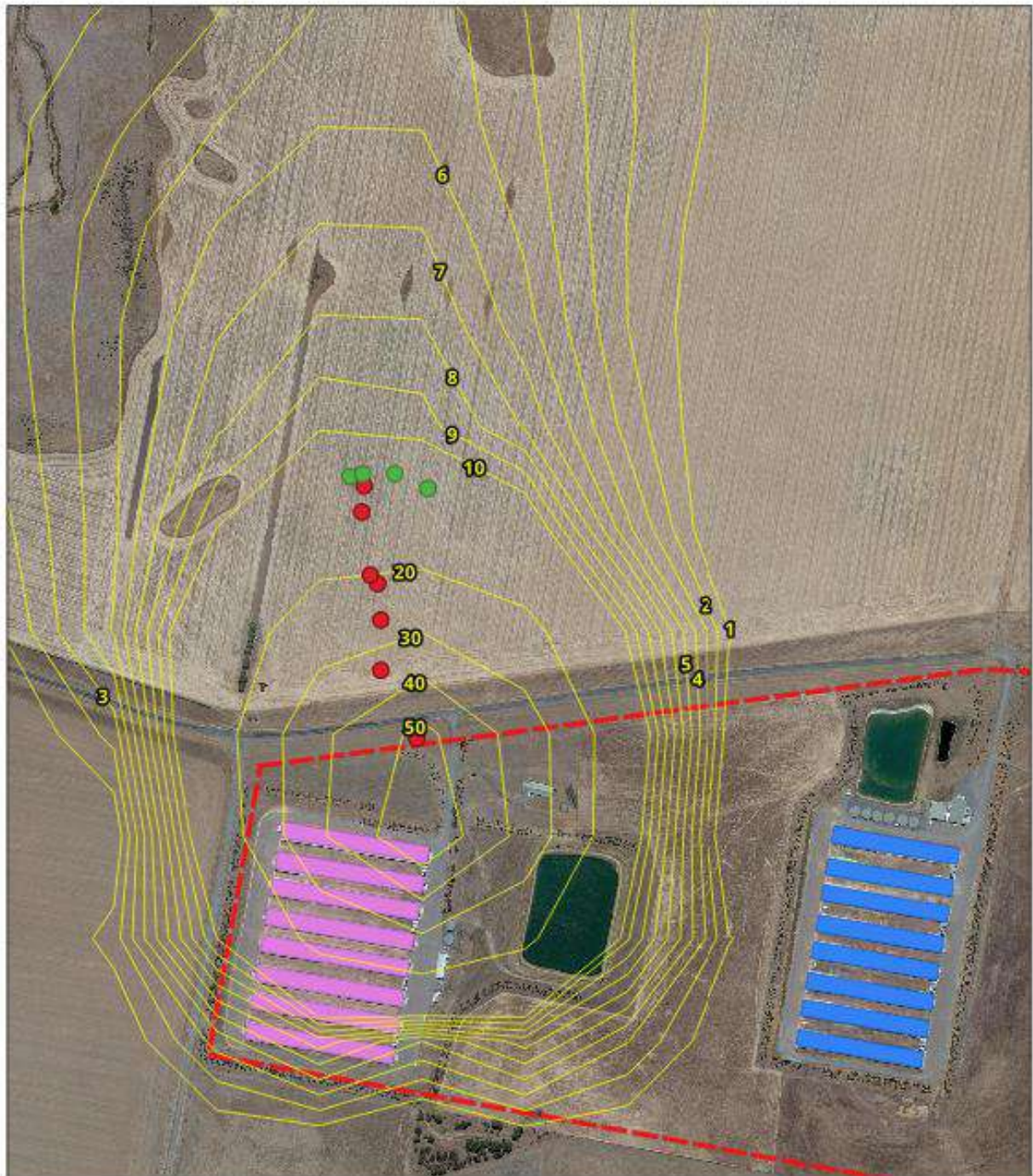


Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- No Odour

<p>Paper Size ISO A4</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 3</p>	<p>Project No. 12627065 Revision No. - Date: 19/02/2024</p>
<p>Document Path: I:\drive\ghd\all\ Melbourne\Projects\01\12627065\Tech\Air Quality\05_GIS\12627065_GandvieraFarm_ProTen.apx</p> <p>©2024. While GHD has taken care to ensure the accuracy of this product, GHD and DATA CUSTODIAN(S), make no representations or warranties about its accuracy, completeness or suitability for any particular purpose. GHD and DATA CUSTODIAN(S) cannot accept liability of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred as a result of the product being inaccurate, incomplete or unsuitable in any way and for any reason.</p>				<p>FIGURE D3</p> <p style="font-size: x-small;">Data Source: Google Earth Imagery 2024 Created By: Cheong Si Sim</p>

Figure D.3 Calibrated odour impact compared with Odour Survey 3



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- No Odour

<p>Paper Size ISO A4</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 GV2 UTM54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 4</p>	<p>Project No. 12627065 Revision No. - Date: 19/02/2024</p>
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FIGURE D4

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Figure D.4 Calibrated odour impact compared with Odour Survey 4



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds

— Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2

- Obvious
- No Odour

<p>Paper Size ISO A4</p> <p>0 100 200 m</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>			<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 5</p>	<p>Project No. 12627065 Revision No. - Date. 19/02/2024</p>
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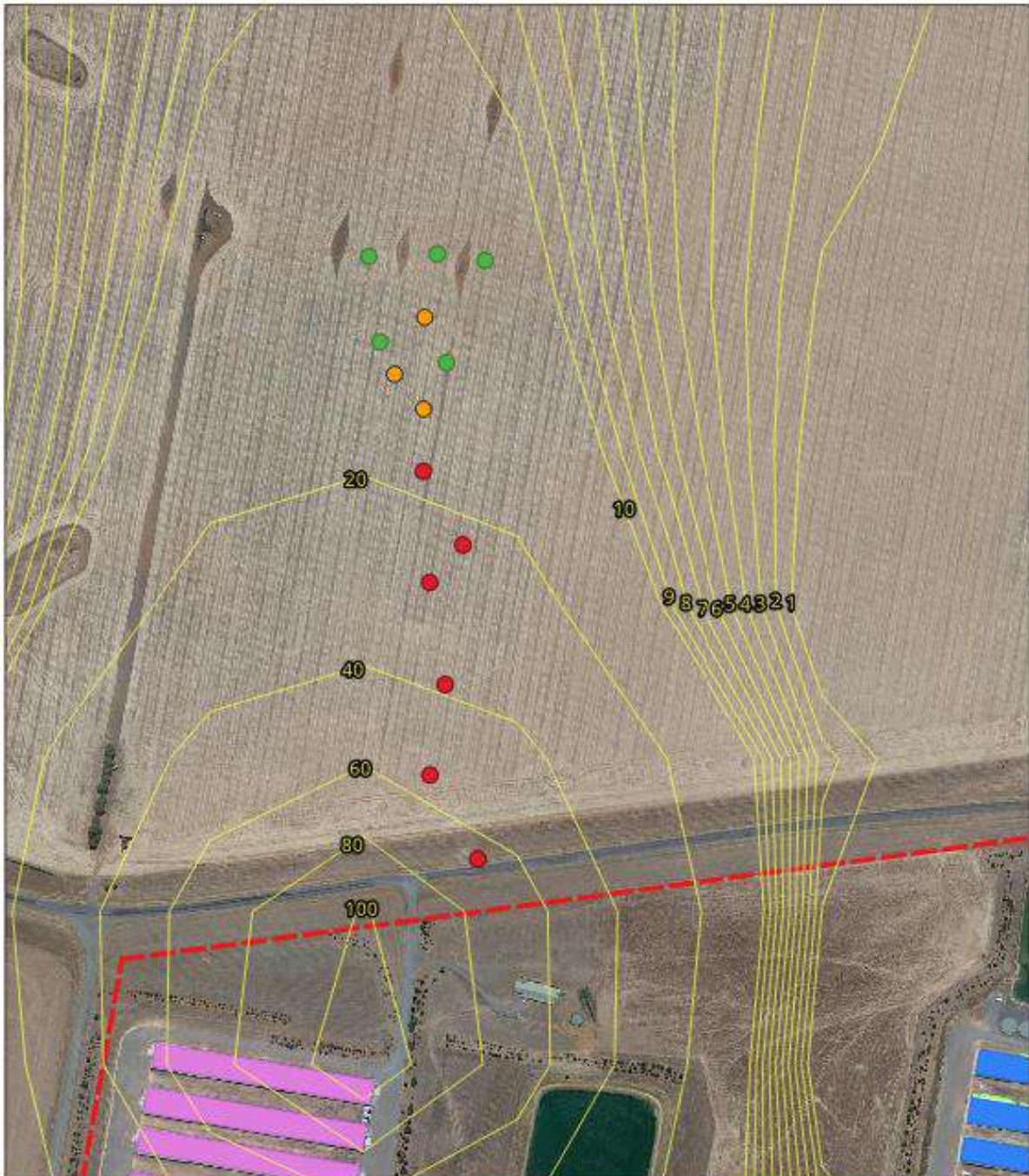
FIGURE D5

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Figure D.5 Calibrated odour impact compared with Odour Survey 5



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds

Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2

- Obvious
- Subtle
- No Odour



ProTen Victoria Pty Ltd
 Moolort Broiler Farm Odour Assessment
**Calibrated odour impact
 compared with Odour Survey 6**

Project No. 12627065
 Revision No. -
 Date: 19/02/2024

FIGURE D6

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Figure D.6 Calibrated odour impact compared with Odour Survey 6

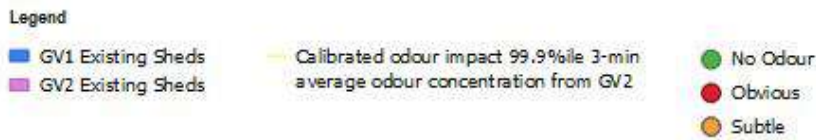
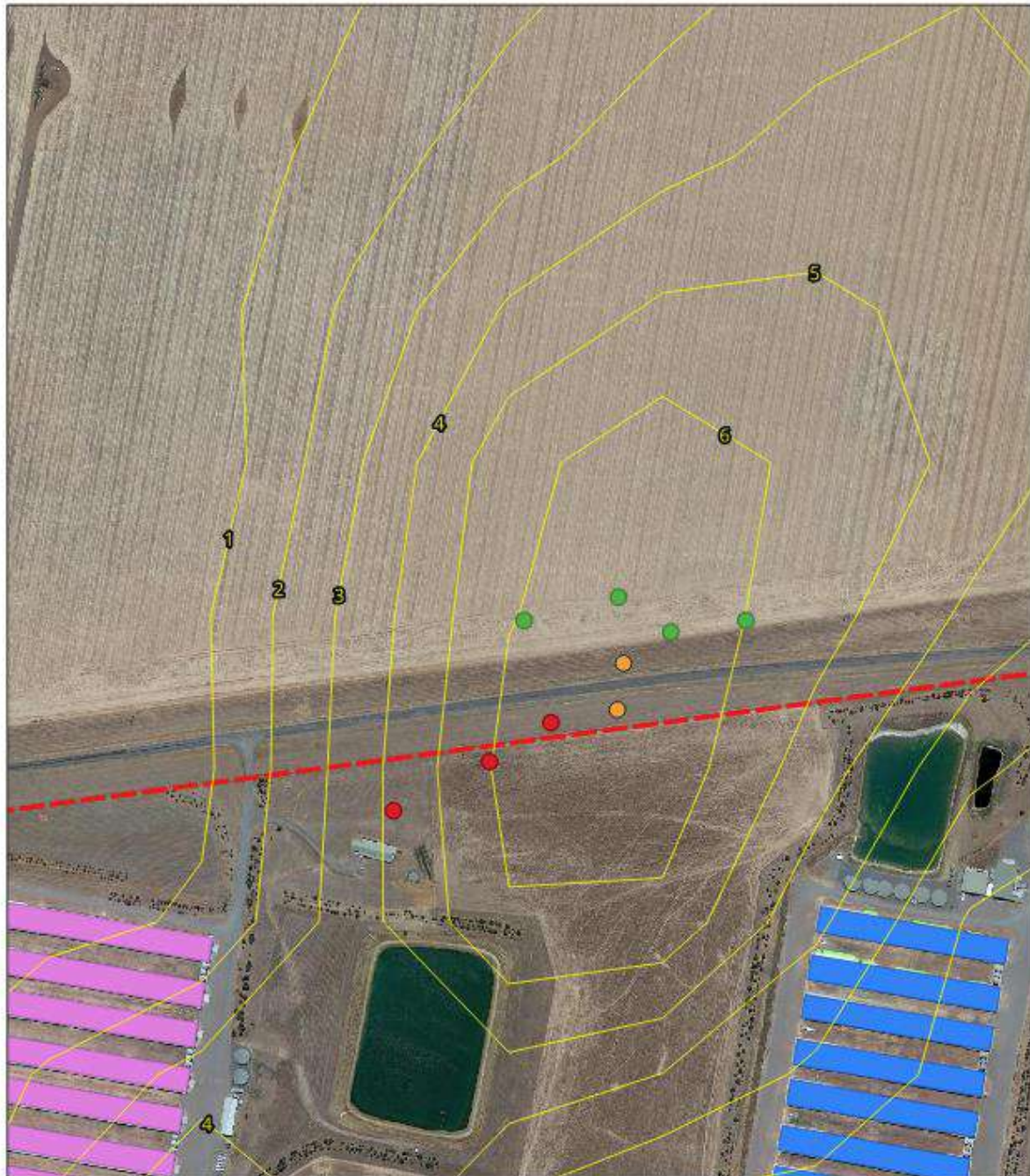
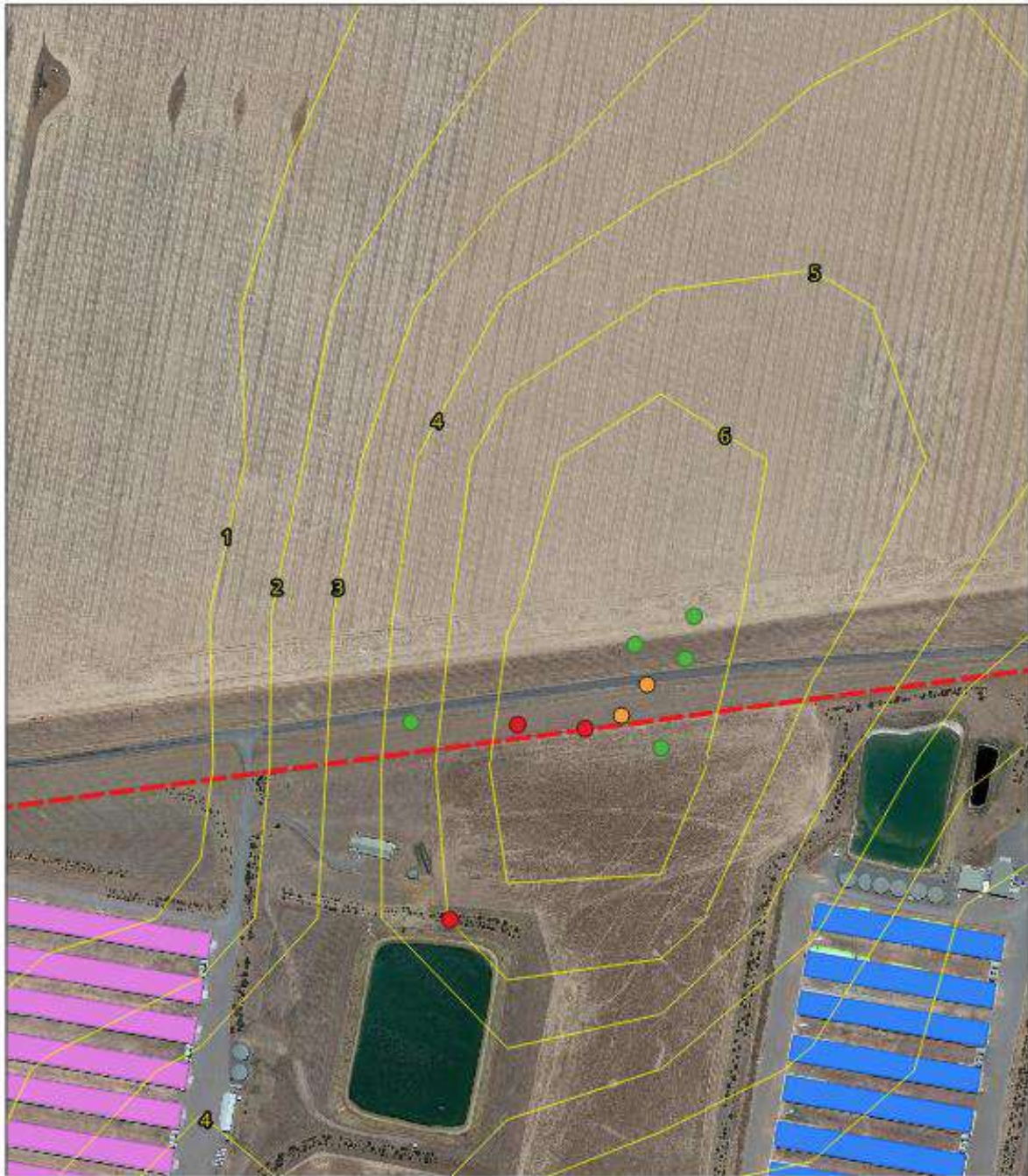


FIGURE D7

Coordinates Path: I:\gdrive\gdrive\Projects\1112627065\Task\Air Quality\08_G0812627065_BroilerFarm_ProTen.agx Data Source: Google Earth Imagery 2024 Created By: Cheng Yi Sim

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Figure D.7 Calibrated odour impact compared with Odour Survey 7



- Legend**
- GV1 Existing Sheds
 - GV2 Existing Sheds
 - Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
 - Obvious
 - Subtle
 - No Odour

<p>Paper Size: ISO A4</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: WGS 1984 Grid: UTM 54 S</p>		<p>ProTen Victoria Pty Ltd Moolort Broiler Farm Odour Assessment</p> <p>Calibrated odour impact compared with Odour Survey 8</p>	<p>Project No. 12627065 Revision No. - Date 19/02/2024</p>
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FIGURE D8

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Figure D.8 Calibrated odour impact compared with Odour Survey 8



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- Subtle
- No Odour



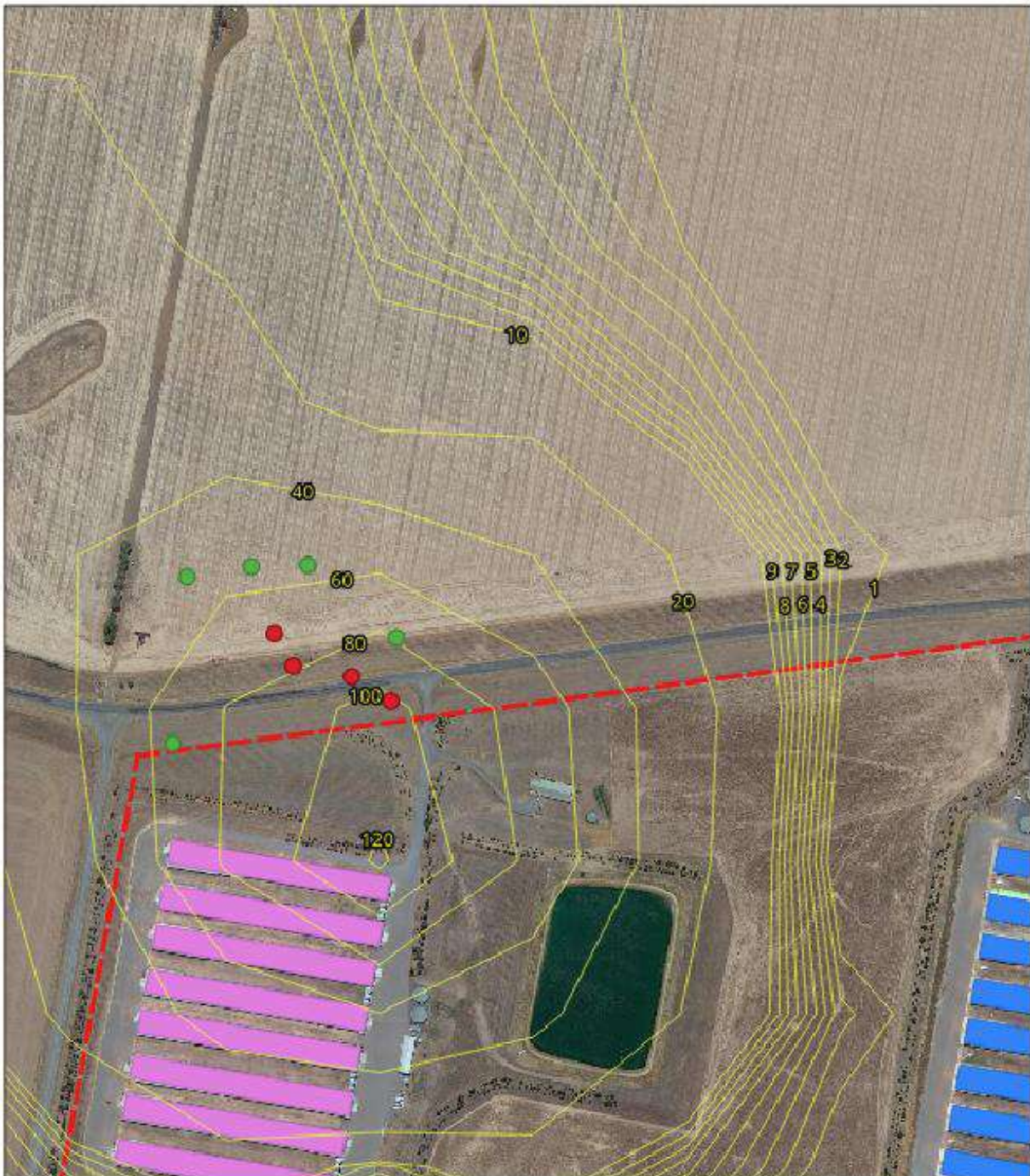
ProTen Victoria Pty Ltd
Moolart Broiler Farm Odour Assessment
Calibrated odour impact compared with Odour Survey 9

Project No. 12627065
Revision No. -
Date: 19/02/2024

FIGURE D9

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Figure D.9 Calibrated odour impact compared with Odour Survey 9



Legend

- GV1 Existing Sheds
- GV2 Existing Sheds
- Calibrated odour impact 99.9%ile 3-min average odour concentration from GV2
- Obvious
- No Odour



ProTen Victoria Pty Ltd
Moolort Broiler Farm Odour Assessment
Calibrated odour impact compared with Odour Survey 10

Project No. 12627065
 Revision No. -
 Date: 19/02/2024

FIGURE D10

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Figure D.10 Calibrated odour impact compared with Odour Survey 10


Appendix E

Baseline Odour Assessment to Determine the Extent of Odour Plume”, prepared by AOC Specialist



Jim Demetriou

Air Odour and Compliance Specialist

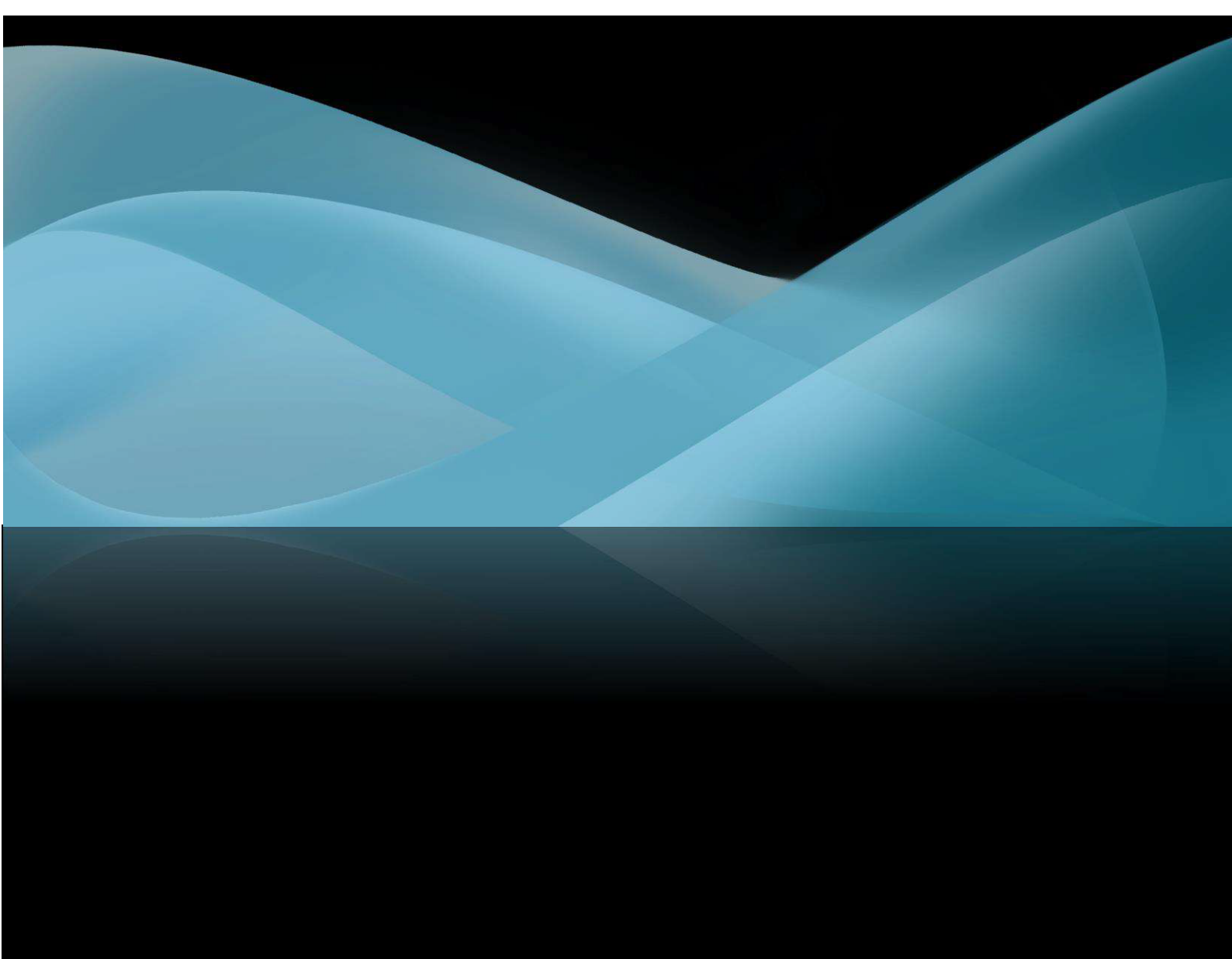
 0424615658

 AOCspecialist@hotmail.com

Baseline Odour Assessment to Determine the Extent of Odour Plume

Broiler Farm Grandview 2, at 1496 Rodborough Road,
Moolort, Vic, 3465.

14th-15th and 27th- 28th November 2023



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Figure 7 Odour Survey 7 Grandview 2 27 th November 2023 12:00-12:40	11
Figure 8 Odour Survey 8 Grandview 2 27 th November 2023 12:00-12:40	12
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1 Introduction

In-field odour assessments were conducted on November 14th, 15th, 27th, and 28th, 2023, at Proten Broiler Farm, Grandview 2, situated at 1496 Rodborough Road, Moolort, Vic. The purpose of these assessments was to determine the extent of the odour plume emanating from the broiler sheds.

The site comprises two farms, Grandview 1 and Grandview 2, featuring 8 tunnel ventilation sheds oriented from east to west, with fans located on the east side. Grandview 1 was unoccupied during the first odour assessment and housed 1-2 day old birds during the second assessment.

Measurements were taken based on accessibility and wind direction, aiming to establish the distance travelled by the odour plume from the broiler sheds. The data collection included evaluations under normal and worst-case meteorological and operational conditions. These assessments occurred at various times throughout the day, encompassing early morning, mid-morning, early afternoon, and late afternoon.

The evaluations specifically considered worst-case operational scenarios, focusing on sheds at their peak bird weight and density, just before the initial and final pickups when odour emissions are expected to be at their highest.

2 Odour Assessment Methodology

All odour assessments were undertaken by Jim Demetriou, Principal Director of AOC Specialists who has 38 years' experience in undertaking odour assessments and meets the odour screening criteria of AS4323.3.

The odour assessments undertaken were based on EPA Victoria Guidance for field odour surveillance, Publication 1881 May 2021. The plume assessment was chosen as the assessment methodology as the odour generator is the only source of odour in the area. Upwind observations were undertaken to rule out any other odour sources.

The assessments commenced downwind of the source where the presence of an odour could be observed. The odour plume is then traced downwind from this point until it is delineated. The characteristic and intensity of odour is noted along random observation points throughout the plume trace. Where odour can no longer be detected along the trace, the assessor commences a zig zag pattern until the odour plume is crossed or delineated. The focus of the assessments is the interface zone where the intensity of the odour decreases and can no longer be detected.

Assessment points are logged along the route with meteorological conditions noted. Wind speed was measured using a handheld anemometer.

The following odour descriptor definitions were used:

Table 1 Odour Descriptor Definitions

Descriptor	Description
Obvious	Odour is easily recognised, can be described, and may be attributed to a source. The assessor can smell it without any effort or focus on it
Subtle	Odour can be recognised only when focusing. For example, by standing still, inhaling slowly and concentrating
No odour	No odour, or odour is not strong enough to be recognised

3 Operating conditions

3.1 Assessments undertaken on 14th and 15th November 2023

Grandview 2

Sheds 1-8

Shed 1 46,362 birds aged 32 days. with average weight of 2.05kg
Shed 2 46,024 birds aged 32 days. with average weight of 2kg
Shed 3 50,080 birds aged 29 days. with average weight of 1.78kg
Shed 4 49,984 birds aged 29 days. with average weight of 1.58kg
Shed 5 46,629 birds aged 28 days. with average weight of 1.58kg
Shed 6 46,385 birds aged 28 days. with average weight of 1.59kg
Shed 7 50,074 birds aged 26 days. with average weight of 1.3kg
Shed 8 49,812 birds aged 26 days with average weight of 1.4kg

3.2 Assessment undertaken on the 27th and 28th November 2023

Gradview 2

Sheds 1-8

During Assessment

Shed 1 28040 birds aged 45 days with average weight of 3.27 kg.
Shed 2 27101 birds aged 44 days with average weight of 3.29 kg.
Shed 3 30432 birds aged 43 days with average weight of 3.05kg
Shed 4 29632 birds aged 42 days with average weight of 2.89kg
Shed 5 30412 birds aged 41 days with average weight of 2.94kg
Shed 6 30278 birds aged 41 days with average weight of 2.95kg
Shed 7 34967 birds aged 39 days with average weight of 2.57kg
Shed 8 36057 birds aged 39 days with average weight of 2.71kg

3892 birds were removed from sheds 1 on the 26th November between 2:30pm and 3:00pm.

4 In-field Odour Assessments

4.1 In-field Odour Survey 1 14th November 2023, 10:20-11:50

Grandview 2 commenced Survey 1 at 10:20am and finished at 11:50am, the wind was oscillating between SSW and SW at 10-15km/hr, temperature 11-13°C, cloudy with some drizzle. 3 tunnel fans and 6 side fans operating during assessment.

Table 2 Odour Survey 1 Gradview2 14th November 2023 10:20-11:50

Points	Odour observation	Frequency	Distance	Latitude	Longitude
1	Obvious	80%		-37.106720°	143.948524°
2	Obvious	60%		-37.105697°	143.949269°
3	Obvious	60%		-37.105222°	143.949269°
4	Obvious	50%		-37.104607°	143.949556°
5	Obvious	50%		-37.104353°	143.949557°
6	Obvious	50%		-37.104161°	143.949582°
7	Obvious	30%		-37.103966°	143.949603°
8	Obvious	10%	630m	-37.103761°	143.949799°
9	Subtle			-37.103697°	143.949751°
10	No Odour			-37.103608°	143.949796°
11	No Odour			-37.103586°	143.949659°
12	No Odour			-37.103616°	143.949975°

Figure 1 Odour Survey 1 Gradview2 14th November 2023 10:20-11:50



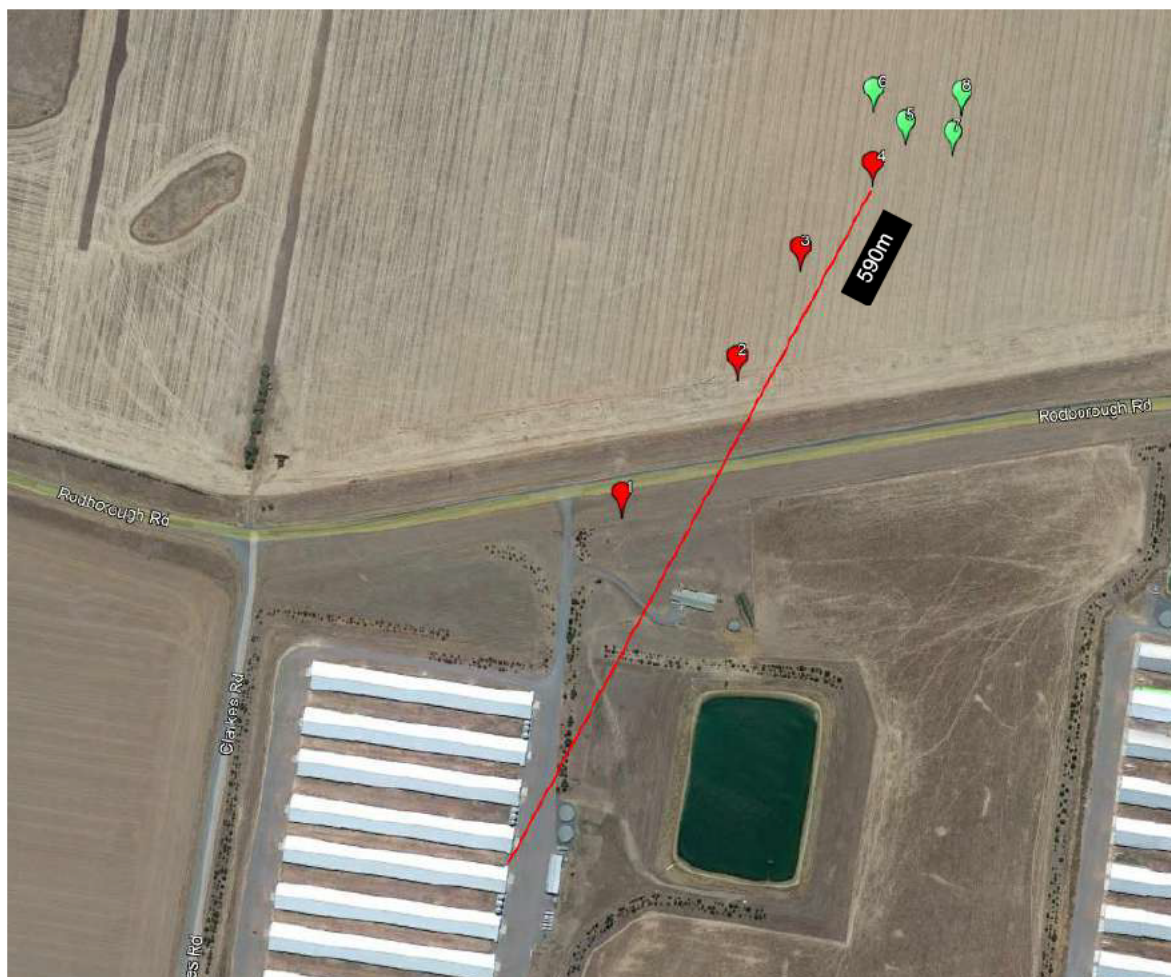
4.2 In-field Odour Survey 2 14th November 2023,13:00-13:40

Survey 2 commenced assessment at 13:00 and finished at 13:40. The wind was SW at 10-15 km/hr, cloudy and 15°C. During the assessment 5 tunnel and 6 side fans were operating.

Table 3 Odour Survey 2 Grandview2, 14th November2023 13:00-13:40

Points	Odour observation	Frequency	Distance	Latitude	Longitude
1	Obvious	50%		-37.106749°	143.948485°
2	Obvious	50%		-37.105787°	143.949495°
3	Obvious	30%		-37.105011°	143.950052°
4	Obvious	30%	590m	-37.104404°	143.950688°
5	No odour			-37.104107°	143.950979°
6	No odour			-37.103874°	143.950697°
7	No odour			-37.104181°	143.951401°
8				-37.103891°	143.951484°

Figure 2 Odour Survey 2 Grandview 2 14th November 2023 13:00-13:40



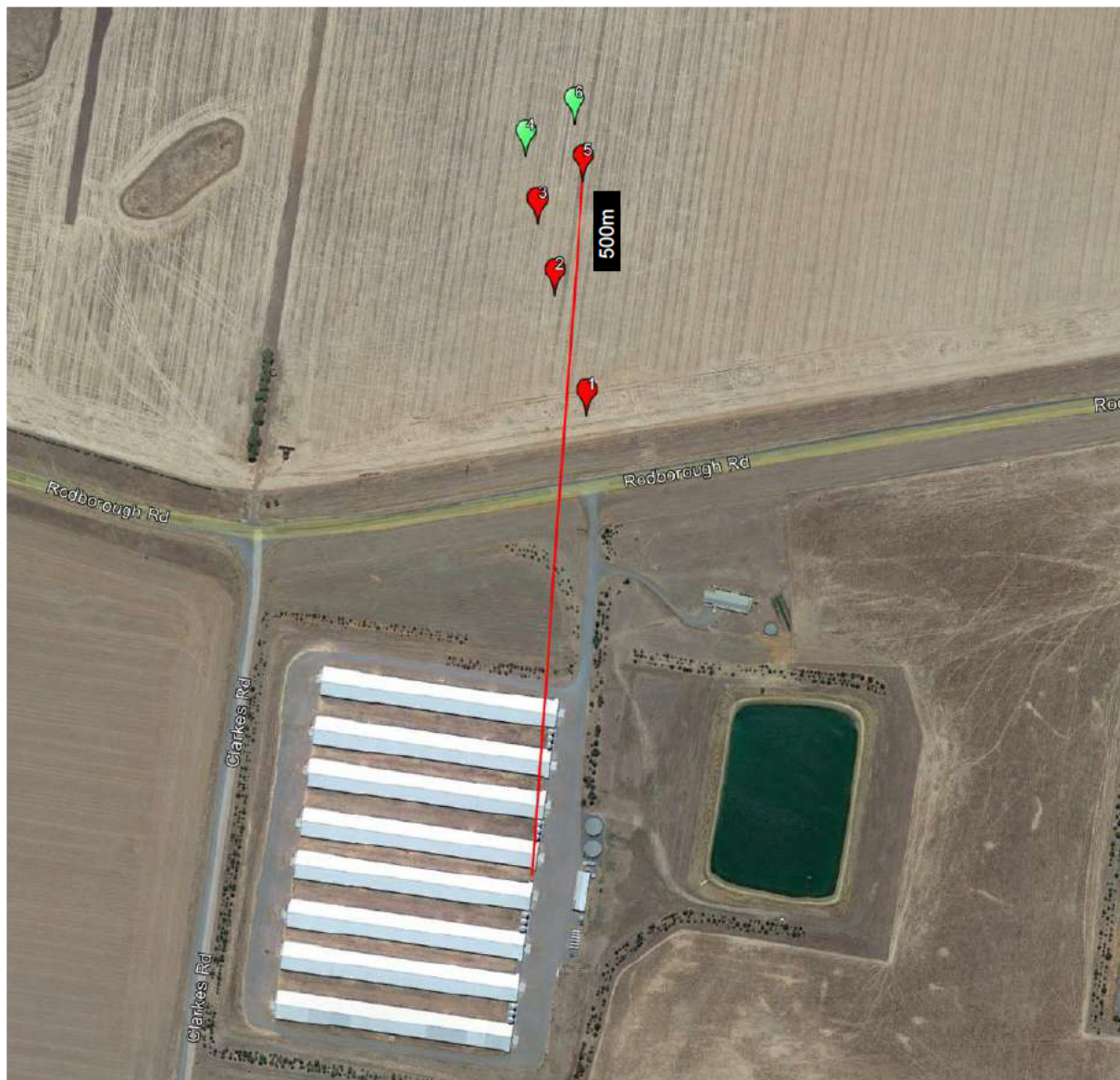
4.3 In-field Odour Survey 3 14th November 2023, 14:20-15:00

Survey 3 commenced at 14:20 and finished at 15:00. The wind was South direction at 10-25km/hr. Cloudy 14°C. During the assessment 5 tunnel and 6 side fans were operating.

