15 July 2024

Mr Fernando Ferreira
[redacted],
[redacted]

Dear Fernando

Response to Colac Otway Shire request for information

Our ref: Matter 39426

We understand that Colac Otway Shire (the Shire) are currently reviewing the flora and fauna assessment reports relating to the Ombursley Broiler farm (Biosis 2023a), the water pipeline connecting the Broiler farm to the Birregurra township (Biosis 2024b) and the targeted survey report for the striped legless lizard (Biosis 2024). The impacts to flora and fauna are currently included within the Birregurra water pipeline report, however the two proposals will be assessed separately by the Shire. As a result, the Shire has requested that the impacts associated with works proposed in the unnamed road reserve are outlined in this letter. This allows a clear separation of impacts associated with the proposed pipeline and those associated with the unnamed road reserve.

The unnamed road reserve to the north of the proposed Broiler farm (east of Mooleric Road) is proposed to be used as a thoroughfare during the construction and operation of the farm. The reserve is currently used for grazing and paddock access by neighbouring landowners and the movement of vehicles through the has resulted in the creation of a vehicle track. However, this track will not adequately support the frequency and types of vehicle movement throughout the reserve during construction and operation of the proposed Broiler farm. A six-metre wide all season road will therefore be constructed within the road reserve to facilitate more frequent movements of large vehicles and machinery.

The following letter of advice outlines the potential impacts of the construction of this road. The impacts detailed in this letter and do not differ from those presented in the previous Biosis flora and fauna assessment report (Biosis 2024b).

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Ecological values within the unnamed road reserve

General values

The unnamed government road to the north of the proposed poultry farm supports several small patches of Plains Grassy Wetland EVC 125. Beyond the mapped patches of Plains Grassy Wetland EVC 125, native vegetation is scattered throughout a largely disturbed area that supports predominantly introduced vegetation such as Toowoomba Canary-grass *Phalaris aquatica*. The soils are black, cracking clays with some surface and embedded rocks.

Tussock grasses (such as Common Tussock-grass *Poa labillardierei*) are sparse and appear to have been heavily grazed throughout the road reserve. Despite the relatively low cover of tussock grasses, the site was considered potentially suitable habitat for Striped Legless Lizard *Delma impar* because the property to the north supports moderate quality habitat with large tussock grasses, surface rocks and inter-tussock spaces. The surface rocks within the road reserve may be utilised by Striped Legless Lizards that could move in from the more suitable habitat to the north. Additionally, Striped Legless Lizards have been recorded in roadsides dominated by Toowoomba Canary-grass in western Victoria. Habitat of this type is known to also support additional small vertebrates including threatened reptiles like the Tussock Skink *Pseudemoia pagenstecheri.* The presence of a population within the road reserve was confirmed during targeted surveys undertaken in 2023, as described below.

No threatened flora were recorded within the study area during the assessment, and the high level of disturbance (evident through cattle pugging and grazing) make it unlikely that any threatened flora species persist within the patches of wetland vegetation.

The habitat zones within the unnamed road reserve were assessed for the presence of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (Seasonal Herbaceous Wetlands; threatened ecological community listed under the EPBC Act). Several key species of this threatened community such as Common Spike-sedge *Eleocharis acuta*, Prickfoot *Eryngium vesiculosum* and Small Loosestrife *Lythrum hyssopifolia* were recorded within one of the habitat zones at a high enough cover to qualify as Seasonal Herbaceous Wetlands. However, the size threshold is not met (both individually and collectively). The remaining two habitat zones do not support any native forb species and therefore do not meet the condition or size thresholds to be considered Seasonal Herbaceous Wetlands.

There were some areas in the road reserve where Common Tussock-grass was present, but not at a high enough cover (<25% cover) to qualify as a patch. The areas were mapped to assist Spirecom in reducing their impacts to native vegetation as much as possible. It is important to note that scattered native vegetation still occurs outside these patches and the mapped Plains Grassy Wetland habitat zones.

The unnamed road reserve was previously mapped as significant habitat for Basalt Tussock Grass *Poa labillardierei* var. (Volcanic Plains)*.* This variety of Tussock Grass is now included in *Poa labillardierei* var. *labillardierei.* Basalt Tussock Grass is used to refer to this species in Figure 1 (Appendix 1) due to the previous consideration of the road reserve as significant habitat due to the presence of this variety of Tussock Grass.

Striped legless lizard targeted surveys

Tile surveys for threatened reptiles were undertaken between 17 October and 22 December 2023. Three reptile and two amphibian species were recorded within the study area during the targeted surveys - Striped Legless Lizard, Eastern Three-lined Skink *Acritoscincus duperreyi*, Tussock Skink, Southern Brown Tree Frog *Litoria ewingii* and Spotted Marsh Frog *Limnodynastes tasmaniensis*. Additionally, one skink *Scincidae* spp. was observed but unable to be identified to the species level during the targeted surveys, as they evaded capture and/or moved too quickly to obtain visual identification. This typically occurred on warmer or more sunny days when individuals were more active.

Four Striped Legless Lizards were recorded during the surveys; one under a tile in Transect 2 (southern boundary of road reserve) and three under tiles within Transect 3 (northern boundary of road reserve; Figure 2, Appendix 1). Head scales were photographed for two of the Striped Legless Lizards captured on Transect 3, and it was determined they were the same individual captured on two separate days. The Striped Legless Lizards observed on Transect 2 and one of the individuals observed on Transect 3 evaded capture and were not able to be photographed. Hence, it is unknown whether the same individual was recorded all four times. However, it is likely that at least two different individuals were recorded as sightings as the capture points on Transect 2 and Transect 3 are located approximately 150 metres apart.

Tussock Skink were recorded on one occasion during the surveys in Transect 5. The unidentified skink that was observed, but not captured, on Transect 1 was also potentially a Tussock Skink due to its colour and size. Tussock Skink are listed as vulnerable under the FFG Act. Based on the results from the current survey, it is reasonable to assume that Tussock Skink are present in moderate abundance throughout the study area.

More information on these surveys can be found in the Striped Legless Lizard report (Biosis 2024).

Victoria's Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

The Guidelines set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation in order to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation' (DELWP 2017).

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation.
- **Minimise** impacts resulting from the removal, destruction or lopping of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

The following actions have been taken to avoid and/or minimise the impacts of the proposed pipeline development on the landscape:

- The six-metre wide all-weather road proposed within the unnamed road reserve has been positioned to avoid all impacts to native vegetation patches. Additionally, temporary construction fencing has been erected around the patches of native vegetation. It is important to note that the construction of the road will still impact scattered native vegetation patches and Striped Legless Lizard habitat.

The extent of native vegetation patches and the location of large trees within patches and any scattered trees within the study area were mapped (Appendix 1), and the vegetation condition was assessed in relation to standard methods (DSE 2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

Based on the current design (provided by Spirecom on 14 December 2023), the proposed development of the all-weather road will not require the removal of any native patch vegetation. However, scattered native vegetation (that does not meet the definition of a patch within the Guidelines) will be impacted. As a result, a planning permit will be required to construct the proposed road, but native vegetation offset credits will not be required for these impacts.

Recommendations and conclusions

Striped Legless Lizard have been identified within the unnamed road reserve (see the Striped legless lizard targeted survey report for more information, Biosis 2024). As a result, it is recommended that the proposed construction of the road is referred to the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). We understand that Spirecom are currently preparing an EPBC Act referral for these works.

No works should proceed within the suitable habitat for Striped legless lizard (Biosis 2024) in the unnamed road reserve before the EPBC Act referral has been assessed. This includes the construction of no-go fencing to protect native vegetation. While temporary fencing is unlikely to impact the Striped legless lizard, construction of any permanent or more invasive fencing may impact on Striped Legless Lizard habitat and should therefore be discussed with the federal government throughout the referral process before it is undertaken.

While the current proposed location of the road does not propose to remove any patches of native vegetation (as define under the Guidelines) any changes to the footprint of the road will need to be re-assessed as they may result in impacts to the vegetation mapped within the reserve.

As long as the works are in line with the EPBC Act referral process and do not significantly impact Striped Legless Lizard habitat, no-go fencing should be erected around native vegetation mapped within the road reserve to ensure impacts to retained native vegetation do not occur during construction and operation of the all-weather road.

Please contact me if you have any enquiries.

Yours sincerely

Hayley Sime

Botanist

References

Biosis 2023a. *320 Mooleric Road, Birregurra. Flora and Fauna Assessment*, Report prepared for Spirecom Pty Ltd. Authors: Gibson, M. and Russell, W. Biosis Pty Ltd, Ballarat, VIC. Project no. 38562.

Biosis 2024b. *Mooleric Road Birregurra: Flora and Fauna assessment*, Report prepared for Spirecom Pty Ltd. Authors: Sime, H. Eastick, D. Biosis Pty Ltd. Ballarat, Victoria. Project no. 39426.

Biosis 2024. *Mooleric Road Birregurra Striped Legless Lizard targeted survey*, Report for Spirecom Pty Ltd. Author: Eastick D. Biosis Pty Ltd, Melbourne, VC. Project no. 39426.

DELWP 2017. 'Guidelines for the Removal, Destruction or Lopping of Native Vegetation', https://www.environment.vic.gov.au/native-vegetation/native-vegetation-removal-regulations.

Appendices

Appendix 1 Native vegetation and Striped legless lizard figures

Legend

Study area

Impact area

Road construction

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 1.1 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100
Metres
Scale: 1:2,500 @ A3
Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_FFA_F3_Veg_removal
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx

Legend

Study area

Impact area

Road construction

Ecological vegetation classes (EVCs)

125 Plains Grassy Wetland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 1.2 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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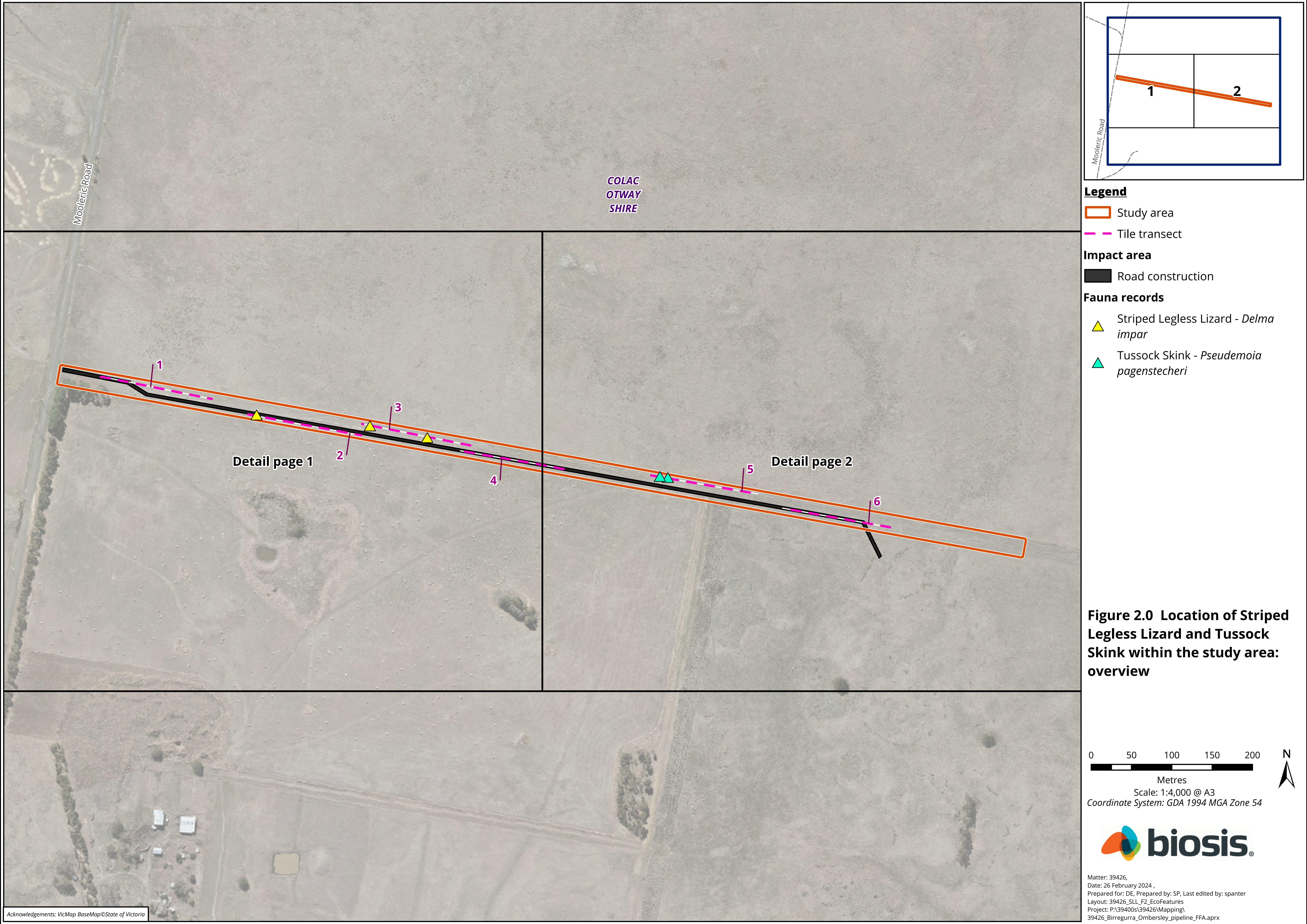

Figure 2.0 Location of Striped Legless Lizard and Tussock Skink within the study area: overview

Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
Layout: 39426_SLL_F2_EcoFeatures
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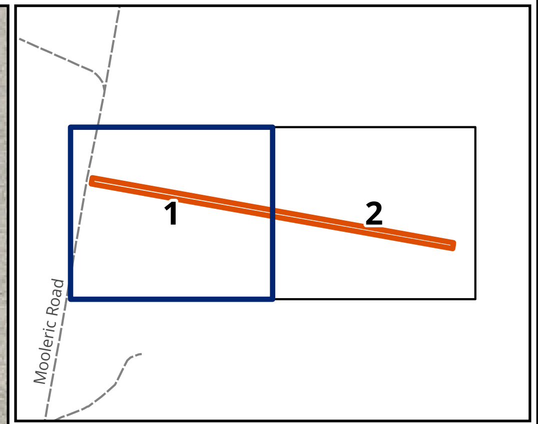


Legend

Study area

Tile transect

Impact area

Road construction

Fauna records

Striped Legless Lizard - *Delma impar*

Figure 2.1 Location of Striped Legless Lizard and Tussock Skink within the study area: detail (west)

0 25 50 75 100

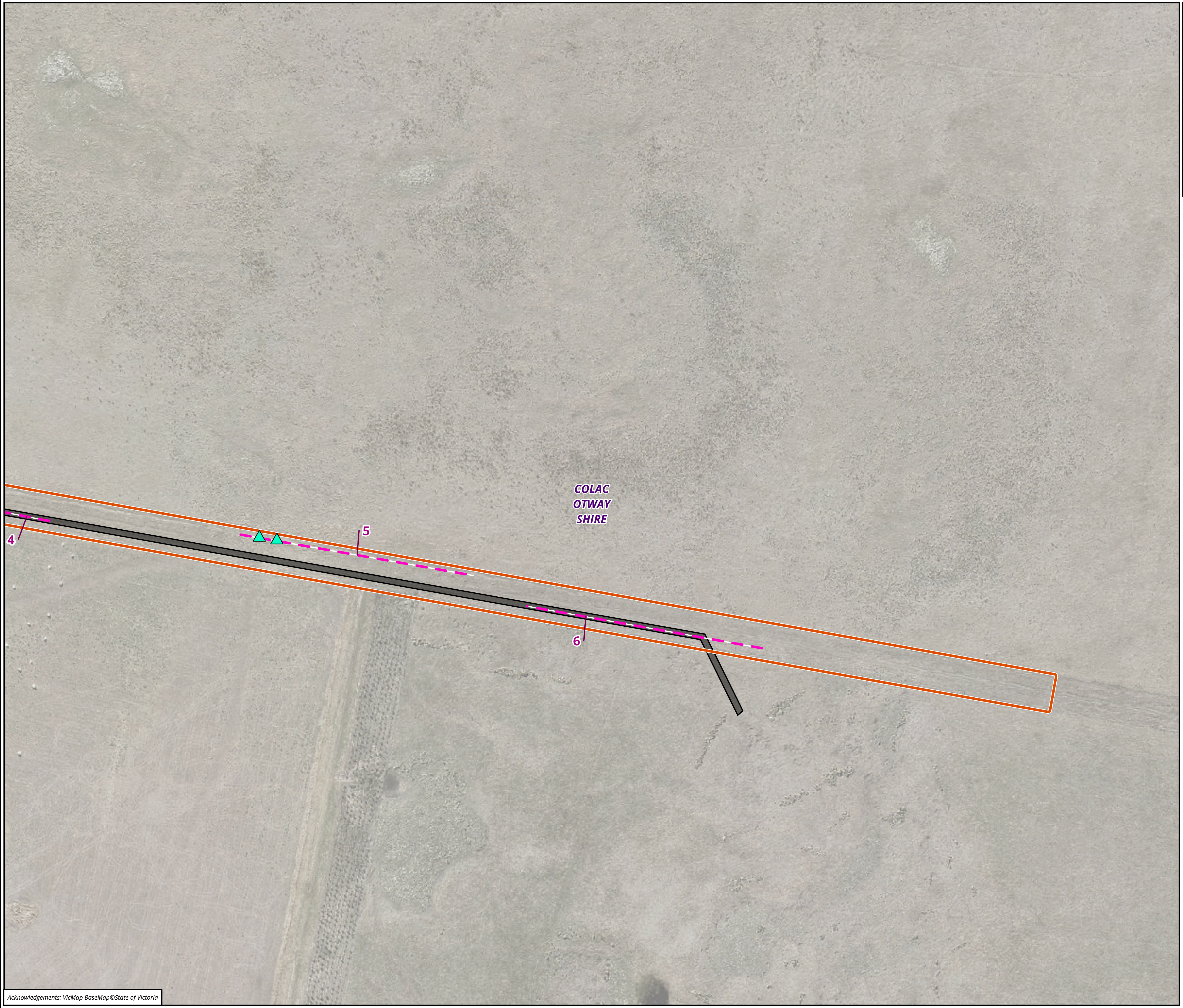
Metres

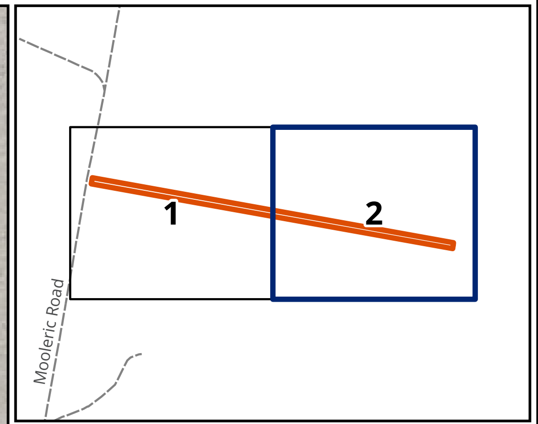
Scale: 1:2,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
Layout: 39426_SLL_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx





Legend

Study area

Tile transect

Impact area

Road construction

Fauna records

Tussock Skink - *Pseudemoia pagenstecheri*

Figure 2.2 Location of Striped Legless Lizard and Tussock Skink within the study area: detail (east)

0 25 50 75 100
Metres
N

Scale: 1:2,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

biosis

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
Layout: 39426_SLL_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx

Acknowledgements: VicMap BaseMap©State of Victoria

Appendix 2 Methods

Methods

Flora assessment

An initial flora assessment was undertaken on 5 July 2023 by Hayley Sime (Botanist) in the unnamed road reserve. Several areas (particularly along the western boundary) of the road reserve were inundated at the time of the survey. An additional survey of the unnamed road reserve was undertaken on 25 September 2023. The patches of vegetation that were inundated during the previous assessment were dry and could be more effectively assessed and mapped at this time.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01).

The Guidelines classify native vegetation into two categories (DELWP 2017a):

- A **scattered tree** is defined as a native canopy tree that does not form part of a patch of native vegetation.
- A **patch** of native vegetation (measured in hectares) is either:
  - An area of native vegetation, with or without trees, where at least 25% of the total perennial understorey cover is native plants.
  - An area with three or more native canopy trees where the drip line (i.e. the outermost boundary of a tree canopy) of each tree touches the drip line of at least one other tree, forming a continuous canopy.
  - Any mapped wetland included in the Current wetlands map, available in DEECA systems and tools.

Patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are determined by DEECA.

A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type. EVC descriptions provide a list of the typical canopy species. A scattered tree is defined as either small or large, and is determined using the large tree benchmark for the relevant EVC. The extent of a small, scattered tree is the area of a circle with a 10 metre radius (i.e. 0.031 hectares), while the extent of a large scattered tree is a circle with a 15 metre radius (i.e. 0.070 hectares). A condition score is applied to each scattered tree based on information provided by DEECA's NVIM.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation identified in the study area. This assessment is consistent with DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017a). For the purposes of this assessment the limit of the resolution for identification of a patch of native vegetation was taken to be 0.001 habitat hectares (Hha). That is, if a discrete patch of native vegetation was present with sufficient cover but its condition and extent would not have resulted in the identification of at least 0.001 habitat hectares, the vegetation patch of vegetation was not mapped or included in the assessment.

Species nomenclature for flora follows the Victorian Biodiversity Atlas (VBA).

Fauna assessment

The study area was investigated on 5 July and 25 September 2023 by Ian Smales (Principal Zoologist) and Danielle Eastick (Zoologist) to determine its values for fauna. These were determined based on the types and qualities of habitat(s) present. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Particular attention was given to searching for significant species and their habitats. Fauna species were recorded with a view to characterising the values of the site and the investigation was not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

Appendix 3 Vegetation Quality Assessment results

EVC #: Name			Plains Grassy Wetland		
		Max Score	Score	Score	Score
Site Condition	Large Trees	10	NA	NA	NA
	Tree Canopy Cover	5	NA	NA	NA
	Lack of Weeds	15	9	9	9
	Understorey	25	10	5	5
	Recruitment	10	3	3	3
	Organic Matter	5	3	3	3
	Logs	5	0	0	0
	Total Site Score		25	20	20
	EVC standardiser		1.36	1.36	1.36
	Adjusted Site Score		34	27.2	27.2
Landscape Value	Patch Size	10	1	1	1
	Neighbourhood	10	0	0	0
	Distance to Core Area	5	1	1	1
	Total Landscape Score		2	2	2
Habitat points = #/100		100	18.25	23.25	23.25
CONDITION SCORE		1	0.18	0.23	0.23
Habitat Zone area (ha)			0.00342	0.0047	0.0052
Habitat Hectares (Hha)			0.0006	0.0011	0.0012

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Biosis acknowledges the Aboriginal and Torres Strait Islander peoples as Traditional Custodians of the land on which we live and work.
We pay our respects to the Traditional Custodians and Elders past and present and honour their connection to Country and ongoing contribution to society.

320 Mooleric Road Birregurra

Flora and fauna assessment

FINAL REPORT

Prepared for Spirecom Pty Ltd

12 October 2023

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Document information

Report to:	Spirecom Pty Ltd
Prepared by:	Matt Gibson, Wyn Russell
Biosis project no.:	38562
File name:	38562.OmbersleyPoultry.FFA.20230615
Citation:	Biosis 2023. 320 Mooleric Road, Birregurra. Flora and Fauna Assessment. Report for Spirecom Pty Ltd. Gibson, M., Russell, W. Biosis Pty Ltd., Ballarat, Vic. Project no 38562.

Document control

Version	Internal reviewer	Date issued
Draft version 01	KS	15/06/2023
Final version 01	KS	12/10/2023

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Spirecom Pty Ltd: Fernando Ferreira
- Victorian Government Department of Environment, Energy and Climate Action for access to the Victorian Biodiversity Atlas, NatureKit and EnSym/Native Vegetation Information Management tool
- Australian Government Department of Climate Change Energy the Environment and Water for access to the Protected Matters Search Tool

Biosis staff involved in this project were:

- Matt Gibson and Wyn Russell (field assessment)
- Grace O'Loghlin (mapping)
- Katrina Sofo (quality assurance)

SUMMARY

Biosis Pty Ltd was commissioned by Spirecom Pty Ltd to undertake a flora and fauna assessment of an area of land proposed for development of a poultry facility. The study area is located in agricultural land approximately 20 kilometres north-east of Colac, Victoria.

Ecological values

Key ecological values identified within the study area are as follows:

- Patches of Plains Grassy Wetland, that correspond with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened community Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.
- Plains Grassy Wetland areas may provide habitat for several threatened fauna species, including Brolga *Antigone rubicunda*, Tussock Skink *Pseudemoia pagenstecheri*, Hairy Burrowing Crayfish *Engaeus sericatus* and Growling Grass Frog *Litoria raniformis*.
- Plains Grassy Wetland areas may provide habitat for several threatened flora species, including Matted Flax-lily *Dianella amoena*, Clover Glycine *Glycine latrobeana*, Pale Swamp Everlasting *Coronidium gunnianum* and Purple Blown-grass *Lachnagrostis semibarbata*.
- The site may be utilised by several wide ranging threatened species including Black Falcon *Falco subniger*, White-throated Needletail *Hirundapus caudacutus*, Grey-headed Flying-fox *Pteropus poliocephalus* and Southern Bent-wing Bat *Miniopterus orianae bassanii*.

Government legislation and policy

An assessment of the project in relation to key biodiversity legislation and policy is provided and summarised below.

Legislation / policy	Relevant ecological feature on site	Permit / approval required
EPBC Act	Patches of Plains Grassy Wetland, that correspond with the listed threatened community Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. Plains Grassy Wetland areas provide potential habitat for Matted Flax-lily, Clover Glycine and Growling Grass Frog. Grey-headed Flying-fox, White-throated Needletail and Southern Bent-wing Bat may make occasional use of the area.	Referral not required if patches of Plains Grassy Wetland can be completely avoided.
FFG Act	Potential habitat for several threatened species present.	Site is on private land. Protected Flora Permit not required
Planning & Environment Act	Site contains patches of remnant Plains Grassy Wetland.	Planning permit required to lop or remove native vegetation if native vegetation cannot be avoided.

Legislation / policy	Relevant ecological feature on site	Permit / approval required
CaLP Act	Three noxious weed species recorded within the study area	Comply with requirements to control/eradicate these species.

Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

There is no design established for the site as yet, and there is scope to build the facility without impacting upon any native vegetation. Offsets will be required if native vegetation removal cannot be avoided within the study area, or if there are other impacts required for the project outside of the study area (not included in this assessment).

Recommendations

The results of this assessment should be incorporated into the project design, by adding the flora and fauna mapping information into the planning maps and investigating options to retain as much of the mapped vegetation/habitats as possible.

All areas of EVC 125 Plains Grassy Wetland should be considered in the design process, to ensure there are no direct or indirect impacts.

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan. This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

Contents

Tables

Figures

1. Introduction

1.1. Project background

Biosis Pty Ltd was commissioned by Spirecom Pty Ltd to undertake a flora and fauna assessment of four land parcels at 320 Mooleric Road Birregurra. Construction and operation of poultry farming sheds is proposed for the study area.

1.2. Scope of assessment

The objectives of this investigation are to:

- Describe the vascular flora (ferns, conifers, flowering plants), vertebrate fauna (mammals, birds, reptiles, frogs, fishes) and decapod crustacea (e.g. crayfish).
- Map native vegetation and other habitat features.
- Review the implications of relevant biodiversity legislation and policy, including Victoria's Guidelines for the removal, destruction or lopping of native vegetation ('the Guidelines').
- Identify potential implications of the proposed development and provide recommendations to assist with development design.
- Recommend any further assessments of the site that may be required (e.g. a vegetation impact assessment or targeted searches for threatened species).

The study site was limited to private land, as shown in Figures 1 and 2. No assessment of offsite areas, including road reserves, was undertaken.

1.3. Location of the study area

The study area includes the following four land parcels, located at 320 Mooleric Road Birregurra.

- Lot 1 TP247757
- Lot 3 TP372519
- Lot 4 TP247757
- Lot 4 TP372519

The study area is located approximately 7 kilometres north of Birregurra, and 20 kilometres north-east of Colac (Figure 1). It encompasses 130 hectares of private land. It is currently zoned Farming Zone (FZ) and is used for sheep and cattle grazing. A commercial quarry is operating on the adjacent land to the east, between the study area and Mooleric Road.

The study area is within the:

- Victorian Volcanic Plain Bioregion
- Barwon River Basin
- Management area of the Corangamite Catchment Management Authority (CMA)

- Colac Otway Shire local government area
- Traditional lands of the Eastern Maar.

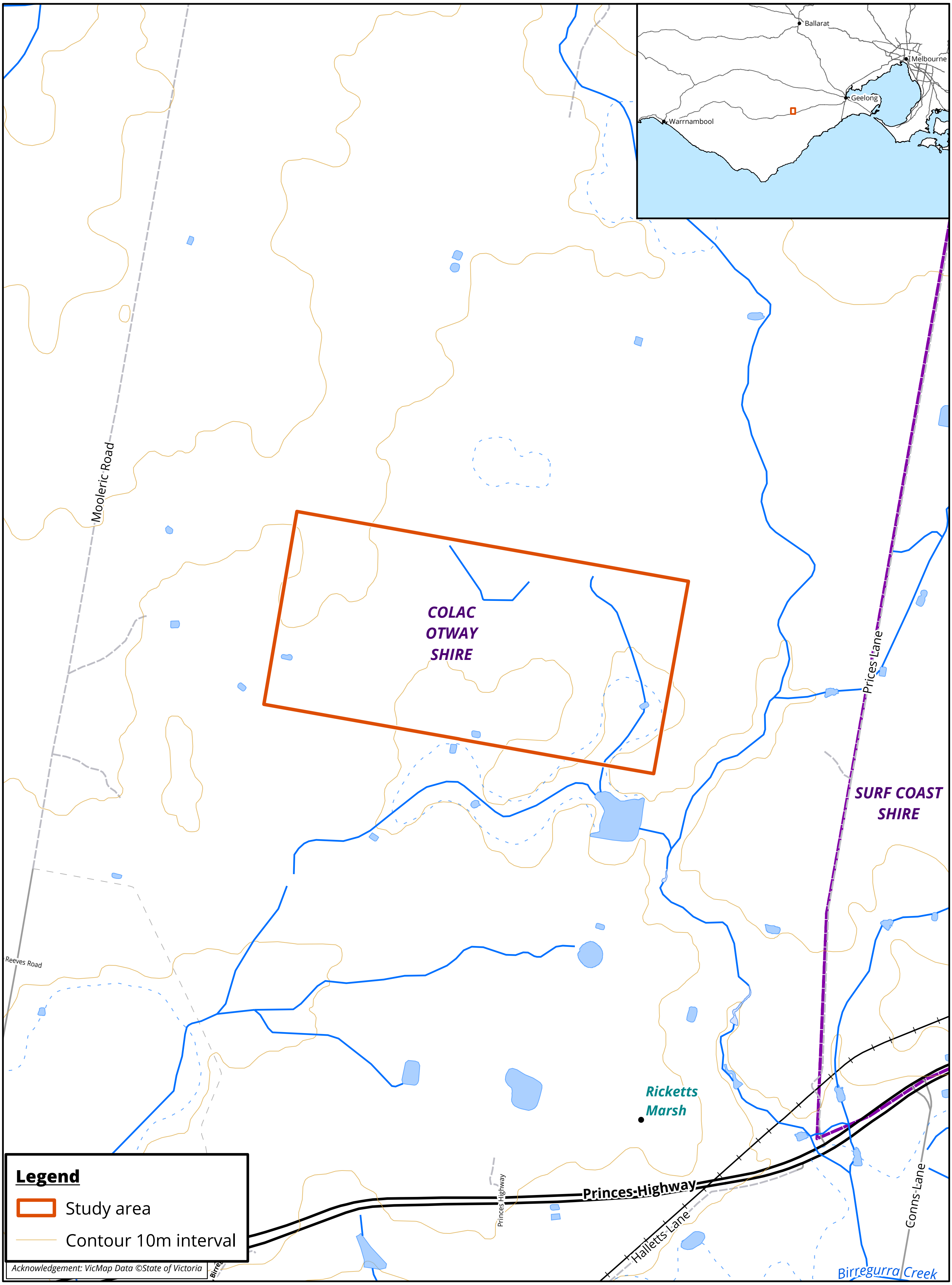


Figure 1 Location of the study area - Ombersley, Victoria

Matter: 38562,
Date: 11 May 2023,
Prepared for: WR, Prepared by: GO, Last edited by: gologhlin
Layout: 38562_F1_Locality
Project: P:\38500s\38562\Mapping\38562_OmbersleyPoultryFFA.aprx

0 200 400 600 800
Metres
Scale: 1:20,000 @ A4
Coordinate System GDA 1994 MGA Zone 54

N

00

2. Methods

2.1. Database review

In order to provide a context for the study area, information about flora and fauna from within 5 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases, many of which are maintained by the Victorian Government Department of Energy, Environment and Climate Action (DEECA) (formerly Department of Environment, Land, Water and Planning (DELWP)) or the Australian Government Department of Climate Change, Energy, Environment and Water (DCCEEW). Records from the following databases were collated and reviewed:

- DEECA's Victorian Biodiversity Atlas (VBA), including the 'VBA_FLORA25, FLORA100 & FLORA Restricted' and 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' datasets.
- DCCEEW's Protected Matters Search Tool for matters protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Other sources of biodiversity information were examined including:

- DEECA's NatureKit mapping tool.
- DEECA's Habitat Importance maps.
- DEECA's Native Vegetation Information Management (NVIM) system.
- Planning Scheme overlays relevant to biodiversity based on http://planningschemes.dpcd.vic.gov.au.
- Biosis (2014). Ombersley Quarry: Flora and Fauna Assessment. Report prepared for MCG Quarries Pty Ltd. Biosis Project #17781.

2.2. Definitions of threatened species or communities

Threatened species or communities include those species or communities that are listed under the EPBC Act and/or FFG Act. The conservation status of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Conservation status of threatened species and ecological communities

Government level	Conservation status
National	Listed as nationally critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent in Victoria under the FFG Act

Lists of threatened species generated from the databases are provided in Appendix A (flora) and Appendix B (fauna) and the species have been assessed to determine their likelihood of occurrence based on the process outlined below.

2.3. Determining likelihood of occurrence of threatened species

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix A (flora) and Appendix B (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the FFG Act (hereafter referred to as ' threatened species') are assessed to determine their likelihood of occurrence. The habitat value for threatened species is calculated by the Habitat Importance Modelling produced by DEECA (DELWP 2017a). Where threatened species are recorded in the study area this is noted in Appendix A (flora) and Appendix B (fauna).

Threatened species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species is also considered.

2.4. Site investigation

2.4.1. Flora assessment

The flora assessment was undertaken on 9 May 2023 and a list of flora species was collected. This list will be submitted to DEECA for incorporation into the Victorian Biodiversity Atlas. Planted species have not been recorded unless they are naturalised.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01).

The Guidelines classify native vegetation into two categories (DELWP 2017a):

- A **patch** of native vegetation (measured in hectares) is either:
  - An area of native vegetation, with or without trees, where at least 25% of the total perennial understorey cover is native plants.
  - An area with three or more native canopy trees where the drip line (i.e. the outermost boundary of a tree canopy) of each tree touches the drip line of at least one other tree, forming a continuous canopy.
  - Any mapped wetland included in the Current wetlands map, available in DEECA systems and tools.

Patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are determined by DEECA.

- A **scattered tree** is defined as a native canopy tree that does not form part of a patch of native vegetation.

A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type. Ecological vegetation class descriptions provide a list of the typical canopy species. A scattered tree is defined as either small or large, and is determined using the large tree benchmark for the relevant EVC. The extent of a small scattered tree is the area of a circle with a 10 metre radius (i.e. 0.031 hectares), while the extent of a large scattered tree is a circle with a 15 metre radius (i.e. 0.070 hectares). A condition score is applied to each scattered tree based on information provided by DEECA's NVIM.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation identified in the study area. This assessment is consistent with DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017a). For the purposes of this assessment the limit of the resolution for identification of a patch of native vegetation was taken to be 0.001 habitat hectares (Hha). That is, if a discrete patch native vegetation was present with sufficient cover but its condition and extent would not have resulted in the identification of at least 0.001 habitat hectares, the vegetation patch of vegetation was not mapped or included in the assessment.

Where relevant, notes were made on specific issues such as noxious weed infestations, evidence of management works, current grazing impacts and the regeneration capacity of the vegetation.

Species nomenclature for flora follows the Victorian Biodiversity Atlas (VBA).

2.4.2. Fauna assessment

The study area was investigated on 9 May 2023 to determine its values for fauna. These were determined primarily on the basis of the types and qualities of habitat(s) present. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Particular attention was given to searching for significant species and their habitats. Fauna species were recorded with a view to characterising the values of the site and the investigation was not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

2.4.3. Permits

Biosis undertakes flora and fauna assessments under the following permits and approvals:

- Wildlife Authorisation issued by DEECA under the *Victorian Wildlife Act 1975* (Permit Number 10010193).
- Permit to Take/Keep Protected Flora issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010194).
- Permit to Take Protected Fish issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010195).
- Permit to Conduct Research in areas managed by the Parks Victoria issued by DEECA under the *National Parks Act 1975*, *Crown Land (Reserves) Act 1978* and *Parks Victoria Act 2018* (Permit Number 10010071).
- Permit to catch and release fish issued by the Victorian Fisheries Authority under the *Victorian Fisheries Act 1995* (Permit Number RP 1220, Personal File Number 13041).
- Approvals 18.21 and 20.21 issued by the Wildlife and Small Institutions Animal Ethics Committee of the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR).
- Scientific Procedures Fieldwork Licence issued by DEDJTR's Wildlife and Small Institutions Animal Ethics Committee (Licence Number 20020).

2.5. Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as low abundance, patchy distribution, species dormancy, seasonal conditions, and migration and breeding behaviours. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current flora and fauna assessment was conducted in May (autumn), which is not an optimal time for survey, however the conditions were appropriate for assessing the extent of native vegetation and habitats present within the site.

2.6. Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes.
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice.
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a).
- Native Vegetation Management Plans prepared by Catchment Management Authorities.
- *Planning and Environment Act 1987* – specifically Clauses 12.01-2, 52.17 and 66.02 and Overlays in the Planning Scheme.
- Noxious weeds and pest animals lists under the *Catchment and Land Protection Act 1994* (CaLP Act).

2.7. Mapping

Mapping was conducted using hand-held GPS-enabled tablets and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the tablets (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans. However this mapping may not be sufficiently precise for detailed design purposes.

3. Results

The ecological features of the study area are described below and mapped in Figure 2.

Species recorded during the flora and fauna assessment are listed in Appendix A (flora) and Appendix B (fauna). Unless of particular note, these species are not discussed further.

Threatened species recorded or predicted to occur in the local area is also provided in those appendices, along with an assessment of the likelihood of the species occurring within the study area.

3.1. Vegetation and fauna habitat

Most of the study area has been highly modified due to clearing and grazing by stock. Most of the study area has been significantly degraded and supports predominantly introduced vegetation that is of limited ecological value.

Areas of Plains Grassy Wetland vegetation were identified in two locations within the study area. These areas correspond with an endangered community and provide potential habitat for several threatened flora and fauna species. Brolgas could use the mapped Plains Grassy Wetland for foraging and roosting, and it is also potentially suitable breeding habitat for the FFG Act listed Brolga. A known breeding wetland is located within 860 metres of the mapped Plains Grassy Wetland, north of the study area, is within walking distance for unfledged chicks and could be part of a breeding pair's home range (Veltheim et al. 2019). The site also contains linear plantings of native and introduced trees, and areas of surface rock within the cleared pasture. These features are described further in Table 2 and mapped in Figure 2.

Photos are provided in Appendix C.

Table 2 Summary of vegetation and habitat types within the study area

Vegetation or habitat type	Description	Location	Significant values
Predominantly introduced vegetation (Photo 1)	The majority of the study area supports degraded paddocks that have been cleared in the past and are currently used for grazing purposes.	Majority of the study area.	Potential habitat for common open-country species, including White-throated Needletail *Hirundapus caudacutus*, Southern Bent-winged Bat *Miniopterus orianae bassanii* and Black Falcon *Falco subniger*.
Planted vegetation (Photo 2)	Several linear plantings are present within the study area, including a planting of native trees and shrubs along the eastern boundary fence, and plantings of introduced Radiata Pine *Pinus radiata*, Monterey Cypress *Hesperocyparis macrocarpa* and Sugar Gum *Eucalyptus cladocalyx*.	Several linear plantations shown on Figure 2.	Planted eucalypts may be occasionally visited, when in flower, by foraging Grey-headed Flying-fox *Pteropus poliocephalus* from the colony at the Colac Botanic Gardens.
Plains Grassy Wetland EVC (Photo 3)	The fenced area in the south-eastern corner of the study area supports dense cover of Common Tussock-grass *Poa labillardierei*. There is also a smaller associated area along the southern boundary of the property.	Fenced area in the south-eastern corner of the study area (Figure 2). Unfenced area near the southern boundary of the property is part of a larger wetland area that extends into the property to the south.	Potential habitat for several threatened species, including Matted Flax-lily *Dianella amoena*, Clover Glycine *Glycine latrobeana*, Pale Swamp Everlasting *Coronidium gunnianum*, Purple Blown-grass *Lachnagrostis semibarbata*, Growling Grass Frog *Litoria raniformis*, Tussock Skink *Pseudemoia pagenstecheri* and Hairy Burrowing Crayfish *Engaeus sericatus*. Possible foraging and roosting habitat for Brolga *Antigone rubicunda,* which has been recorded locally. Potential to be part of a breeding home range and to support nesting. Local records include breeding pairs, and the study area occurs within the potential home range of a pair.
Constructed dams (Photo 3)	Several dams were recorded within the study area. Most of these are accessible to stock and were in heavily grazed areas, lacking native vegetation. The dam in the	Scattered throughout the site.	The constructed dam near the south-eastern corner of the study area may provide habitat for Growling Grass Frog.

Vegetation or habitat type	Description	Location	Significant values
	south-eastern corner of the study area was in a fenced area, excluded from stock. This dam showed some development of aquatic vegetation and aquatic habitat features.		Dams in the study area may provide roosting habitat for Brolgas occurring locally.
Rock outcrops (Photo 4)	Areas of surface rock are present in the western half of the study area. These areas are heavily grazed and support a similar suite of introduced grasses and other weeds as the surrounding pasture areas.	Rock outcrops limited to western half of study area. Rock piles in eastern half of study area where historical rock clearing and cropping has occurred.	Habitat for a range of native reptiles and small mammals. Unlikely to support threatened species due to significant disturbance of surrounding grassland, except for Brolga, which could occasionally forage amongst the rocky outcrops

3.2. Landscape context

The study area is in a rural farming area and the majority of surrounding land-use is either grazing or cropping. The site has experienced long term disturbance through grazing, cropping and removal of surface rocks.

The study area is not located close to any large conservation reserves. It is approximately 20 kilometres from Lake Colac and Lake Murdeduke, and a similar distance to the north of the forested area of the Otway Ranges.

Some neighbouring properties and road reserves support remnant grasslands or wetland vegetation, including the property to the north, which is managed for grazing and wind energy generation.

The property to the south supports a large, low lying area that contains Plains Grassy Wetland vegetation, and two sections of this wetland extend short distances into the study area, near the southern boundary.

No major waterways pass through the site. The Birregurra Creek and Barwon River both flow through the landscape several kilometres to the south of the site.

3.3. Threatened species and ecological communities

Threatened species recorded or predicted to occur within 5 kilometres of the study area or from the relevant catchment (aquatic species) are listed in Appendix A (flora) and Appendix B (fauna). An assessment of the likelihood of these species occurring in the study area and an indication of where within the site (i.e. which habitats or features of relevance to the species) is included. A summary of those species recorded or with a medium or higher likelihood of occurring in the study area is provided in Table 3.

Table 3 Summary of EPBC Act and FFG Act listed species most likely to occur in the study area

Species name	Listing status	Area of value within the study area
Matted Flax-lily *Dianella amoena*	Endangered under EPBC Act Endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Clover Glycine *Glycine latrobeana*	Vulnerable under EPBC Act Vulnerable under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Pale Swamp Everlasting *Coronidium gunnianum*	Critically endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Purple Blown-grass *Lachnagrostis semibarbata* var. *filifolia*	Endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Purple Blown-grass *Lachnagrostis semibarbata* var. *semibarbata*	Endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Growling Grass Frog *Litoria raniformis major*	Vulnerable under EPBC Act and FFG Act	Constructed dam surrounded by the fenced area of Plains Grassy Wetland in the south-east corner of the study area. May move through wet depressions and drainage lines when dispersing between wetlands.

Species name	Listing status	Area of value within the study area
White-throated Needletail *Hirundapus caudacutus*	Vulnerable under EPBC Act and FFG Act	Wide-ranging aerial species that may pass through the area on occasion.
Grey-headed Flying-fox *Pteropus poliocephalus*	Vulnerable under EPBC Act	Species may occasionally forage in flowering Sugar Gums planted on the east and west borders of the study area.
Southern Bent-winged Bat *Miniopterus orianae bassanii*	Critically endangered under EPBC and and FFG Act	May forage throughout the general area.
Brolga *Antigone rubicunda*	Endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area. Potential breeding home range movement corridor between this wetland and a known breeding wetland within 860 metres. Locally occurring pair may also forage within the study area, within the wetland, drainage lines and rocky outcrops.
Black Falcon *Falco subniger*	Critically endangered under FFG Act	May forage throughout the general area.
Tussock Skink *Pseudemoia pagenstecheri*	Endangered under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.
Hairy Burrowing Crayfish *Engaeus sericatus*	Vulnerable under FFG Act	Fenced area of Plains Grassy Wetland in the south-east corner of the study area.

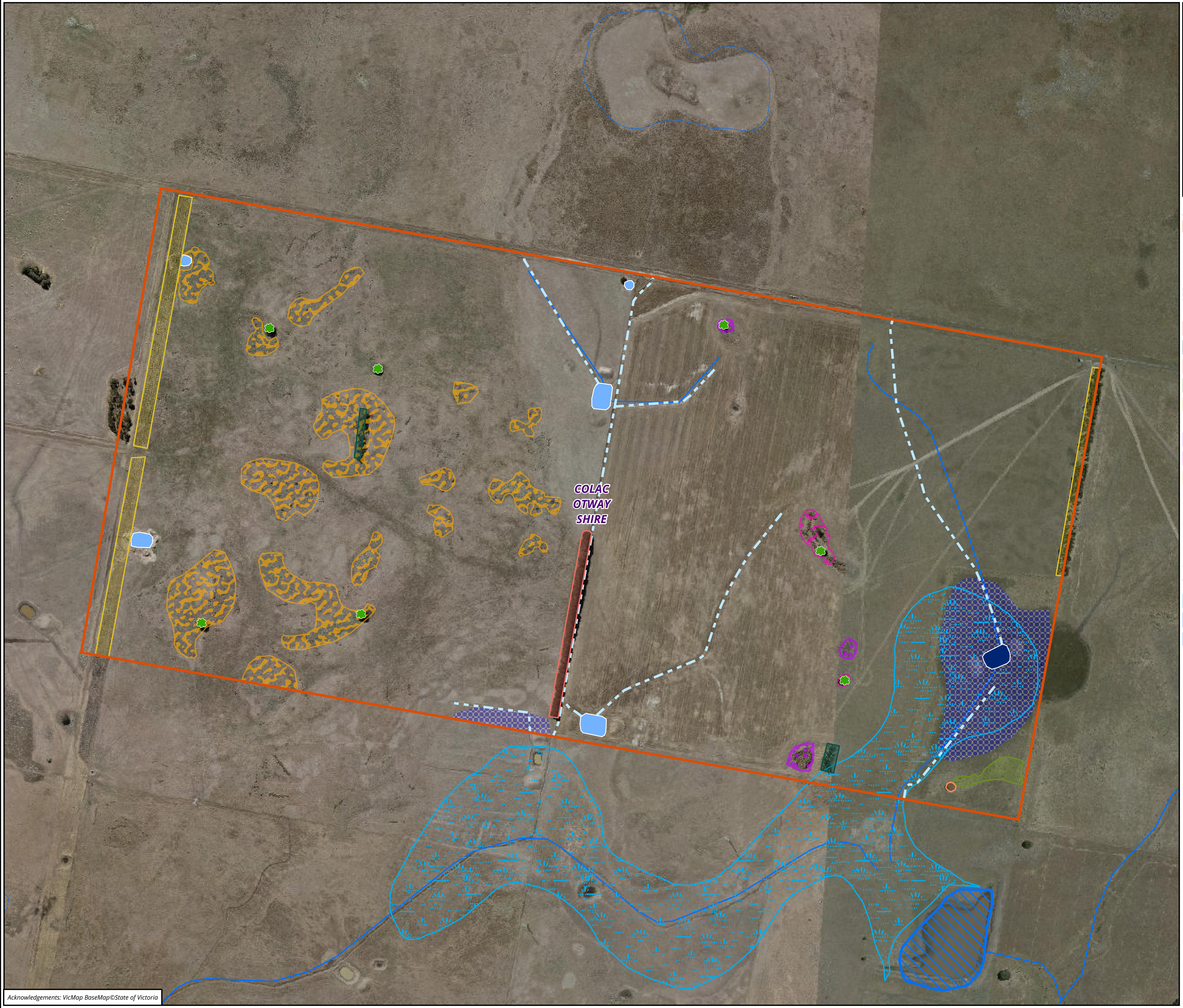
3.3.1. Threatened ecological communities

The fenced area in the south-east corner of the study area supports a high cover of Common Tussock-grass, and this area corresponds with the definition of the EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain. This community is likely to have occurred across most of the site prior to clearing for agriculture.

3.4. Further survey recommendations

No development plan is currently available.

Ecological values on the site are limited to the fenced area of Plains Grassy Wetland in the south-eastern corner of the study area and a potential movement corridor for locally breeding Brolga, which could be associated with the breeding wetland in the adjacent property, within approximately 200 metres north of the study area and 860 metres of the Plains Grassy Wetland. No further assessments are required if development can be excluded from this area. If the Plains Grassy Wetland was proposed to be disturbed, further survey would be required to determine the presence/absence of a range of threatened species and ecological communities, including those listed in Table 3.



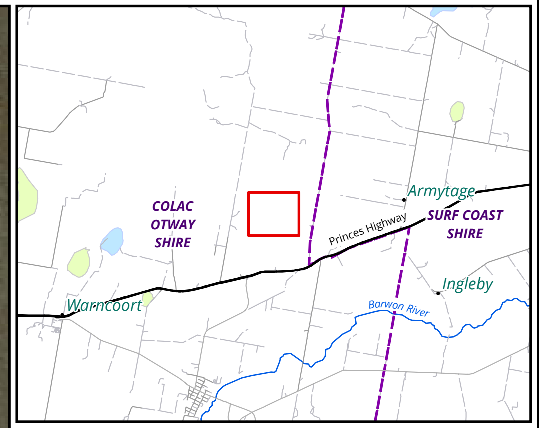


Figure 2 Ecological features of the study area

Matter: 38562,
Date: 11 May 2023,
Prepared for: WR, Prepared by: GO, Last edited by: gologhlin
Layout: 38562_F2_EcoFeatures
Project: P:\38500s\38562\Mapping\
38562_OmbersleyPoultryFFA.aprx

4. Biodiversity legislation and government policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail. Where available, links to further information are provided.

4.1. Commonwealth

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act.

Further information including a guide to the referral process is available at http://www.environment.gov.au/epbc/index.html

The MNES relevant to the project are summarised in Table 4. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

Table 4 Assessment of project in relation to the EPBC Act

MNES	Project specifics	Assessment against significant impact guidelines
EPBC Act listed species	The likelihood of threatened flora and fauna species occurring in the study area is assessed in Appendix A (flora) and Appendix B (fauna). Six species are considered potentially present, including two flora species: • Matted Flax-lily • Clover Glycine and four fauna species: • White-throated Needletail • Grey-headed Flying-fox • Southern Bent-winged Bat • Growling Grass Frog	White-throated Needletail, Grey-headed Flying-fox and Southern Bent-wing Bat have potential to fly and forage throughout the general area, but are unlikely to be impacted by the proposed development, as the study area does not support areas of important habitat for these species. Potential habitat for Growling Grass Frog, Matted Flax-lily and Clover Glycine is limited to the two patches of Plains Grassy Wetland mapped within the study area. If these areas can be avoided, there would be no requirement for further targeted surveys or referrals.
EPBC Act listed ecological communities	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (critically endangered) is present within the study area. Two patches of Plains Grassy Wetland EVC correspond with the definition of this community, located near the southern boundary of the study area.	This community is unlikely to be impacted if direct removal is avoided, and the project is designed in a manner that does not alter the local hydrology.

MNES	Project specifics	Assessment against significant impact guidelines
Migratory species	Thirteen migratory species have been recorded or predicted to occur in the project search area (Appendix B.3). • Latham's Snipe	While some of these species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species. The Latham's Snipe could use the wetland habitat, drains and inundated areas with native and non-native vegetation.
Wetlands of international importance (Ramsar sites).	The study area is identified as being within the catchment of two Ramsar sites: Western District Lakes and Port Phillip Bay (western shoreline) and Bellarine Peninsula.	The study area does not drain directly into either Ramsar site and the development is not likely to result in a significant impact.

On the basis of criteria outlined in the relevant Significant Impact Guidelines it is considered unlikely that a significant impact on a Matter of National Environmental Significance would result from the proposed action, if direct and indirect impacts to the mapped areas of Plains Grassy Wetland EVC can be avoided. If the final design avoids impacts then referral of the proposed action to the Australian Government Minister for the Environment to determine whether the action requires approval under the EPBC Act is therefore unlikely to be required.

4.2. State

4.2.1. Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DEECA to 'take' protected flora species. Permit exemptions under the FFG Act generally apply to the non-commercial removal of protected flora from private land, unless there is 'critical habitat' that has been declared on the land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish on private or public land.

The study area is on private land, does not contain any declared 'critical habitat' for the purposes of the FFG Act and the flora species are not being taken for the purpose of commercial sale. A protected flora permit is therefore not required, however the presence of rare or threatened flora and habitat for threatened fauna will be considered by the Responsible Authority in determining its response to an application for native vegetation removal under Clause 52.17 (see below).

4.2.2. Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

Declared noxious weeds identified in the study area are listed in Appendix A (Table 7) and established pest animals are listed in Appendix B (Table 10).

The proponent must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Further information is at http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds

4.2.3. Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

Of particular relevance to the development proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the Colac Otway Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 73.01) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses'. It is an objective of Clause 12.01-2 of the State Planning Policy Framework (Native Vegetation Management) that removal of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Clause 52.17 (Native Vegetation) requires a planning permit to remove, destroy or lop native vegetation including some dead native vegetation. Decision guidelines that must be considered by the referral or responsible authority are contained in Section 7 of the Guidelines, and referred to in Clause 52.17-4. Clause 52.17 does not apply if a Native Vegetation Precinct Plan corresponding to the land is incorporated in the Scheme. It should be noted that where native vegetation does not meet the definition of a patch or scattered tree, as described in Section 3.1, the Guidelines do not apply. However, a permit may still be required to remove, destroy or lop native vegetation under the provisions of the Scheme.

Under Clause 66.02 a permit application to remove, destroy or lop native vegetation is required to be referred to DEECA as a recommending referral authority if any of the following apply:

- the class of application is on the detailed assessment pathway
- a property vegetation precinct plan applies to the site or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

The study area is not covered by any overlays relevant to biodiversity under the Scheme.

Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DELWP 2017a). The Guidelines replaced the previous incorporated document titled Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013) on 12 December 2017.

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for the guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

A detailed assessment of the implications for the project under the Guidelines is provided in Section 5 of this report. Under the Guidelines, there are three assessment pathways for assessing an application for a permit to remove native vegetation: basic, intermediate and detailed.

5. Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines were introduced in December 2017. They set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation in order to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation to ensure that the important biodiversity values of native vegetation continue to be delivered into the future.
- **Minimise** impacts resulting from the removal of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact resulting from the removal of native vegetation.

DEECA has provided biodiversity information tools to assist with determining the assessment pathway associated with the removal of native vegetation and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

5.1. Vegetation quality assessment

The extent of native vegetation patches, the location of large trees within patches and any scattered trees were mapped within the study area (Figure 2) and the condition was assessed in relation to standard methods provided by DSE (2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks. DEECA's Native Vegetation Information Management system was also used to determine vegetation extent and condition.

A continuous area of the same EVC is termed a 'habitat zone'. Different habitat zones exists where there are different EVCs present and/or discrete (non-continuous) patches of the same EVC. A separate vegetation quality assessment was conducted for each habitat zone. The vegetation quality assessment score was multiplied by the extent of the habitat zone to give a value in habitat hectares.

Two habitat zones were identified. The results of the vegetation quality assessment are provided in Table 5 and the area mapped as Plains Grassy Wetland is shown in Figure 2.

Table 5 Habitat hectares of native vegetation within the study area

Site ID			1	2
Habitat Zone ID			A	A
EVC #: Name			125 Plains Grassy Wetland	125 Plains Grassy Wetland
		Max Score	**Score**	**Score**
Site Condition	Large Trees	10	N/A	N/A
	Tree Canopy Cover	5	N/A	N/A
	Lack of Weeds	15	6	6
	Understorey	25	10	10
	Recruitment	10	3	3
	Organic Matter	5	3	3
	Logs	5	N/A	N/A
	Total Site Score		21	21
	Standardized Site Score (x 75/55)		28.64	28.64
Landscape Value	Patch Size	10	2	2
	Neighbourhood	10	1	1
	Distance to Core Area	5	1	1
	Total Landscape Score		4	4
Habitat points = #/100		100	32.64	32.64

5.2. Offset requirements

There is no design established for the site as yet, and there is scope to build the facility without impacting upon any native vegetation. Offsets will be required if native vegetation removal cannot be avoided within the study area, or if there are other impacts required for the project outside of the study area (not included in this assessment).

6. Key ecological values and recommendations

This section identifies the key ecological features of the study area, provides an outline of potential implications of proposed development on those values and includes recommendations to assist Spirecom to design a development to minimise impacts on biodiversity.

The primary measure to reduce impacts to biodiversity values within the study area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat, potential movement corridors for the Brolga. Potential disturbance to locally breeding Brolga should be considered and avoided. It is critical that these issues be considered during the design phase of the project, when key decisions are made about the location of infrastructure including sheds, access roads, parking areas, services and temporary material storage. The results of this assessment should therefore be incorporated into the project design, by adding the flora and fauna mapping information into the planning maps and investigating options to retain as much of the mapped vegetation/habitats as possible.

A summary of potential implications of development of the study area and recommendations to minimise impacts during the **design phase** of the project is provided in Table 6.

Table 6 Summary of key ecological values, potential implications of developing the study area and recommendations to minimise ecological impacts during the design phase.

Ecological feature (Figure 2)	Implications of development	Recommendations
Native vegetation	Remnant native vegetation is present in two locations near the southern boundary of the study area. These areas are mapped as EVC 125 Plains Grassy Wetland and correspond with the definition of the threatened ecological community Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.	All areas of EVC 125 Plains Grassy Wetland should be considered in the design process, to ensure there are no direct or indirect impacts.
Threatened species and ecological communities	Plains Grassy Wetland mapped within the study is a threatened ecological community (Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains) and provides potential habitat for several threatened species including Growling Grass Frog and the Brolga Movement corridor and home range of a local pair is likely to include the Plains Grassy Wetland and area between this wetland and a breeding wetland 860 metres to the north/north-west of the study area.	All areas of EVC 125 Plains Grassy Wetland should be considered in the design process, to ensure there are no direct or indirect impacts. Potential impacts on habitat for likely Brolga breeding home range movement corridor and disturbance to a local breeding pair should be considered in the design process, to ensure there are no direct or indirect impacts.

Construction and post-construction management

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan. This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

REFERENCES

Veltheim I, Cook S, Palmer GC, Hill FAR, & McCarthy MA 2019. 'Breeding home range movements of pre-fledged brolga chicks, *Antigone rubicunda* (Gruidae) in Victoria, Australia – Implications for wind farm planning and conservation', *Global Ecology and Conservation*, 20: e00703.

APPENDICES

Appendix A. Flora

The following abbreviations and symbols are relevant to this Appendix.

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (public land only)	
SP	State prohibited species	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	
R	Restricted species	
Other		
#	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

Appendix A.1. Flora species recorded from the study area

Table 7 Flora species recorded from the study area

Status	Scientific Name	Common Name
Indigenous species		
	Acacia melanoxylon	Blackwood
	Amphibromus spp.	Swamp Wallaby-grass
	Callitriche spp.	Water Starwort
	Casuarina spp.	Sheoak
	Cycnogeton procerum (broad erect leaf variant)	Common Water-ribbons
	Duma florulenta	Tangled Lignum
	Eleocharis acuta	Common Spike-sedge
	Epilobium hirtigerum	Hairy Willow-herb
	Eucalyptus camaldulensis	River Red-gum
	Eucalyptus leucoxylon	Yellow Gum
	Eucalyptus ovata	Swamp Gum
	Geranium spp.	Crane's Bill
	Juncus spp.	Rush
	Juncus subsecundus	Finger Rush
	Lachnagrostis filiformis s.l.	Common Blown-grass
	Lemna spp.	Duckweed
	Limosella australis	Austral Mudwort
	Lythrum hyssopifolia	Small Loosestrife
	Myriophyllum spp.	Water Milfoil
	Oxalis perennans	Grassland Wood-sorrel
	Poa labillardierei	Common Tussock-grass
	Stellaria angustifolia subsp. *Angustifolia*	Swamp Starwort
Non-indigenous (planted) native species		
v	*Corymbia maculata*	Spotted Gum
e, r	*Melaleuca armillaris* subsp. *Armillaris*	Giant Honey-myrtle
Introduced species		
	Arctotheca calendula	Cape Weed
	Australopyrum spp.	*Wheat Grass*
R	*Cirsium vulgare*	Spear Thistle
	Cupressus spp.	Cypress
	Cynosurus echinatus	Rough Dog's-tail
	Eucalyptus cladocalyx	Sugar Gum
	Hesperocyparis macrocarpa	Monterey Cypress
	Hordeum leporinum	Barley Grass
	Hypochaeris radicata	Flatweed
	Lolium perenne	Perennial Rye-grass
RC	*Lycium ferocissimum*	African Box-thorn
	Malva parviflora	Small-flower Mallow

Status	Scientific Name	Common Name
	Phalaris aquatica	Toowoomba Canary-grass
	Polygonum aviculare s.s.	Hogweed
	Romulea rosea	Onion Grass
	Rumex crispus	Curled Dock
R	*Silybum marianum*	Variegated Thistle
	Sonchus asper s.s.	Rough Sow-thistle
	Sonchus oleraceus	Common Sow-thistle
	Symphyotrichum subulatum	Aster-weed
	Trifolium spp.	Clover
	Ulmus spp.	Elm
	Urtica urens	Small Nettle

Appendix A.2. Listed flora species

The following table includes threatened flora species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 8 May 2023). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur. A proportion of the flora habitat descriptions have been reproduced with permission from the Royal Botanic Gardens Victoria (RBGV 2020).

Table 8 Threatened flora species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Amphibromus fluitans	River Swamp Wallaby-grass	VU			PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	**Low**	Limited suitable habitat.
Dianella amoena	Matted Flax-lily	EN	cr	2013	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	**Medium**	Potential habitat present. Recently recorded nearby.
Dodonaea procumbens	Trailing Hop-bush	VU			PMST	Sandy or clay soils in low-lying, winter-wet areas in grasslands, woodlands, and low-open forest.	**Low**	No suitable habitat or nearby records.
Glycine latrobeana	Clover Glycine	VU	v	2016	PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	**Medium**	Potential habitat present. Recently recorded nearby.
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	e		PMST	Low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions.	**Low**	No suitable habitat or nearby records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Lepidium aschersonii	Spiny Peppercress	VU	e		PMST	Heavy clay soils near salt lakes on the volcanic plains; disjunct records near Lake Omeo.	**Low**	No suitable habitat or nearby records.
Lepidium hyssopifolium	Basalt Pepper-cress	EN			PMST	Basalt plains grassland and woodland communities.	**Low**	No suitable habitat or nearby records.
Leucochrysum albicans subsp. Tricolor	White Sunray	EN	e		PMST	Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	**Low**	No suitable habitat or nearby records.
Pimelea spinescens subsp. Spinescens	Spiny Rice-flower	CR	cr		PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	**Low**	No suitable grassland habitat or nearby records.
Poa sallacustris	Salt-lake Tussock-grass	VU	cr		PMST	Grasslands and herblands on the sloping verges of saline lakes.	**Low**	No suitable habitat or nearby records.
Prasophyllum spicatum	Dense Leek-orchid	VU	cr		PMST	Heath and heathy woodlands.	**Low**	No suitable habitat or nearby records.
Pterostylis chlorogramma	Green-striped Greenhood	VU	e		PMST	Heathy woodland; more specific habitat requirements are poorly known.	**Low**	No suitable habitat or nearby records.
Rutidosis leptorhynchoides	Button Wrinklewort	EN	e		PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	**Low**	No suitable habitat or nearby records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Senecio macrocarpus	Large-headed Fireweed	VU	cr		PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or drought conditions in summer.	**Low**	No suitable habitat or nearby records.
Senecio psilocarpus	Swamp Fireweed	VU			PMST	Seasonally inundated herb-rich swamps, growing on peaty soils or volcanic clays.	**Low**	No suitable habitat or nearby records.
Thelymitra epipactoides	Metallic Sun-orchid	EN	e		PMST	Moist or dry sandy loams or loamy sands, primarily in coastal heaths, grasslands and woodlands, but also in similar communities at drier inland sites.	**Low**	No suitable habitat or nearby records.
Thelymitra matthewsii	Spiral Sun-orchid	VU	e		PMST	Typically on well-drained soils on slightly elevated sites, but also on coastal sandy flats. Often in open situations following disturbance.	**Low**	No suitable habitat or nearby records.
Xerochrysum palustre	Swamp Everlasting	VU	cr		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	**Low**	No suitable habitat or nearby records.
State significance								
Calotis anthemoides	Cut-leaf Burr-daisy		cr	2010		Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion.	**Low**	Limited suitable habitat and very few nearby records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Comesperma polygaloides	Small Milkwort		cr	2019		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	**Low**	No suitable habitat.
Coronidium gunnianum	Pale Swamp Everlasting		cr	2011		Widespread and sometimes locally common, particularly in high-rainfall areas of Victoria; often in moist sites in open forests and woodlands.	**Medium**	Some potential habitat and numerous records in similar locations to the south of the study area.
Cullen parvum	Small Scurf-pea		e	1973		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	**Low**	Limited suitable habitat and very few nearby records.
Lachnagrostis semibarbata var. filifolia	Purple Blown-grass		e	2011		Wet marshes and slightly saline swamps and depressions, on heavy soils away from the coast.	**Medium**	Some potential habitat and records in similar locations near the study area.
Lachnagrostis semibarbata var. semibarbata	Purple Blown-grass		e	2011		Wet marshes and slightly saline swamps and depressions in plains communities.	**Medium**	Some potential habitat and records in similar locations near the study area.
Melaleuca armillaris subsp. Armillaris	Giant Honey-myrtle		e	2008		Near coastal heath/scrub, rocky coast and foothill outcrops.	**n/a**	Any local specimens are planted.
Microseris scapigera s.s.	Plains Yam-daisy		cr	2013		Damp depressions in grasslands, woodlands, stream banks, alpine herbfields and around the margins of saline lakes and flats.	**Low**	Limited suitable habitat and very few nearby records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Tripogonella loliiformis	Rye Beetle-grass		e	2010		Dry sites in association with escarpments and rocky outcrops.	**Low**	No suitable habitat or nearby records.

Appendix A.3. Threatened ecological communities

The following table includes the threatened ecological communities that have potential to occur within the project area. The list of threatened ecological communities has been compiled with reference to characteristics of FFG Act threatened communities (SAC 2013) and predictive output from the PMST (accessed on 8 May 2023).

Table 9 Threatened ecological communities predicted to occur within 5 km of the project area.

Community Name	Conservation status	Source	Description
National significance			
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	PMST	Not present. No remnant woodlands present on the site.
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	PMST	Not present.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	PMST	Not present. No remnant woodlands present on the site.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	PMST	Present within the study area. Two areas of Plains Grassy Wetland mapped.
State significance			
Coastal Moonah (*Melaleuca lanceolata* subsp. *lanceolata*) Woodland Community	Threatened		Not present
Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04	Threatened		Not present

Appendix B. Fauna

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (fish only)	

Appendix B.1. Fauna species recorded from the study area

Table 10 Vertebrate fauna recorded from the study area (present assessment)

Status	Scientific Name	Common Name
Indigenous species		
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza nana	Yellow Thornbill
	Anthochaera carunculata	Red Wattlebird
	Chenonetta jubata	Australian Wood Duck
	Cisticola exilis	Golden-headed Cisticola
	Colluricincla harmonica	Grey Shrike-thrush
	Egretta novaehollandiae	White-faced Heron
	Falco cenchroides	Nankeen Kestrel
	Grallina cyanoleuca	Magpie-lark
	Poliocephalus poliocephalus	Hoary-headed Grebe
	Rhipidura leucophrys	Willie Wagtail
	Tadorna tadornoides	Australian Shelduck
	Vanellus miles	Masked Lapwing
	Macropus giganteus	Eastern Grey Kangaroo
	Limnodynastes tasmaniensis	Spotted Marsh Frog
	Litoria ewingii	Southern Brown Tree Frog
	Crinia signifera	Common Froglet
	Ctenotus spaldingi	Large Striped Skink
Introduced species		
	Alauda arvensis	Eurasian Skylark
	Vulpes vulpes	Red Fox

Appendix B.2. Listed fauna species

The following table includes a list of threatened fauna species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 8 May 2023). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur.

Table 11 Threatened fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Pedionomus torquatus	Plains-wanderer	CR	cr	1927	PMST	Native grassland with a sparse, open structure. Species extinct from much of historic range. Distribution within Victoria limited to northern arid grasslands.	**Negligible**	Study area is outside the species current range. Species extent within Victoria is limited to northern arid grasslands.
Rostratula australis	Australian Painted-snipe	EN	cr		PMST	Shallows of well-vegetated freshwater wetlands.	**Low**	No local records. Wetland habitat within the study area is either degraded, or has deep steep banks, unlikely to provide suitable foraging habitat.
Botaurus poiciloptilus	Australasian Bittern	EN	cr	1994	PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	**Low**	Wetland habitat within the study area is either degraded, or has deep steep banks, unlikely to provide suitable foraging habitat.
Falco hypoleucos	Grey Falcon	VU	v		PMST	Lightly timbered plains and Acacia scrub.	**Negligible**	Species is largely restricted to semi-arid inland regions. No local records.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Callocephalon fimbriatum	Gang-gang Cockatoo	EN			PMST	S Vic to E NSW. Forests and woodlands from coast to alpine areas. Autumn-winter dispersal from highlands to lower elevations. Forages in eucalypts, acacias, hawthorns and some exotic garden trees and shrubs.	**Low**	No local records. Minimal suitable foraging habitat is fragmented, low quality, and isolated in cleared landscape. No Hawthorn *Crataegus monogyna* recorded within the study area.
Neophema chrysostoma	Blue-winged Parrot	VU			PMST	A range of coastal, sub-coastal and semi-arid regions throughout south-eastern Australia. Favour heathy woodland for breeding, nests in tree hollows in coastal eucalypt forests and woodlands.	**Negligible**	No local records. No suitable coastal heathy woodland or semi-arid habitat within the study area. No hollow trees.
Lathamus discolor	Swift Parrot	CR	cr		PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas. Species nests exclusively in Tasmania.	**Low**	No local records. Minimal suitable foraging habitat is fragmented, low quality, and isolated in cleared landscape.
Hirundapus caudacutus	White-throated Needletail	VU	v		PMST	An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	**Medium**	Species is highly mobile and widely distributed across eastern Australia. Species is likely to fly over the study area occasionally.
Gallinago hardwickii	Latham's Snipe			-	PMST	A migrant to Australia from July to April occurring in a wide variety of permanent and ephemeral	**High**	Highly mobile wetland inhabitant. Potential wetland habitat, may also use drains and dam edges and areas of native and non-native vegetation when

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
						wetlands. Prefers open freshwater wetlands with nearby cover, but also recorded on the edges of creeks and rivers, river-pools and floodplains. Forages in soft mud at edge of wetlands and roosts in a variety of vegetation around wetlands including tussock grasslands, reeds and rushes, tea-tree scrub, woodlands and forests.		inundated. May forage in suitable habitats in the study area.
Numenius madagascariensis	Eastern Curlew	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, coastal lagoons and bays.	**Negligible**	No local records. Species is primarily coastal, unlikely to visit the study area. No suitable shallow wetland habitat.
Calidris ferruginea	Curlew Sandpiper	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Low**	No local records. Species is primarily coastal, unlikely to visit the study area. No suitable shallow wetland habitat.
Melanodryas cucullata	Hooded Robin	EN	v		PMST	Woodlands of eucalypt, Mallee, semi-cleared farmland with logs and woody debris.	**Negligible**	No local records. Minimal wooded habitat within the study area, negligible log and woody debris cover.
Aphelocephala leucopsis	Southern Whiteface	VU			PMST	Open forests and woodlands with a grassy and/or shrubby understorey.	**Negligible**	No local records. Minimal wooded habitat within the study area, negligible grassy and/or shrubby understorey.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Grantiella picta	Painted Honeyeater	VU	v		PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	**Negligible**	No local records. Minimal woodland and forest habitat. No mistletoes recorded within the study area.
Anthochaera phrygia	Regent Honeyeater	CR	cr		PMST	A range of dry woodlands and forests dominated by nectar-producing tree species. Species extinct from much of historic range. Distribution within Victoria limited to north-east.	**Negligible**	Species is widely considered extinct in Victoria other than in the north-east of the state. No suitable habitat or local records.
Stagonopleura guttata	Diamond Firetail	VU	v		PMST	Open forests and woodlands with a grassy ground layer.	**Negligible**	No local records. No suitable grassy woodland habitat.
Climacteris picumnus	Brown Treecreeper	VU			PMST	Often observed feeding on insects as it spirals up trees or when hopping along the ground or on fallen litter. Generally inhabits open eucalypt forests, woodlands and Mallee, often where there are stands of dead trees.	**Negligible**	No local records. No suitable wooded habitat or stands of dead trees within the study area.
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll	EN			PMST	Rainforest and wet and dry sclerophyll forests and woodlands.	**Negligible**	No local records. No suitable wooded habitat within the study area. Species unlikely to persist in cleared agricultural landscapes.
Antechinus minimus maritimus	Swamp Antechinus	VU	v		PMST	Dense wet heath and heathy woodland, sedgeland and dense tussock grassland.	**Negligible**	No local records. No suitable heathy or sedgeland habitat within the study area.
Perameles gunnii	Eastern Barred Bandicoot	EN	e	1949		Natural temperate grasslands and grassy woodlands. This species is considered extinct within the wild.	**Negligible**	No recent records. Species is considered extinct from the wild.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Petaurus australis	Yellow-bellied Glider	VU			PMST	Sclerophyll forest with large hollow-bearing trees, prefers mature eucalypt dominated forest and woodland. Distributed along South-eastern Australia.	**Negligible**	No local records. No suitable tall contiguous forest within the study area.
Potorous tridactylus trisulcatus	Long-nosed Potoroo	VU	v		PMST	Forest, heathy woodlands and heathlands.	**Negligible**	No local records. No suitable heathy woodland habitat.
Pseudomys novaehollandiae	New Holland Mouse	VU	e		PMST	Coastal heathland, heathy woodland and dry sclerophyll forest.	**Negligible**	No local records. No coastal heathy woodland habitat.
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	e		PMST	Heathland, shrubland, sedgeland, heathy open forest and woodland; also exotic vegetation, such as blackberry thickets and rank grasses where native vegetation has been removed.	**Negligible**	No local records. No suitable heathy woodland habitat. Species unlikely to persist in cleared agricultural landscapes.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	v		PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas. Forms large colonies in tall dense tree canopies, often at population centres.	**Medium**	Study area is approximately 20 kilometres from active category 2-3 camp at Colac botanic gardens. Species may occasionally forage in flowering Sugar gums planted on the east and west borders of the study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Miniopterus orianae bassanii	Southern Bent-winged Bat (southern ssp.)	CR	cr		PMST	Woodlands, grasslands, pasture especially near wetlands. Roosts in caves, crevices in cliff faces and in mines.	**Medium**	No local records. No suitable roosting habitat within the study area. Individuals may occasionally forage over wetlands and adjacent grassland and pasture habitat.
Delma impar	Striped Legless Lizard	VU	e	2008	PMST	Natural temperate grassland, grassy woodland and exotic grassland. Often associated with surface rocks and cracking clay soils as shelter.	**Low**	Grassland habitat within majority of the study area is significantly disturbed by heavy grazing and rock removal. Grassland in south-east fenced section is unlikely to provide suitable habitat due to: seasonal flooding, extremely dense 'choaked' grass structure, no rock cover, and Red gums shading grassland and providing perches for predatory birds.
Lissolepis coventryi	Swamp Skink	EN	e		PMST	Densely vegetated swamps and associated watercourses, and adjacent wet heaths, sedgelands and saltmarshes.	**Low**	No local records. No suitable vegetated swamp or saltmarsh habitat.
Eulamprus tympanum marnieae	Corangamite Water Skink	EN	e		PMST	Basalt rock outcrops and stonewalls associated with remnant vegetation and adjacent to permanent or ephemeral wetlands.	**Low**	No local records. Study area is outside the known distribution of the species. Negligible rocky wetland habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Litoria raniformis major	Growling Grass Frog	VU	v	2017	PMST	Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	**Medium**	Several recent local records. High quality mapped wetland and surrounding vegetation in fenced south-east corner of study area contains potentially suitable habitat for foraging and breeding.
Prototroctes maraena	Australian Grayling	VU	e		PMST	Adults inhabit cool, clear, freshwater streams.	**Negligible**	No local records. No stream habitat within the study area.
Galaxiella pusilla	Dwarf Galaxias	VU	e		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	**Negligible**	No local records. Study area is outside of the species known range. Distribution within Victoria is limited to waterways around Portland, and east of Melbourne.
Nannoperca obscura	Yarra Pygmy Perch	VU	v		PMST	Lakes, pools and slow-flowing streams with abundant aquatic vegetation.	**Low**	No local records. Minimal suitable wetland habitat within the study area is restricted to small dams and ephemeral drainage lines.
Synemon plana	Golden Sun Moth	VU	v	2017	PMST	Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean needle grass.	**Low**	Grassland habitat within the study area is severely degraded, and lacks suitable cover of required feed grasses.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
State significance								
Antigone rubicunda	Brolga		e	2021		Shallow freshwater and brackish wetlands, crops, grassland and pasture.	**High**	Local recent records, including breeding records within 200 metres of study area. Some suitable foraging habitat in mapped high quality wetland in fenced south-east corner of study area. Plains Grassy Wetland habitat provides suitable foraging and roosting habitat, andcould potentially or occasionally support nesting. The wetland may be within breeding home range of a known breeding site within 860 metres.
Spatula rhynchotis	Australasian Shoveler		v	2010		Variety of wetlands, with a preference for large, permanent, freshwater lakes/swamps with dense fringing vegetation.	**Low**	Minimal suitable wetland habitat. Species prefers large densely vegetated swamp habitat.
Accipiter novaehollandiae	Grey Goshawk		e	2014		Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	**Low**	Species is rarely recorded within the region. No wet forest habitat. Species may occasionally pass through the study area, but is unlikely to inhabit it.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Falco subniger	Black Falcon		cr	2010		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks. Mostly hunts over open plains and undulating land with large tracts of low vegetation. Primarily occurs in arid and semi-arid zones in the north, north-west and west of Victoria, though can be forced into more coastal areas by droughts and subsequent food shortages.	**Medium**	Several records throughout the region. Species may hunt over the study area occasionally, but is unlikely to nest due to minimal tree cover.
Gelochelidon macrotarsa	Australian Gull-billed Tern		e	1986		Floodplains, saltmarsh, claypans and flooded pasture.	**Low**	No recent local records. Species may occasionally pass through the study area, or forage within flooded pasture, but is unlikely to inhabit it.
Actitis hypoleucos	Common Sandpiper		v		PMST	Migrates to Australia from Eurasia in August where it inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	**Negligible**	No local records. No suitable wetlands with muddy margins.
Tringa nebularia	Common Greenshank		e		PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands with shallow margins.	**Low**	No local records. No suitable shallow marshy wetland habitat.
Ornithorhynchus anatinus	Platypus		v	1994		A variety of freshwater waterbodies, particularly those with stable banks suitable for burrows, and shallow waters for foraging.	**Negligible**	No suitable wetland or waterway habitat within the study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Pseudemoia pagenstecheri	Tussock Skink		e	2008		On the ground in a range of grasslands or sparse grassy woodlands from alps to coast.	**High**	Recent local records. Some potentially suitable grassland habitat in ungrazed, fenced south-east corner of property.
Engaeus sericatus	Hairy Burrowing Crayfish		v	2008		Burrows are connected to the water table, typically adjacent to creeks or on floodplains. Although it is widespread in Victoria, most records are found in an area extending from the Otways, west to Port Fairy and north to Ballarat.	**Medium**	No burrowing crayfish burrows observed within the study area, however, study area contains some suitable wetland habitat surrounding mapped high quality wetland in fenced south-east corner of property. Unlikely to inhabit areas of grazed rocky pasture.

Appendix B.3. Migratory species (EPBC Act listed)

Table 12 Migratory fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Most recent record
Migratory species		
Gallinago hardwickii	Latham's Snipe	PMST
Hirundapus caudacutus	White-throated Needletail	PMST
Apus pacificus	Fork-tailed Swift	PMST
Pandion haliaetus	Osprey	PMST
Numenius madagascariensis	Eastern Curlew	PMST
Actitis hypoleucos	Common Sandpiper	PMST
Tringa nebularia	Common Greenshank	PMST
Calidris ferruginea	Curlew Sandpiper	PMST
Calidris acuminata	Sharp-tailed Sandpiper	PMST
Calidris melanotos	Pectoral Sandpiper	PMST
Motacilla flava	Yellow Wagtail	PMST
Rhipidura rufifrons	Rufous Fantail	PMST
Myiagra cyanoleuca	Satin Flycatcher	PMST

Appendix C. Photos of the study area

Photo 1 Exotic pasture grasses cover most of the study area.

Photo 2 Revegetation along the eastern boundary of the study area.

Photo 3 **Dam and surrounding area of native vegetation (Plains Grassy Wetland EVC) in the south-eastern corner of the study area.**

Photo 4 **Example of potential Brolga breeding habitat in the Plains Grassy Wetland vegetation.**

Photo 5 Basalt rocky rise (rock outcrops) in the western paddock.

Appendix D. Addendum to 320 Mooleric Road, Birregurra flora and fauna assessment report: Letter addressing council comments

12 October 2023

[redacted]

Dear Fernando

Addendum to 320 Mooleric Road, Birregurra flora and fauna assessment report: Letter addressing council comments.

Project number: 38562

Biosis Pty Ltd (Biosis) provided Spirecom Pty Ltd (Spirecom) with a draft report on 15 June 2023, detailing the findings of a flora and fauna assessment (FFA) of the site of a proposed poultry farm in Ombursley, Victoria. The report was submitted by Spirecom to Colac Otway Shire (Council) who have subsequently requested additional information. The additional information is addressed in the following letter and will be attached to the final version of the FFA report as an addendum.

This letter also details the ecological values present within the government road reserve to the north of the initial footprint that will be used for accessing the poultry farm site. This area was not included in the initial study area. No detailed impact or construction footprints have been provided for the road reserve, meaning that vegetation loss cannot be calculated for this area at this stage.

Colac Otway Shire request for further information

Potential impacts to surrounding wetlands and waterways

According to the works footprint provided by Spirecom (dated 16 June 2023), native vegetation will not be directly impacted for the construction of the poultry farm (Figure 1 and Figure 2, Appendix A). However, indirect impacts to surrounding wetland, waterways and the flora and fauna they support may still occur during the construction and operation of the poultry farm.

Several streams and wetlands that occur within and adjacent to the study area feed into the Birregurra Creek. Indirect impacts to streams and wetlands can occur during construction when adequate protections against erosion and sedimentation are not implemented (see Appendix E for suggested mitigation measures).

Minimisation and (where possible) avoidance of risks to waterways and wetlands surrounding the poultry farm should extend beyond construction to the daily operation of the poultry farm. For example, risks of the water retarding basin overflowing into adjacent areas should be minimised to ensure this does not impact surrounding wetlands and waterways.

Table 1 presents some of the key legislation relevant to waterways and the implications of proposed impacts.

Table 1 **Key legislation and policy considerations for the waterways and wetlands surrounding the proposed poultry farm**

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
State legislation			
Water Act 1989	Creeks, streams and wetlands that flow into the Birregurra Creek.	Referral to relevant Catchment Management Authority (CMA) for a works on waterways permit if any works are proposed to directly impact streams, creeks and wetlands.	Only indirect impacts are likely to occur because of construction and operation of the poultry farm. However, Spirecom should consult the relevant CMA to determine the need for a permit to undertake the proposed works.
Fisheries Act 1995	Protected aquatic biota may be impacted if in stream or bank works are proposed within or in proximity to streams or wetlands that flow into the Birregurra Creek.	Provided appropriate mitigation actions are taken, a permit is unlikely to be required.	Direct impacts to Birregurra Creek are not likely to occur during construction and operation of the poultry farm.
Environment Protection Act 2017	Instream and riparian habitats of Birregurra Creek and the wetlands and waterways that flow into it.	The project works must comply with the *Environment Protection Act 2017* (EP Act), Environment Protection Regulations 2021 and Environment Reference Standards (ERS). Specifically, the project manager must comply with the General Environmental Duty (GED) under the EP Act including: Clause 42 – Construction activities and Clause 45 – Native vegetation protection and rehabilitation.	Impacts to surface water quality because of the project must not result in changes that exceed background levels and/or the water quality objectives to protect surface water uses and values. To ensure that direct and indirect (e.g. runoff) impacts to surface water quality do not exceed the background levels and/or water quality objectives, it is recommended that Spirecom engage with the Environment Protection Authority (EPA) and prepare and implement a site-specific Construction Environmental Management Plan (CEMP), which includes all EPA approved erosion control measures. These temporary control measures should be inspected during rainfall events to ensure controls are able to prevent/minimise offsite discharges and long-term impacts. Sediment control measures selected should also reflect the level of protection required to protect the ecological values within and surrounding the study area. Suggested mitigation measures are provided in Appendix E.

Impacts to Brolga *Antigone rubicunda*

The flora and fauna assessment (FFA) report has been updated to reflect community feedback regarding the utilisation of nearby wetlands for breeding by Brolga *Antigone rubicunda* (listed as endangered under the *Flora and Fauna Guarantee Act 1988;* FFG Act). These changes include:

- Updating the likelihood of occurrence from medium to high.
- Updating wording in the likelihoods table in Appendix A of the FFA report and habitat values in Table 2 of the FFA report.
- Section 3.1, Section 3.4, Section 6 Table 2, Table 3, Table 4 – added information on the habitat suitability and potential use.

VBA database shows numerous breeding and non-breeding records in the area between Mooleric Road, Ondit Road West and Prices Lane, which has a number of wetlands and wet depressions throughout. The nearest breeding wetland is within 200 metres of the study area. Local records suggest that at least two pairs could regularly be present in the area.

The Plains Grassy Wetland is within potential breeding home range of the nearest known breeding site and could be used by a pair and their chicks for foraging, roosting and potentially nesting. It is uncertain how regularly the wetland in the study area would be used by Brolgas given the presence of a quarry to the west and possible disturbance from its operations. Pairs nesting within 2 kilometres of the Plains Grassy Wetland could potentially move through the study area and may move between it and the known breeding wetland 200 metres north if the study area boundary.

While the construction and operation of a poultry farm could disturb breeding activity of the Brolga, and may exclude or reduce activity of Brolgas within the study area, this is likely to affect one or two pairs, based on the known breeding sites and activity of the species locally. The proposed poultry farm is unlikely to result in a significant impact to the population, however, potential impacts to local pairs could be avoided and minimised through implementing disturbance buffers around the wetlands and the likely movement corridor. The wetland habitat in the study area will not be impacted as it is outside of the development footprint.

Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (the 'Guidelines')

The steps that have been taken during the design of the development to ensure that impacts on biodiversity from the removal of native vegetation have been avoided and minimised include:

- Avoiding direct impacts to all native vegetation mapped within the proposed poultry farm footprint.
- Locating temporary site storage and compounds on existing disturbed land (away from any patches of native vegetation) to minimise impacts to native vegetation.

All planning permit applications to remove native vegetation are assigned to an assessment pathway determined by the extent and location of proposed native vegetation removal. The assessment pathway will dictate the information to be provided in a planning permit application and the decision guidelines the responsible authority (e.g. Council) and/or DEECA as a referral authority will use to assess the permit application.

Proposed removal of native vegetation

Following submission of the draft FFA report on 15 June 2023, Spirecom have provided Biosis with a proposed impact footprint of the development. No native vegetation is proposed to be removed for the construction of the poultry farm in this masterplan (Figure 2, Appendix A). If the impact footprint changes and impacts are proposed to any native vegetation, a Guidelines assessment will need to be undertaken and vegetation losses and offset requirements calculated.

An impact footprint has not yet been provided for the unnamed government road in the north of the study area (see Figure 2). Once this impact footprint has been provided, the proposed losses to native vegetation can be calculated. If native vegetation is proposed for removal, a planning permit will be required under Clause 52.17 of the Colac Otway Planning Scheme.

Further survey requirements

Threatened flora

Four threatened flora species are also considered to have a medium or higher likelihood of occurring within the study area:

- Matted Flax-lily *Dianella amoena* (EPBC Act: Endangered; FFG Act; Critically endangered)
- Clover Glycine *Glycine clandestina* (EPBC Act: Vulnerable; FFG Act; Vulnerable)
- Pale Swamp Everlasting *Coronidium gunnianum* (FFG Act; Critically endangered)
- Purple Blown-grass *Lachnagrostis semibarbata* var. *filifolia* (FFG Act; Endangered)
- Purple Blown-grass *Lachnagrostis semibarbata* var. *semibarbata* (FFG Act; Endangered)

Suitable habitat for these species is limited to areas of Plains Grassy Wetland Ecological Vegetation Class (EVC) 125. As shown in Figure 2, the current masterplan (Dated 16 June 2023) does not propose to impact this vegetation and, as a result, is not considered to constitute a significant impact on any of these species.

The Plains Grassy Wetland EVC 125 vegetation within the unnamed road reserve is unlikely to support threatened flora species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or FFG Act due to disturbance from cattle and vehicle access.

Threatened fauna

As discussed in the FFA report, five threatened fauna species are considered to have a medium or higher likelihood of occurring within the study area:

- Growling Grass Frog *Litoria raniformis* (*Environment Protection and Biodiversity Conservation* Act (EPBC Act): Vulnerable; FFG Act; Vulnerable)
- Brolga *Antigone rubicunda* (FFG Act; Endangered) (discussed above)
- Black Falcon *Falco subniger* (FFG Act; Critically endangered)
- Tussock Skink *Pseudemoia pagenstecheri* (FFG Act; Endangered)
- Hairy Burrowing Crayfish *Engaeus sericatus* (FFG Act; Vulnerable)

The EPBC Act Migratory listed species Latham's Snipe *Gallinago hardwickii* may also occur.

As with the flora, additional surveys are only recommended if impacts are proposed within areas of Plains Grassy Wetland EVC 125 within the poultry farm footprint (no impacts currently proposed). Additional targeted surveys for these species are not recommended unless the development footprint is altered, and impacts are proposed in areas of Plains Grassy Wetland EVC 125 (Figure 2).

While Growling Grass Frogs may utilise the site as a dispersal corridor between patches of more suitable habitat, the development is unlikely to result in a significant impact to the species as it will not completely remove movement corridors within the study area.

The unnamed road reserve may provide suitable habitat for Striped Legless Lizard *Delmar impar.* As a result, targeted surveys are currently being undertaken. The results of these surveys will be available in early 2024.

Qualifications

As discussed in the main FFA report, the assessment of the poultry farm was undertaken in autumn which is not an optimal time to survey for many of the threatened species that are assessed as having a medium or higher likelihood of occurrence within the poultry farm footprint. However, the high level of disturbance to vegetation in the paddock was clear and it is therefore unlikely that any threatened flora species that require seasonal surveys are present within the impact footprint. If the impact footprint changes and extends to the patches of Plains Grassy Wetland, the survey will not have been adequate to determine whether any of the threatened species listed above are present.

As none of these species are likely to occur within the construction footprint, the current survey is adequate.

Extension of the study area to include the unnamed government road

The FFA report does not present the ecological values within the unnamed government road that occurs to the north - northwest of the proposed poultry farm. This area was surveyed as part of an assessment for the proposed water pipeline that will connect the poultry farm to the Birregurra township (submitted to Spirecom on 3 August 2023 (Biosis Pty Ltd 2023)). Council has since requested the results of the assessment are included in this addendum. The area will be used for vehicle access for the purpose of the poultry farm and installation of the proposed pipeline.

In addition, Council raised concerns regarding the native vegetation mapping within the road reserve. The unnamed road reserve has since been re-surveyed and the following results updated accordingly.

Field assessment methods

The unnamed road reserve was assessed on 5 July 2023 by Hayley Sime (Botanist) and Danielle Eastick (Zoologist). The road reserve was flooded along the northern boundary during the initial assessment making it difficult to assess the presence of native vegetation.

After receiving information from Council regarding the presence of significant native vegetation in the unnamed road reserve (driven by the presence of Common Tussock-grass *Poa labillardierei*) the road reserve was assessed again on 25 September 2023 by Hayley Sime in more favourable conditions for plant identification. Photos are provided in Appendix B and a list of flora and fauna species recorded is provided in Appendix C and Appendix D respectively.

Flora and fauna habitat

The unnamed government road to the north of the proposed poultry farm supports several small patches of Plains Grassy EVC 125. Beyond the mapped patches of Plains Grassy Wetland EVC 125, native vegetation is scattered throughout a largely disturbed area that supports predominantly introduced vegetation such as Toowoomba Canary-grass *Phalaris aquatica*. The soils are black, cracking clays with some surface and embedded rocks.

Tussock grasses (such as Common Tussock-grass *Poa labillardierei*) are sparse and appear to have been heavily grazed throughout the road reserve. Despite the relatively low cover of tussock grasses, the site is considered potentially suitable habitat for Striped Legless Lizard *Delma impar* because the property to the north supports moderate quality habitat with large tussock grasses, surface rocks and inter-tussock spaces. The surface rocks within the road reserve may be utilised by Striped Legless Lizards that could move in from the more suitable habitat to the north. Additionally, Striped Legless Lizards have been recorded in roadsides dominated by Toowoomba Canary-grass in western Victoria. Targeted surveys for Striped Legless Lizard are currently being undertaken within the road reserve.

No threatened flora were recorded within the study area during the assessment, and the high level of disturbance (evident through cattle pugging and grazing) means it is unlikely that any threatened flora species persist within the patches of wetland vegetation.

The habitat zones within the unnamed road reserve were assessed for the presence of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (Seasonal Herbaceous Wetlands; threatened ecological community listed under the EPBC Act). Several key species of this threatened community such as Common Spike-sedge *Eleocharis acuta,* Prickfoot *Eryngium vesiculosum* and Small Loosestrife *Lythrum hyssopifolia* were recorded within habitat zone 22 (Figure 1, Appendix A) at a high enough cover to qualify as Seasonal Herbaceous Wetlands. While habitat zone 22 meets the condition thresholds for Seasonal Herbaceous Wetlands, the size threshold is not met (both individually and collectively). Habitat zones 23 and 24 do not support any native forb species and therefore do not meet the size or condition thresholds to be considered Seasonal Herbaceous Wetlands.

Polygons have been mapped around most areas where Common Tussock-grass occurs as scattered individuals outside of the mapped patches of native vegetation. These areas were mapped due to the importance of the species within the landscape and to maximise the opportunities for avoiding impacts to the species.

Brolga and Latham's Snipe may occasionally utilise the area for foraging when it is inundated, with most likely use in areas with native vegetation.

Recommendations

The ecological values identified in the unnamed road reserve and proposed poultry farm footprint need to be considered during the design, construction and post construction phase of the project. The following recommendations should be considered by Spirecom to avoid and minimise the impacts of this development to native vegetation:

- Create and incorporate a site-specific Construction Environmental Management Plan (CEMP) which addresses environmental inductions for contractors, vegetation retention and management, installation of temporary fencing/signage, drainage and sediment control and management/enhancement of retained threatened species habitats.

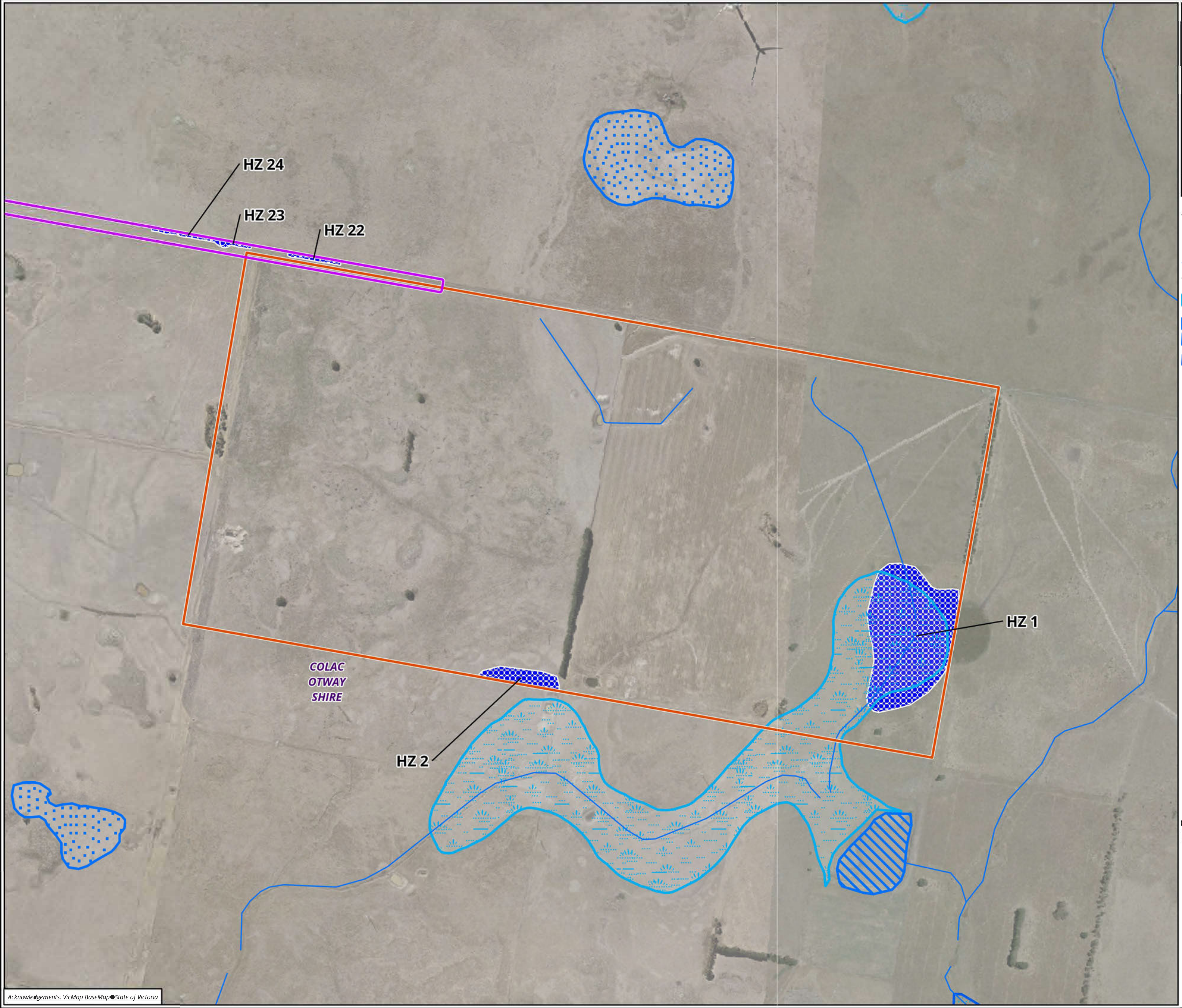
- Adopt similar practices during the operation of the poultry farm to ensure ongoing impacts to surrounding wetlands are minimised.
- Incorporate the native vegetation and polygon mapping within the unnamed government road reserve into the design of the access road to avoid impacting most of the wetland vegetation and Common Tussock-grass within the reserve.

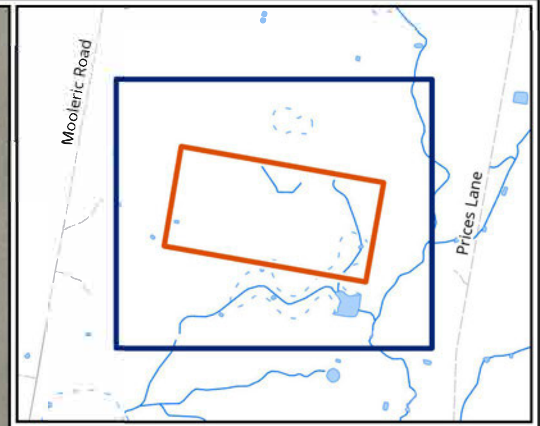
Yours sincerely

Hayley Sime

Hayley Sime
Botanist

Appendix A. Updated / additional figures





Legend

- Study area
- Unnamed road reserve
- River, creek

Wetlands (DEECA)

- 2 - Freshwater meadow
- 3 - Shallow freshwater marsh
- 5 - Permanent open freshwater
- 99 - No Category

Retained Vegetation

Ecological vegetation classes (EVCs)

- 125 Plains Grassy Wetland

Figure 1.0 Impacts to vegetation

0 100 200 300 400

Metres

Scale: 1:7,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 38562,
Date: 02 October 2023,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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Project: P:\38500s\38562\Mapping\
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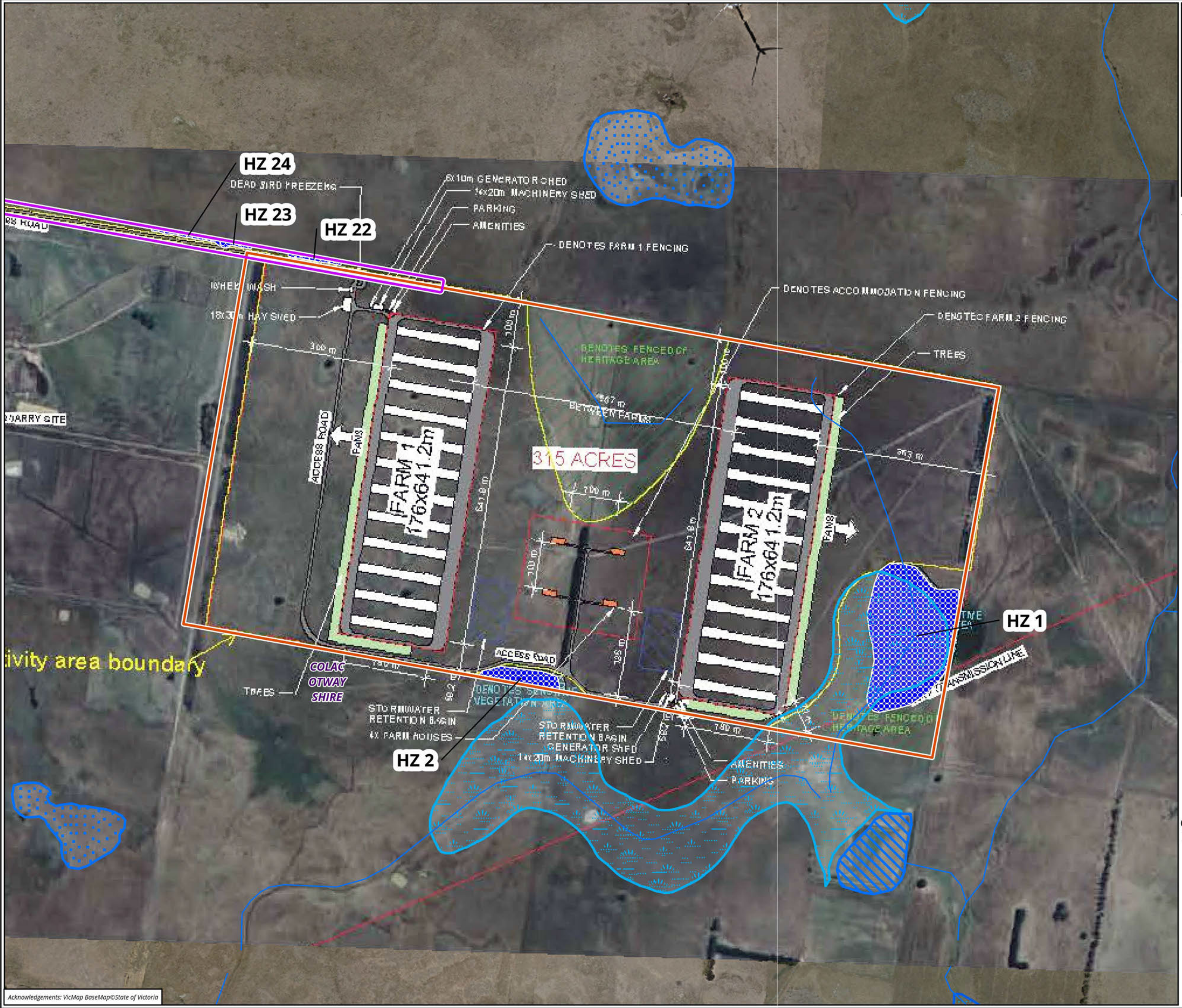

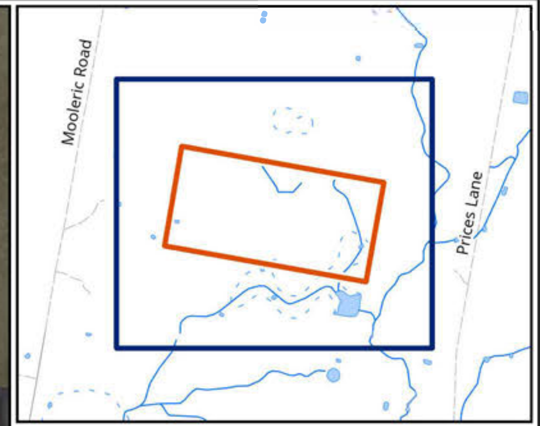

Legend

- Study area
- Unnamed road reserve study area
- River, creek

Wetlands (DEECA)

- 2 - Freshwater meadow
- 3 - Shallow freshwater marsh
- 5 - Permanent open freshwater
- 99 - No Category

Retained vegetation

Ecological vegetation classes (EVCs)

- 125 Plains Grassy Wetland

Figure 2.0 Impacts to vegetation.

0 100 200 300 400

Metres

Scale: 1:7,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 38562,
Date: 02 October 2023,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 38562_F4b_Impacts_unnamed_road_plan
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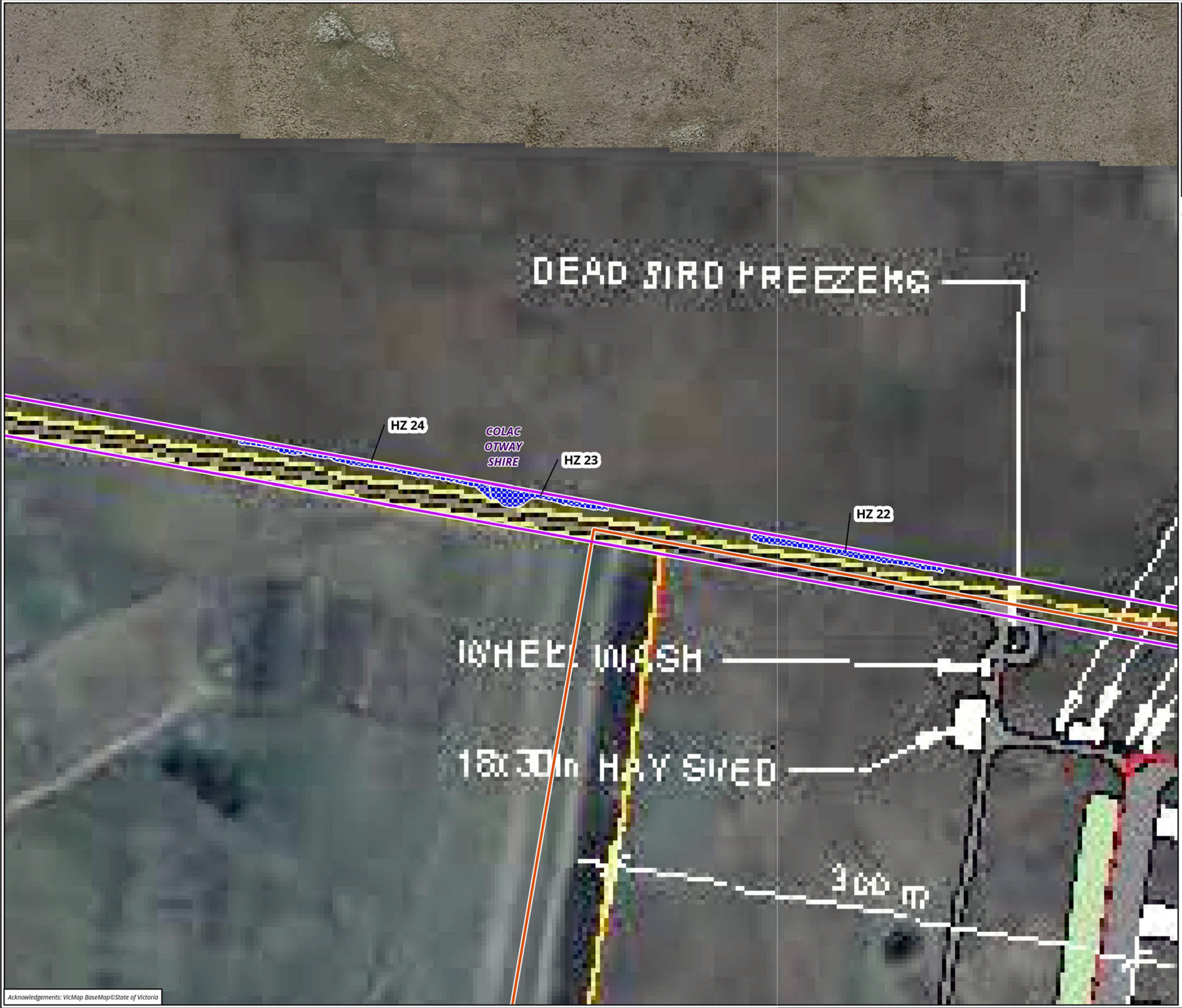
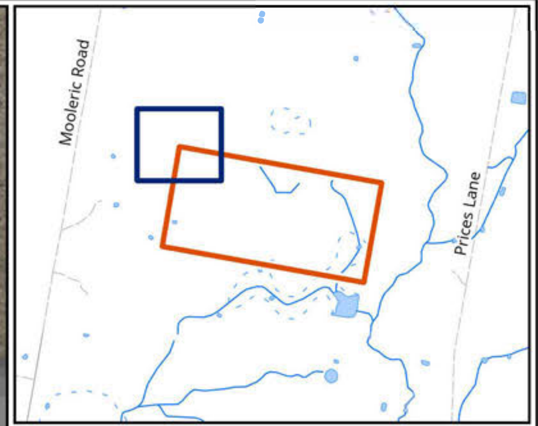




Legend

- Study area
- Unnamed road reserve study area

Ecological vegetation classes (EVCs)

- 125 Plains Grassy Wetland

Figure 2.1 Impacts to vegetation

0 25 50 75 100
Metres
Scale: 1:2,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

N

biosis.

Matter: 38562,
Date: 02 October 2023,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 38562_F4b_Impacts_unnamed_road_plan
Project: P:\38500s\38562\Mapping\
38562_OmbersleyPoultryFFA.aprx

Appendix B. Photos of the unnamed road reserve

Photo 1 **Example of Plains Grassy Wetland EVC 125 recorded within the unnamed road reserve. Photo taken facing northwest on 25 September 2023.**

Photo 2 **Majority of the southern half of the unnamed road reserve is highly disturbed and dominated by introduced species. Photo taken facing southwest on 25 September 2023.**

Photo 3 **Example of scattered and grazed Common Tussock-grass that occurs through the unnamed road reserve but is predominantly restricted to the northern boundary. Photo taken facing northwest on 25 September 2023.**

Photo 4 **Large surface rocks occur along the northern boundary of the unnamed road reserve. Photo taken facing east on 25 September 2023.**

Photo 5 **Illustration of the higher quality habitat found in the adjacent property to the north of the unnamed road reserve. Higher grazing pressure may have reduced the cover of Common Tussock-grass in the unnamed road reserve. Photo taken facing east on 25 September 2023.**

Photo 6 **The unnamed road reserve has been degraded due to vehicle access and cattle pugging the soil. Photo taken facing east on 25 September 2023.**

Photo 7 **Scattered native vegetation within the unnamed road reserve that does not meet the definition of a patch. Photo taken facing west on 25 September 2023.**

Appendix C. Flora species list from the unnamed road reserve

The following abbreviations and symbols are relevant to this Appendix.

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (public land only)	
SP	State prohibited species	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	
R	Restricted species	
Other		
#	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

Appendix C.1. Flora species recorded from the study area

Table 2 Flora species recorded from the study area

Status	Scientific Name	Common Name
Indigenous species		
	Austrostipa spp.	Spear Grass
	Poa labillardierei var. (Volcanic Plains)	Basalt Tussock-grass
P	*Calocephalus citreus*	Lemon Beauty-heads
	Carex spp.	Sedge
	Drosera hookeri	Branched sundew
	Juncus spp.	Rush
	Rytidosperma spp.	Wallaby Grass
Introduced species		
	Arctotheca calendula	Cape Weed
	Centaurium erythraea	Common Centaury
RC	*Cynara cardunculus* subsp. *flavescens*	Artichoke Thistle
	Cynodon dactylon	Couch
	Hypochaeris glabra	Smooth Cat's-ear
	Lactuca serriola	Prickly Lettuce
RC	*Lycium ferocissimum*	African Box-thorn
R	*Nassella neesiana*	Chilean Needle-grass
R	*Oxalis pes-caprae*	Soursob
	Paspalum distichum	Water Couch
	Phalaris aquatica	Toowoomba Canary-grass
	Plantago coronopus	Buck's-horn Plantain
	Plantago lanceolata	Ribwort
	Romulea rosea	Onion Grass
RC	*Rosa rubiginosa*	Sweet Briar
	Sanguisorba minor	Salad Burnet
R	*Verbascum thapsus* subsp. *thapsus*	Great Mullein
	Vicia sativa subsp. *cordata*	Common Vetch

Appendix D. Fauna species list from the unnamed road reserve

following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (fish only)	

Appendix D.1. Fauna species recorded from the study area

Table 3 Vertebrate fauna recorded from the study area (present assessment)

Status	Scientific name	Common name
Indigenous species		
	Accipiter novaehollandiae	Grey Goshawk
	Anthochaera carunculata	Red Wattlebird
	Anthus novaeseelandiae	Australasian Pipit
EN, e	*Callocephalon fimbriatum*	Gang-gang Cockatoo
	Cracticus tibicen	Australian Magpie
	Crinia signifera	Common Froglet
	Falco cenchroides	Nankeen Kestrel
	Macropus giganteus	Eastern Grey Kangaroo
	Ocyphaps lophotes	Crested Pigeon
	Ptilotula penicillata	White-plumed Honeyeater
	Rhipidura leucophrys	Willie Wagtail
Introduced species		
	Alauda arvensis	European Skylark
	Carduelis carduelis	European Goldfinch

Appendix E. Suggested mitigation measures

Construction and post construction management

Specific detail relating to preventing impacts on retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan (CEMP). This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

Recommendations to be considered prior to and during the construction phase are summarised in Table 4.

Table 4 Suggested mitigation measures to be considered prior to and during the construction phase and included in the project CEMP

Actions		Timing	Responsibility
Construction Environmental Management Plan	CEMP to be prepared.	Prior to construction.	Spirecom and/or construction contractor
Stockpiles and laydown areas	All material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing, and not in areas of retained native vegetation.	Prior to and during construction.	Spirecom and/or construction contractor
Soil erosion/ sedimentation	Dust suppression measures should be implemented during construction. Implementation of temporary stormwater controls during construction is necessary to ensure that discharges and drainage channels are consistent with existing conditions. Particular attention needs to be given to potential indirect impacts on streams and wetlands within and adjacent to the study area that flow into Birregurra Creek.	Prior to construction, during construction and ongoing operation of the farm.	Spirecom and/or construction contractor
Weed control on site	Where practicable all fill, soil or rocks transported on site should be weed and pathogen free and all vehicles operating on site should be washed down prior to works commencing.	During construction and ongoing operation of the farm.	Spirecom and/or construction contractor

Table 6 Estimated Traffic Generation per Production Year (PER SITE)

Activity	Vehicle Type	Vehicles (One Way Vehicle Trips) PER ANNUM, PER SITE
Heavy Vehicles		
Delivery of shed bedding material – Free Range sheds	Twin axle rigid truck	110
Delivery of chicks	Twin axle rigid truck	67
Delivery of feed- Free Range sheds	Semi-trailer	416
Delivery of gas (LPG)	Rigid tanker	32
Broiler pick up	Semi-trailer	875
Removal of shed litter material	Semi-trailer	165
Removal of dead birds	Twin axle rigid truck	11
	Heavy Vehicle Sub-Total	**1679**
Light Vehicles		
Staff visits and catching crew	Car	730
Tradesman	Ute/Van	58
Maintenance	Van	26
Shed litter material removal contractors	Car	93
Shed wash down contractors	Car	187
	Light Vehicle Sub-Total	**1094**
	TOTAL	**2773**

6.0 Conclusion

This assessment of the traffic issues for the construction of the Proposed Birregurra Farm at Government Road
Birregurra, VIC, 3242, has concluded the following:

- The farm will generate a maximum demand of approximately 3 staff vehicles and 5 trucks per day during operational phase.
- The main access point is off the Government Road.
- All the above-mentioned roads in Table 4.1 can absorb the additional vehicles in the peak hour.
- Vehicles departing the site are expected to experience no delays.

As per the data contained herewith regarding traffic movements provided, we request that the Shire should Take the details herewith supplied into consideration that there are no traffic related reasons why a planning permit for the Birregurra Farm should not be issued.

Technical Memorandum

12 March 2024

To	Fernando Ferreira, Spirecom	**Email**	[redacted]
Copy to	Corangamite CMA Colac-Otway Shire Council	**Email**	
From	Ashley Roberts & Emma Mackenzie	**Project No.**	12629222
Project Name	Birregurra Broiler Farm - Stormwater Management Plan		
Subject	Existing Conditions Flood Assessment		

1. Introduction

1.1 Purpose of this Memorandum

The purpose of this Memorandum is to document the analysis undertaken to establish a robust understanding of the current or base case flood conditions at the Birregurra site – 320 Mooleric Road, Ombersley, VIC 3241.

1.2 Scope and limitations

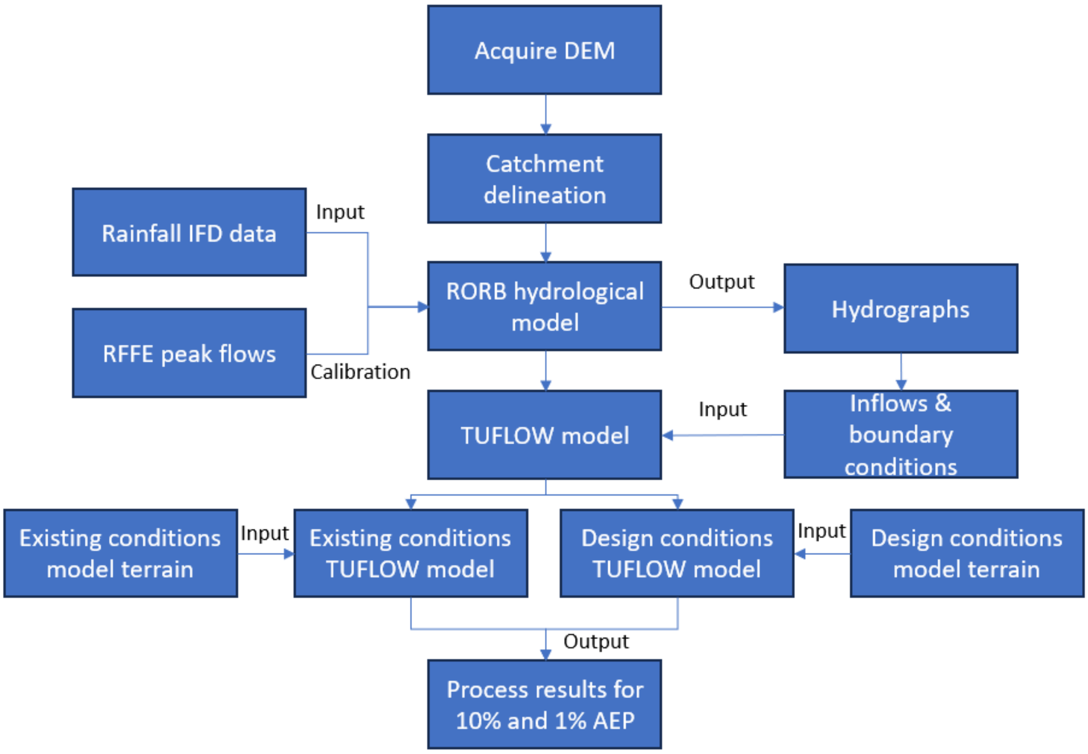
This technical memorandum has been prepared by GHD for ProTen Pty Ltd. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

Accessibility of documents

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

1.3 Methodology

We have undertaken this assessment of the current flood conditions in accordance with Australian Rainfall & Runoff 2019. An overview of our approach and its various components is shown below.



1.3.1 Hydrological Model

Hydrological modelling was undertaken using RORB to get estimates of the flow hydrographs for the 10% and 1% AEP events for multiple storm durations and temporal patterns:

- Entering the site from the upstream catchment
- Within the site, due to excess rainfall

Flow hydrographs are extracted for each storm duration and temporal pattern. The maximum of median flows was determined for each of the AEP's and compared with peak flows of the Regional Flood Frequency Estimation (RFFE) model as a sensibility check. Comparison of results at an upstream location show good alignment, as shown below:

AEP	RFFE (m^3/s)	RORB (m^3/s)
10%	2.68	2.40
1%	6.11	6.22

1.3.2 Hydraulic Model

The existing conditions TUFLOW hydraulic model was developed based on the ARR 2019 guidelines. It covers an area of approximately 440 ha and includes the project site extending another 500 m to the north, west and east and more than 800 m south of the site under investigation.

The following key inputs were provided to enable the TUFLOW model build:

- Model terrain: 1m site survey (110 ha) and 5m broader DEM based on LiDAR for the remaining modelled area
- Inflows: RORB output hydrographs for the 10% and 1% AEPs applied to TUFLOW model as inflows at different locations
    - Flow Hydrograph from site upstream
    - Excess rainfall falling on site
- Downstream boundary set: normal depth boundary condition at a few hundred metres downstream of the site to take into account the complexities of the wetland located around the downstream end of the site

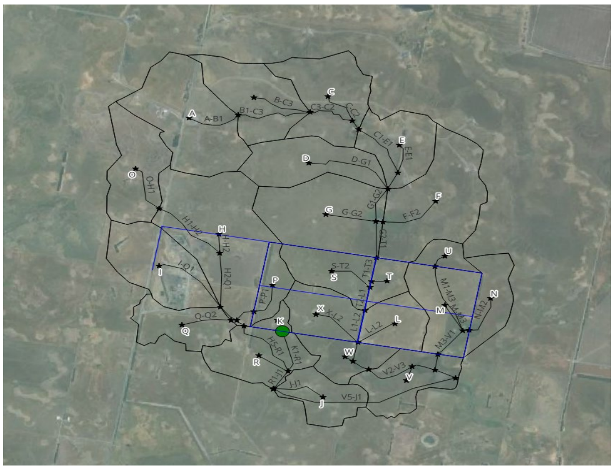


Figure 1 – RORB Model Boundary

Figure 2 – TUFLOW Model Boundary

The existing conditions TUFLOW model was run for 10 temporal patterns of from 10min-12hr storm durations for the 1% AEP and 10% AEP events. A depth map was produced based on the max of median storms for each AEP. The flood extents have been produced after applying a 5 cm filter.

1.4 Results

Flood depth and velocity maps for the existing conditions TUFLOW model runs are presented below.

1.4.1 Comparison of flood extents 2016 vs 2024

1% AEP flood extents from the 2016 Flood Mapping Study were compared with that of the 2024 TUFLOW model for the site and are presented below.