Table 4 Odour Survey 3 Grandview2, 14th November 2023 14:20-15:00

Points	Odour observation	Frequency	Distance		
1	Obvious	80%		-37.106112°	143.947967°
2	Obvious	50%		-37.105327°	143.947706°
3	Obvious	20%		-37.104861°	143.947562°
4	No Odour			-37.104416°	143.947465°
5	Obvious	50%	505m	-37.104578°	143.947933°
6	No Odour			-37.104201°	143.947859°

Figure 3 Odour Survey 3 Grandview 2 14th November 2023 14:20-15:00



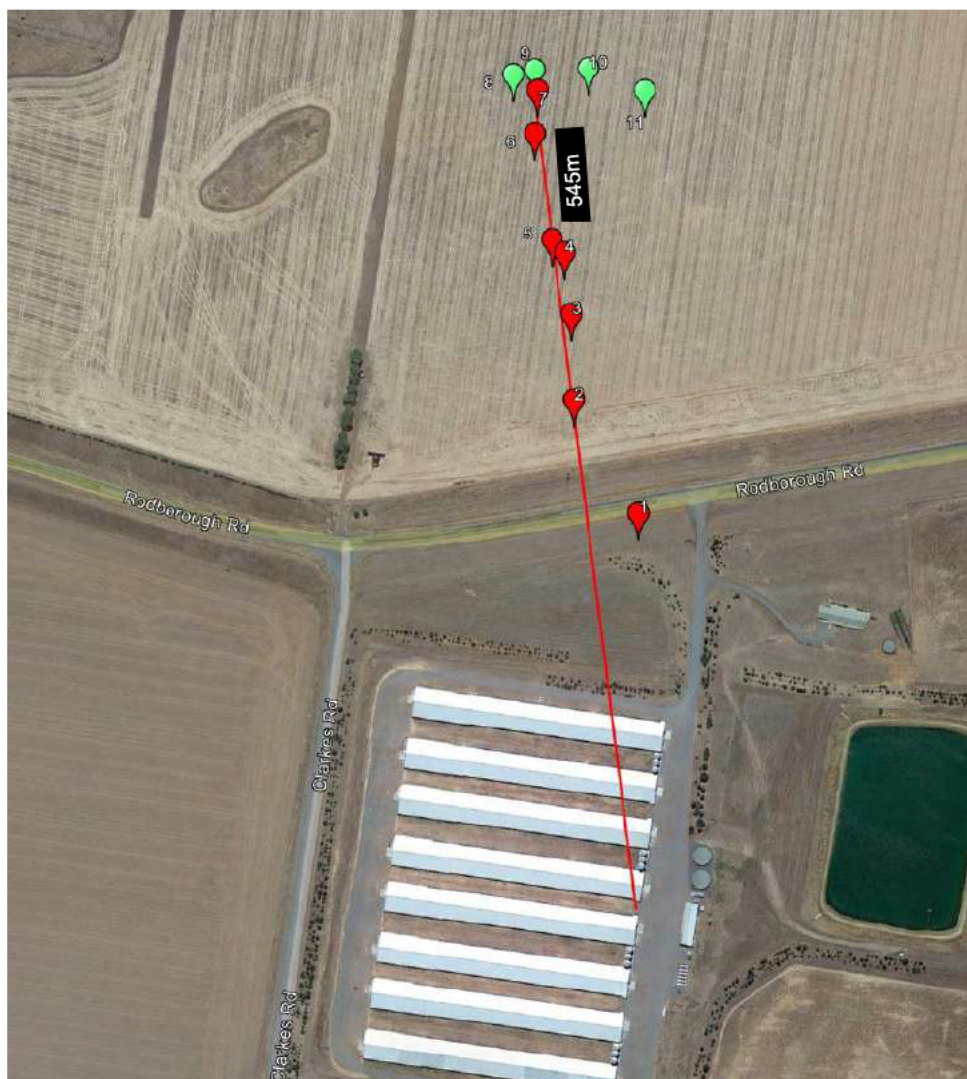
4.4 In-field Odour Survey 4 15th November 2023, 08:15-09:00

Survey 4 commenced at 08:15 and finished at 09:00. The wind was from the S to SSE, at 10km/hr and 11°C. During the assessment 3 tunnel and 6 side fans were operating

Table 5 Odour Survey 4 Grandview 2 15th November 2023, 08:15-09:00

Point	Odour observation	Frequency	Distance	Lat	Long
1	Obvious	100%		-37.106848°	143.947538°
2	Obvious	80%		-37.106151°	143.947042°
3	Obvious	80%		-37.105623°	143.947021°
4	Obvious	30%		-37.105244°	143.946967°
5	Obvious	30%		-37.105162°	143.946869°
6	Obvious	20%		-37.104506°	143.946732°
7	Obvious	10%	545m	-37.104237°	143.946752°
8	No Odour			-37.104140°	143.946562°
9	No Odour			-37.104110°	143.946728°
10	No Odour			-37.104101°	143.947143°
11	No Odour			-37.104239°	143.947579°

Figure 4 Odour Survey 4 Grandview 2 15th November 2023 08:15-09:00



4.5 In-field Odour Survey 5 15th November 2023, 10:15-11:15

Survey 5 commenced at 10:15 and finished at 11:15. The wind was from an WSW direction, 5-10km/hr, overcast and 16°C. During the assessment 6 tunnel and 6 side fans were operating

Table 6 Odour Survey 5 Grandview 2 15th November 2023, 10:15- 11:15

Points	Odour observation	Frequency	Distance	latitude	longitude
1	Obvious	80%,		-37.108072°	143.950360°
2	Obvious	80%,		-37.107930°	143.950785°
3	Obvious	60%		-37.107988°	143.951270°
4	Obvious	50%		-37.107758°	143.951686°
5	Obvious	20%		-37.107658°	143.952143°
6	Obvious	10%	470m	-37.107581°	143.952460°
7	No Odour			-37.107617°	143.952687°
8	No Odour			-37.107376°	143.952919°
9	No Odour			-37.107891°	143.952744°
10	No Odour			-37.108283°	143.952646°
11	No Odour			-37.106937°	143.952968°

Figure 5 Odour Survey 5 Grandview 2 15th November 2023 10:15-11:15



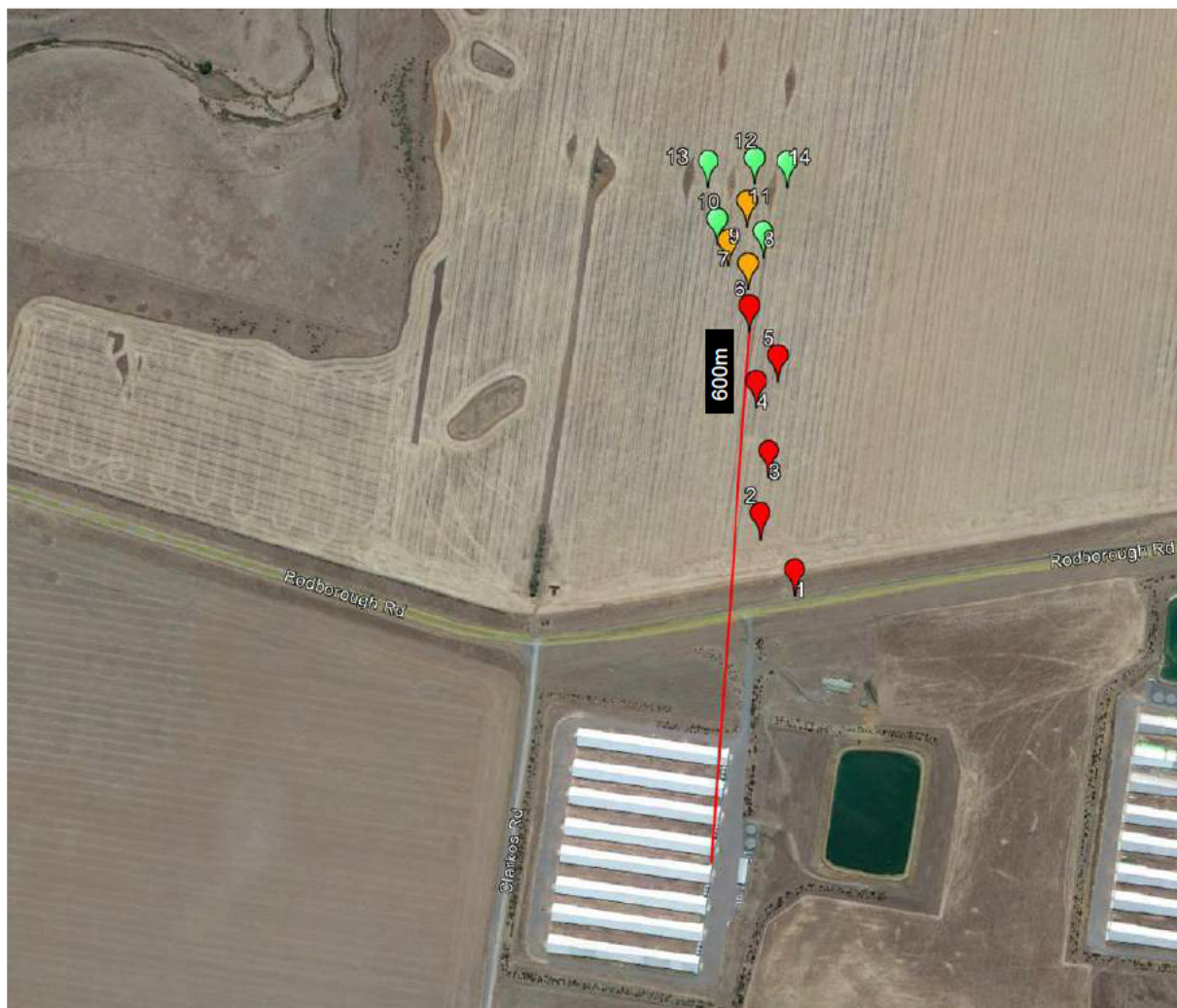
4.6 In-field Odour Survey 6 27th November 2023, 09:45-10:45

Survey 6 commenced at 09:45 and finished at 10:45. The wind was from the S-SSW direction, 5-10km/hr, 11-20°C. At the beginning of the assessment 3 tunnel and 6 side fans were operating. On completion of the assessment 7 tunnel and 6 side fans were operating.

Table 7 Odour Survey 6 Grandview 2 27th November 2023, 10:15-11:15

Points	Odour observation	Frequency	Distance	latitude	longitude
1	Obvious	80%		-37.106407°	143.948585°
2	Obvious	80%		-37.105833°	143.948145°
3	Obvious	80%		-37.105200°	143.948252°
4	Obvious	50%		-37.104489°	143.948091°
5	Obvious	50%		-37.104224°	143.948370°
6	Obvious	20%	600m	-37.103719°	143.948005°
7	Subtle			-37.103284°	143.947990°
8	No Odour			-37.102957°	143.948177°
9	Subtle			-37.103050°	143.947729°
10	No Odour			-37.102829°	143.947593°
11	Subtle			-37.102643°	143.947976°
12	No odour			-37.102205°	143.948068°
13	No Odour			-37.102236°	143.947474°
14	No Odour			-37.102240°	143.948485°

Figure 6 Odour Survey 6 Grandview 2 27th November 2023 ,10:15-11:15



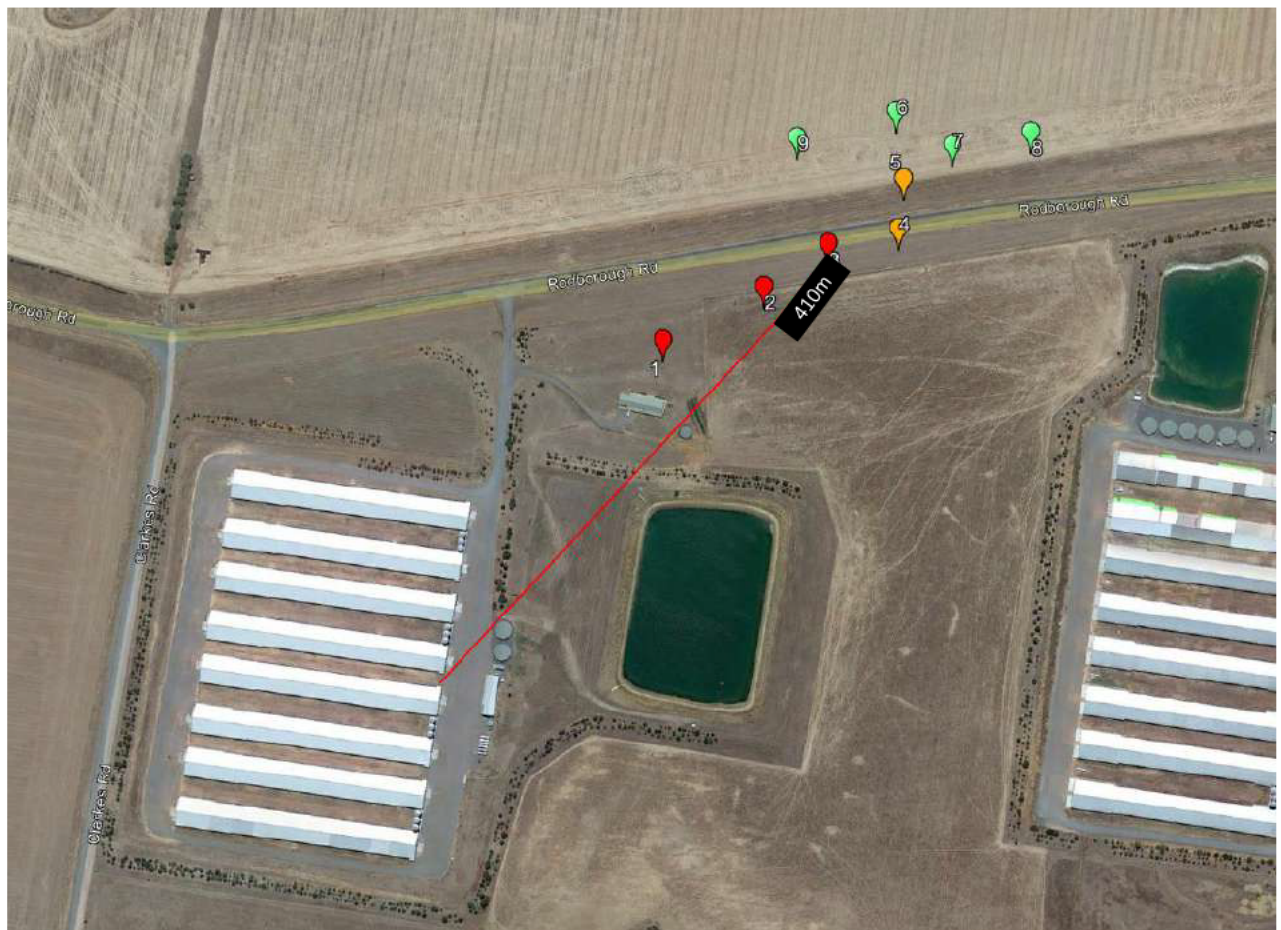
4.7 In-field Odour Survey 7 27th November 2023, 12:00-12:40

Survey 7 commenced at 12:00 and finished at 12:40. The wind was from the SW-WSW direction, 10-14km/hr, 25°C. During the assessment 7 tunnel and 6 side fans were operating.

Table 8 Odour Survey 7 Grandview 2 27th November 2023 12:00-12:40

Points	Odour observation	Frequency	Distance	latitude	longitude
1	Obvious	100%		-37.107044°	143.949280°
2	Obvious	80%		-37.106685°	143.950100°
3	Obvious	30%	410m	-37.106400°	143.950624°
4	Subtle			-37.106299°	143.951198°
5	Subtle			-37.105968°	143.951238°
6	No Odour			-37.105515°	143.951177°
7	No Odour			-37.105740°	143.951640°
8	No Odour			-37.105649°	143.952289°
9	No Odour			-37.105695°	143.950363°

Figure 7 Odour Survey 7 Grandview 2 27th November 2023 12:00-12:40



4.8 In-field Odour Survey 27th November 2023, 13:30-14:40

Survey 8 commenced assessment at 13:30 and finished at 14:40. The wind was from the SW direction at 18-21km/hr. Clear skies 25°C. During the assessment 8 tunnel and 6 side fans were operating

Table 9 Odour Survey 8 Grandview 2 27th November 2023 13:30-14:40

Points	Odour observation	Frequency	Distance	Latitude	Longitude
1	Obvious	60%		-37.107816°	143.949815°
2	No Odour			-37.106452°	143.949422°
3	Obvious	40%		-37.106440°	143.950351°
4	Obvious	20%	425m	-37.106457°	143.950938°
5	Subtle			-37.106359°	143.951251°
6	Subtle			-37.106140°	143.951466°
7	No Odour			-37.105949°	143.951791°
8	No Odour			-37.105650°	143.951856°
9	No Odour			-37.105857°	143.951350°
10	No Odour			-37.106573°	143.951605°

Figure 8 Odour Survey 8 Grandview 2 27th November 2023 12:00-12:40



4.9 In-field Odour Survey 9 28th November 2023, 07:45-08:45

Survey 9 commenced assessment at 07:45 and finished at 08:45. The wind was initially from the SSW shifting to SW direction at 8-11km/hr. partly cloudy and 13°C. During the beginning of the assessment 2 tunnel and 6 side fans were operating. On completion of the assessment 3 tunnel and 6 side fans were operating.

Table 10 Odour Survey 9 Grandview 2 28th November 2023 07:45-08:45

Points	Odour observation	Frequency	Distance	Latitude	Longitude
1	Obvious	80%		-37.106443°	143.948403°
2	Obvious	60%		-37.106351°	143.948819°
3	Obvious	60%		-37.106206°	143.949796°
4	Obvious	20%	415m	-37.106009°	143.950160°
5	Subtle			-37.106129°	143.950429°
6	No Odour			-37.106326°	143.950869°
7	No Odour			-37.105889°	143.950965°
8	Subtle			-37.105682°	143.950469°
9	No Odour			-37.105302°	143.950830°
10	No Odour			-37.105273°	143.950375°

Figure 9 Odour Survey 9 Grandview 2 28th November 2023 07:45-08:45



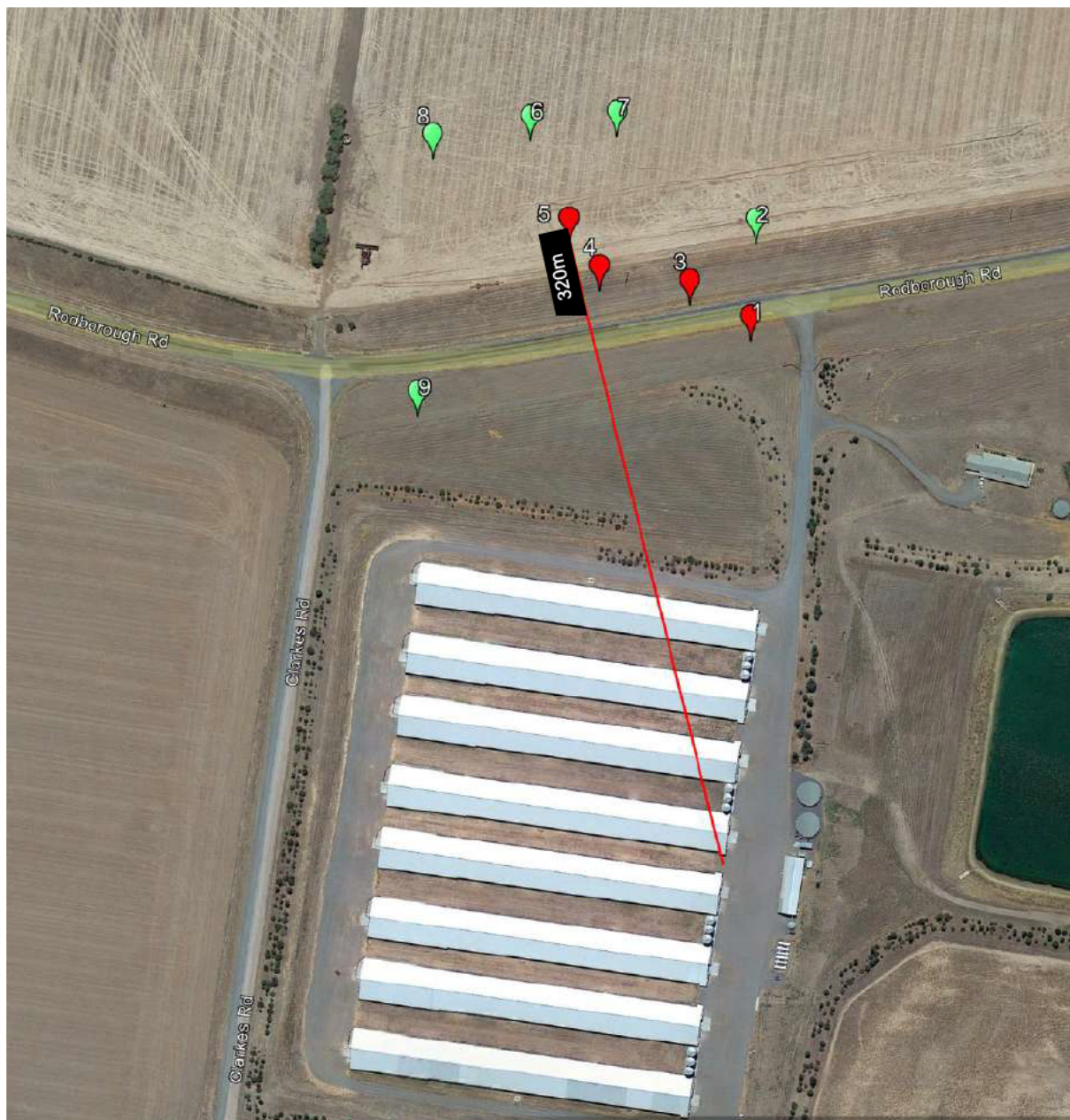
4.10 In-field Odour Survey 10 28th November 2023, 09:30-10:45

Survey 10 commenced assessment at 09:30 and finished at 10:45. The wind was initially from the S shifting to SE direction at 5-10km/hr, partly cloudy and 23°C. 6 tunnel and 6 side fans were operating.

Table 11 Odour Survey 10 Grandview 2 28th November 2023 09:30-10:45

Points	Odour observation	Frequency	Distance	Latitude	Longitude
1	Obvious	40%		-37.106745°	143.947700°
2	No Odour			-37.106304°	143.947731°
3	Obvious	60%		-37.106583°	143.947355°
4	Obvious	20%		-37.106519°	143.946844°
5	Obvious		320m	-37.106304°	143.946672°
6	No Odour			-37.105839°	143.946453°
7	No Odour			-37.105820°	143.946943°
8	No Odour			-37.105923°	143.945898°
9	No Odour			-37.107086°	143.945816°

Figure 10 Odour Survey 10 Grandview 2 28th November 2023 09:30-10:45



5 Discussion

Odour assessments were conducted throughout one growing cycle at Grandview 2, spanning two events. Grandview 1 remained vacant during the first event and housed 1-2 day old birds during the second, with no associated odour observed in either case.

Event 1, occurring over two days on November 14-15, 2023, involved five assessments conducted just before the initial thin-out, when the sheds were at maximum stocking density. Event 2 took place on November 27-28, 2023, covering the final thin-out and pickup phases, coinciding with the birds reaching their maximum age and weight.

These assessments considered both normal and worst-case meteorological and operational conditions. They encompassed various times of the day, including early morning, mid-morning, early afternoon, and late afternoon. Worst-case operational scenarios were also examined, such as the sheds being at maximum bird age and weight.

The highest odour emissions were observed in the morning, immediately after an increase in the air ventilation rate from the sheds. Similar to previous assessments at other broiler farms, the intensity of the odour plume diminished rapidly and was generally perceived as either obvious or no odour. It was noted that the litter on this farm was in a very dry condition.

5.1 Event 1

The assessments took place on November 14-15, 2023, when the birds were at their maximum density, prior to the initial thin-out. At this time, the birds were aged between 26-32 days old, and each shed housed approximately 46-50,000 birds. The evaluations were conducted under light to moderate wind speeds, varying between 5 to 25 km/hr, and with wind directions ranging from 135 to 225 degrees. During these conditions, the odour plume observed at an obvious level, travelled distances spanning from 470 to 630 metres.

5.2 Event 2

The assessments on November 27-28, 2023, were carried out when the birds reached their maximum age and weight, specifically aged between 41-45 days and weighing between 2.48 and 3.2 kg. Each shed housed birds at a density ranging from 28,000 to 32,000. The evaluations occurred under light to moderate wind speeds, ranging from 5 to 21 km/hr, with wind directions spanning from 105 to 255 degrees. The odour plume at obvious level was observed to travel distances ranging from 320 to 600 metres.

6 Conclusion

In conclusion, the odour assessments were conducted under worst-case operational and meteorological conditions, accounting for temporal fluctuations. These evaluations occurred at various times throughout the day, including early morning, mid-morning, early afternoon, and late afternoon, while considering changes in wind direction and velocity. This approach provides an understanding of odour dispersion across diverse meteorological conditions.

Although no discernible trend was identified, it was observed that the distance covered by the odour plume was at its highest immediately after an increase in the air ventilation rate, typically early to mid-morning. Overall, the distance at which the odour plume travelled remained consistent for both events, ranging from 470-630m for event 1 and 320-600m for event 2.

It's notable that there were no cumulative odour effects from Grandview 1. The absence of detectable odour from Grandview 1, coupled with staggered grow cycles, contributes to low odour emissions from one farm when the other is at its peak.



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Report

141 Clarkes Road, Strathlea – Surface Water Management Plan

ProTen Pty Ltd

5 April 2024





Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
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ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.





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1 INTRODUCTION

In December 2017, the Victorian Civil and Administrative Tribunal (VCAT) directed Central Goldfields Shire Council to grant and issue a permit for the land at 141 Clarkes Road, Strathlea, to allow the use and development of the land for a 325,000 bird (six shed) broiler farm¹.

ProTen Pty Ltd have acquired the land and wish to amend the existing planning permit to enable them to use and develop the site for a broiler farm that can be used as either a 445,000 bird conventional broiler farm or a 400,000 free-range farm. Two dwellings are also proposed on the adjacent property to the north at 39 Clarkes Road.

Water Technology has prepared this surface water management plan, to support the planning permit application to Central Goldfields Shire Council. The report considers both the conventional and free-range farm scenarios and documents the surface water management mitigation measures required for the broiler farm operation to:

- Mitigate any environmental impacts related to potential polluted or contaminated water runoff into the downstream receiving environment; and
- Comply with the *Victorian Code for Broiler Farms* (2009) requirements.

¹ VCAT Reference no. P672/2017 & Permit Application no. PA120/16



2 SITE DESCRIPTION

The Subject Site consists of two parcels of land at 141 Clarkes Road and 39 Clarkes Road, Moolort, as shown in Figure 2-1. The parcels are bounded by Clarkes Road to the west, Joyces Creek to the east, and adjoining farmland to the north and south. It has a frontage of just over 1,600 m along Clarkes Road:

- The parcel at 141 Clarkes Road has an area of approximately 106 hectares.
- The parcel at 39 Clarkes Road has an area of approximately 107 hectares.

Joyces Creek flows from south to north along the eastern boundary of the Subject Site. The sites have been cleared and are currently used for stock grazing.

The Subject Site, west of Joyces Creek, is in the Central Goldfields Shire. Joyces Creek and land to the east of Joyces Creek are in the Mount Alexander Shire. The two parcels are currently zoned Farming Zone (FZ). There is a Salinity Management Overlay (SMO), a Land Subject to Inundation Overlay (LSIO), and an Environmental Significance Overlay (ESO1) over the low-lying land along the west (Central Goldfields Shire) side of Joyces Creek. There is an Environmental Significance Overlay (ESO5) over Joyces Creek within the Mount Alexander Shire.

The broiler farm is to be located on the western part of the Subject Site adjacent to Clarkes Road, approximately 1.1 km south of the existing broiler farms at 1480 Rodborough Road and more than a kilometre west of Joyces Creek. The proposed operation area is outside of the overlays described above.

As shown in Figure 2-2, the western boundary of the Subject Site is located on a north-south ridge-line, with the land sloping down eastwards, towards Joyces Creek.





Figure 2-1 Subject Site Locality

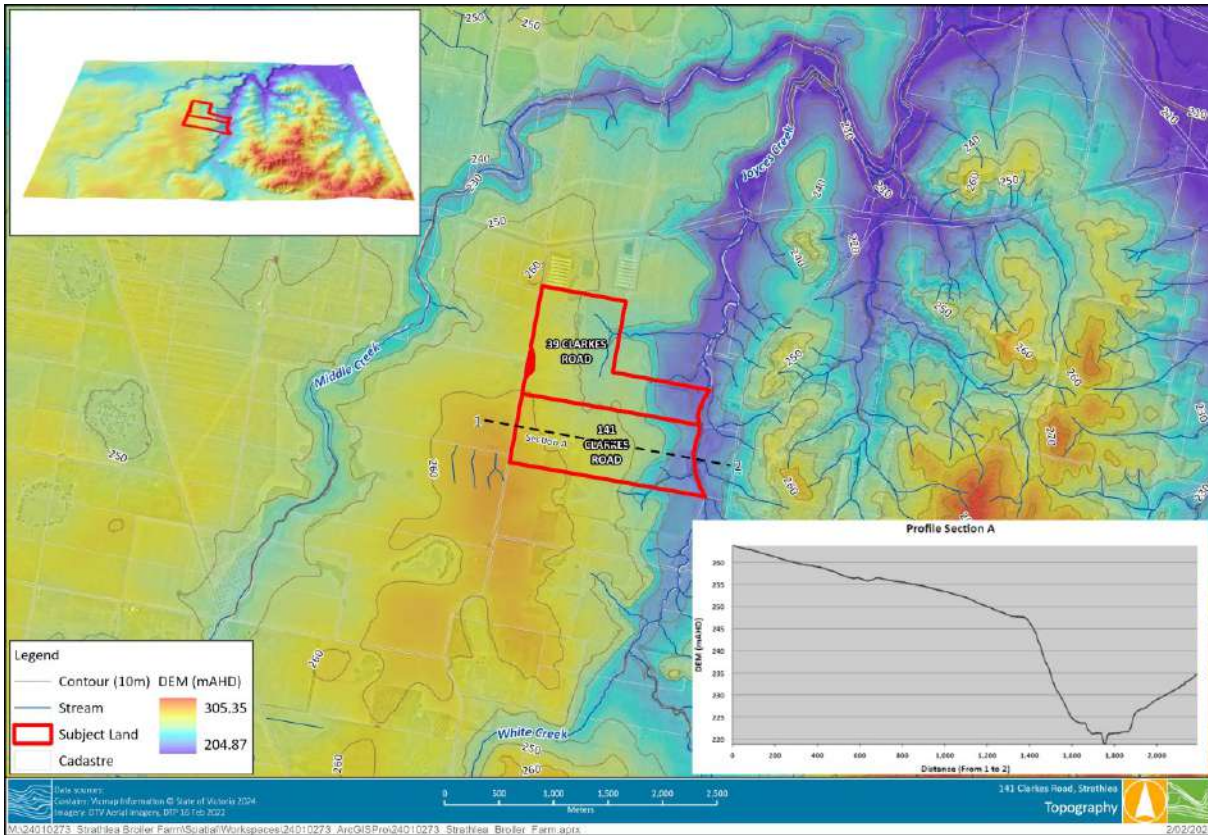


Figure 2-2 Subject Site and Surrounding Topography

2.1 Waterways

The local watercourses in the vicinity of the Subject Site (as identified on the VicMap watercourse GIS layer) are shown as pale blue lines in Figure 2-3. Joyces Creek flows south to north across the eastern part of the Subject Site. The gully leading from the area to be developed continues northward beyond the Subject Site boundary until it connects with a minor watercourse. This watercourse continues to drain northward then eastward until it joins with Joyces Creek approximately 1.6 km downstream of the Subject Site boundary.

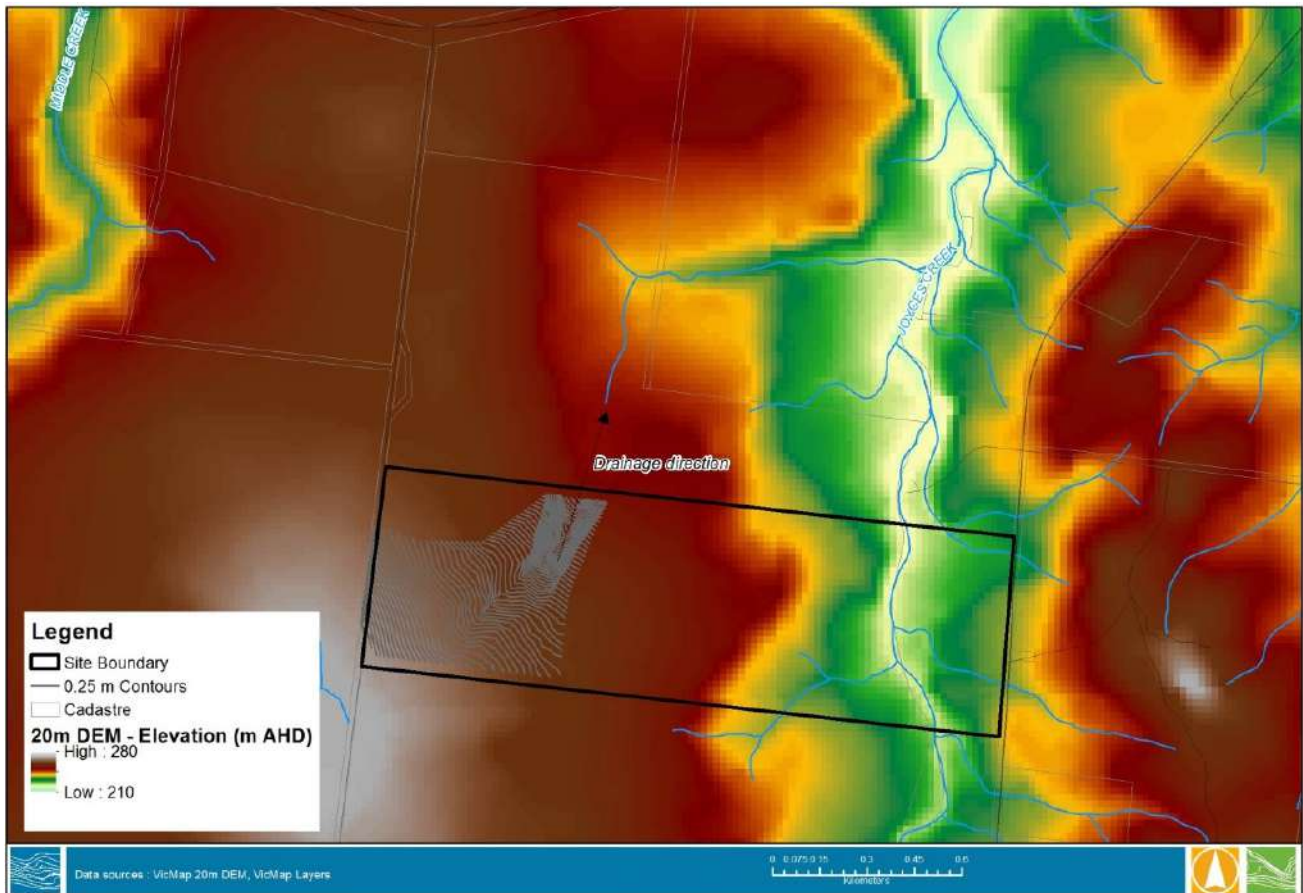


Figure 2-3 Waterways (141 Clarkes Road, Mooloort)

The catchment of Joyces Creek drains an area of approximately 187 km² upstream of the Subject Site. The catchment is shown in Figure 2-4. Joyces Creek is gauged upstream at Strathlea (DEPI site 407230). Joyces Creek is an intermittent stream which tends to remain dry through the summer and autumn months and typically experiences flows through winter and spring, and/or after periods of heavy rain. Joyces Creek flows into Cairn Curran Reservoir at Joyces Creek settlement located approximately 6 km northeast of the Subject Site. Cairn Curran Reservoir is owned and operated by Goulburn Murray Water for irrigation and domestic and stock water supply.

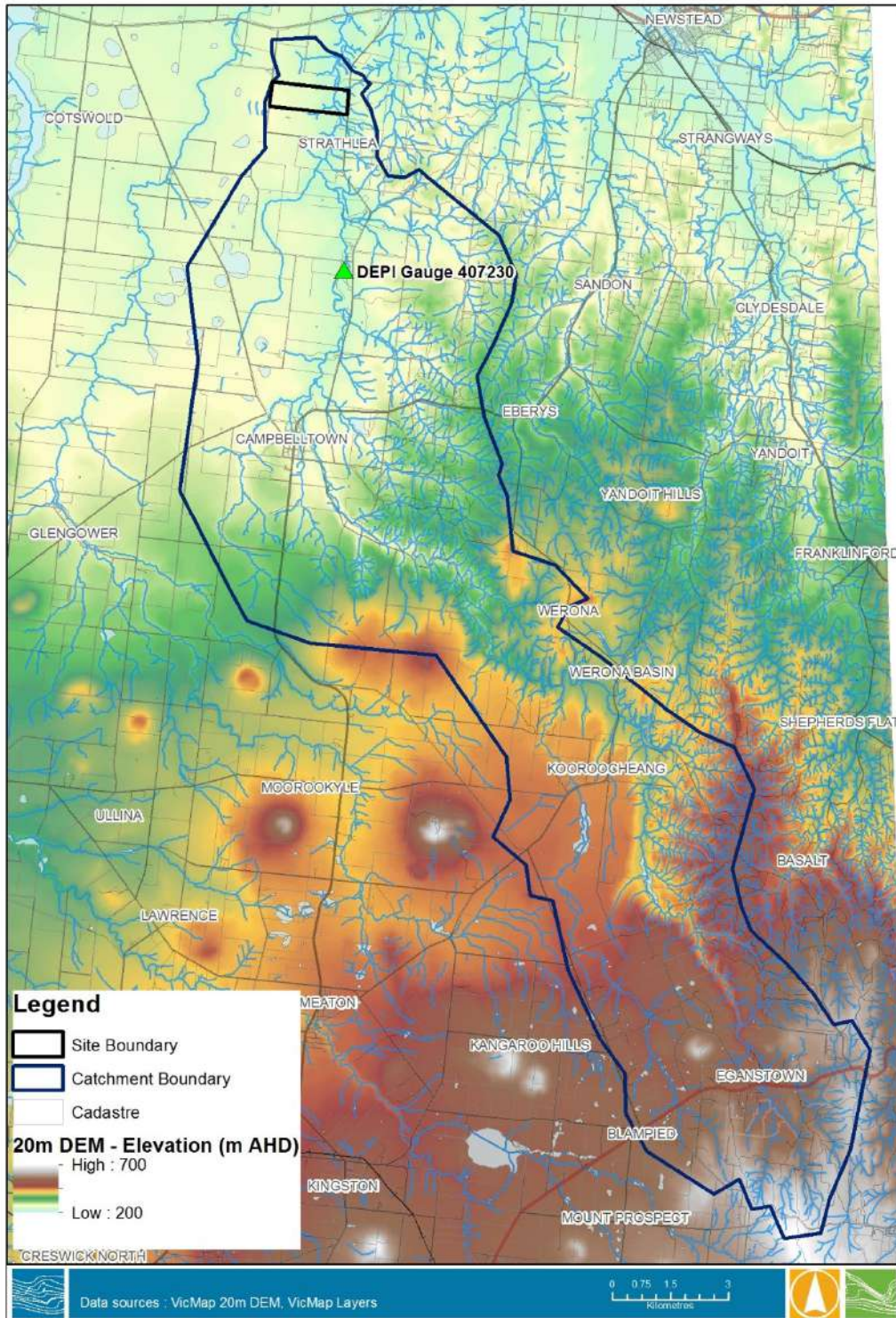


Figure 2-4 Catchment Area for Joyces Creek (141 Clarkes Road, Mooloort)



3 PROPOSED DEVELOPMENT

The proposed development is for a bird broiler farm on 141 Clarkes Road, Mooloort, located on the highest ground in the southwest corner of the Subject Site, as shown in Figure 3-1. The proposed layout of the farm is shown in Figure 3-2. It will consist of 8 sheds arranged in rows perpendicular to Clarkes Road.

Stormwater runoff from the farm will be captured and managed via a dam, sized to retain run-off from a one-in-ten-year storm in accordance with the *Victorian Code for Broiler Farms* (2009). Stormwater will also be re-used for farm water supply, supplemented by groundwater during dry periods.



Figure 3-1 Location of Proposed Broiler Farm (FocusCDS Consultants)



Figure 3-2 Layout of the Proposed Broiler Farm at 141 Clarkes Road Strathlea (FocusCDS Consultants)

ProTen Pty Ltd will operate the broiler farm either as a 445,000 bird conventional broiler farm or a 400,000 bird free-range farm.



4 GROUNDWATER ASSESSMENT

4.1 Management Area

The Subject Site is located within the Mid-Loddon Groundwater Management Area (GMA), specifically the Moolort Zone, the southernmost area of the GMA (Goulburn-Murray Water, 2023). The Moolort zone management area in 2022/23 had 23 licenced abstractions of groundwater with a licence entitlement of 3,875.4 ML/yr, however, only 1,583.3 ML was abstracted in 2022/23, approximately 41% of the licence entitlement.



4.2 Geology and Hydrogeology

There are two recognised aquifers in the Mid-Loddon GMA being the shallow Shepparton Formation and the deeper Calivil Formation, also referred to as the Deep Lead aquifer (Macumber, 2007). The Shepparton Formation generally occurs to depths of 60 m to 65 m and consists of clays and discontinuous 'shoe-string' sands, with thicker fan-delta sands best developed approximately 50 km north of the site. Groundwater flow direction is not reported for the Shepparton Formation in the vicinity of the site, largely due to the lack of abstraction from the formation and the coincidence with overly fractured rock geology.

The Calivil Formation underlies the clayey Shepparton Formation and is considered the regional aquifer in the vicinity of the site being comprised of very coarse sand, gravel and small boulders at the base of the formation in incised paleovalleys and grading upwards (getting shallower) to finer sand deposits. The Calivil Formation is about 45 m to 65 m thick and thins to the north, with groundwater flow generally from south to north (Macumber, 2007). The distinction between the deep Calivil and shallow Shepparton Formations is non-distinctive and generally determined by sediment type and colour.

It is reported by Macumber (2007) that the Moolort Zone of the GMA has extensive interbedded basalt valley flow which overlie both the deep Calivil and the shallower Shepparton Formations. The basalt flows are a fractured rock aquifer in their own right, with several monitoring bores screened in the shallow basalts. Macumber (2007) reports that groundwater within the basalt, Shepparton and Calivil Formations are interconnected as groundwater hydrographs show coincidental groundwater elevations and the same patterns of increasing and decreasing water levels. The basalt flows near Moolort, approximately 5 km north of the site, are up to 50 m in thickness.

The closest regularly monitored groundwater bore on the Visualising Victoria's Groundwater website² (accessed February 2024) is bore 138653, located on Locks Lane (Figure 4-1), approximately 3 km northwest of the Subject Site, which reported a geological profile of 7.9 m of red grey clay from surface overlaying 23.1 m of weathered basalt over a further 9 m of clay. The co-located bore (138654) report 1.5 m of red clay from surface over 2 m of 'weathered ash' (considered to be weathered basalt) over 10 m of weathered basalt and then interbedded firm and weathered basalt to 40 m depth.

Bore (89796) (Figure 4-1) located less than 1 km from the Subject Site reported 1.98 m of top red volcanic soil from surface and then hard boulders and seams of clay to 7.62 m depth underlain by basalt and bluestone to 15.85 m depth.

The three closest bores to the site, indicate that the site is likely to be underlain by clay and basaltic geologies within the uppermost 10-20 m.

4.2.1 Groundwater Levels

Groundwater levels at the Subject Site have not been recorded, however, groundwater monitoring bores at Locks Lane (Figure 4-1), approximately 3 km from the Subject Site identified as bores 138653 (screened between 78 m and 81 m depth in the Calivil Formation) and 138654 (screened from 37 m to 40 m depth screened in the basalt) are regularly monitored for groundwater levels and report groundwater levels on average deeper than 15 m below ground level (mbgl) from 2017 to 2023 in bore 138653 and on average deeper than 10 mbgl from 2017 to 2023 in bore 138654. Hydrographs for the two bores are provided below in Figure 4-2.