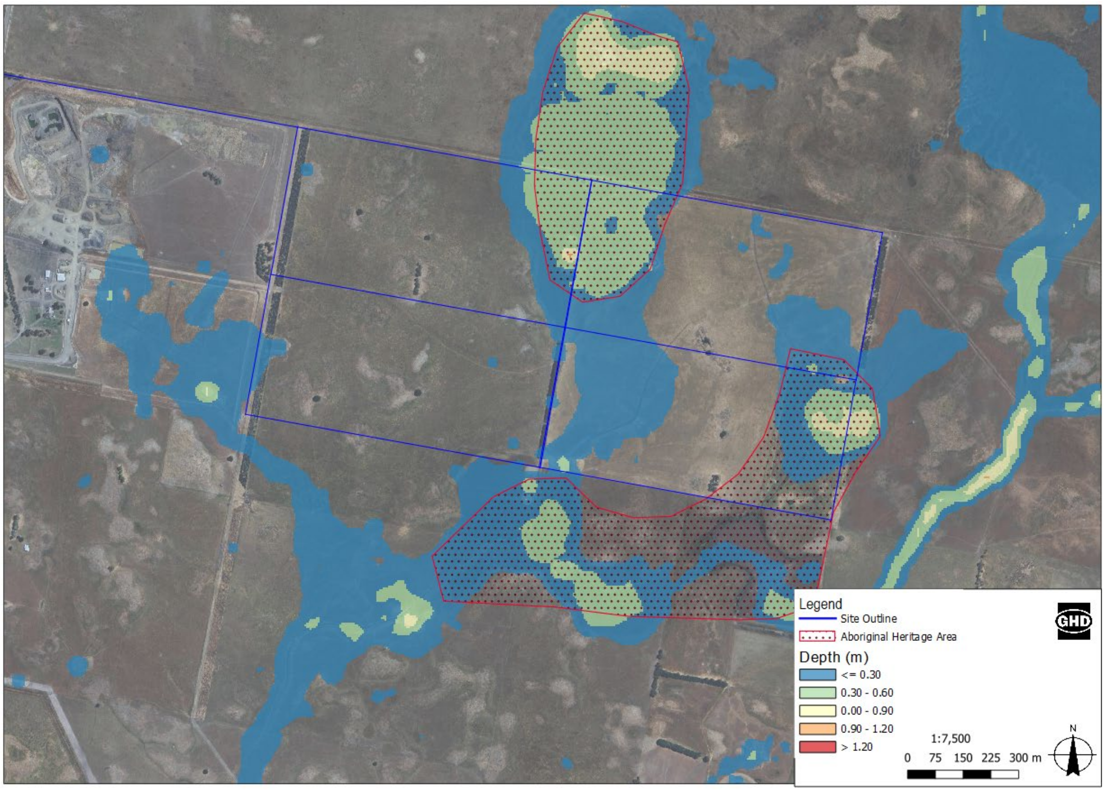


Figure 3 *2016 flood mapping study 1% AEP flood extent.*

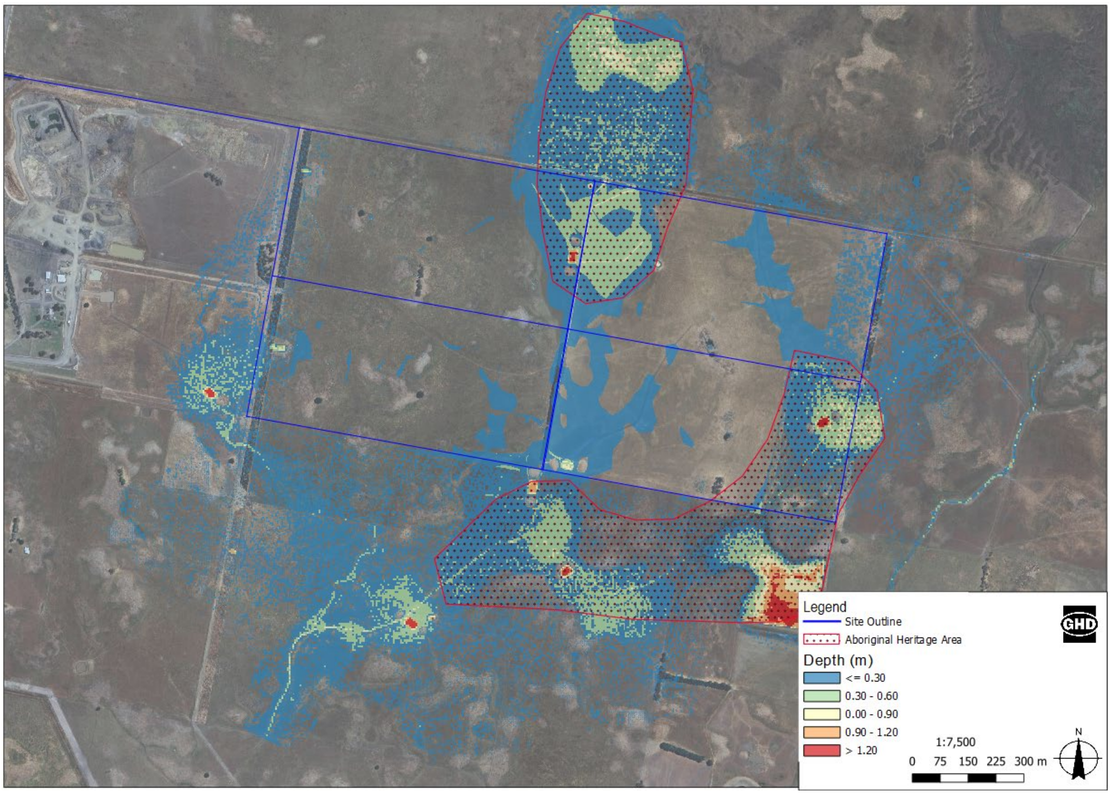


Figure 4 *2024 TUFLOW flood model 1% AEP flood extent.*

Generally, the main flow paths are similar across both TUFLOW models. However, there are some differences in the flood depths and extents which can be due to:

- Modelling guidelines: The 2024 model has been set up based on 2019 ARR guidelines. The 2016 model would have been developed using guidelines appropriate at the time of the study. The differences in these guidelines could be attributed to the way losses are applied to different surfaces. Additionally, the 2019 guidelines recommend the use of ten temporal patterns of a particular storm duration for model runs, while previously a single pattern was used for a particular storm duration
- Terrain data quality and survey extent: A 1m farm survey digital elevation model (DEM) was input to the 2024 TUFLOW model, providing greater definition through the site. This was not available for the 2016 study as modelling that was undertaken was at a broader scale for the whole Barwon river catchment and thus used a coarser DEM

1.4.2 10% AEP Flood

The flood depth and velocity maps for the 10% AEP event were overlayed with the proposed site concept design to understand any potential issues with the current layout. These are illustrated below.

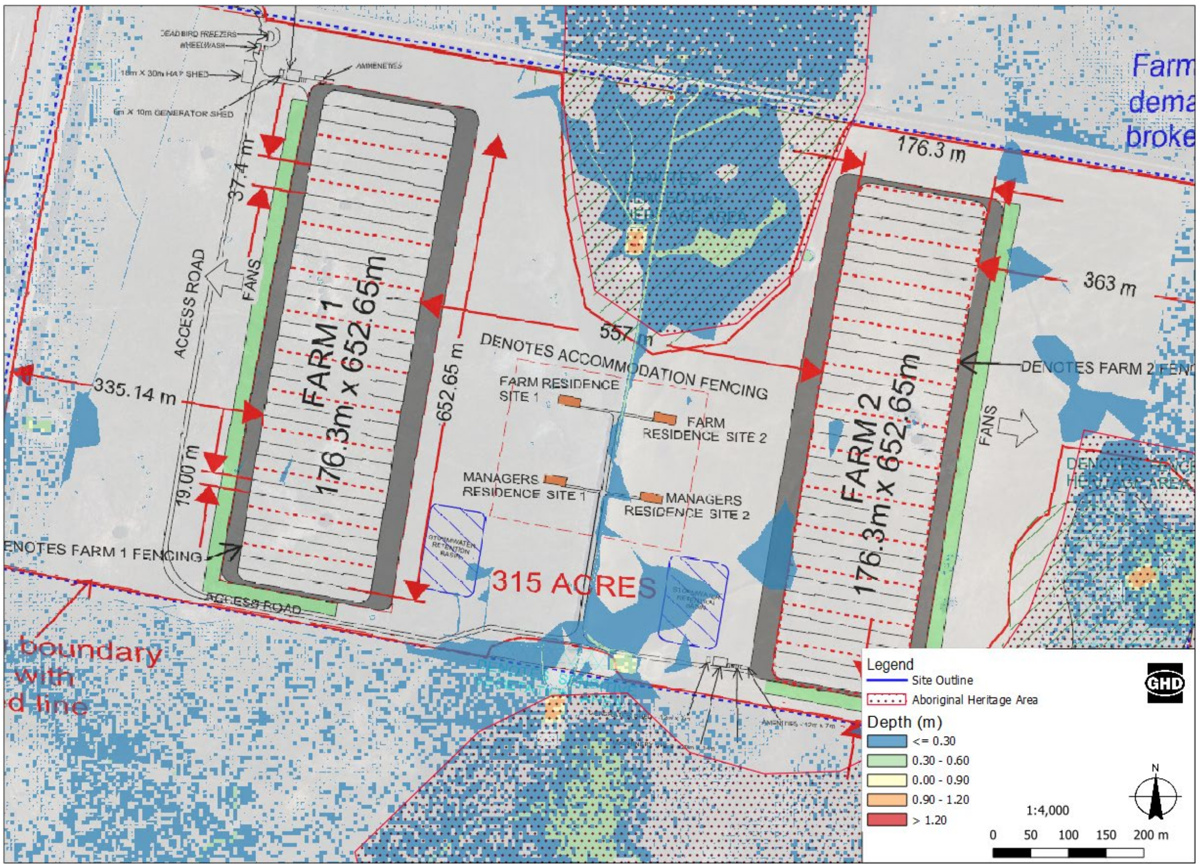


Figure 5 10% AEP flood depth map with design layout overlayed.

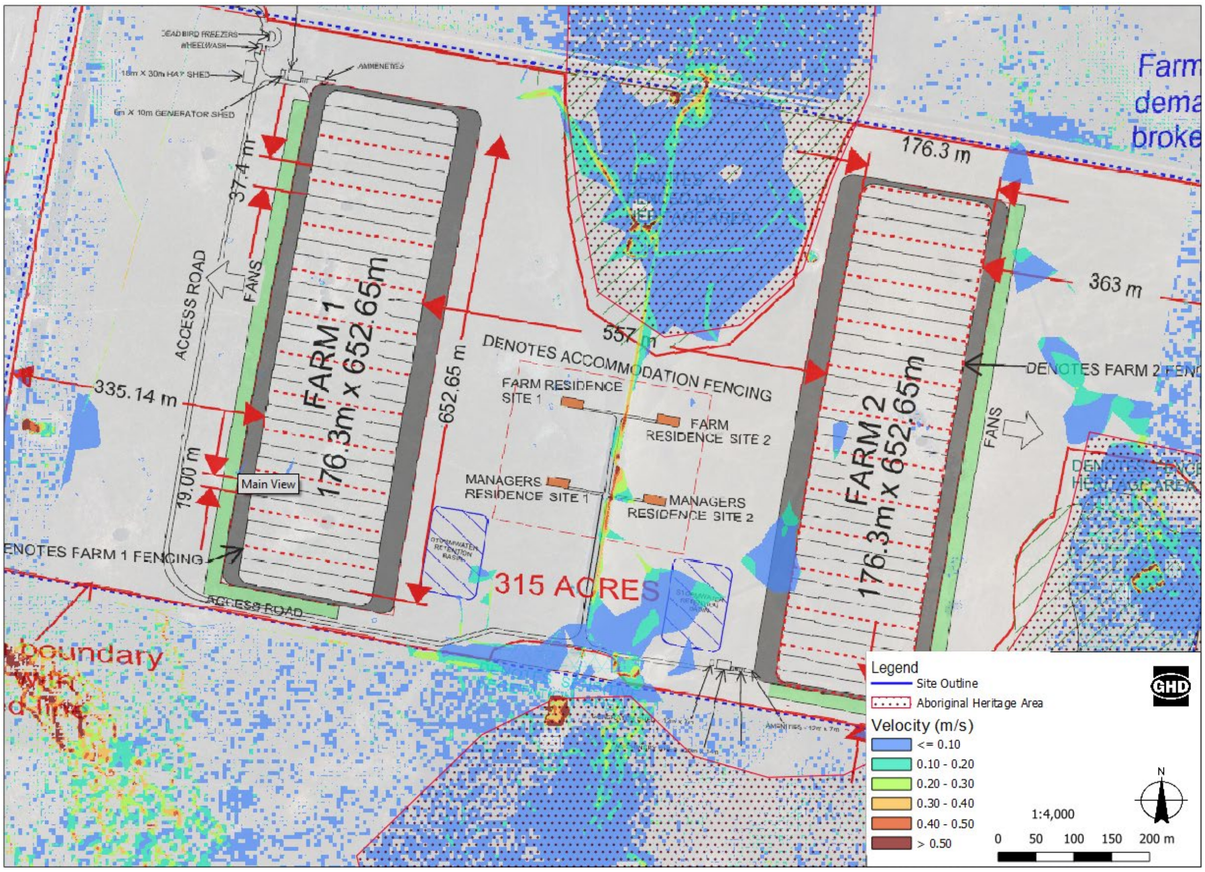


Figure 6 10% AEP flood velocity map with design layout overlayed.

Key findings from the 10% AEP event summarised below:

- The buildings lie just outside the 10% AEP flood extents
- Access roads and hardstand areas lie within the 10% AEP flood extents
- Higher velocities are contained within the main drain passing through the site

1% AEP Flood

Similar results for the 1% AEP event are provided below.

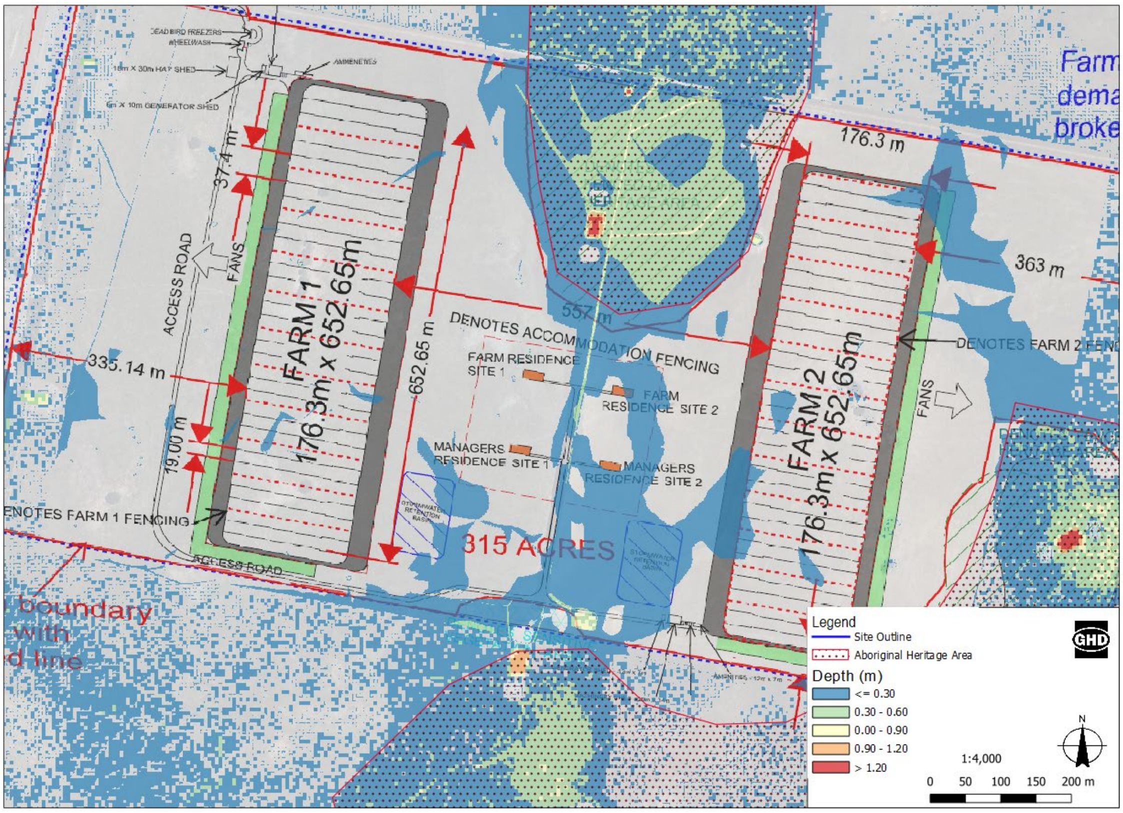


Figure 7 *1% AEP flood depth map with design layout overlayed.*

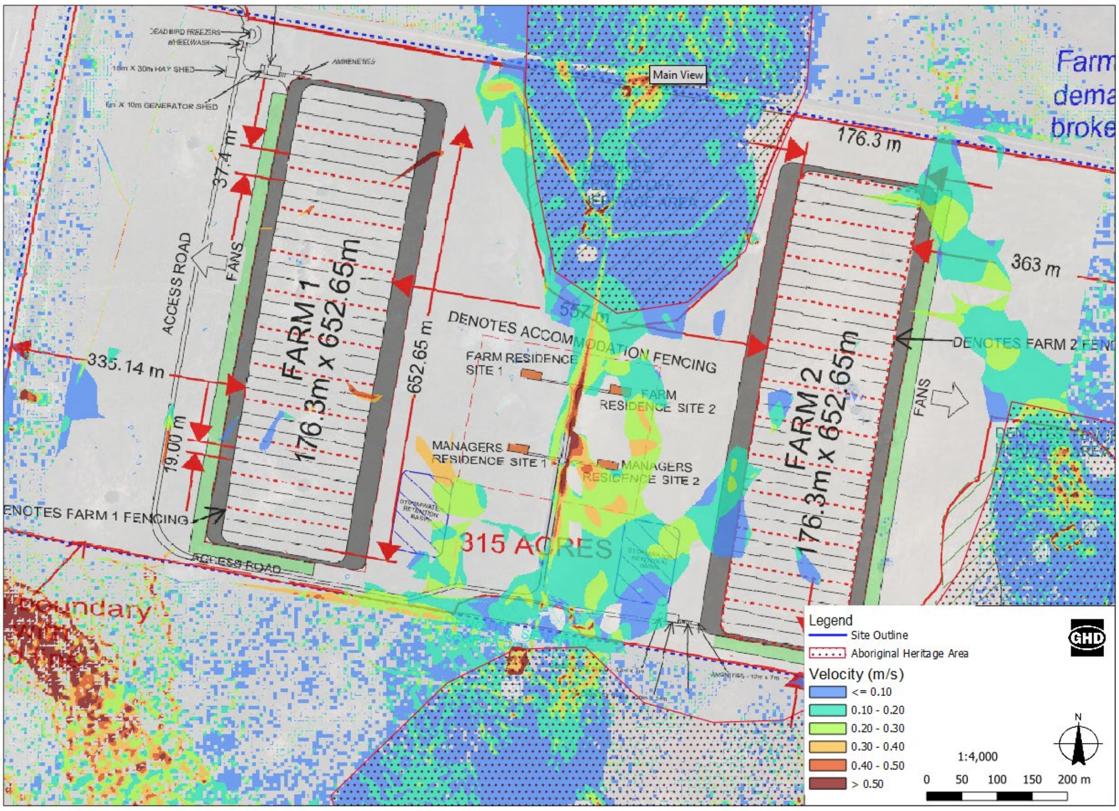


Figure 8 *1% AEP flood depth map with design layout overlayed.*

This Technical Memorandum is provided as an interim output under our agreement with ProTen Pty Ltd. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

Key findings from the 1% AEP event summarised below:

- It is interpreted that the residence buildings of the site and the access roads lie within the 1% AEP flood extents. However, flood depths in this area are less than 300 mm.
- Higher velocities are confined to within the channel drain

1.5 Recommendations

The results of the existing conditions flood assessment were presented and discussed on 4th March 2024. Minor adjustments to the development proposal to reduce potential flood impacts both on site and on neighbouring properties were identified, these are shown below.

- Residences – those on the eastern part of the site need to be outside the 1% flood extent, particularly as the flow appears to be an active overland flow path with a flood conveyance function.
- Access roads – where possible move these outside of the 1% flood extent. Noting however that the east-west road cannot be relocated due to site constraints (aboriginal cultural heritage), but the flooding of this road is less than 300mm, and measures will be incorporated in the road design to mitigate impacts, including cross drainage culverts and setting the road level to be above the 10% AEP as a minimum.
- Any bunding proposed should ideally be located outside of the flood extent to avoid loss of flood storage (as loss of flood storage could lead to downstream flood impacts that exceed the allowable tolerances that the CMA may not accept)
- If mitigation is required we could consider increasing the capacity of channelised drain, noting this is already a constructed channel which is not known to provide habitat for significant native flora or fauna. The design for increased capacity of the channel would need to retain the existing flow regime without increasing flows downstream of the site;
- Pump station infrastructure – ensure this is outside the 1% flood extent.

Once the above measures have been incorporated into the proposed development design, we are confident that the current floodplain storage can be maintained and that there will be no significant offsite impacts in terms of afflux, (with a maximum tolerance of 5mm increase in flood level downstream of the site).

Please contact either myself or Ash Roberts on [redacted].

Kind regards,

Emma Mackenzie
Senior Water Resources Engineer

[redacted]

Mooleric Road Birregurra 39426

Striped Legless Lizard targeted survey

FINAL REPORT

Prepared for Spirecom Pty Ltd

29 January 2024

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Document control

Version	Internal reviewer	Date issued
Draft version 01	IS	23/01/2024
Final version 01	IS	26/02/2024

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Spirecom Pty Ltd
- Victorian Government Department of Energy, Environment and Climate Action for access to the Victorian Biodiversity Atlas and NatureKit

Biosis staff involved in this project were:

- Hayley Sime (project management)
- Ian Smales, Wyn Russell, Clare McCutcheon, Shannon Braun, Michael Bodnacuk, Karthika Jayakumar (assistance in the field)
- Sam Panter (mapping)
- Ian Smales (quality assurance)

Contents

Tables

Figures

1. Introduction

1.1. Project background

Biosis Pty Ltd was commissioned by Spirecom Pty Ltd (Spirecom) to undertake a targeted survey for Striped Legless Lizard *Delma impar* for a proposed access road (the study area) to a poultry production development at 320 Mooleric Road, Ombersley (the project). The project requires an upgrade to the existing unnamed government road to an 'all weather' road. The impact area of the road construction is proposed to be six meters wide and approximately 1.2 kilometres long (Figure 2).

Biosis undertook a flora and fauna assessment (FFA) for the project in 2023 (Biosis 2023a) and identified the presence of suitable habitat for the Striped Legless Lizard, which is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Targeted surveys for Striped Legless Lizard were subsequently recommended for an impact area of approximately 2.6 hectares of potential habitat, with survey results to be incorporated into an EPBC Act referral. It is understood that Spirecom is seeking an EPBC Act referral for the construction of the all weather road.

1.2. Scope of assessment

The objectives of this investigation are to:

- Undertake a targeted survey for Striped Legless Lizard in the study area.
- Provide a short report outlining the findings of the survey.
- Determine the potential nature and extent of impacts from proposed works on Striped Legless Lizard.
- Prepare a significant impact assessment for the component of the project impacting Striped Legless Lizard in accordance with:
  - *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable striped legless lizard, Delma impar* (DSEWPC 2011).
  - Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (vulnerable species) (DE 2013).

1.3. Location of the study area

The study area is located along an east-west oriented public road reserve near Ombersley, 20 kilometres north-east of Colac, Victoria (Figure 1). It encompasses approximately 2.6 hectares of public land currently zoned in the Colac Otway Planning Scheme as Farming Zone (FZ). It occurs within a predominantly agricultural landscape with the surrounding properties cleared for grazing and cropping. An operational basalt quarry is adjacent to the majority of its southern boundary, and Mount Gellibrand Windfarm is the property to its northern boundary.

The study area is within the:

- Victorian Volcanic Plain and the Otway Plain Bioregion.
- Barwon River Basin.
- Management area of the Corangamite Catchment Management Authority (CMA).
- Colac Otway Shire local government area.

- Traditional lands of the Eastern Maar.

1.4. Species description

The Striped Legless Lizard *Delma impar* is a long, thin-bodied lizard of the Pygopodidae family. The Striped Legless Lizard, like all members of the Pygopodidae, lacks forelimbs and has reduced or vestigial hind limbs (NSW NPWS 1999). Striped Legless Lizards reach a maximum length of approximately 300 millimetres with the tail contributing over half of this length. The snout to vent length is approximately 120 millimetres. Striped Legless Lizards exhibit considerable variation in colour patterning ranging from pale to grey-brown on the dorsal surface to pale cream on the ventral surface. A series of stripes run the length of the body and become diagonal bands on the tale. Some adults and most juveniles are pale brown with a dark head and lack the dorsal patterning more regularly associated with this species (NSW NPWS 1999). Striped Legless Lizards are often confused with snakes but can be differentiated by the presence of ear openings, an undivided (entire) tongue and the high tail to body-length ratio (NSW NPWS 1999).

The species is listed as vulnerable under the EPBC Act and as endangered under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).

Striped Legless Lizards have sometimes been thought to exclusively inhabit native grasslands dominated by *Austrostipa* and *Themeda* species in south-eastern Australia, ranging from the Australian Capital Territory in the north-east to just over the South Australia border in the south-west (DEWHA 2011). However, further studies indicate the species also utilises introduced pasture grass and inhabits cleared woodland areas (NSW NPWS 1999). This more general habitat specification indicates that a dense grassland structure along with suitable soil type, is the principal habitat requirement as opposed to a specific composition of native grass species (Harley et al. 2005).

Major threats to the Striped Legless Lizard include loss of grassland habitat due to urban expansion, particularly on Melbourne's western fringe and habitat modification from agricultural development across the species range (NSW NPWS 1999). Other threats include inappropriate fire regimes and possibly predation by native and introduced predators (NSW NPWS 1999).

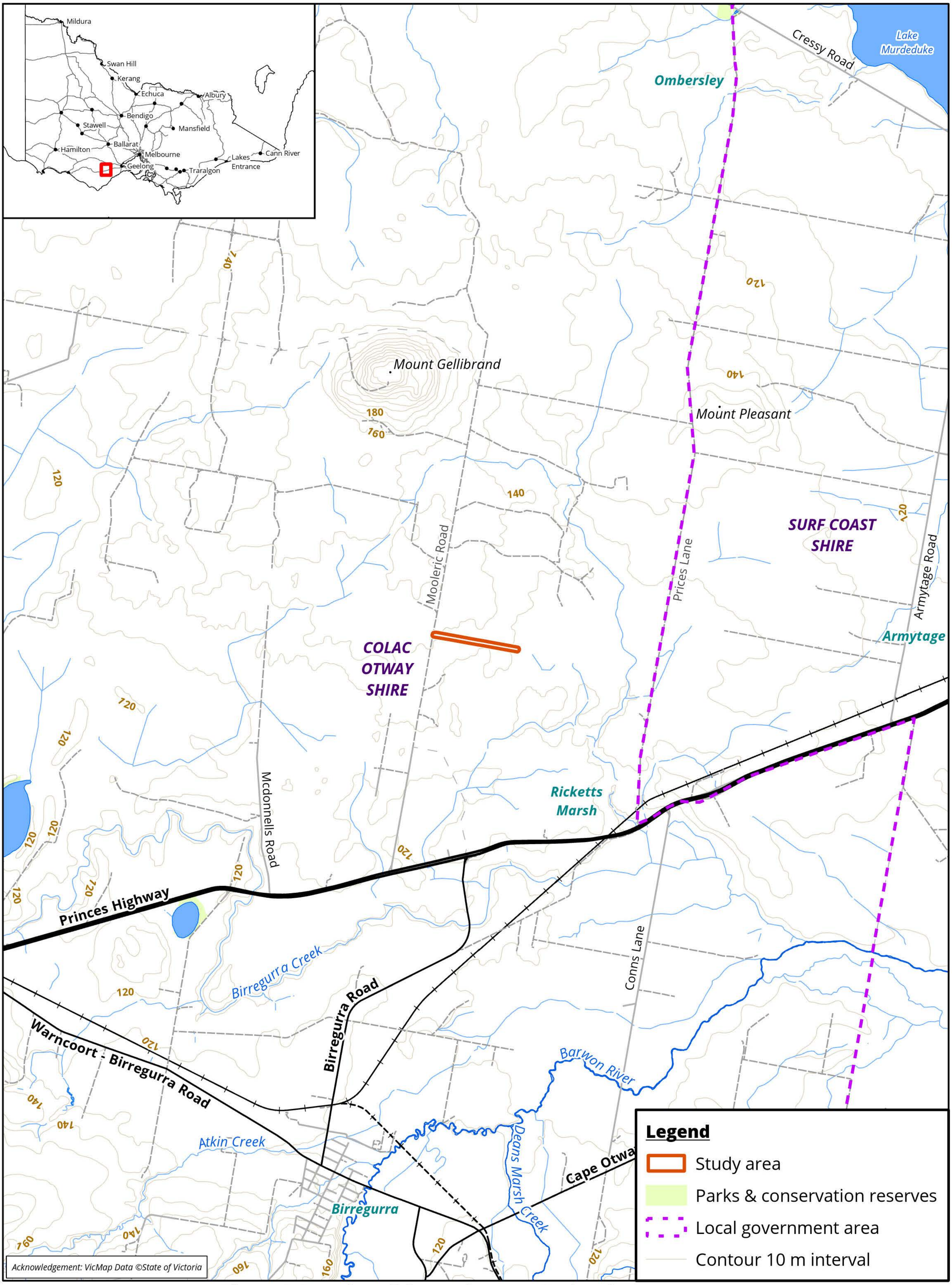

Figure 1 Location of the study area - Ombersley, Victoria

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Matter: 39426,
Date: 09 January 2024 ,
Prepared for: SP, Prepared by: HS, Last edited by: spanter
Layout: 39426_SLL_F1_Location
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx

Scale: 1:70,000 @ A4
Coordinate System GDA 1994 MGA Zone 54

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2. Methods

2.1. Survey methodology

The primary method used to survey for Striped Legless Lizard within the study area was the placement of artificial shelter (terracotta roof tile) transects, in accordance with the *Survey guidelines for Australia's threatened reptiles* (DEWHA 2011). Each tile transect consisted of 25 terracotta roof tiles spaced approximately 5 metres apart. Three tile transects were placed in suitable habitat along the northern side of the road reserve (grids 1, 3, 5), and three transects on the southern side (grids 2, 4, 6), such that a total of 150 tiles were surveyed.

Tile transects were established within the study area on 22 September 2023, three weeks prior to the initial survey. Tile checks were conducted in the species active period, with a total of ten tile checks completed from 17 October to 22 December 2023 at approximately weekly intervals. Survey grids were decommissioned on 22 December 2023. Transects were sampled across a variety of weather conditions, on days when ambient temperatures did not exceed 28°C (except for survey 9, which was undertaken at 30°C).

In addition to tile transects, active searching was also undertaken opportunistically throughout the study area while completing tile transect checks. This included lifting rocks and other debris to locate reptiles sheltering beneath. Animals were only briefly handled to obtain a photograph for the purpose of data collection and identification, and were released immediately afterwards at the point of capture. All vertebrate species encountered within the study area were noted and species records will be submitted to the Department of Energy, Environment and Climate Action (DEECA) for inclusion in the Victorian Biodiversity Atlas (VBA).

A summary of survey timing and weather conditions is presented in Table 1.

Table 1 Survey timing and conditions

Check	Date	Start time	End time	Temperature (°C)	Cloud cover	Average wind speed (km/hr)	Relative humidity (%)
1	17/10/2023	12:45 PM	1:20 PM	13.9	1/8	7.0	62
2	23/10/2023	12:00 PM	1:15 PM	11.9	8/8	13.0	76.8
3	02/11/2023	10:00 AM	11:00 AM	15.0	8/8	0.0	77
4	09/11/2023	2:15 PM	3:00 PM	21.8	0/8	1.2	51.6
5	16/11/2023	11:45 PM	12:30 PM	15.7	7/8	19.9	60
6	22/11/2023	12:30 PM	1:30 PM	18.5	1/8	18.5	54
7	28/11/2023	10:00 AM	11:00 AM	19	8/8	3.0	91

Check	Date	Start time	End time	Temperature (°C)	Cloud cover	Average wind speed (km/hr)	Relative humidity (%)
8	04/12/2023	10:00 AM	11:00 AM	22	8/8	3.0	65
9	13/12/2023	1:30 PM	2:45 PM	30	4/8	15	50
10	22/12/2023	12:00 PM	1:00 PM	23.3	3/8	12	52

2.2. Mapping and data collection

Mapping was conducted using hand-held GPS-enabled tablets and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the tablets (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration. Spatial data collected from the study area were regularly synchronised with a cloud server.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our spatial data are available to incorporate into design concept plans. However, this mapping may not be sufficiently precise for detailed design purposes.

2.2.1. Permits

Biosis undertakes targeted fauna surveys under the following permits and approvals:

- Wildlife Authorisation issued by DEECA under the *Victorian Wildlife Act 1975* (Permit Number 10010193)
- Approvals 18.21 issued by the Wildlife and Small Institutions Animal Ethics Committee of the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR)
- Scientific Procedures Fieldwork Licence issued by DEDJTR's Wildlife and Small Institutions Animal Ethics Committee (Licence Number 20020).

2.3. Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters of National Environmental Significance listed under the EPBC Act and associated policy statements, significant impacts guidelines, listing advice and key threatening processes.
- Threatened taxa listed under Section 10 of the FFG Act and associated action statements and listing advice.

3. Results

3.1. Survey results

Three reptile and two amphibian species were recorded within the study area during the targeted surveys - Striped Legless Lizard, Eastern Three-lined Skink *Acritoscincus duperreyi*, Tussock Skink *Pseudemoia pagenstecheri*, Southern Brown Tree Frog *Litoria ewingii* and Spotted Marsh Frog *Limnodynastes tasmaniensis*. Additionally, one skink *Scincidae* spp. was observed but unable to be identified to the species level during the targeted surveys, as it evaded capture and moved too quickly to obtain visual identification.

Four Striped Legless Lizards were recorded during the surveys (Table 2); one under a tile in Transect 2 (southern boundary of road reserve) and three under tiles within Transect 3 (northern boundary of road reserve; Figure 2). Head scales were photographed on two occasions when a Striped Legless Lizard was captured on Transect 3, and it was determined they were the same individual captured on two separate days. The Striped Legless Lizards observed on Transect 2 and one of the individuals observed on Transect 3 evaded capture and were not able to be photographed. Hence, it is unknown whether the same individual was recorded all four times. However, it is likely that at least two different individuals were recorded as the sighting points on Transect 2 and Transect 3 are located approximately 150 metres apart. Photographs of the Striped Legless Lizards captured are provided in Appendix A.

The unnamed government road where Striped Legless Lizard were recorded supports several small patches of Plains Grassy Wetland EVC 125, and native vegetation is scattered throughout a largely disturbed area that supports predominantly introduced vegetation such as Toowoomba Canary-grass *Phalaris arundinacea*. The soils are black, cracking clays with some surface and embedded rocks. Tussock grasses (such as Common Tussock-grass *Poa labillardierei*) are sparse and appear to have been heavily grazed throughout the road reserve. Although Striped Legless Lizards typically prefer native grasslands, the findings are consistent with the current understanding of the species requirements which can include sites with exotic grasses that are used for breeding and foraging by the species (Threatened Species Scientific Committee 2016, Hartley et al. 2005). The surface rocks within the road reserve may be utilised by Striped Legless Lizards that could move in from the more suitable habitat to the north, which supports moderate quality habitat with large tussock grasses, surface rocks and inter-tussock spaces.

The land to the north of the road reserve is occupied by Mount Gellibrand Windfarm which underwent a Flora and Fauna assessment before development (BL&A 2005). BL&A determined there was marginal habitat throughout the windfarm site with the exception of the high-quality grasslands in the southern part of the site, which appears to correspond to the suitable Striped Legless Lizard habitat directly north of the study area. In addition, there are records of Striped Legless Lizard from 2022 within Mount Gellibrand Windfarm approximately 2.5 kilometres west of the study area. Much of the area immediately south of the road reserve is occupied by an operational quarry that is not habitat suitable for Striped Legless Lizards (Biosis 2014). The remaining land to the south of the road reserve is used for livestock grazing and the soil is highly disturbed, and much of this land has been assessed for the proposed Ombersley Poultry Farm and determined no suitable habitat for Striped Legless Lizard (Biosis 2023b).

Tussock Skink were recorded on one occasion during the surveys in Transect 5. The unidentified skink that was observed, but not captured, on Transect 1 was also potentially a Tussock Skink due to its colour and size. Tussock Skink is listed as vulnerable under the FFG Act. Based on the results from the current survey and characteristics of available habitat, it is reasonable to assume that Tussock Skinks are present in moderate abundance throughout the study area.

Table 2 Striped Legless Lizard targeted survey results

Check	Date	Method	Species recorded	Location	Notes
1	17/10/2023	Tile transect	**Striped Legless Lizard** Unidentified skink - *Scincidae* spp. Spotted Marsh Frog Southern Brown Tree Frog	Transect 3 Transect 1 Transect 5 Transect 6	Photographed Evaded capture
2	23/10/2023	Tile transect	Southern Brown Tree Frog	Transect 6	
3	2/11/2023	Tile transect	**Striped Legless Lizard** Eastern Three-lined Skink	Transect 3 Transect 1	Photographed
4	9/11/2023	Tile transect	Spotted Marsh Frog	Transect 4	
5	16/11/2022	Tile transect	None recorded	NA	
6	26/10/2022	Tile transect	**Striped Legless Lizard**	Transect 2	Evaded capture
7	28/11/2023	Tile transect	Spotted Marsh Frog X4	Transect 1 Transect 3 Transect 4 Transect 5	
8	4/12/2023	Tile transect	Spotted Marsh Frog X11	Transect 1 Transect 2 Transect 5 Transect 6	
9	13/12/2023	Tile transect	Tussock Skink X2 Spotted Marsh Frog X5	Transect 5 Transect 1 Transect 3 Transect 4 Transect 5	
10	22/12/2023	Tile transect	**Striped Legless Lizard**	Transect 3	Evaded capture

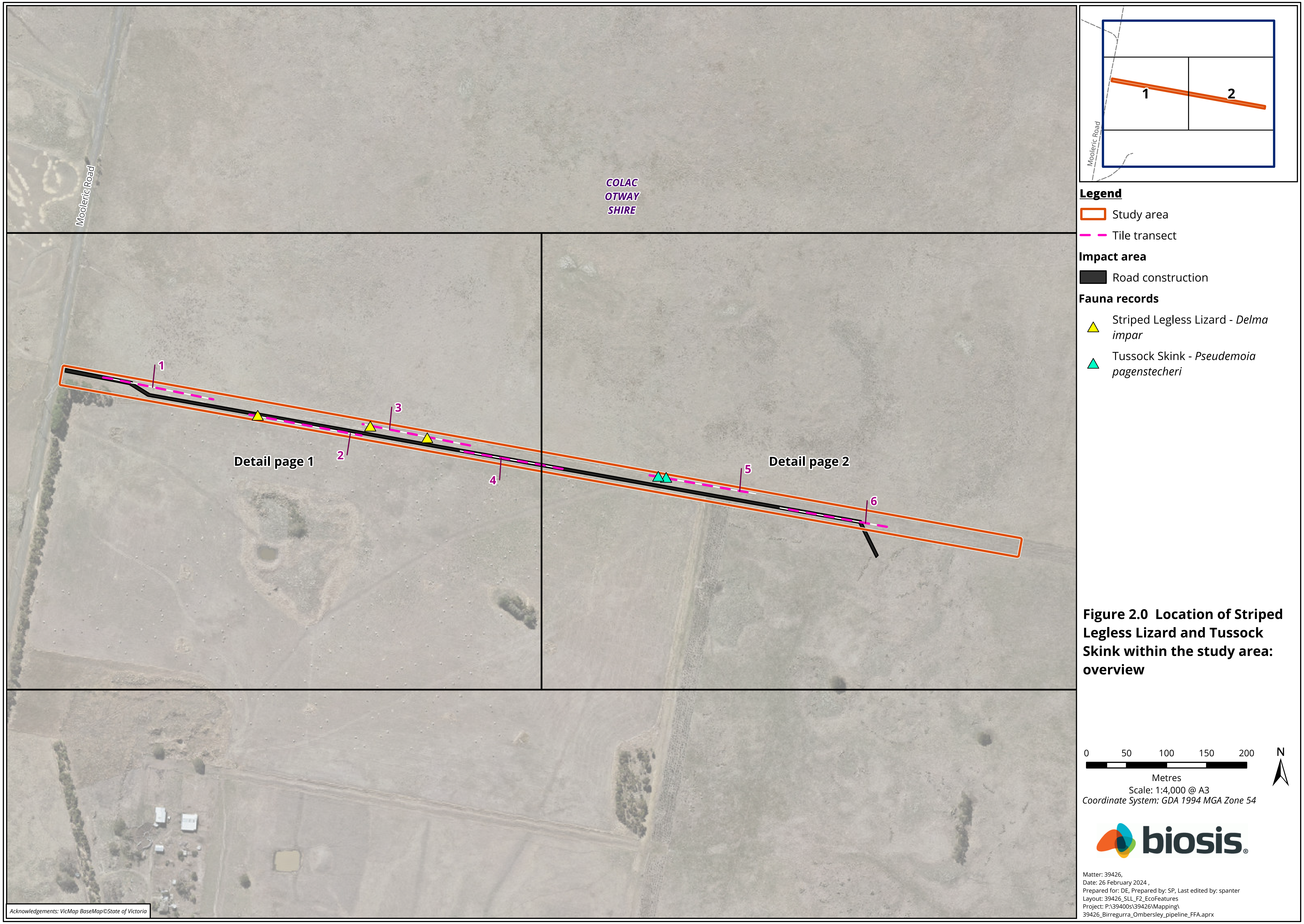

Figure 2.0 Location of Striped Legless Lizard and Tussock Skink within the study area: overview

Scale: 1:4,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
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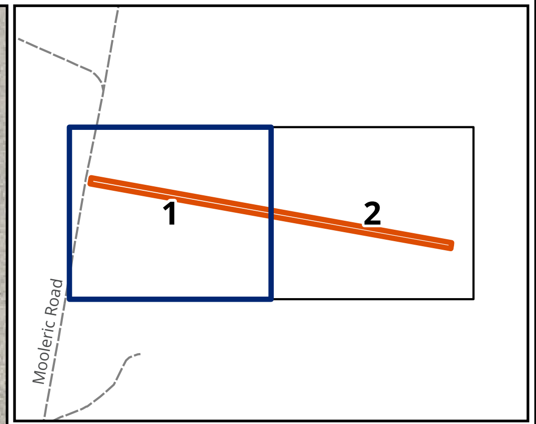

Legend

Study area

Tile transect

Impact area

Road construction

Fauna records

Striped Legless Lizard - *Delma impar*

Figure 2.1 Location of Striped Legless Lizard and Tussock Skink within the study area: detail (west)

0 25 50 75 100

Metres

Scale: 1:2,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
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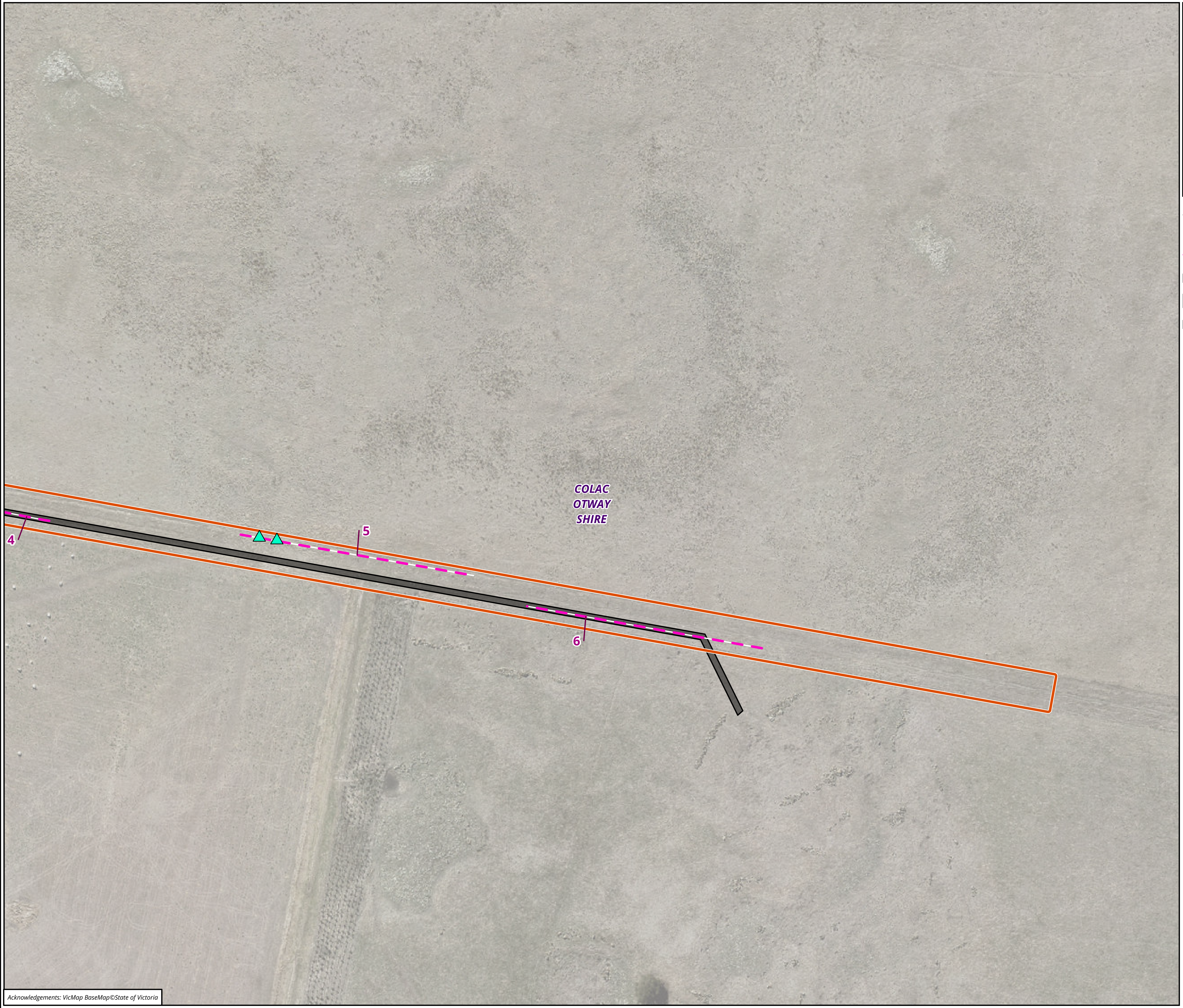

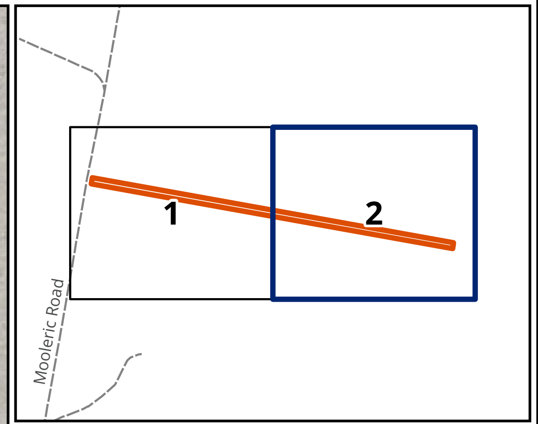

Legend

Study area

Tile transect

Impact area

Road construction

Fauna records

Tussock Skink - *Pseudemoia pagenstecheri*

Figure 2.2 Location of Striped Legless Lizard and Tussock Skink within the study area: detail (east)

0 25 50 75 100

Metres

N

Scale: 1:2,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

biosis.

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: DE, Prepared by: SP, Last edited by: spanter
Layout: 39426_SLL_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
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4. Biodiversity legislation and government policy

4.1. Commonwealth

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to 'actions' that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Under the EPBC Act, a person must not take an action that has, will have or is likely to have a significant impact on any matter of environmental significance without approval from the Australian Government Minister for the Environment.

The Striped Legless Lizard is listed as vulnerable under the EPBC Act and is therefore considered a matter of national environmental significance. The results from the targeted survey confirm that the species is present within the study area and the proposed works will therefore require the removal of habitat currently occupied by the species. It is possible that the species is present throughout the study area given the availability of suitable habitat.

Significant impact assessment

A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts (DE 2013).

Specific referral guidelines have been prepared for the Striped Legless Lizard, therefore an assessment has been prepared using the significant impact criteria for Striped Legless Lizard outlined in *Environmental Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable Striped Legless Lizard, Delma impar* (DSEWPC 2011) (Table 3). An assessment has also been prepared in accordance with the *Matters of National Environmental Significance Significant impact guidelines 1.1 for vulnerable species* (DE 2013). The self-assessment process assists a proponent in determining whether a significant impact is likely and whether a project should be referred. The significant impact assessment for Striped Legless Lizard is based on the current proposed road design provided by Spirecom. Impacts can be reassessed upon the confirmation of the project impact area and construction methodologies.

Table 3 Assessment of Striped Legless Lizard *Delma impar* (listed vulnerable species) in relation referral guidelines for Striped Legless Lizard (flowchart in DEWHA 2011)

Referral guidelines for Striped Legless Lizard (DSEWPC 2011)	Outcome	Notes
Could the impacts of the action occur within modelled distribution of the Striped Legless Lizard?	Yes	The action occurs within modelled distribution for Striped Legless Lizard (DSEWPC 2011) and individuals have been recorded within the study area.
Could the impacts of your action affect Striped Legless Lizard individuals or habitat?	Yes	The action will affect Striped Legless Lizard habitat and/or individuals. There is extensive suitable native grassland habitat within the property directly north of the study area, and although the study area consists of less coverage of native grassland habitat, it provides additional habitat for the species. The proposed action may result in further isolation and reduced area of occupancy for Striped Legless Lizard.
Have you surveyed for the Striped Legless Lizard using the recommended methods?	Yes	Artificial shelter site survey was undertaken by suitably qualified zoologists in accordance with the *Survey guidelines for Australia's threatened reptiles* (DSEWPC 2011). Striped Legless Lizard were recorded during survey efforts on four separate occasions, determined to be at least two (but potentially three) different individuals.
Could your action impact on an important population of Striped Legless Lizard or the species as a whole?	Yes	The EPBC Act defines an important population as one that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal. • Populations that are necessary for maintaining genetic diversity. • Populations that are near the limit of the species range. An important population of Striped Legless Lizard must meet one of the criteria above and is considered likely to be viable in the long term. However, the subsequently approved Conservation Advice for Striped Legless Lizard under the EPBC Act (Threatened Species Scientific Committee 2016) says, "All populations of the Striped Legless Lizard are likely to be important for the species recovery". As a consequence, the population inhabiting the study site is considered to be part of an important population. The property directly north of the study area is occupied by Mount Gellibrand Windfarm which underwent a Flora and Fauna assessment before development (BL&A 2005). BL&A determined there was marginal habitat throughout the windfarm site with the exception of the high-quality grasslands in the southern part of the site, which appears to correspond to the suitable Striped Legless Lizard habitat directly north of the study area. Habitat within the study area likely forms part of the broader area of occupancy for the population. Due to much of the existing habitat for this species being highly modified and fragmented, this population is important for species conservation. The proposed methodology for the road upgrade involves removing the existing vegetation and natural surface rock in the road reserve, therefore has the potential to further reduce the area of occupancy of the population in the reserve and thus impact an important population.

		The project has potential to impact upon a six metre wide strip of habitat that is the very southern portion of a wider population extending to the north. The action is unlikely to impact on the population as a whole.
Is your impact mitigation best practice so that it may reduce the significance of your impacts?	Yes	Conditional on adherence to mitigation measures recommended in sections 5.2 and 5.3.
Could your action require a referral to the federal environment minister for significant impacts on the striped legless lizard?	Yes	The proposed works will result in decreased habitat for a population of Striped Legless Lizard. The proposed works may also limit dispersal between populations or habitat patches, through removal of vegetation or creation of a physical barrier. Biosis recommends that the project be referred to the Australian Government Minister for the Environment.

Table 4 Assessment of Striped Legless Lizard *Delma impar* (listed vulnerable species) in relation to Significant Impact Criteria for vulnerable species (DE 2011)

Significant impact criteria	Likelihood of significant impact	Notes
Lead to a long-term decrease in the size of an important population	Unlikely	As stated in Table 3, the approved Conservation Advice for Striped Legless Lizard under the EPBC Act (Threatened Species Scientific Committee 2016) says, "All populations of the Striped Legless Lizard are likely to be important for the species recovery". As a consequence, the population inhabiting the study site is considered to be part of an important population. Due to the cryptic nature of the species, the extent and nature of habitat use within the study area is unknown. At least two, but possibly three, individuals were located during surveys, which suggests that the area may provide breeding habitat. However, the area is highly modified and quality of grassland is lower than that on the property north of the study area. The habitat to the south is of poorer quality, and highly disturbed by the quarry and grazing livestock, so the road reserve represents a narrow strip of the southernmost portion of the population. Compliance with recommended mitigation and rehabilitation measures (sections 5.2 and 5.3) will ensure the project does not lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of an important population	Likely	Striped Legless Lizards were identified in the study area. Although the area is highly modified and dominated by introduced flora, it is unknown whether the study area acts as primary or secondary habitat for the species. Works in the study area will result in the direct removal or modification of known habitat, including impacts on tussock-forming grasses, rocks and soil structure. Therefore, a small reduction in the area of occupancy for an important population is likely to occur.
Fragment an existing population into two or more populations	Unlikely	Striped Legless Lizards are known to have limited dispersal capability (Threatened Species Scientific Committee 2016) and significant landscape features such as rivers or roads are likely boundaries to their dispersal. The land to the south of the western end of the road reserve is occupied by the Ombersley Quarry, which is too disturbed to provide habitat for Striped Legless Lizard. The remaining land to the south of the road reserve is used for livestock grazing and the soil is highly disturbed, and much of this land has been assessed for the proposed Ombersley Poultry Farm and determined no suitable habitat for Striped Legless Lizard (Biosis 2023b). The property directly north of the study area is occupied by Mount Gellibrand Windfarm which underwent a Flora and Fauna assessment before development (BL&A 2005). BL&A determined there was marginal habitat throughout the windfarm site with the exception of the high-quality grasslands in the southern part of the site, which appears to correspond to the suitable Striped Legless Lizard habitat directly north of the study area. It is therefore apparent that the proposed project will entail the loss of a six metre-wide strip of habitat for Striped Legless Lizards that is the southern-most strip of a wider population extending substantially into adjacent land to the north of the road reserve. As such the action does not have capacity to fragment the existing population.

Adversely affect habitat critical to the survival of a species	Unlikely	It is unlikely that the proposed action would adversely affect habitat deemed critical to the survival of the species.
Disrupt the breeding cycle of an important population	Unlikely	The life history of the Striped Legless Lizard is poorly known. However, it is believed that females deposit up to two eggs every year in December to January, within a soil cavity or under rocks in communal nests. In the case that Striped Legless Lizard are distributed throughout the study area and a wider area of land to its north. All habitat suitable for the species is understood to also be suitable for the species to breed. The project may disrupt breeding of individuals utilising the small portion of the broader local distribution occupied by the study area, but loss of that portion is unlikely to affect breeding within the broader local population. To minimise disruption to the breeding cycle, works should occur outside of the breeding season (December to February).
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Whilst the works will modify or destroy a small area of known habitat, the extent and scale of the road is unlikely to result in overall species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely	The proposed project does not include any known mechanism that would result in the establishment of invasive species harmful to Striped Legless Lizard that are not already present in the local area.
Introduce disease that may cause the species to decline	Unlikely	The proposed works do not include any known mechanism that would result in the introduction of a disease that is not already present in the local area.
Interfere with the recovery of the species	Unlikely	The proposed works will not interfere with the recovery of the species in respect to the specific objectives for recovery outlined in the in the National Recovery Plan for Striped Legless Lizard (Smith and Robertson 1999). Short-term disturbance or a very small number of mortalities are unlikely to interfere with the species' overall recovery.

4.2. State

4.2.1. Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.

Link for further information: https://www.environment.vic.gov.au/conserving-threatened-species/victorias-framework-for-conserving-threatened-species

The FFG Act defines public land as Crown land or land owned by, or vested in, a public authority, while private land is defined as any land other than public land. A public authority is defined in the FFG Act as a body established for a public purpose by or under any Act and includes:

- an Administrative Office
- a Government Department
- a municipal council
- a public entity
- a State-owned enterprise.

The study area is on public land. The proponent is not considered to meet the definition of a public authority, and there is no declared critical habitat within the study area.

5. Summary of impacts and recommendations for mitigation

5.1. Impacts

The proposed project works involve the construction of □□-metre-wide all-weather road in the study area. Based on Biosis' understanding of the current proposed works and construction methodologies, the key impacts to Striped Legless Lizard and their habitat are summarised as follows:

- Removal and modification of habitat known to be occupied by the species.
- Direct mortality of individuals as a result of construction activities/methods.
- Increased risk of predation in the short to medium term due to exposure and loss of habitat.

5.2. Mitigation measures

Measures to reduce impacts to Striped Legless Lizard and their habitat should be considered before and during works. Mitigation measures should be applied consistently throughout the study area. Likely appropriate measures to mitigate species impacts include:

- Limit road construction to the southernmost area of the road reserve, which is where the lowest number of Striped Legless Lizards were recorded and the furthest point from the more suitable habitat to the north of the property.
- Minimise the width of disturbance when intercepting habitat.
- Restore habitat in areas of soil or habitat disturbance using indigenous grass species. Earthworks should be carried out in a manner to maintain the existing soil by stockpiling relevant layers and restoring them in sequence.
- Ensure that surface and/or embedded rocks, or other refuge sites (e.g. logs) are not removed from the site. Where possible, reintroduce or increase the cover of surface refuges outside the immediate alignment of the new all-weather road to augment existing habitat.
- Develop site-specific Conservation Management Plan and/or Construction Environmental Management Plan relating to the long-term management and monitoring of the species and associated habitat.
- Salvage and relocation of Striped Legless Lizard and Tussock Skink within impacted habitat areas prior to and during works occurring.
- During construction, especially while any trenches are open, all trenches must be checked daily for the presence of threatened fauna and an ecologist must be on call to remove any trapped animals to adjacent areas of appropriate habitat.

5.3. Next steps

The approvals pathway for this project, based on the current construction footprint, will likely require a referral to the Department of Climate Change, Energy, the Environment, and Water (DCCEEW). Minor field investigation activities such as driving on site, or minor soil disturbance associated with geotechnical and hydrogeological investigation purposes may proceed as they are unlikely to significantly impact the species. Such activities should be avoided when the ground is wet, and non-disruptive heavy machinery (e.g. rubber tread) should be used. Driving on site should be minimised and restricted to the same paths where possible.

Biosis understands that Spirecom is seeking an EPBC Act referral for the impacts proposed to Striped Legless Li ard the construction of the six metre wide all weather road.

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APPENDICES

Appendix A. Photos of Striped Legless Lizard

Photo 1 Striped Legless Lizard recorded at transect 3 on 2 November 2023

Photo 2 Striped Legless Lizard recorded at transect 3 on 17 October 2023

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Operational Noise Impact Assessment (desktop) – Technical Report

Spirecom

Project Details

Introduction

The Group 2 Acoustic Research has been commissioned to undertake and Environmental Noise Impact Assessment for the construction of 24 x Sheds and associated infrastructure located at 320 MOOLERIC ROAD, OMBERSLEY VIC 3241.

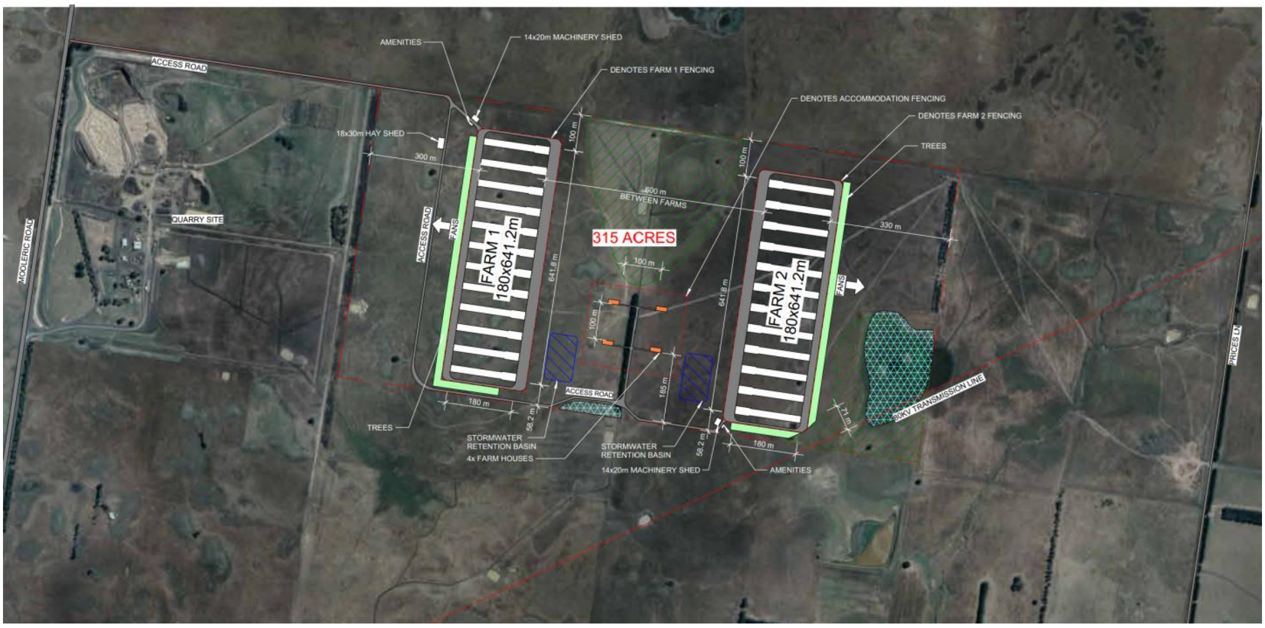
Mooleric Broiler farm seeks the development application consent to construct 24 shed Breeder Site. Therefore, the regulators (EPA and planning authorities) requires an environmental noise impact assessment to be undertaken.

The Development application and planning is assessed in accordance with the Environment Protection Authority (EPA), the planning authorities and its regulations.

Scope of Assessment

The Mooleric Broiler Farm is proposing to build 24 x sheds . **Figure A** shows the location of the farm and the proposed location and configuration of the development of the construction on the farm.

Figure A - the location of the farm



To determine if the proposed development would be in accordance with Noise Policy the following is required.

Provide a report prepared by a suitably experienced, professional acoustic engineering consultant, demonstrating that worst case predicted noise from the proposal can meet the Recommended Maximum noise level (listed below). The report must state what the overall predicted noise would be at the most noise affected premises in any direction after adjustment for any noise character.

The report must be accompanied by a statement from the applicant that any recommendations in the report will be implemented by the applicant.

G2A

RECOMMENDED MAXIMUM NOISE LEVELS

The subject land (Generating zone) is zoned as Farming FZ and nearby sensitive receivers (receiving zone) is classified as Rural Living Zone RLZ .

Zone levels

The recommended noise level are as follows:

Period	Daytime	Evening	Night time
Recommended noise level	[illegible]	[illegible]	[illegible]

Distance-adjusted levels:

The Zone levels are adjusted to account for the distance between the zone where the noise emitter is located and the location of noise receiver (the noise sensitive receiver):

-When the noise generator and receiver are not within the same zone classification/type, subtract one decibel for every 100 meters of receiver distance.

Following this rule:

-'Receiver distance' is the shortest distance from the noise sensitive receiver to the emitting zone.

-If there is a zone for a road a railway line that divides the emitting zone, this road, railway zone would be ignored

- The maximum adjustment shall be made up to a maximum subtraction of nine decibels.

-The distance adjustment should be applied to each of the day, evening and night.

Base noise level check

The distance-adjusted levels are checked against the following 'base noise levels' for each period of the day[illegible]

Day	Evening	Night
45dB(A)	37dB(A)	32dB(A)

Taking the greater of the distance adjusted level and base noise level[illegible]e [illegible]e[illegible]

Day	Evening	Night
45dB(A)	37dB(A)	32dB(A)

Note:

The background level check and adjustment has not been considered.

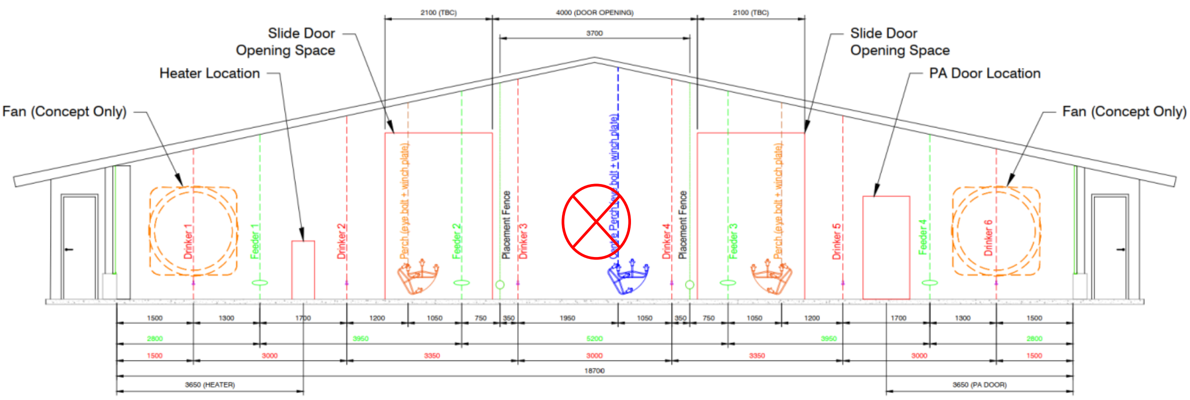
Proposed Layout and Noise Sources

Development Site

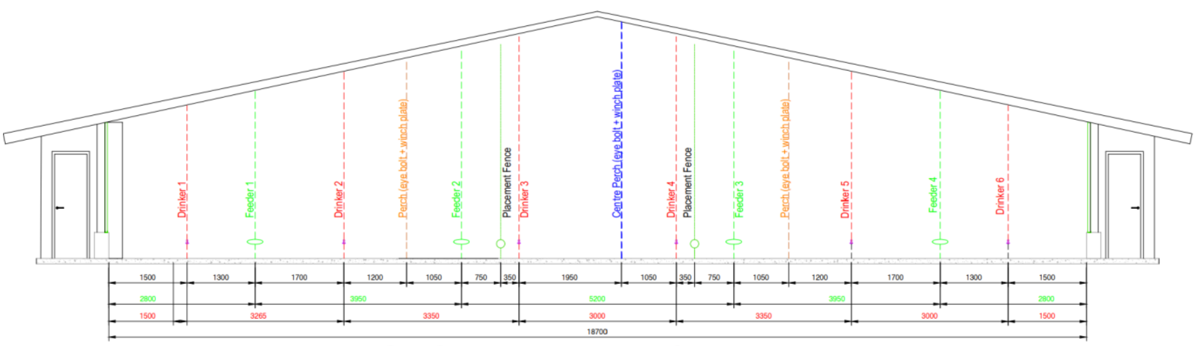
The proposed development consists of 24 buildings each serviced by 2 extraction fans.

Indicative layouts below show the location, position ,extent of equipment and building services units and location of noise sensitive receivers.

Figure B - Setting out drawings



CoolCell End View - 18.7m SHED (Internal Nib)
Internals, Doors, Fans & Heater



CoolCell End View - 18.7m SHED (Internal Nib)
Internals Only

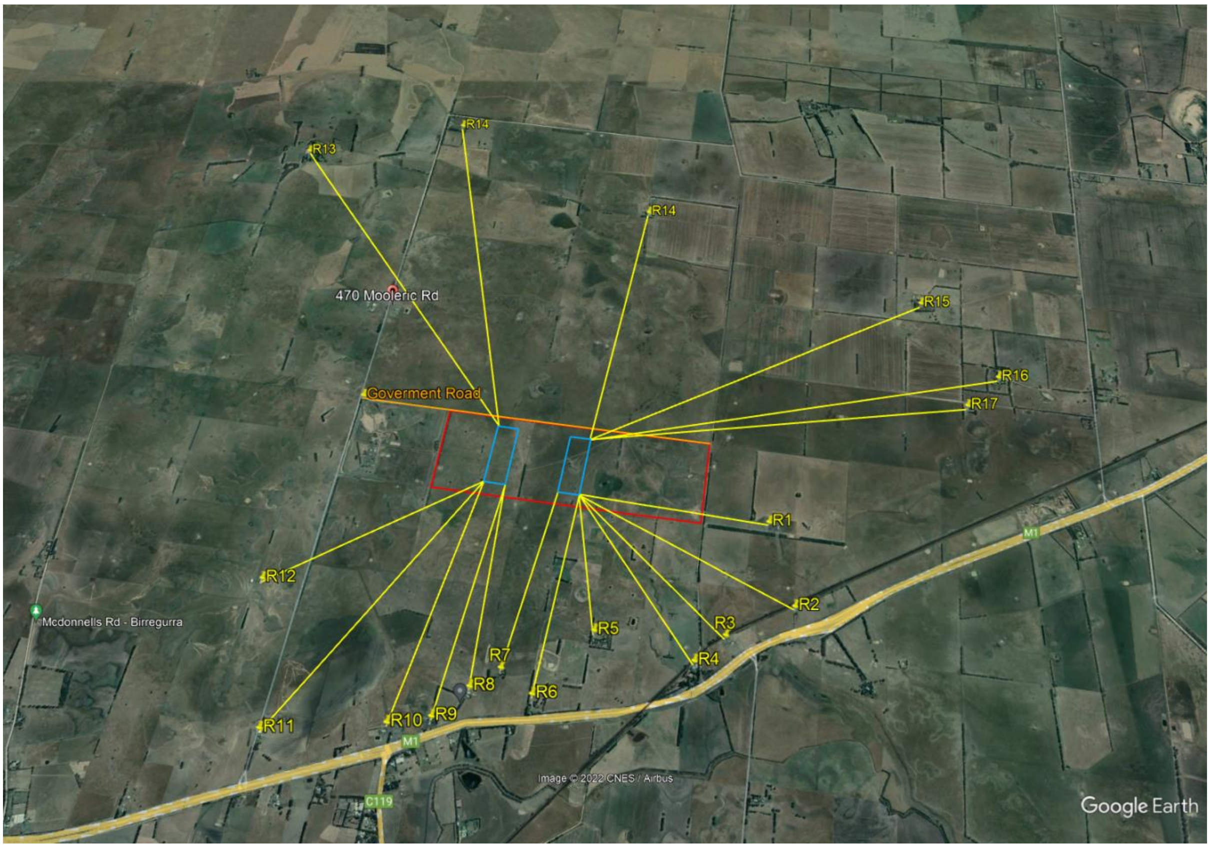


Figure C: The locations of sensitive receptors in the vicinity of the Development Site are shown and listed in Table A.

Table A Sensitive Receptors in the Vicinity of the Development Site

Receiver ID	Location	Receptor Type	Approximate Distance from EDGE OF Nearest Development Site
R1	PRICES LANE	Farm Residence	1.65 km
R2	PRINCESS HIGHWAY	Farm Residence	2.06 km
R3	PRINCESS HIGHWAY	Farm Residence	1.75 km
R4	PRICES LANE	Farm Residence	1.76 km
R5	PRINCESS HIGHWAY	Farm Residence	1.26 km
R6	PRINCESS HIGHWAY	Farm Residence	1.80 km
R7	PRINCESS HIGHWAY	Farm Residence	1.63 km
R8	PRINCESS HIGHWAY	Farm Residence	1.82 km
R9	DARCYS LANE	Farm Residence	2.09 km
R10	DARCYS LANE	Farm Residence	2.20 km
R11	Mooleric Road	Farm Residence	2.70 km

R12	Mooleric Road	Farm Residence	2.03 km
R13	Mooleric Road	Farm Residence	3.96 km
R14	Mooleric Road	Farm Residence	3.73 km
R15	Armytage Road	Farm Residence	3.49 km
R16	Armytage Road	Farm Residence	3.81 km
R17	Armytage Road	Farm Residence	3.44 km

Noise Sources

The information and data received form the client doesn't include detailed information on the noise sources, the below table lists the sources of noise typically present in such application considered in this assessment to contribute towards external environmental noise propagation. However, an update of the report could be provided if the detailed information of the noise source is specified.

Internal building services located within rooms proposed to be enclosed by block-work, or acoustically-rated enclosures with no direct path to the external environment have been considered non-contributory.

Table B – Noise Source Data

	Source Sound Power Level (SWL) dB @ 1/8 band Frequency (Hz)								No. of units per building
Item	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
FAN BD-BLUE 170C-6 WITH LIGHT TRAP	84	79	74	69	64	60	59	54	2

Data Sources:

FAN BD-BLUE 170C-6: Big Dutchman Published Data

Noise Assessment

Operational Equipment

Although all equipment is unlikely to be running 24-hours per day, a detailed on-time schedule of is not possible to obtain, as equipment operation depends largely on environmental conditions inside and outside of the buildings.

As a worst-case scenario, this assessment has considered full operation of all items of equipment continuously over the daytime and night-time periods.

G2A

Model

Using data and layouts obtained from the client, and operational noise assessment model has been created using the CadnaA Environmental Noise Assessment Package (DataKustik). Measurements of building extents and distances to the nearest affected noise-sensitive property has been assessed by topographical software and used in the environmental noise mapping suite, Assuming no correction for atmospheric conditions, or ground absorption.

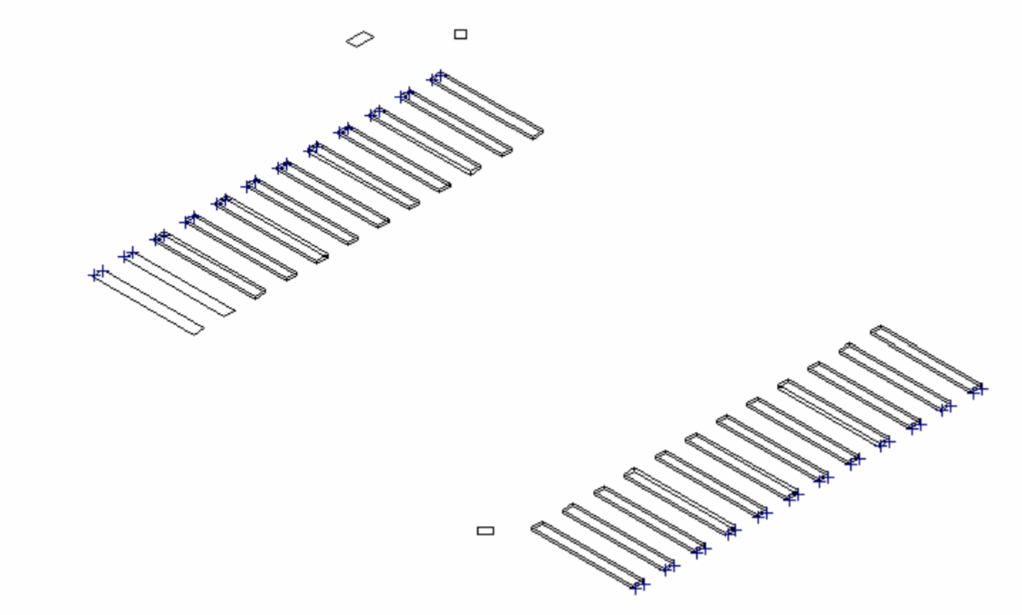


Figure D – 3D model overview

The resultant noise levels from combined operational activity, when considered at worst case full, steady-load are well below the recommended maximum noise level of 32 dB(A) night time limit, 37 dB(A) evening time limit, and 45 dB(A) day time limit

Given that an assumption of all equipment operating continuously (daytime and night-time) for each hour is likely to be a relative worst case, the resulting noise levels 15 dB $L_{Aeq,t}$ should be considered an upper limit of the actual levels that would be expected from the operation of the site at nearest noise sensitive receivers.

The predicted noise levels satisfy the project noise trigger level by 24 dB(A) for the daytime and 22 dB(A) for the evening period and 17 dB(A) on night time. On that basis, unacceptable noise impacts are not expected. On this basis it is unlikely that the nearest noise-sensitive properties would be adversely affected by the proposed development.

Proprietary acoustic modelling software (CadnaA) has been used to calculate the likely noise propagation of the new development. This is set out in the Appendices at the end of this report.

Source levels have only been provided in terms of single overall figures. However, the calculation has been carried out over the octave band audible frequency range including low frequency (63Hz and 125Hz). Typical spectra taken from known units has been used to supplement the calculation data, and has been presented within this report.

Context

The development is currently part of a development process which seeks to construct building services units. While the specific usage is proposed to be maintained, the operation within the site is expected to make full use of the best available technology to minimize noise egress to the surrounding environment.

The current model indicates that proposed building services equipment should be largely inaudible when considered at the nearest noise-sensitive property (NOISE FROM INDUSTRY IN REGIONAL VICTORIA, NIRV)

In meeting the required prescriptive noise limits as defined by the NIRV requirement for a baseline environmental background/ambient noise survey to justify/assess the intrusion/annoyance over and above the existing background noise climate has been negated.

Conclusions

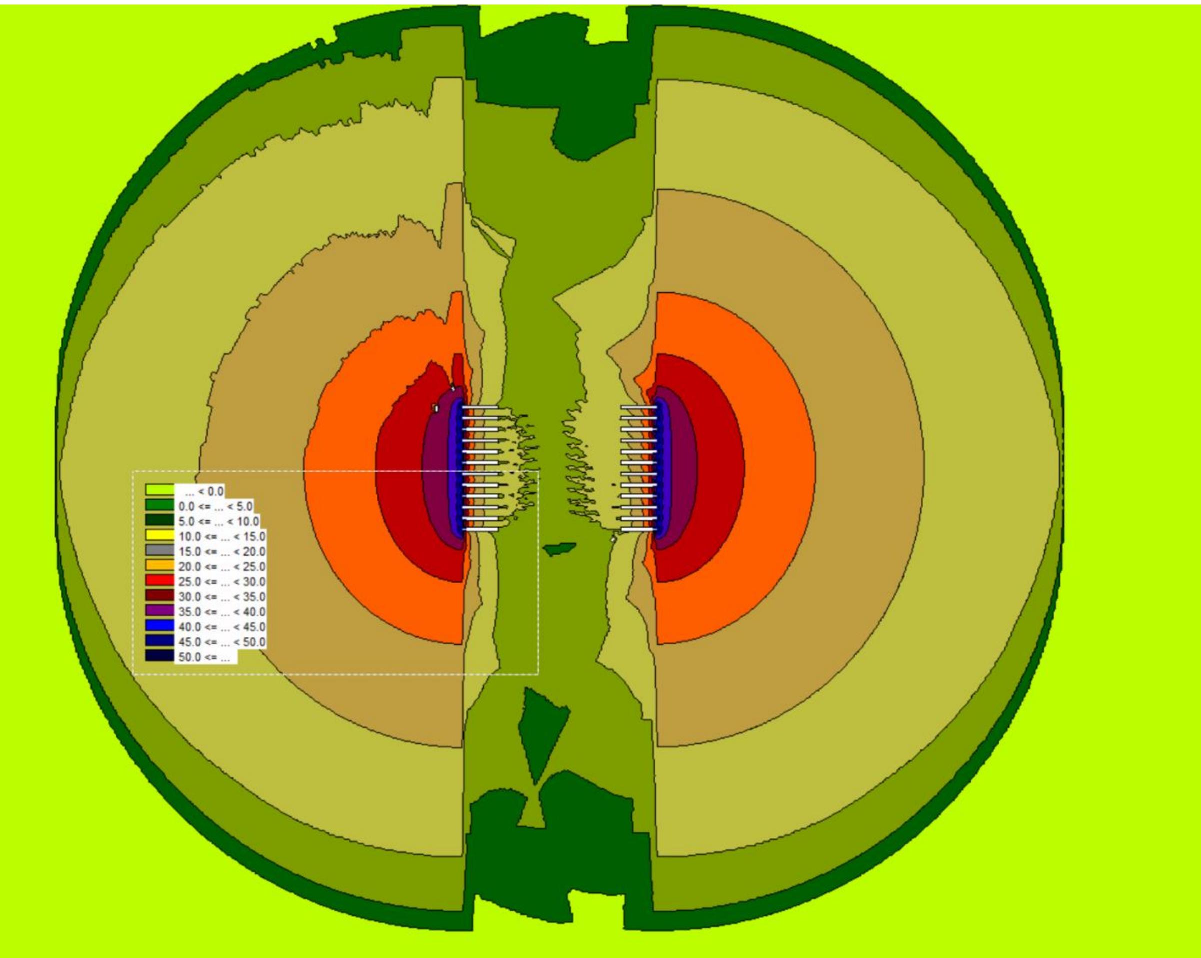
The Group Acoustic Research has been commissioned to undertake and Environmental Noise Impact Assessment on behalf of Mooleric Broiler Farm Construction in anticipation of the construction of 24 sheds.

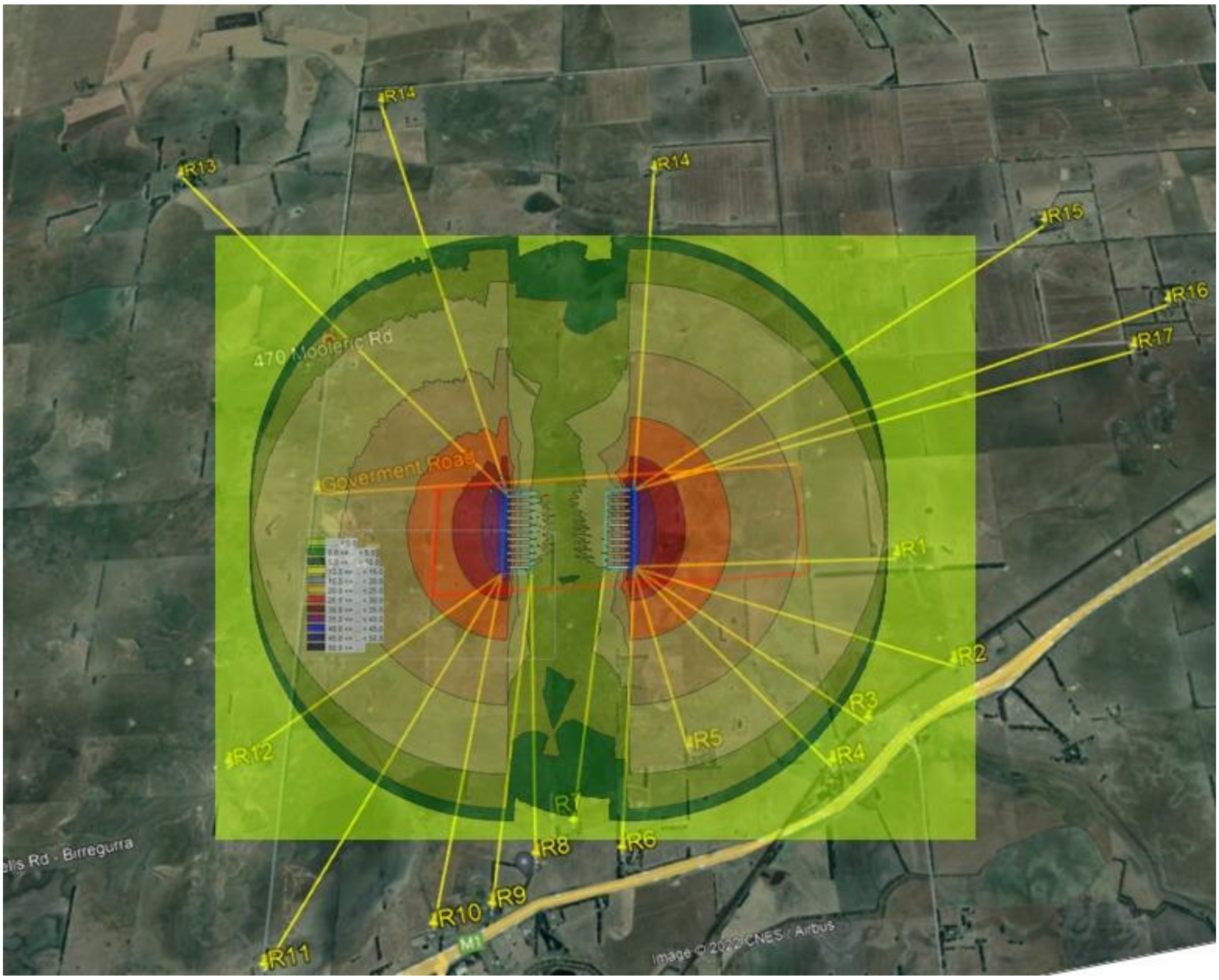
Assessments have been carried out in accordance with Local planning guidance and international assessment standards and calculation procedures.

Mitigation measures have been noted as not required, based on the current proposals resulting in noise egress levels below the prescribed intrusion noise limit.

Fixed plant use are assessed to not cause an exceedance of prescriptive noise levels during operation and as a result are deemed a *'low impact' and inaudible*.

Appendix – A Modelling Outputs




R13
R14
R14
R15
R16
R17
470 Mooleric Rd
Goverment Road
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
M1
Image © 2022 CNES / Airbus

G2A

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airenvironment

CLIENT

ProTen Pty Ltd

PROJECT

Mooleric Broiler Farm

PROJECT #

0132.2306

REPORT

Odour Impact Assessment

11 December 2023

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[illegible]	[illegible] *ProTen Pty Ltd, Mooleric Broiler Farm Odour Impact Assessment* [illegible]
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[illegible]

11 December 2023

[illegible]

[illegible]

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[illegible]

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APPENDICES

Glossary

Term	Definition
Units of measurement	
Am^3/s	actual cubic metres per second (volumetric flow rate at actual temperature and pressure)
Atm	Atmosphere (unit of air pressure)
d	day
h	hour
K	Kelvin (unit of temperature)
km	kilometre
km/h	kilometres per hour
m	metre
m/s	metres per second (velocity)
m^2	square metres
m^3	cubic metres
m^3/s	cubic metres per second (volumetric flow rate)
min	minute
Nm^3/s	normalised cubic metres per second (volumetric flow rate at 0 °C and 1 Atm)
°C	degrees Celsius
ou	odour unit
rad	radians (unit of angle)
s	second
Sm^3/s	standard cubic metres per second (volumetric flow rate at 25 °C and 1 Atm)
yr	year
Abbreviations/Definitions	
3D	three-dimensional
AWS	automatic weather station
BOM	Bureau of Meteorology
C_{25}	The 25^{th} percentile concentration
C_{75}	The 75^{th} percentile concentration
$C_{99.9}$	The 99.9^{th} percentile concentration
CALMET	A diagnostic meteorological model currently developed by Exponent Inc.
CALPUFF	A Gaussian puff dispersion model currently developed by Exponent Inc.
DEM	digital elevation model
EPA	Environment Protection Authority Victoria
OER	odour emission rate
PG	Pasquill-Gifford Scheme
SRTM1	near-global 1-arc second (~30 m) Digital Elevation Model produced by the Shuttle Radar Topography Mission (SRTM1 version 3)
SRTM3	global 3-arc second (~90 m) Digital Elevation Model produced by the Shuttle Radar Topography Mission
TAPM	The Air Pollution Model. Prognostic meteorological and air dispersion model developed by the Australian Government's Commonwealth Scientific and Industrial Research Organisation (CSIRO).
Statistical terms	
IOA	Index of agreement
MAE	Mean absolute error
ME	Mean error
RMSE	Root Mean Square Error

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Executive Summary

[illegible] Mooleric Broiler Farm.

[illegible] *Guidance for assessing odour* [illegible]

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[illegible]

Table ES1 Distribution of predicted 3-minute average ground-level odour concentrations at sensitive receptors for the Mooleric Broiler Farm, 1 March 2017 to February 2022

Receptor	Median, ou	Mean, ou	C_{75}, ou	$C_{99.9}$, ou	Max, ou	n
R1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Receptor	Median, ou	Mean, ou	C_{75}, ou	$C_{99.9}$, ou	Max, ou	n
R7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R14a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R14b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table Notes: C_{25}, C_{75}, and $C_{99.9}$ represent the 25th, 75th and 99.9th percentile concentrations respectively. SEPP AQM is no longer in force, meaning that there is no assessment criterion for odour predictions.

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1 Introduction

2 Site Description

[illegible] modules' sets of fans 960 m apart and directed in opposite directions.

Figure 2-1 Proposed layout of the Mooleric Broiler Farm

[illegible]

[illegible]

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3 Legislative Requirements, Context and Air Quality Assessment Criteria

3.1 Draft separation distance guideline

E[illegible]A[illegible] [illegible] ("Planning and environmental guideline for establishing meat chicken farms" Guide 1 Assessment Guide, [illegible] *Guidance for assessing odour* [illegible]

3.2 National guideline for meat chicken farms

T[illegible]e *Planning and Environment Guideline for Establishing Meat Chicken Farms* [illegible]

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  - [illegible]

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- Tier 2 utilises an 'S[illegible]Factor' formula to calculate [illegible]
  - F[illegible]r[illegible] [illegible]
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  - O[illegible]

  T[illegible]e [illegible]F[illegible]r [illegible]
- T[illegible]er [illegible]

3.3 EPAV guidance for assessing odour

T[illegible]e *Guidance for Assessing Odour* [illegible]E[illegible]A [illegible]

- [illegible]

3.4 Approach for this assessment

4 Existing Environment

4.1 Modelling domain

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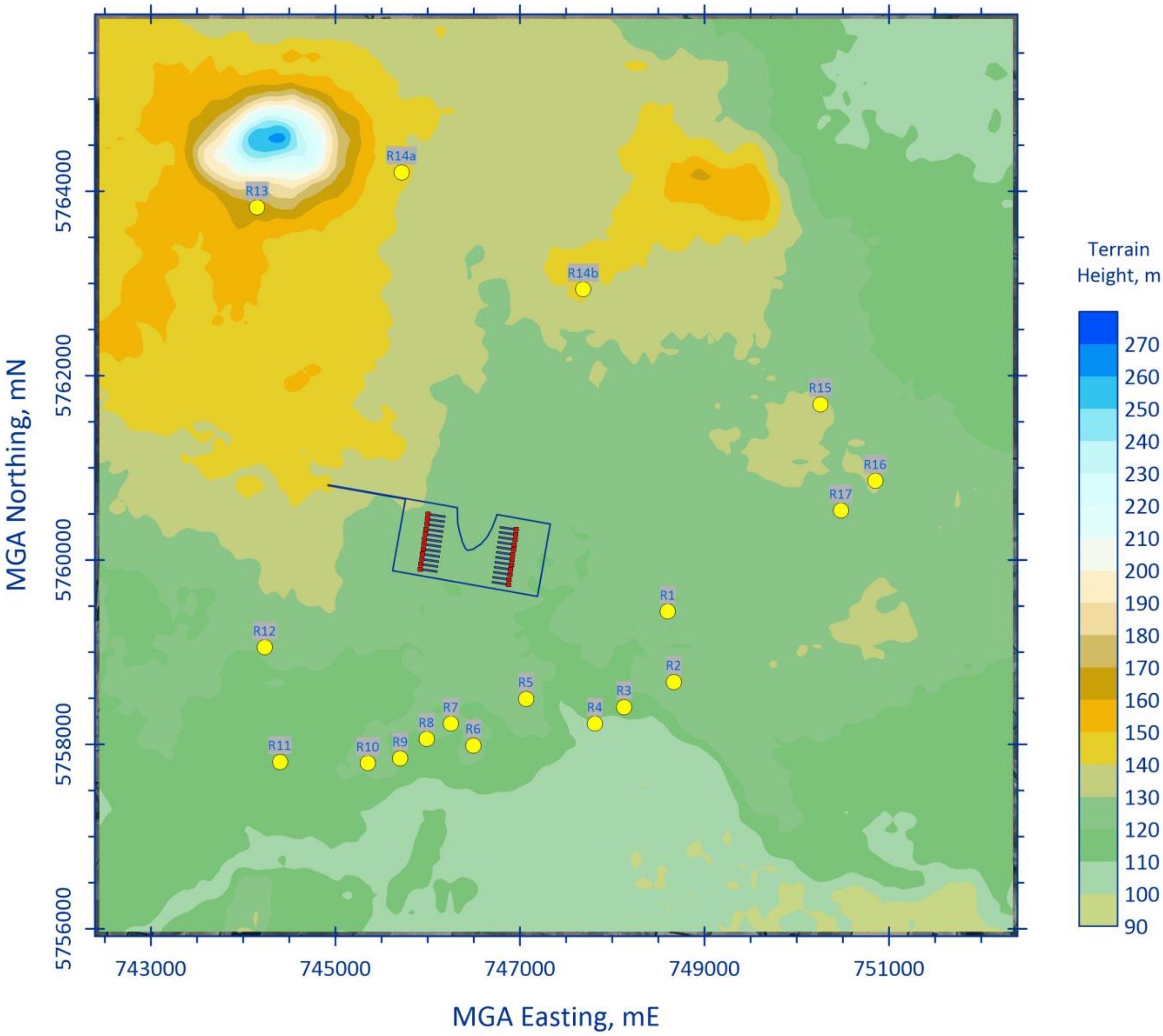

Figure 4-1 Digital elevation model of the region surrounding the Mooleric broiler farm

The land use classification for the region illustrated in Figure 4-2 has been extracted from the Australian Collaborative Land Use and Management Program (ACLUMP). The predominant land use in the region is cropland and pasture.

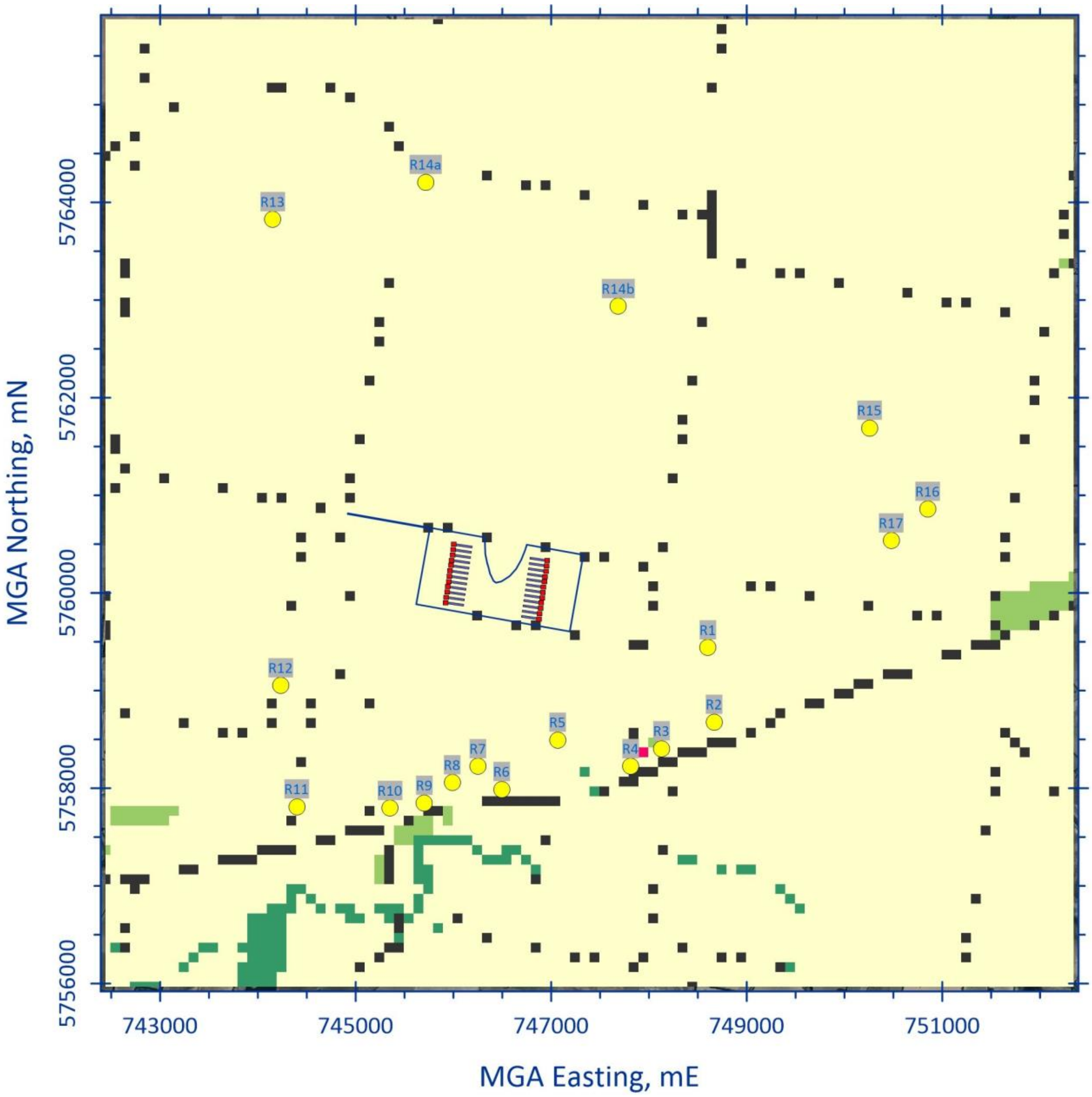

Figure 4-2 Land-use classification of the region surrounding the Mooleric broiler farm

Figure note: Land use is defined for each 200 m grid cell using the United States Geological Survey (USGS) classification system, where:
Red = Residential (USGS Class 11)
Grey = Transportation, Communications, and Utilities (USGS Class 14)
Pale Yellow = Cropland and Pasture (USGS Class 21)
Light Green = Mixed Rangeland (USGS Class 33)
Dark Green = Mixed Forest (USGS Class 43)

5 Emissions Inventory

5.1 The K-factor odour emissions model

Od[illegible] [illegible] [illegible] de[illegible]ed [illegible] [illegible] de[illegible] [illegible] Ar [illegible] E[illegible] (AE[illegible]) [illegible] Or[illegible] [illegible] H[illegible] ([illegible]AE H[illegible]). T[illegible] [illegible] (OER[illegible]) [illegible] de[illegible]ed [illegible]

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- OER [illegible] [illegible]red[illegible]ed [illegible] [illegible]
- [illegible] and six representing the shed's design and management
- A [illegible] [illegible]
- D [illegible] de[illegible]
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$$OER = 0.025 * K * A * D * V^{[illegible]}$$ E[illegible]

[illegible] AE H[illegible]

I[illegible] [illegible]

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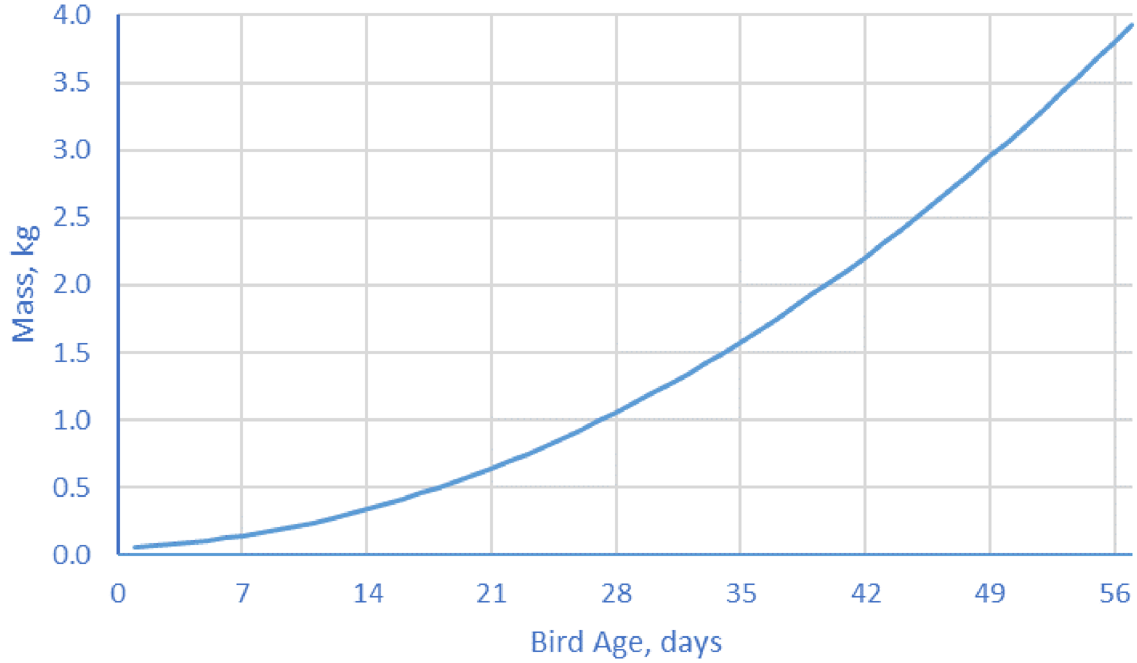

Figure 5-1 Bird weight as a function of age (Ross 308 Performance Tables)

$$Weight, kg = \frac{(1.1118 * age^2 + 4.6295 * \text{age} + 55.6)}{1000}$$ E[illegible]

[illegible]

Table 5-1 Shed ventilation as a percentage of maximum ventilation

Bird age (weeks)	1	2	3	4	5	6	7	8
Temperature above target (°C)[1]	Ventilation rate (as a percentage of the maximum)							
< 1	1.28	2.55	5.11	7.66	9.79	11.49	17.03	17.03
1	1.28	12.50	12.50	25.00	25.00	25.00	25.00	25.00
2	1.28	25.00	25.00	37.50	37.50	37.50	37.50	37.50
3	1.28	37.50	37.50	50.00	50.00	50.00	50.00	50.00
4	1.28	37.50	37.50	50.00	50.00	50.00	50.00	50.00
5	1.28	37.50	37.50	50.00	50.00	50.00	50.00	50.00
6	1.28	37.50	37.50	62.50	75.00	75.00	75.00	75.00
7	1.28	37.50	37.50	62.50	75.00	75.00	87.50	100.00
8	1.28	62.50	62.50	62.50	75.00	75.00	100.00	100.00

Table note: [1]Ambient temperature minus the target effective temperature within the shed.

[illegible]

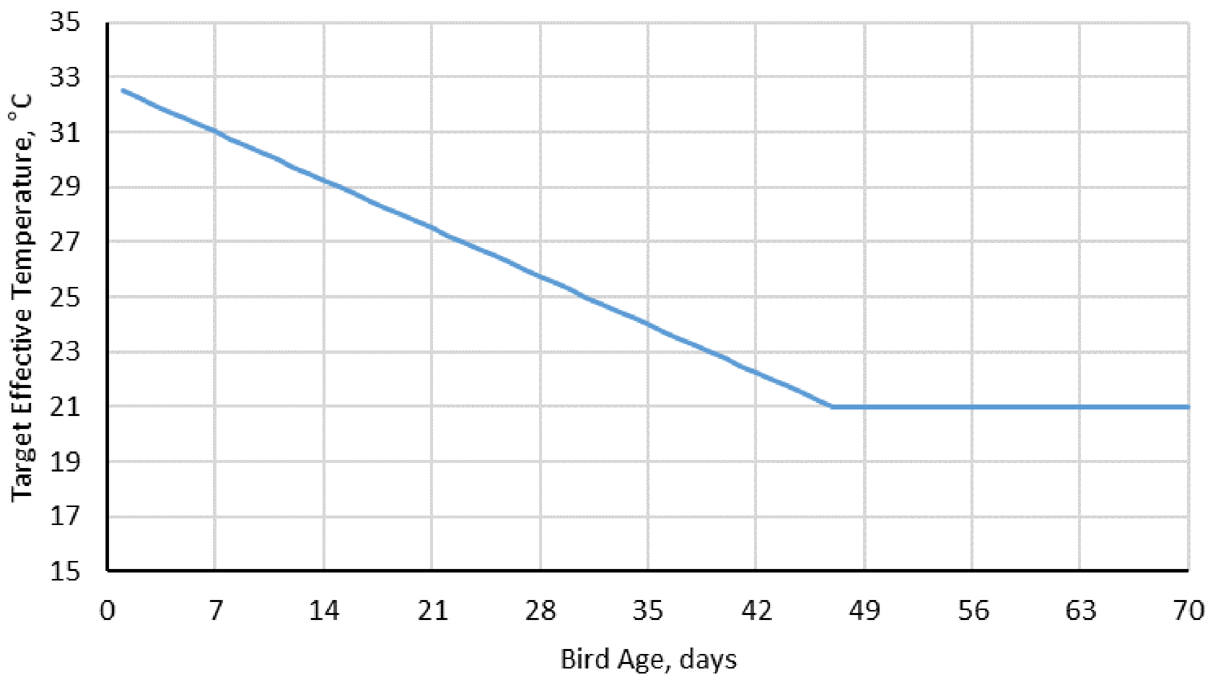

Figure 5-2 Typical target shed temperature with batch age (PAE Holmes, 2011)

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- [illegible]
- [illegible] of each shed's respective [illegible]
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- [illegible]
- Selection of the 'typical' target temperature profile.

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5.2 Bird numbers

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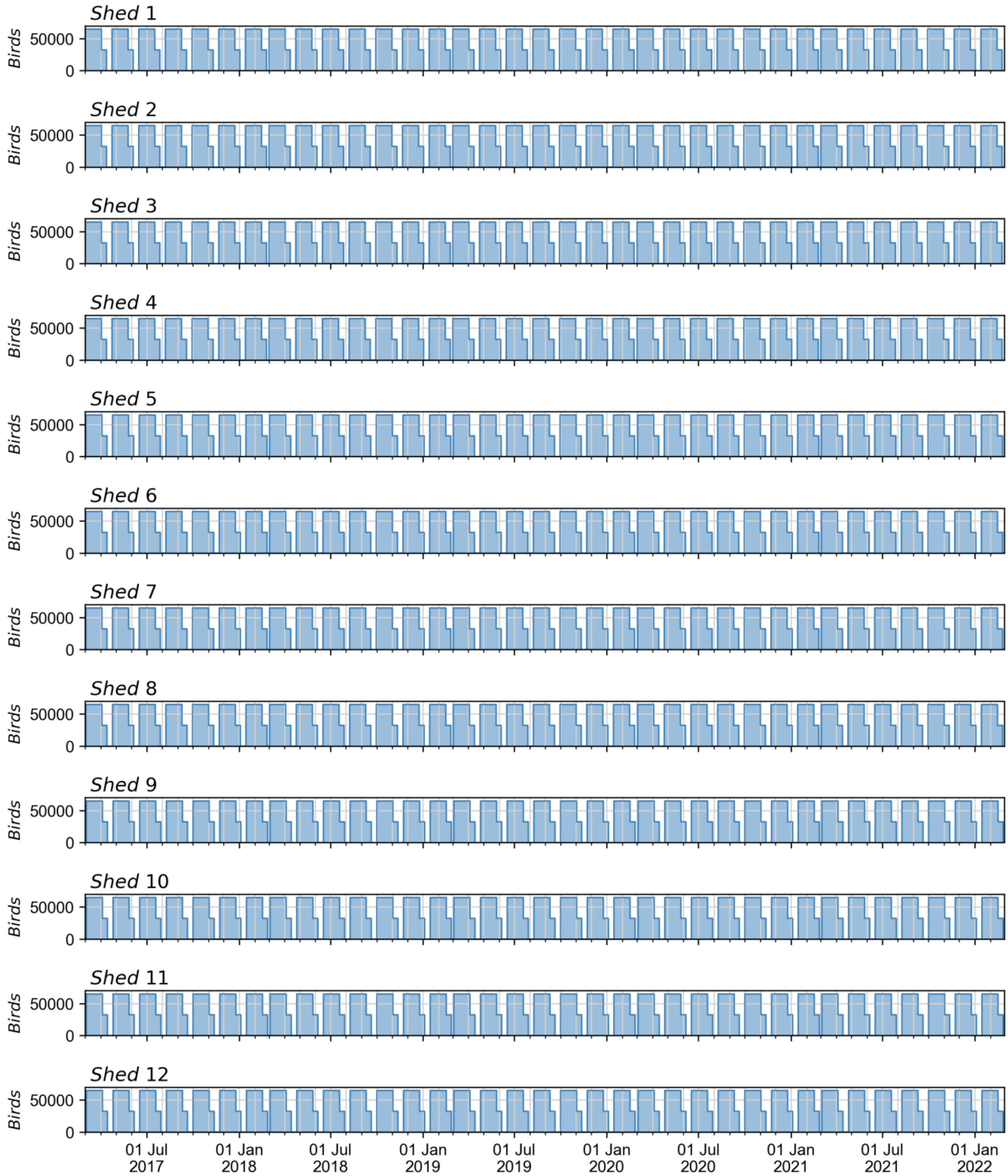

Figure 5-3 Time varying bird numbers for Module 1 (65,000 birds placed per shed)

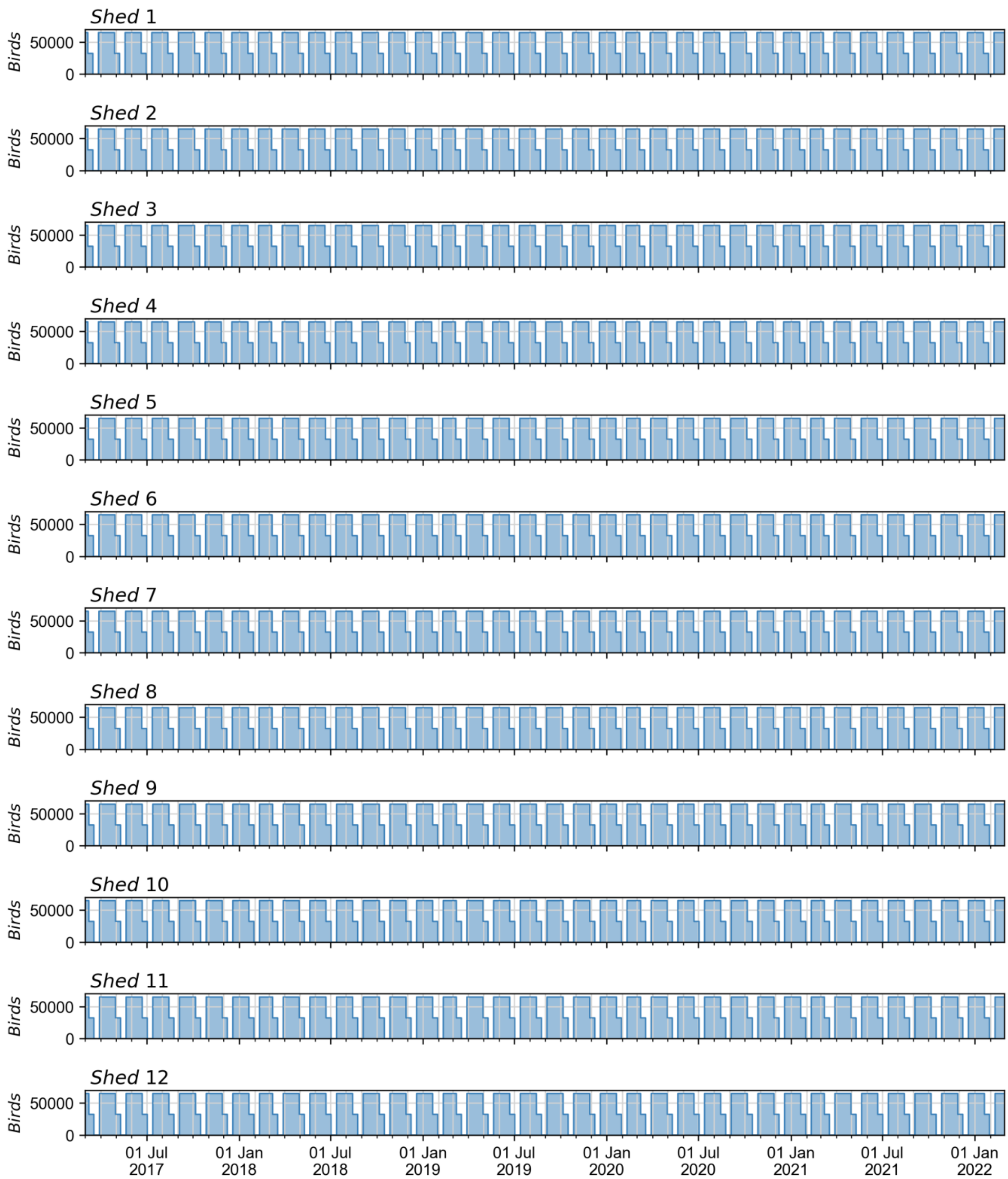

Figure 5-4 Time varying bird numbers for Module 2 (65,000 birds placed per shed)

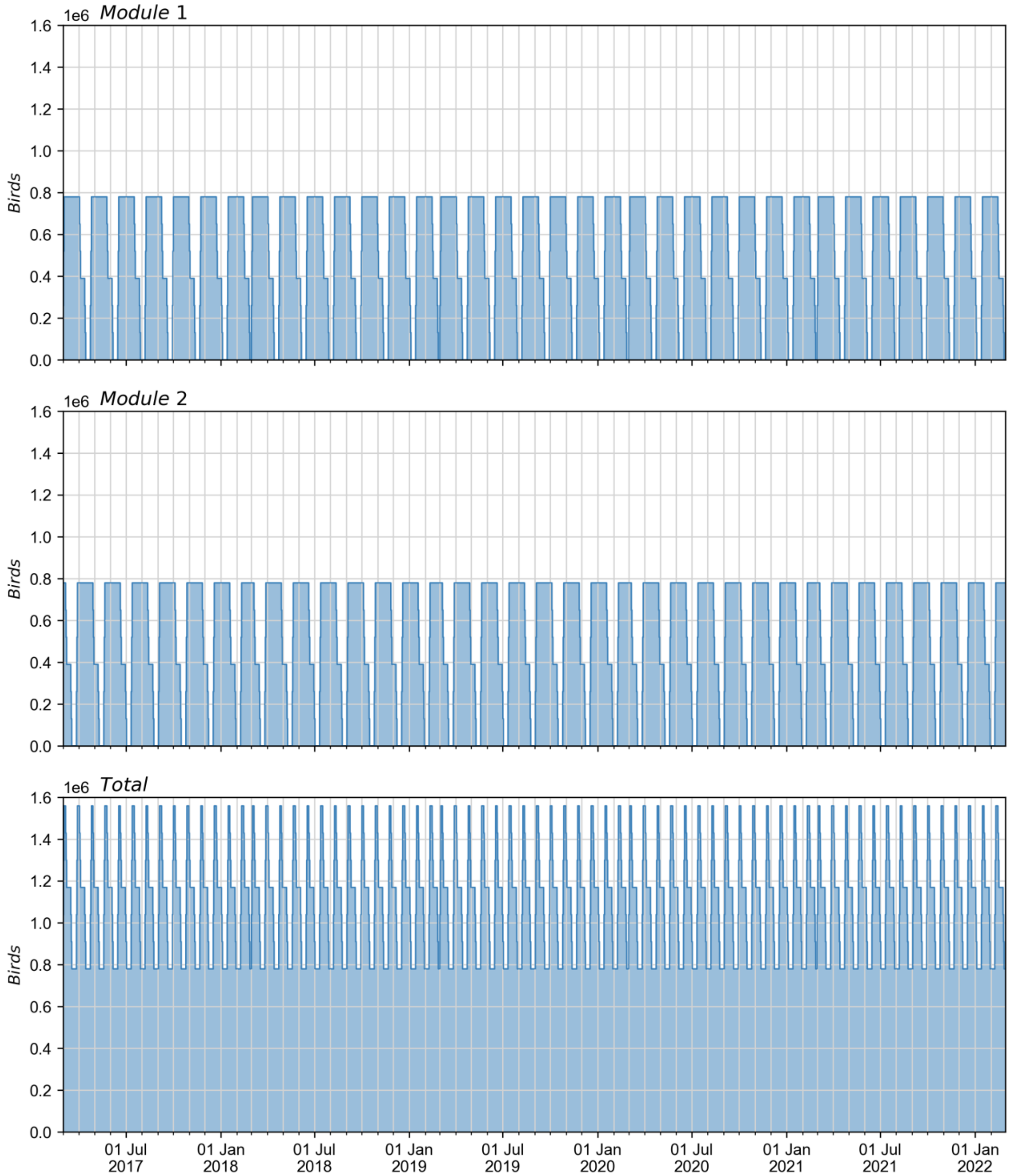

Figure 5-5 Time varying total bird numbers for Modules 1 and 2, and the entire farm

5.3 Odour emission rates

[illegible]

Table 5-2 Range of total odour emission rates for all sources

Source	Odour emission rate, ou.m³/s		
	Minimum	Average	Maximum
Module 1 Shed 1	0	3803	37559
Module 1 Shed 2	0	3803	37559
Module 1 Shed 3	0	3803	37559
Module 1 Shed 4	0	3803	37559
Module 1 Shed 5	0	3804	35618
Module 1 Shed 6	0	3804	35618
Module 1 Shed 7	0	3804	35618
Module 1 Shed 8	0	3804	35618
Module 1 Shed 9	0	3811	35078
Module 1 Shed 10	0	3811	35078
Module 1 Shed 11	0	3811	35078
Module 1 Shed 12	0	3811	35078
Module 2 Shed 1	0	3735	31743
Module 2 Shed 2	0	3735	31743
Module 2 Shed 3	0	3735	31743
Module 2 Shed 4	0	3735	31743
Module 2 Shed 5	0	3741	41505
Module 2 Shed 6	0	3741	41505
Module 2 Shed 7	0	3741	41505
Module 2 Shed 8	0	3741	41505
Module 2 Shed 9	0	3752	41505
Module 2 Shed 10	0	3752	41505
Module 2 Shed 11	0	3752	41505
Module 2 Shed 12	0	3752	41505
Total	30897	90585	452011

[illegible]

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[illegible] ambient air within each shed, meaning that the “hot day spikes” are less pronounced in reality. Either [illegible]

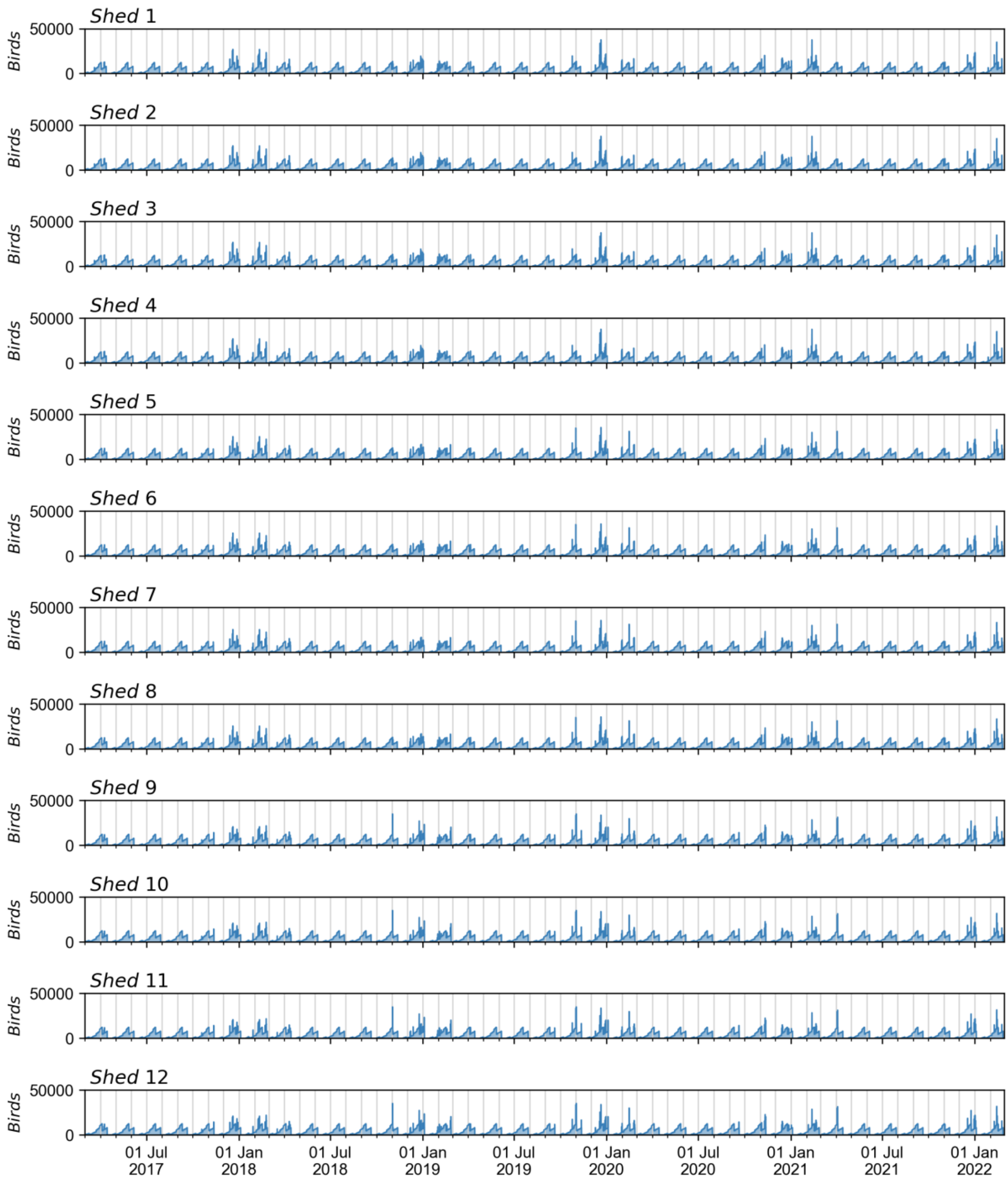

Figure 5-6 Time varying odour emission rates for Module 1 sheds

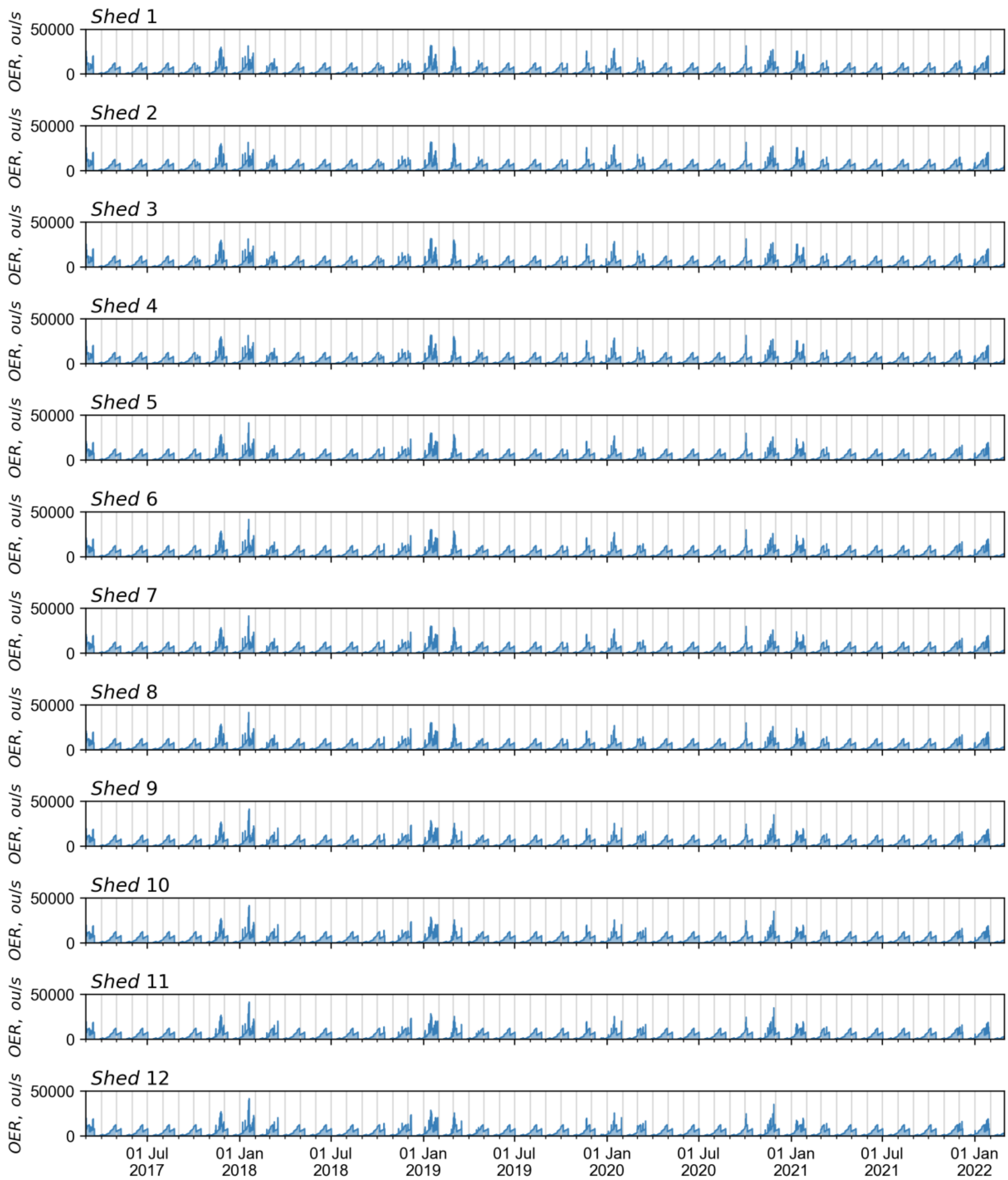

Figure 5-7 Time varying odour emission rates for Module 2 sheds

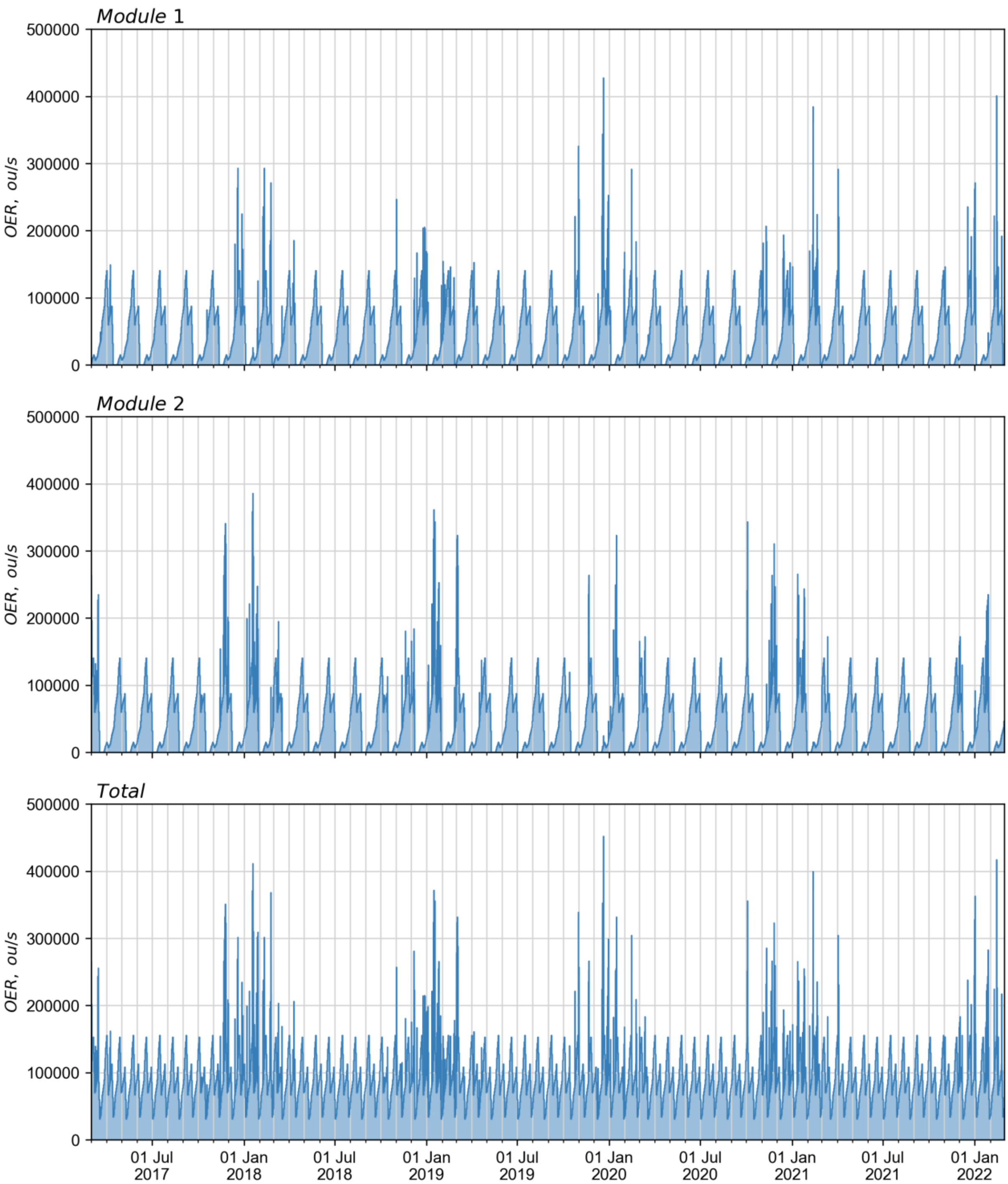

Figure 5-8 Time varying total odour emission rates for Modules 1 and 2, and the entire farm

A □□□ □□□□e □re□□e□□□ d□□r□□□□□□ □□□□F□□re □□□□ □□□ □re□□red □□□□□□□ □e d□□r□□□□□□ □□□d□□r e□ □□□□□ r□□e□ □□□ree d□ere□□□□□□e□□