The general groundwater level trends from the two monitored bores suggest a slow decrease in groundwater levels from 2012 until 2022/23 where a slight increase in groundwater levels was observed, however it is

² [138653 : \(vvg.org.au\)](https://vvg.org.au)



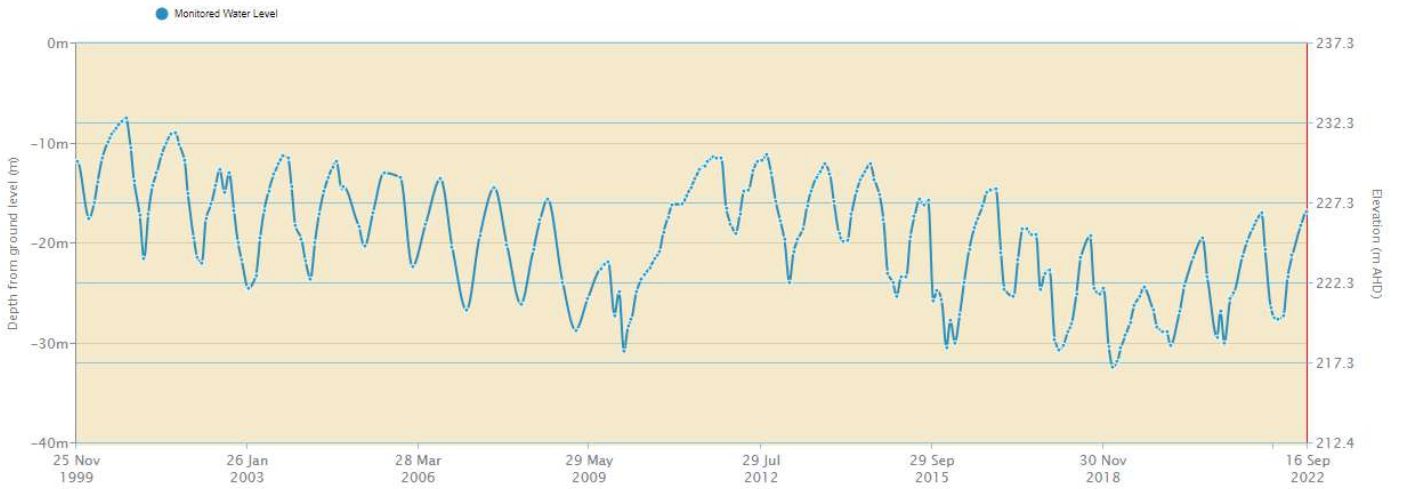
considered that this may be a response to the high rainfall year of 2022/23 and not a long-term increasing trend (Figure 4-2).

The Annual Mid-Loddon report (Goulburn-Murray Water, 2023) for 2022/23 reported annual groundwater fluctuations at the nearby Locks Lane bore (138653) due to abstraction and seasonal changes in rainfall (Figure 4-2). The report identifies that groundwater is seasonally drawn down by about 6 m by early Autumn (March) after the lower summer rainfall period, and then recovers by approximately 6 m to a post-winter high following the higher rainfall period into Spring (November).

The VVG website, returned depth to groundwater at the subject site of 20-50 m, deeper than reported at the 138653 and 138654 monitoring bores, however for a conservative approach the shallower approximate 10 m to groundwater figure has been adopted. It is therefore interpreted that groundwater is likely to be at least 10 m below ground level at the subject site.



Monitoring for bore: 138653



Monitoring for bore: 138654

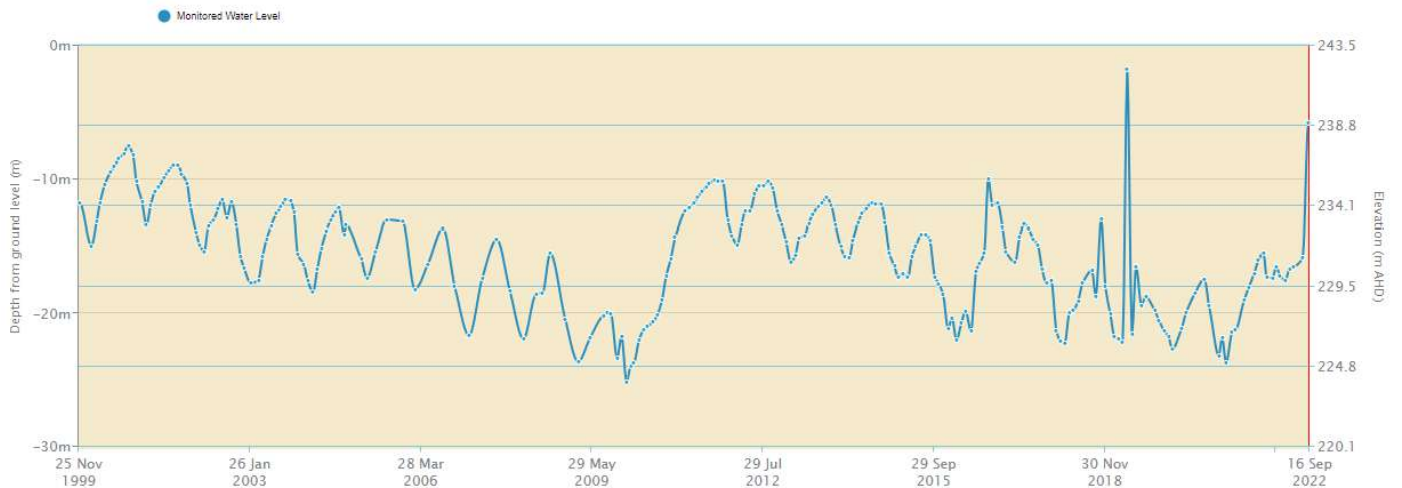


Figure 4-2: Groundwater Hydrographs from VVG^{1, 3}

³ [138654 : \(vvg.org.au\)](http://138654.vvg.org.au)

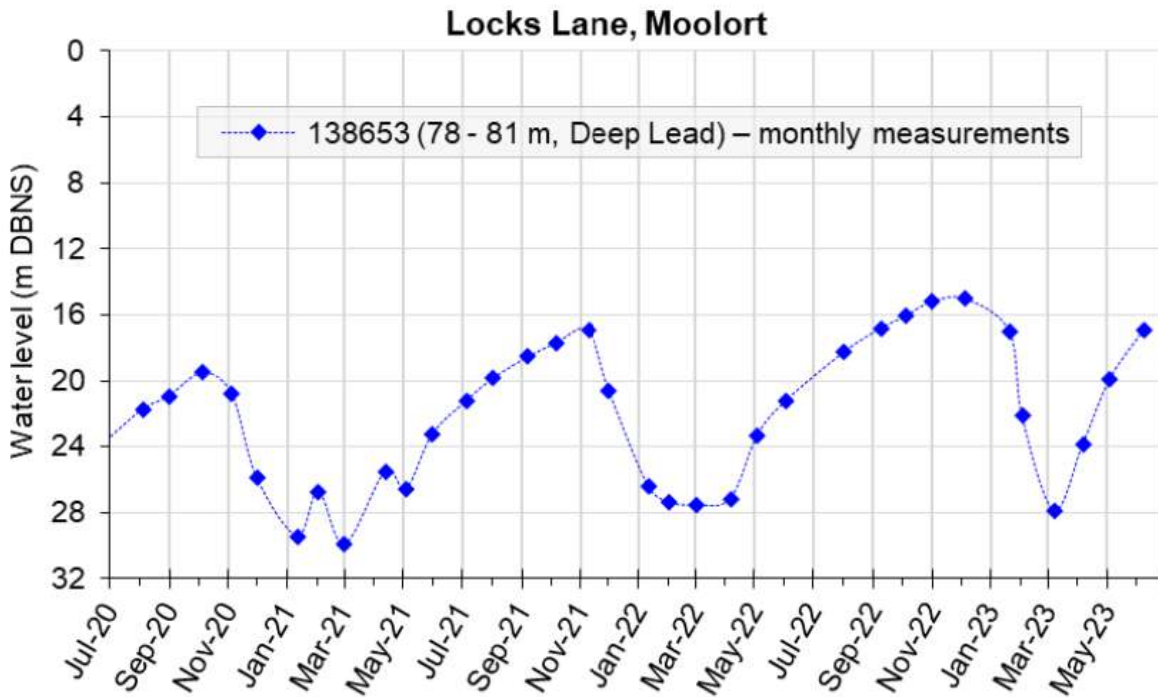


Figure 4-3: Locks Lane Groundwater Bore (138653) Monthly Groundwater Levels (Goulburn-Murray Water, 2023)

4.2.2 Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) were identified within 2 km of the Subject Site (Figure 4-4). Based on the depth to groundwater and local clayey soils, the risk to groundwater is considered small and therefore GDEs at greater distances were not considered likely to be impacted by any potential nutrient export from the proposed broiler farm. Two waterways located to the east (Joyces Creek) and west (Middle Creek) are reported as having a high and moderate, respectively, potential for groundwater interaction from the fractured rock basaltic aquifer. However, at over 1 km from the subject site it is not considered that the broiler farm will have any impacts on the two waterway systems from a groundwater perspective.

There is a named wetland located approximately 1 km to the southwest of the Subject Site, identified as White Swamp on the VVG website, and having a low potential for groundwater interaction. Therefore, it is not considered likely to be impacted by any operations at the Subject Site. An unnamed wetland located south of the Subject Site is also reported to have a low potential for groundwater interaction and therefore not considered at any risk from the proposed broiler farm.

There are no identified springs within 2 km of the Subject Site.

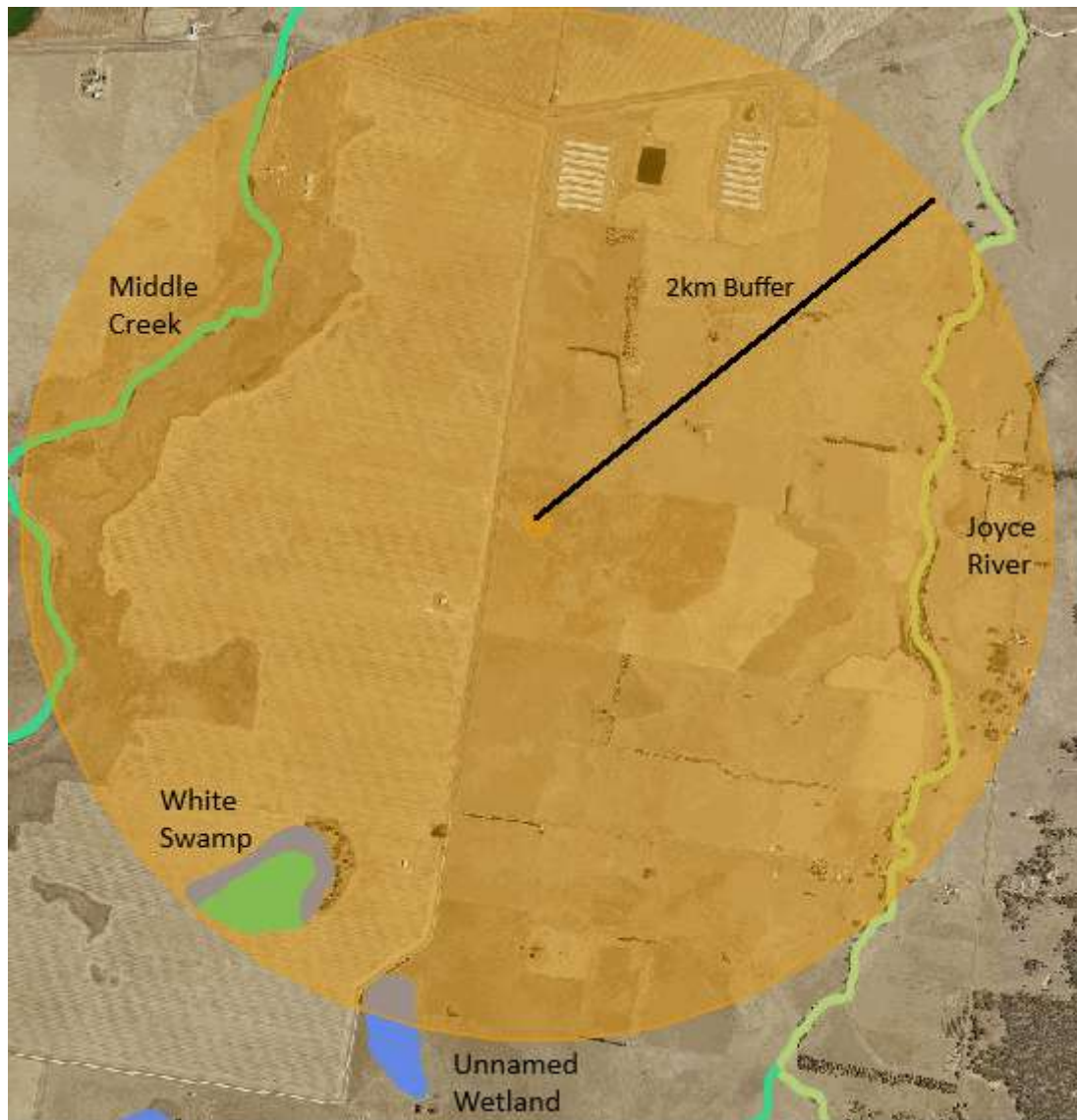


Figure 4-4: GDEs within a 2km buffer

4.2.3 Soils

The VVG website identifies that the soils in the vicinity of the Subject Site are vertisol class soils which are described as:

“Clay soils with shrink-swell properties that exhibit strong cracking when dry and at depth have slickensides and/or lenticular peds. Although many soils exhibit gilgai microrelief, this feature is not used in their definition.” And as having a “clay field texture or more than 35% or more clay thought the solum”

By the Australian Soil Classification (ASC) (Isbell, 2002). The vertisol (cracking clays) classification identifies the soils as high clay content indicating a low likelihood of infiltration of surface water to groundwater.

Based on the reported clayey soil type, the soil phosphorus level and the Phosphorus Buffering Index (PBI) was determined from the detailed description provided in Tables 22 and Table 23 respectively of Appendix C of the Egg Industry Environmental Guidelines (McGahan et al 2018). The clay based vertisol soil was



determined to have a soil phosphorus level of <24 (low) and a PBI of <280 (low) for surface water risk assessment purposes.

4.2.4 Rainfall

Rainfall data was sourced from the Bureau of Meteorology Bridgewater weather station (station 81058), which is located 70 km north of the Subject Site and is considered to be representative of the entire GMA which is approximately 140 km in length, with Bridgewater being located roughly in the centre of the GMA.

The Bridgewater station recorded 652 mm of rain in the 2022/23 water year, reported as the 2nd highest rainfall total in the last 50 years (Goulburn-Murray Water, 2023). The Annual report provided a rainfall graph (Figure 4-2) from 1974 to 2023 indicating that rainfall has generally been below the long-term average with occasional years of high rainfall, but in general there is a deficit in rainfall compared to the long-term average. It is noted that 2010/11 and 2022/23 were above average rainfall years resulting in flooding and likely increased groundwater recharge.

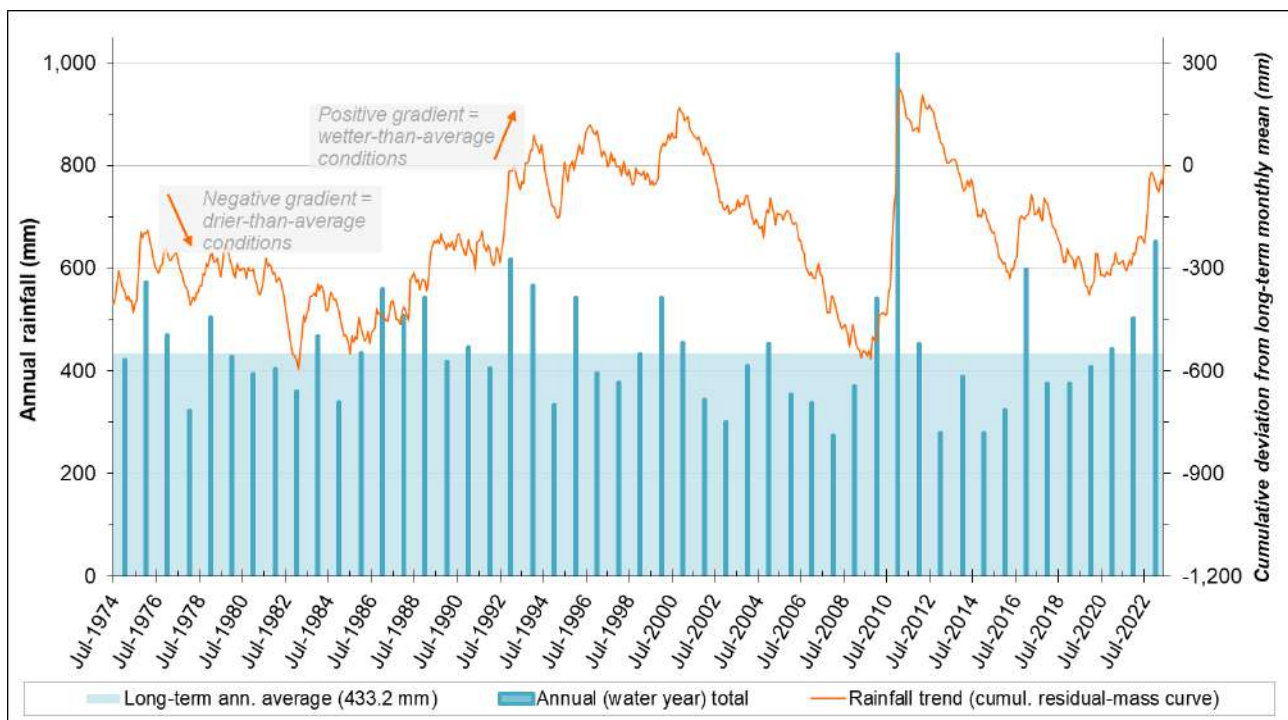


Figure 4-2 Rainfall recorded at Bridgewater (BOM: 81058) July 1974 to June 2023 (Goulburn-Murray Water, 2023)



5 BROILER FARM - NUTRIENT RISK ASSESSMENT

Poultry manure contains high levels of nitrogen, phosphorus and potassium. These nutrients may result in downstream contamination and/or the potential for blue-green algal blooms receiving waters.

A nutrient risk assessment for the proposed facility has been undertaken, based on the methodology detailed in Appendix C of the *Egg Industry Environmental Guidelines* (McGahan *et al* 2018). This methodology considers a range of factors, including rainfall characteristics, farm size, stocking rates, land shape, ground cover and a range of different soil parameters.

The following sections provide the background information utilised in the Risk Assessment for both surface water and groundwater.

5.1 Groundwater Risk Assessment

Based on the methodology and discussions provided in detail in Appendix C of the Egg Industry Environmental Guidelines (McGahan *et al* 2018), the following Nutrient Loading Risk Assessment for Groundwater has been developed. The results of the assessment are summarised in Table 5-1 for groundwater. The nutrient risk assessment results in an overall risk score for the facility of 285 for groundwater. This score fits the “Low Risk” band (scores of 100 to 400) as provided in the Guidelines. These results suggest the facility presents a low environmental risk in relation to the potential impacts of nutrient loading on groundwater.



Table 5-1 Nutrient Loading Risk Assessment for Groundwater

		Low	Moderate	High	Very High	Score	Risk for Factor	Comment
Runoff Factors	Factor Weight	1	2	4	8		Weight x Score	
Soil Profile	25	Heavy clay to surface: • Cracking clays • black earths	Constrained soils: • Duplex soils • Solodic soils	Poorly structured soils: • Massive earths	Well structured/draining soils: • Structured earths • Structured loam soils • sand	1	25 (25x1)	Based on the VVG designation of vertosol (cracking clay) soils and geological logs from near vicinity groundwater bores.
Groundwater	20	>10 m to GW where protected by clay or impermeable strata (otherwise >20m)	>2 m to GW where protected by clay or impermeable strata (otherwise >10m)	>2 m to unprotected GW	<2 m to unprotected GW	1	20 (20x1)	Based on a clay-based topsoil and monitored groundwater levels at nearby bores of >10 m to groundwater over the previous 6 years.
Rainfall (mm/yr)	20	<5,000	5,000 - <10,000	10,000 - 20,000	>20,000	1	20 (20x1)	Based on the average rainfall at Bridgewater of 652 mm/yr
Pasture Type	15	>30% Lucerne	>30% deep rooted perennials	>30% shallow rooted perennials	<30% perennials	4	60 (15x4)	The pastures in range areas will be managed to maintain at least 80% vegetation coverage (EMP)



Farm Size (# of birds)	15	<10,000	10,000 - <60,000	60,000 - <250,000	>250,000	8	120 (15x8)	Based on a maximum stock of 400,000 birds (under free-range scenario)	
Stocking Rate (birds/ha)*	5	<750	750 - <1,500	1,500 - <5,000	>5,000	8	40 (5x8)	Between 35,000 and 40,000 birds/ha	
Risk Assessment Score								285	Low Risk 100 – 400 High risk 400 – 600 Very High >600



5.2 Surface Water Risk Assessment

Based on the methodology and discussions provided in detail in Appendix C of the Egg Industry Environmental Guidelines (McGahan et al 2018), the following Nutrient Loading Risk Assessment for surface water has been developed. The results of the assessment are summarised in Table 5-2 for surface water. The nutrient risk assessment results in an overall risk score for the facility of 330 for surface water. This score fits the “Low Risk” band (scores of 100 to 400) as provided in the Guidelines. These results suggest the facility presents a low environmental risk in relation to the potential impacts of nutrient loading on surface waters.



Table 5-2 Nutrient Loading Risk Assessment for Surface Water

		Low	Moderate	High	Very High	Score	Risk for Factor	Comment
Runoff Factors	Factor Weight	1	2	4	8		Weight x Score	
Rainfall factor	20	<5,000	5,000 - <10,000	10,000 - 20,000	>20,000	1	20 (20x1)	Based on the average rainfall at Bridgewater of 652 mm/yr.
Distance to waterways	15	>200m	100-200m	30-100m	<30m	1	15 (15 x 1)	Greater than 300m (waterways to the east)
Farm Size (# of birds)	15	<10,000	10,000 - <60,000	60,000 - <250,000	>250,000	8	120 (8 x 15)	400,000 free-range farm
Soil Profile	10	Well structured/draining soils: • Structured earths • Structured loam soils • sand	Poorly structured soils: • Massive earths	Constrained soils: • Duplex soils • Solodic soils	Heavy clay to surface: • Cracking clays • black earths	8	80 (8x10)	Based on the VVG designation of vertosol (cracking clay) soils and geological logs from near vicinity groundwater bores.
Land Shape	10	Swales and contour banks	Uniform flat or sloping land	Slightly uneven, minor rills	Highly concentrated gully flow	2	20 (2 x 10)	Sloping land (west to east)
Groundcover	10	80-100%	60-<80%	45-<60%	<45%	1	10	The pastures in the range areas will likely



							(1 x 10)	be >85%
Stocking Rate	5	<750 birds/ha	750 - <1,500 birds/ha	1,500 - <5,000 birds/ha	>5,000 birds/ha	8	40 (8 x 5)	Between 35,000 and 40,000 birds/ha
Slope	5	<1	1-<3.75	3.75-15	>15	2	10 (2 x 5)	~1.6% slope - calculated from LiDAR
Soil P	5	Refer to explanatory notes (Egg Industry Environmental guidelines - Appendix C)				1	5 (1 x 5)	The clay based vertosol soil was determined to have a soil phosphorus level of <24 (low)
Topsoil PBI	5	>280 (clay)	140-280 (clay loam)	35 -<140 (sandy loam)	<35 (sand)	2	10 (2 x 5)	The clay based vertosol soil was determined to have a PBI of <280 (low)
Risk Assessment Score							330	Low Risk 100 – 400 High risk 400 – 600 Very High >600



5.3 Waterway Setback

Nutrient levels decrease significantly with distance from poultry sheds (see Figure 5-1). The shed closest to the designated waterway is more than 1000 m from the Joyces Creek and 500 m from the minor watercourse located to the north of the proposed development area. Additionally, manure deposition in areas more than 25 m away from a fixed shed only represent about 2% of total manure deposition (Wiedemann et. al., 2018, Larsen et al., 2017)⁴. The lower nutrient concentration and higher groundcover (minimum 80% vegetation coverage) in the pastures in the range areas pose a reduced environmental risk, even on high risk sites. Wiedemann et al. (2018) showed nutrient levels in areas more than 25 m away from sheds, “were typically within acceptable agronomic ranges for crop and pasture production and management”.

Additionally, the proposed stormwater management strategy incorporates a sediment basin and retention dam located between the proposed sheds and the receiving waterway, that will retain runoff from the proposed development site. The dam will have the capacity to retain the 1 in 10 year ARI flow volume, refer to Section 6.

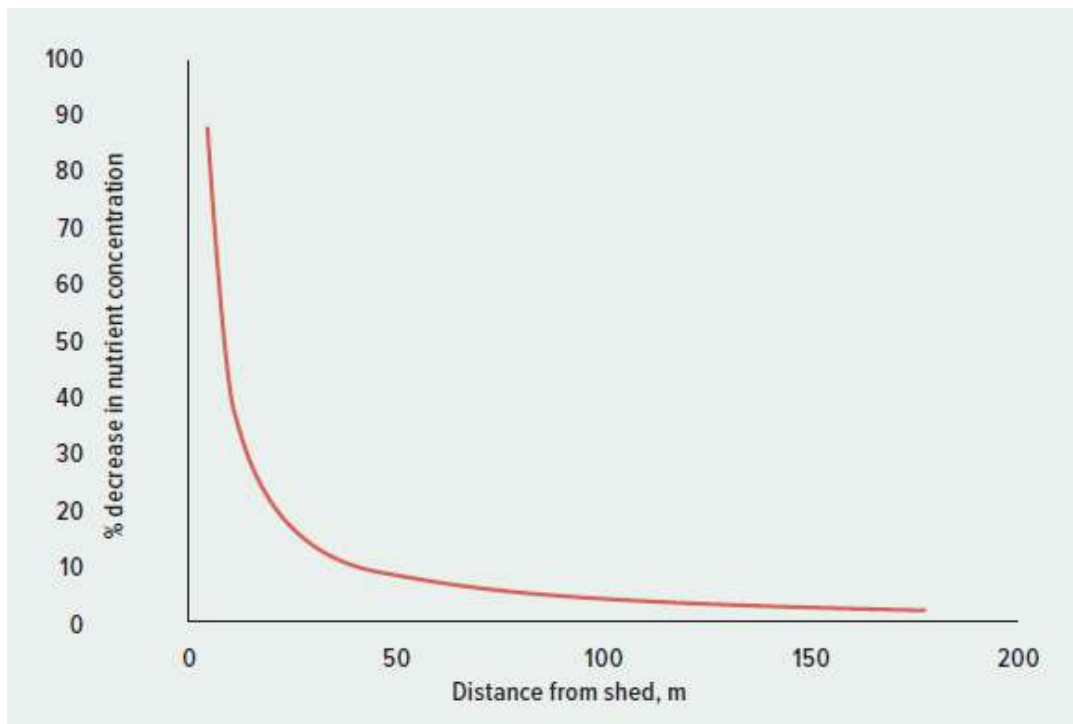


Figure 5-1 Combined soil nutrient (nitrate-N and available-P) levels and distance from shed (Wiedemann et. al., 2018, from Enviro Fact Sheet *Free Range Production: Management of range areas*)

5.4 Summary

The nutrient risk assessment results suggest the development is not likely to cause any contamination to groundwater and the downstream waterways, indicating no further investigations are required. Appropriate design and operational measures will further mitigate risk, as discussed in the following section.

⁴ Both cited in the Enviro Fact Sheet [Free Range Production: Management of range areas](#)



6 BROILER FARM STORMWATER MANGEMENT

This section documents the proposed surface water management when the site operates as a broiler farm, with up to 445,000 birds on site.

The following are key elements of the proposed on site stormwater management strategy:

- Cleaning of sheds is done by removal of litter by bobcat followed by disinfection by high-pressure low-volume sprays. The sheds have dwarf concrete walls and floors to ensure no inflow or outflow of stormwater.
- Shed roofs are not guttered and roof runoff occurs directly to open grassed swales alongside and between the sheds.
- Stormwater runoff from the site (including grassed areas between sheds) is directed to a dam to the north-east of the proposed development via grassed swales.
- Water quality treatment measures are to be located upstream of the retention dam:
 - The proposed treatment train is discussed in Section 6.
- The dam will have the capacity to retain the 1 in 10 year ARI storm flow volume:
 - Sizing of the dam is supported by a detailed water balance analysis, discussed in Section 6.4.
- Groundwater will be used supplement the dam water supply during dry periods.
- Runoff from catchment areas upstream of the site is directed around the site and dam by cutoff drains and bunds (hence the dam is not “online” to the local runoff path).

Figure 6-1 show a schematic of the proposed stormwater concept design for the site.

The following sections detail:

- How external flows are managed relative to the development area:
- The proposed water quality treatment train for stormwater runoff generated within the site, which consists of:
 - Bunding and diversion of stormwater flows entering the site to avoid the mixing of runoff from within the free-range grazing areas and external catchment flows.
 - Vegetated buffer strips.
 - A sedimentation pond at the outfall of the swale (before dam).
 - A retention dam.

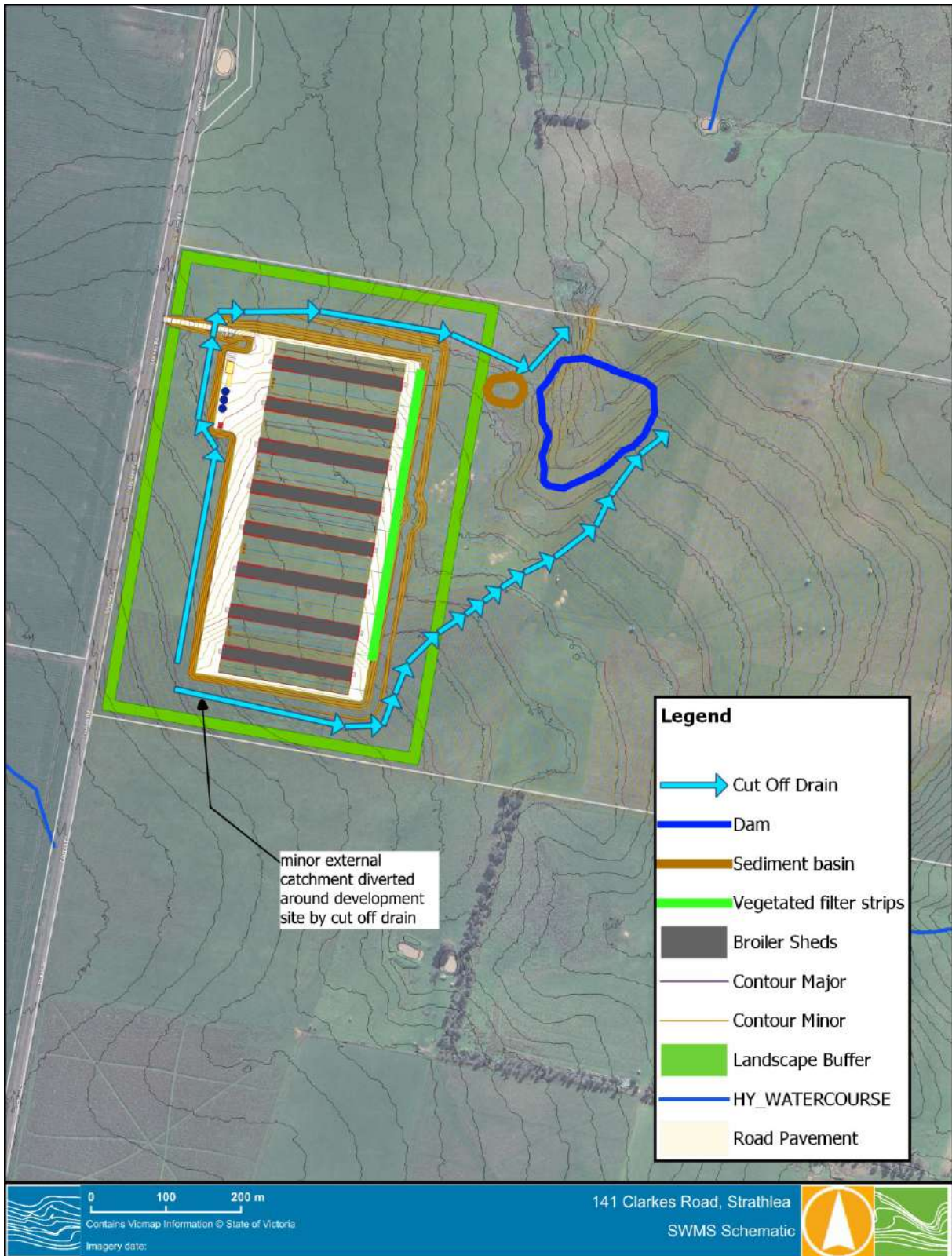


Figure 6-1 Stormwater Management Strategy Schematic



6.1 Free-range Areas

The free-range area between the sheds is to be drained to ensure all runoff travels north-east toward the treatment area and subsequently via the sedimentation basin to the dam for retention and re-use. All runoff from the free-range area for events up to a 10% AEP storm will be retained. The development area will be bunded and provided with cut-off drainage to ensure all external runoff from the south-western external catchment is directed around the sheds and does not mix with the free-range areas.

6.2 Water Separation

Roof water will mix with surface water from the free-range areas. Separation of these water sources is not proposed within the stormwater management strategy. The stormwater treatment measures (swales and ponds) associated with the development areas have been sized accordingly.

6.3 Water Quality Assets

The runoff will be treated by a Vegetated Filter Strip and a sedimentation basin before flowing into the retaining dam.

6.3.1 Vegetated Filter Strip

A Vegetated Filter Strip will be constructed immediately upstream of the sedimentation basin. The Vegetated Filter Strip was sized in accordance with *Egg Industry Environmental Guidelines (Edition II – McGahan et al., 2018)*. The Vegetated Filter Strip width was determined to be a minimum of 2 m. Calculations supporting the concept design are provided in Appendix B.

6.3.2 Sedimentation Basin

A sedimentation basin will be constructed immediately upstream of the retaining dam. The sedimentation basin is sized to ensure >99% capture of 125 µm particles. The sediment basin provides two primary functions. Firstly, it assists in the control of nutrients by trapping fine sediments as nutrients (particularly phosphorus) are often bound in particulate form to the sediments. Secondly it minimises siltation of the dam and hence benefits the maintenance regime, as it is easier to desilt the sediment pond than the dam. Typical details of a sedimentation basin are shown in Figure 6-2 and Table 6-1. Calculations supporting the concept design are provided in Appendix B. Recommended management and maintenance regimes are also detailed in Appendix B.

Table 6-1 Sedimentation Basin Summary

Item	
Design Flow	0.127 m ³ /s
Sedimentation Basin Normal Water Level Surface Areas	600 m ²
Capture Efficiency	99%
Permanent Water Depth	1.5 m

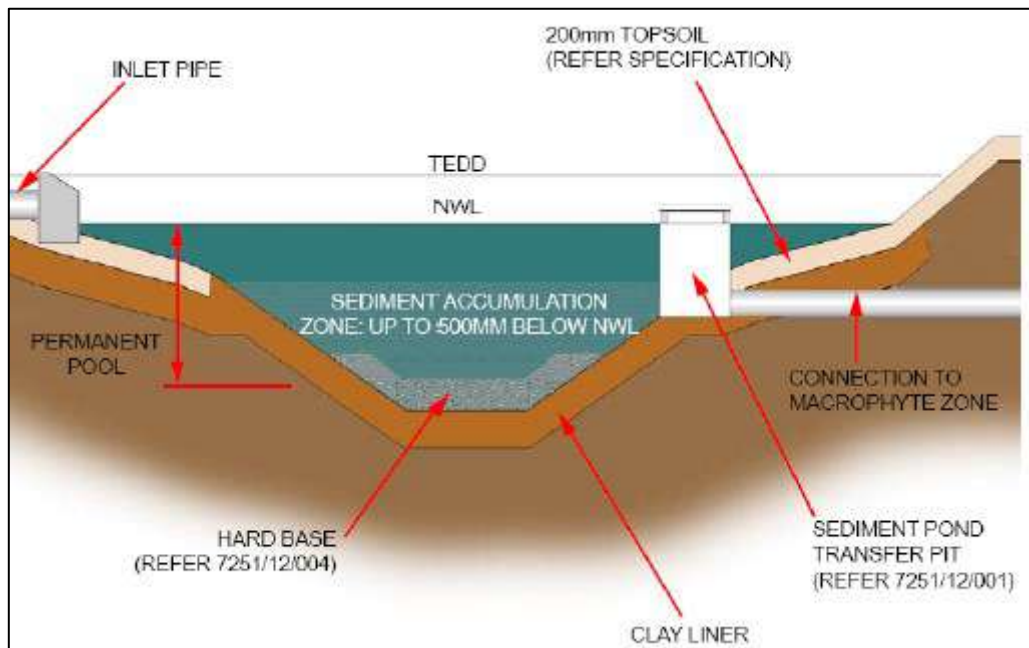


Figure 6-2 Typical Details of Sedimentation Basin (source: Melbourne Water)

6.4 Retention Dam

The proposed dam is sized to retain the 1 in 10 year ARI flow from the broiler farm site. A water balance analysis was undertaken which comprised the following steps:

1. Definition of the area and type of contributing sub-catchments;
2. Derivation of dam inflows, outflows and any losses:
 - a. Scenarios for the conventional operation (445,000 birds) and the free-range operation (400,000 birds) were considered.
3. Computation of the water balance and dam water level fluctuations for an extended period of available rainfall data.
4. Indicative sizing of the dam (stage-storage relationship) to comply with the *Victorian Code for Broiler Farms* (2009) requirements.

Two scenarios were considered in sizing the retention dam:

- With water re-use from the retention dam.
- Without water re-use from the retention dam.

6.4.1 With Water Re-use

Dam water would be re-used to meet poultry seasonal water consumption rates, as follows:

- Chicken drinking water consumption of 8 L per bird per batch
- Cooling water consumption of 12 L per bird per batch in the warm season
- 3.4 batches in the cool season (April to October)



- 2.2 batches in the warm season (November to March)

Under the development proposal 400,000 birds was conservatively adopted to assess the size of a required retention dam (that is less re-use and more water in the dam).

This resulted in a cool season consumption estimate for the facility of 51,810 L/day, and a corresponding warm season consumption estimate of 117,333 L/day.

Proten have advised that approximately 8 ha of free-range and surrounding areas will be irrigated. They anticipate doing this 10 times per year with an application rate of about 0.2 ML/ha. This resulted in an additional of 16 ML/year of dam water re-used for irrigation. The water balance assumed that this would be applied on a daily basis, on a rate of ~44 m³/day.

Top-up pumping (from groundwater) would be required to maintain operational supply. The average annual water balance deficit is 13.68 ML/y. It is noted that, based on the VVG website, the site is located in an area of high salinity of 7,000 – 13,000 mg/L indicating groundwater may be unsuitable as livestock drinking water⁵ without treatment. It is also noted that other water quality treatment measures (for bird health/bio-security reasons) may be required to enable water re-use. This is a separate consideration to the downstream receiving environment issues addressed in this report.

The retention dam size is 76,400 m³, with a footprint of about 1.9 ha.

6.4.2 Without Water Re-use

The retention dam was also sized considering no water re-use for landscape irrigation and bird drinking water and cooling. The design of the dam was therefore revised to understand the asset footprint, dependent on the level of water re-use allowed for.

Without water re-use, the retention dam size would be significantly larger, about 241,000 m³, with a footprint of about 5.4 ha. There is ample space within the Subject Site to accommodate either design,

6.4.3 Water Balance Summary

Table 6-2 summarises the retention basin sizing. Calculations supporting the concept design are provided in Appendix A.

⁵ <500 mg/L, as per (draft) *Livestock drinking water quality guidelines – Australia and New Zealand* (November 2023)



Table 6-2 Water Balance Results – Retention Dam Sizes

	Option A - With Reuse and Landscape Irrigation*	Option B – Without Re-use
Dam Storage (m ³)	76,374	240,751
Dam Area (m ²)	18.762	54,176
Dam Max depth Adopted (m)	5	5
Number of days over topping in 27 years (Max 10 allowable events in 100 years)	5 (2 events, i.e. consecutive days)	4 (3 events, i.e. consecutive days)

*Reuse determined conservatively based on 400,000 birds

6.5 Impacts on the local and regional drainage system and catchments

The water balance modelling has demonstrated that average outflow volumes from the dam are likely to be approximately 99% less than existing runoff volumes (for the sheds, free-range area and access tracks etc). Therefore, any impact on the local and regional drainage system would be due to a flow reduction resulting from retention of flows from the dam catchment and re-use.

As a worst-case scenario (in events which are completely captured by the dam), the proposed broiler farm will result in approximately 16.29 hectares of land being effectively removed from the catchment of Joyces Creek. This equates to a reduction in area of the catchment of Joyces Creek of less than 0.1%.

The method used to adjust the peak flows to the smaller catchment area, based on techniques described by Grayson et al. (1996)⁶, is represented by the following equation:

$$\frac{Q_d}{Q_e} = \left(\frac{A_d}{A_e}\right)^b$$

Where:

- Q_d = discharge in developed conditions
- Q_e = discharge in existing conditions
- A_d = catchment area under developed conditions
- A_e = catchment area under existing conditions
- b = exponent

A value of 0.7 for exponent b is recommended for situations where limited or no catchment data is available (Grayson et al. 1996).

Based on this equation the reduction in catchment area would be expected to have the effect of reducing flows in Joyces Creek downstream of the site by about 0.06%. From this analysis it is concluded that the proposal will have no measurable impact on the surface water flow volumes or water quality in the Joyces Creek system.

The proposed development is unlikely to result in increases in flow in any storms up to the 1 in 100 year ARI, due to the retarding effect of the storage within the dam.

⁶ Grayson, R.B., Argent, R.M., Nathan, R.J., McMahon, T.A. and Mein, R. (1996) Hydrological Recipes: Estimation Techniques in Australian Hydrology. Cooperative Research Centre for Catchment Hydrology, Australia, 125 pp.





7 SUMMARY

This report sets out a recommended Stormwater Management Plan for the facility at 141 Clarkes Road, Strathlea. It has been prepared to support an amendment to a planning permit granted by VCAT to enable the use and development of the site for a broiler farm that can be used as either a 445,000 bird conventional broiler farm or a 400,000 free-range farm.

Two dwellings are also proposed on the adjacent property to the north at 39 Clarkes Road. These will have no significant hydrologic impact on the site or downstream environment and do not require any detailed investigation.

This Stormwater Management Strategy outlines how stormwater from the site will be captured, stored, treated and disposed of, In particular:

- Diversion of overland flow entering the site from the south-west from entering the poultry farm area and associated retention dam in events up to 10% AEP design storm.
- A proposed water quality treatment train conveying runoff from the free-range area to a proposed dam to avoid pollutants being washed offsite during storm events up to and including the 10% AEP storm event. The treatment train consists of:
 - Swales and Vegetated Buffer Strip;
 - A 600 m² sedimentation basin; and
 - A retaining dam.

The swale, buffer strip and sediment pond will allow for pre-treatment of surface runoff prior to the dam. These measures in conjunction with an appropriate maintenance regime will allow for appropriate water quality to be maintained within the dam.

There will be no discernible impact on the flow or water quality within Joyces Creek and the downstream environment.





APPENDIX A WATER BALANCE MODEL





A water balance model for the poultry farm draining to the retention dam was developed to assess the likelihood of the dam overflowing. The dam is expected to retain the 10% AEP flow originating from the free-range area. It is estimated that an area of approximately 18.97 ha will drain to the dam (refer Figure 6-1), via a swale and sedimentation basin. A number of conservative assumptions have been adopted including ignoring dust suppression demands within the site.

A MUSIC model (Figure A-1) was built to determine the flows to the proposed dam generated by the development area, as a result of long-term rainfall and catchment conditions.



Figure A-1 MUSIC Model Schematic



A-1 Stage-Storage Relationship

The adopted stage-storage relationship is shown in Table A-1.

Table A-1 Dam Stage Storage Relationship

Stage (m)	Storage (m ³)	Area (m ²)
0.00	-	-
0.25	3,003	12,180
0.50	6,090	12,519
0.75	9,262	12,859
1.00	12,520	13,200
1.25	15,862	13,542
1.50	19,290	13,884
1.75	22,804	14,227
2.00	26,404	14,571
2.25	30,090	14,916
2.50	33,862	15,262
2.75	37,721	15,608
3.00	41,667	15,955
3.25	45,699	16,303
3.50	49,818	16,652
3.75	54,025	17,002
4.00	58,319	17,352
4.25	62,701	17,703
4.50	67,171	18,055
4.75	71,728	18,407
5.00	76,374	18,761

A-2 Dam Inflows and Outflows

Components of the water balance include dam inflows and outflows. In the case of this dam, the known inflows are catchment runoff. The known outflows are evapotranspiration, seepage, offtake for use in the poultry sheds and overflow.

A-2-1 Rainfall and Catchment Runoff into Dam

Rainfall data from the Bureau of Meteorology's (BoM) weather station at Joyce's Creek was used in the MUSIC modelling for the period 1987-2014. The hard stand areas, driveways and sheds, have been included in the MUSIC model with a single node. Vegetated areas within the local dam catchment were incorporated into the MUSIC model as a separate node. The vegetated areas are represented as 10% Fraction Impervious (FI) and the hardstand area is 90% FI.

A-2-2 Evaporation and Evapotranspiration and Dam Seepage

Mean monthly pan evaporation and potential evapotranspiration (PET) data were obtained from BoM gridded data for Moolort and adopted for modelling dam evaporation losses in the water balance model. The adopted mean monthly evaporation estimates are shown in Figure C-2. Seepage is the rate at which water seeps into



the ground (i.e. water loss through infiltration from the dam). A conservative seepage value of 0.00 mm/hr was applied based on the assumption that the proposed dam will be clay-lined.

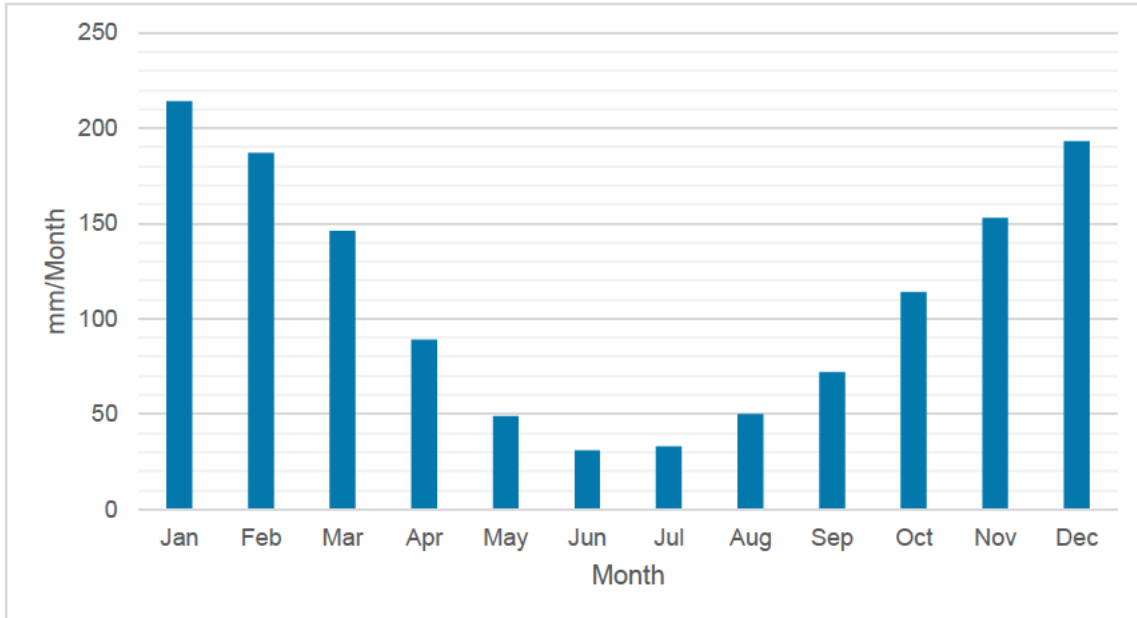


Figure C-2 Mean Monthly Evaporation Rates for Moolort (BoM)

A-2-3 Outflow and Overflow

Spillway overflow will occur when the water level exceeds the crest of the dam embankment (approximate depth of 5 m) at the north-east of the dam. The rate of spillway overflow was assumed to be unlimited for the purpose of water balance modelling, though in reality it cannot exceed the rate of inflow.

Re-use demand was adopted as per Section 6.4.1.

A-3 Water Balance Results

Average inflows, rainfall and losses (seepage and evaporation losses) are summarised in Table A-3 for the development scenario adopting re-use onsite. The modelled water level between 1987 and 2014 is shown as the green line in Figure C-4. During that period, the dam spillway is triggered 2 times over a 27-year period, including during periods of abnormally wet weather (almost consecutive period of spillway overflow).

Table A-2 Average Inflows, Rainfall and Losses

Water Component	Average (m ³ /year)
Direct Rainfall	9,659
Inflow	41,830
Outflow (reuse)	44,965
Evaporation	19,300
Seepage	0
TOTAL	-19,395

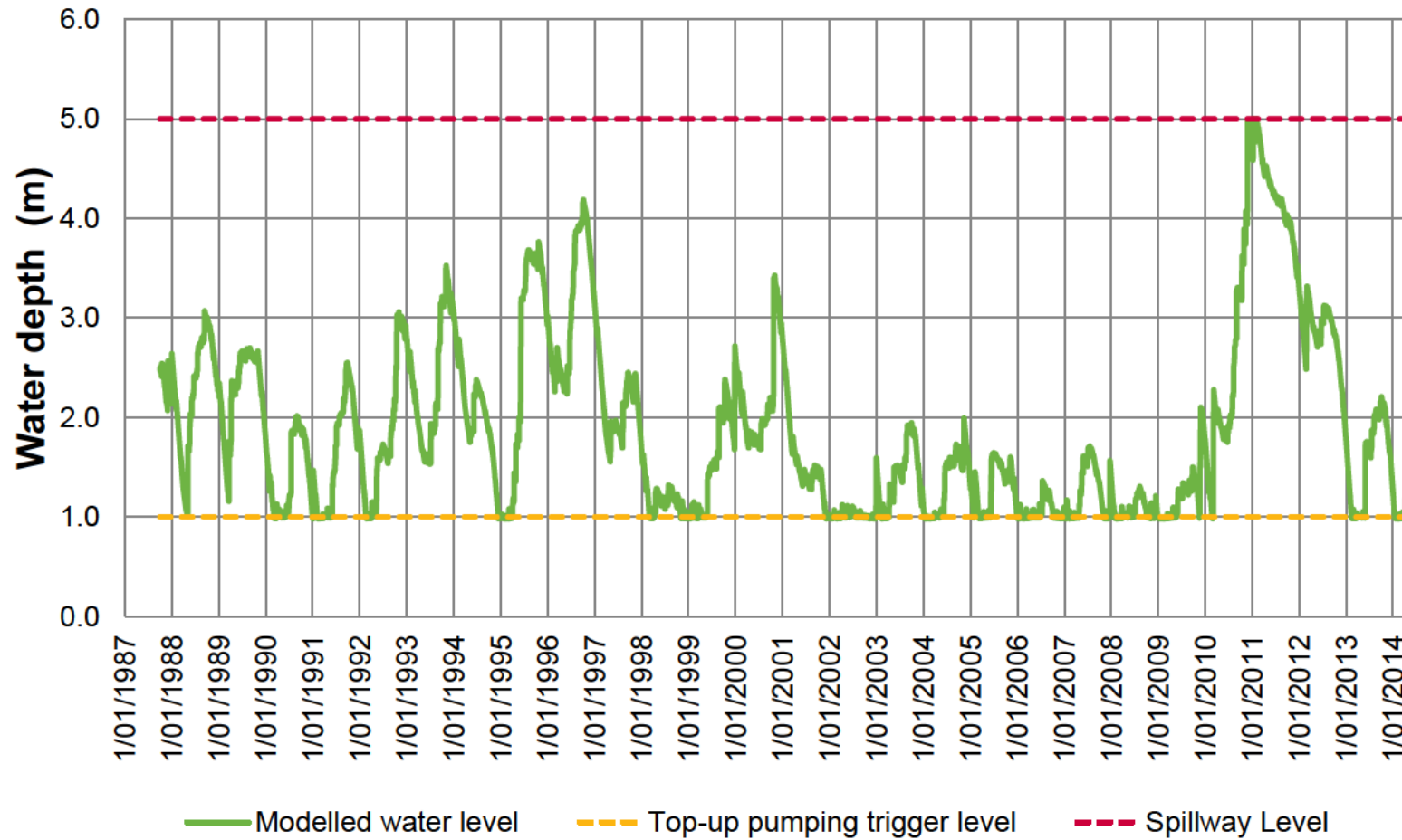


Figure C-4 Modelled Water Levels in the Proposed Dam (1987-2014) – with Irrigation & Water Re-use





APPENDIX B STORMWATER CONCEPT DESIGN





B-1 Swale

The external catchment areas will be diverted around the development by swales and bunds, as discussed in Section 6. The design parameters and expected flow rates are shown in Table B-1. Indicative swale alignments are shown in Figure 6-1. The swales were sized to convey the 10% AEP flow (Q₁₀), using a Mannings calculation with flows adopted from a Rational Method that uses BoM 2016 IFDs. The slopes of the swales have a 1 in 200 design gradient.

Table B-1 Swale Details (indicative)

Area	Catchment (ha)	Fraction Impervious (%)	Q ₁₀ (m ³ /s)	Top Width (m)	Batter Slopes	Depth (m)	Vegetation height (mm)	Capacity (m ³ /s)
Full development area catchment at sedimentation basin inlet	16.29	37%	0.842	3.5	1 in 3	0.6	10 (Manning n = 0.035)	0.94
Western diversion around development area	4.8	10%	0.15	3	1 in 3	0.5	10 (Manning n = 0.035)	0.58
Southern diversion around development area	6.7	10%	0.205	3	1 in 3	0.3	10 (Manning n = 0.035)	0.58

Given existing levels within the site, the swale gradient may be steeper than the 1 in 200 assumed above. It is appropriate for the design to be optimised at the detailed design stage and variations to slope can be readily accommodated.

B-2 Sedimentation Basin

The sedimentation basin has been sized to ensure >99% removal of 125 µm particles, for a Q_{3 month} of 127 l/s (Rational method). The catchment for the sedimentation basin includes the sheds, hardstand areas, and vegetated areas upstream of the retention basin. The calculations used to assess this are outlined below. The catchment areas area was assumed to have a fraction imperviousness (FI) of 37% based on the delineation of the area into two categories:

Hardstand areas (including sheds) = 5.59 ha at 0.9 % FI

Vegetated areas upstream of the retention dam = 10.8 ha at 0.1 % FI

Sedimentation Basin Calculations



Fair and Geyer Equation – Equ 10.3 WSUD Stormwater Technical Manual (2005)

$$R = 1 - \left[1 + \frac{1}{n} \cdot \frac{v_s}{Q/A} \cdot \frac{(d_e + d_p)}{(d_e + d^*)} \right]^{-n} \quad \lambda = 1 - 1/n; \quad n = \frac{1}{1-\lambda}$$

R = fraction of Initial Solids Removed = 80 - 90 % typ.

- R = fraction of Initial Solids Removed = 80 - 90 % typ.
- d_p = Depth of permanent pool
- d_e = Extended detention depth above permanent pool
- d* = depth below permanent pool sufficient to retain particles (lower of 1.0m or d_p)
- Q = design flow (Typically 3 month, 6 month or 1 year flow)
- A = Basin Surface Area
- n = turbulence parameter (see above) = 1 for significant short circuiting and turbulence
= 5 for insignificant short circuiting and turbulence
- v_s = setting velocity for particles

Table 7.2 Settling velocities under ideal conditions (Maryland Department of Environment, 1987)

Classification of Particle size range	Particle diameter (µm)	Settling velocities (mm/s)
Very coarse sand	2000	200
Coarse sand	1000	100
Medium sand	500	53
Fine sand	250	26
Very fine sand	125	11
Coarse silt	62	2.3
Medium silt	31	0.66
Fine silt	16	0.18
Very fine silt	8	0.04
Clay	4	0.011

Calculations

Sediment Target = *Very fine sand for standard residential developments*

V_s = m/s *This value changes for different particle size target*

d_e = m *Extended Detention Depth max 0.35 for MW*

d_p = m *Permanent Pool Volume Depth 1.5 m is a common depth for standard residential developments*

d* = m *(lower of 1 m and d_p)*

$\frac{(d_e + d_p)}{(d_e + d^*)} =$

Q = m³/s *Ration Method*

A = m² *Area of the sediment basin at NWL*

L/W = *Length/Width Ratio (assuming rectangular shape)*

$\frac{V_s}{Q/A} =$

λ = *Pond shape assumption (see figure 10.5 above)*

n =

Fraction of Initial Solids Removed

R =



B-3 Vegetated Filter Strip

Vegetated filter strips are vegetated areas that act as buffer strips, promoting deposition of organic matter from free-range areas. They should be designed in accordance with Appendix I in Egg Industry Environmental Guidelines (May 2018). Adopted factors for Vegetated filter strip determination:

- **Low to Rainfall factor**, based on a Rainfall Erosivity of below 1425 for Strathlea;
- **High Soil Erodibility factor**, based on a K factor of 0.05 (e.g. Cracking Clays);
- **Low Slope factor**, based on a 2% slope (500 m length of slope); and
- **Good Cover**, with pastures in the low intensity range areas managed to maintain at least 80% vegetation coverage.

As shown in Table B-3, the width of potential vegetated filter strips is a minimum of 2 m.

Table B-3 Vegetated Filter Strips Width Determination

Rainfall Factor	Soil Erodibility	Slope	Filter Width (Poor Cover)	Filter Width (Good Cover)
LOW	LOW	LOW	2	2
		MEDIUM	3	2
		HIGH	6	2
	MEDIUM	LOW	2	2
		MEDIUM	5	2
		HIGH	11	2
	HIGH	LOW	2	2
		MEDIUM	7	4
		HIGH	16	10

B-4 Water Quality

A MUSIC model was developed (Figure B-1) to assess runoff quality generated by the development area upstream of the proposed dam. The vegetated filter strip was represented by a swale network along the eastern side of the development area.

Table B-4 and Table B-5 outline the swale and sedimentation basin parameters adopted, while default MUSIC 'agricultural' catchment nodes were adopted to represent the local sub-catchment areas.

Table B-4 MUSIC Swale Properties



	Conveyance and VFS swales	Swales within free range area
Depth (m)	0.5	0.4
Top Width (m)	4	8
Slope (%)	1-2	0.5
Batter Slope	1 in 4	1 in 10
Vegetation Height (m)	0.1*	0.1

*0.2 for VFS

Table B-5 MUSIC Swale Properties

	Sediment Basin Parameter
Surface Area (m ²)	600
Permanent Pool Volume (m ³)	350
Extended Detention Depth (m)	0.35

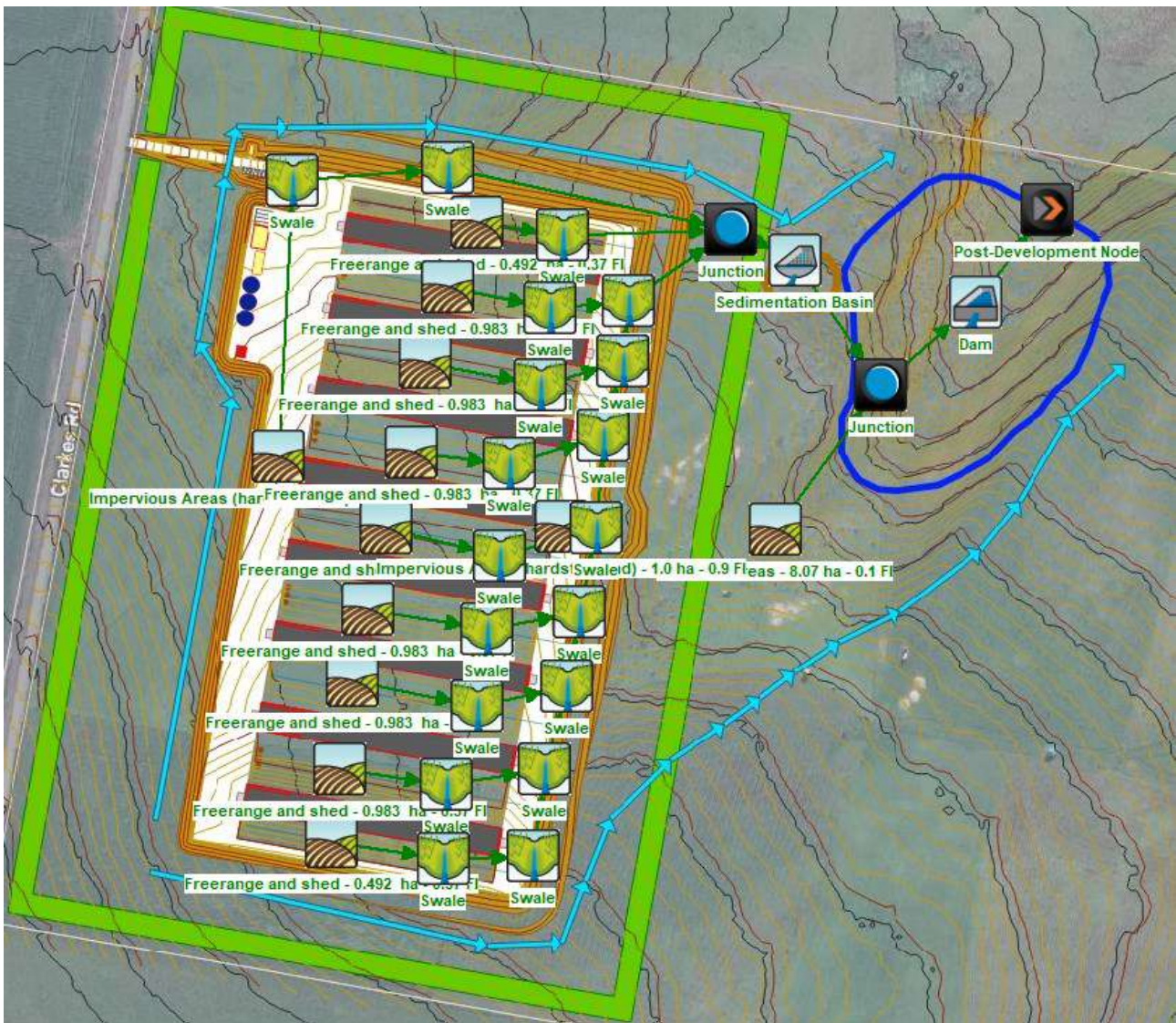


Figure B-1 MUSIC Water Quality Model Schematic

Table B-6 summarises the pollutant reduction achieved through the treatment train directly upstream of the proposed retention dam, additionally this table summarises the catchment area pollutants in the pre-development scenario.



Table B-6 Results

	Sources		Residual Load		% Reduction	
	Pre	Post	Pre	Post	Pre	Post
Flow (ML/yr)	14.2	41.8	14.2	41.3	0	1.2
Total Suspended Solids (kg/yr)	2,480	9,490	2,480	2,850	0	70
Total Phosphorus (kg/yr)	6.62	25.4	6.62	10	0	60.6
Total Nitrogen (kg/yr)	47.6	173	47.6	88.8	0	48.7
Gross Pollutants (kg/yr)	336	1.21E+03	336	145	0	88

Table B-7 summarises the pollutant reduction achieved through the treatment train inclusive of the proposed retention dam. Re-use demand had not been incorporated in this water quality pollutant analysis.

Table B-7 Results

	Sources		Residual Load		% Reduction	
	Pre	Post	Pre	Post	Pre	Post
Flow (ML/yr)	14.2	41.8	14.2	0.537	0	98.7
Total Suspended Solids (kg/yr)	2,480	9,490	2,480	11	0	99.9
Total Phosphorus (kg/yr)	6.62	25.4	6.62	7.12E-02	0	99.7
Total Nitrogen (kg/yr)	47.6	173	47.6	0.767	0	99.6
Gross Pollutants (kg/yr)	336	1,210	336	0	0	100



Melbourne

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800

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Suite 3, Level 1, 20 Wentworth Street
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Adelaide

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Geelong

51 Little Fyans Street
Geelong VIC 3220
Telephone (03) 8526 0800

Wimmera

597 Joel South Road
Stawell VIC 3380
Telephone 0438 510 240

Gold Coast

Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227
Telephone (07) 5676 7602

watertech.com.au



APPENDIX 3 – PHOTOGRAPHS



Photo 1: Typical broiler sheds (fan end)



Photo 2: Typical broiler shed (cool pad end)



Photo 3: Side wall of broiler shed



Photo 4: Typical end of shed showing fans



Photo 5: Typical cool pad



Photo 6: Typical mini vent (external wall)



Photo 7: Typical feed silos



Photo 8: Typical internal view of sheds showing automated feeders & drinkers.



Photo 9: Typical close up view of nipple drinkers

APPENDIX 4 – STUB STACK PHOTOGRAPH



An example of a stub stack

APPENDIX 5 – LANDSCAPE PLANTING COSTS

Proposed Broiler Farm – 39 & 141 Clarkes Road, Strathlea

Landscaping cost estimate

Element	Description	Unit	Quantity	Rate (\$)	Amount (\$)
Site Preparation	General ground works, set out, OHS, etc.	item	1	2,000	2,000
Planting Preparation	Weed eradication, preparation of soil	m ²	36,295	0.50	18,148
Planting	Trees & shrubs – Enviro-cells including tree guards.	Item	18,150	5.00	90,750
Establishment	13 weeks of landscape establishment	weeks	13	600	7,800
TOTAL					118,698

APPENDIX 1 – PLANNING PERMIT No. T120/16



PLEASE QUOTE REFERENCE **P31660.0141 & PA120/16**
ENQUIRIES **Miriam Smith**

25 January 2018

Jack Kraan (for Grandview Poultry)
Focus CDS Consultants
9-10 Garden Court
NARRE WARREN VIC 3805

Dear Sir/Madam,

APPLICATION FOR PLANNING PERMIT NO. T120/16

PROPOSAL: Use and development of a broiler farm and associated infrastructure

LAND AT: 141 Clarkes Road, Strathlea VIC 3364

I refer to the above planning permit application and the recent VCAT hearing regarding same.

As directed by the VCAT correction order dated 11 January 2018, please find enclosed a copy of the corrected Planning Permit for your records.

The planning permit sets out conditions to which the use and/or development must comply. Please ensure you read the conditions carefully and take note of any requirements which set a time limit for certain works to be commenced or completed.

Please note that a building permit may also be required for the proposed development. You may contact Council's building surveyor on 5461 0627 for advice.

Should you have any queries regarding your planning permit please contact me on 5461 0626 and quote the above planning permit number.

Yours faithfully,


Miriam Smith
Manager Planning



PLANNING PERMIT

Permit No: **T120/16**
 Planning Scheme: **CENTRAL GOLDFIELDS PLANNING SCHEME**
 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Rodborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

- 1 Before the development commences, amended plans to the satisfaction of the responsible authority must be submitted to and approved by the responsible authority. When approved, the plans will be endorsed and then form a part of this permit. The plans must be generally in accordance with the plans substituted by the Tribunal (being plans prepared by Land Management Surveys: Sheet 1 of 7 Rev D; Sheet 2 of 7 Rev E; Sheet 3 of 7 Rev F; Sheet 4 of 7 Rev B; Sheet 5 of 7 Rev B; Sheet 7 of 7 Rev F, with Sheets 3 and 7 dated 06/07/2017; Sheets 1 and 2 dated 10/04/2017; Sheets 4 and 5 dated 24/08/2016), but modified to include:
 - (a) The Environmental Management Plan (EMP) required by condition 6.
 - (b) The revised Landscaping Plan required by condition 8.
 - (c) The Stormwater Management Plan and/or Strategy required by condition 11.
 - (d) The Traffic Management Plan including a road routes plan required by condition 26.
 - (e) Dust suppression mitigation measures for the loading and unloading of litter and spent litter trucks at the shed locations.
 - (f) Materials schedule to include non-reflective materials for all buildings and silos and a cream/white/off-white roof for all broiler farm sheds.
- 2 The layout of the site and size of the buildings and works, as shown on the approved endorsed plans shall not be altered or modified without the consent in writing of the responsible authority. Any substantive changes, in the opinion of the responsible authority, will require a new application and permit.
- 3 The use and development hereby permitted must at all times be carried out in accordance with the endorsed documentation to the satisfaction of the responsible authority.

Use to cease if certain land not used in-conjunction with the broiler farm

- 4 Prior to the commencement of the development, evidence must be provided to the responsible authority, to its satisfaction, that the land which adjoins the northern boundary of the land to which this permit relates (known as No. 39 Clarkes Road, Moolort/ Crown Allotment 2, Parish of Rodborough), is in the same ownership as the land to which this permit applies.

Signature for
 the Responsible Authority: _____

Date Issued: 19th December 2017
 Date Corrected: 25th January 2018



PLANNING PERMIT

Permit No: **T120/16**
 Planning Scheme: **CENTRAL GOLDFIELDS PLANNING SCHEME**
 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Rodborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

- 5 The use authorised by this permit must immediately cease, if the land which adjoins the northern boundary of the subject land (known as No. 39 Clarkes Road, Moolort/ Crown Allotment 2, Parish of Rodborough) is not in the same ownership as, or is not used at all times in conjunction with, the land which is the subject of this permit.

Environment Management Plan

- 6 Prior to the commencement of the use hereby permitted, an Environmental Management Plan (EMP) for the operation of the broiler farm must be submitted to and be to the satisfaction of the responsible authority and Goulburn Murray Water. When approved by the responsible authority and Goulburn Murray Water, the EMP will be endorsed and then form part of this permit. The EMP must be in generally in accordance with the EMP submitted with the application (prepared by FocusCDS Consultants dated 2016) and Victorian Code for Broiler Farms 2009 (as may be amended from time to time), but amended to include the following additional requirements:
 - (a) bird-pick up trucks which are attending the site between 10pm and 7am must have broadband (non-audible) reverse beepers;
 - (b) no deliveries of feed are to occur between 10pm and 7am;
 - (c) any faulty fans are to be immediately decommissioned and are to be repaired within 3 business days (unless otherwise agreed by the responsible authority);
 - (d) measures to ensure compliance with the traffic management plan, including information to be provided to drivers to ensure they follow the route required by the traffic management plan;
 - (e) a requirement for the maintenance of the existing site-specific weather monitoring station, to the satisfaction of the responsible authority, with data from this monitoring station be provided to the responsible authority on request;
 - (f) placement of birds is to be co-ordinated with the existing broiler farms at No. 1480 Rodborough Road, Moolort so that it is staggered in a manner which is generally in accordance with the assumptions of the odour modelling carried out by GHD as part of the permit application process;
 - (g) shed clean out to be carried out during the day-time period and not at a time when prevailing weather conditions are likely to be conducive to offsite odour impacts;
 - (h) litter and dead bird stockpiling, spreading or disposal is not to occur on the site, nor on other adjoining land associated with the broiler farm (including No. 39 Clarkes Rd, Moolort and No. 1480 Rodborough Road, Moolort);

Signature for the Responsible Authority:



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**PLANNING
PERMIT**

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THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

- (i) litter, dead birds and other waste from other broiler farms is not to be accepted, disposed of, stockpiled on or spread on or over the land; and
 - (j) there is to be a nominated community liaison person/s which is independent of the operation of the broiler farm. This liaison person/s is to be appointed by the applicant, after consultation with the local community, and is to be to satisfaction of Council. The nominated community liaison person/s is to be a point of contact between the broiler farm operators and the community, including in relation to complaint resolution. The nominated community liaison person/s is to be provided with access to the farm log book required to be kept by 2.6.1 of the EMP, as appropriate to assist in resolving complaint.
- 7 Site performance inspections, site audits and reviews of the Environmental Management Plan must be undertaken in accordance with the endorsed Environmental Management Plan. Any revision to the Environmental Management Plan must be submitted to and approved by the responsible authority and Goulburn Murray Water. When approved such revised Environmental Management Plan will be endorsed as evidence of its approval and will thereby become part of the endorsed plan of this permit.

Landscape Plan

- 8 Prior to the commencement of the use hereby permitted, a revised Landscape Plan must be submitted to and be to the satisfaction of the responsible authority. The revised Landscape Plan must be prepared by a person suitably qualified or experienced in landscape design to ensure substantial visual screening to the satisfaction of the responsible authority. When approved by the responsible authority, the revised Landscape Plan will be endorsed and then form part of this permit. The revised Landscape Plan must be generally in accordance with the landscape plan prepared by XURBAN, Drawing No. LS01, dated 24 June 2017 and must include:
- (a) species and number of the trees, shrubs and ground covers to be planted;
 - (b) details of the methods to be used when planting, including deep ripping before planting as appropriate;
 - (c) the timeline for planting, with the planting to commence within 6 months and be completed within 12 months of the construction of the broiler sheds; and
 - (d) a short-term (1-3 years) and long-term (3 years +) maintenance plan, including a requirement for replacement planting of dead or diseased plants, appropriate irrigation methods and regular weed control.

Signature for
the Responsible Authority:



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PLANNING PERMIT

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 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Rodborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

- 9 The landscaping and maintenance, as detailed in the endorsed plans, must be carried out to the satisfaction of the responsible authority. Once landscaped the landscaped areas as shown on the endorsed plan(s) must not be used for any other purpose except with the prior written consent of the responsible authority.
- 10 A landscape performance bond to the satisfaction of the responsible authority must be established in accordance with Approved measure E4 M1.8 of the Victorian Code for Broiler Farms 2009.

Stormwater Management Plan

- 11 Prior to the commencement of the use or any earthworks on the site hereby permitted, a Stormwater Management Plan and/or Strategy must be submitted to and be to the satisfaction of the responsible authority. When approved by the responsible authority, the Stormwater Management Plan will be endorsed and then form part of this permit. The Stormwater Management Plan must detail all proposed storm water quality works within the site during construction and operation of the broiler farm development. Such plan must be prepared by a person suitably qualified and may detail staging of works in line with the development proposed to the satisfaction of the Responsible Authority.

Amenity

- 12 The amenity of the area must not be detrimentally affected by the use or development through the:-
 - (a) Transport of materials, goods or commodities to or from the site.
 - (b) Appearance of any building, works or materials. The site shall be kept orderly and tidy to the satisfaction of the responsible authority.
 - (c) Emission of noise, artificial light, vibration, smell, fumes, smoke, vapour, steam, soot, ash, dust, waste water, waste products.
 - (d) The presence of vermin.
 - (e) Dust and particulate matter resulting from deliveries and pick-ups at and from the sheds.
- 13 The permit holder/operator shall use all appropriate broiler farm management techniques to the satisfaction of the responsible authority to minimise emissions beyond the site to the detriment of any person or the amenity of the neighbourhood of any broiler and/or chemical, disinfectant or associated odour.

Signature for
 the Responsible Authority



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 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Redborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

- 14 In the event of the responsible authority receiving any complaint regarding the operation of the broiler farm, the operator will be informed of such complaint by the responsible authority and the operator shall immediately investigate the reason for the complaint and take appropriate remedial action, as required, to comply with this permit to the satisfaction of the responsible authority.
- 15 If the responsible authority determines, in its opinion, that the amenity of nearby residents is adversely affected by the emission of an unreasonable level of odour, noise, dust or traffic noise from the broiler farm, the operators must immediately take actions and/or undertake works, which are directed by the responsible authority and may include adjusting stocking density in the sheds, removing unsatisfactory spent litter promptly, or any other actions including provision of mechanical odour or dust mitigation devices to rectify the emission of offensive, odour, dust or noise, all to the satisfaction and specification of the responsible authority.
- 16 In the event of the EMP Nuisance Complaint Handling provisions not rectifying any complaint, in the opinion of the responsible authority, particularly in the areas of Odour Emissions or Dust complaints, the responsible authority may, in its sole discretion, direct the operator under the Permit and EMP, to undertake a Supplementary Audit, at the cost of the farm operator, to identify the complaint causes and recommend appropriate ongoing, in shed remedies, to mitigate the sources of the complaint and implement such remedies deemed appropriate by the responsible authority, at its sole discretion and to the satisfaction of the responsible authority.
- 17 Should the in-shed remedies recommended in the above condition not be successful in mitigating or eliminating any amenity or nuisance complaint/s to the satisfaction of the responsible authority, the responsible authority may direct appropriate in-shed or ex-shed environmental amenity control plant & equipment, to be installed to a specification and to a time scheduled, all to the satisfaction of the responsible authority.
- 18 The broiler farm sheds and all feed stores must be vermin and bird proof to the satisfaction of the responsible authority.
- 19 The permit holder must use its best endeavours to ensure that all trucks and heavy vehicles used in transporting livestock and litter do not cause any detriment to the amenity by noise or excessive vehicle movements. The permit holder must ensure that contractors engaged comply with all necessary Victorian vehicle design (ADR) and maintenance (roadworthy) requirements.
- 20 No external floodlighting shall be installed without the written permission of the responsible authority.

Signature for the Responsible Authority: _____

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21 The use of chemicals in association with the use and development of the site must be in accordance with the endorsed EMP to the satisfaction of the responsible authority.

Environmental Health conditions

22 Prior to the commencement of use of the broiler farm the following must be undertaken by the permit holder/operator to the requirements and satisfaction of the responsible authority:

- (a) Provision must be made for a wastewater disposal field of adequate area located remote from any waterway or any dam to the satisfaction of Council's Environmental Health Officer. The installation of the waste water system must be in accordance with the Code of Practice – Onsite Wastewater Management (EPA publication 891.3 February 2013) and a separate permit must be obtained from Council's Environmental Health Officer prior to installation.

23 All waste water from the proposed amenities building must be treated and disposed of to the requirements of Council's Environmental Health Officer.

24 The wastewater disposal area must be kept free of stock, buildings and driveways and must be planted with appropriate vegetation to maximise its performance. Stormwater must be diverted to the proposed dam.

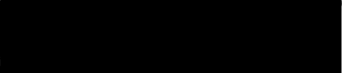
Engineering conditions

Road

25 Prior to the commencement of use of the broiler farm the following must be undertaken by the permit holder/operator to the requirements and satisfaction of the responsible authority:

- (a) Clarkes Road is to be constructed from Rodborough Road to 25 metres south of the main entrance to the site. Such road is to be constructed to accommodate B Double trucks to a minimum road standard – unsealed pavement to be 7 metres wide and at least 450mm deep, design depth of pavement to be verified by subgrade and pavement materials testing, to the satisfaction of the responsible authority.
- (b) An annual maintenance fee of \$11,800, indexed annually, is required to be paid to Council for unsealed road maintenance of the upgraded section of Clarkes Road for the additional road maintenance costs due to the extent of heavy vehicle traffic imposed by the Broiler Farm Development.

Signature for
 the Responsible Authority



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 Known as 141 Clarkes Road, Strathlea VIC 3364
THE PERMIT ALLOWS: Use and development of the land for a 325,000 bird (six shed) broiler farm

- (c) The intersection of Rodborough Road and Clarkes Road is to be asphalt overlaid with a 40 mm thick 10mm aggregate Type H asphalt for 50 metres in length. (25 metres either side of the centreline of Clarkes Road and 25 metres into Clarkes Road).
- (d) Prior to the commencement of any road works the permit holder/operator must submit detailed construction plans and make further application for, and have approved, a Consent for Works permit. All works constructed or carried out must be in accordance with the approved plans/permit(s) and to the satisfaction of the responsible authority.

Access

- 26 Prior to the commencement of use of the broiler farm the following must be undertaken by the permit holder/operator to the requirements and satisfaction of the responsible authority:
- (a) A Traffic Management Plan must be submitted and endorsed detailing heavy vehicle access (including but not limited to construction vehicles, livestock transport and litter transport) to and from the broiler farm site. Such access from the Pyrenees Highway must be restricted to Clarkes Road, Rodborough Road and Locks Lane. No alternative routes are permitted without approval from the responsible authority and no alternative routes will be permitted on local roads through Mount Alexander Shire.
 - (b) A vehicular crossover must be constructed (or existing upgraded) between the site and Clarkes Road. The crossover must be of crushed rock pavement construction and be in accordance with the Typical B-Double Vehicle Crossing (Rural Entrance) IDM Standard Drawing SD265.
 - (c) The permit holder/operator must submit detailed construction plans and make further application for, and have approved, a driveway crossing permit/s. All works constructed or carried out must be in accordance with the approved plans/permit(s) and to the satisfaction of the responsible authority.
 - (d) Once constructed the crossover/s must be thereafter maintained by the permit holder/operator to the satisfaction of the responsible authority.

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Internal access areas

27 The surface of parking and loading areas and access roads and lanes must be constructed and maintained to an appropriate standard and specification to the satisfaction of the responsible authority in order to prevent dust and drainage run-off causing a loss of amenity to the site or broader area. All such surfaces and roads to be constructed to ensure all-weather use and access.

Drainage

- 28 All storm water must be accommodated and treated within the site.
- 29 All storm water and surface water drainage from the proposed buildings, hard standing areas, driveways and yards must be designed to be contained within the site and designed for storm water quality and quantity to comply with the Best Practice Environmental Management Guidelines for Urban Storm water (CSIRO) 1999 to the satisfaction of the responsible authority.
- 30 The legal point of discharge of storm water is to be to the proposed dam on the development.
- 31 Any discharge of storm water from the proposed dam to the surrounding land, in the event of an extreme storm water event, shall be treated to prevent erosion of the site and surrounding area.

Waste Disposal

- 32 The treatment of waste and litter from the operation of the site is to be undertaken in accordance with the endorsed Environmental Management Plan.
- 33 No stockpiling of waste or litter is to occur on the site or on any adjoining land associated with the broiler farm, including No. 39 Clarkes Road, Moolort and No. 1480 Rodborough Road, Moolort. All waste is to be disposed off-site to the satisfaction of the responsible authority.
- 34 All waste pick-up vehicles/trucks to be covered with secure covers, which are used to prevent dust or spillage of waste on departure from the site.

Rural Road Numbers

- 35 Rural Road Numbers as assigned by Council's Rates Officer must be clearly displayed at the main access points for the site.

Signature for the Responsible Authority: 

Date Issued: 19th December 2017
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PLANNING PERMIT

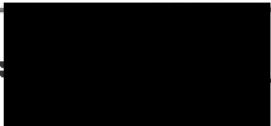
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Goulburn Murray Water (GMW) conditions

- 36 All construction and ongoing activities must be in accordance with sediment control principles outlined in 'Construction Techniques for Sediment Pollution Control' (EPA, 1991).
- 37 All chemicals shall be stored in appropriate locked storage units, and such areas must be bunded appropriately to the satisfaction of the responsible authority and GMW.
- 38 All wastewater from the proposed amenities building must be treated and disposed of using an EPA approved system, installed, operated and maintained in compliance with the relevant EPA Code of Practice and Certificate of Approval.
- 39 The wastewater disposal area for this system must be located at least 100 metres from the nearest waterway, 40m from any drainage line, 60m from the nearest dam and at least 20m from any bore.
- 40 The wastewater disposal area must be kept free of all infrastructure including buildings, driveways tanks and service trenching and must be planted with appropriate vegetation to maximise its performance. Stormwater must be diverted away. A reserve wastewater disposal field of equivalent size to the primary disposal field must be provided for use in the event that the primary field requires resting or has failed.
- 41 The wastewater disposal area must not be located in any area of cut or fill.
- 42 Potentially contaminated stormwater and drainage from hard stand areas and the areas around the sheds must be directed to retention dams which must be designed with a capacity and freeboard to enable the run-off from a 1 in 10 year storm to be retained. The overflow from these dams must be designed such that no water is discharged off-site or to any waterways. Overflow must not cause erosion.
- 43 Effluent dam capacity needs to include 600mm freeboard for wave action and increases in water level due to rainfall.
- 44 All soil removed during construction of the dams must be reused, stabilized or vegetated on-site to ensure that no sediment can be transported off-site.
- 45 All water from the retention dams must be re-used within the boundaries of the lot unless climatic conditions are significantly wetter than average for an extended period of time in which case the overflow to land may operate.

Signature for the Responsible Authority:



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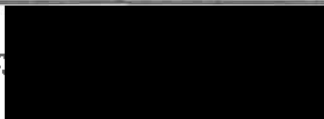
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 Planning Scheme: **CENTRAL GOLDFIELDS PLANNING SCHEME**
 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Rodborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler farm**

- 46 The floors of the sheds must be constructed with an impervious surface or of clay compacted to achieve a design permeability of 1 x 10⁻⁹ m/sec. The shed must be designed to ensure that all litter can be retained within the shed until removal following bird removal.
- 47 Spent litter and associated waste must be removed from the site and must not be stockpiled, composted or distributed (spread) on or over the site or other sites associated with the broiler farm, including No. 39 Clarkes Road, Moolort and No. 1480 Rodborough Road, Moolort. The spent litter must be transported offsite by an approved contractor.
- 48 There must be no litter from the sheds stockpiled on the site or other sites associated with the broiler farm, including No. 39 Clarkes Road, Moolort and No 1480 Rodborough Road, Moolort. Any temporary storage areas for wet litter must have an impermeable base and bunding to ensure contaminated run-off does not discharge from the temporary storage area.
- 49 Prior to the removal of spent litter off-site, the removal contractor shall be provided with a fact sheet to be given to the end users of litter advising that:
 - (a) Litter should not be spread
 - i Within 200 metres of any waterway
 - ii On areas subject to inundation
 - iii On slopes with a gradient greater than 10%
 - iv On areas with shallow topsoils
 - v On rocky or impermeable soils
 - vi Within 20 metres of the property boundary
 - (b) Land application of litter should be undertaken at a rate appropriate for the soil type and the type of pasture/crop grown. The rate of application should ensure relevant N,P and K uptake such that there can be no discharge of excess nutrients to any waterways.
- 50 Dead birds must not be incinerated or buried onsite or other sites associated with the broiler farm, including No. 39 Clarkes Road, Moolort and No 1480 Rodborough Road, Moolort. In an emergency situation and with the approval of GMW the EPA or relevant authority including the Chief Veterinary Officer (DEPI) will determine a suitable site for burial due to the site being located in a Proclaimed Water Catchment.