- Od□□r e□ □□□□□□ r□□ □ □□□□e □□ed □□□ed □□M□d□e □□
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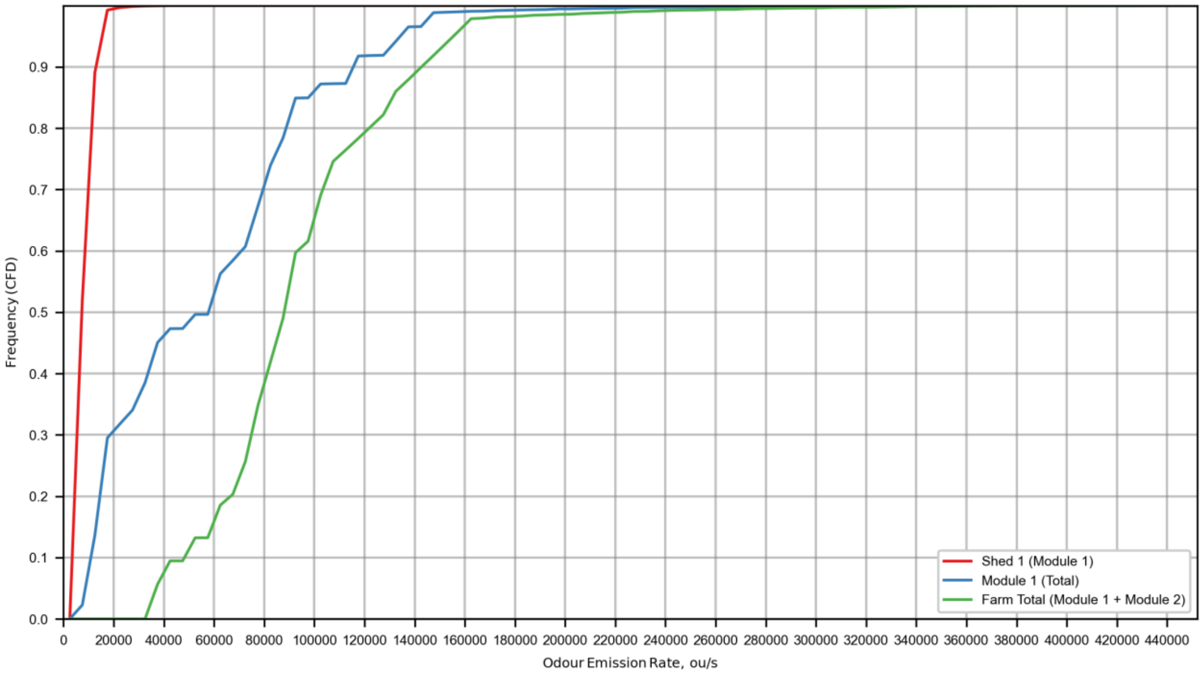

Figure 5-9 Cumulative frequency distribution of odour emissions from a single shed; a single module; the entire ProTen Mooleric Broiler Farm

6 Dispersion Modelling and Impact Assessment Method

6.1 Selection of a representative period of meteorology

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6.2 Meteorological modelling

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A[illegible] [illegible]de[illegible] [illegible]ere [illegible]red [illegible] [illegible]der[illegible] [illegible]e *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the Approved Methods for the Modeling and Assessment of Air Pollutants in NSW, Australia* [illegible]TR[illegible] E[illegible]r[illegible] [illegible]Gr[illegible]

6.2.1 TAPM prognostic meteorological model

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[illegible]

6.2.2 CALMET diagnostic meteorological pre-processor

[illegible]

[illegible] prognostic grid data was used by the CALMET diagnostic model as 'initial guess' [illegible]

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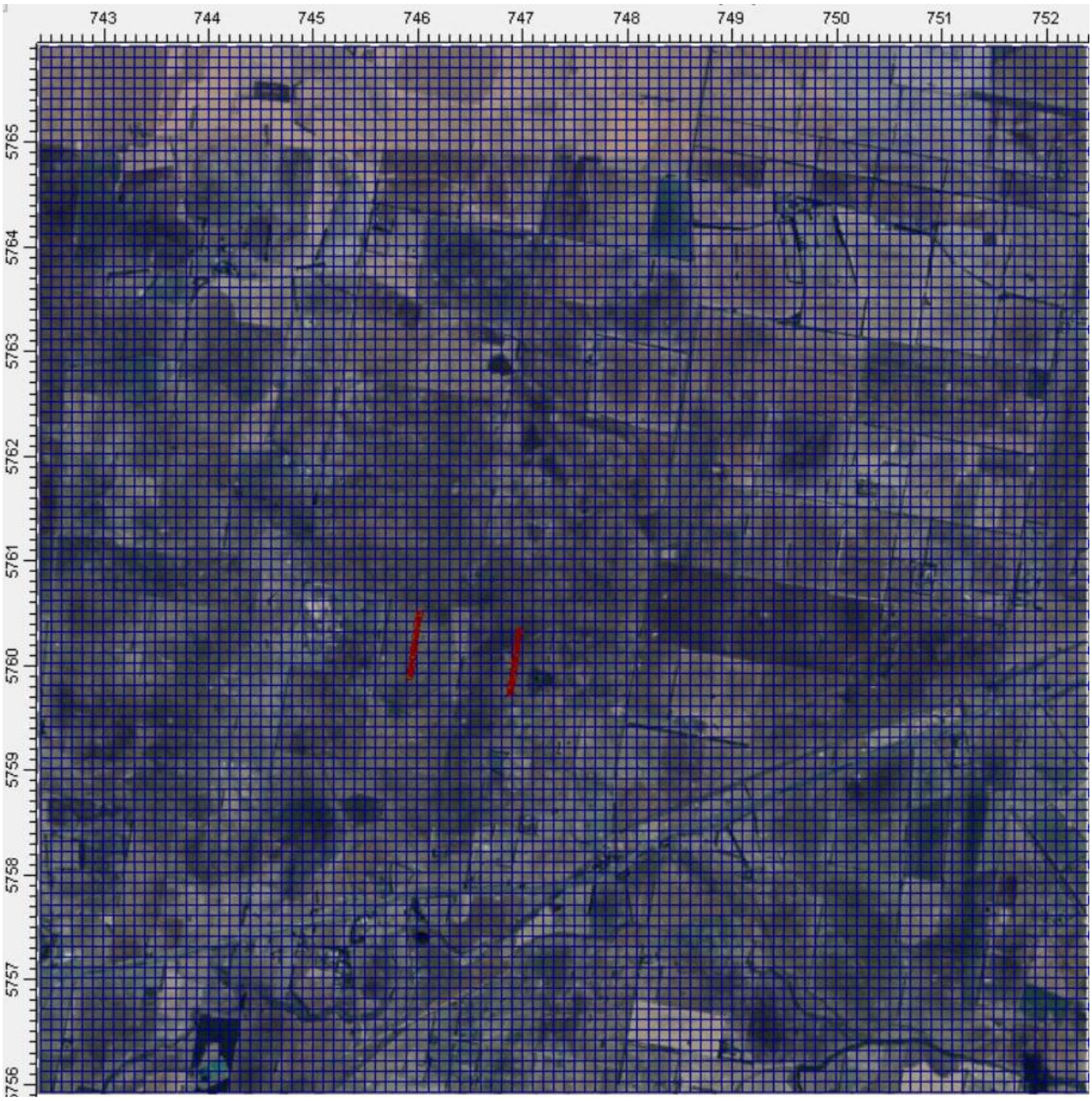

Figure 6-1 The CALMET 100 column by 100 row 100 m meteorological grid

6.2.3 Meteorological model performance evaluation

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6.3 Analysis of dispersion meteorology

6.3.1 Wind speed and direction

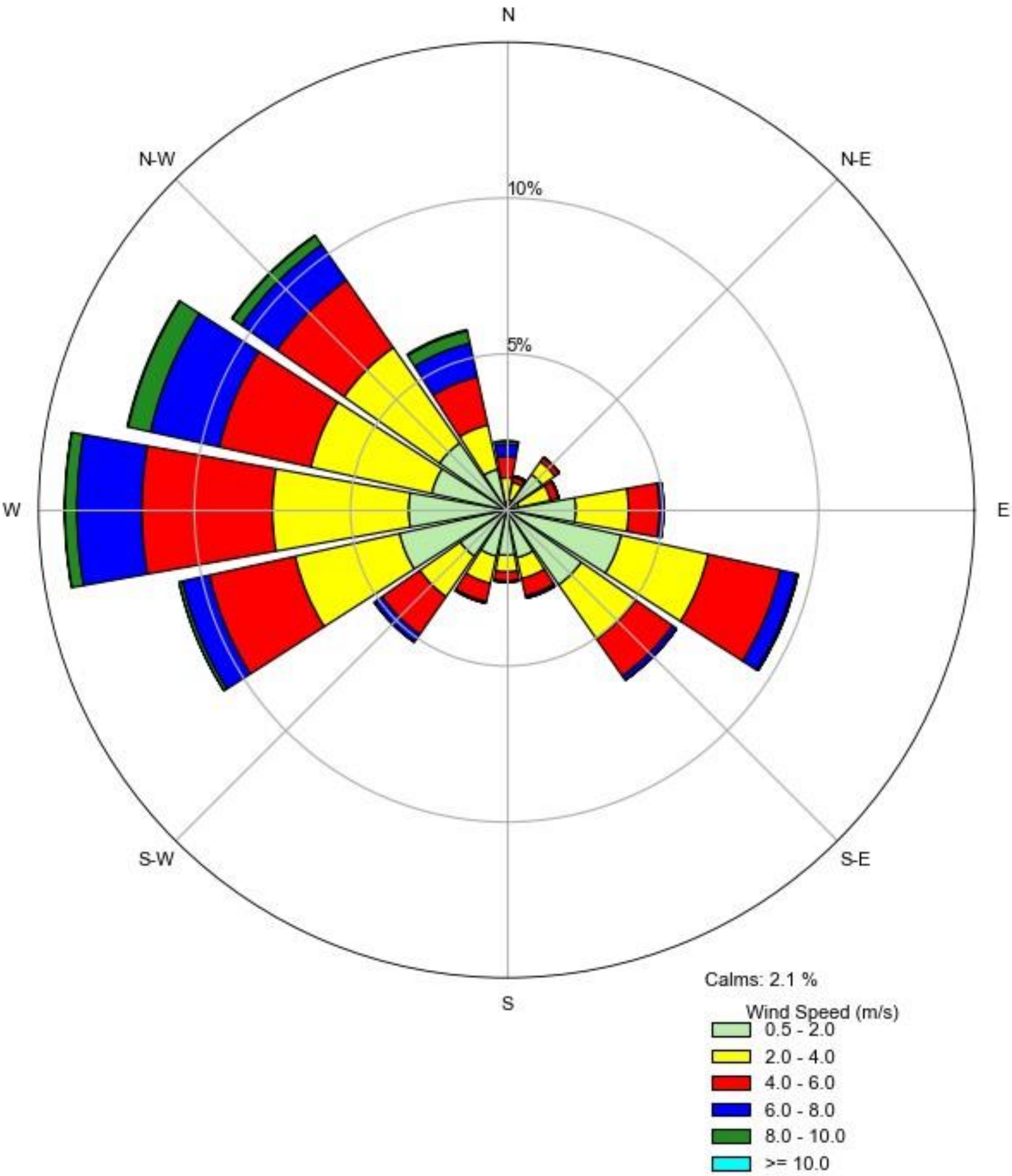

Figure 6-2 Distribution of winds at the broiler farm, 1 March 2017 to 28 February 2022

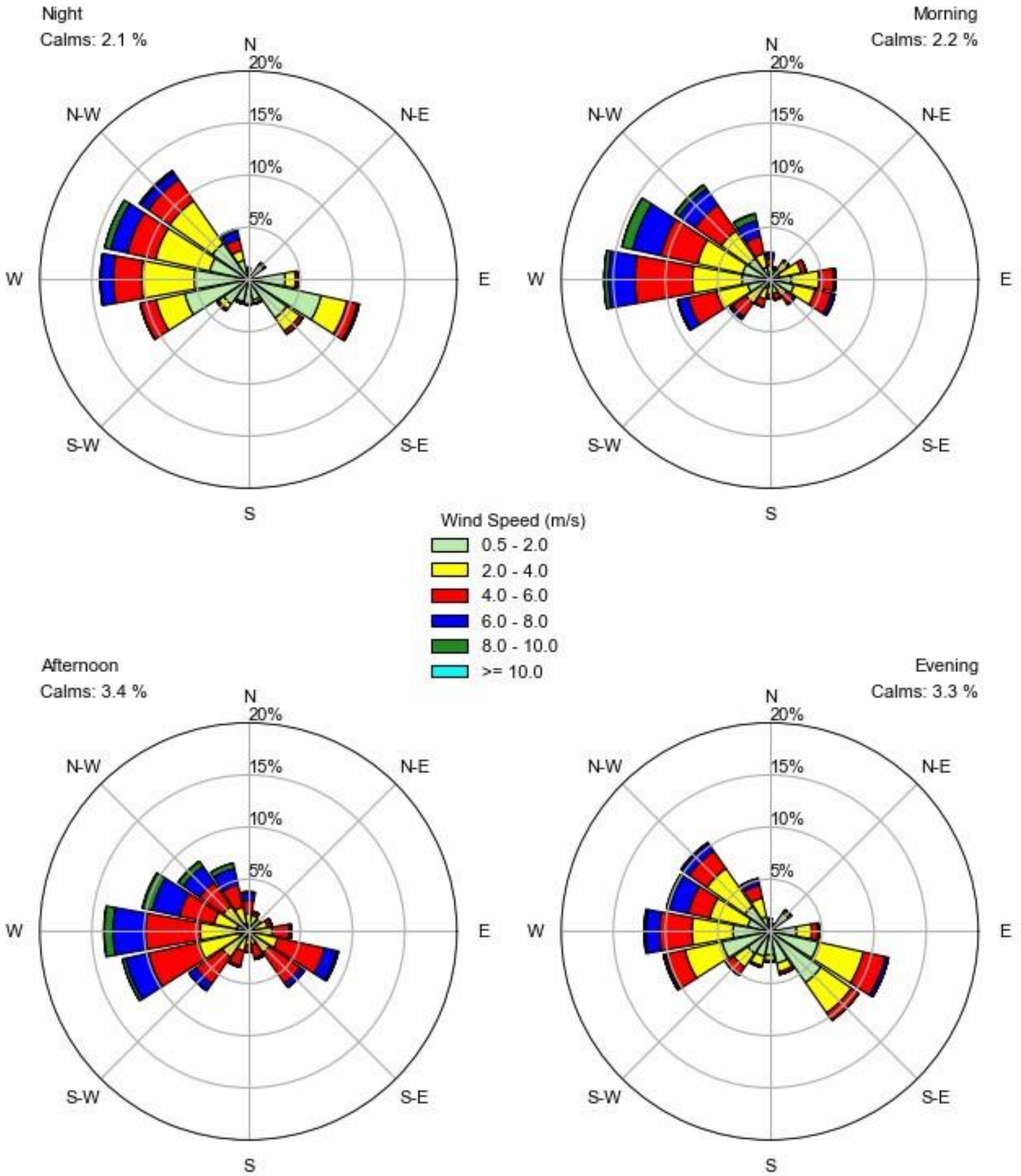

Figure 6-3 Diurnal distribution of winds at the broiler farm, 1 March 2017 to 28 February 2022

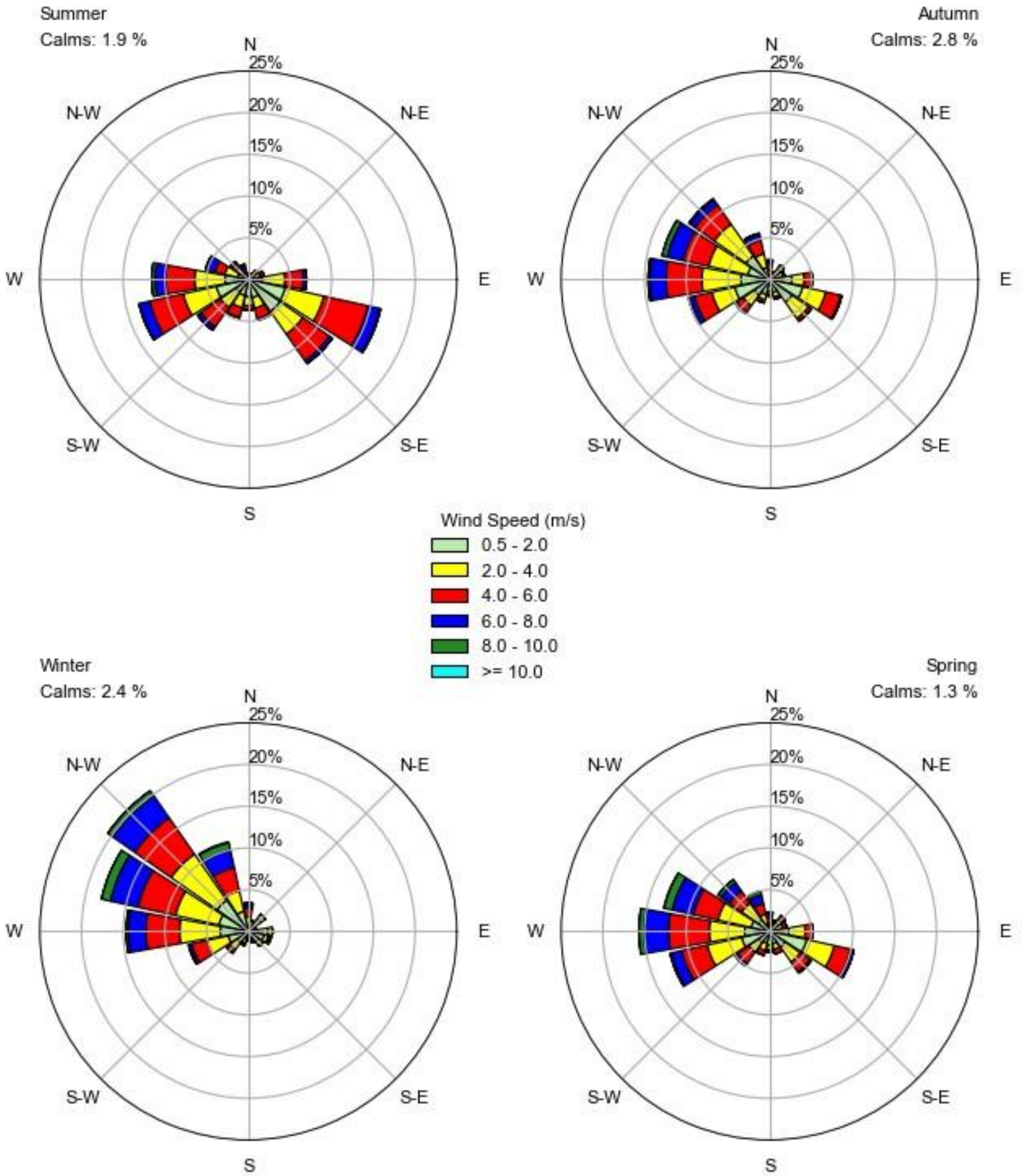

Figure 6-4 Seasonal distribution of winds at the broiler farm, 1 March 2017 to 28 February 2022

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Table 6-1 Annual, seasonal and diurnal mean wind speeds at the broiler farm, 1 March 2017 to 28 February 2022

Period	Mean Wind Speed (m/s)	Calms (%)
Annual	3.4	2.1
Summer	3.4	1.9
Autumn	3.0	2.8
Winter	3.5	2.4
Spring	3.5	1.3
Night: Midnight to 6am	2.6	3.4
Morning: 6am to Midday	3.7	3.3
Afternoon: Midday to 6pm	4.4	1.0
Evening: 6pm to midnight	2.8	0.9

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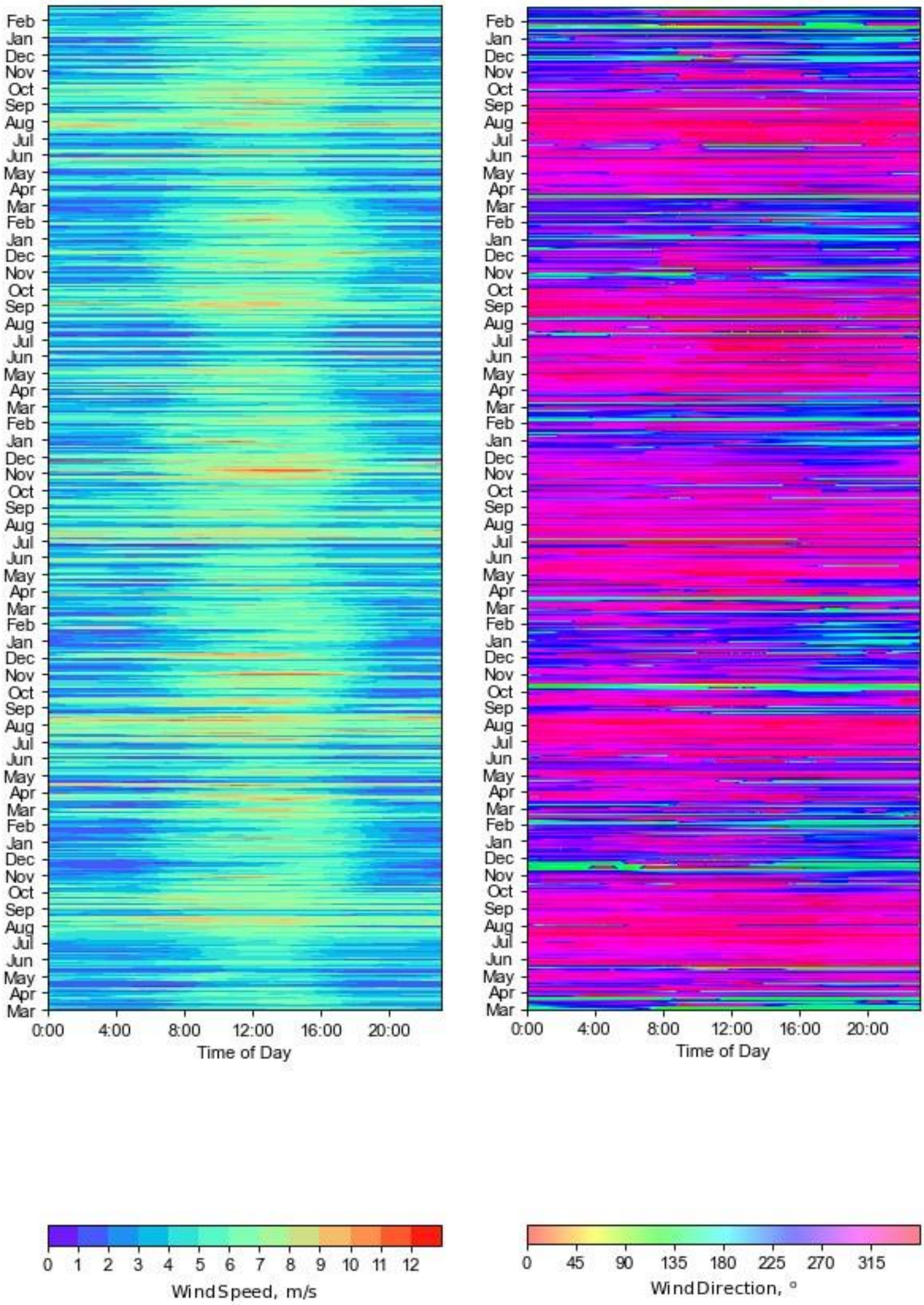

Figure 6-5 Predicted monthly and hourly profiles of wind speed and direction at the broiler farm, 1 March 2017 to 28 February 2022

6.3.2 Atmospheric stability

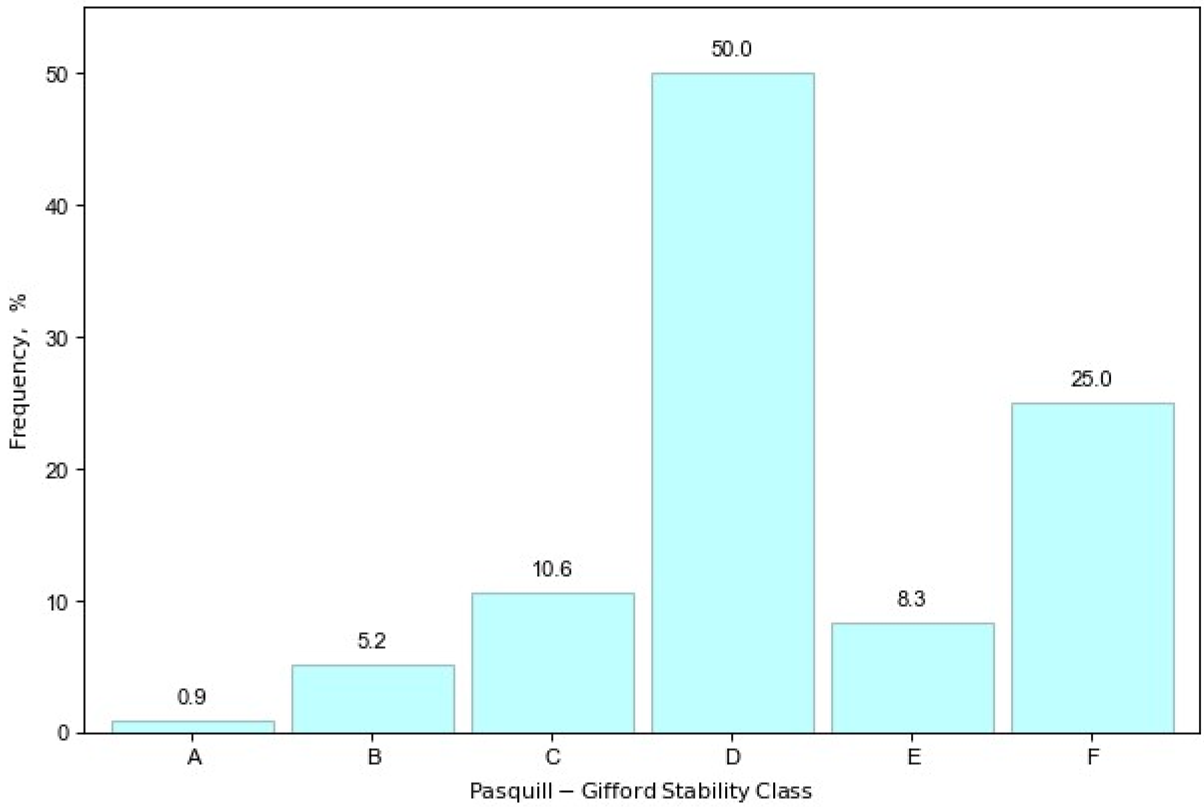

Figure 6-6 Frequency distribution of hourly atmospheric stability classifications at the broiler farm, 1 March 2017 to 28 February 2022

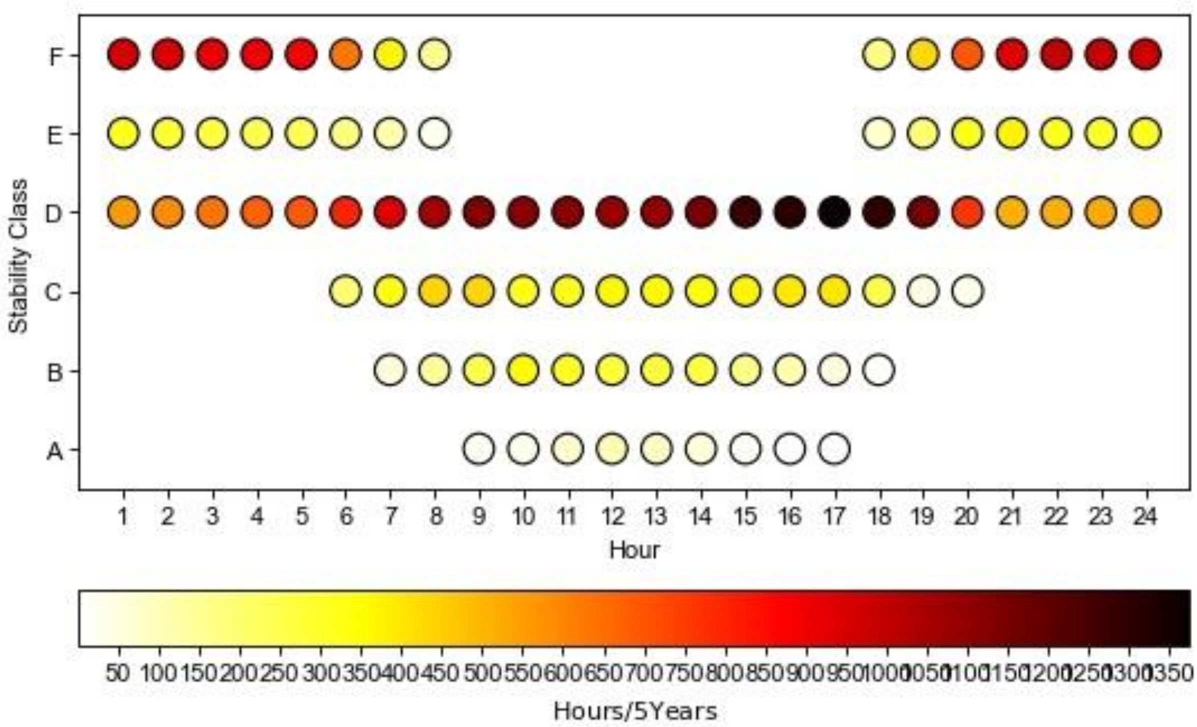

Figure 6-7 Hourly distribution of atmospheric stability at the broiler farm, 1 March 2017 to 28 February 2022

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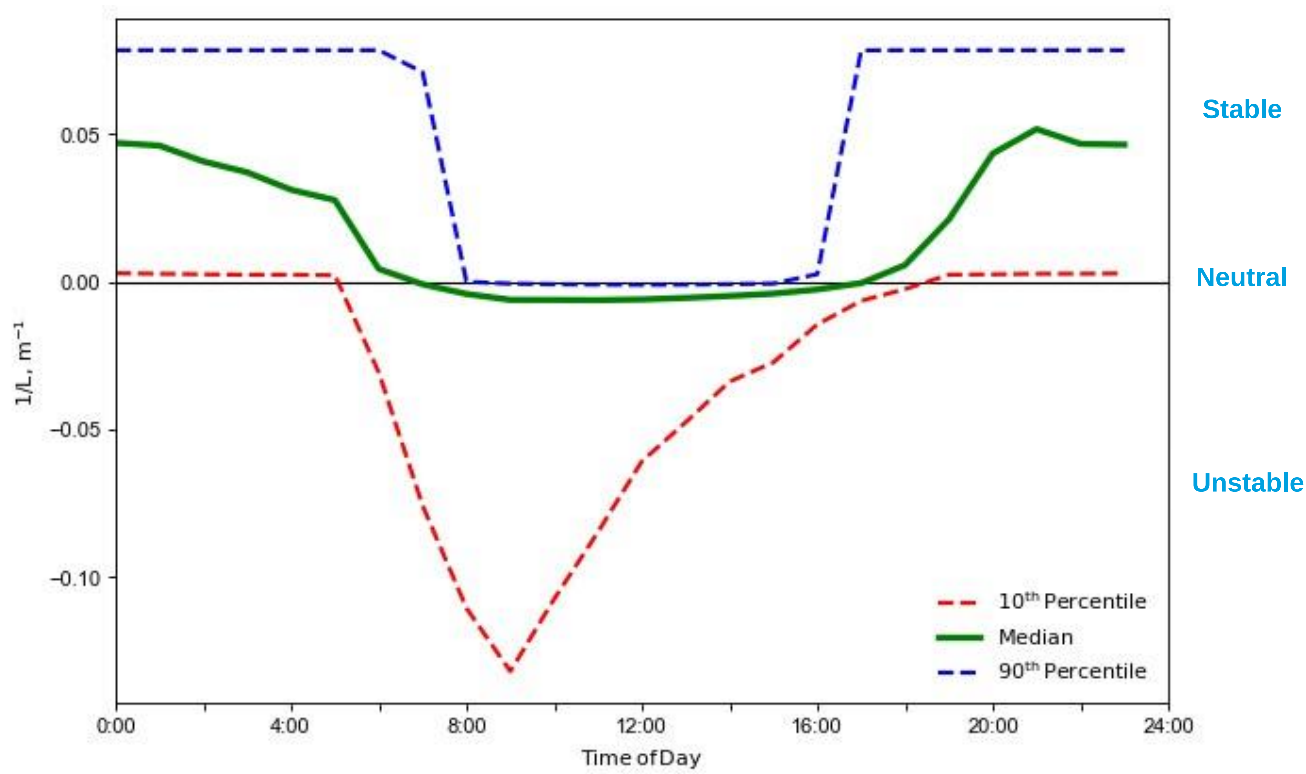

Figure 6-8 Hourly profile of the inverse Monin-Obukhov length (1/L) at the broiler farm, 1 March 2017 to 28 February 2022

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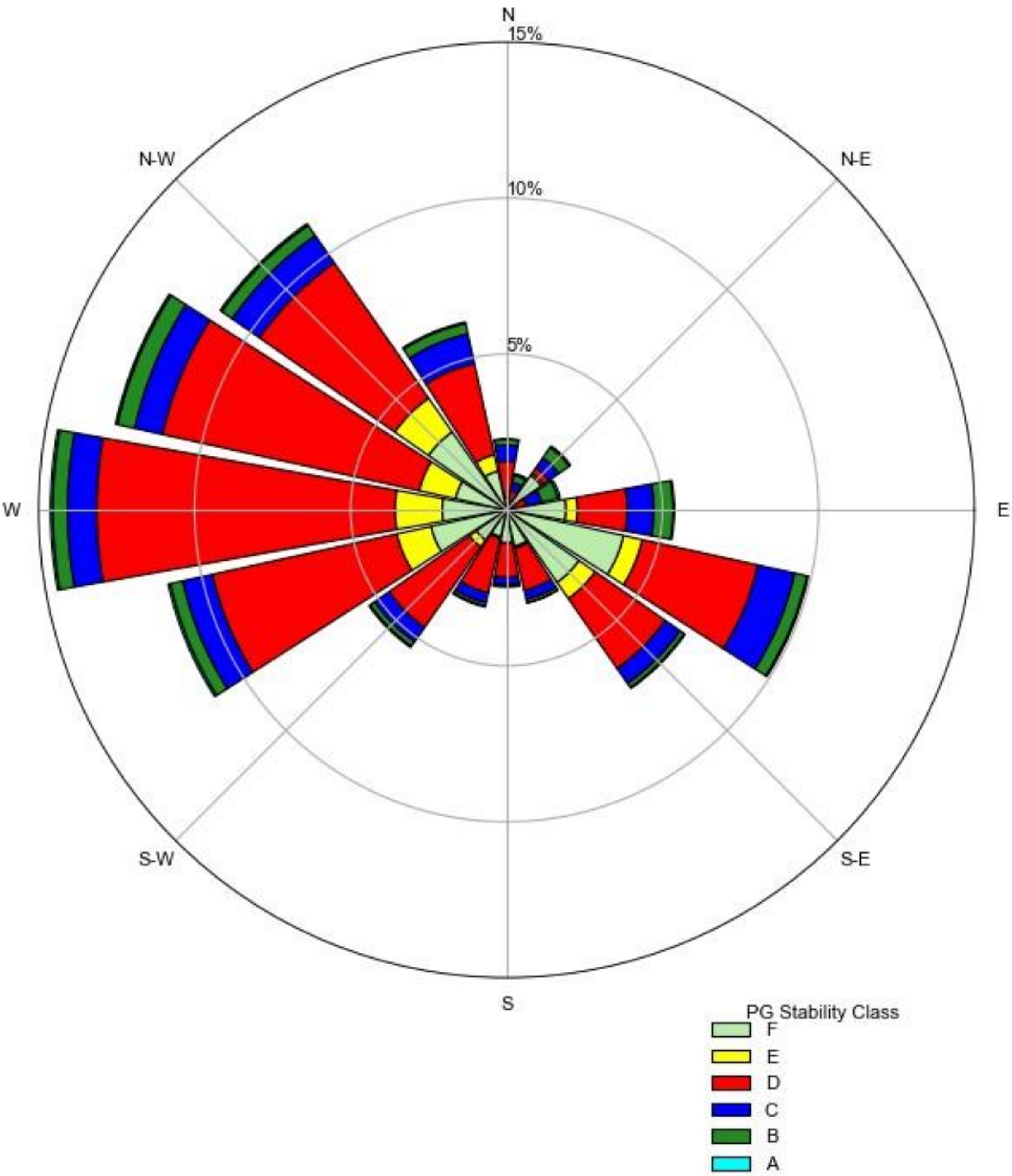

Figure 6-9 Stability rose diagram illustrating the relationship between hourly wind direction and Pasquill-Gifford stability class at the broiler farm, 1 March 2017 to 28 February 2022

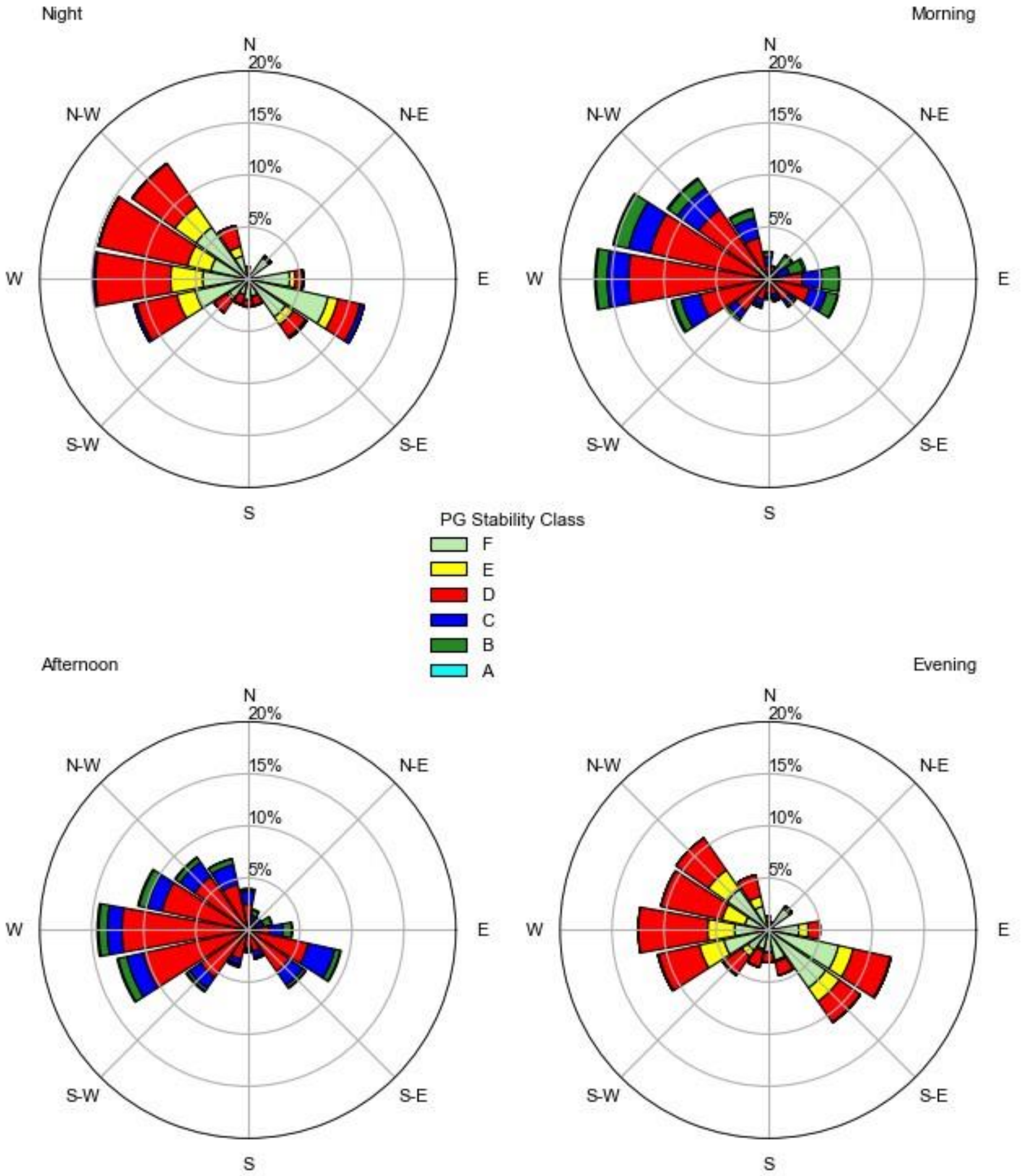

Figure 6-10 Stability rose diagram illustrating the relationship between hourly wind direction and Pasquill-Gifford stability class at the broiler farm, 1 March 2017 to 28 February 2022

6.3.3 Mixing Height

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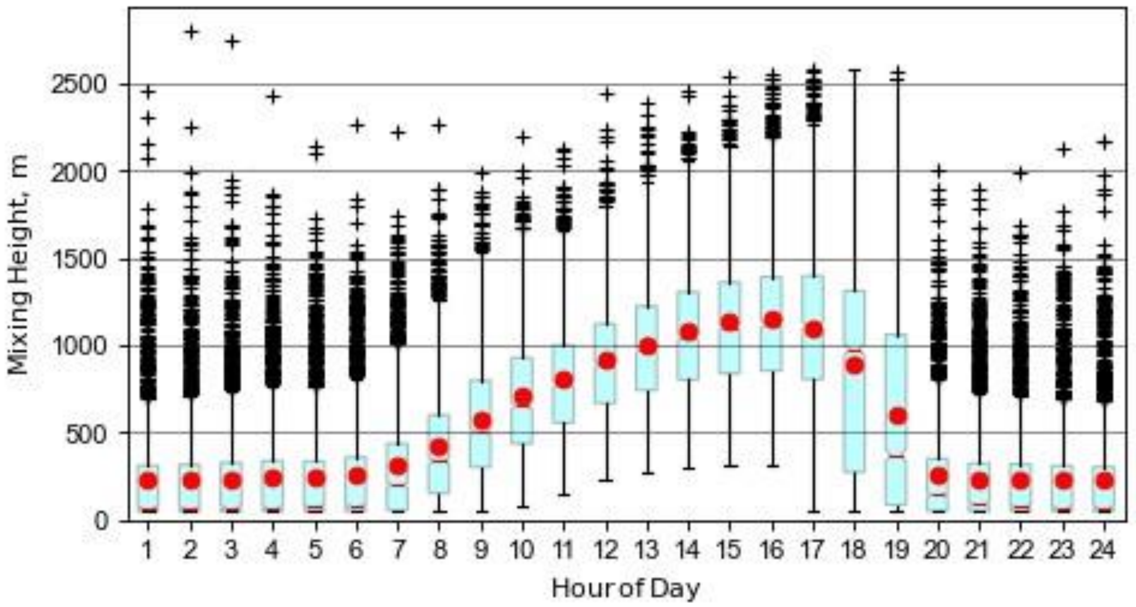

Figure 6-11 Distribution of hourly mixing heights at the rearer farm, 1 March 2017 to 28 February 2022

6.4 CALPUFF model and odour emission source configuration

6.4.1 Model configuration

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6.4.2 Configuration of emission sources

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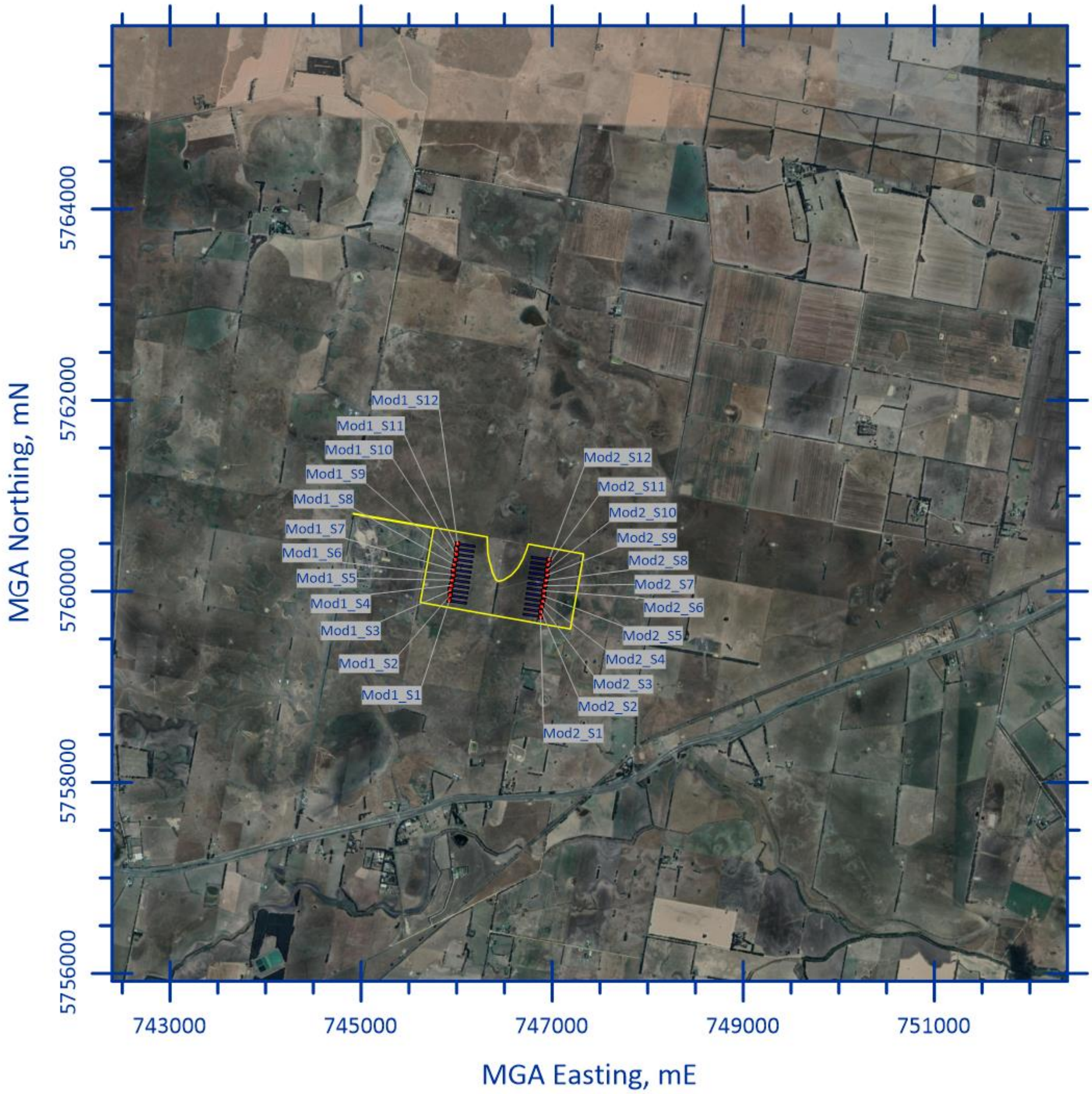

Figure 6-12 Sources included in the model

Figure Note: The volume sources simulating odour emissions from the tunnel ventilation fans are shown in red.

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Table 6-2 Volume source configuration for the proposed broiler sheds

Source ID in model	Description	Effective height (m)	σ Y_0 (m)	σ Z_0 (m)	Easting (mE, GDA20)	Northing (mN, GDA20)	Base elevation (m)
Mod1_S1	Module 1, Shed 1 fan	2.3	4.4	1	745922	5759901	123.9
Mod1_S2	Module 1, Shed 2 fan	2.3	4.4	1	745930	5759955	124.4
Mod1_S3	Module 1, Shed 3 fan	2.3	4.4	1	745938	5760009	124.5
Mod1_S4	Module 1, Shed 4 fan	2.3	4.4	1	745946	5760063	125.1
Mod1_S5	Module 1, Shed 5 fan	2.3	4.4	1	745954	5760118	125.3
Mod1_S6	Module 1, Shed 6 fan	2.3	4.4	1	745961	5760172	126.1
Mod1_S7	Module 1, Shed 7 fan	2.3	4.4	1	745969	5760226	126.2
Mod1_S8	Module 1, Shed 8 fan	2.3	4.4	1	745977	5760280	126.7
Mod1_S9	Module 1, Shed 9 fan	2.3	4.4	1	745985	5760334	126.9
Mod1_S10	Module 1, Shed 10 fan	2.3	4.4	1	745993	5760388	127.0
Mod1_S11	Module 1, Shed 11 fan	2.3	4.4	1	746001	5760442	127.0
Mod1_S12	Module 1, Shed 12 fan	2.3	4.4	1	746009	5760496	127.2
Mod2_S1	Module 2, Shed 1 fan	2.3	4.4	1	746878	5759735	122.2
Mod2_S2	Module 2, Shed 2 fan	2.3	4.4	1	746886	5759789	121.9
Mod2_S3	Module 2, Shed 3 fan	2.3	4.4	1	746894	5759843	122.1
Mod2_S4	Module 2, Shed 4 fan	2.3	4.4	1	746902	5759897	122.1
Mod2_S5	Module 2, Shed 5 fan	2.3	4.4	1	746909	5759951	121.8
Mod2_S6	Module 2, Shed 6 fan	2.3	4.4	1	746917	5760005	121.4
Mod2_S7	Module 2, Shed 7 fan	2.3	4.4	1	746925	5760059	120.7
Mod2_S8	Module 2, Shed 8 fan	2.3	4.4	1	746933	5760113	120.9
Mod2_S9	Module 2, Shed 9 fan	2.3	4.4	1	746941	5760168	120.4
Mod2_S10	Module 2, Shed 10 fan	2.3	4.4	1	746949	5760222	120.5
Mod2_S11	Module 2, Shed 11 fan	2.3	4.4	1	746957	5760276	120.1
Mod2_S12	Module 2, Shed 12 fan	2.3	4.4	1	746965	5760330	120.6

6.4.3 Modelling scenarios

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6.4.4 Model receptors

Gridded receptors

[illegible]

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Table 6-3 Characteristics of the CALPUFF sampling (receptor) grid

Parameter	Value
Columns	100
Rows	100
Grid Resolution (m)	100
Minimum Easting (mE, GDA94)	742,393
Maximum Easting (mE, GDA94)	752,393
Minimum Northing (mN, GDA94)	5,755,919
Maximum Northing (mN, GDA94)	5,765,919
West-East Extent (m)	10,000
South-North Extent (m)	10,000

Sensitive Receptors

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Table 6-4 Discrete receptor locations

Receptor	Easting (mE, GDA2020)	Northing (mN, GDA2020)	Description
R1	748603	5759440	Prices Lane
R2	748666	5758678	Princess Highway
R3	748128	5758407	Princess Highway
R4	747813	5758225	Prices Lane
R5	747066	5758494	Princess Highway
R6	746494	5757990	Princess Highway
R7	746250	5758224	Princess Highway
R8	745987	5758058	Princess Highway
R9	745703	5757849	Darcys Lane
R10	745352	5757795	Darcys Lane
R11	744398	5757811	Mooleric Road
R12	744234	5759052	Mooleric Road
R13	744152	5763825	Mooleric Road
R14a	745716	5764207	Mooleric Road
R14b	747687	5762935	Mooleric Road
R15	750257	5761689	Armytage Road
R16	750850	5760859	Armytage Road
R17	750478	5760535	Armytage Road

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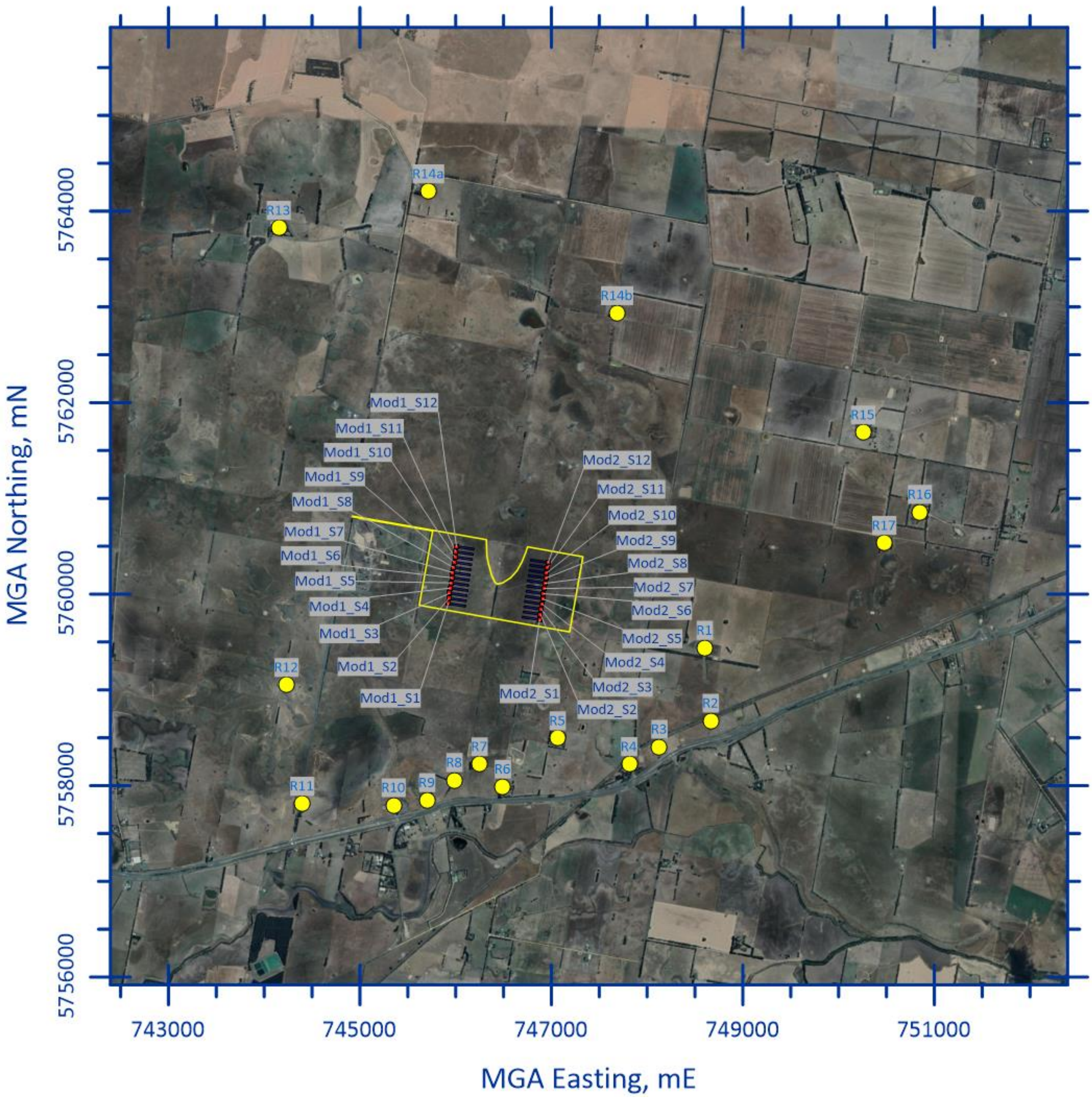

Figure 6-13 Nearest sensitive receptors to the broiler farm site

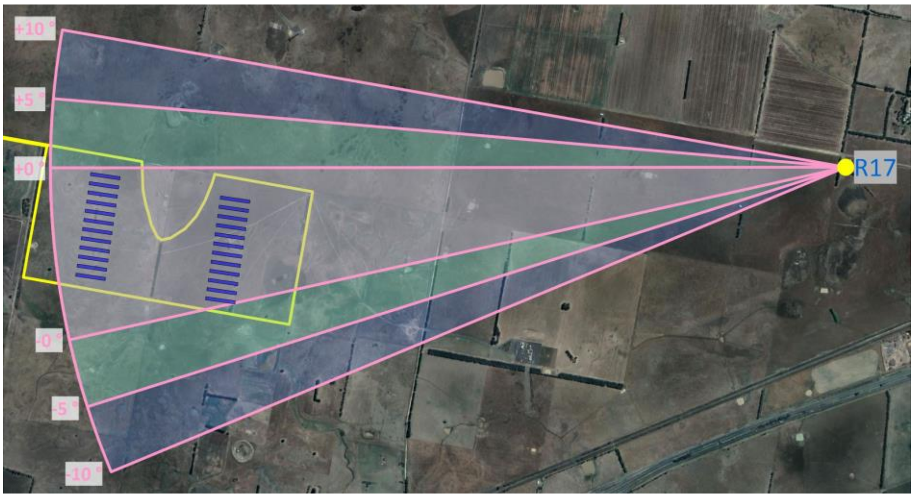

Figure 6-14 An example of critical wind direction arcs directing broiler farm odour to a sensitive receptor location

Figure note: The ±0 ° wind direction arc (pink) shows the range of wind directions necessary to transport the odour plume from the broiler farm directly to the sensitive receptor. The ±5° (green) and 10° (blue) arcs show the effect of widening the range of wind directions beyond the extent of the odour source envelope to account for plume meander on its journey from source to receptor.

Table 6-5 Source-receptor distances and critical wind direction arcs

Receptor	Source-Receptor Distance, m		Lower Source to Receptor Bearing, °			Upper Source to Receptor Bearing, °		
	Closest source	Furthest source	-10°	-5°	0°	0°	+5°	+10°
R1	1753	2795	269.4	274.4	279.4	298.9	303.9	308.9
R2	2080	3218	284.0	289.0	294.0	314.5	319.5	324.5
R3	1823	2977	294.0	299.0	304.0	329.0	334.0	339.0
R4	1771	2900	301.5	306.5	311.5	338.1	343.1	348.1
R5	1246	2271	310.9	315.9	320.9	356.9	1.9	6.9
R6	1777	2567	333.4	338.4	343.4	12.2	17.2	22.2
R7	1592	2297	339.0	344.0	349.0	22.4	27.4	32.4
R8	1808	2485	348.1	353.1	358.1	27.9	32.9	37.9
R9	2054	2794	356.2	1.2	6.2	31.9	36.9	41.9
R10	2173	3010	3.8	8.8	13.8	38.2	43.2	48.2
R11	2581	3600	21.0	26.0	31.0	52.2	57.2	62.2
R12	1894	3015	40.7	45.7	50.7	75.5	80.5	85.5
R13	3807	4924	130.8	135.8	140.8	155.4	160.4	165.4
R14a	3719	4623	151.7	156.7	161.7	176.8	181.8	186.8
R14b	2690	3517	184.5	189.5	194.5	214.8	219.8	224.8
R15	3569	4695	230.1	235.1	240.1	254.5	259.5	264.5
R16	3927	5019	244.3	249.3	254.3	266.0	271.0	276.0
R17	3524	4599	247.5	252.5	257.5	269.8	274.8	279.8
Minimum	1246	2271	-	-	-	-	-	-
Maximum	3927	5019	-	-	-	-	-	-

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Table 6-6 Frequency of winds (%) arriving from within the critical wind direction arcs at each sensitive receptor, 1 March 2017 to 28 February 2022

Receptor	±0° Critical Wind Direction Arc	±5° Critical Wind Direction Arc	±10° Critical Wind Direction Arc
R1	11.1	17.0	23.2
R2	11.0	16.4	21.6
R3	12.3	16.8	21.0
R4	11.4	14.8	18.5
R5	9.9	12.7	15.6
R6	3.3	4.5	6.4
R7	2.9	4.0	5.1
R8	1.8	2.6	4.3
R9	1.4	2.5	3.7
R10	1.8	3.0	3.9
R11	2.6	3.0	3.5
R12	1.7	2.5	3.8
R13	2.4	4.3	7.0
R14a	1.9	3.1	4.4
R14b	3.2	4.8	6.4
R15	7.5	12.2	16.5
R16	7.3	14.0	19.8
R17	7.9	14.5	20.5
Minimum	1.4	2.5	3.5
Maximum	12.3	17.0	23.2

7 Odour Risk Assessment

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7.1 Level 1assessment Tools

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7.1.1 Duration of emissions test

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7.1.2 Wind direction test

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7.1.3 Minor source test

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Table 7-1 Determination of minor source status

Minor source criterion	Mooleric broiler farm assessment
The source is stationary with a stack height of at least 10 m.	**Criterion not met** All broiler farm's sources are stationary, however in the current proposed configuration there will be no stacks. If stacks were to be employed then they would be stub stacks with a likely height of 5.6 m (1 m above ridgeline height)
The source height is at least 1.7 times the relevant building height(s), meaning there aren't any obstructions within a 15 m radius that could influence stack dispersion (including building wake effects).	**Criterion not met** The broiler sheds are 4.6 m in height, providing a required minimum source height of 7.8 m. The tunnel ventilation fans are assumed to release odour emissions at half the building height (2.3 m).
The emission source is situated on level terrain (free of terrain effects).	**Meets criterion** The regional terrain is flat as shown in Figure 4-1.

Minor source criterion	Mooleric broiler farm assessment
The distance between the emission source and the receiving environment occupied by people is ≥100 m.	**Meets criterion** The closest identified sensitive receptor location is R5, located approximately 1,246 m to the south-southeast of Module 2.
At the source location, average wind speeds of < 1 m/s occur less than 20 % of the year.	**Meets criterion** The frequency of winds less than 1 m/s in speed at the broiler farm site is 9.7% as shown in Figure 7-1.
The odour emission rate lies under the odour flow rate vs stack height plot (Figure 5) for the proposed stack height.	**N/A** In the current proposed configuration, there will be no stacks fitted to broiler sheds.

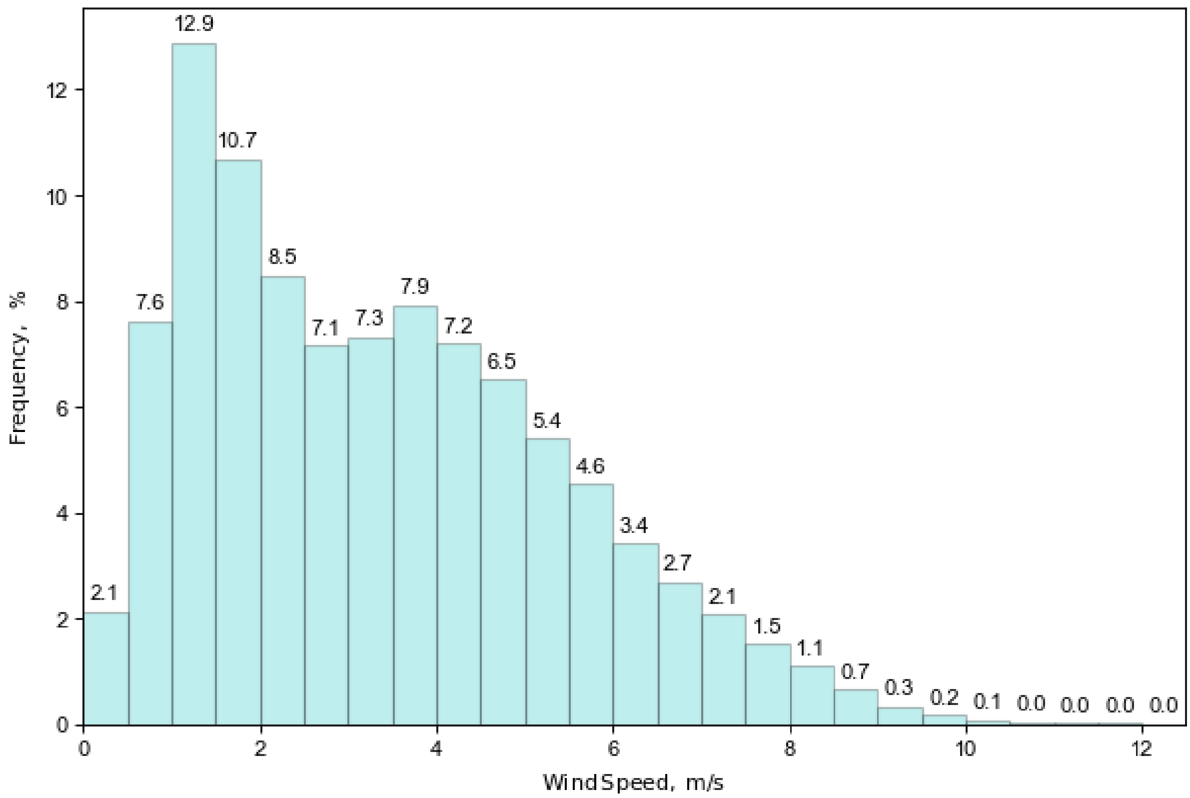

Figure 7-1 Wind speed frequency histogram for the Mooleric broiler farm site, 1 March 2017 to 28 February 2022

Figure note: CALMET model predictions extracted at a model grid point located between Modules 1 and 2.

7.1.4 Level 1 risk assessment

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7.2 Level 2 source-pathway-receiving environment tool

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7.2.1 Hazard potential of the source (odour source score – OSS)

E[illegible]A [illegible]A[illegible]A *Guideline for assessing odour* [illegible]

[illegible]

A [illegible]O[illegible]re [illegible]

7.2.2 Exposure pathway between the source and sensitive locations (odour pathway score– OPS)

T[illegible]e O[illegible]re [illegible]

- D[illegible]e
- Me[illegible]
- Terr[illegible]d [illegible]d
- H[illegible]

Distance Score

T[illegible]e M[illegible] [illegible]dered [illegible] a "[illegible]d[illegible]e" odour source, attracting a distance [illegible]re [illegible]

Meteorology score:

T[illegible]e M[illegible]dered [illegible]

[illegible]

T[illegible]e [illegible]dered [illegible]

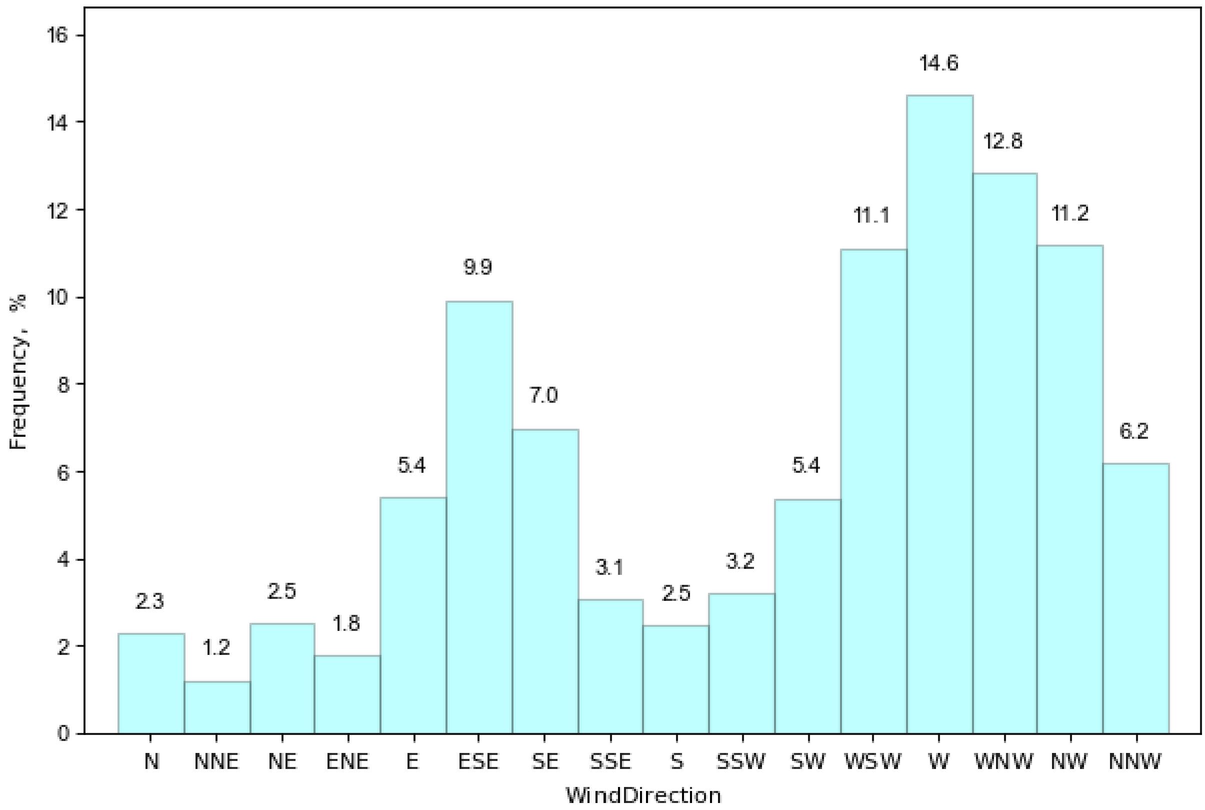

Figure 7-2 Wind direction frequency histogram for the Mooleric broiler farm site, 1 March 2017 to 28 February 2022

Figure note: CALMET model predictions extracted at a model grid point located between Modules 1 and 2.

Terrain and built form score:

T[illegible]e M[illegible]er[illegible] [illegible]r[illegible]er [illegible]r[illegible] [illegible]dered [illegible]e [illegible]r[illegible]e [illegible]err[illegible]d [illegible]d [illegible]r[illegible] [illegible]r[illegible]re [illegible]T[illegible]ed [illegible]e [illegible]e [illegible]d [illegible]rr[illegible]d[illegible]re[illegible]e[illegible]e[illegible]red [illegible]d[illegible]ed d[illegible]e[illegible]

Hours of Operation score:

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Final OPS score

T[illegible]e [illegible]O[illegible] [illegible]re [illegible]de[illegible]er[illegible]ed [illegible]e [illegible]e [illegible]e[illegible]e d[illegible]e[illegible]e[illegible]e[illegible]r[illegible]err[illegible]d [illegible]r[illegible]d [illegible]r[illegible]er[illegible]re[illegible]A[illegible]O[illegible]re [illegible]ere[illegible]re [illegible]ed[illegible]

7.2.3 Sensitivity of the receiving environment (odour receiving environment score – ORS)

T[illegible]e re[illegible]e[illegible]e[illegible]r[illegible]e[illegible]e[illegible]OR[illegible]re [illegible]de[illegible]er[illegible]ed [illegible]

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- [illegible]e [illegible]r[illegible]e[illegible]e [illegible]d[illegible]r[illegible]

Land use

E[illegible]A [illegible] *Guidance for assessing odour* [illegible]

Historical context

A [illegible]

Final ORS score

[illegible] ORS [illegible]

7.2.4 Level 2 risk assessment

[illegible] OSS, OPS and ORS [illegible] Table 7-2 [illegible] Mooleric broiler farm [illegible]

Table 7-2 Overall risk calculated using the source/pathway/receiving environment tool

Minor source criterion	Mooleric broiler farm assessment
Odour source score (OSS)	4
Odour pathway score (OPS)	3
Odour receiving environment score (ORS)	4
Overall risk score	11 (high risk)

7.3 Level 3 assessment tools

[illegible]

- CALPUFF odour prediction [illegible]
- A[illegible] EPA [illegible]
- Field odour [illegible] Mode [illegible] Mode [illegible] Mode [illegible] Mode [illegible]

7.3.1 CALPUFF odour prediction isopleths

[illegible] Figure [illegible]

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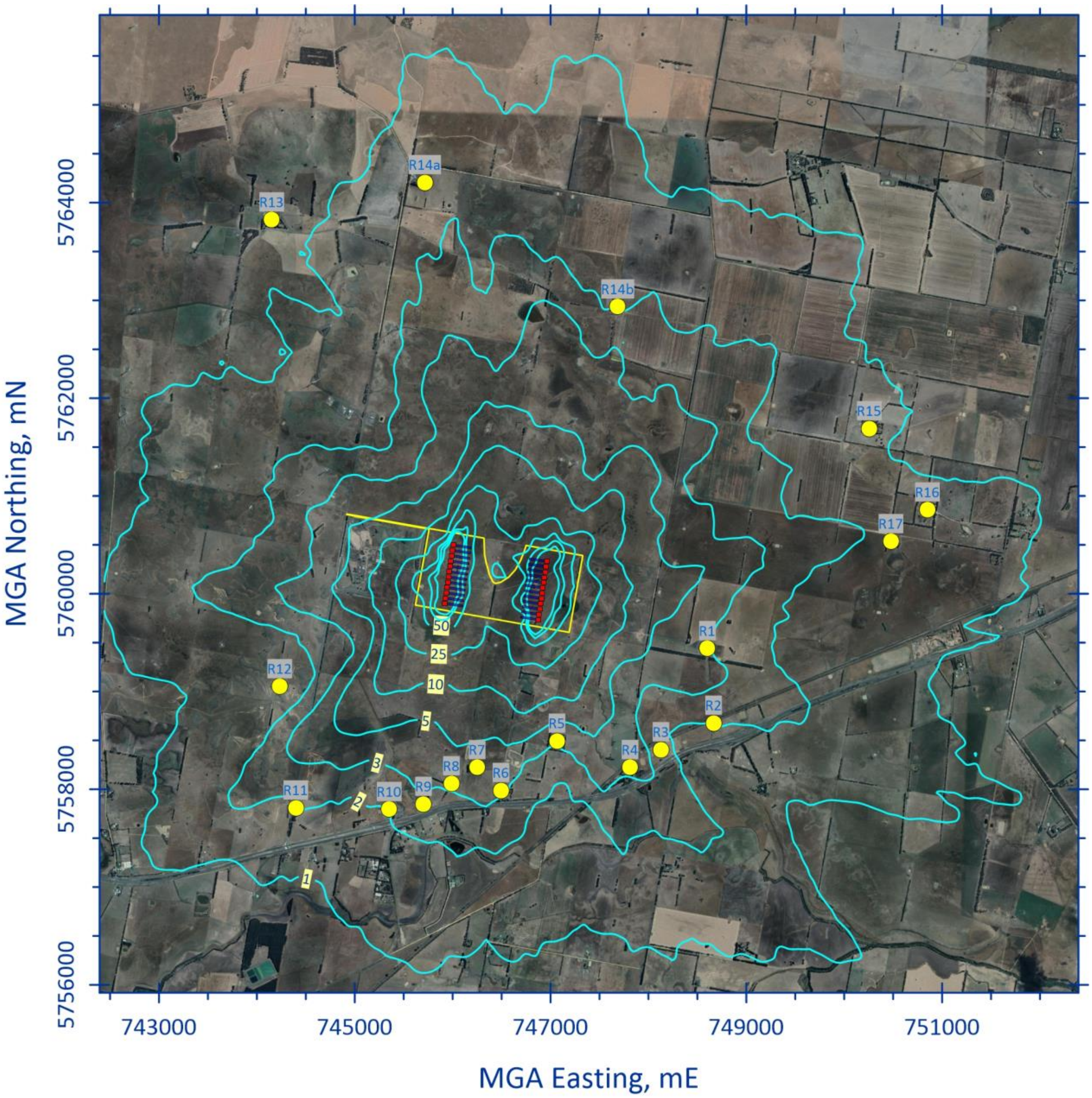

Figure 7-3 Predicted 3-minute average, 99.9th percentile odour concentrations for the Mooleric broiler farm, 1 March 2017 to February 2022

Assessment scenario: All sources — 3-minute average 99.9th percentile odour concentrations	**Contours**: 1; 2; 3; 5; 10; 25; 50; 75; 100 ou
Data source: CALPUFF	**Prepared by**: M Power
Location: Mooleric Broiler Farm	**Date**: 7/11/2023

7.3.2 Odour predictions at sensitive receptor locations

Distribution of results

[illegible]

Table 7-3 Distribution of predicted 3-minute average ground-level odour concentrations at sensitive receptors for the Mooleric Broiler Farm, 1 March 2017 to February 2022

Receptor	Min, OU	C_{25}, OU	Median, OU	Mean, OU	C_{75}, OU	$C_{99.9}$, OU	Max, OU	n
R1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R14a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R14b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Min.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table Notes: C_{25}, C_{75}, and $C_{99.9}$ represent the 25th, 75th and 99.9th percentile concentrations respectively.
SEPP AQM is no longer in force, meaning that there is no assessment criterion for odour predictions.

[illegible] as a box and whiskers plot ("box plot") in F[illegible]re [illegible]

- T[illegible]e [illegible]
- The "first quartile", Q1 (25[illegible]
- T[illegible]e [illegible]
- The "third quartile", Q3 (75[illegible]
- T[illegible]e [illegible]

[illegible]

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[illegible]

[illegible]

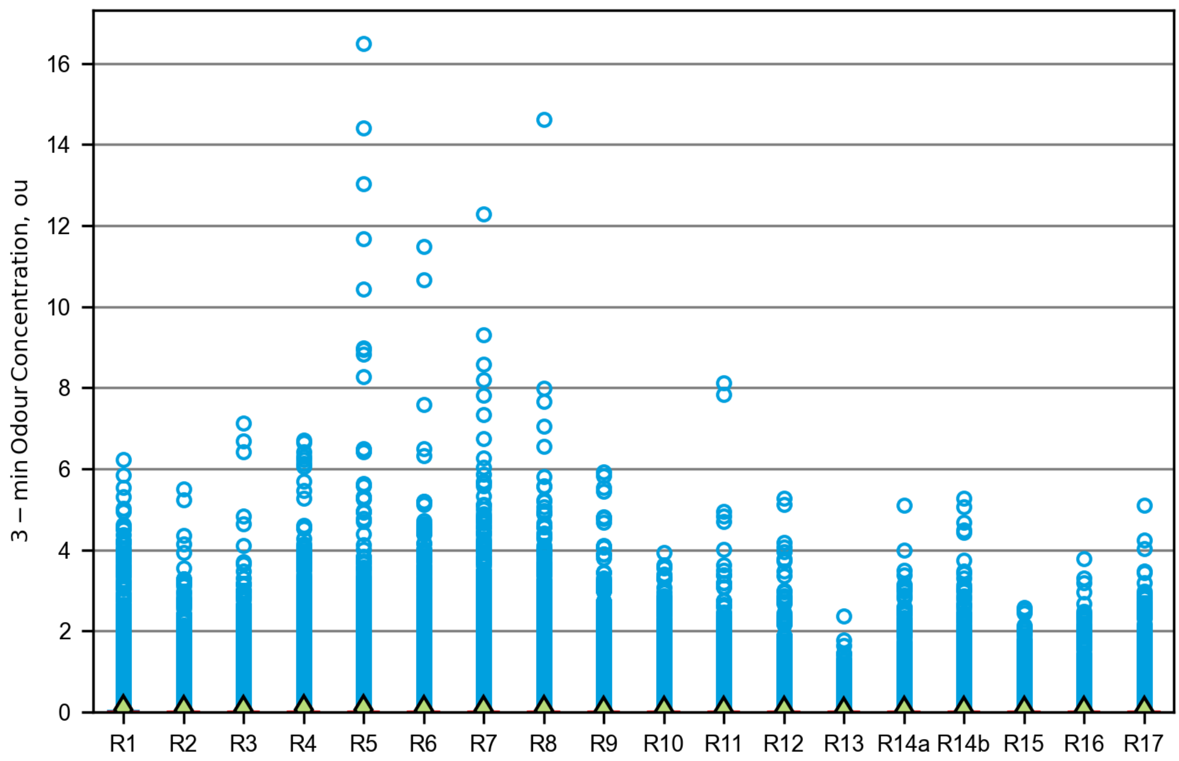

Figure 7-4 Box and whiskers analysis of 3-minute average ground-level odour concentrations at sensitive receptors for the Mooleric Broiler Farm, 1 March 2017 to February 2022

Diurnal variation in predicted odour concentrations

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[illegible]

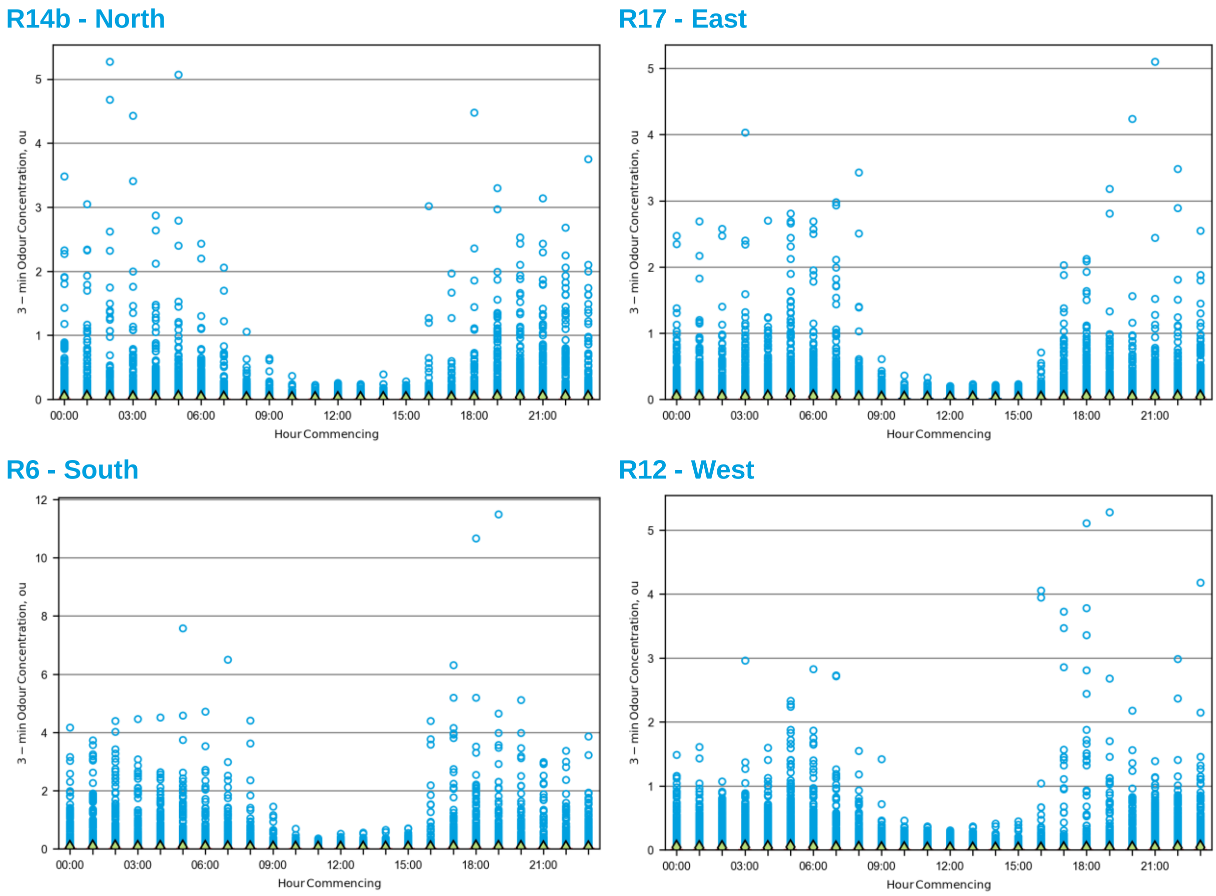

Figure 7-5 Diurnal variation in odour concentrations at sites surrounding the proposed farm

Odour environmental risk assessment

[illegible]

[illegible]

Frequency	Odour concentration		
Odour events per year	10+ OU	6–9 OU	1–5 OU
0–9	see note below		
10-44	H	M	L
45-175	H	H	M
>175	H	H	M

Key:

L = low risk (compliant with SEPP (AQM))

M = medium risk

H = high risk

[illegible]

Figure 7-6 EPAV broiler farm odour risk assessment matrix

A[illegible] OERA [illegible] ere[illegible]re [illegible]re[illegible]red [illegible] e [illegible]e[illegible]e[illegible]r [illegible]de[illegible] re[illegible] r e[illegible] e[illegible]e re[illegible]e[illegible]r [illegible] e[illegible] [illegible]re [illegible]ed [illegible]der[illegible]d[illegible] e [illegible]d[illegible]r r[illegible] e[illegible] e T[illegible]e re[illegible] [illegible]re [illegible]re[illegible]e[illegible]ed [illegible] T[illegible]e [illegible] r[illegible] e[illegible]e[illegible]r Re[illegible]e[illegible]r R[illegible] d R[illegible] R[illegible] ed[illegible] r[illegible] e[illegible]e[illegible] [illegible]er de[illegible]ed [illegible]e[illegible]e re[illegible]e[illegible]r [illegible]

Table 7-4 Predicted OERA risk level at sensitive receptors for the proposed Mooleric Broiler Farm

Receptor	Frequency (1 ≤ ou > 6)	Frequency (6 ≤ ou > 10)	Frequency (ou ≥ 10)	Risk Level
R1	92	0	0	Medium
R2	41	0	0	Low
R3	78	1	0	Medium
R4	111	1	0	Medium
R5	80	2	1	Medium
R6	69	1	0	Medium
R7	90	2	0	Medium
R8	74	1	0	Medium
R9	59	0	0	Medium
R10	39	0	0	Low
R11	32	0	0	Low
R12	23	0	0	Low
R13	4	0	0	Low
R14a	21	0	0	Low
R14b	31	0	0	Low
R15	14	0	0	Low
R16	17	0	0	Low
R17	24	0	0	Low

Table Note: As the modelling results extend over a 5-year period, the total frequency was divided by 5 to align with OREA requirements.

7.4 Complaints analysis

[illegible]

[illegible]

[illegible]

"It Smells Like To Chooks, Like From A Chook Farm. Very Pungent Smell."

[illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

- [illegible] trucks passing close to the complainant's residence. In particular [illegible]
- [illegible]
- [illegible]

- [illegible]

[illegible]

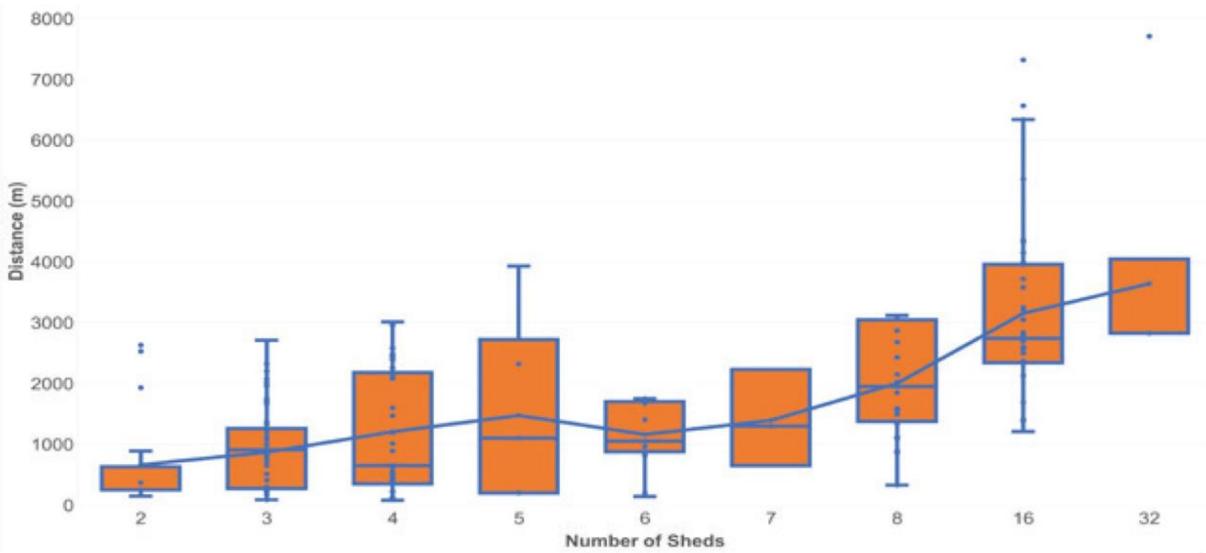

Figure 7-7 The relationship between the broiler farm size and the distance to complainants
Source: Figure 1, Bydder and He, 2022, p. 50.

[illegible]

[illegible]

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- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

7.5 Community surveys

[illegible]

7.6 Field odour intensity surveys

[illegible]

[illegible] truthed). This would provide more confidence in the model's ability to predict odour [illegible]

[illegible]

[illegible]

8 Conclusions and Recommendation

8.1 Conclusions

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Figure 8-1 Example of stub-stack tunnel ventilation

8.2 Recommendations

[illegible]

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- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

9 References

[illegible] *Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide)* [illegible]

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[illegible] *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'*.

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Appendix A

Meteorological Inter-annual Variability Analysis

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 Methodology for the Assessment of Meteorological Inter-annual Variability

1.1 Review and selection of regional meteorological observations

[illegible]

Table 1-1 Location of the closest AWS site in relation to the Mooleric Broiler Farm

BoM Station Number	BoM Station Name	Latitude/ Northing (GDA 2020)	Longitude/ Easting (GDA 2020)	Distance from the Site	Bearing from the Site
090035	Colac (Mount Gellibrand)	-38.2333 °S (744418 mN)	143.7925 °E (5764612 mE)	4.9 km	334 ° (N-NW)

Figure 1-1 Location of the Mount Gellibrand BoM AWS site in relation to the Mooleric Broiler Farm

1.2 Analysis of regional meteorological observations

F[illegible] M[illegible]Ge[illegible] [illegible] Air E[illegible] have defined the 'meteorological year' as the twelve [illegible] M[illegible] Fe[illegible] it would commence with the end of one year's [illegible] T[illegible] M[illegible] Fe[illegible]

T[illegible] T[illegible]

Table 1-2 Meteorological data assessed for BoM Mt Gellibrand site (BoM station number 090035)

Parameter	Time period assessed	Data	Analysis
Wind speed Wind direction Wind vector U component Wind vector V component Air temperature Dew point temperature Surface atmospheric pressure	1 March 2017 to 28 February 2022	30-minute data points from BoM AWS	Comparisons of: • Frequency distributions (as probability density functions) as year-on-year and each year against the mean of all five years • Frequency distribution anomaly (as a percentage) from the mean of all five years • Correlation statistics (R^2)
Rainfall	1 March 2017 to 28 February 2022	Annual and monthly totals (mm)	Comparison of monthly and annual rainfall totals
El Niño Southern Oscillation	1 March 2017 to 28 February 2022	Monthly Southern Oscillation Index	SOI classification and strength

T[illegible] with stability a function of the atmosphere's vertical temperature profile and the wind speed. [illegible] E[illegible] O[illegible]

[illegible]

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- T[illegible]
- T[illegible]

2 Analysis of Meteorological Inter-annual Variability

2.1 Wind speed

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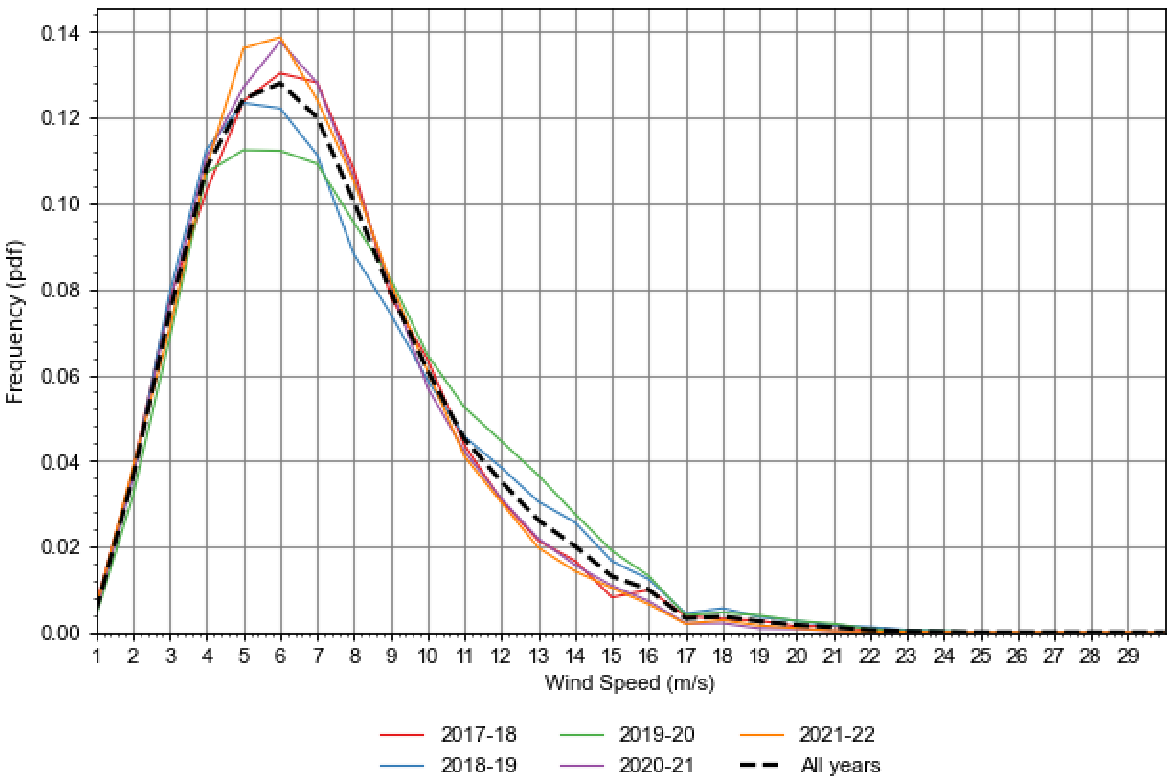

Figure 2-1 Comparison of annual observed wind speed frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

[illegible]

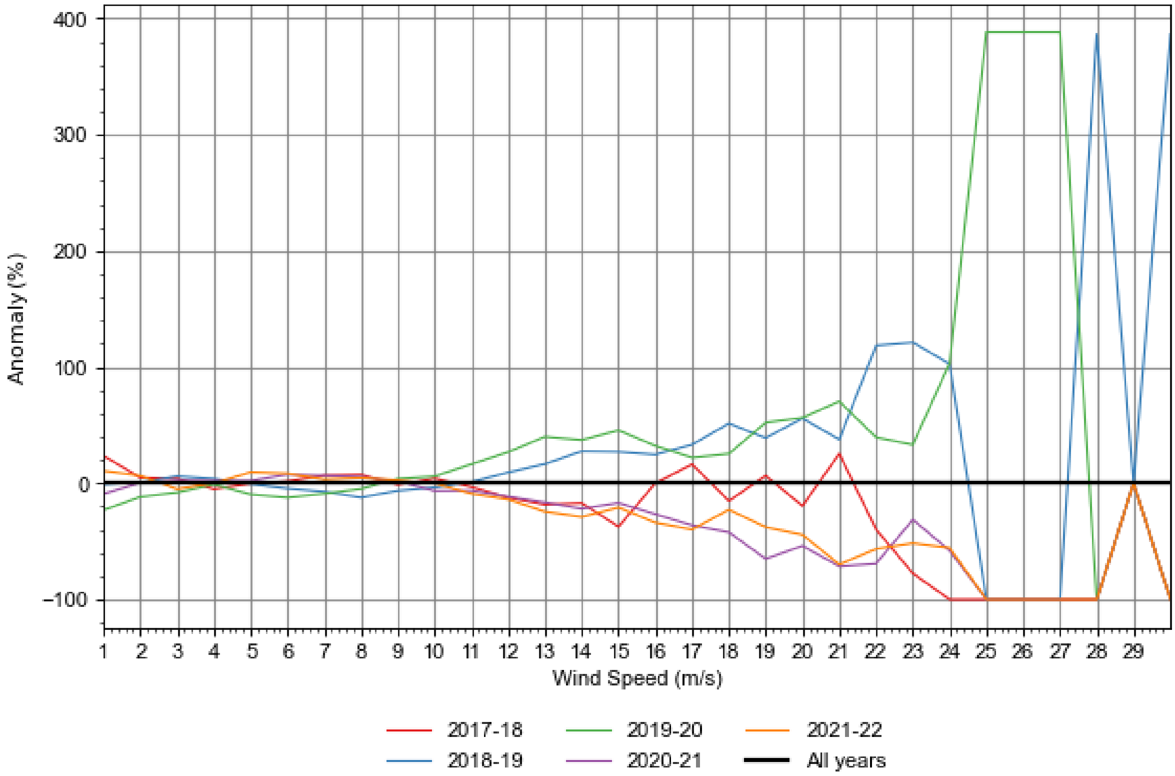

Figure 2-2 Annual observed wind speed frequency distribution anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

The R^2 [illegible] for each year [illegible] each year [illegible] the [illegible] are [illegible] in Table [illegible]

Table 2-1 Correlation coefficients matrices of the distributions of wind speed at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9913	1				
2019-20	0.9872	0.9938	1			
2020-21	0.9986	0.9933	0.9872	1		
2021-22	0.9974	0.9918	0.985	0.9987	1	
All years	0.998	0.997	0.9935	0.9987	0.9977	1

2.2 Wind direction

T[illegible]e [illegible]d [illegible]e[illegible]e[illegible]r [illegible]e[illegible] [illegible]d d[illegible]re[illegible] [illegible]DF[illegible] [illegible]d [illegible]e [illegible]e[illegible] [illegible]e[illegible]r [illegible]e [illegible]e[illegible]e [illegible]e[illegible]e[illegible]r [illegible]er[illegible]d [illegible]M[illegible]r[illegible] [illegible] Fe[illegible]r[illegible]r[illegible] [illegible]re [illegible]r[illegible] [illegible]re[illegible]e[illegible]ed [illegible] F[illegible]re [illegible]d F[illegible]re [illegible] re[illegible]e[illegible]e[illegible]

Each year's distribution is similar to that of the [illegible]e[illegible]e[illegible]r [illegible]e[illegible]e [illegible]d d[illegible]re[illegible]d [illegible]r[illegible] re[illegible]re[illegible]e[illegible]er [illegible]e H[illegible]e[illegible]er[illegible]ere [illegible]e[illegible]e [illegible]r[illegible]e[illegible]ee[illegible]e[illegible] [illegible]e[illegible]r [illegible]d [illegible]e [illegible]e[illegible]e[illegible]r [illegible]e[illegible]e [illegible]DF [illegible]d [illegible]e [illegible]d[illegible]e [illegible]e[illegible]er[illegible]re[illegible]d [illegible]e[illegible] [illegible]ere [illegible]e[illegible]e [illegible]r[illegible]e[illegible]ee[illegible]e [illegible]e[illegible]r[illegible]T[illegible]r[illegible] [illegible]e[illegible]r [illegible]

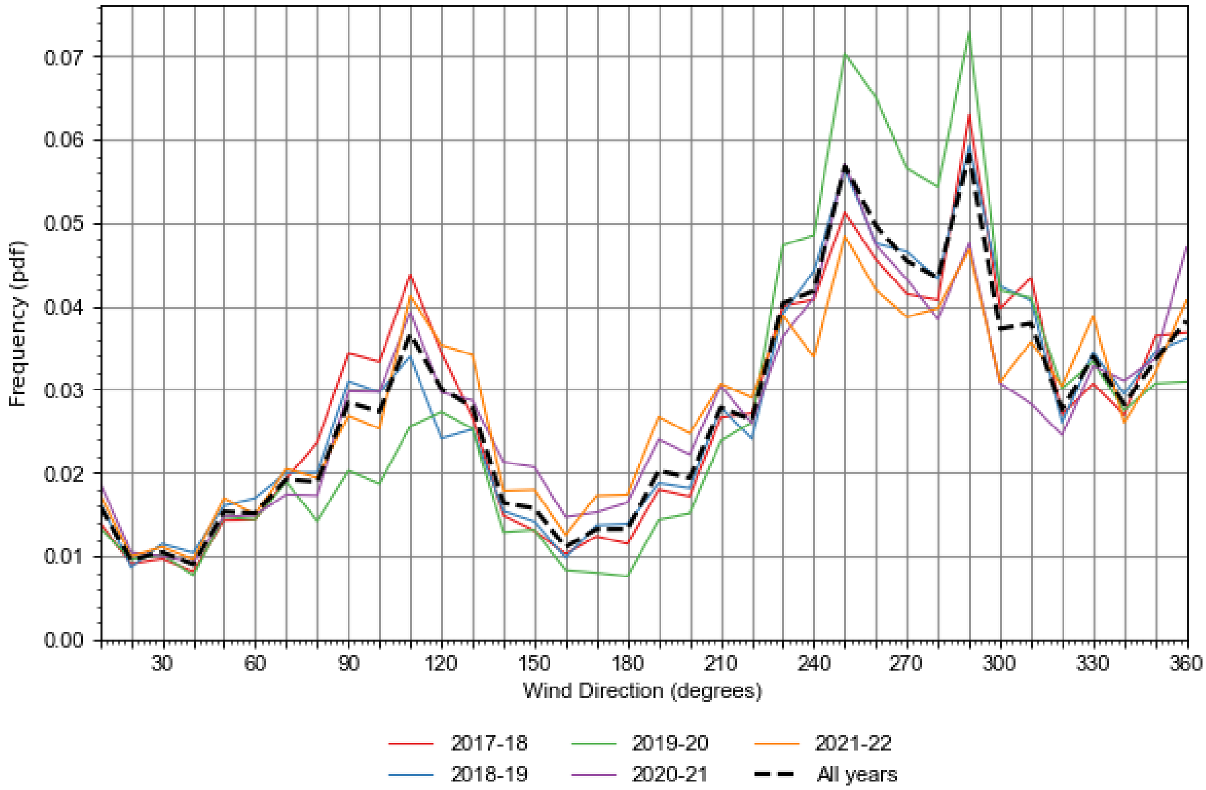

Figure 2-3 Comparison of annual observed wind direction frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

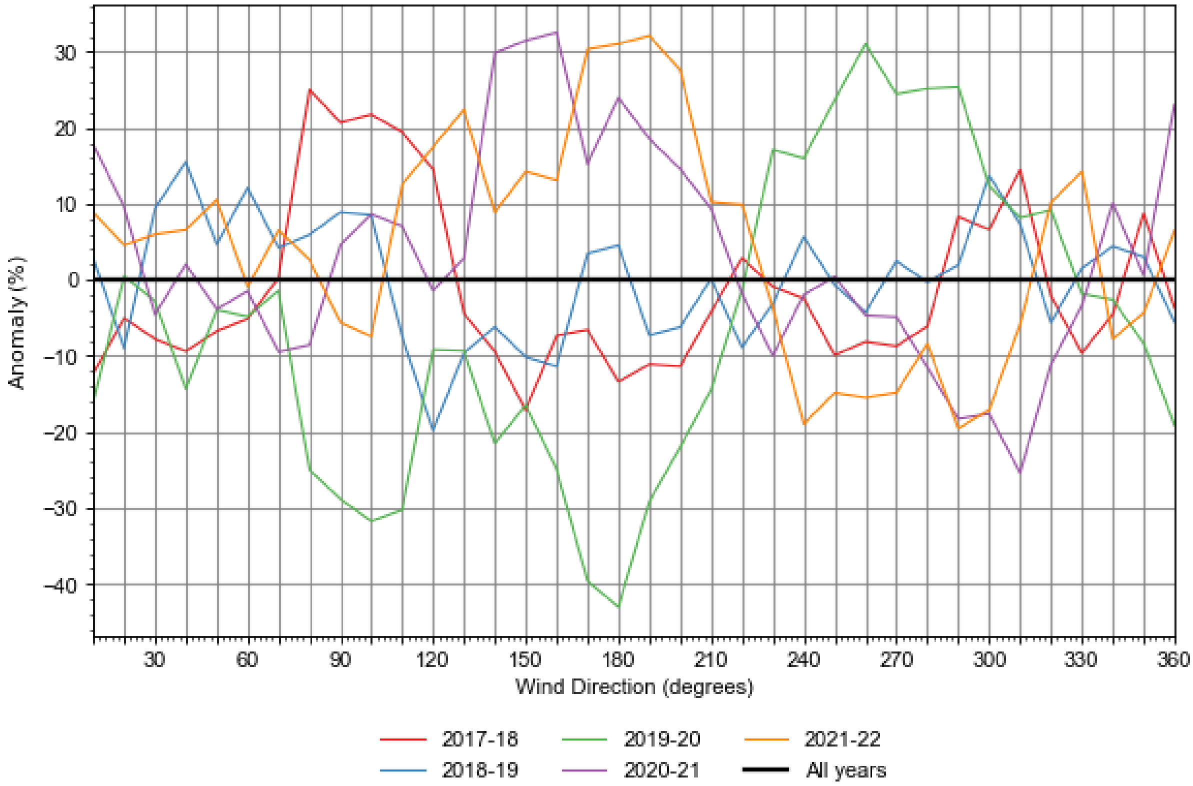

Figure 2-4 Annual observed wind direction frequency distribution anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

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Table 2-2 Correlation coefficients matrices of the distributions of wind direction at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9688	1				
2019-20	0.9066	0.9587	1			
2020-21	0.9152	0.9313	0.8841	1		
2021-22	0.93	0.9127	0.8686	0.9449	1	
All years	0.974	0.9888	0.9636	0.9592	0.9527	1

2.3 Wind U component

T□e □□□□□□□□d □e□□ □□d □□□□□ □□□e□□e□□er□□ □□□ □□□e□□□□□□e□□DF□□□d □e □□□□ □□□ □□e□□□ □e□r □□ □e □e□□ □□□□e □e□e□r □er□□d □M□r□□ □□□□ □□Fe□r□□r□ □□□□□□□re □re□e□ed □□F□□re □□□ □□d F□□re □□□□re□e□□e□□□

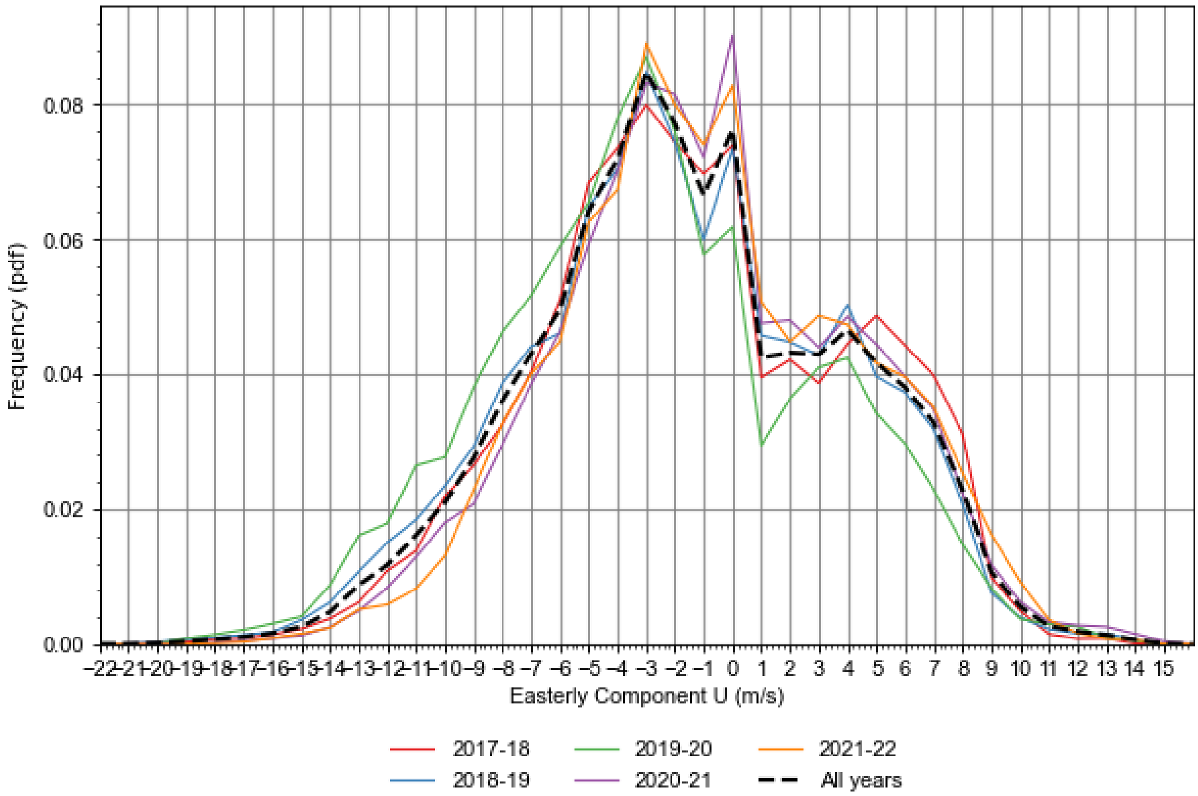


Figure 2-5 Comparison of annual observed wind U-component frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

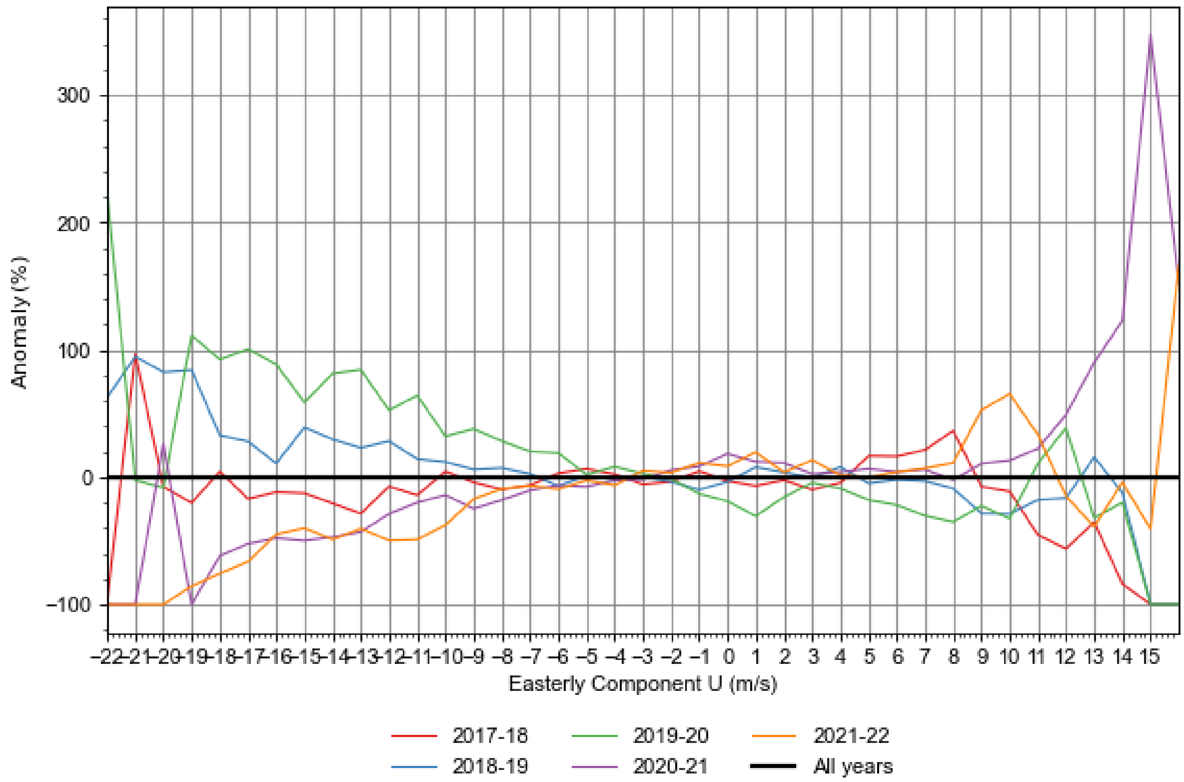


Figure 2-6 Annual observed wind U-component frequency distributions anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

The R^2 correlation coefficients for each year and compared each year versus the mean (all years) are provided in Table 2-3.

Table 2-3 Correlation coefficients matrices of the distributions of the wind U-component at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9873	1				
2019-20	0.9556	0.9749	1			
2020-21	0.9863	0.9851	0.9382	1		
2021-22	0.985	0.9843	0.9381	0.9953	1	
All years	0.9937	0.9971	0.9717	0.9918	0.9913	1

2.4 Wind V component

[illegible]

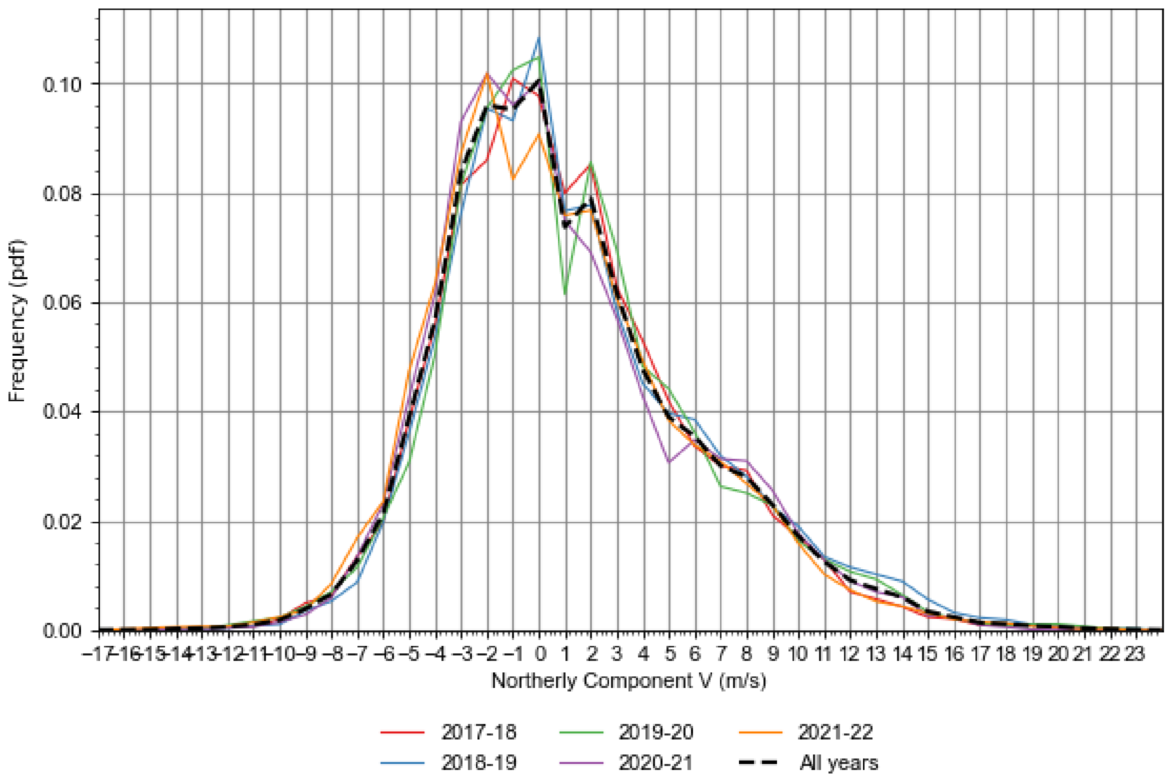


Figure 2-7 Comparison of annual observed wind V-component frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

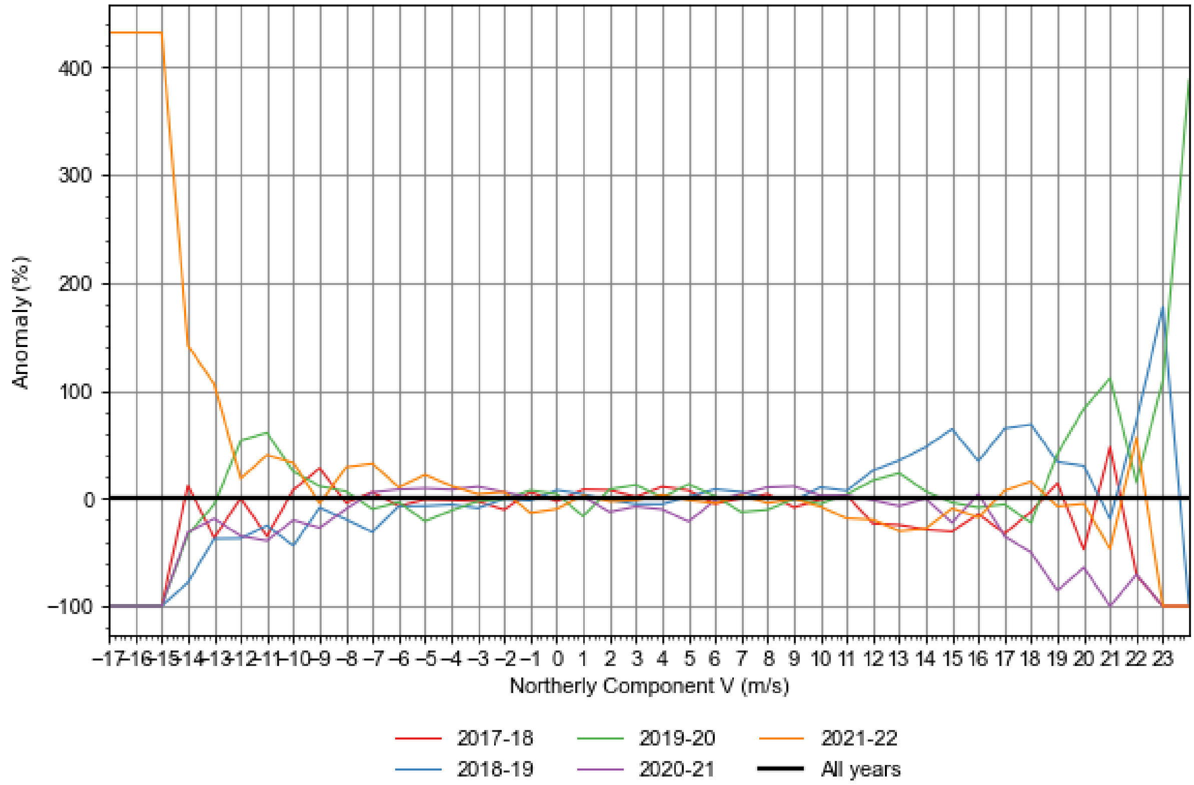


Figure 2-8 Annual observed wind V-component frequency distributions anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

The R^2 correlation coefficients for each year and the period each year versus the mean distribution are summarised in Table 2-4.

Table 2-4 Correlation coefficients matrices of the distributions of the wind V-component at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9929	1				
2019-20	0.9912	0.9917	1			
2020-21	0.9872	0.9907	0.9829	1		
2021-22	0.9881	0.9867	0.9802	0.9933	1	
All years	0.9965	0.9971	0.994	0.9953	0.994	1

2.5 Temperature

[illegible]

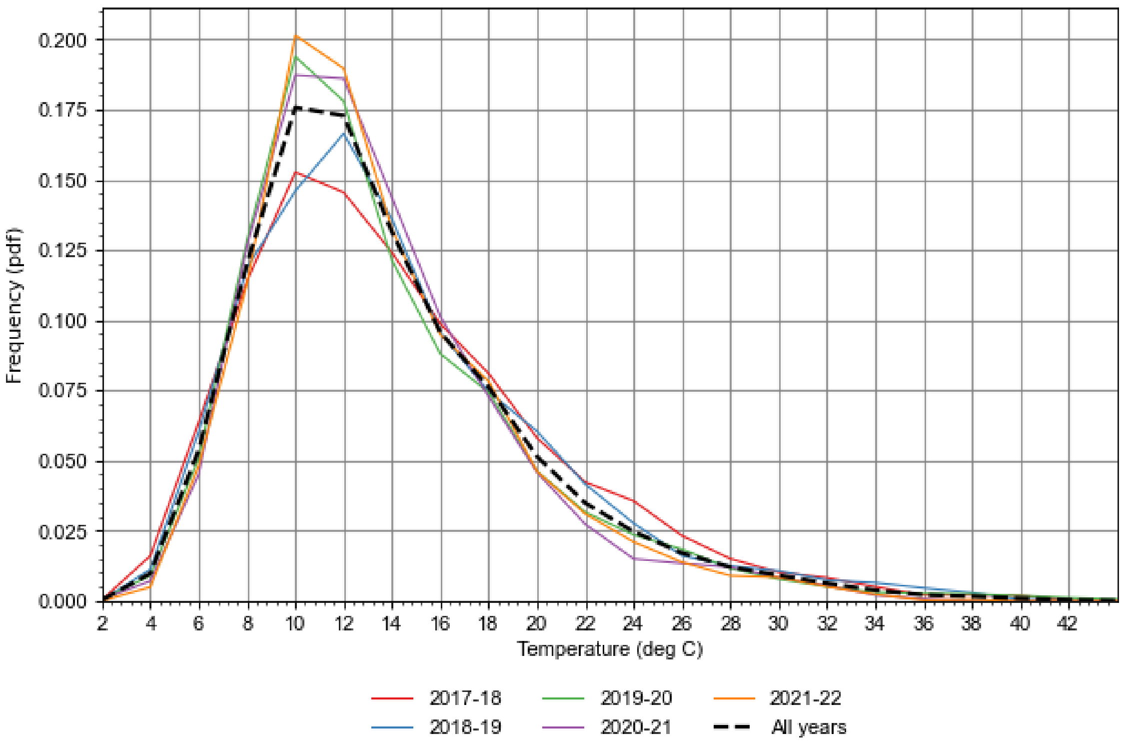


Figure 2-9 Comparison of annual observed temperature frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

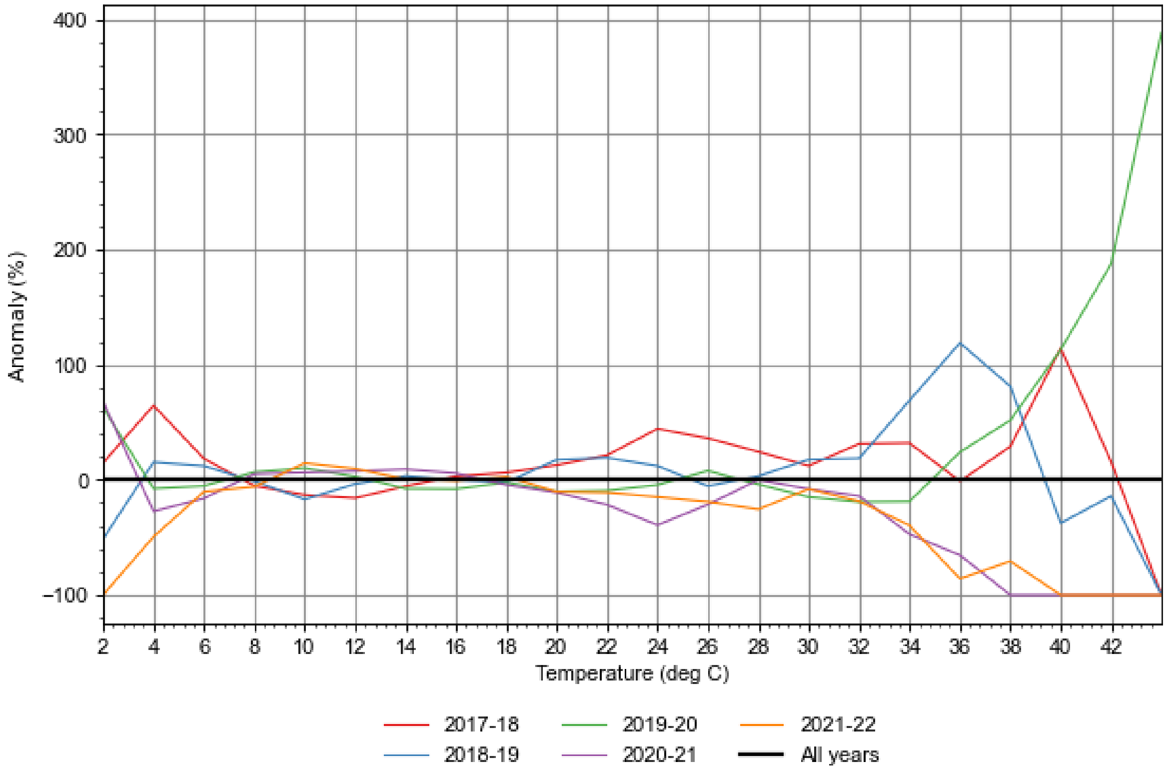


Figure 2-10 Annual observed temperature frequency distribution anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

The R^2 correlation coefficients for each year [illegible] each year [illegible] are presented in Table [illegible]

Table 2-5 Correlation coefficients matrices of the distributions of temperature at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9938	1				
2019-20	0.9823	0.9813	1			
2020-21	0.9835	0.9884	0.9948	1		
2021-22	0.9802	0.9811	0.9968	0.996	1	
All years	0.9922	0.9934	0.9962	0.9977	0.996	1

2.6 Dew point temperature

[illegible]

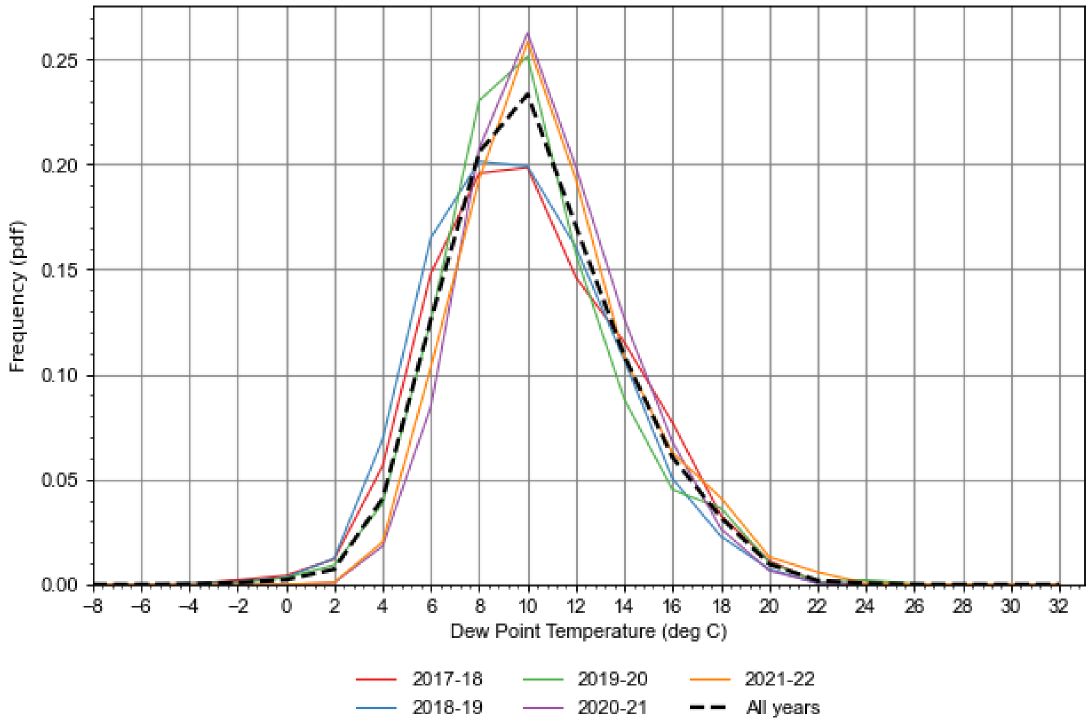


Figure 2-11 Comparison of annual observed dew point temperature frequency distributions to the mean at Mt Gellibrand (BoM station number 090035)