Signature for
 the Responsible Authority



Date Issued: 19th December 2017
 Date Corrected: 25th January 2018



**PLANNING
PERMIT**

Permit No: **T120/16**
 Planning Scheme: **CENTRAL GOLDFIELDS PLANNING SCHEME**
 Responsible Authority: **CENTRAL GOLDFIELDS SHIRE COUNCIL**

ADDRESS OF THE LAND: **Crown Allotment 3, Parish of Rodborough
 Known as 141 Clarkes Road, Strathlea VIC 3364**
THE PERMIT ALLOWS: **Use and development of the land for a 325,000 bird (six shed) broiler
 farm**

EPA conditions

- 51 Noise emitted from the premises must not exceed the recommended levels as set out in Noise from Industry in Regional Victoria (NIRV; EPA Publication 1411, 2011) or as amended.
- 52 Discharge of wastewater to land must not adversely affect the land.
- 53 Management of farm waste at the premises should be in accordance with EPA Publication IWRG641 Farm Waste Management June 2009 or as amended.
- 54 Stormwater contaminated with effluent must not be discharged beyond the boundary of the premises.
- 55 Nuisance dust must not be discharged beyond the boundaries of the premises.

Expiry

- 56 This permit will expire if:-
 - (a) the development of the first shed is not commenced within four (4) years of the date of this permit; or
 - (b) the development of the final shed is not completed or the use is not commenced within six (6) years of the date of this permit.

In accordance with section 69 of the *Planning and Environment Act 1987*, an application may be submitted to the responsible authority for an extension of the periods referred to in this condition.

This permit was corrected on 25th January, 2018, in accordance with VCAT correction order dated 11th January 2018

Signature for the Responsible Authority:

Date Issued: 19th December 2017
 Date Corrected: 25th January 2018

IMPORTANT INFORMATION ABOUT THIS PERMIT

WHAT HAS BEEN DECIDED?

- The responsible authority has issued a permit at the direction of the Victorian Civil and Administrative Tribunal.

(Note: This is not a permit granted under Division 5 or 6 of Part 4 of the **Planning and Environment Act 1987**.)

CAN THE RESPONSIBLE AUTHORITY AMEND THIS PERMIT?

The responsible authority may amend this permit under Division 1A of Part 4 of the **Planning and Environment Act 1987**.

WHEN DOES A PERMIT BEGIN?

A permit operates:

- from the date specified in the permit; or
- if no date is specified, from—
 - I. the date of the decision of the Victorian Civil and Administrative Tribunal, if the permit was issued at the direction of the Tribunal; or
 - II. the date on which it was issued, in any other case.

WHEN DOES A PERMIT EXPIRE?

1. A permit for the development of land expires if—
 - the development or any stage of it does not start within the time specified in the permit; or
 - the development requires the certification of a plan of subdivision or consolidation under the **Subdivision Act 1988** and the plan is not certified within two years of the issue of the permit, unless the permit contains a different provision; or
 - the development or any stage is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit or in the case of a subdivision or consolidation within 5 years of the certification of the plan of subdivision or consolidation under the **Subdivision Act 1988**.
2. A permit for the use of land expires if—
 - the use does not start within the time specified in the permit, or if no time is specified, within two years after the issue of the permit; or
 - the use is discontinued for a period of two years.
3. A permit for the development and use of land expires if—
 - the development or any stage of it does not start within the time specified in the permit; or
 - the development or any stage of it is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit; or
 - the use does not start within the time specified in the permit, or, if no time is specified, within two years after the completion of the development; or
 - the use is discontinued for a period of two years.
4. If a permit for the use of land or the development and use of land or relating to any of the circumstances mentioned in section 6A(2) of the **Planning and Environment Act 1987**, or to any combination of use, development or any of those circumstances requires the certification of a plan under the **Subdivision Act 1988**, unless the permit contains a different provision—
 - the use or development of any stage is to be taken to have started when the plan is certified; and
 - the permit expires if the plan is not certified within two years of the issue of the permit.
5. The expiry of a permit does not affect the validity of anything done under that permit before the expiry.

WHAT ABOUT REVIEWS?

- The person who applied for the permit may apply for a review of any condition in the permit unless it was granted at the direction of the Victorian Civil and Administrative Tribunal, in which case no right of review exists.
- An application for review must be lodged within 60 days after the permit was issued, unless a notice of decision to grant a permit has been issued previously, in which case the application for review must be lodged within 60 days after the giving of that notice.
- An application for review is lodged with the Victorian Civil and Administrative Tribunal.
- An application for review must be made on the relevant form which can be obtained from the Victorian Civil and Administrative Tribunal, and be accompanied by the applicable fee.
- An application for review must state the grounds upon which it is based.
- A copy of an application for review must also be served on the responsible authority.
- Details about applications for review and the fees payable can be obtained from the Victorian Civil and Administrative Tribunal.

APPENDIX 6 – PLANNING PROPERTY REPORT

PLANNING PROPERTY REPORT

From www.planning.vic.gov.au at 26 February 2024 12:31 PM

PROPERTY DETAILS

Address: **39 CLARKES ROAD MOOLORT 3465**
Crown Description: **More than one parcel - see link below**
Standard Parcel Identifier (SP): **More than one parcel - see link below**
Local Government Area (Council): **CENTRAL GOLDFIELDS**
Council Property Number: **31660.0039**
Planning Scheme: **Central Goldfields**
Directory Reference: **Vicroads 58 H3**

www.centralgoldfields.vic.gov.au

[Planning Scheme](#) [Central Goldfields](#)

This property has 2 parcels. For full parcel details get the free Property report at [Property Reports](#)

UTILITIES

Rural Water Corporation: **Goulburn-Murray Water**
Urban Water Corporation: **Coliban Water**
Municipal Water: **Outside drainage boundary**
Power Distributor: **POWERCOR**

STATE ELECTORATES

Legislative Council: **NORTHERN VICTORIA**
Legislative Assembly: **BENDIGO WEST**

OTHER

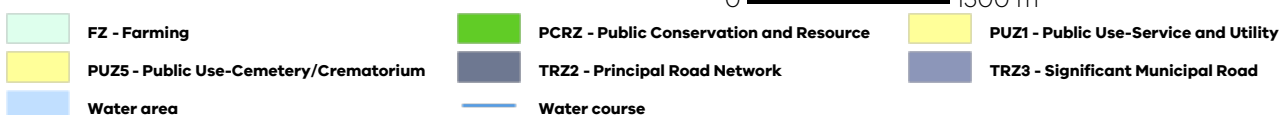
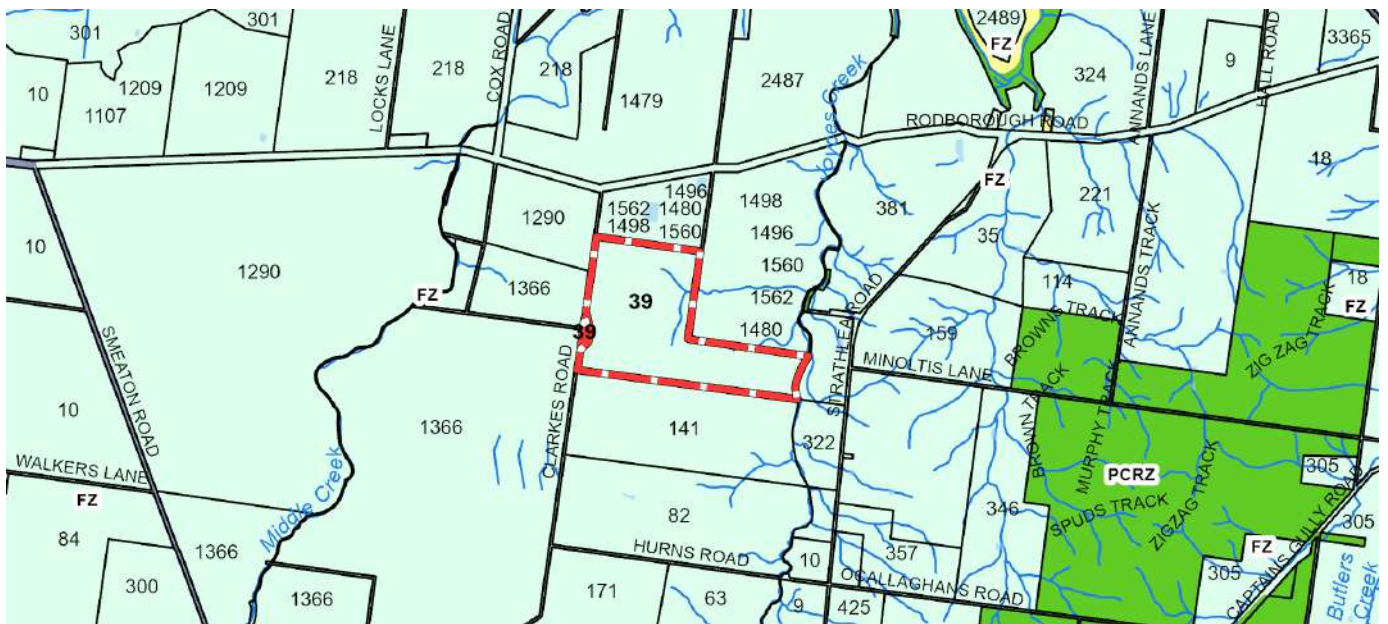
Registered Aboriginal Party: **Dja Dja Wurrung Clans Aboriginal Corporation**

[View location in VicPlan](#)

Planning Zones

[FARMING ZONE \(FZ\) \(CENTRAL GOLDFIELDS\)](#)

[SCHEDULE TO THE FARMING ZONE \(FZ\) \(CENTRAL GOLDFIELDS\)](#)



Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

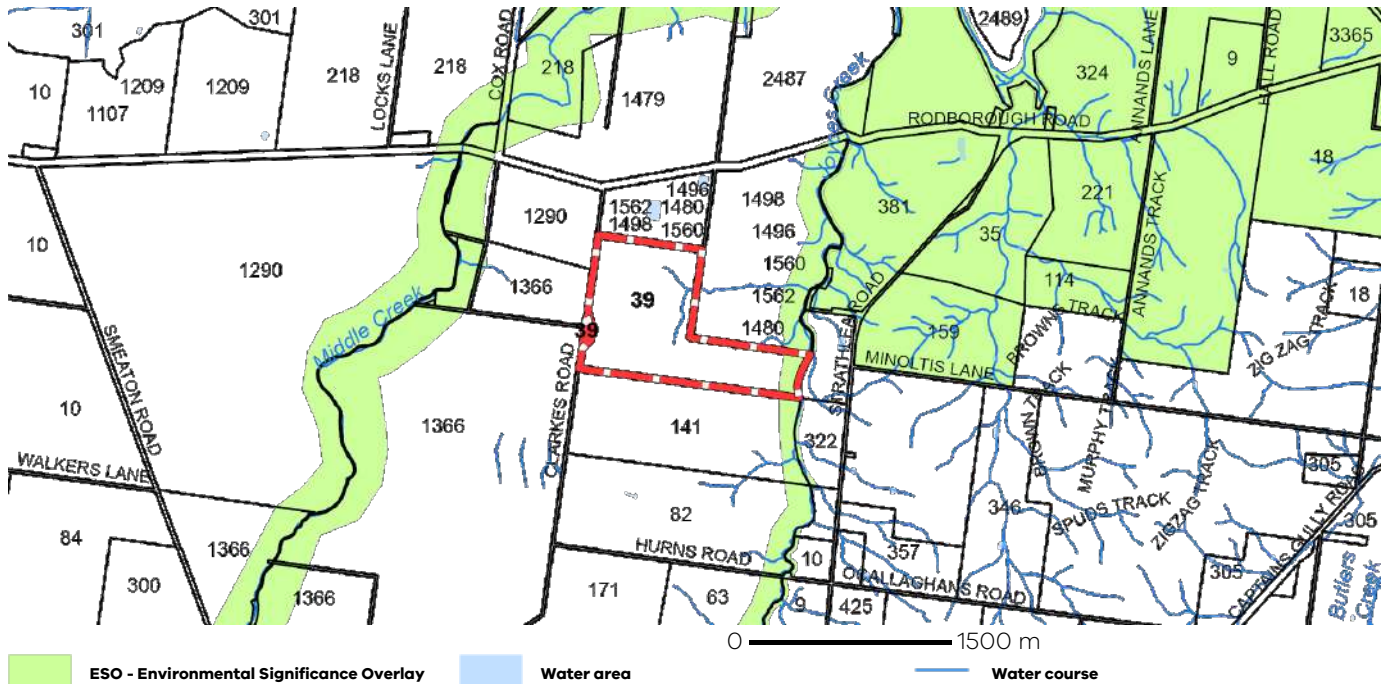
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Notwithstanding this disclaimer, a vendor may rely on the information in this report for the purpose of a statement that land is in a bushfire prone area as required by section 32C (b) of the Sale of Land 1962 (Vic)

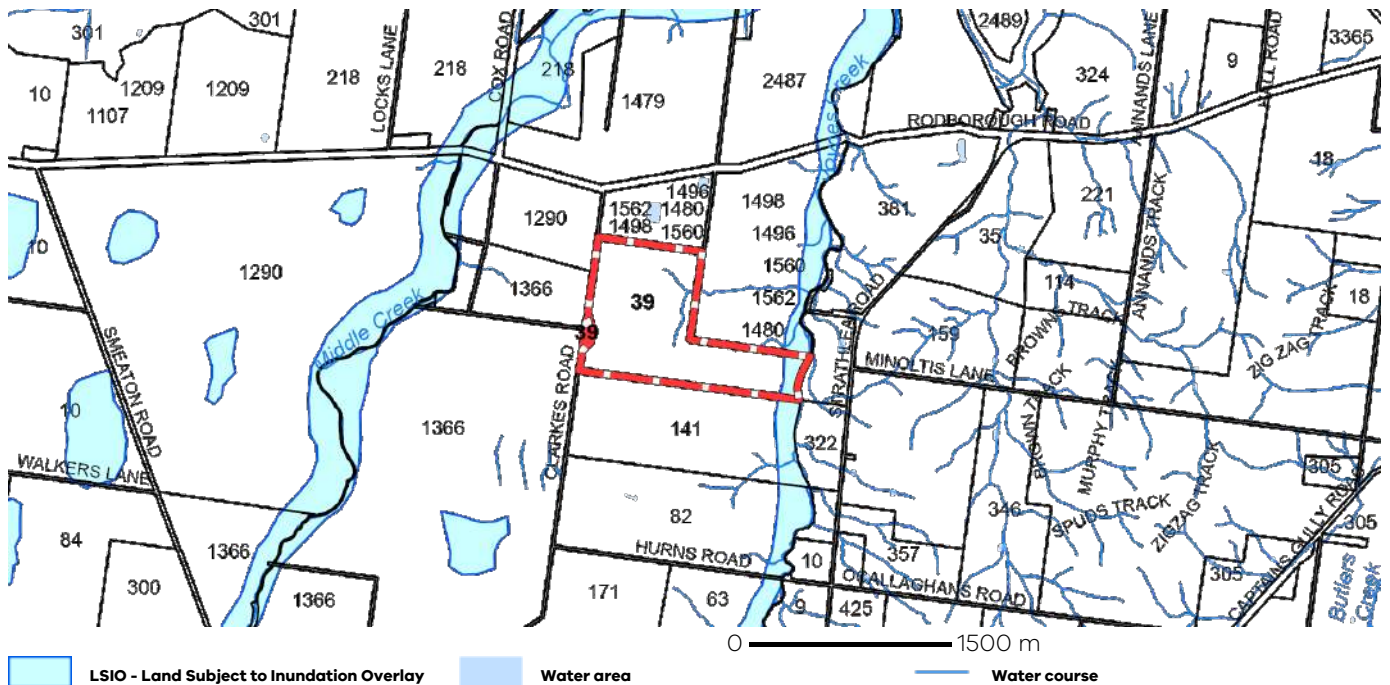
Planning Overlays

ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO) (CENTRAL GOLDFIELDS)
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1) (CENTRAL GOLDFIELDS)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

LAND SUBJECT TO INUNDATION OVERLAY (LSIO) (CENTRAL GOLDFIELDS)
LAND SUBJECT TO INUNDATION OVERLAY - SCHEDULE 1 (LSIO1) (CENTRAL GOLDFIELDS)

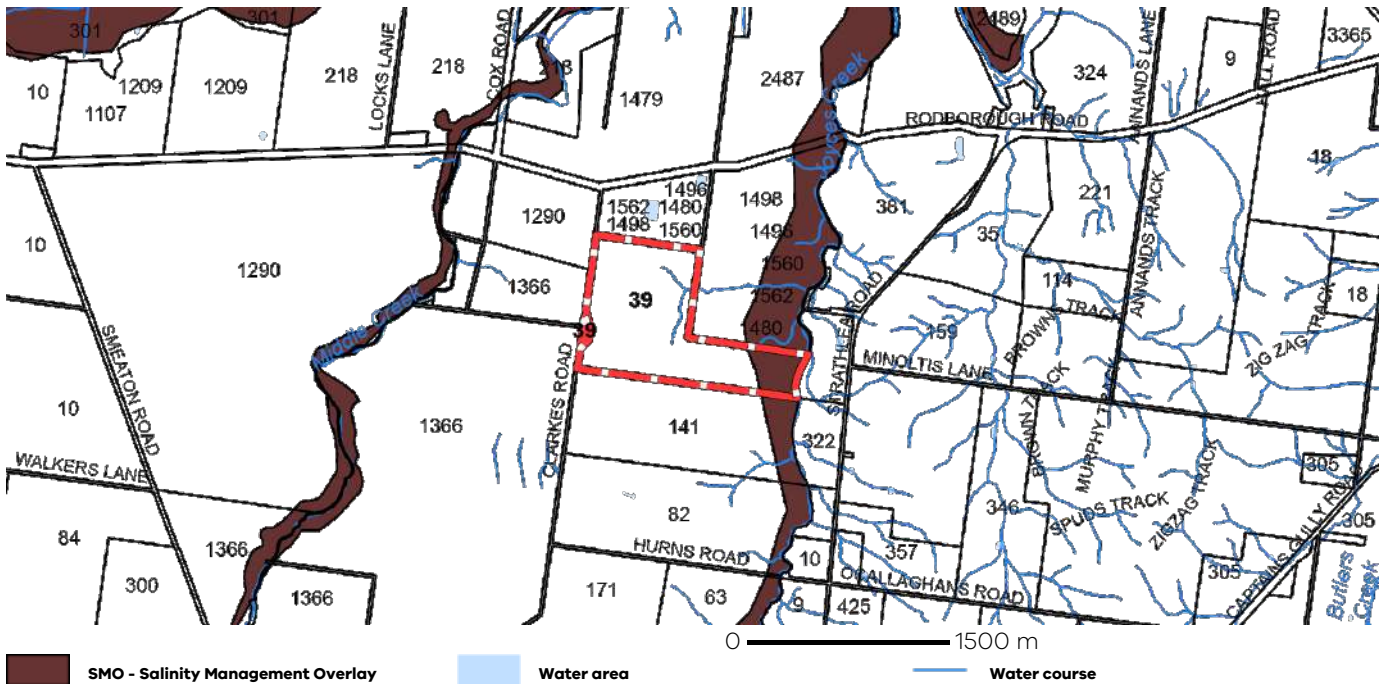


Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

Planning Overlays

[SALINITY MANAGEMENT OVERLAY \(SMO\) \(CENTRAL GOLDFIELDS\)](#)

[SALINITY MANAGEMENT OVERLAY SCHEDULE \(SMO\) \(CENTRAL GOLDFIELDS\)](#)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

OTHER OVERLAYS

Other overlays in the vicinity not directly affecting this land

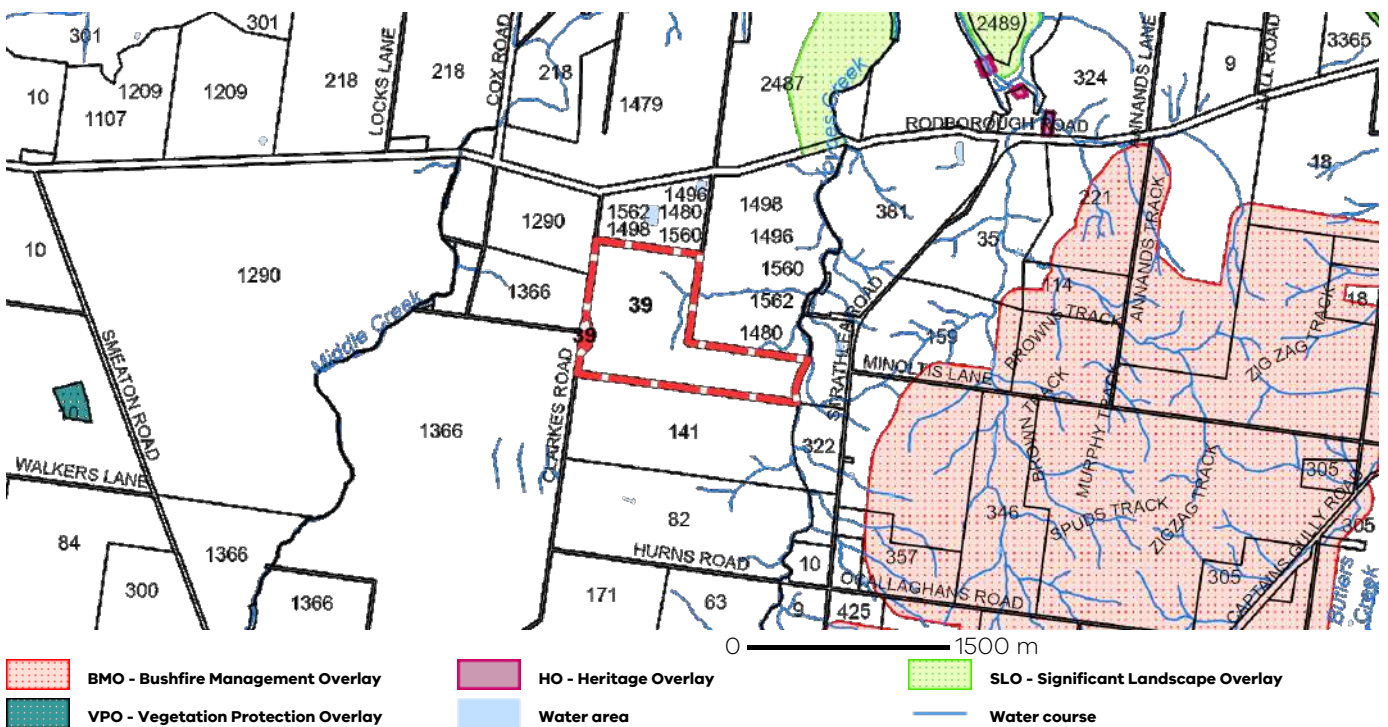
[BUSHFIRE MANAGEMENT OVERLAY \(BMO\) \(MOUNT ALEXANDER\)](#)

[HERITAGE OVERLAY \(HO\) \(MOUNT ALEXANDER\)](#)

[SIGNIFICANT LANDSCAPE OVERLAY \(SLO\) \(MOUNT ALEXANDER\)](#)

[SIGNIFICANT LANDSCAPE OVERLAY \(SLO\) \(CENTRAL GOLDFIELDS\)](#)

[VEGETATION PROTECTION OVERLAY \(VPO\) \(CENTRAL GOLDFIELDS\)](#)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

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Further Planning Information

Planning scheme data last updated on 7 December 2023.

A **planning scheme** sets out policies and requirements for the use, development and protection of land. This report provides information about the zone and overlay provisions that apply to the selected land. Information about the State and local policy, particularly, general and operational provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting <https://www.planning.vic.gov.au>

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the **Planning and Environment Act 1987**. It does not include information about exhibited planning scheme amendments, or zonings that may affect the land. To obtain a Planning Certificate go to Titles and Property Certificates at Landata - <https://www.landata.vic.gov.au>

For details of surrounding properties, use this service to get the Reports for properties of interest.

To view planning zones, overlay and heritage information in an interactive format visit <https://mapshare.maps.vic.gov.au/vicplan>

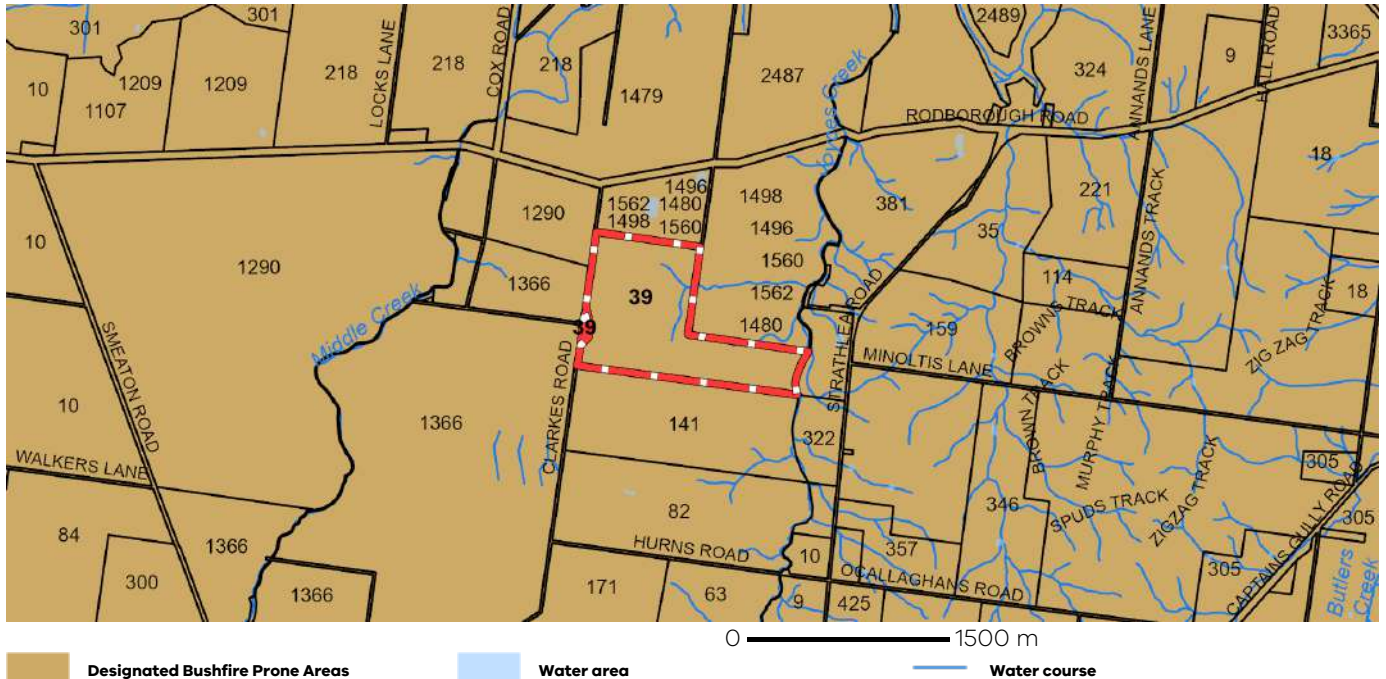
For other information about planning in Victoria visit <https://www.planning.vic.gov.au>

Designated Bushfire Prone Areas

This property is in a designated bushfire prone area. Special bushfire construction requirements apply to the part of the property mapped as a designated bushfire prone area (BPA). Planning provisions may apply.

Where part of the property is mapped as BPA, if no part of the building envelope or footprint falls within the BPA area, the BPA construction requirements do not apply.

Note: the relevant building surveyor determines the need for compliance with the bushfire construction requirements.



Designated BPA are determined by the Minister for Planning following a detailed review process. The Building Regulations 2018, through adoption of the Building Code of Australia, apply bushfire protection standards for building works in designated BPA.

Designated BPA maps can be viewed on VicPlan at <https://mapshare.vic.gov.au/vicplan/> or at the relevant local council.

Create a BPA definition plan in [VicPlan](#) to measure the BPA.

Information for lot owners building in the BPA is available at <https://www.planning.vic.gov.au>.

Further information about the building control system and building in bushfire prone areas can be found on the Victorian Building Authority website <https://www.vba.vic.gov.au>. Copies of the Building Act and Building Regulations are available from <http://www.legislation.vic.gov.au>. For Planning Scheme Provisions in bushfire areas visit <https://www.planning.vic.gov.au>.

Native Vegetation

Native plants that are indigenous to the region and important for biodiversity might be present on this property. This could include trees, shrubs, herbs, grasses or aquatic plants. There are a range of regulations that may apply including need to obtain a planning permit under Clause 52.17 of the local planning scheme. For more information see [Native Vegetation \(Clause 52.17\)](#) with local variations in [Native Vegetation \(Clause 52.17\) Schedule](#)

To help identify native vegetation on this property and the application of Clause 52.17 please visit the Native Vegetation Information Management system <https://nvim.dewp.vic.gov.au/> and [Native vegetation \(environment.vic.gov.au\)](https://www.environment.vic.gov.au) or please contact your relevant council.

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From www.planning.vic.gov.au at 26 February 2024 12:27 PM

PROPERTY DETAILS

Address: **141 CLARKES ROAD STRATHLEA 3364**
 Crown Description: **Allot. 3 PARISH OF RODBOROUGH**
 Standard Parcel Identifier (SP): **3\PP3456**
 Local Government Area (Council): **CENTRAL GOLDFIELDS**
 Council Property Number: **31660.0141**
 Planning Scheme: **Central Goldfields**
 Directory Reference: **Vicroads 58 H3**

www.centralgoldfields.vic.gov.au

[Planning Scheme](#) [Central Goldfields](#)

UTILITIES

Rural Water Corporation: **Goulburn-Murray Water**
 Urban Water Corporation: **Coliban Water**
 Melbourne Water: **Outside drainage boundary**
 Power Distributor: **POWERCOR**

STATE ELECTORATES

Legislative Council: **NORTHERN VICTORIA**
 Legislative Assembly: **BENDIGO WEST**

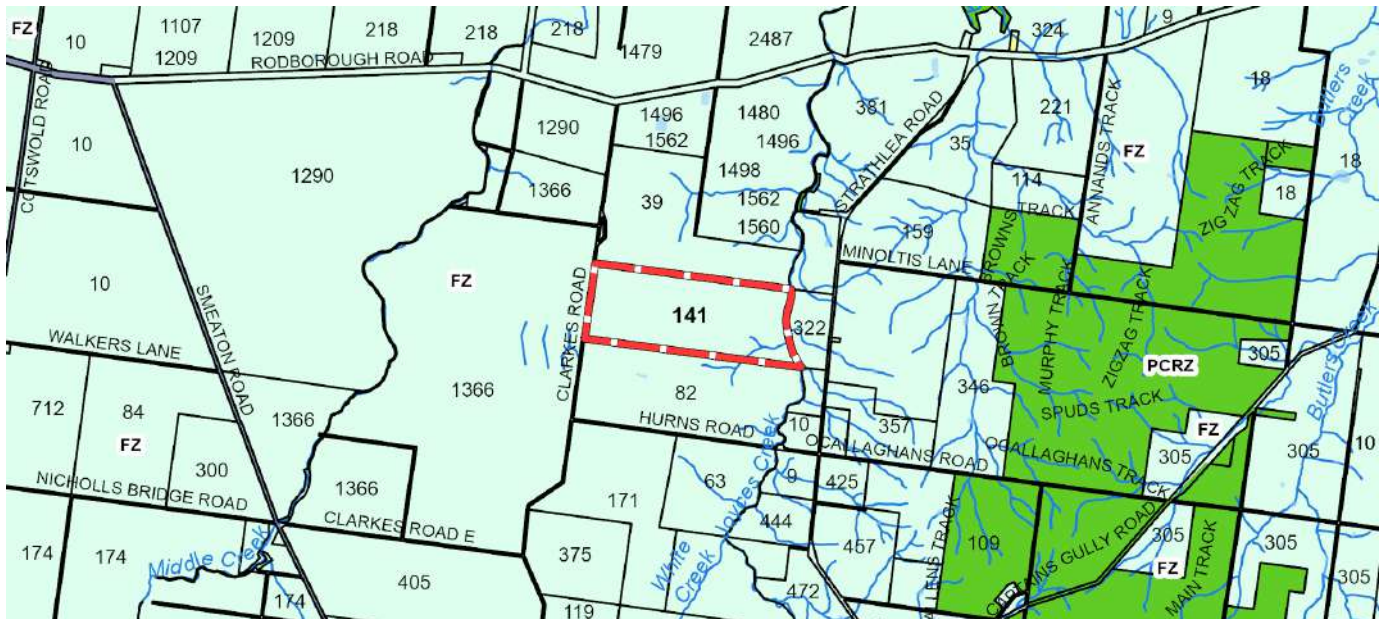
OTHER

Registered Aboriginal Party: **Dja Dja Wurrung Clans Aboriginal Corporation**

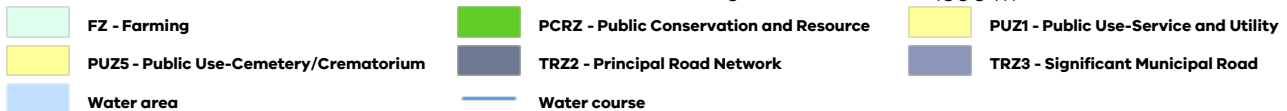
[View location in VicPlan](#)

Planning Zones

[FARMING ZONE \(FZ\) \(CENTRAL GOLDFIELDS\)](#)
[SCHEDULE TO THE FARMING ZONE \(FZ\) \(CENTRAL GOLDFIELDS\)](#)



0 1500 m



Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

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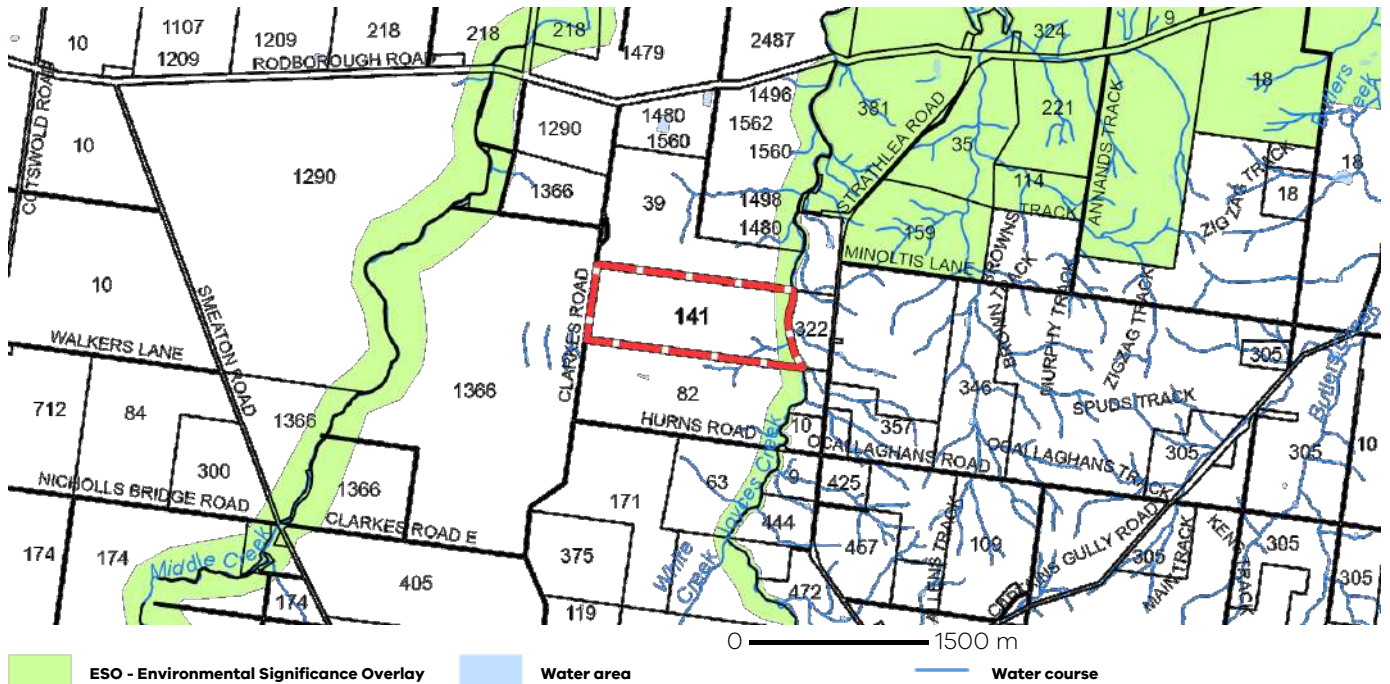
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ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO) (CENTRAL GOLDFIELDS)

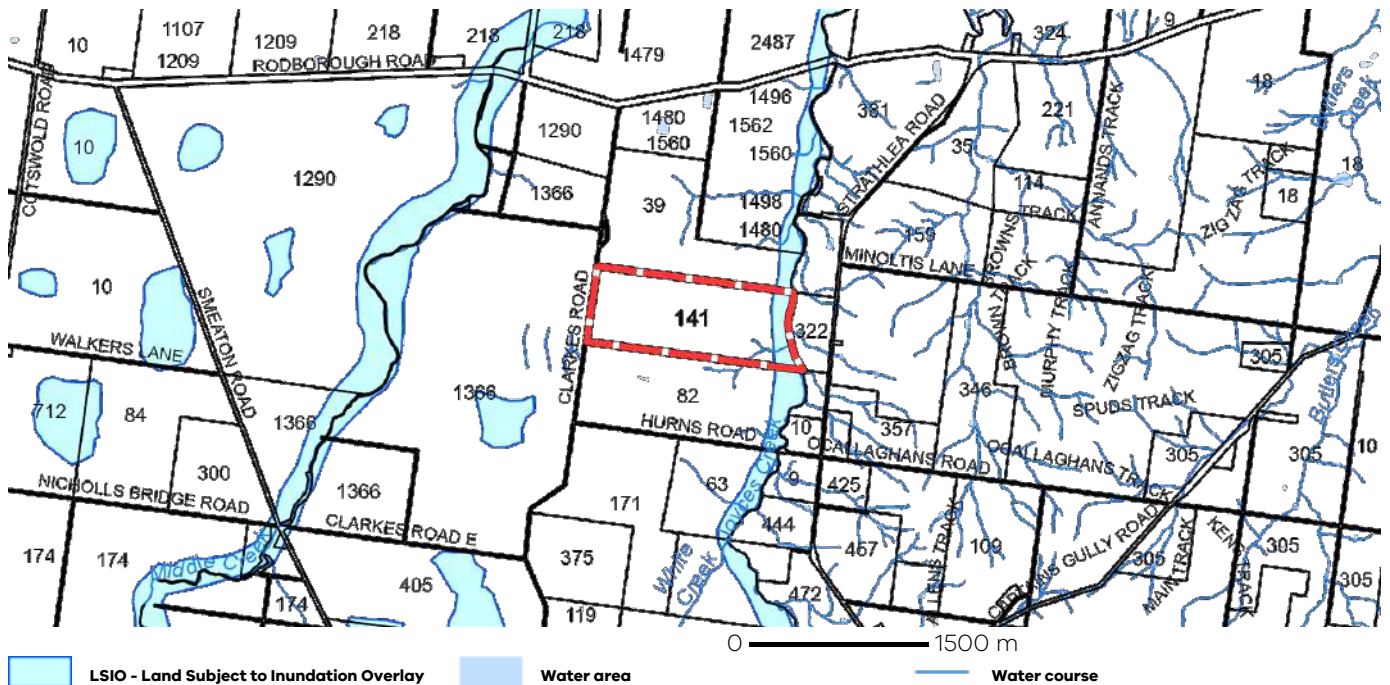
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1) (CENTRAL GOLDFIELDS)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

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LAND SUBJECT TO INUNDATION OVERLAY - SCHEDULE 1 (LSIO1) (CENTRAL GOLDFIELDS)



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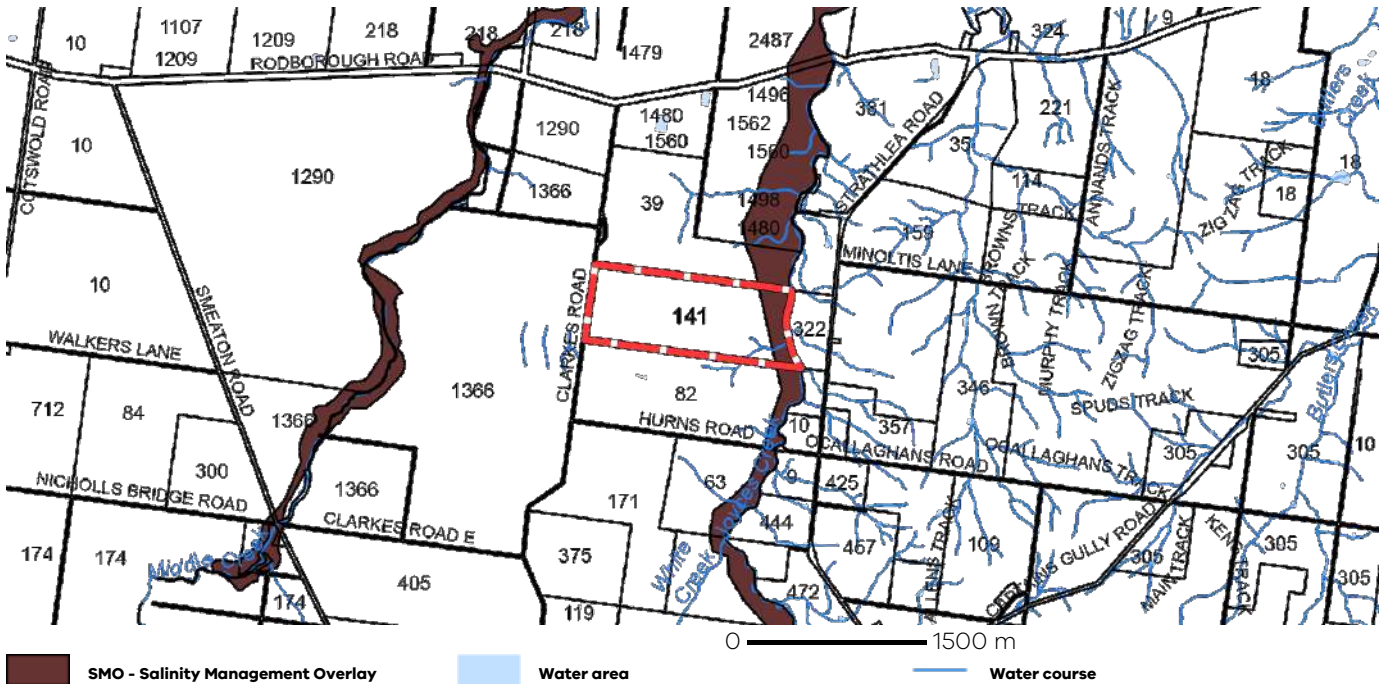
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[SALINITY MANAGEMENT OVERLAY SCHEDULE \(SMO\) \(CENTRAL GOLDFIELDS\)](#)

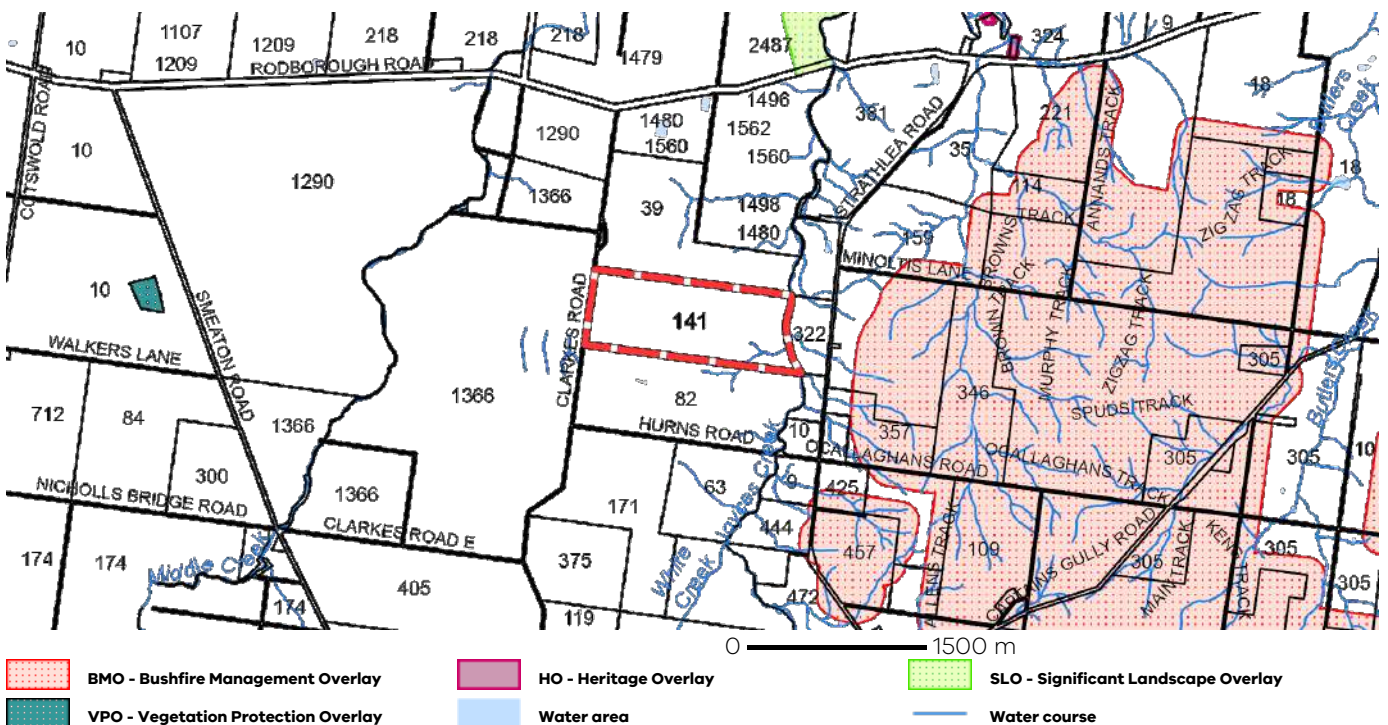


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OTHER OVERLAYS

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Areas of Aboriginal Cultural Heritage Sensitivity

All or part of this property is an area of cultural heritage sensitivity.