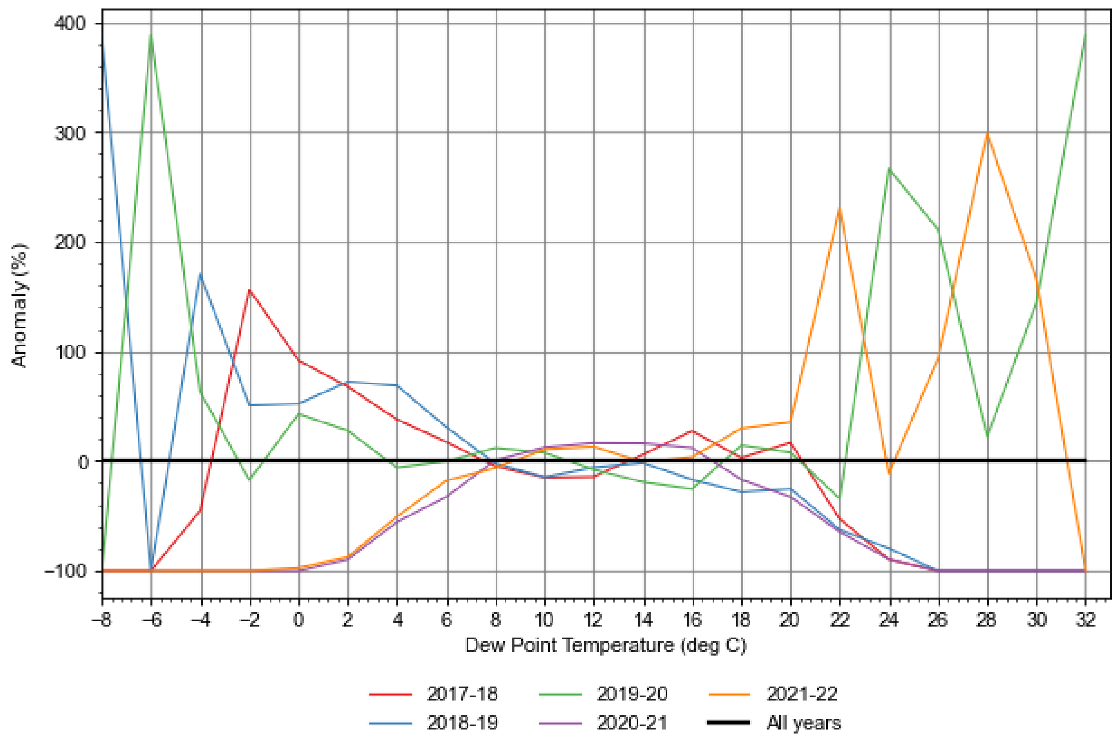


Figure 2-12 Annual observed dew point temperature frequency distribution anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

T□e R□ □□rre□□□□□□ □□□□□□□□□□ □□r e□□□ □e□r □□ □e□r□□□d e□□□ □e□r □er□□□ □□e □e□□ □□□□□e□r□□□re □□□ □ □r□ed □□ T□□e □□□ □□r □□e □□M M□Ge□□□r□□d A□ □ □□e□

Table 2-6 Correlation coefficients matrices of the distributions of dew point temperature at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9929	1				
2019-20	0.9756	0.9734	1			
2020-21	0.9554	0.9416	0.9748	1		
2021-22	0.9626	0.9521	0.9821	0.9959	1	
All years	0.9884	0.9829	0.9931	0.9858	0.9907	1

2.7 Surface atmospheric pressure

T[illegible]e [illegible]d [illegible]e[illegible] [illegible]e[illegible] [illegible]e[illegible]e[illegible]re[illegible]re [illegible]DF[illegible] [illegible]d [illegible]e [illegible] [illegible]e[illegible] [illegible]e[illegible]r [illegible] [illegible]e [illegible]e[illegible] [illegible]e [illegible]e[illegible] [illegible]e[illegible]r [illegible]er[illegible]d [illegible]M[illegible]r[illegible] [illegible] [illegible] Fe[illegible]r[illegible]r[illegible] [illegible]re [illegible]re[illegible]e[illegible]ed [illegible] F[illegible]re [illegible] [illegible]d F[illegible]re [illegible]T[illegible]e [illegible]re[illegible]re d[illegible]r[illegible] [illegible]r e[illegible] [illegible]e[illegible]r [illegible]r[illegible]d[illegible] [illegible] [illegible]e[illegible]r re[illegible]e[illegible]e [illegible]e[illegible]e[illegible]r [illegible]e[illegible] [illegible]e [illegible] A[illegible] [illegible] [illegible]e[illegible]

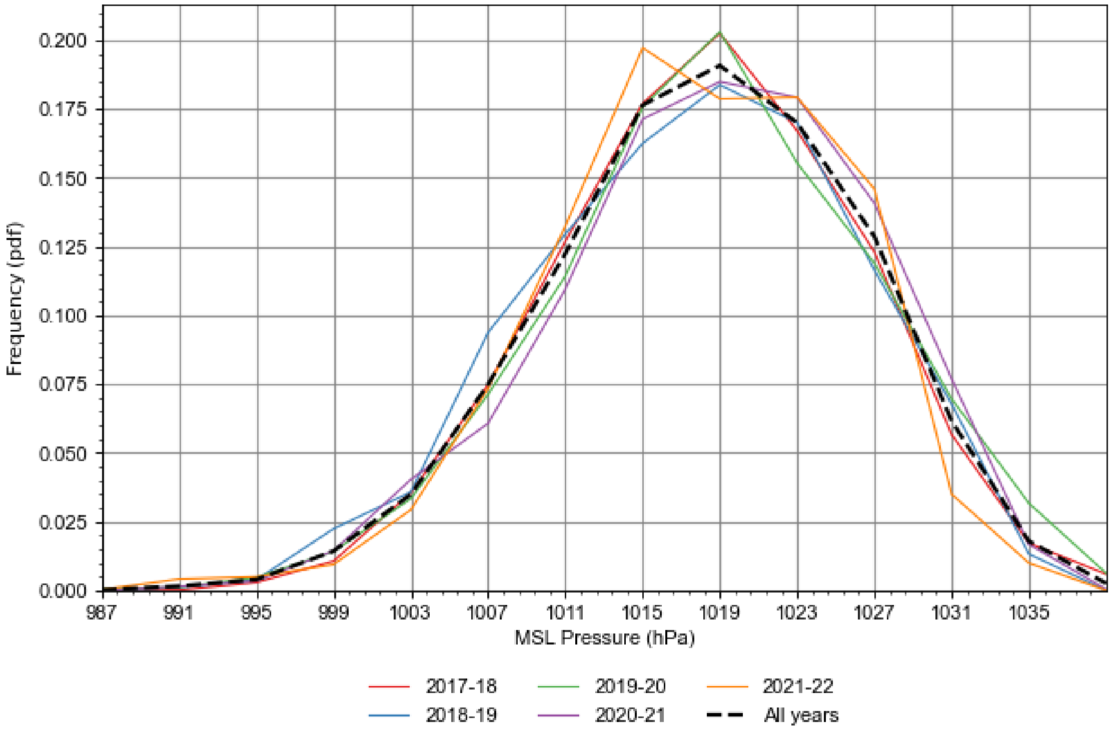


Figure 2-13 Comparison of annual observed mean sea level pressure frequency distributions to the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

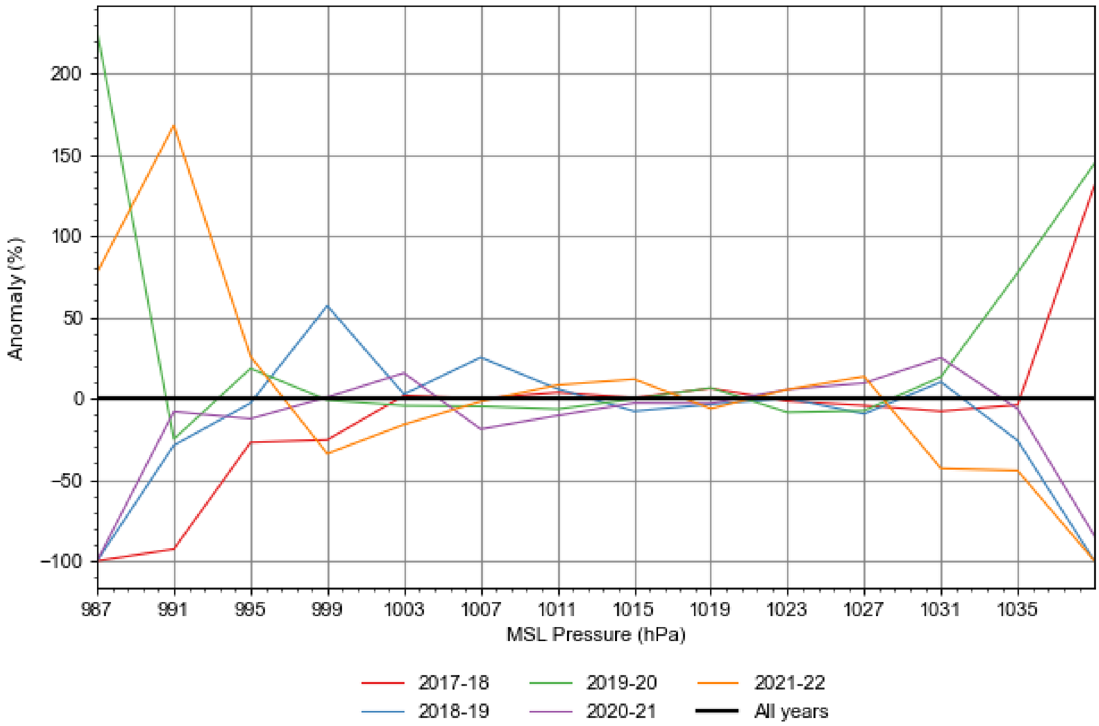


Figure 2-14 Annual observed mean sea level pressure frequency distribution anomaly from the mean

Figure Note: BoM Mt Gellibrand (Station number 090035)

T□e R□ □rre□□□□□ □□□□□□□□□ □□r e□□□ □e□r □□ □e□r□□□d e□□□ □e□r □er□□□ □□e □e□□ □□□□□e□r□□□re □□□ □ □r□□ed □□ T□□e □□□ □□r □□e M□Ge□□□r□□d □□M A□ □ □□e□

Table 2-7 Correlation coefficients matrices of the distributions of mean sea level pressure at Mt Gellibrand (BoM station number 090035)

Year	2017-18	2018-19	2019-20	2020-21	2021-22	All years
2017-18	1					
2018-19	0.9918	1				
2019-20	0.9957	0.9846	1			
2020-21	0.9873	0.982	0.986	1		
2021-22	0.9858	0.9777	0.9733	0.9793	1	
All years	0.9984	0.9934	0.9942	0.9931	0.9895	1

2.8 Rainfall

Monthly rainfall totals for the five-year period March 2017 to February 2022 are presented in Figure 2-15 for the Mt Gellibrand BoM AWS site.

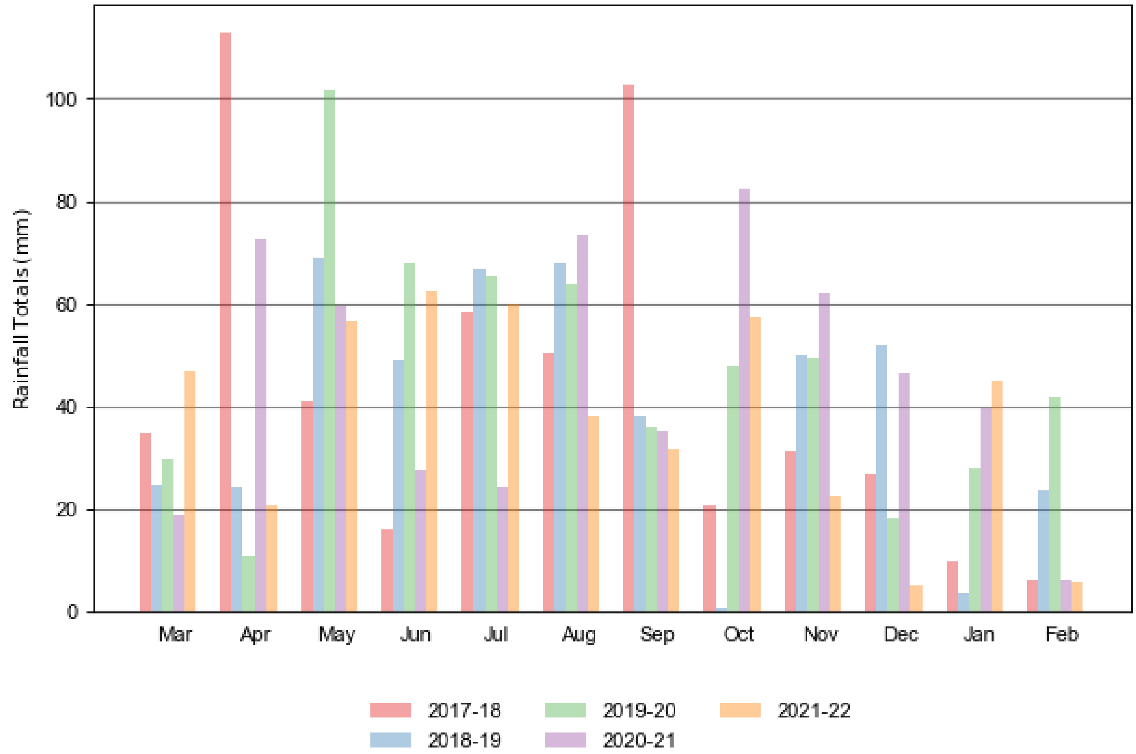


Figure 2-15 Monthly rainfall totals during the period March 2017 to February 2022

Figure Note: BoM Mt Gellibrand (Station number 090035)

2.9 El Niño Southern Oscillation

[illegible]

[illegible]

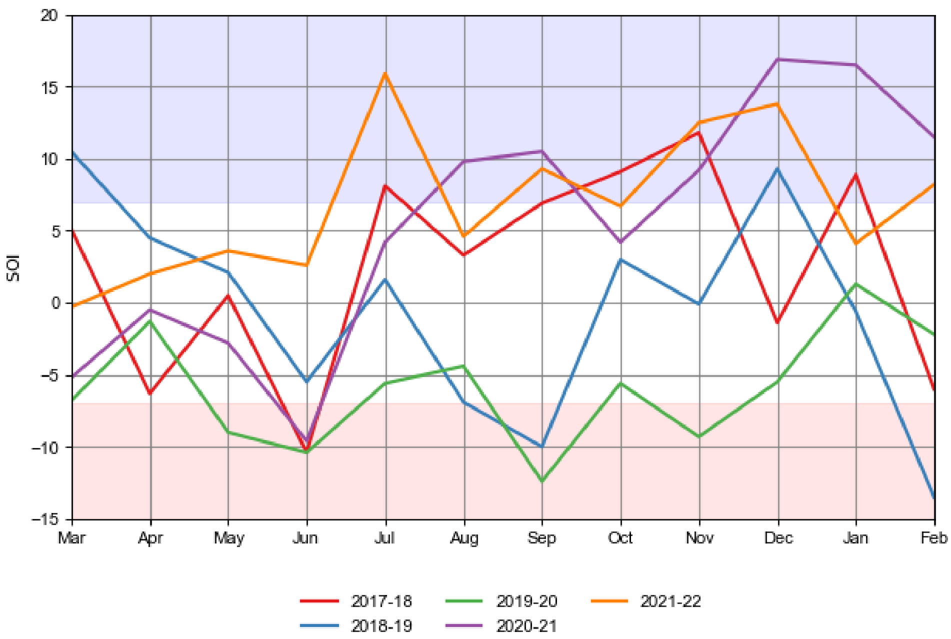


Figure 2-16 Monthly SOI for the period from March 2017 to February 2022

3 Analysis of annual variability by BoM Site

3.1 Correlation statistical analyses

[illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

3.2 Correlation statistic rankings

[illegible]

Table 3-1 Weightings applied to the meteorological parameter aggregation

Meteorological parameter	Wind speed	Wind direction	Air temperature	Dew point temperature	MSL pressure	SOI	Rain
Weighting	1.3	1.3	1.1	1	1	1	1

[illegible]

Table 3-2 Weighted rankings of correlation statistics for meteorological parameters

Year	Wind speed (m/s)	Wind direction (degrees)	Temp (°C)	Dew point temp (°C)	MSL pressure (hPa)	SOI	Annual rainfall	Aggregate ranking	Final rank
2017-18	2.6	2.6	5.5	3	1	2	1	17.7	1
2018-19	5.2	1.3	4.4	5	3	1	2	21.9	3
2019-20	6.5	3.9	2.2	1	2	4	4	23.6	4
2020-21	1.3	5.2	1.1	4	4	3	3	21.6	2
2021-22	3.9	6.5	3.3	2	5	5	5	30.7	5

[illegible]

Appendix B

Summary of CALMET Model Configuration Parameters

CALMET Parameters

0132.2306_ProTen_Mooleric
CALMET 2017-2018
100m resolution, 10x10 km

INPUT GROUP: 0 -- Input and Output File Names		
Parameter	**Description**	**Value**
GEODAT	Input file of geophysical data (GEO.DAT)	GEO.DAT
METLST	Output file name of CALMET list file (CALMET.LST)	CALMET.LST
METDAT	Output file name of generated gridded met files (CALMET.DAT)	CALMET.DAT
LCFILES	Lower case file names (T = lower case, F = upper case)	F
NUSTA	Number of upper air stations	0
NOWSTA	Number of overwater stations	0
NM3D	Number of prognostic meteorological data files (3D.DAT)	12
NIGF	Number of IGF-CALMET.DAT files used as initial guess	0

INPUT GROUP: 1 -- General Run Control Parameters		
Parameter	**Description**	**Value**
IBYR	Starting year	2017
IBMO	Starting month	3
IBDY	Starting day	1
IBHR	Starting hour	0
IBSEC	Starting second	0
IEYR	Ending year	2018
IEMO	Ending month	3
IEDY	Ending day	1
IEHR	Ending hour	0
IESEC	Ending second	0
ABTZ	Base time zone	UTC+1000
NSECDT	Length of modeling time-step (seconds)	3600
IRTYPE	Output run type (0 = wind fields only, 1 = CALPUFF/CALGRID)	1
LCALGRD	Compute CALGRID data fields (T = true, F = false)	T
ITEST	Flag to stop run after setup phase (1 = stop, 2 = run)	2
MREG	Regulatory checks (0 = no checks, 1 = US EPA LRT checks)	0

INPUT GROUP: 2 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
PMAP	Map projection system	UTM
FEAST	False easting at projection origin (km)	0.0
FNORTH	False northing at projection origin (km)	0.0

INPUT GROUP: 2 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
IUTMZN	UTM zone (1 to 60)	54
UTMHEM	Hemisphere of UTM projection (N = northern, S = southern)	S
RLAT0	Latitude of projection origin (decimal degrees)	0.00N
RLON0	Longitude of projection origin (decimal degrees)	0.00E
XLAT1	1st standard parallel latitude (decimal degrees)	30S
XLAT2	2nd standard parallel latitude (decimal degrees)	60S
DATUM	Datum-Region for the coordinates	WGS-84
NX	Meteorological grid - number of X grid cells	100
NY	Meteorological grid - number of Y grid cells	100
DGRIDKM	Meteorological grid spacing (km)	0.1
XORIGKM	Meteorological grid - X coordinate for SW corner (km)	742.3930
YORIGKM	Meteorological grid - Y coordinate for SW corner (km)	5755.9190
NZ	Meteorological grid - number of vertical layers	12
ZFACE	Meteorological grid - vertical cell face heights (m)	0.00,20.00,60.00,100.00,150.00,200.00,250.00,350.00,500.00,800.00,1600.00,2600.00,4600.00

INPUT GROUP: 3 -- Output Options		
Parameter	**Description**	**Value**
LSAVE	Save met fields in unformatted output file (T = true, F = false)	T
IFORMO	Type of output file (1 = CALPUFF/CALGRID, 2 = MESOPUFF II)	1
LPRINT	Print met fields (F = false, T = true)	F
IPRINF	Print interval for output wind fields (hours)	1
STABILITY	Print gridded PGT stability classes? (0 = no, 1 = yes)	0
USTAR	Print gridded friction velocities? (0 = no, 1 = yes)	0
MONIN	Print gridded Monin-Obukhov lengths? (0 = no, 1 = yes)	0
MIXHT	Print gridded mixing heights? (0 = no, 1 = yes)	0
WSTAR	Print gridded convective velocity scales? (0 = no, 1 = yes)	0
PRECIP	Print gridded hourly precipitation rates? (0 = no, 1 = yes)	0
SENSHEAT	Print gridded sensible heat fluxes? (0 = no, 1 = yes)	0
CONVZI	Print gridded convective mixing heights? (0 = no, 1 = yes)	0
LDB	Test/debug option: print input met data and internal variables (F = false, T = true)	F
NN1	Test/debug option: first time step to print	1
NN2	Test/debug option: last time step to print	1
LDBCST	Test/debug option: print distance to land internal variables (F = false, T = true)	F
IOUTD	Test/debug option: print control variables for writing winds? (0 = no, 1 = yes)	0

INPUT GROUP: 3 -- Output Options		
Parameter	**Description**	**Value**
NZPRN2	Test/debug option: number of levels to print starting at the surface	1
IPR0	Test/debug option: print interpolated winds? (0 = no, 1 = yes)	0
IPR1	Test/debug option: print terrain adjusted surface wind? (0 = no, 1 = yes)	0
IPR2	Test/debug option: print smoothed wind and initial divergence fields? (0 = no, 1 = yes)	0
IPR3	Test/debug option: print final wind speed and direction? (0 = no, 1 = yes)	0
IPR4	Test/debug option: print final divergence fields? (0 = no, 1 = yes)	0
IPR5	Test/debug option: print winds after kinematic effects? (0 = no, 1 = yes)	0
IPR6	Test/debug option: print winds after Froude number adjustment? (0 = no, 1 = yes)	0
IPR7	Test/debug option: print winds after slope flow? (0 = no, 1 = yes)	0
IPR8	Test/debug option: print final winds? (0 = no, 1 = yes)	0

INPUT GROUP: 4 -- Meteorological Data Options		
Parameter	**Description**	**Value**
NOOBS	Observation mode (0 = stations only, 1 = surface/overwater stations with prognostic upper air, 2 = prognostic data only)	2
NSSTA	Number of surface stations	0
NPSTA	Number of precipitation stations	-1
ICLDOUT	Output the CLOUD.DAT file? (0 = no, 1 = yes)	0
MCLOUD	Method to compute cloud fields (1 = from surface obs, 2 = from CLOUD.DAT, 3 = from prognostic (Teixera), 4 = from prognostic (MM5toGrads)	4
IFORMS	Surface met data file format (1 = unformatted, 2 = formatted)	2
IFORMP	Precipitation data file format (1 = unformatted, 2 = formatted)	2
IFORMC	Cloud data file format (1 = unformatted, 2 = formatted)	1

INPUT GROUP: 5 -- Wind Field Options and Parameters		
Parameter	**Description**	**Value**
IWFCOD	Wind field model option (1 = objective analysis, 2 = diagnostic)	1
IFRADJ	Adjust winds using Froude number effects? (0 = no, 1 = yes)	1
IKINE	Adjust winds using kinematic effects? (0 = no, 1 = yes)	0
IOBR	Adjust winds using O'Brien velocity procedure? (0 = no, 1 = yes)	0
ISLOPE	Compute slope flow effects? (0 = no, 1 = yes)	1
IEXTRP	Extrapolation of surface winds to upper layers method (1 = none, 2 = power law, 3 = user input, 4 = similarity theory, - = same except layer 1 data at upper air stations are ignored)	1
ICALM	Extrapolate surface winds even if calm? (0 = no, 1 = yes)	0
BIAS	Weighting factors for surface and upper air stations (NZ values)	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0
RMIN2	Minimum upper air station radius of influence for surface extrapolation exclusion (km)	4

INPUT GROUP: 5 -- Wind Field Options and Parameters		
Parameter	**Description**	**Value**
IPROG	Use prognostic winds as input to diagnostic wind model (0 = no, 13 = use winds from 3D.DAT as Step 1 field, 14 = use winds from 3D.DAT as initial guess field, 15 = use winds from 3D.DAT file as observations)	14
ISTEPPGS	Prognostic data time step (seconds)	3600
IGFMET	Use coarse CALMET fields as initial guess? (0 = no, 1 = yes)	0
LVARY	Use varying radius of influence (F = false, T = true)	F
RMAX1	Maximum radius of influence in the surface layer (km)	0
RMAX2	Maximum radius of influence over land aloft (km)	0
RMAX3	Maximum radius of influence over water (km)	0
RMIN	Minimum radius of influence used in wind field interpolation (km)	0.1
TERRAD	Radius of influence of terrain features (km)	9
R1	Relative weight at surface of step 1 fields and observations (km)	0
R2	Relative weight aloft of step 1 field and observations (km)	0
RPROG	Weighting factors of prognostic wind field data (km)	0
DIVLIM	Maximum acceptable divergence	5E-006
NITER	Maximum number of iterations in the divergence minimization procedure	50
NSMTH	Number of passes in the smoothing procedure (NZ values)	2,11*4
NINTR2	Maximum number of stations used in each layer for interpolation (NZ values)	12*99
CRITFN	Critical Froude number	1
ALPHA	Empirical factor triggering kinematic effects	0.1
NBAR	Number of barriers to interpolation of the wind fields	0
KBAR	Barrier - level up to which barriers apply (1 to NZ)	10
IDIOPT1	Surface temperature (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
ISURFT	Surface station to use for surface temperature (between 1 and NSSTA)	-1
IDIOPT2	Temperature lapse rate used in the computation of terrain-induced circulations (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
IUPT	Upper air station to use for the domain-scale lapse rate (between 1 and NUSTA)	-1
ZUPT	Depth through which the domain-scale lapse rate is computed (m)	200
IDIOPT3	Initial guess field winds (0 = compute from obs/prognostic, 1 = read from DIAG.DAT)	0
IUPWND	Upper air station to use for domain-scale winds	-1
ZUPWND	Bottom and top of layer through which the domain-scale winds are computed (m)	1.0, 1.00
IDIOPT4	Read observed surface wind components (0 = from SURF.DAT, 1 = from DIAG.DAT)	0
IDIOPT5	Read observed upper wind components (0 = from UPn.DAT, 1 = from DIAG.DAT)	0
LLBREZE	Use Lake Breeze module (T = true, F = false)	F
NBOX	Lake Breeze - number of regions	0

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters		
Parameter	**Description**	**Value**
CONSTB	Mixing height constant: neutral, mechanical equation	1.41
CONSTE	Mixing height constant: convective equation	0.15
CONSTN	Mixing height constant: stable equation	2400
CONSTW	Mixing height constant: overwater equation	0.16
FCORIOL	Absolute value of Coriolis parameter (1/s)	9E-005
IAVEZI	Spatial mixing height averaging? (0 = no, 1 = yes)	1
MNMDAV	Maximum search radius in averaging process (grid cells)	1
HAFANG	Half-angle of upwind looking cone for averaging (degrees)	30
ILEVZI	Layer of winds used in upwind averaging (between 1 and NZ)	1
IMIXH	Convective mixing height method (1 = Maul-Carson, 2 = Batchvarova-Gryning, - for land cells only, + for land and water cells)	1
THRESHL	Overland threshold boundary flux (W/m**3)	0
THRESHW	Overwater threshold boundary flux (W/m**3)	0.05
ITWPROG	Overwater lapse rate and deltaT options (0 = from SEA.DAT, 1 = use prognostic lapse rates and SEA.DAT deltaT, 2 = from prognostic)	0
ILUOC3D	Land use category in 3D.DAT	16
DPTMIN	Minimum potential temperature lapse rate (K/m)	0.001
DZZI	Depth of computing capping lapse rate (m)	200
ZIMIN	Minimum overland mixing height (m)	50
ZIMAX	Maximum overland mixing height (m)	3000
ZIMINW	Minimum overwater mixing height (m)	50
ZIMAXW	Maximum overwater mixing height (m)	3000
ICOARE	Overwater surface fluxes method	10
DSHELF	Coastal/shallow water length scale (km)	0
IWARM	COARE warm layer computation (0 = off, 1 = on)	0
ICOOL	COARE cool skin layer computation (0 = off, 1 = on)	0
IRHPROG	Relative humidity read option (0 = from SURF.DAT, 1 = from 3D.DAT)	1
ITPROG	3D temperature read option (0 = stations, 1 = surface from station and upper air from prognostic, 2 = prognostic)	2
IRAD	Temperature interpolation type (1 = 1/R, 2 = 1/R**2)	1
TRADKM	Temperature interpolation radius of influence (km)	500
NUMTS	Maximum number of stations to include in temperature interpolation	5
IAVET	Conduct spatial averaging of temperatures? (0 = no, 1 = yes)	1
TGDEFB	Default overwater mixed layer lapse rate (K/m)	-0.0098
TGDEFA	Default overwater capping lapse rate (K/m)	-0.0045
JWAT1	Beginning land use category for temperature interpolation over water	999
JWAT2	Ending land use category for temperature interpolation over water	999
NFLAGP	Precipitation interpolation method (1 = 1/R, 2 = 1/R**2, 3 = EXP/R**2)	2
SIGMAP	Precipitation interpolation radius of influence (km)	100.
CUTP	Minimum precipitation rate cutoff (mm/hr)	0.01

Appendix C

Evaluation of Meteorological Model Performance

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 Available Observations

The location of the closest Bureau of Meteorology (BoM) automatic weather station (AWS) in relation to the Mooleric Broiler Farm is provided in Table 1-1, and shown in Figure 1-1. The closest AWS site is located North-northwest at the summit of Mt Gellibrand, approximately 4.9 km from the site.

Table 1-1 Location of the closest AWS site in relation to Mooleric Broiler Farm

BoM Station Number	BoM Station Name	Latitude/ Northing (GDA 2020)	Longitude/ Easting (GDA 2020)	Distance from the Site	Bearing from the Site
090035	Colac (Mount Gellibrand)	-38.2333 °S (744418 mN)	143.7925 °E (5764612 mE)	4.9 km	334 ° (N-NW)

Figure 1-1 Location of the Mt Gellibrand BoM AWS site in relation to Mooleric Broiler Farm

2 Methodology for Model Performance Evaluation

Observations collected at the BoM Mt Gellibrand AWS, during the period selected for modelling (1 March 2017 to 28 February 2022), were compared with meteorological data generated by the TAPM meteorological modelling system for the same time period and approximate location. Model predictions were selected from the 300 m grid (Grid 5) at the closest respective model grid point to the BoM Mt Gellibrand AWS site, for evaluation analysis.

The model predictions were validated against observations using the following statistical measures. Details about these measures are discussed in Section 3.

- Root Mean Square Error (RMSE)
- Systematic Root Mean Square Error ($RMSE_S$)
- Unsystematic Root Mean Square Error ($RMSE_U$)
- Mean Error (ME)
- Mean Absolute Error (MAE)
- Index of Agreement (IOA)
- Skill E
- Skill V
- Skill R

In addition to these measures, basic descriptive statistics such as the minimum, mean, maximum, and standard deviation were also derived.

3 Statistics used in the Evaluation

There are no defined standards for numerical weather model performance. Statistical scores simply provide a means to quantify the magnitude of the difference between predictions and observations. These provide a useful guide to performance benchmarks of what should be expected from a model. These values are guidelines and are not absolute values of pass or fail.

3.1 Root mean square error (RMSE)

$$\mathrm{RMSE} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(P_i - O_i)^2}$$

Where:

N = number of observed and predicted hours in analysis (i.e. one year)

P = hourly prediction

O = hourly observation

The RMSE can be described as the standard deviation of the difference for hourly predicted and observed pairings at a specific point. The RMSE is a quadratic scoring rule, which measures the average magnitude of the error. The difference between predicted and corresponding observed values are each squared and then averaged over the sample. Finally, the square root of the average is taken. Since the errors are squared before they are averaged, the RMSE gives a relatively high weight to large errors. This means the RMSE is most useful when large errors are particularly undesirable. Overall, the RMSE is a good overall measure of model performance, but since large errors are weighted heavily (due to squaring), its value can be distorted. The units of RMSE are the same those of the values being analysed.

An appropriate benchmark for acceptable model performance for wind speed predictions is an RMSE value of 2 m/s or lower.

3.2 Systematic root mean square error ($RMSE_s$)

$$\mathrm{RMSE_S} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(\hat{P}_i - O_i)^2}$$

Where:

N = number of observed and predicted hours in analysis (i.e. one year)

$\hat{P}$ = mean of predictions

O = hourly observation

The $RMSE_s$ is calculated as the square root of the mean square difference of hourly predictions from the regression formula and observation pairings, at a specific point. The regressed predictions are taken from the least squares formula. The $RMSE_s$ estimates the model's linear (or systematic) error. The systematic error is a measure of the bias in the model due to user input or model deficiency, i.e., data input errors, assimilation variables, and choice of model options. The $RMSE_s$ is a metric for the model's accuracy.

3.3 Unsystematic root mean square error ($RMSE_u$)

$$\mathrm{RMSE}_U = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(\hat{P}_i - P_i)^2}$$

Where:

N = number of observed and predicted hours in analysis (i.e. one year)

$\hat{P}$ = mean of predictions

O = hourly prediction

The $RMSE_u$ is calculated as the square root of the mean square difference of hourly predictions from the regression formula and model prediction value pairings, at a specific point. The $RMSE_u$ is a measure of how much of the difference between predictions and observations result from random processes or influences outside the legitimate range of the model. This error may require model refinement, such as new algorithms or higher resolution grids, or that the phenomena being simulated cannot be fully resolved by the model. The $RMSE_u$ is a metric for the model's precision.

Ultimately, for good model performance, the RMSE should be a low value, with most of the variation explained in the observations. Here, the systematic error $RMSE_s$ should approach zero and the unsystematic error, $RMSE_u$, should approach the RMSE since:

$$\mathrm{RMSE}^2 = \mathrm{RMSE}_S^2 + \mathrm{RMSE}_u^2$$

3.4 Mean error and mean absolute error

The Mean Error (ME) is simply the average of the hourly modelled values minus the hourly observed values. It contains both systematic and unsystematic errors and is heavily influence by high and low errors.

Specific mean error benchmarks denoting acceptable model performance have been developed for:

- wind speed — ≤ ±0.5 m/s
- wind direction — ≤ ±10 °
- temperature — ≤ ±0.5 °C
- relative humidity — ≤ ±1 g/kg.

The Mean Absolute Error (MAE) measures the average magnitude of the errors in a set of predictions, without considering their direction. It measures accuracy for continuous variables. Expressed in words, the MAE is the average of the absolute values of the differences between predictions and the corresponding observation. The MAE is a linear score, which means that all the individual differences are weighted equally in the average. The MAE and the RMSE can be used together to diagnose the variation in the errors in a set of predictions. The RMSE will always be larger or equal to the MAE; the greater difference between them, the greater the variance in the individual errors in the sample. If the RMSE = MAE, then all the errors are of the same magnitude. Both the MAE and RMSE can range from 0 to ∞. They are negatively-oriented scores, i.e., lower values are better.

Specific mean absolute error benchmarks denoting acceptable model performance have been developed for:

- wind direction — ≤ 30 °
- temperature — ≤ 2 °C

- relative humidity — ≤ 2 g/kg.

3.5 Index of agreement

The Index of Agreement (IOA) is defined as:

$$\mathrm{IOA} = 1 - \frac{\sum_{i=1}^{N}(P_i - O_i)^2}{\sum_{i=1}^{N}(|P_i - O_{mean}| + |O_i - O_{mean}|)^2}$$

Where:

N is the number of observations,
P_i are the hourly model predictions,
O_i are the hourly observations,

O_{mean} is the observed observation mean, and $\hat{P}_i = a + bO_i$ is the linear regression fitted with intercepts a and slope b.

The IOA is calculated using a method described in Willmott (1982). The IOA can take a value between 0 and 1, with 1 indicating perfect agreement. The IOA is the ratio of the total RMSE to the sum of two differences, i.e., the difference between each prediction and the observed mean, and the difference between each observation and observed mean. From another perspective, the IOA is a measure of the match between the departure of each prediction from the observed mean and the departure of each observation from the observed mean. In general, a value of 0.5 is considered acceptable and >0.6 is considered good performance for time and space predictions. Specific index of agreement benchmarks denoting acceptable model performance have been developed for:

- wind speed — ≥ 0.6
- air temperature — ≥ 0.8
- relative humidity — ≥ 0.6.

3.6 Skill measures

Skill measure statistics are given in terms of a score, rather than in absolute terms. A model's skill can be measured by the difference in the standard deviation of the modelled and observed values (Chang and Hanna, 2004).

The **Skill_E (se)** is indicative of how much of the standard deviation in the observations is predicted to be due to random/natural processes (unsystematic) in the atmospheric boundary layer. i.e., turbulence/chaos. For good model performance, the value for Skill_E should be less than one, i.e.:

SKILL_E = (RMSE_U/ STDEV OBS) < 1 shows skill

Skill_V (sv) is ratio of the standard deviation of the model predictions to the standard deviation of the observations. For good model performance, the value for Skill_V should be close to one, i.e.:

SKILL_V = (STDEV_MOD/ STDEV _OBS) close to 1 shows skill

SKILL_R (sr) takes into account systematic and unsystematic errors in relation to the observed standard deviation. For good model performance, the value for Skill_E should be less than one, i.e.:

SKILL_R = (RMSE/ STDEV _OBS) < 1 shows skill

4 Model Performance Evaluation

4.1 Descriptive statistics

The basic statistics for TAPM predictions and observations at the BoM Mt Gellibrand AWS for the period modelled are compared in Table 4-1. Table 4-1 shows that the distribution of observations and model predictions are very similar.

Table 4-1 Descriptive statistics for meteorological observations and TAPM model predictions at the BoM Mt Gellibrand AWS

Descriptive Statistics	Wind speed		U Vector wind		V Vector wind		Temperature		Relative Humidity	
	AWS OBS	TAPM MOD	AWS OBS	TAPM MOD	AWS OBS	TAPM MOD	AWS OBS	TAPM MOD	AWS OBS	TAPM MOD
Average	6.5	4.0	-1.8	-1.4	0.6	-0.1	12.8	13.0	83.3	78.1
Standard deviation	3.3	2.0	5.2	3.4	4.7	2.5	5.7	5.3	20.5	18.8
Minimum	0.0	0.0	-19.4	-12.8	-16.4	-9.6	0.2	1.4	5.0	12.4
Maximum	22.4	12.8	14.3	9.5	21.8	11.2	43.2	41.2	100	100
n	43304	43498	43254	43498	43254	43498	43305	43498	43305	43498

Table note: U component is the east-west component of the wind.
V component is the north-south component of the wind.

4.2 Statistical model evaluation measures

Evaluation statistics for wind speed and U and V wind components are detailed in Table 4-2. The statistical measures used to evaluate model performance show that the TAPM model predicted winds well, performing within acceptable limits. In particular, all predicted wind parameters easily met each of their respective benchmarks, with the exception of the Root Mean Square Error for the East-West (U) vector wind component and the Mean Error (Bias) for the North-South (V) vector wind component.

Table 4-2 Evaluation statistics for TAPM wind predictions at the BoM Mt Gellibrand AWS

Statistic	Ideal score	Benchmark	Wind speed score	U wind component score	V wind component score
RMSE	0 m/s	≤ 2 m/s	3.3 m/s	2.6 m/s	2.9 m/s
$RMSE_S$	0 m/s	≤ 2 m/s	3.0 m/s	2.1 m/s	2.6 m/s
$RMSE_U$	0 m/s	≤ 2 m/s	1.2 m/s	1.4 m/s	1.3 m/s
Mean Error (Bias)	0 m/s	≤ ±0.5 m/s	-2.5 m/s	0.4 m/s	-0.7 m/s
MAE (Gross error)	0 m/s	≤ 2 m/s	2.6 m/s	2.1 m/s	2.2 m/s
IOA	1	≥ 0.6	0.7	0.9	0.8
$Skill_e$	<1	< 1	0.4	0.3	0.3
$Skill_v$	1	~ 1	0.6	0.7	0.5
$Skill_r$	<1	< 1	1.0	0.5	0.6

Table note: U component is the east-west component of the wind.
V component is the north-south component of the wind.
Benchmarks were conservatively selected for simple terrain.
Statistics meeting their respective benchmarks are highlighted in green, with those not meeting their benchmark being highlighted in red.

Evaluation statistics for air temperature and relative humidity are detailed in Table 4-3. The statistical measures used to evaluate model performance show that the TAPM model predicted air temperature and relative humidity well, meeting their respective benchmarks for all evaluation statistics with the exception of the mean Error (Bias) and MAE (Gross Error) for Temperature.

Table 4-3 Evaluation statistics for TAPM air temperature and relative humidity predictions at the BoM Mt Gellibrand AWS

Statistic	Ideal score	Air Temperature, °C		Relative Humidity, %	
		Benchmark	Score	Benchmark	Score
RMSE	0	-	1.8	-	13.9
$RMSE_S$	0	-	0.7	-	7.7
$RMSE_U$	0	-	1.7	-	11.6
Mean Error (Bias)	0	≤ ±0.5	0.2	≤ ±10	-5.2
MAE (Gross Error)	0	≤ 2	1.3	< 20	10.4
IOA	1	≥ 0.8	1.0	≥ 0.6	0.9
$Skill_E$	<1	< 1	0.3	< 1	0.6
$Skill_V$	1	~ 1	0.9	~ 1	0.9
$Skill_r$	<1	< 1	0.3	< 1	0.7

Table note: Benchmarks were conservatively selected for simple terrain.
Statistics meeting their respective benchmarks are highlighted in green, with those not meeting their benchmark being highlighted in red.

4.3 Wind

The wind speed probability density function (PDF) for the TAPM 300 m grid is presented in Figure 4-1. The corresponding PDFs for the easterly (U) and northerly (V) components of winds are shown in Figure 4-2 and Figure 4-3 respectively. Quantile-Quantile (Q-Q) plots for wind speed are shown in Figure 4-4. Wind roses for TAPM and observed wind distributions at the BoM Mt Gellibrand AWS site are presented in Figure 4-5.

Statistical comparisons of the predicted and observed winds at the BoM Mt Gellibrand AWS site are presented in Figure 4-1 to Figure 4-4. This statistical evaluation proved difficult due to the situation of the AWS on Mt Gellibrand. The location of the AWS atop the hill caused localised effects that the model was unable to accurately replicate. Furthermore, the extraction of the meteorological data from a grid cell nearest to the hill to provide an accurate representation of the meteorology was difficult, as the AWS on the hill was situated near the intersection of four model grid cells. These factors have affected the accuracy of the model evaluation.

Notwithstanding this, the model performance evaluation indicated that TAPM underpredicted the mean wind speed with a predicted mean value of 4 m/s compared to the observed mean value of 6.5 m/s. It also significantly over-predicted the frequency of light winds. This too could be an artefact of the comparison of the observed data from an elevated AWS with modelled data dominated by relatively flat terrain with a hill that is not well resolved in the model. This over-prediction of the light winds will add a degree of conservatism to the dispersion model predictions for fugitive emission sources, which tend to generate the highest ground level concentrations during light wind, stable conditions. In addition, TAPM predicted lower frequencies of winds above 5 m/s, which tend to be the conditions in which emissions are well dispersed. Model predictions do fall within the ± 50% criterion for acceptable model performance for wind speed under 19 m/s, and overall show general agreements with the observed wind speed distribution. However, several of the statistical measures do not meet the benchmark, such as the RSME and systematic RMSE, which is an indication that the model did not resolve the effect of the hill. The model is therefore considered not to be ideal, but is acceptable due to this conservatism and its potential to over-predict ground-level odour concentrations.

The wind rose diagram (Figure 4-5) shows that TAPM predicts the overall wind direction distribution quite well, with the exception of a noticeable reduction in northerly winds in the predicted data and the aforementioned inaccuracy in the distribution of wind speed in each direction.

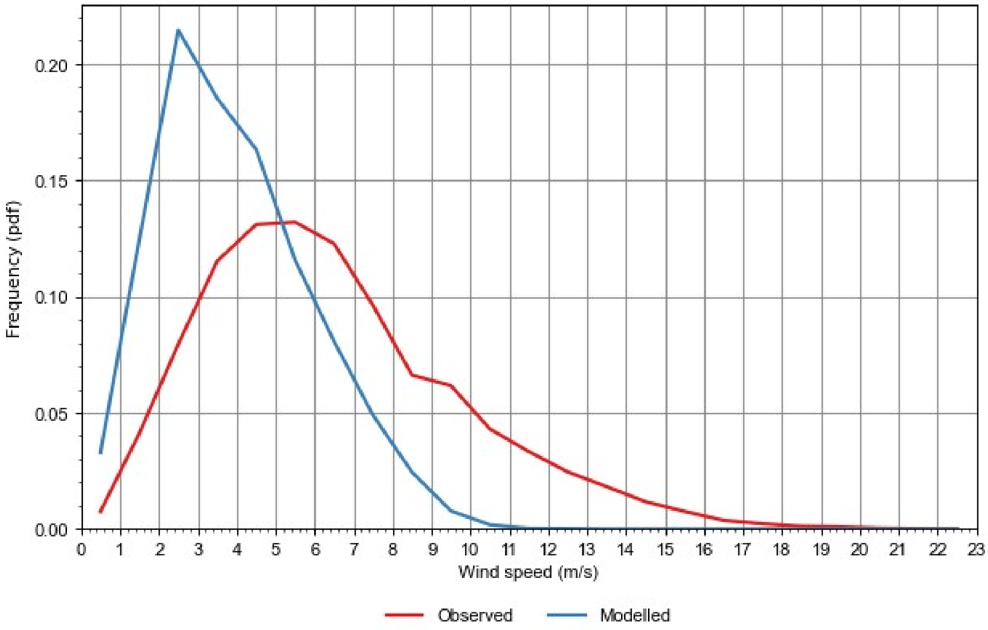


Figure 4-1 Distribution of wind speeds at the BoM Mt Gellibrand AWS

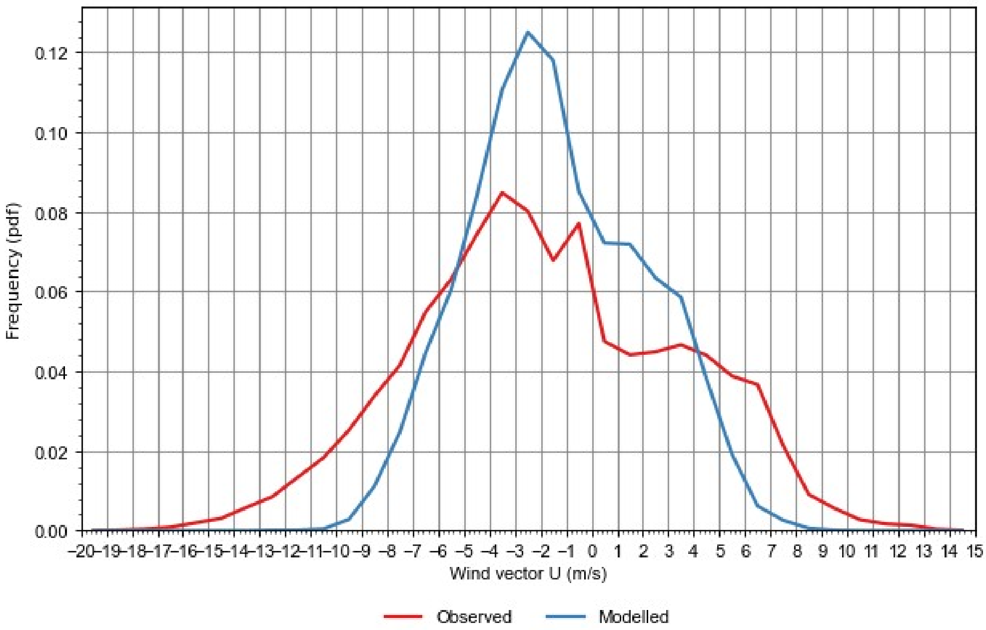


Figure 4-2 Distribution of easterly (U) component of wind at the BoM Mt Gellibrand AWS

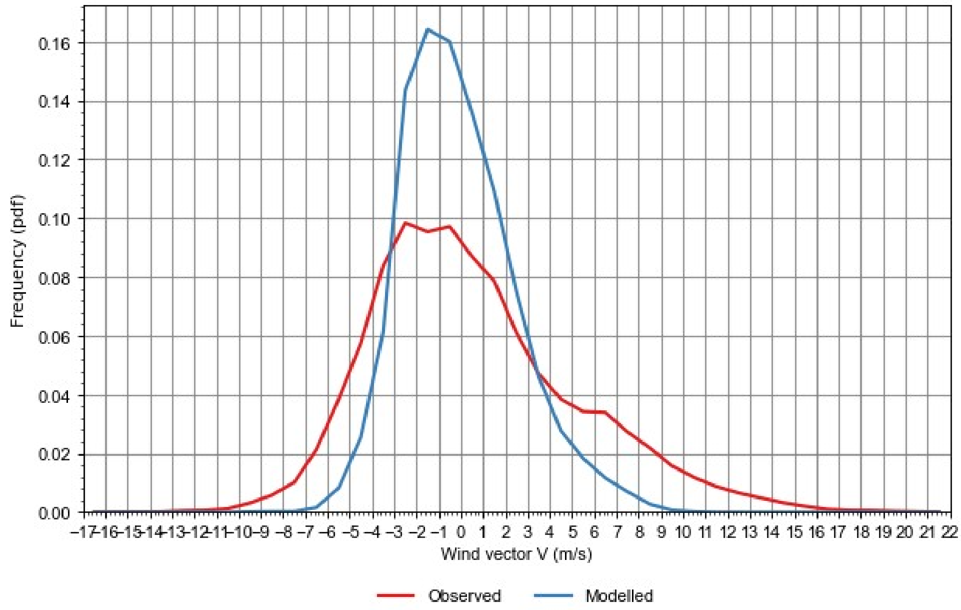


Figure 4-3 Distribution of northerly (V) component of wind at the BoM Mt Gellibrand AWS

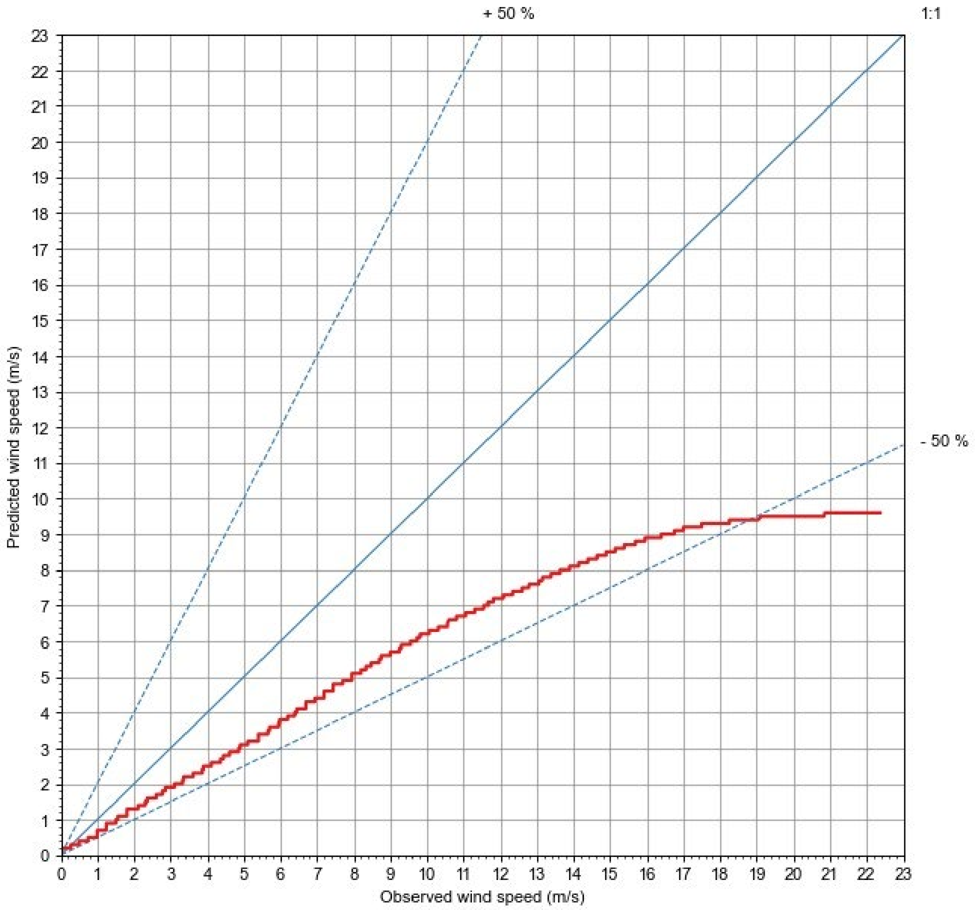


Figure 4-4 Quantile-quantile (Q-Q) plot of wind speeds at the BoM Mt Gellibrand AWS

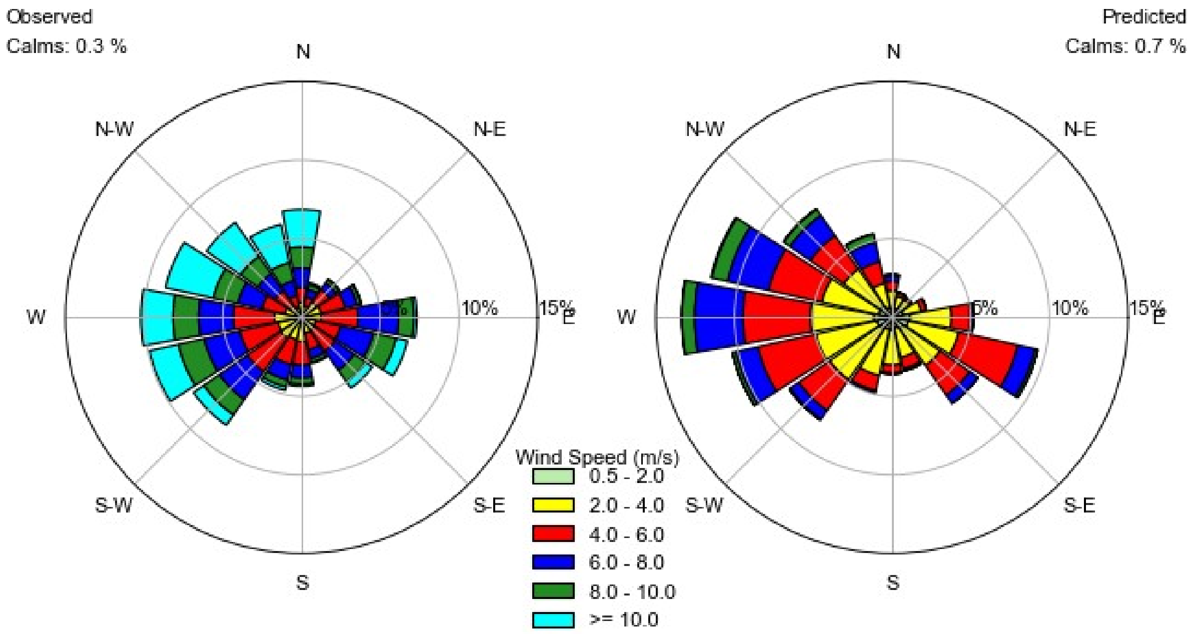


Figure 4-5 Distribution of observed (left) and TAPM predicted (right) winds at the BoM Mt Gellibrand AWS

4.4 Air temperature

The PDF and Q-Q plots for air temperature are provided in Figure 4-6 and Figure 4-7 respectively, showing that TAPM predicted a very temperature distribution for the period modelled, slightly overestimating the frequency of temperatures between 8 and 12 °C and underestimating the frequency of temperatures below 6 °C.

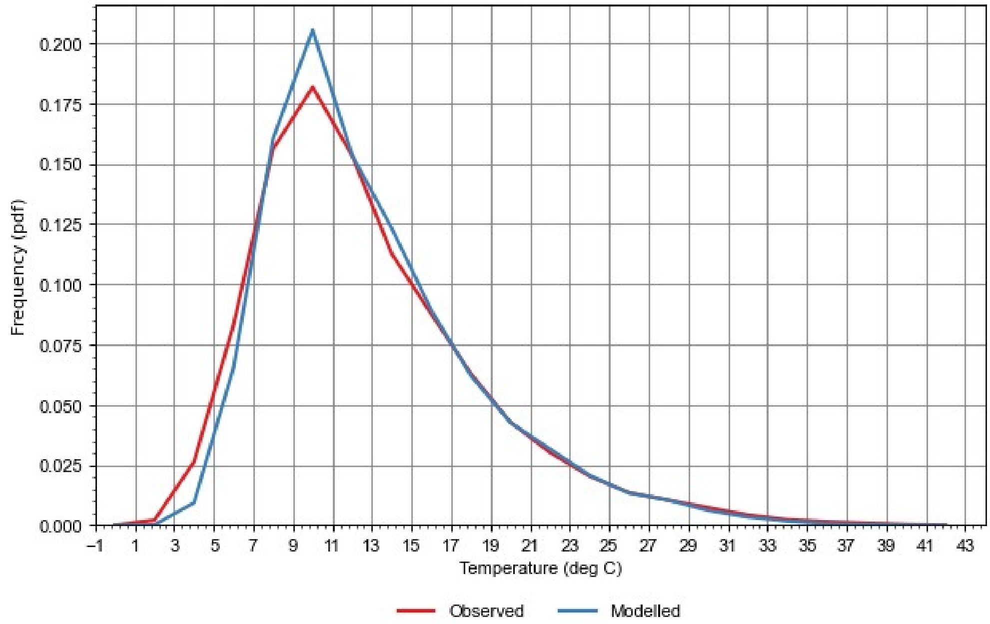


Figure 4-6 Distribution of temperature at the BoM Mt Gellibrand AWS

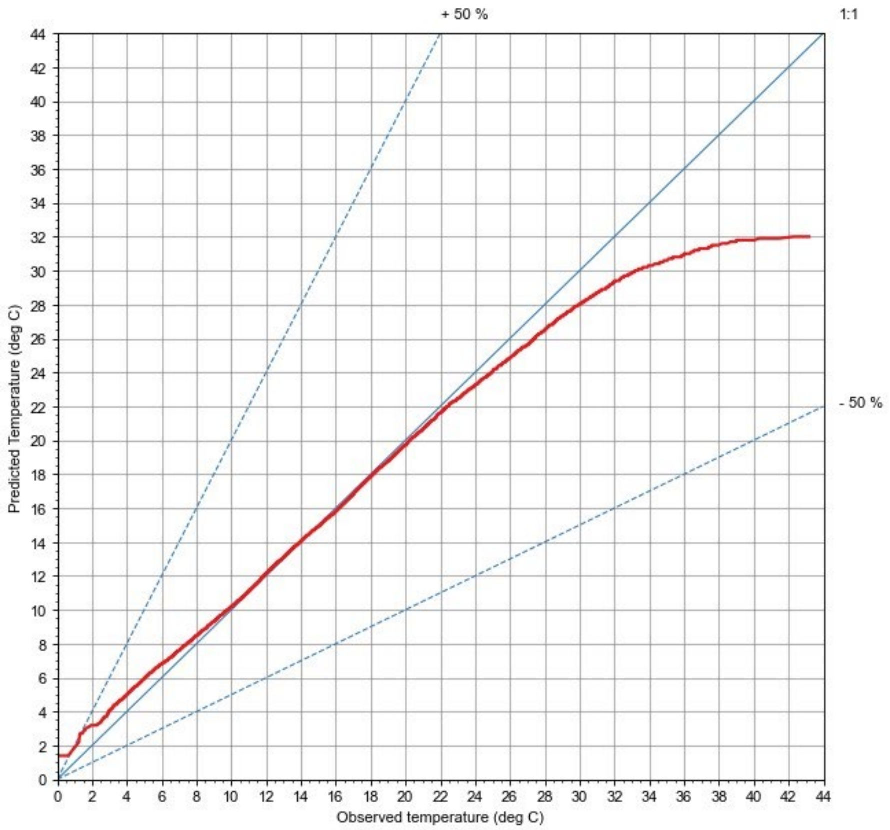


Figure 4-7 Quantile-quantile (Q-Q) plot of temperature at the BoM Mt Gellibrand AWS

4.5 Relative humidity

The PDF and Q-Q plots for relative humidity are provided in Figure 4-8 and Figure 4-9 respectively, showing that TAPM predicted a similar distribution of relative humidity to the observations for the period modelled with some deviation between the observed and modelled results as the relative humidity approaches 100%.

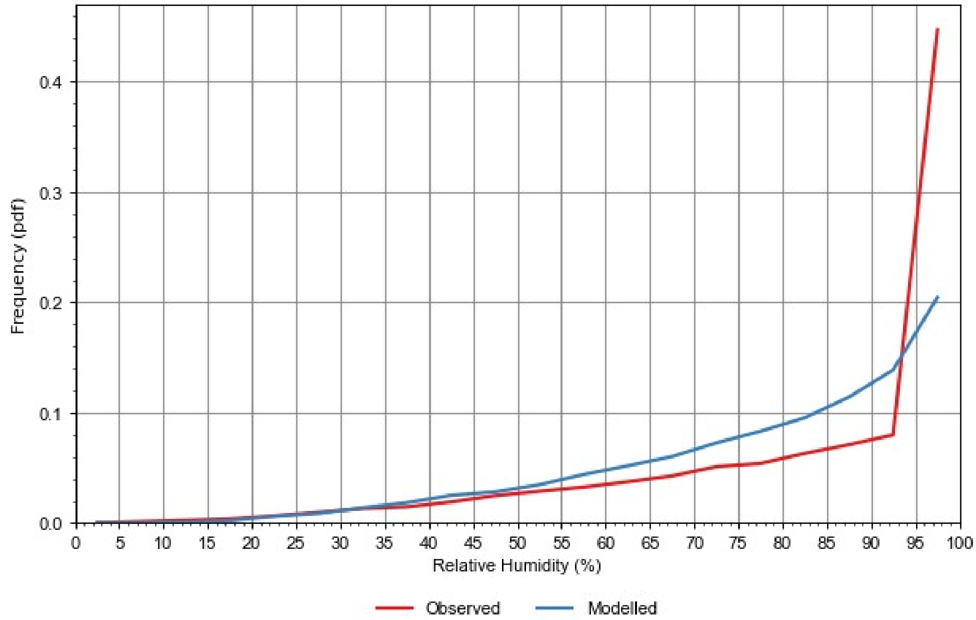


Figure 4-8 Distribution of relative humidity at the BoM Mt Gellibrand AWS

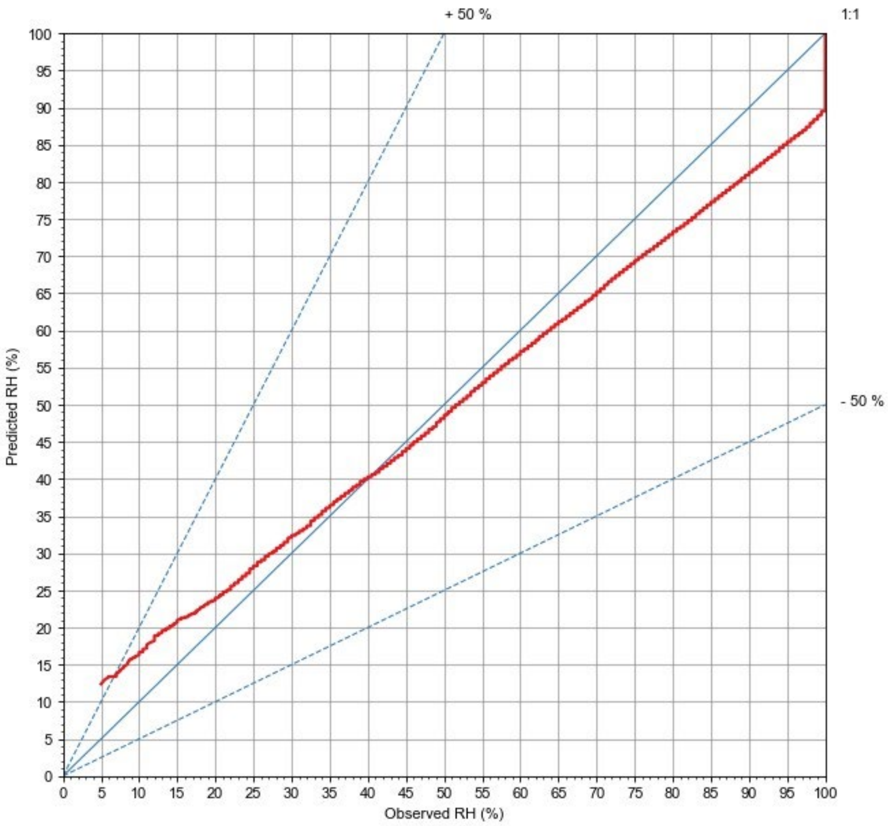


Figure 4-9 Quantile-quantile (Q-Q) plot of relative humidity at the BoM Mt Gellibrand AWS

5 Conclusions

The closest BoM observation site to Mooleric Broiler farm is located north-northwest of the site at Mt Gellibrand, approximately 4.9 km away. On the TAPM 300 m grid (Grid 5), the closest grid point to this location is approximately 160 m to the north-west of the BoM observation site. TAPM predictions made at the closest Grid 5 grid point to the BoM observation site were compared against observations for the same time period.