Areas of cultural heritage sensitivity are defined under the Aboriginal Heritage Regulations 2018, and include registered Aboriginal cultural heritage places and land form types that are generally regarded as more likely to contain Aboriginal cultural heritage.

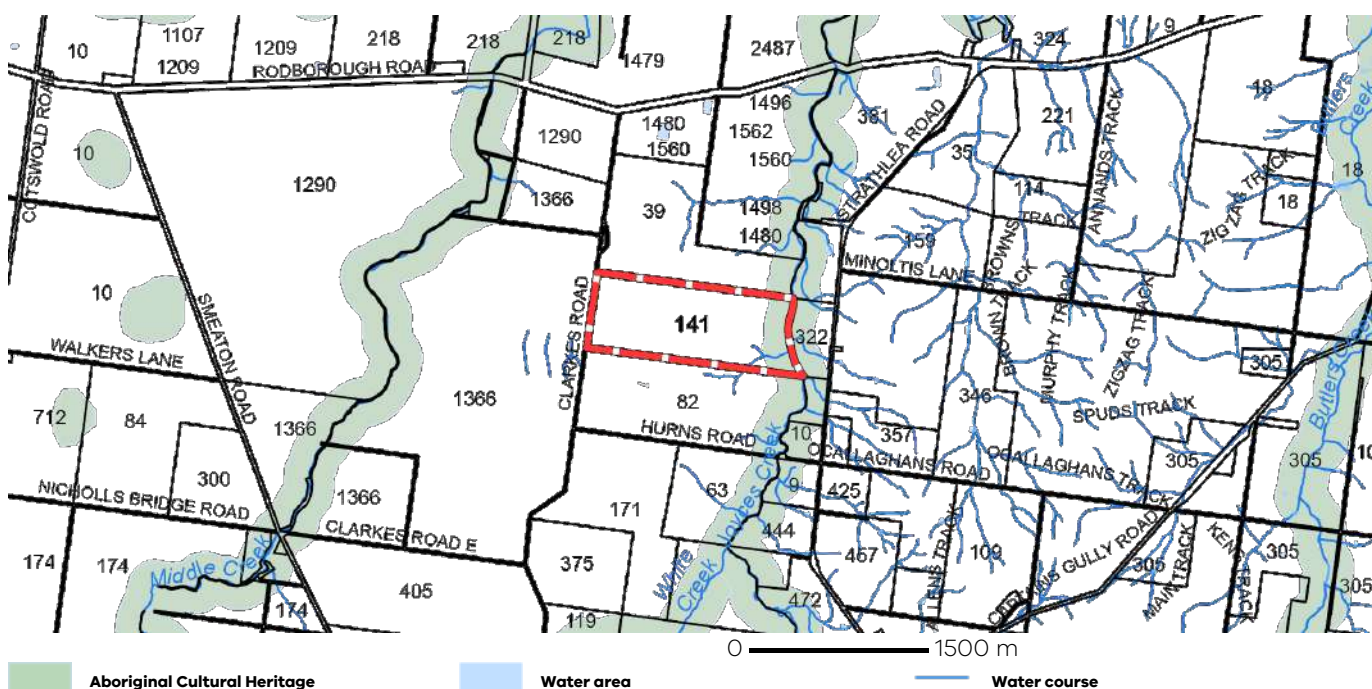
Under the Aboriginal Heritage Regulations 2018, areas of cultural heritage sensitivity are one part of a two part trigger which require a cultural heritage management plan be prepared where a listed high impact activity is proposed.

If a significant land use change is proposed (for example, a subdivision into 3 or more lots), a cultural heritage management plan may be triggered. One or two dwellings, works ancillary to a dwelling, services to a dwelling, alteration of buildings and minor works are examples of works exempt from this requirement.

Under the Aboriginal Heritage Act 2006, where a cultural heritage management plan is required, planning permits, licences and work authorities cannot be issued unless the cultural heritage management plan has been approved for the activity.

For further information about whether a Cultural Heritage Management Plan is required go to <http://www.aav.nrms.net.au/aavQuestion1.aspx>

More information, including links to both the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2018, can also be found here - <https://www.aboriginalvictoria.vic.gov.au/aboriginal-heritage-legislation>



Further Planning Information

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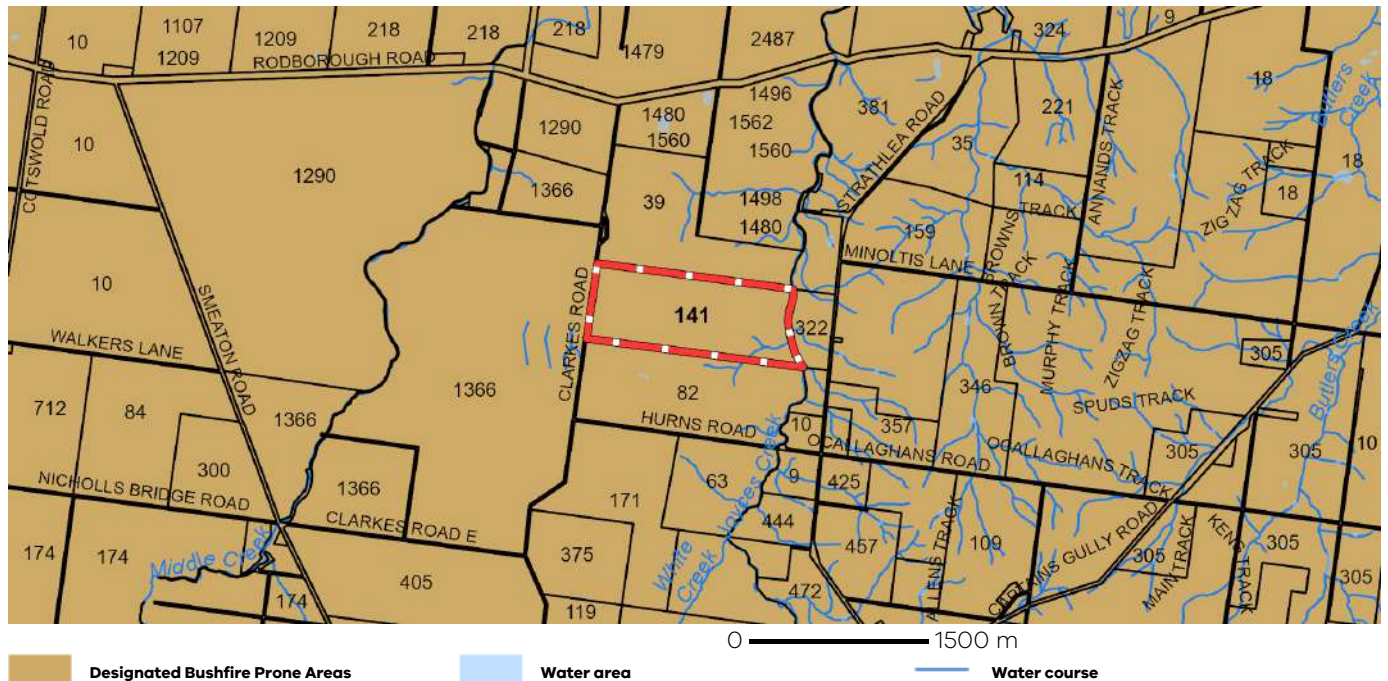
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APPENDIX 2 – CERTIFICATES OF TITLE



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The Victorian Government acknowledges the Traditional Owners of Victoria and pays respects to their ongoing connection to their Country, History and Culture. The Victorian Government extends this respect to their Elders, past, present and emerging.

**REGISTER SEARCH STATEMENT (Title Search) Transfer of
Land Act 1958**

Page 1 of 1

VOLUME 07371 FOLIO 071

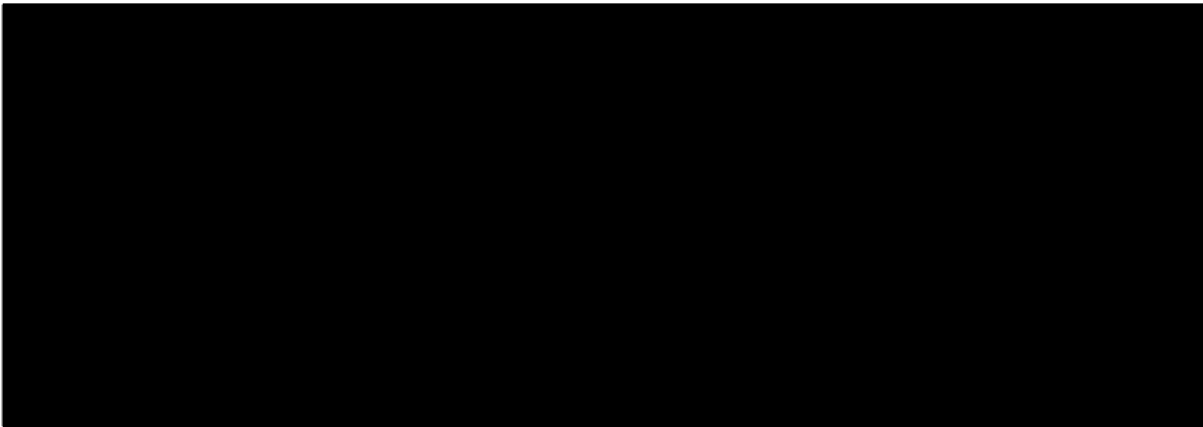
Security no : 124112943078N
Produced 26/02/2024 12:46 PM

CROWN GRANT

LAND DESCRIPTION

Crown Allotment 2 and Crown Allotment 2A Parish of Redborough.

REGISTERED PROPRIETOR



ENCUMBRANCES, CAVEATS AND NOTICES

Any crown grant reservations exceptions conditions limitations and powers noted on the plan or imaged folio set out under DIAGRAM LOCATION below. For details of any other encumbrances see the plan or imaged folio set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP776499R FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

-----END OF REGISTER SEARCH STATEMENT-----

Additional information: (not part of the Register Search Statement)

ADMINISTRATIVE NOTICES

NIL



DOCUMENT END



Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Secure Electronic Registries Victoria.

Document Type	Plan
Document Identification	TP776499R
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TITLE PLAN	EDITION 1	TP 776499R
<p>Location of Land</p> <p>Parish: RODBOROUGH</p> <p>Township:</p> <p>Section:</p> <p>Crown Allotment: 2, 2A</p> <p>Crown Portion:</p> <p>Last Plan Reference</p> <p>Derived From: VOL 7371 FOL 071</p> <p>Depth Limitation: 50 FEET</p>	<p>Notations</p> <p>SUBJECT TO THE RESERVATIONS EXCEPTIONS CONDITIONS AND POWERS CONTAINED IN CROWN GRANT VOL 7371 FOL 071 AND NOTED ON SHEET 2 OF THIS PLAN</p> <p>WATERWAY NOTATION:</p> <p>C.A. 2 IN THIS PLAN MAY ABUT CROWN LAND THAT MAY BE SUBJECT TO A CROWN LICENCE TO USE</p> <p>ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN</p>	
Description of Land / Easement Information		<p>THIS PLAN HAS BEEN PREPARED FOR THE LAND REGISTRY, LAND VICTORIA, FOR TITLE DIAGRAM PURPOSES AS PART OF THE LAND TITLES AUTOMATION PROJECT</p> <p>COMPILED: 12/03/2003</p> <p>VERIFIED: L.S.</p>
<p>COLOUR CODE</p> <p>Y=YELLOW</p>		
<p>ENLARGEMENT</p>		
<p>LENGTHS ARE IN LINKS</p>	<p>Metres = 0.3346 x Feet</p> <p>Metres = 0.201168 x Links</p>	<p>Sheet 1 of 2 sheets</p>

TITLE PLAN

TP 776499R

LAND DESCRIPTION INCLUDING RESERVATIONS EXCEPTIONS
 CONDITIONS AND POWERS SHOWN ON THE CROWN GRANT

THAT PIECE OF LAND in the said State containing three hundred and thirteen acres three roods and twenty-five perches more or less being allotments two and two^A in the Parish of Redborough County of Talbot

delineated with the measurements and abutments thereof in the map drawn in the margin of these presents and therein colored yellow PROVIDED nevertheless that the grantee shall be entitled to sink wells for water and to the use and enjoyment of any wells or springs of water upon or within the boundaries of the said land for any and for all purposes as though he held the land without limitation as to depth EXCEPTING nevertheless unto Us Our heirs and successors all gold and silver and minerals as defined in the Mines Act 1926 in upon or under or within the boundaries of the land hereby granted AND reserving to Us Our heirs and successors free liberty and authority for Us Our heirs and successors and Our and their licensees agents and servants at any time or times hereafter to enter upon the said land and to search and mine therein for gold silver and minerals as aforesaid and to extract and remove therefrom any such gold silver and minerals and to search for and work dispose of and carry away the said gold silver and minerals lying in upon or under the land hereby granted and for the purposes aforesaid to sink shafts make drives erect machinery and to carry on any works and do any other things which may be necessary or usual in mining and with all other incidents that are necessary to be used for the getting of the said gold silver and minerals and the working of all mines seams lodes and deposits containing such gold silver and minerals in upon or under the land hereby granted AND ALSO reserving to Us Our heirs and successors—

- (i) all petroleum as defined in the Mines (Petroleum) Act 1935 on or below the surface of the said land and
- (ii) the right of access for the purpose of searching for and for the operations of obtaining such petroleum in any part or parts of the said land and
- (iii) rights of way for access and for pipelines and other purposes necessary for obtaining and conveying such petroleum in the event of such petroleum being obtained in any part or parts of the said land.

PROVIDED ALWAYS that the said land is and shall be subject to be resumed for mining purposes under Section 168 of the Land Act 1926.

AND PROVIDED also that the said land is and shall be subject to the right of any person being the holder of a miner's right or of a mining lease or mineral lease under the Mines Act 1926 or any corresponding previous enactment to enter therein and to mine for gold silver or minerals within the meaning of the said Act and to erect and occupy mining plant or machinery thereon in the same manner and under the same conditions and provisions as those to which such person would for the time being be entitled to mine for gold and silver in and upon Crown lands PROVIDED that compensation shall be paid to the said

GRANTEE

his executors administrators assigns or transferees by such person for surface damage to be done to such land by reason of mining thereon such compensation to be determined as provided for the time being by law and the payment thereof to be a condition precedent to such right of entry.

LENGTHS ARE IN LINKS

Metres = 0.3048 x Feet
 Metres = 0.201168 x Links

Sheet 2 of 2 sheets

**REGISTER SEARCH STATEMENT (Title Search) Transfer of
Land Act 1958**

Page 1 of 1

VOLUME 07629 FOLIO 147

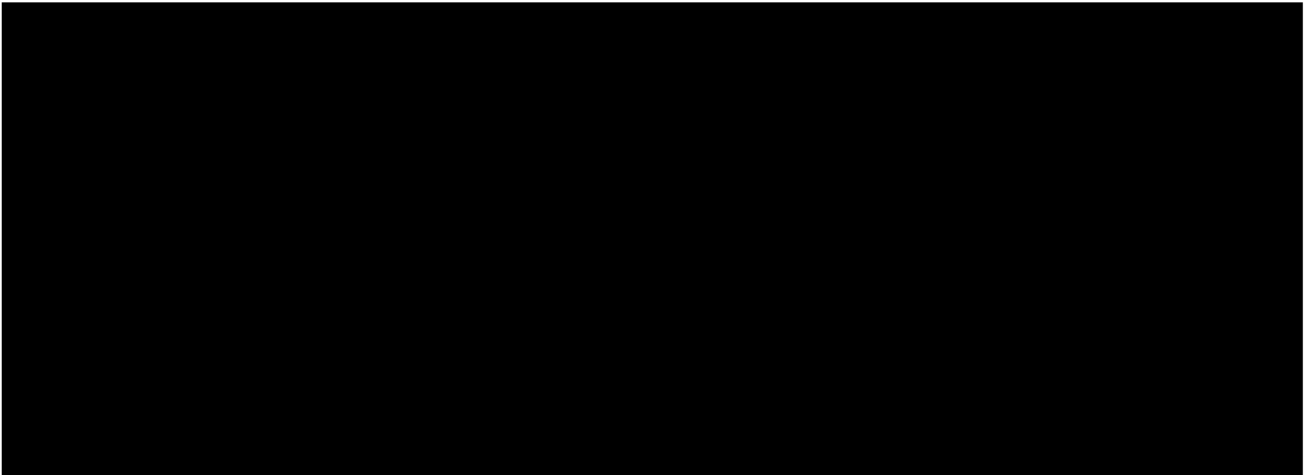
Security no : 124112946290W
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CROWN GRANT

LAND DESCRIPTION

Crown Allotment 3 Parish of Rodborough.

REGISTERED PROPRIETOR



ENCUMBRANCES, CAVEATS AND NOTICES

Any crown grant reservations exceptions conditions limitations and powers noted on the plan or imaged folio set out under DIAGRAM LOCATION below. For details of any other encumbrances see the plan or imaged folio set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP609878U FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

DOCUMENT END



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TITLE PLAN	EDITION 1	TP 609878U
<p>Location of Land</p> <p>Parish RODBOROUGH</p> <p>Township</p> <p>Section</p> <p>Crown Allotment 3</p> <p>Crown Portion</p> <p>Last Plan Reference</p> <p>Derived From VOL 7629 FOL 147</p> <p>Depth Limitation 50 FEET</p>	<p>Notations</p> <p>SUBJECT TO THE RESERVATIONS EXCEPTIONS CONDITIONS AND POWERS CONTAINED IN CROWN GRANT VOL 7629 FOL 147 AND NOTED ON SHEET 2 OF THIS PLAN</p> <p>ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN</p>	
<p>Description of Land / Easement Information</p>		<p>THIS PLAN HAS BEEN PREPARED FOR THE LAND REGISTRY, LAND VICTORIA, FOR TITLE DIAGRAM PURPOSES AS PART OF THE LAND TITLES AUTOMATION PROJECT</p> <p>COMPILED 23/08/2000</p> <p>VERIFIED. MP</p> <p>COLOUR CODE</p> <p>Y=YELLOW</p>
<p>LENGTHS ARE IN LINKS</p>	<p>Metres = 0.2046 x Feet</p> <p>Metres = 0.201168 x Links</p>	<p>Sheet 1 of 2 sheets</p>

TITLE PLAN

TP 609878U

LAND DESCRIPTION INCLUDING RESERVATIONS EXCEPTIONS
 CONDITIONS AND POWERS SHOWN ON THE CROWN GRANT

ALL THAT PIECE OF LAND in the said State containing three hundred and fifteen acres three roods and twenty-nine perches more or less being Allotment three in the Parish of Rodborough County of Talbot

deducted with the measurements and abatals thereof in the map drawn in the margin of these presents and therein colored yellow. PROVIDED nevertheless that the grantee shall be entitled to sink wells for water and to the use and enjoyment of any wells or springs of water upon or within the boundaries of the said land for any and for all purposes as though he held the land without limitation as to depth. EXCEPTED nevertheless unto Us Our heirs and successors all gold and silver and minerals as defined in the *Mines Act 1925* in upon or under or within the boundaries of the land hereby granted. And reserving to Us Our heirs and successors free liberty and authority for Us Our heirs and successors and Our and their lieges agents and servants at any time or times hereafter to enter upon the said land and to search and mine therein for gold silver and minerals as aforesaid and to extract and remove therefrom any such gold silver and minerals and to search for and work dispose of and carry away the said gold silver and minerals lying in upon or under the land hereby granted and for the purposes aforesaid to sink shafts make drives erect machinery and to carry on any works and do any other things which may be necessary or usual in mining and with all other incidents that are necessary to be used for the getting of the said gold silver and minerals and the working of all mines seams lodes and deposits containing such gold silver and minerals in upon or under the land hereby granted. And also reserving to Us Our heirs and successors—

- (i) all petroleum as defined in the *Mines (Petroleum) Act 1935* on or below the surface of the said land and
- (ii) the right of access for the purpose of searching for and for the operations of obtaining such petroleum in any part or parts of the said land and
- (iii) rights of way for access and for pipelines and other purposes necessary for obtaining and conveying such petroleum in the event of such petroleum being obtained in any part or parts of the said land.

PROVIDED always that the said land is and shall be subject to be resumed for mining purposes under Section 169 of the *Land Act 1925*.

AND PROVIDED also that the said land is and shall be subject to the right of any person being the holder of a miner's right or of a mining lease or mineral lease under the *Mines Act 1925* or any corresponding previous enactments to enter therein and to mine for gold silver or minerals within the meaning of the said Act and to erect and occupy mining plant or machinery thereon in the same manner and under the same conditions and provisions as those to which such person would for the time being be entitled to mine for gold and silver in and upon Crown lands PROVIDED that compensation shall be paid to the said

GRANTEE

his executors administrators assigns or transferees by such person for surface damage to be done to such land by reason of mining thereon such compensation to be determined as provided for the time being by law and the payment thereof to be a condition precedent to such right of entry.

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Sheet 2 of 2 sheets

APPENDIX 7 – COMPLIANCE WITH VICTORIAN CODE FOR BROILER FARMS

Victorian Code for Broiler Farms 2009

Assessment against Best Practice Farm Design and Operation

ELEMENT 1 (E1) – LOCATION, SITING AND SIZE

ELEMENT 1(E1): LOCATION, SITING AND SIZE	
<p><u>OBJECTIVE, ELEMENT 1</u></p> <p>To ensure the location and size of the broiler farm, and the siting of the broiler sheds, temporary litter stockpiles, compost piles and litter spreading areas:</p> <ul style="list-style-type: none"> • minimise the risk of adverse amenity impacts on nearby existing, planned and potential future sensitive uses as a result of odour, dust and noise. • do not adversely affect the use and development of nearby land. • avoid pollution of ground and surface waters • avoid adverse impacts on the visual quality of the landscape. • minimise biosecurity risks. 	
<p>STANDARD E1 S1: AMENITY PROTECTION</p> <p>Adverse impacts on the amenity of the surrounding area are minimised by ensuring broiler sheds, temporary litter stockpiles, compost piles and litter spreading areas are adequately separated from existing and planned residential and rural living areas, sensitive uses and broiler farm property boundaries.</p>	
Approved measures	Comment
<p>E1 M1.1</p> <p>The nearest external edge of a new or existing broiler shed(s) or temporary litter stockpile / compost pile is / are set back by at least 1000 m from the boundary of a:</p> <ul style="list-style-type: none"> • residential zone, urban growth zone or other urban zone where housing is a primary purpose of the zone, or • future residential area, shown on a plan or strategy incorporated in the planning scheme. 	<p><u>Complies</u></p> <p>The nearest external edge of the sheds is located approximately 9 kilometres from the nearest residential zone (Township Zone) at Newstead. There are no other urban zoned areas or future residential areas in the general area.</p>

Approved measures (cont.)	Comment (cont.)
<p>E1 M1.2</p> <p>The nearest external edge of a new or existing broiler shed(s) or litter stockpile / compost pile is / are set back by at least 750 m from the boundary of a:</p> <ul style="list-style-type: none"> • zone that provides for rural living (i.e. a Rural Living Zone or Green Wedge A Zone), or • future rural living area shown on a plan or strategy incorporated in the planning scheme. 	<p><u>Complies</u></p> <p>There are no existing or future zones that provide for low density residential or rural living in the general area.</p>
<p>E1 M1.3</p> <p>Prevailing meteorological conditions and topographical features are taken into account in determining the adequacy of separation distances to nearby sensitive uses. The minimum separation distances (as prescribed by Formula 1 of the Code) may need to be greater for some limited site specific circumstances. For example, the separation distance to a sensitive use located downslope in a drainage valley may need to be increased to minimise the risk of odour impacts.</p>	<p><u>Complies</u></p> <p>Meteorological conditions and topographical features have been taken into account in the OERA prepared by GHD.</p>
<p>E1 M1.4</p> <p>The nearest external edge of any new shed or temporary litter stockpile / compost pile is / are set back at least 100 m from the broiler farm property boundary. This distance is referred to as the boundary setback.</p> <p>For the purposes of this measure, a new shed includes an extension to an existing shed to house an increased number of birds.</p>	<p><u>Complies</u></p> <p>The shortest boundary buffer is 100 m. This is between the southern shed edge and the southern boundary of the subject land.</p>
<p>E1 M1.5</p> <p>The nearest external edge of a temporary litter stockpile / compost pile is / are set back at least 300 m from an existing sensitive use beyond the broiler farm property boundary.</p>	<p><u>Complies</u></p> <p>There are no temporary litter stockpiles or compost piles to be located on the subject land.</p>

Approved measures (cent)	Comment (cent)
<p>E1 M1.6</p> <p>The nearest external edge of a litter spreading area is set back at least 20 m from the broiler farm boundary.</p>	<p><u>Complies</u></p> <p>Litter from the sheds will not be spread on the farm.</p>
<p>E1 M1.7</p> <p>The nearest edge of a litter spreading area is set back at least 100 m from any existing sensitive use beyond the broiler farm property boundary.</p>	<p><u>Complies</u></p> <p>Litter from the sheds will not be spread on the farm.</p>
<p>STANDARD E1 S2: WATERWAY PROTECTION</p> <p>Adverse impacts on waterways are avoided by ensuring that broiler sheds, temporary litter stockpiles, compost piles and litter spreading areas are adequately separated from waterways, or other risk mitigation measures are incorporated and approved by the responsible authority.</p>	
Approved measures	Comment
<p>E1 M2.1</p> <p>A natural vegetative buffer zone of at least 30 m (or any greater distance specified in the planning scheme or by the Catchment Management Authority) is maintained along waterways. No buildings, roads or litter storage or litter re-spreading areas are located in the vegetative buffer zone. The measuring point for a waterway is the point water may reach before flowing over a bank (the bank-full discharge level).</p>	<p><u>Complies</u></p> <p>No buildings or infrastructure will be located within the vicinity of any waterway. Refer to hydrological assessment.</p>
<p>E1 M2.2</p> <p>A clearance of a further 20 m from the edge of the natural vegetative buffer zone to the nearest external edge of any broiler shed is provided to ensure adequate shed ventilation, minimise vermin habitat and provide adequate access to the sheds and fire-fighting protection.</p>	<p><u>Complies</u></p> <p>Refer to comments immediately above.</p>

Approved measures (cont.)	Comment (cont.)
<p>E1 M2.3</p> <p>No solid or liquid waste (including temporary litter stockpiles, compost piles and litter spreading areas) is stored or disposed of within:</p> <ul style="list-style-type: none"> • 800 m of any potable water supply take-off controlled by a statutory authority • 200 m of any waterway supplying potable water • 100 m of any other type of waterway. 	<p><u>Complies</u></p> <p>No solid or liquid waste will be stored on the farm.</p> <p>Used litter from the farm will not be spread on the subject land.</p>
<p>STANDARD E1 S3: PROTECTING THE VISUAL QUALITY OF THE LANDSCAPE</p> <p>Buildings and works are sited to account for the topography of the site and views from public roads, to minimise their visual impact on the landscape.</p>	
Approved measures	Comment
<p>E1 M3.1</p> <p>Buildings and works are not sited on steep slopes (greater than 20 per cent slope).</p>	<p><u>Complies</u></p> <p>The slope of the subject land where the sheds are to be located does not exceed 3%.</p>
<p>E1 M3.2</p> <p>Buildings and works are oriented to follow the contours of the land.</p>	<p><u>Complies</u></p> <p>The sheds are to be located on relatively flat land.</p>
<p>E1 M3.3</p> <p>Existing ridgeline vegetation is maintained to avoid breaking the ridgeline silhouette.</p>	<p><u>Not Applicable</u></p> <p>There is no ridgeline within the property.</p>

STANDARD E1 S4: BIOSECURITY

An appropriate distance is provided between the broiler farm (that is the broiler sheds, temporary litter stockpiles, compost piles and litter spreading areas), and other existing poultry farms under separate management, to minimise the risk of disease transmission.

Approved measures	Comment
E1 M4.1 The nearest external edge of new or existing broiler sheds is / are set back from sheds on other poultry farms by the distance specified in Table 1 of <i>Biosecurity Guidelines for Poultry Producers</i> (Agnote AG1155 at www.dpi.vic.gov.au/notes/).	<u>Complies</u> The closest chicken farm is Grandview Poultry Unit 2 which is 1,171 m from the proposed sheds. Thus, the setback distance of 1,000 m specified in the Biosecurity Guidelines is complied with. All farms are contracted to the same processor, Hazeldenes.
E1 M4.2 Temporary litter stockpiles or compost piles are separated by at least 100 m from a new or existing broiler shed on the subject land, or are sited and managed as otherwise stipulated by the processor to meet biosecurity requirements.	<u>Complies</u> There are no temporary litter stockpiles or compost piles to be located on the property.
E1 M4.3 The litter spreading area is separated by at least 20 m from a new or existing broiler shed on the subject land, or is sited and managed as otherwise stipulated by the processor to meet biosecurity requirements.	<u>Complies</u> Litter from the sheds will not be spread on the farm.

STANDARD E1 S5: FUTURE USE AND DEVELOPMENT OF NEIGHBOURING LAND

Broiler sheds are sited so that offensive odour, dust and noise emissions will not adversely impact the orderly and sustainable use and development of land located beyond the farm property boundary, including the ability to establish a dwelling (excluding a bed and breakfast or caretaker's house) on a vacant property, having regard to:

- the existing and likely future use and development of the land including any approved sensitive uses
- the existing physical and environmental characteristics of the land
- the purpose and requirements of the zone applying to the land
- any applicable land use decision guidelines, policies and strategies in the planning scheme.

Approved measures	Comment
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Approved measures	Comment
<p>E1 M5.1</p> <p><u>Class B Farms</u> – The required minimum separation distance covers no more than 50 per cent of the area of a property located beyond the broiler farm property boundary.</p>	<p><u>Not Applicable</u></p> <p>The farm is a Cluster farm.</p>
<p>E1 M5.2</p> <p><u>Class B Farms</u> – Where a property located beyond the broiler farm property boundary is not currently developed with a dwelling (excluding a caretaker's house or a bed and breakfast) the remaining area of the property (unaffected by the separation distance requirement) is capable of providing a 20 metre x 30 metre building envelope for a dwelling taking into account the following siting considerations:</p> <ul style="list-style-type: none"> • any applicable planning scheme requirements including zoning considerations and any setback requirements for buildings not requiring a planning permit under the applicable zoning provisions • whether the land is encumbered by steep terrain, native vegetation, offsite impacts of an existing intensive animal industry or any other significant topographic, environmental or land use characteristic that may significantly limit the ability to establish and use a dwelling • whether the land is identified in the planning scheme as being subject or susceptible to flooding (both river and coastal inundation), landslip or any other form of hazard that may limit the ability to establish and use a dwelling. <p>However, the remaining land does not need to be capable of providing a building envelope if the land covered by the minimum separation distance requirement is equally unacceptable in terms of providing the building envelope having regard to the siting considerations listed above.</p>	<p><u>Not Applicable</u></p> <p>The farm is a Cluster farm.</p>

Approved measures (cont.)	Comment (cont.)
E1 M5.2 (cont.)	
<p><u>Special Class and Farm Clusters</u> – There are no approved measures for Special Class and Farm Clusters under Standard E1 S5. These broiler farm applications must be assessed against this standard on a case-by-case basis using the information produced by the Odour ERA (see the 'Odour Environmental Risk Assessment (Odour ERA)' section of this Code).</p>	<p><u>Complies</u></p> <p>The Odour ERA has been prepared and demonstrates that the proposed farm fitted with stub stacks will give rise to a low risk of odour impacts for all sensitive receptors within a 2 kilometre radius of the farms. Both the approved and proposed farms are low risk.</p>

ELEMENT 2 (E2) – FARM DESIGN, LAYOUT AND CONSTRUCTION

ELEMENT 2 (E2): FARM DESIGN, LAYOUT AND CONSTRUCTION	
<p><u>OBJECTIVE, ELEMENT 2</u></p> <p>To ensure the design and construction of the broiler farm minimise the risk of adverse amenity and environmental impacts, and support the cost effective operational efficiency of the farm.</p>	
<p>STANDARD E2 S1: PROTECTING THE VISUAL QUALITY OF THE LANDSCAPE</p> <p>Buildings and works are designed and constructed to minimise their visual impact. Site topography and existing and proposed vegetation are used to best advantage to screen new buildings and works from public roads and neighbouring properties.</p>	
Approved measures	Comment
<p>E2 M1.1</p> <p>Buildings are constructed in response to the topography of the land as follows:</p> <ul style="list-style-type: none"> On flat land, buildings directly in the view line of adjacent roads and dwellings on neighbouring properties are screened by vegetation (see Element 4: Landscaping). On hilly terrain, the construction of terraces or earth platforms avoids unnecessary or excessive earthworks, and suitable erosion control measures are in place (see also Standard E1 S3 and Approved measures E1 M3.1-3.3). 	<p><u>Complies</u></p> <p>The topography of the subject land is relatively flat. The proposed sheds will be screened by bunding, and substantial landscape and forestry planting as shown on the accompanying landscaping plan.</p> <p>The proposed bunding and plantings will minimise the visual impact of the sheds from nearby locations as demonstrated by the visual assessment prepared by Landform Architects. There will be virtually no change from the previously approved farm.</p>
<p>E2 M1.2</p> <p>Broiler shed walls are clad externally in materials that are non-reflective and finished in natural colours and tones of surrounding vegetation, soil, rocks or other natural features, to improve the visual integration of buildings with the natural landscape.</p>	<p><u>Complies</u></p> <p>The cladding of the walls of the sheds and associated buildings is to be selected from the 'colorbond range' in a non-reflective pale green colour which is consistent with the requirements of the Code and Permit No. T120/16.</p>

STANDARD E2 S2: EFFICIENT FARM OPERATION

The design and layout of the whole broiler farm provides environmental and amenity protection while maximising the efficiency of farm operations, including:

- orderly management of feed and water, including:
 - adequate (quality and quantity) water supply
 - drinker technology that minimises wetting of litter through water spillage
 - treatment and disinfection of non-potable drinking water supply (dams, rivers and bores).
- efficient placement of silos and feed systems
- efficient placement and collection of birds
- efficient placement of fresh litter
- collection, handling and treatment of all wastes
- cleaning and maintenance of collection areas
- protection against birds and other vermin
- efficient energy and water use.

Approved measures	Comment
<p>E2 M2.1</p> <p>New broiler sheds are orientated to minimise the risk of odour, dust and noise impacts on the surrounding community with tunnel ventilation fans being located at the furthestmost point away from the nearest sensitive use and taking into account the locality and concentration of other sensitive uses.</p>	<p><u>Complies</u></p> <p>The tunnel ventilation fans are located on the eastern end of the sheds. The closest off-site residence to the proposed sheds is 1,350 m to the south east.</p> <p>The Odour ERA demonstrates that the proposed farm fitted with stub stacks will not create a greater risk of unacceptable odour impacts than the broiler farm approved under Planning Permit T120/16. Both present a low risk of odour impacts at sensitive receptors.</p>
<p>E2 M2.2</p> <p>The design and construction of broiler sheds, associated works and roads facilitate the efficient delivery of feed and birds, collection of birds, and the cleaning and maintenance of sheds and collection areas.</p>	<p><u>Complies</u></p> <p>The shed complex is designed with a ring road around the external perimeter of the sheds, and substantial hardstand areas at the ends of the sheds. This facilitates efficient traffic movement, delivery, collection, cleaning, and maintenance.</p>

Approved measures (cont.)	Comment (cont.)
<p>E2 M2.3</p> <p>Broiler sheds and feed silos are constructed to prevent access by wild birds, vermin and rodents.</p>	<p><u>Complies</u></p> <p>The chicken sheds will be fully enclosed with concrete floors and dwarf walls. The silos and feed distribution are also fully enclosed. This infrastructure will be bird, vermin and rodent proof. Bait stations will be provided to control rodents.</p>
<p>E2 M2.4</p> <p>A continuous water supply is available to the proposed development site (from reticulated town water supply, dams or a bore) for drinking, shed cooling and shed wash down (disinfection).</p>	<p><u>Complies</u></p> <p>Water for all purposes will be sourced from the proposed new dam on-site. This will be supplemented by water from the existing bore in Rodborough Road. Drinking water for the birds will be suitably treated prior to entering the sheds.</p>
<p>E2 M2.5</p> <p>A back-up supply or storage of water is available to hold at least one day's total requirement, in case of a breakdown or loss of normal water supply.</p>	<p><u>Complies</u></p> <p>Backup water supply is provided by the three water tanks to be located on the western end of the sheds as shown on Figure 4 – Broiler Farm Layout. These store 2 days of total water requirements.</p>
<p>E2 M2.6</p> <p>When dam or river water is used to supply water, chlorination, ultraviolet light systems or other appropriate disinfection procedures are used to disinfect the water.</p>	<p><u>Complies</u></p> <p>Drinking water for the birds will be suitably treated prior to entering the sheds.</p>
<p>E2 M2.7</p> <p>Feed and watering systems can be adjusted to meet the requirements of the birds as they grow.</p>	<p><u>Complies</u></p> <p>Both the automatic watering and feed delivery systems located within the sheds will be capable of adjustment as the birds grow.</p>
<p>E2 M2.8</p> <p>Nipple drinkers with trays are used to provide drinking water.</p>	<p><u>Complies</u></p> <p>High quality, "state of the art" nipple drinkers fitted with drip trays will be used to provide drinking water (refer to Photos 8 - 9 provided in Appendix 3).</p>

Approved measures (cont.)	Comment (cont.)
<p>E2 M2.9</p> <p>Silos and feed systems are designed, sited and constructed to minimise spills of feed.</p>	<p><u>Complies</u></p> <p>The feed silos and delivery systems are totally enclosed which ensures that the likelihood of any feed spills is negligible.</p>
<p>STANDARD E2 S3: AVOIDING ENVIRONMENTAL IMPACTS FROM BROILER SHEDS</p> <p>Broiler shed floors and areas surrounding the sheds are designed and constructed to avoid the leaching of nutrients into the ground.</p>	
Approved measures	Comment
<p>E2 M3.1</p> <p>A concrete hard stand area is located at the entrance to each broiler shed.</p>	<p><u>Complies</u></p> <p>Concrete hard stand areas will be constructed at the doors at each end of the sheds.</p>
<p>E2 M3.2</p> <p>The base of the broiler sheds is constructed from low permeability materials such as concrete, compacted clay or another sealed surface.</p>	<p><u>Complies</u></p> <p>The base of the broiler sheds will be concrete with a finished floor level 0.35 m above the swales in the free range areas between the sheds.</p>
<p>E2 M3.3</p> <p>The finished floor level of the broiler sheds is above the natural surface level to prevent the entry of stormwater run-off. Alternatively, the shed is bunded or a surface drainage system is installed to prevent the entry of stormwater run-off.</p>	<p><u>Complies</u></p> <p>The finished floor levels of the sheds will be 0.35 m above the swales between the sheds. Surface drainage systems will be constructed to drain all surface water flows away from the sheds via grassed swales, vegetated buffer strip and sediment basin to the proposed dam.</p>

STANDARD E2 S4: NOISE MANAGEMENT

The broiler farm development meets the requirements of the *Interim Guidelines for Control of Noise from Industry in Country Victoria N. 3/89* (or its most recent update). To achieve this, in addition to the requirements of Element 1, Standard 1 (E1 S1); and Element 3, Standard 2 and Standard 4 (E3 S2 and E3 S4), the broiler farm further manages noise levels by ensuring farm vehicles and equipment associated with farm operations do not cause adverse noise impacts on nearby sensitive uses.

Approved measures	Comment
<p>E2 M4.1</p> <p>The design, siting and selection of all mechanical equipment, including fans, pneumatic feed systems and other equipment, minimises the generation of mechanical noise and the likelihood of off-site vibration.</p>	<p><u>Complies</u></p> <p>Mechanical equipment will be chosen with the intent of minimising noise. Equipment will be located well away from nearest off-site dwellings, the closest of which is some 1,350 metres away. The acoustic assessment demonstrates that noise levels from the combined GV1, GV2 & GV3 farms will comply with the EPA's Noise Protocol for all time periods.</p>

STANDARD E2 S5: STORMWATER DRAINAGE

Stormwater and / or wastewater run-off from the broiler farm does not contaminate nearby waterways or groundwater, or cause erosion. Stormwater is also prevented from entering the broiler sheds.

Approved measures	Comment
<p>E2 M5.1</p> <p>Clean stormwater collection areas are separated from areas that broiler farm waste may affect.</p>	<p><u>Complies</u></p> <p>Farm waste is not to be stored on the property. Any spills of waste materials will be promptly cleaned up. Surface flows external to the sheds complex will be diverted around the site and dam and kept separate from stormwater generated by the shed roofs, hardstand and free-range areas.</p>
<p>E2 M5.2</p> <p>Stormwater from sheds and hard standing apron areas is collected and managed on site in a dam(s) or tanks within the broiler farm boundary.</p>	<p><u>Complies</u></p> <p>All surface drainage from roofs, hardstand and free-range areas is to be directed to the proposed new dam shown on Figure 4 – Broiler Farm Layout.</p>

Approved measures (cont.)	Comment (cont.)
<p>E2 M5.3</p> <p>Stormwater table drains with an appropriate gradient are established along all building lines to collect stormwater run-off from sheds and hard standing apron areas.</p>	<p><u>Complies</u></p> <p>Surface drainage systems will be constructed to drain all surface water flows away from the sheds and hardstand areas to swales and direct these via the vegetated buffer strip and sediment basin to the retarding dam.</p>
<p>E2 M5.4</p> <p>In areas subject to soil erosion, the system design incorporates mitigation methods such as crushed rock traps and drops.</p>	<p><u>Complies</u></p> <p>All areas disturbed by earthworks will be revegetated as soon as practical upon completion which will minimise the risk of soil erosion.</p>
<p>E2 M5.5</p> <p>Stormwater management is consistent with any stormwater management plan of the responsible authority.</p>	<p><u>Complies</u></p> <p>Stormwater flows originating from the shed complex area will be managed as discussed above.</p>
<p>E2 M5.6</p> <p>Retaining dams are constructed with the capacity to retain run-off from a one-in-ten-year storm.</p>	<p><u>Complies</u></p> <p>The proposed new dam shown on Figure 4 – Broiler Farm Layout will be designed to retard the one-in-ten-year storm event. This is confirmed by the hydrological assessment.</p>

ELEMENT 3 (E3) – TRAFFIC, SITE ACCESS, ONFARM ROADS AND PARKING

ELEMENT 3 (E3) – TRAFFIC, SITE ACCESS, ONFARM ROADS AND PARKING	
<p><u>OBJECTIVE, ELEMENT 3</u></p> <p>To ensure the location, design and construction of the farm access points, internal roads and parking areas, and the movement of vehicles for broiler farm operations support the safe and efficient operation of the farm, and minimise adverse amenity impacts on nearby sensitive uses.</p>	
<p>STANDARD E3 S1: SITE ACCESS</p> <p>Vehicle access points are designed and constructed to allow all-weather safe entry and exit for the anticipated type and frequency of vehicles, accounting for road and traffic conditions.</p>	
Approved measures	Comment
<p>E3 M1.1</p> <p>Access points are constructed to a standard that minimises deterioration in the road pavement, avoids sharp turns and provides sufficient road width for truck turning movements.</p>	<p><u>Complies</u></p> <p>The proposed access point off Clarkes Road will be constructed to ensure the easy movement of semi-trailers and B-Double vehicles in and out of the site.</p>
<p>E3 M1.2</p> <p>For site access from a public road, the gate to the broiler farm is at least 30 m inside the broiler farm boundary, so articulated vehicles requiring access can park off the public road while the gate is being opened.</p>	<p><u>Complies</u></p> <p>The gate on the access road into the farm will be setback 120 metres from Clarkes Road. This ensures ample off-road standing for articulated vehicles.</p>

STANDARD E3 S2: SITE ACCESS

Vehicle access points to the broiler farm from public roads are located to minimise noise and vehicle light impacts on existing sensitive use.

Approved measures	Comment
E3 M2.1 Vehicle access points are located as far away as possible from a sensitive use not associated with the broiler farm.	<u>Complies</u> The access point for the farm will be some 1,600 m from the nearest residence to the north.
E3 M2.2 All lighting is located, directed and baffled to limit light beyond the development site boundaries.	<u>Complies</u> Given the baffled lights and large boundary setbacks, lighting will not spill beyond the boundaries

STANDARD E3 S3: INTERNAL ROADS AND CAR PARKING

Internal roads and parking areas are designed, constructed and maintained to operate in all weather conditions. Adequate provision is made for the parking and movement on the property of articulated and other vehicles associated with the farm's operation, including the delivery of birds, litter and feed to the premises, and the collection of birds and waste.

Approved measures	Comment
E3 M3.1 Internal roads and parking areas are constructed of a compacted sub-base with table drains, and a compacted gravel layer with a camber to shed rainwater to the drains.	<u>Complies</u> All access roads and hard standing areas will be designed and constructed to meet this requirement. Roads and hardstand areas will be surfaced with crushed rock to provide an all-weather surface.
E3 M3.2 An area(s) is provided for parking articulated vehicles involved in loading and unloading stock, feed, litter and waste.	<u>Complies</u> Ample areas are provided on the substantial hard stand areas at the east and west ends of the sheds.

STANDARD E3 S4: INTERNAL ROADS AND CAR PARKING

Internal roads and parking areas are designed and sited to minimise noise and light impacts on neighbouring sensitive uses.

Approved measures	Comment
<p>E3 M4.1</p> <p>Internal roads and parking areas are designed to ensure efficient traffic flow and to reduce the need for vehicles to reverse. The layout allows ease of access to the site, avoids the use of sharp turns, and for vehicles to leave the farm travelling in a forward direction.</p>	<p><u>Complies</u></p> <p>Figure 4 – Broiler Farm Layout demonstrates that the access road, ring road and substantial hard stand areas meet this requirement.</p>
<p>E3 M4.2</p> <p>Internal roads and parking areas are located as far away as possible from a sensitive use not associated with the broiler farm.</p>	<p><u>Complies</u></p> <p>Figure 2 – Site Context Plan demonstrates that roads and parking areas are a substantial distance away from the neighbouring off-site dwellings, the closest of which is some 1,350 metres from the sheds.</p>
<p>E3 M4.3</p> <p>All lighting is located, directed and baffled to limit light beyond the development site boundaries.</p>	<p><u>Complies</u></p> <p>Given the baffled lights and large boundary setbacks, lighting will not spill beyond the boundaries.</p>

ELEMENT 4 (E4) – LANDSCAPING

ELEMENT 4 (E4) – LANDSCAPING	
<u>OBJECTIVE, ELEMENT 4</u>	
To ensure landscaping is used to minimise the visual impact of broiler sheds and litter storage areas, further reduce the risk of adverse impacts from light and dust on nearby sensitive uses, and protect, manage and enhance on-farm native vegetation and biodiversity.	
STANDARD E4 S1: LANDSCAPING	
Landscaping provides substantial visual screening from roads, public areas, nearby sensitive uses not associated with the broiler farm; integrates the farm into the surrounding landscape; and provides adequate access and clearance around the sheds.	
Approved measures	Comment
E4 M1.1 The landscape plan provides for dense vegetation and planting along frontages to public roads and other highly exposed site boundaries to provide screening of the broiler farm buildings, structures and handling areas.	<u>Complies</u> The accompanying landscape plan shows a proposed landscape buffer around the shed complex as well as forestry plantings. These will provide appropriate screening. The substantial distance to roads, intervening topography and the plantings will substantially screen the views of the sheds from locations that can be frequented by the public. This is confirmed by the accompanying visual assessment.
E4 M1.2 The landscape plan incorporates a mix of trees and large shrubs to ensure effective upper level and lower level screenings of the farm.	<u>Complies</u> The planting detail shown on the landscape plan and planting schedule demonstrate that a mix of trees and large shrubs will be provided to ensure effective upper and lower screening.
E4 M1.3 As far as possible, the landscape plan retains existing trees, particularly native vegetation, and a mix of native and local indigenous plant species that blend into the landscape.	<u>Complies</u> No existing trees are to be removed. Indigenous species and non- indigenous species will be used to achieve short term and longer term screening.

Approved measures (cont.)	Comment (cont.)
<p>E4 M1.4</p> <p>Mounds to a height of approximately 2 m are used if the combination of natural topography and tree planting cannot effectively screen a broiler farm. Soil from shed excavation, stormwater drains and farm dams may be suitable for constructing these mounds.</p>	<p><u>Complies</u></p> <p>The landscape plan and the sections shown on Figures 7 – 9 demonstrate that the combination of earthen bunding and vegetation planting will provide effective screening of the broiler farm. Soil for the bunding will be obtained from the excavation of the shed pad and the construction of the dam.</p>
<p>E4 M1.5</p> <p>Plantings and vegetation are located no closer than 20 m from the perimeter of the broiler sheds to ensure adequate shed ventilation, minimise vermin habitats, and provide adequate shed access and fire-fighting protection.</p>	<p><u>Complies</u></p> <p>The landscape buffer is setback a minimum of 20 m which is a suitable distance from the sides and the ends of the sheds.</p>
<p>E4 M1.6</p> <p>Unpaved areas around sheds are grassed to prevent soil erosion and minimise the heat load on the buildings through radiation from bare ground.</p>	<p><u>Complies</u></p> <p>All unpaved areas of the farm site will be grassed.</p>
<p>E4 M1.7</p> <p>Ground surfaces that are exposed to erosion are stabilised with ground cover planting or other means to minimise erosion.</p>	<p><u>Complies</u></p> <p>The topography of the subject land is relatively flat thus the risk of soil erosion is low. All areas disturbed by earthworks will be revegetated as soon as practical upon completion.</p>
<p>E4 M1.8</p> <p>The permit approval requires the establishment of a landscape performance bond, to ensure effective implementation of a landscape plan approved by the responsible authority. This plan includes a reasonably detailed estimate of the quantity and types of materials, watering equipment, plants and other inputs required. The amount of the bond provides an incentive for the broiler farm operator to fully implement the landscape plan and maintain the vegetation during the establishment period.</p>	<p><u>Complies</u></p> <p>The required estimate is provided at Appendix 5 of this report.</p>

ELEMENT 5 (E5) – WASTE MANAGEMENT

ELEMENT 5 (E5) – WASTE MANAGEMENT	
<p><u>OBJECTIVE, ELEMENT 5</u></p> <p>To manage waste from broiler farm operations to:</p> <ul style="list-style-type: none"> • minimise adverse amenity impacts from odour and dust on nearby sensitive uses • prevent the pollution of ground and surface waters and land • avoid biosecurity risks. 	
<p>STANDARD E5 S1: SPENT LITTER</p> <p>The management and disposal systems for spent litter are designed to minimise odour and dust generation and the likelihood of disease transmission, and to prevent nutrient run-off to surrounding land, waterways or groundwater.</p>	
Approved measures	Comment
<p>E5 M1.1</p> <p>Temporary litter stockpiles or compost piles are not visible or are well screened from neighbouring sensitive uses. If piles are visible from the broiler farm boundary, then they are screened by shedding or other suitable material.</p>	<p><u>Complies</u></p> <p>There are no temporary litter stockpiles or compost piles to be located on the property.</p>
<p>E5 M1.2</p> <p>Temporary litter stockpiles or compost piles are located to prevent water run-off into sensitive areas, such as stormwater drains, waterways and catchments. Additional bunding may be required to prevent entry to, and contamination of, stormwater run-off. It may also be required to prevent extraneous stormwater run-off from entering the compost pile.</p>	<p><u>Complies</u></p> <p>There are no temporary litter stockpiles or compost piles to be located on the property.</p>
<p>E5 M1.3</p> <p>Nutrient-rich run-off from the temporary litter stockpiles or compost piles is collected in a sump or dam and may be re-used to add moisture to the pile.</p>	<p><u>Complies</u></p> <p>Refer to previous comments.</p>

Approved measures (cont.)	Comment (cont.)
<p>E5 M1.4</p> <p>Temporary litter stockpiles or compost piles are on an impermeable base such as concrete, concrete or cement-stabilised soils, to prevent nutrient leaching.</p>	<p><u>Complies</u></p> <p>Refer to previous comments.</p>
<p>E5 M1.5</p> <p>The litter application site is not on land subject to flooding, steep slopes (greater than 10 per cent), rocky, slaking or highly erodible land or highly impermeable soils where there is any risk of nutrient run-off to waterways, surrounding land or groundwater.</p>	<p><u>Complies</u></p> <p>Litter from the sheds will not be spread on the farm.</p>
<p>STANDARD E5 S2: DEAD BIRDS</p> <p>The management and disposal of dead birds is designed to minimise the likelihood of disease transmission, complies with the <i>National Biosecurity Manual for Contract Meat Chicken Farming</i> 13 (or its most recent update) and minimises odour and dust generation.</p>	
Approved measures	Comment
<p>E5 M2.1</p> <p>Where birds are to be frozen before collection, adequate freezers and space for the freezers are provided.</p>	<p><u>Complies</u></p> <p>Adequate freezer capacity will be provided within the freezer building.</p>
<p>E5 M2.2</p> <p>The collection point (for the collection vehicle) is as far as practical away from the farm site so that dead bird bins are not left in public view, and the collection vehicle does not come in close proximity to the broiler sheds.</p>	<p><u>Complies</u></p> <p>The collection point is to be at the freezer building which located outside the biosecurity area and is well clear of the sheds housing the chickens.</p>
<p>E5 M2.3</p> <p>The collection point is appropriately constructed so the bins are protected from extreme weather conditions (for example, from winds that will cause lids to open or bins to tip over); and the site can be easily cleaned in the event of a spill.</p>	<p><u>Complies</u></p> <p>Dead bird collection containers are to be located within the freezer building. Hence these will be protected from extreme weather conditions and are not visible to the public.</p>
Approved measures (cont.)	Comment (cont.)

<p>E5 M2.4</p> <p>Dead bird collection vehicles and all containment systems are leak proof and vermin proof.</p>	<p><u>Complies</u></p> <p>Collection vehicles and containment systems will meet this requirement.</p>
<p>E5 M2.5</p> <p>Incineration of dead birds is conducted only in incinerators built for purpose.</p>	<p><u>Complies</u></p> <p>There will be no incineration of dead birds on the property.</p>
<p>E5 M2.6</p> <p>On-site burial of dead birds is undertaken only in an emergency situation and with the approval of the relevant authorities (the Chief Veterinary Officer of the Department of Primary Industries and EPA Victoria).</p>	<p><u>Complies</u></p> <p>On-site burial of dead birds will only be undertaken in an emergency situation and with the approval of the relevant authorities.</p>
<p>STANDARD E5 S3: CHEMICAL WASTE</p> <p>The management and disposal systems for chemical waste and general farm waste are designed to ensure the safe storage, use and disposal of chemicals.</p>	
<p>Approved measures</p>	<p>Comment</p>
<p>E5 M3.1</p> <p>Secure sheds, with an impermeable concrete base and appropriate bunding to avoid contaminated runoff, are provided to store chemicals, fuels, chemical waste and / or waste containers (before disposal).</p>	<p><u>Complies</u></p> <p>The storage of these materials will be undertaken using a secondary containment system within an enclosed section of the machinery shed in accordance with the requirements of the relevant safety data sheet requirements.</p>

ELEMENT 6 (E6) – FARM OPERATION AND MANAGEMENT (ENVIRONMENTAL MANAGEMENT PLAN (EMP))

ELEMENT 6 (E6) – FARM OPERATION AND MANAGEMENT (ENVIRONMENTAL MANAGEMENT PLAN (EMP))	
<p><u>OBJECTIVE, ELEMENT 6</u></p> <p>To apply best practice management of the broiler farm to avoid or minimise the risk of adverse amenity and environmental impacts on the surrounding environment and nearby sensitive uses.</p>	
<p>STANDARD E6 S1:</p> <p>An environmental management plan (EMP) is developed that includes strategies and measures to avoid or minimise environmental risks, and also contingency actions to manage environmental problems that may arise, as follows:</p>	
Approved measures	Comment
<p>E6 M1.1</p> <p>An environmental management plan (EMP) is developed that is site specific and based on the approved generic EMP (as amended and updated from time to time). If the EMP lodged with permit application does not address any part of the generic EMP, the applicant has addressed why that part is not relevant or applicable.</p> <p>Alternatively, the EMP may be developed under the Victorian Farmers Federation Chicken Care program. To expand an existing Chicken Care-accredited farm, the EMP must be updated to incorporate any new or additional risks as a result of the farm development and to ensure compliance with this Code. Where the EMP does not address any part of the generic EMP, the applicant has addressed why that part is not relevant or applicable.</p>	<p><u>Complies</u></p> <p>The environmental management plan (EMP) accompanies the planning permit application. It is tailored to meet the subject farm's characteristics. It is consistent with the EMP's adopted for the GV1 and GV2 broiler units.</p>
<p>E6 M1.2</p> <p>The farm grower / operator maintains and updates (as required) a manual containing the EMP, which is available for inspection by the responsible authority.</p>	<p><u>Complies</u></p> <p>The proponent commits to keeping the EMP up to date and available for inspection by the responsible authority.</p>

Land Capability Assessment

141 Clarkes Road, Strathlea

November 2016



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Version	Author	Date	Comments
1.0	J.Maw	10 November 2016	Final Version

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This Land Capability Assessment has been divided into 5 parts:

Part 1	Introduction and Overview	Summary of key findings and recommendations, introduction and description of the development and key site features.
Part 2	Risk Assessment	Assessment of the site and soil characteristics and related domestic wastewater risks and mitigating factors.
Part 3	Management Program	Determination of estimated daily wastewater flows, suitable treatment methods, methods for land application, land application area sizing requirements, proposed land application area and final recommendations.
Part 4	Maintenance Protocols	General maintenance requirements, EPA setback requirements, suitable vegetation, and notes on the use of gypsum and lime.
Part 5	Appendices	References, glossary of terms, extracts from the EPA, rainfall data, and soil bore logs.

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Part 1 – Introduction and Overview

This part of the report includes:

- Summary of key findings and recommendations;
- Introduction and description of the development; and
- Key site features.

1.1 Summary of Key Findings and Recommendations

The site is capable of sustainably managing wastewater within the allotment boundaries.

The Risk Assessment for Site and Soil Characteristics identified a number of constraints that were either moderate or major and require appropriate design modification over and above that of a standard design or require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management. These include:

- Excess rainfall over evaporation within the wettest months;
- High dispersive soils; and
- Poor soil permeability.

Potential mitigating factors that overcome the above-mentioned constraints include:

- If installing a sub-surface drip irrigation system, ensure a full water balance calculation is undertaken in calculating the size of the irrigation system;
- Ensure gypsum is applied to the soil at the time the wastewater infrastructure is being installed;
- Ensure soil absorption trenches are sized based on the poor soil permeability onsite or install a shallow sub-surface drip irrigation system within the shallower soil profiles onsite.

Recommendations:

- Install either a primary wastewater treatment system and soil absorption trenches or a secondary wastewater treatment system and shallow sub-surface drip irrigation.

1.2 Introduction

The proposal for this site is the development of a chicken farm and associated infrastructure. At the request of Grandview Poultry Pty Ltd, Ehpic Assessments have undertaken a Land Capability Assessment and provided recommendations for the suitability of onsite wastewater management, the most appropriate location for wastewater disposal and the most suitable type of treatment system. In addition a Wastewater Management Plan is provided that details the proposed layout of the Land Application Areas for wastewater disposal and makes recommendation as to the treatment system and land application system best suited to the needs of the site and the owners.

This Land Capability Assessment (LCA) has been prepared in using the *Municipal Association of Victoria: Land Capability Assessment Framework 2014* as the basis. Modifications to the template have been made where deemed necessary to include local municipality reporting preferences and to accommodate varying site issues.

1.3 Description of Development

Table 1 – Development Details

Site Address:	141 Clarkes Road, Strathlea
Owner/Developer:	Grandview Poultry Pty Ltd
Postal Address:	4 Frankston Gardens Drive, Carrum Downs Vic 2301
Municipality:	Central Goldfields Shire Council
Zoning:	Farming Zone (FZ)
Overlays*:	Environmental Significance Overlay (ESO1) Land Subject to Inundation Overlay (LSIO) Salinity Management Overlay (SMO)
Allotment Size:	~128ha
Domestic Water Supply:	Private Supply
Anticipated Daily Wastewater Load:	350 L/day
Availability of Sewer:	Unavailable

*These do not apply to the proposed development site.

1.4 Site Key Features

Located within the Central Goldfields Shire Council, the 107ha property is situated approximately 17kms southwest of the Maldon Township, 14kms southeast of the Carisbrook Township and 9kms south west of the Newstead Township.

The proposal for this property is the development of a broiler farm including seven sheds, machinery shed and staff amenities, and other related infrastructure. Currently, the site does not contain any built structures.

The property is situated within the declared open, potable water supply catchment area for the Cairn Curran Reservoir (catchment ID 16). The Cairn Curran catchment covers a geographical area of approximately 1,593km². The actual reservoir is located along the Loddon River near the Townships of Baringhup, Newstead and Welshmans Reef and is located approximately 3kms north of the property.

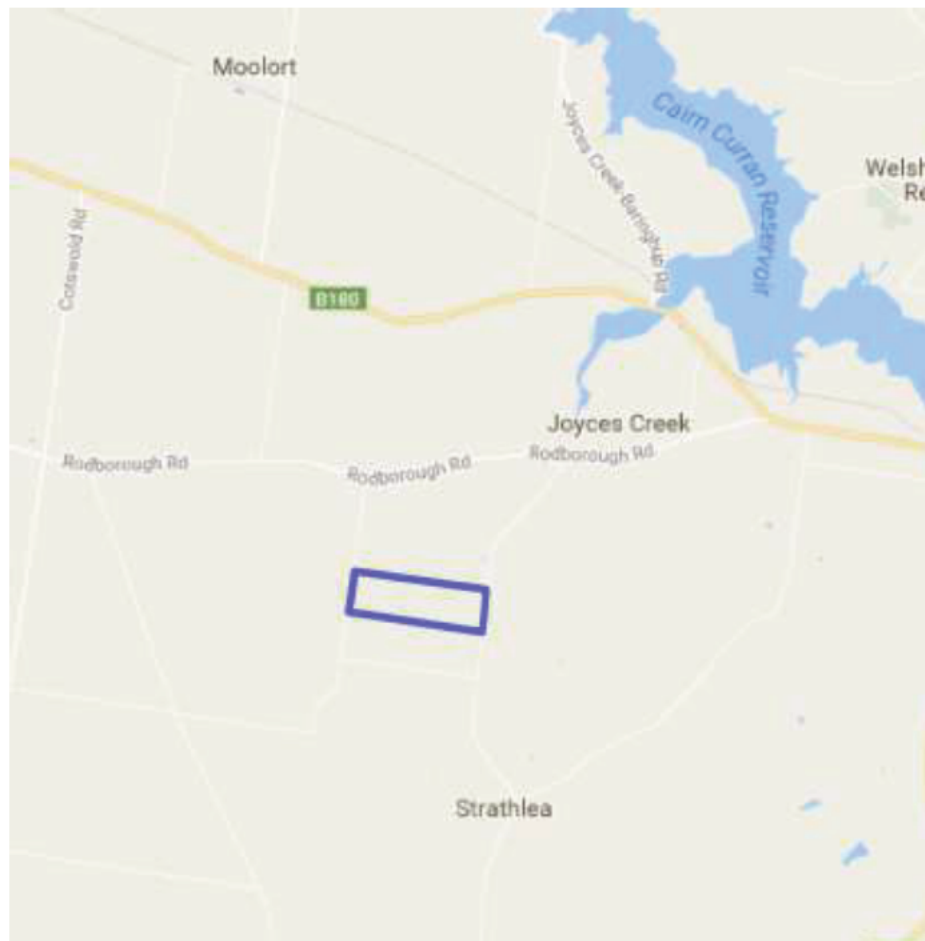
The Cairn Curran Reservoir belongs to a chain of reservoirs along the Loddon River and was constructed in the 1940-50's. The main purpose of the reservoir is to supply water for irrigation, domestic and stock use to customers along the Loddon River.

The nearest surface waters of significance to the property include Joyces Creek which flows the east of the allotment approximately 1.3km from the development site. Joyces Creek flows into the Cairn Curran Reservoirs to the north of the site.

There are no other significant surface waters within close proximity to the site. However, a retention basin will be constructed as part of the development and will be located north east of the proposed broiler farm.

The entire allotment is cleared of any significant vegetation and is relatively flat within the proposed development site.

Figure 1 - Locality Plan



Source: NearMaps

Figure 2 – Aerial Photo



Source: NearMaps

Table 2 – Site Features

Feature	Description	Level of Constraint
Buffer Distances	Buffer distances under the EPA – <i>Onsite Wastewater Management (Publication 891.4)</i> are achievable for both primary and secondary treated land application systems.	Nil
Climate	Average annual rainfall is 572.5mm (Redesdale No. 088051), maximum average rainfall is 65.7mm in July, and minimum average rainfall is 33.3mm in January. Average pan evaporation is 1400-1600 mm annually.	Major
Drainage	No visible signs of surface dampness, spring activity or hydrophilic vegetation in the proposed wastewater disposal area or surrounds.	Nil
Erosion and Landslip	No evidence of sheet or rill erosion: the erosion hazard is low. No evidence of landslip and landslip potential is low.	Nil
Exposure and Aspect	The site is void of any significant vegetation and exposure to sun and wind is excellent.	Nil
Flooding	The proposed land application area is situated above the 1:100 year flood level.	Nil
Groundwater	No signs of shallow groundwater tables to 1.5m depth.	Nil
Imported Fill	No imported fill material was observed on the allotment.	Nil
Land Available for LAA	Considering all the site and soil constraints and buffer setback distances, the allotment has ample suitable land available for land application of treated wastewater.	Nil
Rock Outcrops	No evidence of surface rocks or outcrops.	Nil
Run-on and Run-off	Negligible stormwater run-on and run-off hazard.	Nil
Slope	The proposed land application area is quite flat with gradients less than 2%.	Nil
Surface Waters	<p>Situated within the declared open, potable water supply catchment area for the Cairn Curran Reservoir (catchment ID 16).</p> <p>The nearest surface waters of significance to the property include Joyces Creek which flows the east of the allotment approximately 1.3km from the development site. Joyces Creek flows into the Cairn Curran Reservoirs to the north of the site.</p>	Moderate

Part 2 – Risk Assessment

This part of the report includes:

- Soil information;
- Summary of site and soil constraints;
- Risk assessment of site characteristics and solution brief; and
- Risk assessment of soil characteristics and solution brief.

2.1 Soil Information

A soil survey was conducted onsite to determine the suitability for application of treated domestic wastewater. Soil investigations were conducted at two locations in the vicinity of the proposed development site, as detailed in figure 3 – Soil Survey Location, using a manual soil auger to a depth of 1.5m. The two pits and depth of 1.5m were considered sufficient to adequately characterise the soils within the proposed land application area.

Soil samples were taken from the test pit holes for further laboratory analysis of pH, Electrical Conductivity and Emerson Aggregate Class. Section 2.5 provides the soil constraints in detail for each of the soil samples taken onsite whilst Section 5.5 provides full soil profile descriptions for each of the test pits.

Section 2.5 – Risk Assessment of Soil Characteristics provides an in-depth analysis of the soil profiles encountered onsite. However, the following table provides a summary of the soil survey at the two test locations.

Table 3 – Soil Borehole Profiles

Horizon	Description	Hole 1 (mm)	Hole 2 (mm)
A1	Moderately structured, reddish loam soils.	0-700	0-700
A2	Moderately structured, yellow clay loam soils.	700-1,000	700-1,000
B2	Strongly structured, yellowish to brown light clay soils.	1,000-1,500	1,000-1,5000

The A Horizon soil profile was encountered within the range of 0mm – 700mm. The A Horizon soil profile was considered a clay loam soil (Rating 4a) as characterised in AS/NZS 1547:2012. For the benefit of this assessment, the soil range in the A Horizon is used to determine further land application area sizing for irrigation systems.

The B Horizon soil profile was encountered within the range of 1,000mm – 1,500mm. The B Horizon soil profile was considered a light clay soil (Rating 5a) as characterised in AS/NZS 1547:2012. For the benefit of this assessment, the soil range in the B Horizon is used to determine further land application area sizing for soil absorption trenches.

Clay loam soils or category 4 soils generally have an indicative soil permeability of 0.5 – 1.5 m/day and a maximum Design Irrigation Rate (DIR) of 3.5 mm/day for an irrigation system.

Light clay soils or category 5 soils generally have an indicative soil permeability of 0.12 – 0.5 m/day and a maximum Design Loading Rate (DLR) of 8mm/day for a trench system.

A Merck pH indicator strip was used to determine the acidity for both soil profiles. All tests indicated a range for soil acidity between 5.5 – 6.5. The soil profiles are therefore considered to be suitable for many acid-loving plants.

Electrical conductivity was measured for each soil sample to determine the salinity of the soil. All horizons within both soil profiles recorded EC measurements between 0.08 to 0.19, which means that the soil has a negligible effect on salinity.

The Emerson Aggregate test was performed on all horizons of the two soil samples collected to determine the dispersibility of the soil. The Emerson Aggregate rating for both soil profiles recorded a range within the topsoil and subsoil profiles of 2 (slacking and some partial dispersion). Therefore, both samples are considered dispersive and will require the application of gypsum at the time of installation of the land application system.

The figure below provides the approximate location of the sites where soil boreholes were undertaken.

Figure 3 – Soil Survey Location



Source: NearMaps

2.2 Summary of Site and Soil Constraints

The Risk Assessment for Site and Soil Characteristics identified a number of constraints that were either moderate or major and require appropriate design modification over and above that of a standard design or require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.

Table 4 – Summary of Site and Soil Constraints

Characteristic	Level of Constraint	Explanation
Climate (difference between annual rainfall and pan evaporation)	Major	Rainfall exceeds evaporation within the wettest months of the year.
Emerson Aggregate Class	Major	Topsoil and subsoil: EA Class 2 (slacking and some partial dispersion).
Soil Permeability and Design Loading Rate	Moderate	Subsoil: Strongly structured light clay: 0.12-0.5 m/day saturated conductivity (Ksat) (AS/NZS 1547:2012); 8 mm/day Design Loading Rate (DLR) for soil absorption trench system (Code 891.4).

2.3 Risk Assessment of Site Characteristics

The Risk Assessment of Site Characteristics has been developed for the whole site in accordance with the *Municipal Association of Victoria's (MAVs) Land Capability Assessment Framework (2014)*.

Each site characteristic is assessed in accordance with a level of constraint and provides a qualitative analysis of the level of risk in accordance with the following:

Table 5 – Level of Constraint Classifications (Site)

Nil or Minor:	If all constraints are minor, conventional/standard designs are generally satisfactory.
Moderate:	For each moderate constraint an appropriate design modification over and above that of a standard design should be outlined.
Major:	Any major constraint might prove an impediment to successful onsite wastewater management, or alternatively will require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.

Table 6 – Risk Assessment of Site Characteristics

Characteristic	Levels of Constraint			Level of Constraint		
	Nil or Minor	Moderate	Major			
Climate (difference between annual rainfall and pan evaporation)	Excess of evaporation over rainfall in the wettest months	Rainfall approximates to evaporation	Excess of rainfall over evaporation in the wettest months	Major		
Soil Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface, soil pit fills with water	Nil		
Soil Drainage (Field Handbook Definitions)	Rapidly drained. Water removed from soil rapidly in relation to supply, excess water flows downward rapidly. No horizon remains wet for more than a few hours after addition	Well drained. Water removed from the soil readily, excess flows downwards. Some horizons may remain wet for several days after addition.	Moderately well drained. Water removed somewhat slowly in relation to supply, some horizons may remain wet for a week or more after addition.	Imperfectly drained. Water removed slowly in relation to supply, seasonal ponding, all horizons wet for periods of several months, some mottling.	Poorly/very poorly drained. Water remains at or near the surface for most of the year, strong gleying. All horizons wet for several months.	Nil
Erosion (or potential for erosion)	Nil or minor	Moderate	Severe	Nil		
Exposure to sun and wind	Full sun and/or high wind or minimal shading	Dappled light	Limited patches of light and little wind to heavily shaded all day	Nil		
Fill (imported)	No fill or minimal fill, or fill is good topsoil	Moderate coverage and fill is good quality	Extensive poor quality fill and variable quality fill	Nil		
Flood frequency (ARI)	Less than 1 in 100 years	Between 100 and 20 years	More than 1 in 20 years	Nil		
Groundwater bores	No bores onsite of neighbouring properties	Setback distances from bore complies with Code 891.4	Setback distances from bore do not comply with Code 891.4	Nil		

Characteristic	Levels of Constraint			Level of Constraint
	Nil or Minor	Moderate	Major	
Land area available for LAA	Exceeds LAA and duplicate LAA and buffer distance requirements	Meets LAA and duplicate LAA and buffer distance requirements	Insufficient area for LAA	Nil
Landslip (or landslip potential)	Nil	Minor to moderate	High or severe	Nil
Rock outcrops (% of surface)	<10%	10-20%	>20%	Nil
Slope gradient (%)				
(a) for absorption trenches	<6%	6-15%	>15%	Nil
(b) for surface irrigation	<6%	6-10%	>10%	Nil
(c) for sub-surface irrigation	<10%	10-30%	>30%	Nil
Stormwater run-on	Low likelihood of stormwater run-on		High likelihood of inundation by stormwater run-on	Nil
Surface waters – setback distance (m)	Setback distance complies with Code 891.4		Setback distance does not comply with Code 891.4	Nil
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake	Limited variety of vegetation	Sparse vegetation or no vegetation	Nil

2.4 Site Characteristics Solution Brief

The following site characteristics have been identified within the Risk Assessment of Site Characteristics Matrix (table 6) as either moderate or major and require further design modification over and above that of standard design, or require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.

Table 7 – Site Characteristic Solution Brief

Characteristic	Level of Constraint	Explanation	Solution
Climate (difference between annual rainfall and pan evaporation)	Major	Rainfall exceeds evaporation within the wettest months of the year.	If installing a sub-surface drip irrigation system, ensure a full water balance calculation is undertaken in calculating the size of the irrigation system.

2.5 Risk Assessment of Soil Characteristics

The Risk Assessment of Soil Characteristics has been developed for the whole site in accordance with the (MAVs) *Land Capability Assessment Framework (2014)*.

Each soil characteristic is assessed in accordance with a level of constraint and provides a qualitative analysis of the level of risk in accordance with the following:

Table 8 – Level of Constraint Classifications (Soil)

Nil or Minor:	If all constraints are minor, conventional/standard designs are generally satisfactory.
Moderate:	For each moderate constraint an appropriate design modification over and above that of a standard design should be outlined.
Major:	Any major constraint might prove an impediment to successful onsite wastewater management, or alternatively will require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.

Table 9 – Risk Assessment of Soil Characteristics

Characteristic	Levels of Constraint			Level of Constraint
	Nil or Minor	Moderate	Major	
Electrical Conductivity (as a measure of soil salinity)	<0.8%	0.8 - 2%	>2%	Nil
Emerson Aggregate Class	4,5,6,8	7	1,2,3	Major
pH (favoured range for plants)	5.5-8 is the optimum range for a wide range of plants; 4.5-5.5 suitable for many acid-loving plants		<4.5, >8	Nil
Rock Fragments (size and volume %)	0 - 10%	10 - 20%	>20%	Nil
Soil depth to rock or other impermeable layer (m)	>1.5m	1 - 1.5m	<1m	Nil
Soil structure (pedality)	Highly or moderately structured	Weakly-structured	Structureless, massive or hardpan	Nil
Soil texture, Indicative Permeability	Cat 2b, 3a, 3b, 4a	Cat 4b, 4c, 5a	Cat 1, 2a, 5b, 5c, 6	Moderate
Watertable depth (m) below base of LAA	>2m	1.2 – 2m	<1.2m	Nil

2.6 Soil Characteristics Solution Brief

The following soil characteristics have been identified within the Risk Assessment of Soil Characteristics Matrix (Table 9) as either moderate or major and require further design modification over and above that of standard design, or require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.

Table 10 – Soil Characteristic Solution Brief

Characteristic	Level of Constraint	Explanation	Solution
Emerson Aggregate Class	Major	Topsoil and subsoil: EA Class 2 (slacking and some partial dispersion).	Ensure gypsum is applied to the soil at the time the wastewater infrastructure is being installed.
Soil Permeability and Design Loading Rate	Moderate	Subsoil: Strongly structured light clay: 0.12-0.5 m/day saturated conductivity (Ksat) (AS/NZS 1547:2012); 5 mm/day Design Loading Rate (DLR) for soil absorption trench system (Code 891.4).	Ensure soil absorption trenches are sized based on the poor soil permeability onsite or install a shallow sub-surface drip irrigation system within the shallower soil profiles onsite.

Part 3 - Management Program

This part of the report includes:

- Estimated daily wastewater flow rates;
- Suitable treatment methods;
- Methods for land application of domestic wastewater;
- Land application area sizing requirements;
- Proposed land application area; and
- Final Recommendations.

The following sections outline the suitable onsite wastewater management system and land application system, including determination of the estimated daily wastewater flow, sizing and design considerations and justification for the recommendations made.

3.1 Estimated Daily Wastewater Flow Rate

The proposal for the site is the development of staff amenities at the proposed broiler farm to service a maximum of seven employees at peak times.

Indicative daily wastewater flow rate	350 L/day
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The above indicative daily wastewater flow rate has been calculated keeping in mind 50 L of wastewater per person per day. This typical domestic wastewater design flow allowance is derived from the Code of Practice – Onsite Wastewater Management 891.4, Table 4 and is based on ‘Premises with Showers and Toilets’.

3.2 Suitable Treatment Methods

A range of possible onsite wastewater treatment systems have been considered for the allotment based on the findings of the Risk Assessment for Site and Soil Characteristics. These include:

- Primary wastewater treatment systems:
 - Conventional septic tanks;
 - Wet composting systems (worm farm systems); and
 - Dry composting systems or Incinerator toilets.
- Secondary wastewater treatment systems:
 - Aerated Wastewater Treatment Systems;
 - Membrane filtration;
 - Reed beds; and
 - Trickling filters (sand filter or textile filter).

However, based on the Risk Assessment for Site and Soil Characteristics the following onsite wastewater treatment system is recommended:

A primary wastewater treatment system or a secondary wastewater treatment system.

The installation of a primary wastewater treatment system or secondary wastewater treatment system is recommended for this site because of the following factors:

- Although a number of site and soil constraints have been identified for the property, the installation of either of the above-mentioned wastewater treatment systems will mitigate these risks if installed in accordance with the recommendations of this report.

Refer to the Environment Protection Authority (EPA) website for the complete list of approved options that are available at:

<http://epanote2.epa.vic.gov.au/epa/septic.nsf/2830336ba1417b774a25664a002344d5?OpenView&Count=40&ResortAscending=1>

Only onsite wastewater treatment systems with a current EPA Certificate of Approval (CA) listed on this website may be installed in Victoria. Many of these systems provide the same treatment output and are appropriately grouped on the website but are made and manufactured by various Australian and international manufacturers.

The property owner has the overall responsibility for the final selection of the onsite wastewater treatment system and should include these details in the Septic Tank Permit to Install application form required to be submitted to Council for approval. However, the final selection must comply with the recommendations made previously in this report.

3.3 Methods for Land Application

A range of possible land application systems have been considered for the allotment which have approval for installation in Victoria based on the findings of the Risk Assessment for Site and Soil Characteristics and previous recommendations made concerning the preferred wastewater treatment system. These include:

Land application systems suitable for installation in connection with primary treatment systems:

- Soil absorption trenches;
- Evapo-transpiration beds and trenches;
- Wick bed and trench system; and
- Sand (Wisconsin) mounds;

Land application systems suitable for installation in connection with secondary treatment systems:

- Shallow sub-surface drip irrigation;
- Surface irrigation; and
- Low-pressure effluent distribution (LPED) system.

However, based on the Risk Assessment for Site and Soil Characteristics the following land application system is recommended for the allotment:

Shallow sub-surface drip irrigation (installed in connection with a secondary wastewater treatment system) or soil absorption trenches (installed in connection with a primary wastewater treatment system).

The installation of shallow sub-surface drip irrigation or soil absorption trenches are recommended because of the following factors:

- Although a number of site and soil constraints have been identified for the property, the installation of either of the above-mentioned land application systems will mitigate these risks if installed in accordance with the recommendations of this report.

3.3.1 Shallow Sub-Surface Drip Irrigation

Shallow sub-surface irrigation should be installed in accordance with AS/NZS 1547:2012, manufacturer's instructions and the permit conditions set out in the Central Goldfields Shire Council 'Permit to Install' (which may vary from the EPA and AS1547).

Due to the dispersive nature of the soil it is highly recommended that a textile irrigation (such a KISSS¹) is used.

Textile irrigation will provide more even distribution of effluent, reduce the chances of tunneling in the clay, reduce chance of root intrusion and provide better resistance to sediment intrusion (from the dispersive clay) into the irrigation system. This may significantly extend the life of the irrigation system.

Installation notes:

- The LAA must be ripped/cultivated to a minimum depth of 100mm.
- Suitable low flow (less than 2.7 L/m) pressure compensating dripline should be used. With suitably located vacuum breakers and flushing valves.
 - *It is highly recommended that a textile irrigation be used (such as KISSS).*
- Irrigation is to be laid across the slope of the property.
- Suitable cut off/diversion drains must be installed to divert stormwater away from LAA.
- Installation should be in accordance with the Central Goldfields Shire Council 'Permit to Install' conditions.
- LAA must be protected from traffic and stock.
- Gypsum must be added a minimum rate of 0.5kg gypsum per m².

¹ See *Safety Flow Wrap* product for recycled water at <http://www.kiss.com.au/>

3.3.2 Soil Absorption Trenches

Soil absorption trenches should be installed in accordance with EPA CA 1.2/03 and the permit conditions set out in the Central Goldfields Shire Council 'Permit to Install' (which may vary from the EPA CA).

Installation notes:

- Trenches should be installed at a depth of 400mm, width of 1000mm and have 4m spacing's from trench to trench (measured from the centre of each trench).
- Distribution boxes to be installed in the center of each trench.
- Suitable cut off/diversion drains must be installed to divert stormwater away from the LAA.
- Installation should be in accordance with the Central Goldfields Shire Council 'Permit to Install' conditions.
- LAA must be protected from traffic and stock.
- Prior to back filling the trenches the soil should be mixed with 0.5kg gypsum per m² and a suitable garden lime conditioner.

3.4 Land Application Area Sizing

The Land Application Area (LAA) is calculated in accordance with the Australian/New Zealand Standards 1547:2012 - On-site Domestic Wastewater Management. This standard determines the appropriate trench lengths or minimum irrigation areas. These values may be considered conservative.

The calculations are provided for daily wastewater flows of 350 L/day (as noted in Section 3.1) and a soil category of clay loam for irrigation systems and light clay for soil absorption trenches.

3.4.1 Irrigation Sizing (Soil Category – Clay Loam)

Water balance modeling has been undertaken to determine the necessary size of the shallow sub-surface drip irrigation area. The water balance was conducted in accordance with the Victorian Land Capability Assessment Framework (2014) and Code of Practice – Onsite Wastewater Management 891.4.

The water balance can be expressed by the following equation:

$$\text{Precipitation} + \text{Effluent Applied} = \text{Evapotranspiration} + \text{Percolation} + \text{runoff}$$

Where:

Precipitation refers to deposits of water, either liquid or solid-form that reach the earth from the atmosphere; it can include rain, sleet, snow, hail, dew and frost.

Evapo-transpiration is the removal of water from soil by evaporation and by transpiration from plants. Monthly Evapo-transpiration is estimated to be a percentage of the monthly evaporation. This percentage has been determined by multiplying the mean monthly pan evaporation by a 'crop factor'. Refer to table 23 - Water Balance and Storage Calculations.

Percolation is the rate of drainage through the soil beneath the root zone and is controlled mainly by soil permeability (dependent on texture and structure), but also in part by slope, depth to groundwater and limiting layers.

Retained Rainfall is the proportion of precipitation that is absorbed within the proposed LAA (as opposed to the proportion that is expected to run-off). Vegetation cover, soil type and slope are major factors influencing the amount of rainfall retained.

Data used in the water balance includes:

- Mean monthly rainfall and mean monthly pan evaporation (Redesdale Rain Gauge Location);
- Average daily wastewater load - 350 L/day;
- Design irrigation rate (DIR) – 3.5 mm/day;
- Crop factor – 0.6 to 0.8; and
- Retained rainfall – 100%

The water balance calculation is used to calculate the area required to balance all inputs and outputs to the water balance. As a result of these calculations the following area is required for shallow sub-surface drip irrigation:

Table 11 – Minimum Area for Sub-Surface Drip Irrigation

Maximum Daily Flow (L/day)	Minimum Irrigation Area Required (m ²)	Minimum Length of Dripper Line (m)*
350	182	182

*i.e. a minimum of 182 lineal meters of sub-surface dripper line

Note: Minimum irrigation field size is for the purpose of soil absorption and transpiration. The actual LAA may need to be larger (or divided into zones) due to the requirements of the actual irrigation products used and the size of the pumps installed in the wastewater treatment unit or pump well. The plumber or product representative should be able to provide exact details relating to the individual products used.

3.4.2 Soil Absorption Trench Sizing (Soil Category – Light Clay)

The Australian and New Zealand Standards 1547: 2012 were used to calculate the required soil absorption trench lengths. The formula for sizing soil absorption trenches is as follows:

$$L = Q/DLR \times W$$

Where:

L = Trench length (m)

Q = Design Wastewater Flow (L/day)

DLR = Design Loading Rate (mm/day)

W = Trench Width (m)

As a result of these calculations the following soil absorption trench length is required:

Table 12 - Minimum Trench Lengths

Maximum Daily Flow (L/day)	Trench Length (m)
350	45

Soil absorption trenches
 1000mm (1m) wide, 400mm deep
 3m between each trench
 Trenches generally max. 30m each with distribution box in centre of trench.

3.5 Proposed Land Application Area

Although the the land is very large, the proposed broiler farm will be situated within the southwestern corner of the site with frontage to Clarkes Road. The proposed development will include many features including:

- Seven broiler sheds;
- Machinery shed including staff amenities;
- Rain water tanks;
- Entrance office;
- Car Park;
- Internal access roads;
- Vehicle wheel wash area; and
- Batter surrounding the development.

The only features within the proposed development that will require connection to the proposed domestic wastewater treatment system is the proposed machinery shed. The structure will contain staff amenities including toilets, shower, hand basin and kitchen sink for a maximum peak of seven employees.

Given the absence of any significant surface waters within close proximity to the development and the relatively minor slopes across the site, there are many areas suitable for siting LAAs for domestic wastewater. However, it is important to position the proposed LAA within close proximity to the proposed machinery shed.

Therefore, it is recommended that the proposed LAA be positioned beyond the embankment to the west of the machinery shed between the embankment and western allotment boundary. The proposed septic tank can be located within close proximity to the machinery shed (final position to be determined by the installer) and wastewater pumped under the table drain and embankment to the LAA.

The nominated LAA is approximately 2,700m² (30m x 90m) and is large enough to accommodate the required soil absorption trench lengths or shallow sub-surface drip irrigation areas discussed in section 3.5.1 and 3.5.2 of this report.

Further, the Code of Practice – Onsite Wastewater Management 891.4 specifically requires all unsewered development within declared potable, open water supply catchment areas to nominate a primary LAA (where the physical wastewater infrastructure is installed) as well as a secondary LAA. The intent of the secondary LAA is to be left free of development and used in the event that the wastewater infrastructure in the primary LAA ever fail. The nominated LAA is large enough to act as a primary and secondary LAA.

The nominated LAA is detailed within figure 4.

Section 3.3 of this report recommends either soil absorption trenches or shallow sub-surface drip irrigation only for the site. If the owner wishes to install a primary wastewater treatment system, soil absorption trenches shall be installed only. If a secondary wastewater treatment system is installed, shallow sub-surface drip irrigation shall be installed only.

3.5.1 Soil Absorption Trenches

Section 3.5.2 requires a total of 45m of soil absorption trenches based on the proposed indicative daily wastewater flow rate and permeability of the soil. It is recommended that trenches are no longer than 30m each in length. Therefore, it is recommended that two trenches, the first 30m in length and the second 15m in length, be installed at 1000mm wide and 400mm deep with 3m spacing's between each trench.

This equates to an approximate area of 150m² within the nominated 2,700m² area in figure 4.

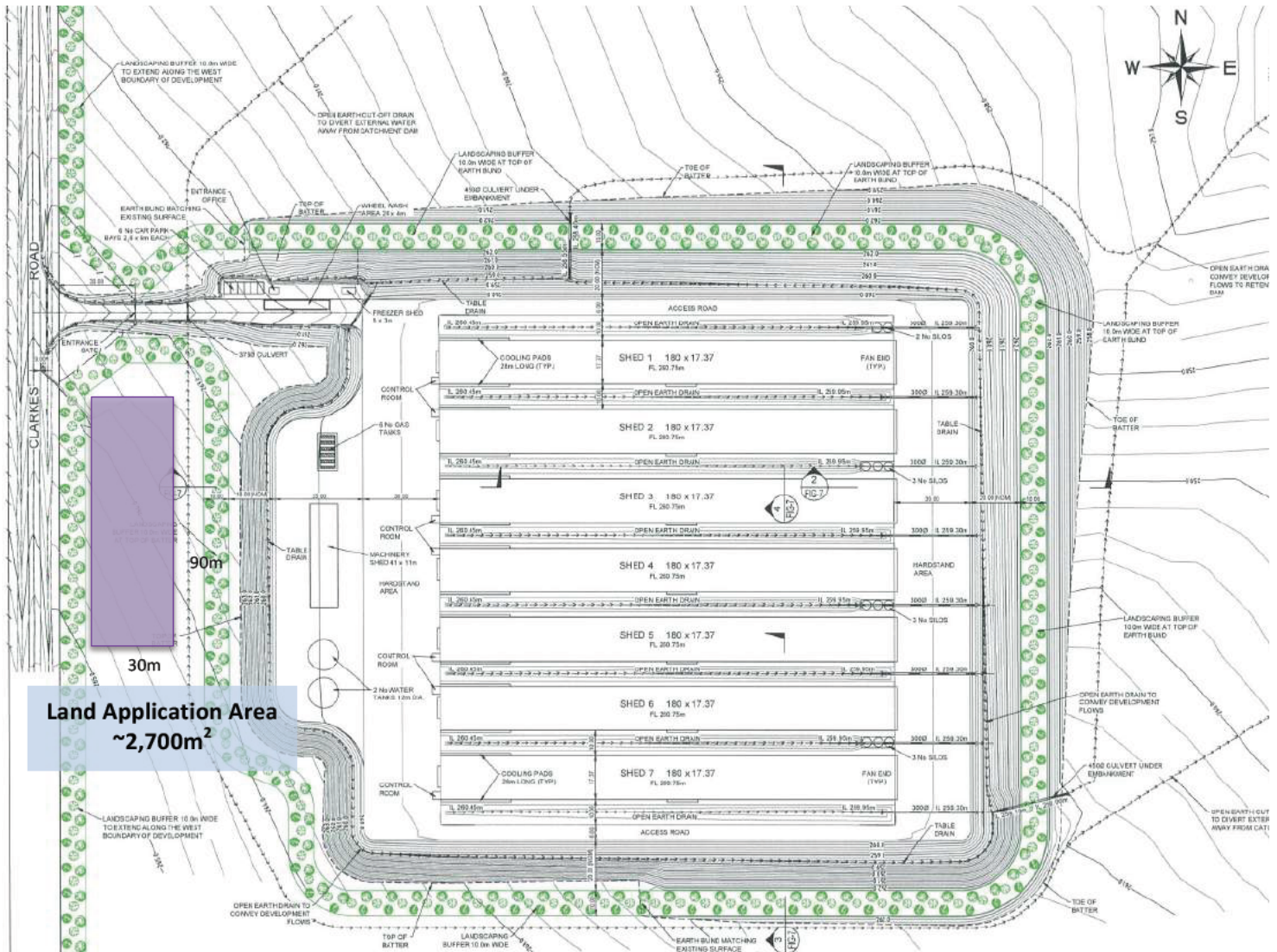
3.5.2 Shallow Sub-Surface Drip Irrigation

If installing shallow sub-surface drip irrigation, it is recommended that the irrigation is pressure compensated and a textile irrigation system such as KISSS be used. Textile irrigation will provide more even distribution of effluent, reduce the chances of tunneling in the clay, reduce the chance of root intrusion and provide better resistance to sediment intrusion into the irrigation system. This may significantly extend the life of the irrigation system.

Section 3.5.1 requires a total shallow sub-surface drip irrigation area of 182m² based on the full water balance calculation. As a design example, approximately 182m² (182 lineal m in total) shall be installed at 1m spacing's with emitters every 0.5m. This equates to approximately 10 irrigation lines at 19m in length.

Final placement, design and configuration of the land application system should be determined by the installer, provided it remains within the nominated LAA and in accordance with the recommendations of this report.

Figure 4 – Proposed LAA: Dimensions



3.6 Conclusion and Recommendations

Based on the information discussed previously within this report, Ehpic Assessments advises that the proposal to develop a broiler farm and install an onsite domestic wastewater system onsite poses a minor to moderate risk to public and environmental health. This is because of the following factors:

- Excess rainfall over evaporation within the wettest months;
- High dispersive soils; and
- Poor soil permeability.

Potential mitigating factors that overcome the above-mentioned constraints include:

- If installing a sub-surface drip irrigation system, ensure a full water balance calculation is undertaken in calculating the size of the irrigation system;
- Ensure gypsum is applied to the soil at the time the wastewater infrastructure is being installed;
- Ensure soil absorption trenches are sized based on the poor soil permeability onsite or install a shallow sub-surface drip irrigation system within the shallower soil profiles onsite.

Recommendations:

- Install either a primary wastewater treatment system and soil absorption trenches or a secondary wastewater treatment system and shallow sub-surface drip irrigation.

Part 4 – Maintenance Protocols

This part of the report includes:

- Ongoing maintenance requirements and responsibilities for homeowners and external contractors;
- Tips and hints on how to maintain your system;
- EPA setback requirements;
- Suitable plants and vegetation; and
- Notes on the use of gypsum and lime.

4.1 Maintenance Protocols

4.1.1 Sustainability

The wastewater system and wastewater disposal options have been recommended to help ensure that the site is able to sustainably treat and contain all wastewater on-site.

1. The longevity of the system will be primarily influenced by how well the septic tank system is maintained and by the quality of the effluent entering it.
2. The longevity of the LAA is a combination of factors:
 - a. The quality of the wastewater from the septic tank. If large volumes of water are flushed through the system or bacteria are killed by chemicals, then sediments may be washed into the LAA. Sediments will eventually clog up the wastewater infrastructure.
 - b. The types of vegetation planted on and around the LAA. Certain trees have invasive root systems that may penetrate the wastewater infrastructure and block the system (see section 4.4 Plants Suitable for LAAs).
 - c. The maintenance of vegetation on the LAA.
 - d. Quality of wastewater entering the septic tank system. In particular phosphates and nitrates will degrade the soil more rapidly and require additional work to the LAA.
 - e. If irrigation is used then the irrigation line should have root inhibitors. Triangle and Toro irrigation have impregnated emitters to reduce the chance of root intrusion. Netafim use a TechFilter (which contains a liquid root inhibitor), which must be changed as part of the regular servicing.
 - f. The choice of irrigation line. The more even the distribution of water is over the LAA the more sustainable and longer lasting the irrigation system. As a general rule low flow emitters 1.6L/hr will provide more even distribution. The use of textile irrigation will give the best even distribution.

Given proper care of the system and LAA, irrigation should not require major maintenance works for 10 years or more and conventional trenches for 15-20 years.

4.1.2 Householder

Take Care of Your System!

The householder has the greatest influence on the longevity and effectiveness of any septic tank system.

The Central Goldfields Shire Council will provide you with a '**Approval to Use**' your septic system once it is approved for use. Read this carefully and follow the instructions. Permits are generally similar but may have variations depending on the installation, location, or local conditions.

Septic Tanks or Treatment Plants

The key tips for your septic tank or treatment plant are:

Do	Don't
<p>Follow the manufacturer's instructions. They will all provide a care and maintenance handbook, read it and follow it.</p>	<p>Put too much water into the system. The septic/treatment plant is only rated for a certain volume and will start to fail when too much is added. In addition you may flood your LAA and consequently require expensive works to fix your system.</p> <p>Put oil, grease and fats into the system. None of the domestic systems can treat great volumes of these. They will clog up your components and cause a variety of other effects.</p>
<p>(For Treatment Plants) Use an accredited/approved service agent and ensure the system is serviced at the required intervals (for most systems quarterly).</p>	
<p>Have the septic tank or primary settlement tank on a treatment plant regularly de-sludged (every 3 years is standard)</p>	

See section 4.2 Brief notes on the care and maintenance of wastewater systems. This contains additional detail and links to detailed care and maintenance documents.

Land Application Areas

Ensure you maintain and care for your LAA. In brief:

Do	Don't
<p>Plant suitable vegetation over it and around it. These will help transpire water and stop the area from becoming water logged. In addition, the plants will absorb various nutrients and stop them from accumulating in the environment. See <i>4.4 Suitable plants for land application areas</i>.</p>	<p>Let vehicles drive over it</p>
	<p>Let stock walk over it</p>
<p>Maintain your vegetation. If you have lawn over the LAA mow it regularly. If you have plants prune them regularly to encourage growth. Growing plants use more water.</p>	<p>Build on or over the LAA</p>
	<p>(Except for maintenance or replanting) dig up the LAA. You may damage the trench or irrigation.</p>

4.1.3 External Contractors

Ensure the service contractor is accredited/approved by the manufacturer of the system.

The majority of package treatment plants require quarterly (3 monthly) servicing. It is critical that the service agent is properly trained and accredited/approved by the manufacturer of the system. Systems vary in their complexity, however each system has propriety components and specific functionalities that can easily be missed or poorly adjusted if the service agent is not correctly trained.

Both conventional septic tanks and treatment plants require periodic de-sludging. De-sludging is the process of removing the solid waste build up from within the septic tank or package treatment plant. For treatment plants your service agent will inform you when it is required. If you are using a conventional septic tank then you should inspect the system at least every year. Normally the 'Approval to Use' will require them to be de-sludged at a minimum of every three (3) years. An approved contractor must carry out de-sludging. These are generally listed in the yellow pages.

4.1.4 Other Ongoing Management or Reporting

Be aware that the system should not be changed or modified. If you plan on extending your house then you will probably require a 'Permit to Alter' your septic tank system from the Central Goldfields Shire Council.

Be aware that some 'Approvals to Use' require periodic testing and reporting.

4.2 Brief Notes on the Care and Maintenance of Wastewater Systems

There are a myriad of fact sheets and guidelines on the care and maintenance of wastewater systems. One of the easiest to read and understand is the *Easy Septic Guide*² available from: <http://www.dlg.nsw.gov.au/DLG/Documents/information/ssguide.pdf>

Package Treatment Plants (Aerated Wastewater Treatment plants (AWTs))

Whilst the principles used for the treatment of waste are similar in most systems, the systems do vary greatly in their capacity to treat effluent. The systems may be particularly susceptible to chemicals, antibiotics, high organic loads etc.

Most of the manufacturers compile a set of "do's and do not's" that are provided as part of the owners guide. It is VITALLY important that you read and FOLLOW these.

All package treatment plants require regular maintenance and will frequently begin to fail if the scheduled maintenance visits cease. A good maintenance contractor will "fine tune" your system every visit. Failure to do so often leads to higher than normal Suspended Solids passing through to the pumpwell and consequently blocking the irrigation line filter. When this happens it usually burns out the pump.

² NSW Department of Local Government (2000)

Most package treatment plants will require periodic de-sludging (see below). Your service agent should notify you when it is required.

Conventional Septic Tanks

Should be inspected each year and de-sludged³ as required. The Central Goldfields Shire Council permits require the septic tank to be de-sludged every 3 years. If your system is not de-sludged in a timely manner then solids will begin to wash through your system and into the soil absorption trenches and block them up. When this happens your trenches will generally need to be re-installed in a new location, which can be very expensive.

Table 13 - General Rules for the Care of a Septic Tank System

System Care – general rules to follow:	
✓	Use soapy water to clean your toilet and fixtures (strong detergents, disinfectants and bleaches will kill the bacteria in your system)
✓	Use low phosphorus detergents
✓	Use low sodium detergents
✓	Use detergents at the recommended quantities
✓	Only use detergents that have a low Alkaline and Chlorine levels
✓	Minimise the amount of fats, food scraps and oil entering the system (particularly from the kitchen sink)
✗	Do not leave taps running for long periods of time
✗	Do not flush unused medicines down the toilet
✗	Do not flush rubbish such as sanitary napkins, condoms, cotton buds or disposable nappies down the system.

Which laundry detergent should I use?

For information on which detergents are best suited to septic systems (low phosphorus and low sodium) go to <http://www.lanfaxlabs.com.au/>. Scroll down to "Laundry Product Testing" and click on the link "[LAUNDRY](#)" (this link should also work). Listed on this page is a printable brochure ([laundry brochure](#)) summarising the results of the tests.

³ De-sludging is the process of removing the solid waste build up from within the septic tank or package treatment plant.

4.3 EPA Setback Distances for Wastewater

The following table details mandatory setback distances for LAAs as prescribed by the Environment Protection Authority (EPA) publication *Code of Practice – Onsite Wastewater Management 891.4* (Table 5).

Table 14 – EPA: *Setback Distances*¹

Landscape, Feature or Structure	Setback Distances (m)		
	Primary Treated Effluent	Secondary Sewerage & Greywater Effluent	Advanced Secondary Greywater Effluent ³
Building			
Wastewater field up-slope of building ⁷	6	3	3
Wastewater field down-slope of building	3	1.5	1.5
Wastewater up-slope of cutting/escarpment ¹²	15	15	15
Allotment boundary			
Wastewater field up-slope of adjacent lot	6	3	1
Wastewater field down-slope of adjacent lot	3	1.5	1.5
Services			
Water supply pipe	3	1.5	1.5
Wastewater up-slope of potable supply channel	300	150	150
Wastewater down-slope of potable supply channel	20	10	10
Gas supply pipe	3	1.5	1.5
In ground water tank ¹⁴	15	4	3
Stormwater drain	6	3	2
Recreational Areas			
Children's grassed playground ¹⁵	6	3 ¹⁶	2 ¹⁶
In-ground swimming pool	6	3 ¹⁶	2 ¹⁶
Surface waters (up-slope of)			
Dam, lake or reservoir (potable water supply) ^{8, 13}	300	150 ⁴	150
Waterways (potable water supply) ^{9, 13}	100	100 ^{4, 17}	50
Waterways, wetlands (continuous or ephemeral, non-potable); estuaries, ocean beach at high-tide mark; dams, lakes or reservoirs (stock and domestic, non potable) ^{8,9}	60	30	30
Groundwater bore			
Category 1 and 2a soils	NA ¹¹	50 ⁵	20
Category 2b and 6 soils	20	20	20
Watertable			
Vertical depth from base of trench to the highest seasonal water table ¹⁸	1.5	1.5	1.5
Vertical depth from irrigation pipes to the highest seasonal water table ¹⁸	NA	1.5	1.5

Source: *Code of Practice – Onsite Wastewater Management (Publication 891.4)*

1	Distances must be measured horizontally from the external wall of the treatment system and the boundary of the disposal/irrigation area, except for the 'Watertable' category, which is measured vertically through the soil profile. For surface waters, the measuring point shall be from the 'bank-full level'.
2	Primary water-based sewerage systems must only be installed in unsewered areas; secondary sewerage systems must only be installed and managed in sewered areas by Water Corporations; secondary greywater systems can be installed in sewered and unsewered areas.
3	Advanced secondary treated greywater of 10/10/10 standard.
4	The setback distances are conditional on the following requirements (otherwise the setback distances for primary effluent apply): <ul style="list-style-type: none"> • Effluent is secondary treated to 20/30 standard as a minimum • Effluent is applied to land via pressure-compensating sub-surface irrigation installed along the contour and • A maintenance and service contract, with a service technician accredited by the manufacturer, is in place to ensure the system is regularly serviced on accordance with the relevant CA and Council Septic Tank Permit conditions.
5	The setback distance to a groundwater bore in Category 1 and 2a soils can be reduced to 20 m where treated and disinfected greywater or sewage (20/30/10 or better standard) is applied via pressure-compensating sub-surface irrigation and the property owner has a service contract.
6	Effluent typically contains high levels of nutrients that have a negative impact on native vegetation and promote the growth of weeds. When determining setbacks, Council should consider not only the potential impact of nutrients from the proposed onsite wastewater management system, but also the cumulative impact of the existing onsite wastewater management systems in the area.
7	Establishing an effluent disposal/irrigation area upslope of a building may have implications for the structural integrity of the building. This issue is beyond the scope of this Code and should be examined by a building professional on a site-by-site basis.
8	Does not apply to dams, lakes and reservoirs located above ground level, which cannot receive run-off.
9	Means a waterway as defined in the <i>Water Act 1989</i> .
10	The setback distances for flat land are equivalent to 'down-slope' setback distances.
11	See Table 9 for other land application options for Category 1 and 2a soils.
12	A cutting or escarpment from which water is likely to emanate.
13	Applies to land, adjacent to a dam, lake or reservoir or waterway that provides water for a public potable water supply which is: <ul style="list-style-type: none"> • Subject to a Planning Scheme Environmental Significant Overlay (ESO) that designates maintenance of water quality as the environmental objective to be achieved (contact the relevant Water Authority to determine whether the ESO is in a potable water supply catchment) • Within a Special Water Supply Area listed in Schedule 5 of the <i>Catchment and Land Protection Act 1994</i>.
14	It is recommended that any primary or secondary treatment system and its associated land application system are installed downslope of an in-ground water tank.
15	Means a school, council, community or other children's grassed playground managed by an organisation, which may contain play equipment.
16	Sub-surface irrigation only.
17	Where intermittent stream on a topographic or orthographic map is found through ground-truthing to be a drainage line (drainage depression) with no defined banks and the bed is not incised, the setback distance is 40m (SCA 2010). The topography of the drainage line must be visually inspected and photographed during the LCA site inspection and reported upon in writing and photographs in the LCA report.
18	The highest seasonal watertable occurs when the watertable has risen up through the soil profile and is closest to the ground surface. This usually occurs in the wettest months of the year.
19	See Section 3.9 for more details on setback distances.

4.4 Suitable Plants for Land Application Areas

As a general guide to planting, please observe the following.

Table 15 – Suitable Plants for Land Application Area

Soil Absorption Trenches	Shallow Sub-Surface Drip Irrigation
<ul style="list-style-type: none"> Bushes, shrubs and trees should not generally be permitted to grow directly over the trenches. Care should be taken when locating trees, to ensure they do not shade the system unless they draw water from it. The larger the tree when grown, the farther it should be planted from the trench. Generally all trees should be greater than 1m from the trench edge. Trees are best planted outside the LAA edges (rather than between trenches). Grasses can generally be planted anywhere within the LAA. 	<ul style="list-style-type: none"> Avoid planting trees within the LAA. Plant them only around the edges if possible. Care should be taken when locating trees, to ensure they do not shade the system unless they draw water from it. Avoid planting bushes and shrubs directly over the pipes, plant them between the rows. Grasses can generally be planted anywhere within the LAA.

The following list is provided from the 1996 EPA *Code of Practice – Septic Tanks: Onsite Domestic Wastewater Management*. As stated in the Code “...although not exhaustive, included as a guide to species that have been found from experience to be satisfactory.”

Table 16 – Plants and Grasses Listed in 1996 Code of Practice

Botanical Names	Common Names
<i>Phragmites australis</i>	
<i>Canna x generalis</i>	Canna Lily, Calla Lily, Ginger Lily
<i>Acacia Howittii</i>	Sticky Wattle
<i>Callistemon citrinus</i>	Crimson Bottlebrush
<i>Callistomon macropunctatus</i>	Scarlet Bottlebrush
<i>Leptospermum lanigerum</i>	Wooley Tea-Tree
<i>Melaleuca decussata</i>	Cross Honey Myrtle
<i>Malaleuca ericifolia</i>	Swamp Paperbark
<i>Maleleuca halmaturorum</i>	Salt paperbark
<i>Tamarix juniperina</i>	Flowering Tamarisk
<i>Eleocharis acuta</i>	Cannas
	Common Spike-Rush
	Buffalo / kikuyu
	Geranium
	Hydrangeas
	Tall wheat grass
	Strawberry Clover
	White Clover

The following table is a list of indigenous plants and grasses suitable for planting around Land Application Areas. This list is provided courtesy of the City of Greater Bendigo.

Table 17 – Suitable Indigenous Plants and Grasses

Botanical Name	Common Name
Large Shrubs	
<i>Acacia dealbata</i> *	Silver Wattle
<i>Acacia mearnii</i> *	Late Black Wattle
<i>Acacia melanoxylon</i> *	Blackwood
<i>Acacia retinodes</i>	Wirilda
<i>Callistemon sieberi</i>	River Bottlebrush
<i>Dodonaea viscosa</i>	Sticky Hop Bush
<i>Hymenandra dentata</i>	Tree Violet
<i>Melaleuca decussata</i>	Totem Poles
<i>Melaleuca lanceolata</i>	Moonah
<i>Melaleuca parvistamina</i> *	Rough-barked Honey-myrtle
<i>Melaleuca uncinata</i>	Broom Honey-myrtle
<i>Melaleuca wilsonii</i>	Violet Honey-myrtle
Small Shrubs	
<i>Indigofera australis</i>	Austral Indigo
<i>Goodenia varia</i>	Sticky Goodenia
Grasses, Sedges and Rushes	
<i>Carex appressa</i>	Tall Sedge
<i>Carex tereticaulis</i>	Basket Sedge
<i>Dianella longifolia</i>	Smooth Flax-lily
<i>Dianella revoluta</i>	Black-anther Flax-lily
<i>Eleocharis acuta</i>	Common Spike-rush
<i>Juncus pallidus</i>	Pale Rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Microlaena stipoides</i>	Weeping Grass
<i>Poa labillardierei</i>	Common Tussock-grass
Ground Covers	
<i>Artiplex semibaccata</i>	Creeping Saltbush
<i>Brachyscome multifida</i>	Cut-leaf Daisy
<i>Dichondra repens</i>	Kidney Weed
<i>Isotoma fluviatilis</i> ssp. <i>australis</i>	Swamp Isotome
<i>Myoporum parvifolium</i>	Creeping Boobialla
<i>Viola hederacea</i>	Native Violet

*To be used with shallow sub-surface drip irrigation only. Not suitable for soil absorption trenches.

Table 18 – Plants not Generally Suitable

Botanical Names	Common Names
Not within 8m	
<i>Eucalyptus Camaldulensis</i>	River Red Gum
<i>Eucalyptus Citriodora</i>	Lemon Scented Gum
<i>Fraxinus Raywoodi</i>	Claret Ash
<i>Eucalyptus Cladocalyx</i>	Sugar Gum
<i>Platanus – all species</i>	Plan Tree
<i>Populus nigra etc.</i>	Poplar
<i>Salix babylonica etc.</i>	Weeping Willow
Not within 2m	
<i>Acacia longifolia</i>	Sallow Wattle
<i>Callistemon viminalis</i>	Weeping Bottlebrush
<i>Callistemon lilacinus</i>	Lilac Bottlebrush
<i>Eucalyptus preissiana</i>	Bell-fruit Mallee
<i>Viminaria juncea</i>	Native Broom

The plants above should not be planted near trenches because of the risk of root invasion.

The species in the table above tolerate varying degrees of soil moisture. System flow outputs will vary from household to household, which will influence the performance of some species. Mounding of garden beds is highly recommended to improve drainage around the root zone. This list is provided as a guide only.

4.5 Notes on the Use of Gypsum and Lime

Where soils are highly dispersive then it is recommended that gypsum be added to the soil prior to the installation of the trenches or irrigation. Where the sodicity of the soil is very high it is recommended that both gypsum and lime be added to the soil prior to installation of the trenches or irrigation.

Using gypsum⁴

Gypsum contains calcium sulfate. Calcium sulfate is a salt, but unlike sodium chloride (the main component of salt in saline watertables) it is not toxic to plants. Gypsum will help to reduce swelling and dispersion of the soil through two mechanisms. These are:

1. Gypsum slightly increases the salinity of the soil solution, and hence reduces swelling. The same effect can be seen when using saline bore water, but this often contains high levels of sodium and chlorine that are toxic to plants. Gypsum will slightly increase salinity without any detrimental effect on plants; and
2. Calcium from the gypsum will swap with the sodium that is held on the clay surfaces. This reduces the sodicity of the soil and is called cation exchange.

Table 19 – Gypsum Application Rate

Exchangeable sodium percentage (%ESP)	Gypsum application rate (kg/m ²)
Greater than 5, less than 10	0.2 – 0.5 kg/m ²
Greater than 10	0.5 kg/m ²

It is recommended that an application rate of 0.5 kg/m² be used.

Even when gypsum is applied at heavy rates it will leach out of the soil. Therefore gypsum will need to re-applied every 2 to 3 years if the effect is to be maintained.

Lime application to sodic soils

Lime (calcium carbonate), like gypsum, is a compound containing calcium. Therefore it can contribute to reducing the effects of sodicity. However, lime is relatively insoluble at a soil pH (CaCl₂) above 5. Where the pH is below 5, lime will help to reduce both acidity and sodicity problems. A mixture of lime and gypsum may be a good option on sodic soils with a pH (CaCl₂) in the 5 to 6.5 range, to provide a more long-lasting effect than gypsum only.

Numerous Lime Soil Conditioners are commercially available. The Lime Soil Conditioner should be added as per the manufacturer's instructions.

⁴ From NSW Agriculture 2000

Part 5 - Appendices

This part of the report includes:

- References;
- Glossary of terms;
- Rainfall and weather data;
- Soil bore logs; and
- Water Balance Calculations.

5.1 References

AS/NZS 1547:2012 On-Site Domestic Wastewater Management

Environment Protection Act 1970 (Victoria)

Environment Protection Authority Victoria (1996), *Code of Practice – Septic Tanks (Publication 451)*, Victorian Government, Melbourne

Environment Protection Authority Victoria (2003), *Guidelines for Environmental Management: Septic Tanks Code of Practice (Publication 891)*, Victorian Government, Melbourne

Environment Protection Authority Victoria (2003), *Land Capability Assessment for Onsite Domestic Wastewater Management (Publication 746.1)*, Victorian Government, Melbourne

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Jacquier, D.W., McKenzie, N.J., Brown, K.L., Isbell, R.F. & Paine, T.A. (2001) *The Australian Soil Classification – An Interactive Key*. Version 1.0. CSIRO Publishing, Melbourne

McKenzie, N., Jacquier, D., Isbell, R., & Brown, K. (2004) *Australian Soils and Landscapes: An illustrated compendium*, CSIRO Publishing, Melbourne.

Municipal Association of Victoria (2006), *Model Land Capability Assessment Report*, MAV & DSE, Melbourne

Municipal Association of Victoria (2014), *Land Capability Assessment Framework*, MAV, Melbourne

National Committee on Soil and Terrain (2009) *Australian Soil and Land Survey Filed Handbook (3rd Edition)*, CSIRO Publishing, Collingwood

State Environment Protection Policy (Waters of Victoria)

5.2 Glossary: Selected Terms from the EPA Code of Practice

Table 20 – Glossary: Selected Terms from the EPA Code of Practice

10/10/10 standard (Advanced Secondary Treatment)	Water quality standard indicating an effluent quality of <10 mg/L BOD ₅ , <10 mg/L suspended solids and E.coli <10 cfu/100 mL. Greywater of this quality may be recycled indoors via toilet flushing or cold-water supply to washing machines. It may also be used for surface and subsurface irrigation
20/30 standard (Secondary Treatment)	Water quality standard indicating an effluent quality of <20 mg/L BOD ₅ and <30 mg/L suspended solids. Wastewater including greywater of this quality may be recycled outdoors via subsurface irrigation.
20/30/10 standard (Secondary Treatment)	Water quality standard indicating an effluent quality of <20 mg/L BOD ₅ , <30 mg/L suspended solids and E.coli <10 cfu/100 mL. Wastewater including greywater of this quality may be recycled outdoors via surface and subsurface irrigation.
Primary Treatment	The physical processes of screening, filtration, sedimentation, flocculation and flotation to remove organic and inorganic matter from wastewater.
Septic tank system	As defined within the Environment Protection Act 1970 (section 53J) ‘...means a system for the bacterial, biological, chemical or physical treatment of sewage, and includes all tanks, beds, sewers, drains, pipes, fittings, appliances and land used in connection with the system’. In essence this includes a wastewater treatment system (all types of onsite wastewater treatment systems, including septic tanks), as well as associated wastewater storage tanks, distribution pipes and the associated wastewater disposal/recycling system and area.
Biochemical oxygen demand (BOD₅)	<p>The amount of oxygen consumed by chemical processes and microorganisms to break down organic matter in water over a five-day period, measured in milligrams per litre (mg/L). Lower BOD indicates lower levels of microbial population in the water and thus a potentially lesser effect on the environment.</p> <p>Most pristine rivers will have a 5-day carbonaceous BOD below 1 mg/L. Moderately polluted rivers may have a BOD value in the range of 2 to 8 mg/L.</p>
Suspended solids (SS)	A measure of the solids in water, expressed in milligrams per litre (mg/L). Suspended solids are important as pollutants and pathogens are carried on the surface of particles. The smaller the particle size, the greater the surface area per unit mass of particle, and so the greater the pollutant load that is likely to be carried.
<i>E.coli: Escherichia coli</i>	A species of bacteria in the faecal coliform group that is found in large numbers in the intestines of animals and humans. Its presence in freshwater indicates recent faecal contamination and is measured in ‘colony-forming units’ (cfu) per 100 mL of water.
Nitrogen & Phosphorous	<p>Wastewater usually contains significant levels of the nutrients nitrogen and phosphorus. Excessive release to the environment can lead to a build up of nutrients, called eutrophication, which can in turn encourage the overgrowth of weeds, algae, and cyanobacteria (blue-green algae).</p> <p>Nitrogen is usually expressed as Total Kjeldahl nitrogen (Kjeldahl refers to a testing method).</p>

5.3 Rainfall and Weather Data

Table 21 – Redesdale Long Term Averages

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Max (°C)	32.2	32.1	28.4	24.2	18.0	14.3	13.3	15.5	18.5	22.5	28.4	29.6
Mean Min (°C)	25.5	25.4	22.8	16.9	14.5	11.5	9.9	11.8	14.7	16.3	20.6	22.9
Mean Rain (mm)	33.3	37.6	33.9	40.4	55.8	59.5	65.7	60.5	54.0	52.3	41.6	37.9
Median Rain (mm)	24.9	52.1	21.2	32.1	44.5	55.3	65.5	58.9	47.8	42.8	31.9	23.5

Source: Bureau of Meteorology

5.4 Soil Bore Logs

Figure 5 – Soil Bore Log: TP1




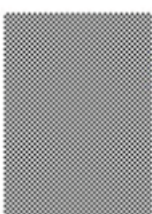

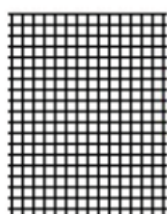
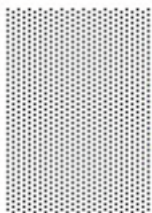
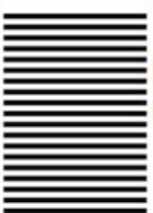
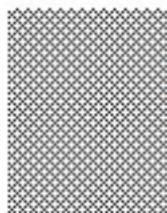
SOIL BORE LOG						EHPIC ASSESSMENTS		
Client:	Grandview Poultry Pty Ltd					Test Pit No:	TP1	
Site:	141 Clarkes Road, Strathlea					Excavated by:	James Maw	
Date:	Nov 2016					Excavation Type:	Shovel and hand auger	
Notes:								
PROFILE DESCRIPTION								
Depth (m)	Graphic Log	Sampling depth/name	Horizon	Texture	Structure	Colour	Moisture Condition	Comments
50		0-700	A1	L	Moderate	Red	Dry	
100								
150								
200								
250								
300								
350								
400								
450								
500								
550								
600								
650								
700								
750		700-1,000	A2	CL	Moderate	Yellow	Dry	
800								
850								
900								
950								
1000								
1050		1,000-1,500	B2	LC	Strong	Brown	Dry	
1100								
1150								
1200								
1250								
1300								
1350								
1400								
1450								
1500								

Figure 6 – Soil Bore Log: TP2

SOIL BORE LOG						EHPIC ASSESSMENTS				
Client:	Grandview Poultry Pty Ltd					Test Pit No:	TP2			
Site:	141 Clarkes Road, Strathlea					Excavated by:	James Maw			
Date:	Nov 2016					Excavation Type:	Shovel and hand auger			
Notes:										
PROFILE DESCRIPTION										
Depth (m)	Graphic Log	Sampling depth/name	Horizon	Texture	Structure	Colour	Moisture Condition	Comments		
50		0-700	A1	L	Moderate	Red	Dry			
100										
150										
200										
250										
300										
350										
400										
450										
500										
550										
600										
650										
700										
750			700-1,000	A2	CL	Moderate	Yellow	Dry		
800										
850										
900										
950										
1000										
1050			1,000-1,500	B2	LC	Strong	Brown	Dry		
1100										
1150										
1200										
1250										
1300										
1350										
1400										
1450										
1500										

Table 22 – Key to Soil Borelogs

Key to Soil Borelogs	Ehpic Assessments
<u>Graphic Log and Textures</u>	

 <p>S - Sand LS - Loamy sand CS - Clayey sand</p>	 <p>C- Clay loam SCL - Sandy clay loam SiCL - Silty clay loam</p>	 <p>Gravel</p>
 <p>SL - Sandy loam</p>	 <p>LC - Light clay SC - Sandy clay</p>	 <p>Parent material (stiff)</p>
 <p>L - Loam LFS - Loam fine sand SiL - Silt loam</p>	 <p>MC - Medium clay HC - Heavy clay</p>	 <p>Parent material (weathered)</p>

5.5 Water Balance Calculations

Table 23 – Water Balance Calculations

Irrigation area sizing using Nominated Area Water Balance & Storage Calculations

Site Address:	141 Clarkes Road, Strathlea		
Date: 9 November 2016	Assessor:	James Maw	

INPUT DATA

Design Wastewater Flow	Q	350	L/day	Based on maximum potential occupancy and derived from Table 4 in the EPA Code of Practice (2013)
Design Irrigation Rate	DIR	3.5	mm/day	Based on soil texture class/permeability and derived from Table 9 in the EPA Code of Practice (2013)
Nominated Land Application Area	L	182	m ²	¹
Crop Factor	C	0.6-0.6	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type ²
Rainfall Runoff Factor	RF	1	unitless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	Redesdale (088501)			BoM Station and number
Mean Monthly Pan Evaporation Data	Redesdale (088501)			BoM Station and number

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R		mm/month	33.3	37.6	33.9	40.4	55.8	59.5	65.7	60.5	54	52	14.6	37.9	545.2
Evaporation	E		mm/month	239.1	191.1	134.2	69.3	37.1	27.6	26.1	53.9	74.7	121.6	147.7	196.4	1322.8
Crop Factor	C		unitless	0.80	0.80	0.70	0.70	0.60	0.60	0.60	0.70	0.80	0.80	0.80	0.80	

OUTPUTS

Evapotranspiration	ET	ExC	mm/month	191	153	94	49	22	17	17	32	52	97	118	159	1001.08
Percolation	B	DIRxD	mm/month	108.5	98	108.5	105.0	108.5	106.0	108.5	108.5	105.0	108.5	105.0	108.5	1277.5
Outputs		ET+B	mm/month	299.8	250.88	202.4	153.5	130.8	121.6	125.4	140.8	157.3	205.8	223.2	267.2	2278.6

INPUTS

Retained Rainfall	RR	RxRF	mm/month	33.3	37.6	33.9	40.4	55.8	59.5	65.7	60.5	54	52	14.6	37.9	545.2
Applied Effluent	W	(QxD)/L	mm/month	59.6	53.8	59.6	57.7	59.6	57.7	59.6	59.6	57.7	59.6	57.7	59.6	701.9
Inputs		RR+W	mm/month	92.9	91.4	93.5	98.1	115.4	117.2	125.3	120.1	111.7	111.6	72.3	97.5	1247.1

STORAGE CALCULATION

Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-206.9	-159.4	-108.9	-55.4	-15.3	-4.4	0.0	-20.7	-45.6	-94.2	-150.9	-169.7	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	9												

LAND AREA REQUIRED FOR ZERO STORAGE	m ²	41	46	64	93	145	169	182	135	102	71	50	47			
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MINIMUM AREA REQUIRED FOR ZERO STORAGE: 182.0 m²

This Land Capability Assessment has been prepared by James Maw Family Trust trading as Ehpic Assessments.

Bendigo

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