Temperature and relative humidity were each well-predicted, meeting all their respective statistical evaluation benchmarks in all cases. However, wind speed and direction were less well-predicted with a number of statistical measures exceeding the benchmark.

The variation between the observed results and modelled results in relation to wind speed and direction is most likely due to the positioning of the AWS and the topography surrounding it. The Mt Gellibrand AWS is positioned on the peak of a hill approximately 150 metres higher than the surrounding terrain and as such, the terrain changes very rapidly with distance from the monitor. Due to this, the nearest TAPM 300m grid cell, despite being only 160 metres from the AWS is still no longer on the top of the mountain but rather on the northern face of it.

The results show that the meteorological dataset generated for the TAPM 300 m grid is imperfect but usable in a CALMET No-Obs dispersion model scenario.

Appendix D

CALPUFF Dispersion Model Configuration

CALPUFF Parameters

0132.2306_ProTen_Mooleric
CALPUFF 2017-2018 all sheds average emission rates
100m resolution, 10x10 km

INPUT GROUP: 0 -- Input and Output File Names		
Parameter	**Description**	**Value**
METDAT	CALMET gridded meteorological data file (CALMET.DAT)	CALMET.DAT
PUFLST	CALPUFF output list file (CALPUFF.LST)	CALPUFF.LST
CONDAT	CALPUFF output concentration file (CONC.DAT)	CONC.DAT
DFDAT	CALPUFF output dry deposition flux file (DFLX.DAT)	DFLX.DAT
WFDAT	CALPUFF output wet deposition flux file (WFLX.DAT)	WFLX.DAT
LCFILES	Lower case file names (T = lower case, F = upper case)	F
NMETDOM	Number of CALMET.DAT domains	1
NMETDAT	Number of CALMET.DAT input files	1
NPTDAT	Number of PTEMARB.DAT input files	0
NARDAT	Number of BAEMARB.DAT input files	0
NVOLDAT	Number of VOLEMARB.DAT input files	1
NFLDAT	Number of FLEMARB.DAT input files	0
NRDDAT	Number of RDEMARB.DAT input files	0
NLNDAT	Number of LNEMARB.DAT input files	0
VOLDAT	Volume source varying emissions file (VOLEMARB.DAT)	Mooleric_2_modules_3_min_average_3min_Vol.dat

INPUT GROUP: 1 -- General Run Control Parameters		
Parameter	**Description**	**Value**
METRUN	Run all periods in met data file? (0 = no, 1 = yes)	0
IBYR	Starting year	2017
IBMO	Starting month	3
IBDY	Starting day	1
IBHR	Starting hour	0
IBMIN	Starting minute	0
IBSEC	Starting second	0
IEYR	Ending year	2018
IEMO	Ending month	3
IEDY	Ending day	1
IEHR	Ending hour	0
IEMIN	Ending minute	0
IESEC	Ending second	0

INPUT GROUP: 1 -- General Run Control Parameters		
Parameter	**Description**	**Value**
ABTZ	Base time zone	UTC+1000
NSECDT	Length of modeling time-step (seconds)	3600
NSPEC	Number of chemical species modeled	1
NSE	Number of chemical species to be emitted	0
ITEST	Stop run after SETUP phase (1 = stop, 2 = run)	2
MRESTART	Control option to read and/or write model restart data	0
NRESPD	Number of periods in restart output cycle	0
METFM	Meteorological data format (1 = CALMET, 2 = ISC, 3 = AUSPLUME, 4 = CTDM, 5 = AERMET)	1
MPRFFM	Meteorological profile data format (1 = CTDM, 2 = AERMET)	1
AVET	Averaging time (minutes)	60
PGTIME	PG Averaging time (minutes)	60
IOUTU	Output units for binary output files (1 = mass, 2 = odour, 3 = radiation)	1

INPUT GROUP: 2 -- Technical Options		
Parameter	**Description**	**Value**
MGAUSS	Near field vertical distribution (0 = uniform, 1 = Gaussian)	1
MCTADJ	Terrain adjustment method (0 = none, 1 = ISC-type, 2 = CALPUFF-type, 3 = partial plume path)	3
MCTSG	Model subgrid-scale complex terrain? (0 = no, 1 = yes)	0
MSLUG	Near-field puffs modeled as elongated slugs? (0 = no, 1 = yes)	0
MTRANS	Model transitional plume rise? (0 = no, 1 = yes)	1
MTIP	Apply stack tip downwash to point sources? (0 = no, 1 = yes)	1
MRISE	Plume rise module for point sources (1 = Briggs, 2 = numerical)	1
MTIP_FL	Apply stack tip downwash to flare sources? (0 = no, 1 = yes)	0
MRISE_FL	Plume rise module for flare sources (1 = Briggs, 2 = numerical)	2
MBDW	Building downwash method (1 = ISC, 2 = PRIME)	1
MSHEAR	Treat vertical wind shear? (0 = no, 1 = yes)	0
MSPLIT	Puff splitting allowed? (0 = no, 1 = yes)	0
MCHEM	Chemical transformation method (0 = not modeled, 1 = MESOPUFF II, 2 = User-specified, 3 = RIVAD/ARM3, 4 = MESOPUFF II for OH, 5 = half-life, 6 = RIVAD w/ISORROPIA, 7 = RIVAD w/ISORROPIA CalTech SOA)	0
MAQCHEM	Model aqueous phase transformation? (0 = no, 1 = yes)	0
MLWC	Liquid water content flag	1
MWET	Model wet removal? (0 = no, 1 = yes)	0
MDRY	Model dry deposition? (0 = no, 1 = yes)	0
MTILT	Model gravitational settling (plume tilt)? (0 = no, 1 = yes)	0
MDISP	Dispersion coefficient calculation method (1= PROFILE.DAT, 2 = Internally, 3 = PG/MP, 4 = MESOPUFF II, 5 = CTDM)	2
MTURBVW	Turbulence characterization method (only if MDISP = 1 or 5)	3
MDISP2	Missing dispersion coefficients method (only if MDISP = 1 or 5)	3

INPUT GROUP: 2 -- Technical Options		
Parameter	**Description**	**Value**
MTAULY	Sigma-y Lagrangian timescale method	0
MTAUADV	Advective-decay timescale for turbulence (seconds)	0
MCTURB	Turbulence method (1 = CALPUFF, 2 = AERMOD)	1
MROUGH	PG sigma-y and sigma-z surface roughness adjustment? (0 = no, 1 = yes)	0
MPARTL	Model partial plume penetration for point sources? (0 = no, 1 = yes)	1
MPARTLBA	Model partial plume penetration for buoyant area sources? (0 = no, 1 = yes)	0
MTINV	Strength of temperature inversion provided in PROFILE.DAT? (0 = no - compute from default gradients, 1 = yes)	0
MPDF	PDF used for dispersion under convective conditions? (0 = no, 1 = yes)	0
MSGTIBL	Sub-grid TIBL module for shoreline? (0 = no, 1 = yes)	0
MBCON	Boundary conditions modeled? (0 = no, 1 = use BCON.DAT, 2 = use CONC.DAT)	0
MSOURCE	Save individual source contributions? (0 = no, 1 = yes)	0
MFOG	Enable FOG model output? (0 = no, 1 = yes - PLUME mode, 2 = yes - RECEPTOR mode)	0
MREG	Regulatory checks (0 = no checks, 1 = USE PA LRT checks)	0

INPUT GROUP: 3 -- Species List		
Parameter	**Description**	**Value**
CSPEC	Species included in model run	ODOR

INPUT GROUP: 4 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
PMAP	Map projection system	UTM
FEAST	False easting at projection origin (km)	0.0
FNORTH	False northing at projection origin (km)	0.0
IUTMZN	UTM zone (1 to 60)	54
UTMHEM	Hemisphere (N = northern, S = southern)	S
RLAT0	Latitude of projection origin (decimal degrees)	0.00N
RLON0	Longitude of projection origin (decimal degrees)	0.00E
XLAT1	1st standard parallel latitude (decimal degrees)	30S
XLAT2	2nd standard parallel latitude (decimal degrees)	60S
DATUM	Datum-region for the coordinates	WGS-84
NX	Meteorological grid - number of X grid cells	100
NY	Meteorological grid - number of Y grid cells	100
NZ	Meteorological grid - number of vertical layers	12
DGRIDKM	Meteorological grid spacing (km)	0.1

INPUT GROUP: 4 -- Map Projection and Grid Control Parameters		
Parameter	**Description**	**Value**
ZFACE	Meteorological grid - vertical cell face heights (m)	0.0, 20.0, 60.0, 100.0, 150.0, 200.0, 250.0, 350.0, 500.0, 800.0, 1600.0, 2600.0, 4600.0
XORIGKM	Meteorological grid - X coordinate for SW corner (km)	742.3930
YORIGKM	Meteorological grid - Y coordinate for SW corner (km)	5755.9190
IBCOMP	Computational grid - X index of lower left corner	1
JBCOMP	Computational grid - Y index of lower left corner	1
IECOMP	Computational grid - X index of upper right corner	100
JECOMP	Computational grid - Y index of upper right corner	100
LSAMP	Use sampling grid (gridded receptors) (T = true, F = false)	T
IBSAMP	Sampling grid - X index of lower left corner	1
JBSAMP	Sampling grid - Y index of lower left corner	1
IESAMP	Sampling grid - X index of upper right corner	100
JESAMP	Sampling grid - Y index of upper right corner	100
MESHDN	Sampling grid - nesting factor	1

INPUT GROUP: 5 -- Output Options		
Parameter	**Description**	**Value**
ICON	Output concentrations to CONC.DAT? (0 = no, 1 = yes)	1
IDRY	Output dry deposition fluxes to DFLX.DAT? (0 = no, 1 = yes)	0
IWET	Output wet deposition fluxes to WFLX.DAT? (0 = no, 1 = yes)	0
IT2D	Output 2D temperature data? (0 = no, 1 = yes)	0
IRHO	Output 2D density data? (0 = no, 1 = yes)	0
IVIS	Output relative humidity data? (0 = no, 1 = yes)	0
LCOMPRS	Use data compression in output file (T = true, F = false)	T
IQAPLOT	Create QA output files suitable for plotting? (0 = no, 1 = yes)	1
IPFTRAK	Output puff tracking data? (0 = no, 1 = yes use timestep, 2 = yes use sampling step)	0
IMFLX	Output mass flux across specific boundaries? (0 = no, 1 = yes)	0
IMBAL	Output mass balance for each species? (0 = no, 1 = yes)	0
INRISE	Output plume rise data? (0 = no, 1 = yes)	0
ICPRT	Print concentrations? (0 = no, 1 = yes)	0
IDPRT	Print dry deposition fluxes? (0 = no, 1 = yes)	0
IWPRT	Print wet deposition fluxes? (0 = no, 1 = yes)	0
ICFRQ	Concentration print interval (timesteps)	1
IDFRQ	Dry deposition flux print interval (timesteps)	1
IWFRQ	Wet deposition flux print interval (timesteps)	1
IPRTU	Units for line printer output (e.g., 3 = ug/m**3 - ug/m**2/s, 5 = odor units)	5

INPUT GROUP: 5 -- Output Options		
Parameter	**Description**	**Value**
IMESG	Message tracking run progress on screen (0 = no, 1 and 2 = yes)	2
LDEBUG	Enable debug output? (0 = no, 1 = yes)	F
IPFDEB	First puff to track in debug output	1
NPFDEB	Number of puffs to track in debug output	1000
NN1	Starting meteorological period in debug output	1
NN2	Ending meteorological period in debug output	10

INPUT GROUP: 6 -- Subgrid Scale Complex Terrain Inputs		
Parameter	**Description**	**Value**
NHILL	Number of terrain features	0
NCTREC	Number of special complex terrain receptors	0
MHILL	Terrain and CTSG receptor data format (1= CTDM, 2 = OPTHILL)	2
XHILL2M	Horizontal dimension conversion factor to meters	1.0
ZHILL2M	Vertical dimension conversion factor to meters	1.0
XCTDMKM	X origin of CTDM system relative to CALPUFF system (km)	0.0
YCTDMKM	Y origin of CTDM system relative to CALPUFF system (km)	0.0

INPUT GROUP: 9 -- Miscellaneous Dry Deposition Parameters		
Parameter	**Description**	**Value**
RCUTR	Reference cuticle resistance (s/cm)	30
RGR	Reference ground resistance (s/cm)	10
REACTR	Reference pollutant reactivity	8
NINT	Number of particle size intervals for effective particle deposition velocity	9
IVEG	Vegetation state in unirrigated areas (1 = active and unstressed, 2 = active and stressed, 3 = inactive)	1

INPUT GROUP: 11 -- Chemistry Parameters		
Parameter	**Description**	**Value**
MOZ	Ozone background input option (0 = monthly, 1 = hourly from OZONE.DAT)	1
BCKO3	Monthly ozone concentrations (ppb)	80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00
MNH3	Ammonia background input option (0 = monthly, 1 = from NH3Z.DAT)	0
MAVGNH3	Ammonia vertical averaging option (0 = no average, 1 = average over vertical extent of puff)	1
BCKNH3	Monthly ammonia concentrations (ppb)	10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00
RNITE1	Nighttime SO2 loss rate (%/hr)	0.2
RNITE2	Nighttime NOx loss rate (%/hr)	2

INPUT GROUP: 11 -- Chemistry Parameters		
Parameter	**Description**	**Value**
RNITE3	Nighttime HNO3 loss rate (%/hr)	2
MH2O2	H2O2 background input option (0 = monthly, 1 = hourly from H2O2.DAT)	1
BCKH2O2	Monthly H2O2 concentrations (ppb)	1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00
RH_ISRP	Minimum relative humidity for ISORROPIA	50.0
SO4_ISRP	Minimum SO4 for ISORROPIA	0.4
BCKPMF	SOA background fine particulate (ug/m**3)	1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00
OFRAC	SOA organic fine particulate fraction	0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15
VCNX	SOA VOC/NOX ratio	50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00
NDECAY	Half-life decay blocks	0

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters		
Parameter	**Description**	**Value**
SYTDEP	Horizontal puff size for time-dependent sigma equations (m)	550
MHFTSZ	Use Heffter equation for sigma-z? (0 = no, 1 = yes)	0
JSUP	PG stability class above mixed layer	5
CONK1	Vertical dispersion constant - stable conditions	0.01
CONK2	Vertical dispersion constant - neutral/unstable conditions	0.1
TBD	Downwash scheme transition point option (<0 = Huber-Snyder, 1.5 = Schulman-Scire, 0.5 = ISC)	0.5
IURB1	Beginning land use category for which urban dispersion is assumed	10
IURB2	Ending land use category for which urban dispersion is assumed	19
ILANDUIN	Land use category for modeling domain	20
Z0IN	Roughness length for modeling domain (m)	.25
XLAIIN	Leaf area index for modeling domain	3.0
ELEVIN	Elevation above sea level (m)	.0
XLATIN	Meteorological station latitude (deg)	-999.0
XLONIN	Meteorological station longitude (deg)	-999.0
ANEMHT	Anemometer height (m)	10.0
ISIGMAV	Lateral turbulence format (0 = read sigma-theta, 1 = read sigma-v)	1
IMIXCTDM	Mixing heights read option (0 = predicted, 1 = observed)	0
XMXLEN	Slug length (met grid units)	1
XSAMLEN	Maximum travel distance of a puff/slug (met grid units)	1
MXNEW	Maximum number of slugs/puffs release from one source during one time step	99

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters		
Parameter	**Description**	**Value**
MXSAM	Maximum number of sampling steps for one puff/slug during one time step	99
NCOUNT	Number of iterations used when computing the transport wind for a sampling step that includes gradual rise	2
SYMIN	Minimum sigma-y for a new puff/slug (m)	1
SZMIN	Minimum sigma-z for a new puff/slug (m)	1
SZCAP_M	Maximum sigma-z allowed to avoid numerical problem in calculating virtual time or distance (m)	5000000
SVMIN	Minimum turbulence velocities sigma-v (m/s)	0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2, 0.2
SWMIN	Minimum turbulence velocities sigma-w (m/s)	0.2, 0.12, 0.08, 0.06, 0.03, 0.016, 0.2, 0.12, 0.08, 0.06, 0.03, 0.016
CDIV	Divergence criterion for dw/dz across puff (1/s)	0, 0
NLUTIBL	TIBL module search radius (met grid cells)	4
WSCALM	Minimum wind speed allowed for non-calm conditions (m/s)	0.5
XMAXZI	Maximum mixing height (m)	3000
XMINZI	Minimum mixing height (m)	50
TKCAT	Emissions scale-factors temperature categories (K)	265., 270., 275., 280., 285., 290., 295., 300., 305., 310., 315.
PLX0	Wind speed profile exponent for stability classes 1 to 6	0.07, 0.07, 0.1, 0.15, 0.35, 0.55
PTG0	Potential temperature gradient for stable classes E and F (deg K/m)	0.02, 0.035
PPC	Plume path coefficient for stability classes 1 to 6	0.5, 0.5, 0.5, 0.5, 0.35, 0.35
SL2PF	Slug-to-puff transition criterion factor (sigma-y/slug length)	10
FCLIP	Hard-clipping factor for slugs (0.0 = no extrapolation)	0
NSPLIT	Number of puffs created from vertical splitting	3
IRESPLIT	Hour for puff re-split	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0
ZISPLIT	Minimum mixing height for splitting (m)	100
ROLDMAX	Mixing height ratio for splitting	0.25
NSPLITH	Number of puffs created from horizontal splitting	5
SYSPLITH	Minimum sigma-y (met grid cells)	1
SHSPLITH	Minimum puff elongation rate (SYSPLITH/hr)	2
CNSPLITH	Minimum concentration (g/m**3)	0
EPSSLUG	Fractional convergence criterion for numerical SLUG sampling integration	0.0001
EPSAREA	Fractional convergence criterion for numerical AREA source integration	1E-006
DSRISE	Trajectory step-length for numerical rise integration (m)	1.0
HTMINBC	Minimum boundary condition puff height (m)	500

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters		
Parameter	**Description**	**Value**
RSAMPBC	Receptor search radius for boundary condition puffs (km)	10
MDEPBC	Near-surface depletion adjustment to concentration (0 = no, 1 = yes)	1

INPUT GROUP: 13 -- Point Source Parameters		
Parameter	**Description**	**Value**
NPT1	Number of point sources	0
IPTU	Units used for point source emissions (e.g., 1 = g/s)	5
NSPT1	Number of source-species combinations with variable emission scaling factors	0
NPT2	Number of point sources in PTEMARB.DAT file(s)	0

INPUT GROUP: 14 -- Area Source Parameters		
Parameter	**Description**	**Value**
NAR1	Number of polygon area sources	0
IARU	Units used for area source emissions (e.g., 1 = g/m**2/s)	1
NSAR1	Number of source-species combinations with variable emission scaling factors	0
NAR2	Number of buoyant polygon area sources in BAEMARB.DAT file(s)	0

INPUT GROUP: 15 -- Line Source Parameters		
Parameter	**Description**	**Value**
NLN2	Number of buoyant line sources in LNEMARB.DAT file	0
NLINES	Number of buoyant line sources	0
ILNU	Units used for line source emissions (e.g., 1 = g/s)	1
NSLN1	Number of source-species combinations with variable emission scaling factors	0
NLRISE	Number of distances at which transitional rise is computed	6

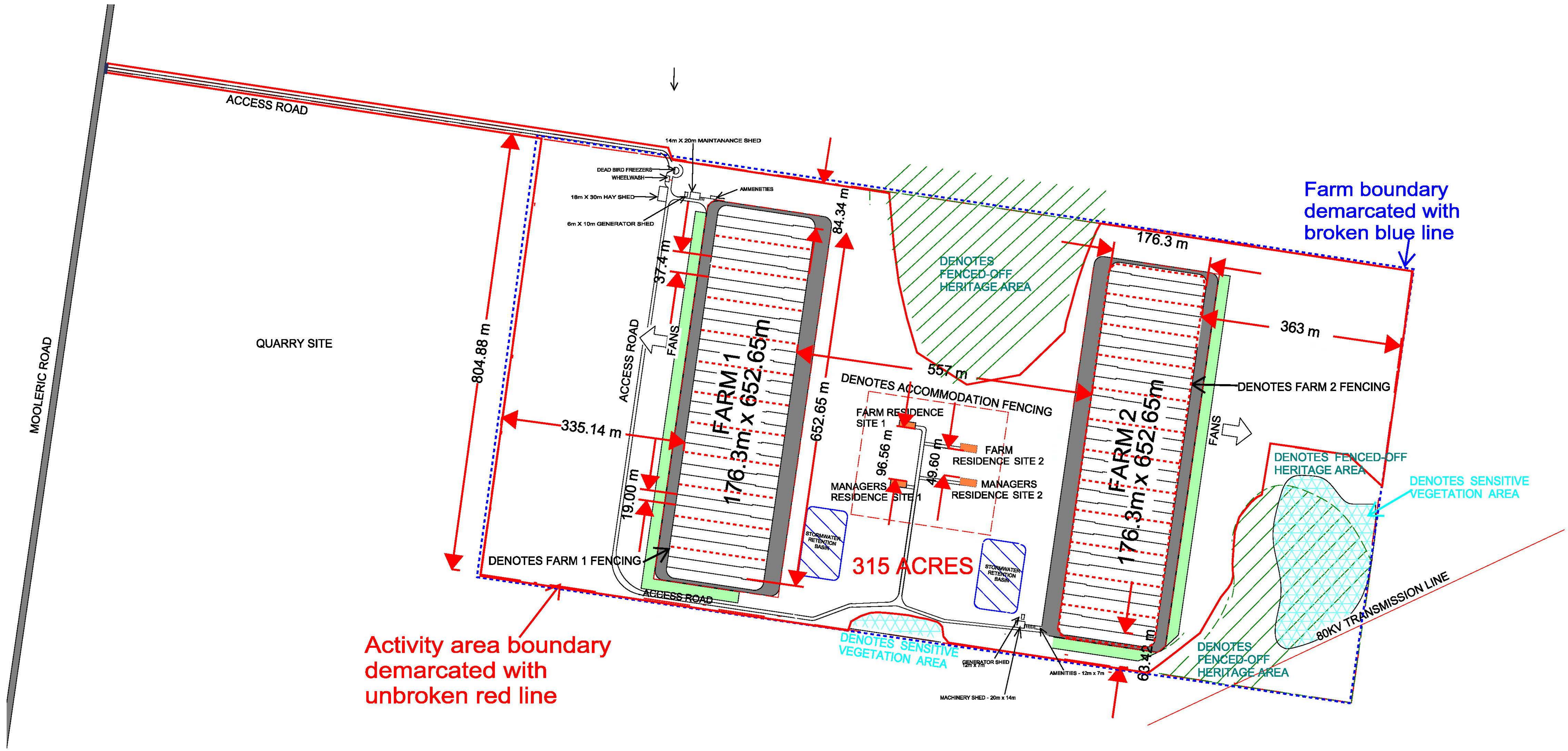
INPUT GROUP: 16 -- Volume Source Parameters		
Parameter	**Description**	**Value**
NVL1	Number of volume sources	0
IVLU	Units used for volume source emissions (e.g., 1 = g/s)	1
NSVL1	Number of source-species combinations with variable emission scaling factors	0
NVL2	Number of volume sources in VOLEMARB.DAT file(s)	24

INPUT GROUP: 17 -- FLARE Source Control Parameters (variable emissions file)		
Parameter	**Description**	**Value**
NFL2	Number of flare sources defined in FLEMARB.DAT file(s)	0

INPUT GROUP: 18 -- Road Emissions Parameters		
Parameter	**Description**	**Value**
NRD1	Number of road-links sources	0
NRD2	Number of road-links in RDEMARB.DAT file	0
NSFRDS	Number of road-links and species combinations with variable emission-rate scale-factors	0

INPUT GROUP: 19 -- Emission Rate Scale-Factor Tables		
Parameter	**Description**	**Value**
NSFTAB	Number of emission scale-factor tables	0

INPUT GROUP: 20 -- Non-gridded (Discrete) Receptor Information		
Parameter	**Description**	**Value**
NREC	Number of discrete receptors (non-gridded receptors)	18
NRGRP	Number of receptor group names	0



No	Revision	Client	Approval	Date
A	For client review -	BW	Bill Williams - CEO ProTen	8/07/2023
B		PROTEN BOARD		8/07/2023
		JW	James Wentworth - CFO ProTen	9/07/2028

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

CURRENT SITUATION ON GROUND - PROTEN BROILER SHED - Birragurra

SPIRECOM
PROJECT MANAGEMENT C

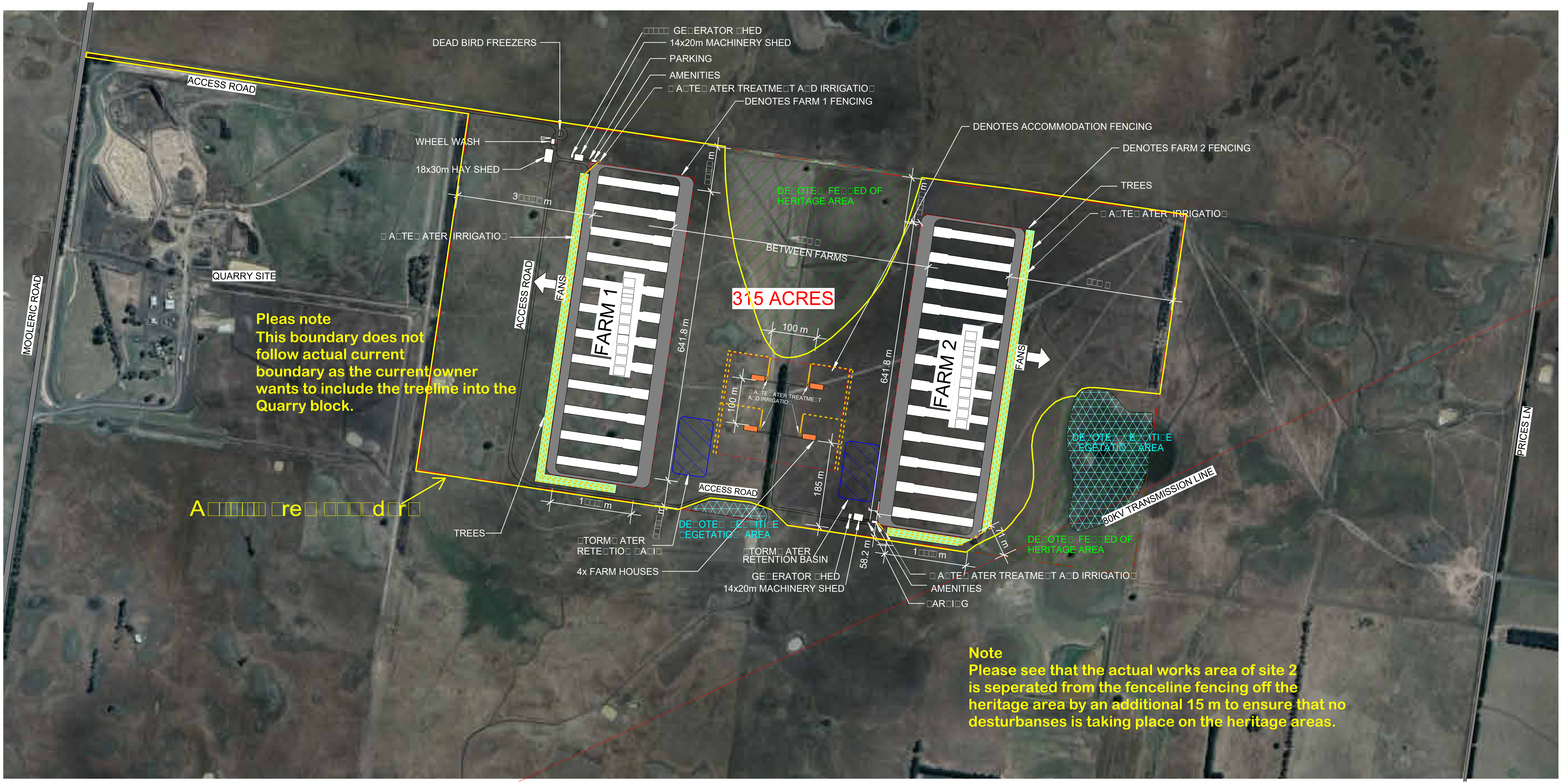
Spirecom Pty Ltd
6 Irrewarra Court
SEABROOK, 3028
Victoria
[redacted]

PROJECT ADDRESS
320 Mooleric Road
BIRREGURRA, VIC, 3242

PROJECT DESIGNER:
F.Ferreira

PROJECT CONTACT:
F.Ferreira
Scale - 1:500 @ A3 (1:250 @ A3)

PROJECT NO.	
CURRENT - 6391 VER 1	Sheet 1 of 13
DATE	REV. DATE
8/07/2023	



PROPOSED NEW CONSTRUCTION - Preliminary drawings

SITE PLAN - DA

1 : 8400

dwellings in wrong place

SANTREV
THE POULTRY HOUSE CONSTRUCTION SPECIALISTS

SANTREV PTY LTD
PO Box 95, Ipswich
Queensland Australia 4305

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ABN: 43 124 970 878
BSA QLD: 1214566
OCBA SA: 277785
BC VIC: CB-U 44246

NOTE: ALL DIMENSIONS
ARE IN mm (millimetres)
UNLESS NOTED
OTHERWISE

REV	DESCRIPTION	DATE

320 MOOLERIC ROAD

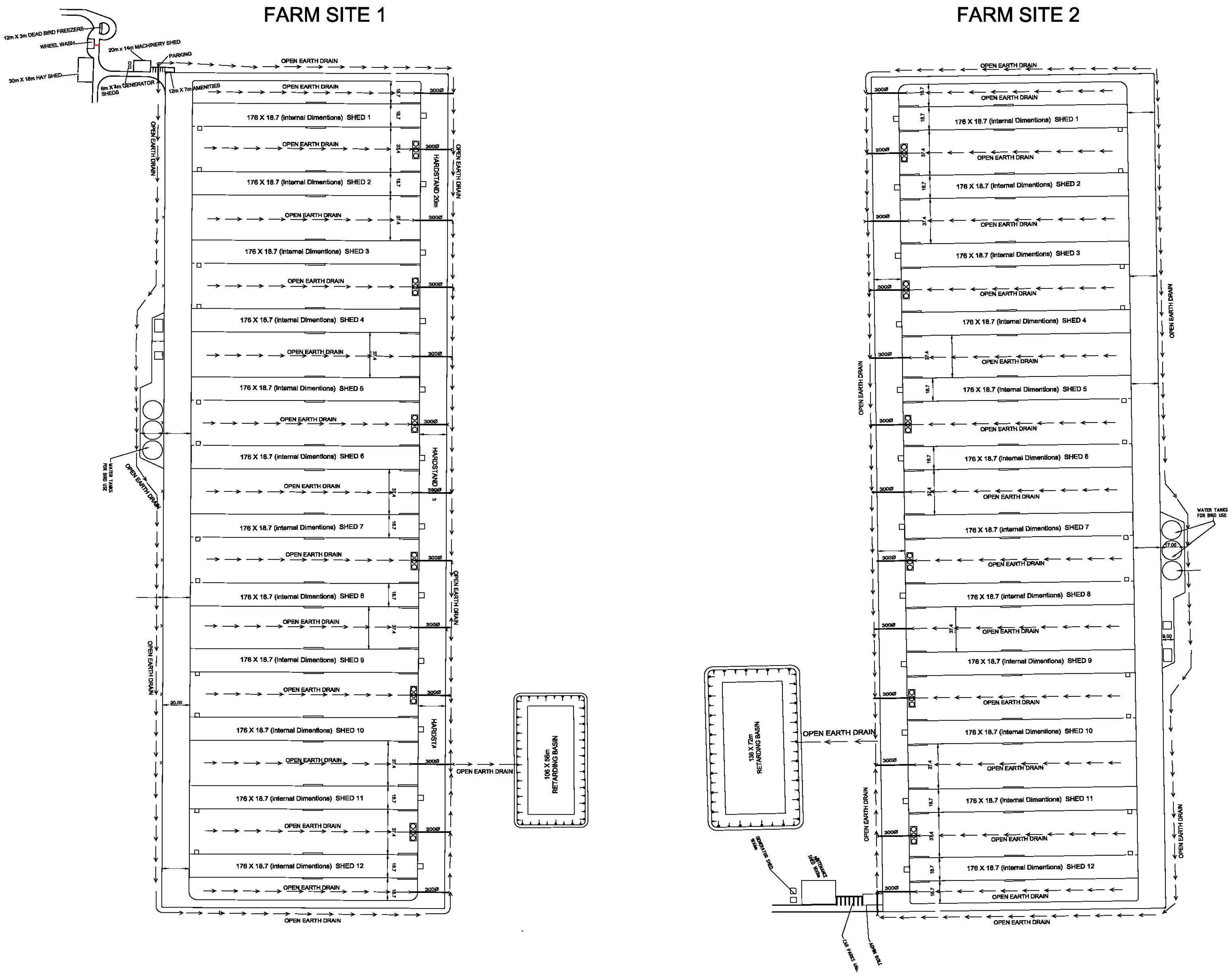
FOR: -

PROJECT ADDRESS:

320 MOOLERIC ROAD,
OMBERSLEY VIC 3241

SHEET TITLE:
SITE PLAN - DA

JOB No.: MOOL	DRAWN BY: DRK
DATE: 16/06/2023	
SCALE (A3): 1 : 8400	DRG No: D 02



No	Revision	Client	Approval	Date
A	For client review -	BW	Bill Williams - CEO ProTen	8/07/2023
B		PROTEN BOARD		8/07/2023
		JW	James Wentworth - CFO ProTen	9/07/2028

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

FARM SITE LAYOUT AND DRAINAGE DRAWINGS - PROTEN BROILER SHED - Birragurra

SPIRECOM
PROJECT MANAGEMENT CT

Spirecom Pty Ltd
6 Irrewarra Court
SEABROOK, 3028
Victoria
[redacted]

PROJECT ADDRESS
320 Mooleric Road
BIRREGURRA, VIC, 3242

PROJECT DESIGNER:
F.Ferreira

PROJECT CONTACT:
F.Ferreira Scale - NOT TO SCALE

PROJECT NO.
PLAN - 6391 VER 1

Sheet 8 of 13

DATE
8/07/2023

REV. DATE

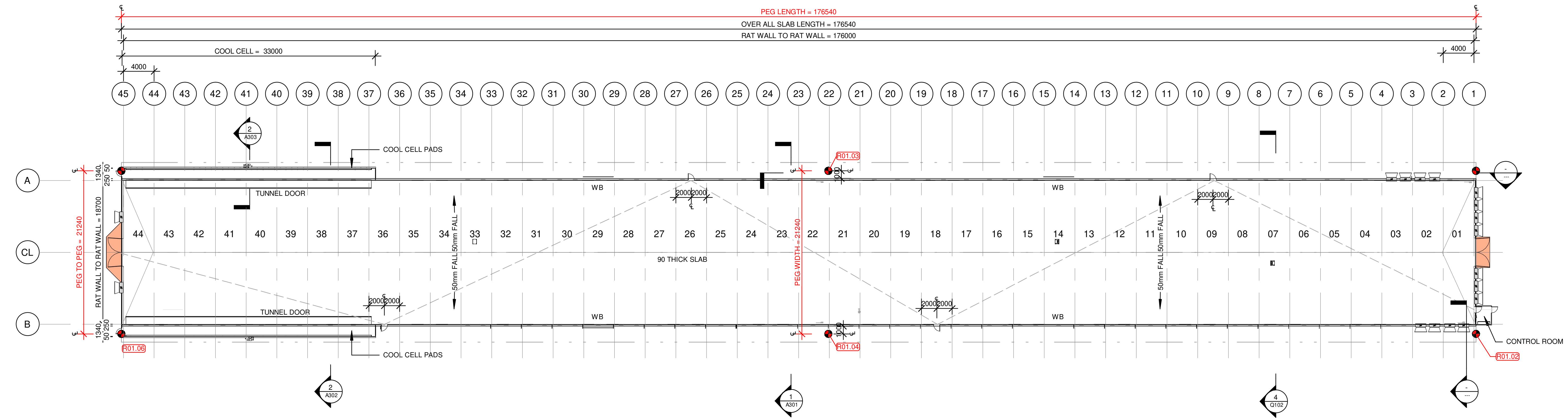
NOTE:

THE FOLLOWING TBC WITH CLIENT PRIOR TO ANY INSTALL
• FAN CONFIGURATION
• MINI-VENT CONFIGURATION
• HEATER POSITIONS
• MINIMUM VENTILATION FAN CONFIGURATION TO BE CONFIRMED

NOTE:

- WALL BRACING (WB) ON BAYS 14 AND 29.
- DRAIN IN SIDE WALLS-BAY #08,12,14,16,21,24,28,32,36,40,42 AND 2 AT EACH END WALL
- ALL SIDE PA DOORS TO BE IN CENTER OF BAYS U.N.O.

SHED #01
- SHEDS 3, 5 & 7 IS SIMILAR TO SHED 1
- SHEDS 2, 4, 6 & 8 ARE MIRRORED FROM SHED 1



SHED #01 LAYOUT - PLAN
1 : 500

DOOR SCHEDULE PER SHED						
Level	DOOR NUMBER	SP #	DESCRIPTION	Head Height	Clear Opening Width	Above FFL (TOS)

DOOR SPECIFICATIONS:

• COLOUR EXTERNAL – WHITE (SURFMIST OR ALIKE).
• COLOUR INTERNAL – WHITE (SURFMIST OR ALIKE).
• COLOUR FRAME – WHITE (SURFMIST OR ALIKE).
• BOLLARDS PROVIDED TO EXTERNAL OPENING DOORS.

POP-OUT DOOR SCHEDULE PER SHED

52 x 3.9m LONG x 0.5m HIGH POP OUT OPENING DOORS

WINDOW SCHEDULE PER SHED							
Level	WINDOW NUMBER	TYPE	DESCRIPTION	Height	Width	Head Height	Above FFL (TOS)

CONSTRUCTION DRAWINGS

SANTREV
THE POULTRY HOUSE CONSTRUCTION SPECIALISTS
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BSA QLD: 1214566
OCBA SA: 277785
BC VIC: CB-U 44246

NOTE: ALL DIMENSIONS ARE IN mm (millimetres) UNLESS NOTED OTHERWISE

REV	DESCRIPTION	DATE
A	PRELIMINARY DRAWINGS	13/07/2023

MOOLERIC FARMS

FOR: SRPP PTY LTD
PROJECT ADDRESS:

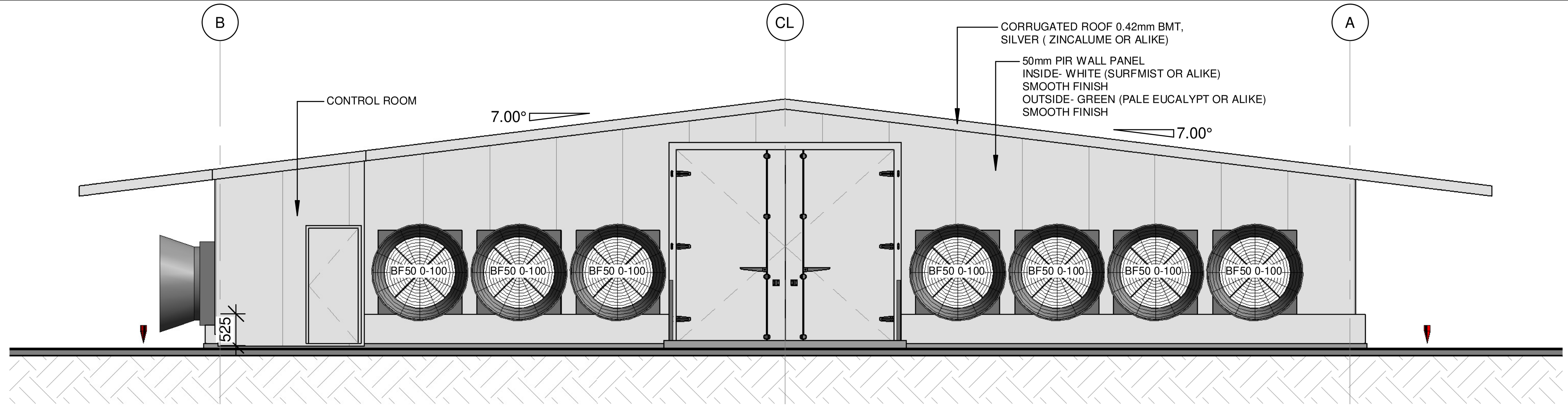
320 MOOLERIC ROAD,
OMBERSLEY
VIC 3241

SHEET TITLE: SINGLE SHED LAYOUT

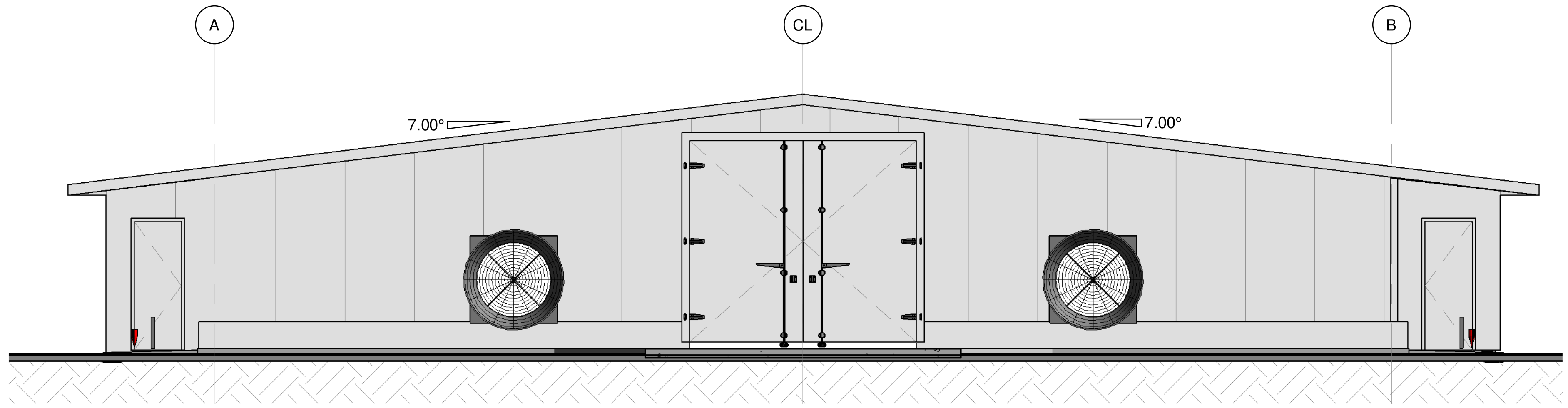
JOB No.: MOOV	DRAWN BY: DRK
DATE: 20/06/2023	REV: A
SCALE (A3): As indicated	DRG No: A103

SHED #01

- SHEDS 3, 5 & 7 IS SIMILAR TO SHED 1
- SHEDS 2, 4, 6 & 8 ARE MIRRORED FROM SHED 1

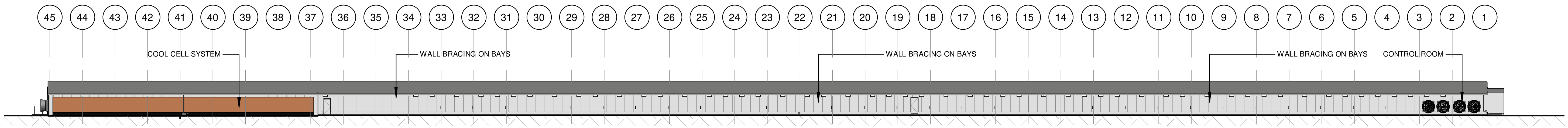


ELEVATION 1 - SHED # 01
1 : 100



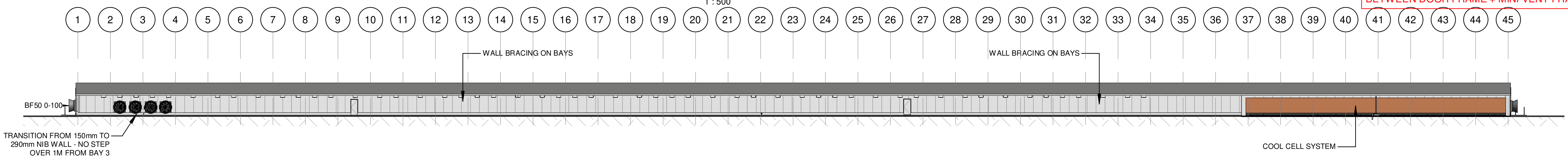
ELEVATION 2 - SHED # 01
1 : 100

ALL FAN STEEL TO BE FIXED TO PANEL AT 400mm C/C USING 12-14 x 75 SELF DRILL HEX CL4 + WASHER BONDED 25mm PAINTED WASHER- SIDE WALLS- INTERNALL, END WALLS- EXTERNAL.



ELEVATION 3 - SHED # 01
1 : 500

MINI-VENT INSTALL TO AVOID ANY CLASH BETWEEN DOOR FRAME + MINI-VENT FRAME



ALL FAN STEEL TO BE FIXED TO PANEL AT 400mm C/C USING 12-14 x 75 SELF DRILL HEX CL4 + WASHER BONDED 25mm PAINTED - TYP.

ELEVATION 4 - SHED # 01
1 : 500

CONSTRUCTION DRAWINGS

SANTREV
THE POULTRY HOUSE CONSTRUCTION SPECIALISTS

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PO Box 95, Ipswich
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BC VIC: CB-U 44246

NOTE: ALL DIMENSIONS ARE IN mm (millimetres) UNLESS NOTED OTHERWISE

REV	DESCRIPTION	DATE
A	PRELIMINARY DRAWINGS	13/07/2023

MOOLERIC FARMS

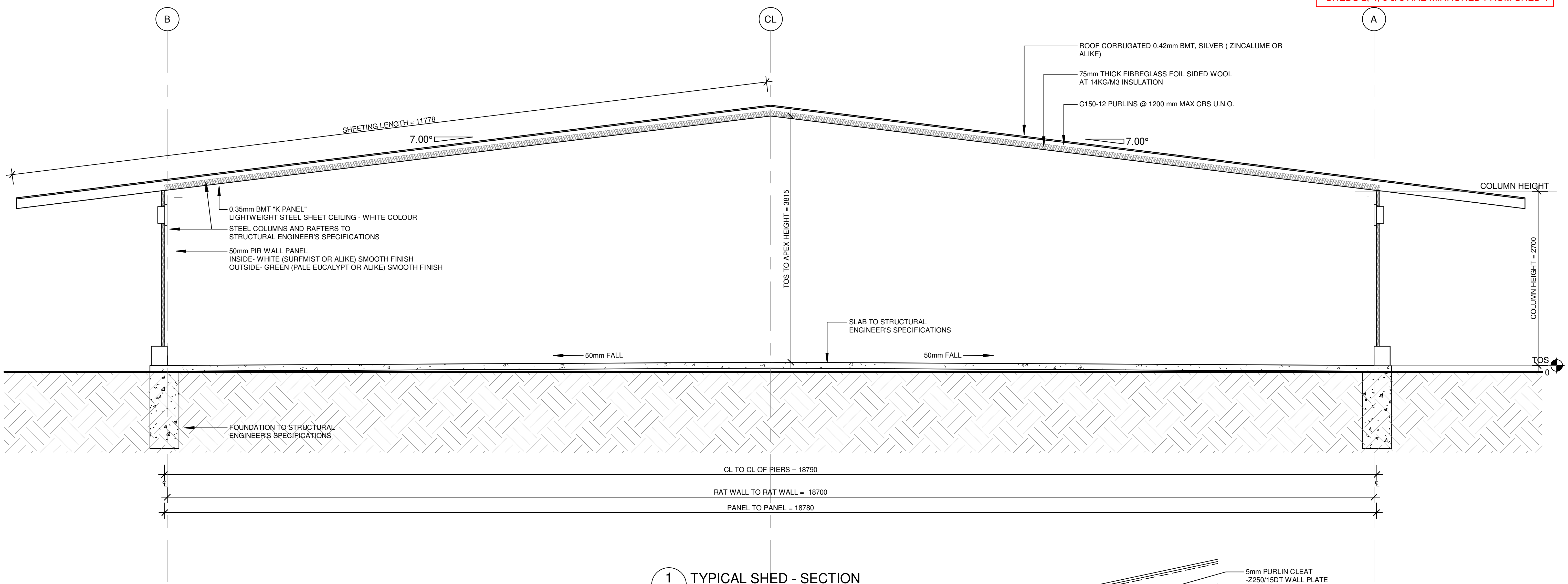
FOR: SRPP PTY LTD
PROJECT ADDRESS:

320 MOOLERIC ROAD,
OMBERSLEY
VIC 3241

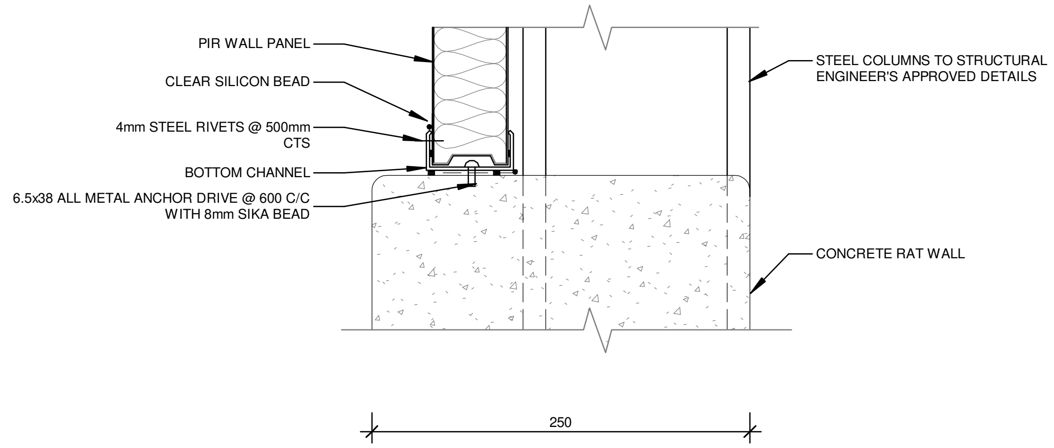
SHEET TITLE: SHED ELEVATIONS	
JOB No.: MOOV	DRAWN BY: DRK
DATE: 20/06/2023	REV: A
SCALE (A3): As indicated	DRG No: A201

SHED #01

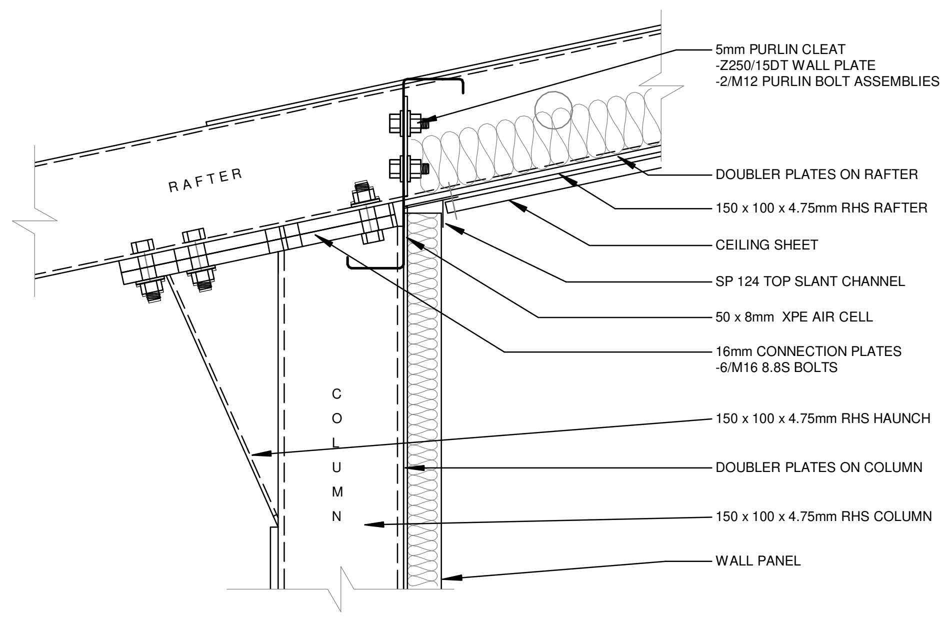
- SHEDS 3, 5 & 7 IS SIMILAR TO SHED 1
- SHEDS 2, 4, 6 & 8 ARE MIRRORED FROM SHED 1



1 TYPICAL SHED - SECTION
A103 1 : 60



FLASHING DETAILS
1 : 5



KNEE CONNECTION DETAILS - SHS
1 : 10

CONSTRUCTION DRAWINGS

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REV	DESCRIPTION	DATE
A	PRELIMINARY DRAWINGS	13/07/2023

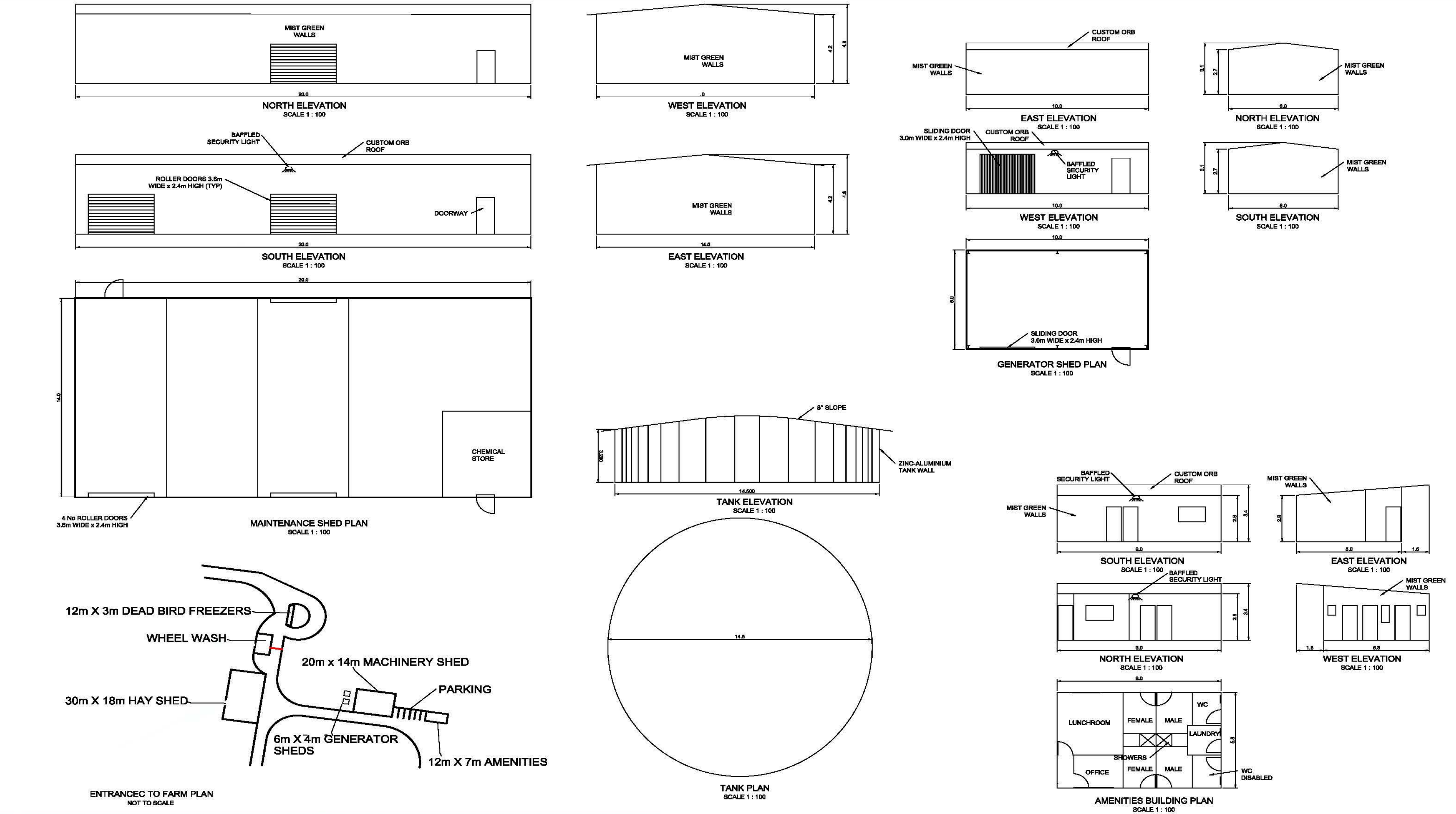
MOOLERIC FARMS

FOR: SRPP PTY LTD

PROJECT ADDRESS:

320 MOOLERIC ROAD,
OMBERSLEY
VIC 3241

SHEET TITLE:	
TYPICAL SHED SECTION	
JOB No.: MOOV	DRAWN BY: JBD
DATE: 20/06/2023	REV: A
SCALE (A3): As indicated	DRG No: A301



	For client review -	BW		8/07/2023
		PROTEN BOARD		8/07/2023
		JW		9/07/2028

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

ELEVATIONS AND FLOORPLANS ANSILARY STRUCTURES

SPIRECOM
PROJECT MANAGEMENT CY

Spirecom Pty Ltd
6 Irrewarra Court
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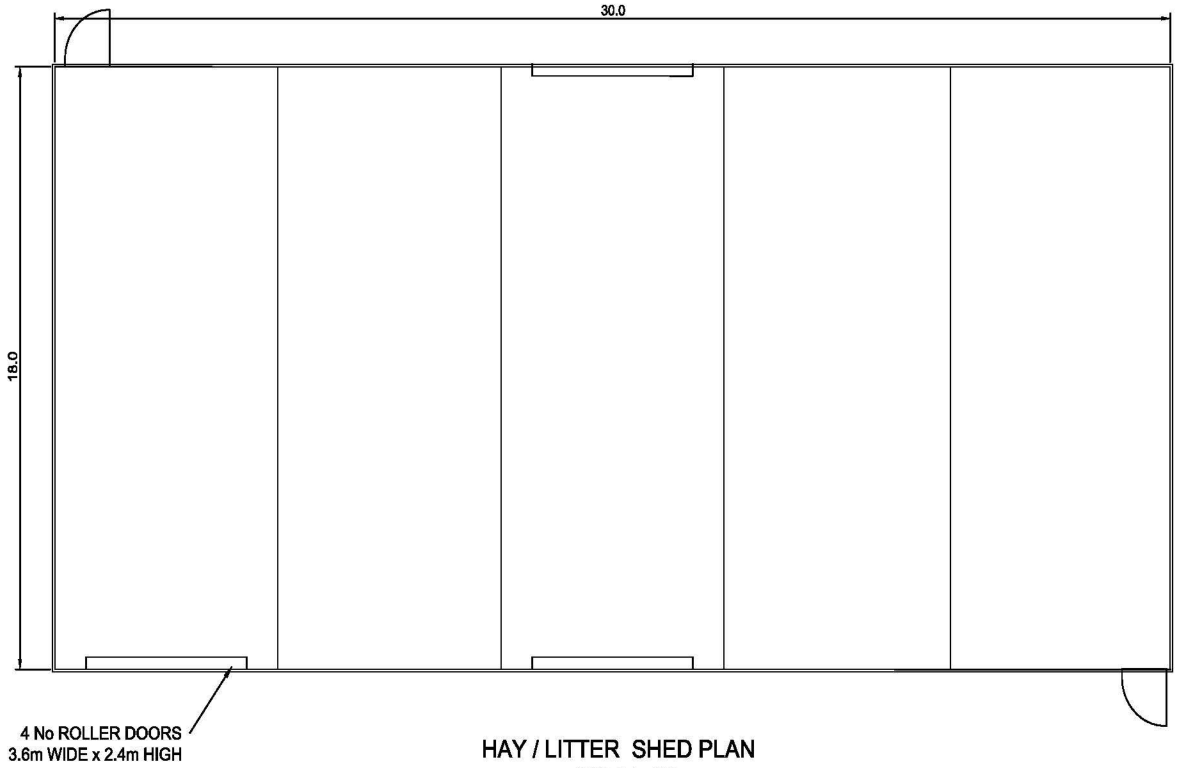
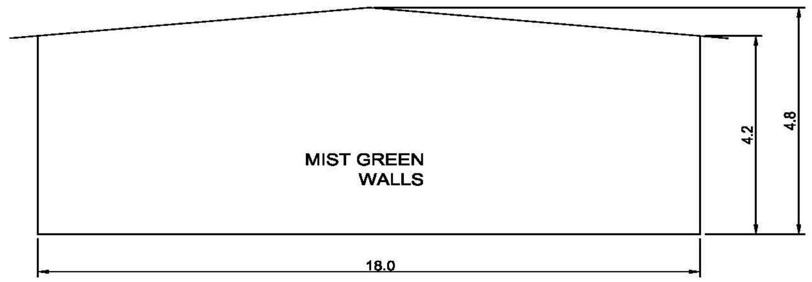
Victoria
[redacted]

PROJECT ADDRESS
320 Mooleric Road
BIRREGURRA, VIC, 3242

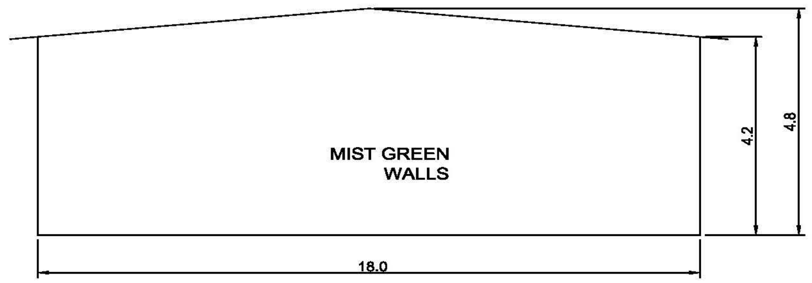
PROJECT DESIGNER: F.Ferreira
PROJECT CONTACT: F.Ferreira
Scale - 1:500 @ A3 (1:250 @ A3)
PROJECT NO.: 6391 VER 1
Sheet 6 of 13
DATE: 8/07/2023
REV. DATE



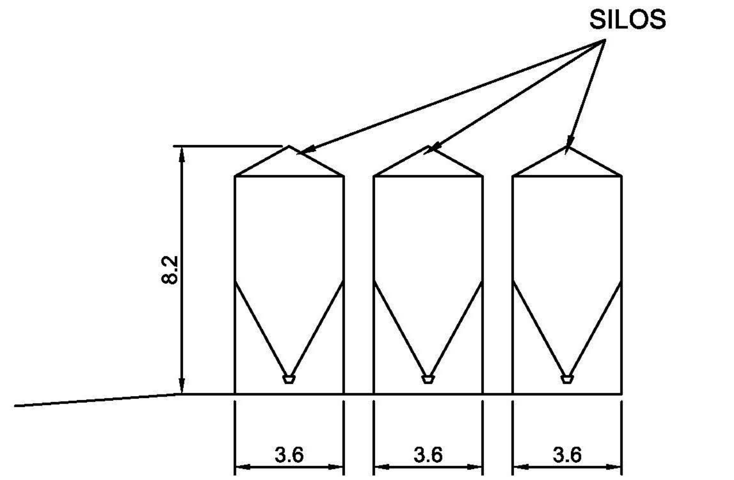
HAY / LITTER SHED PLAN
SCALE 1 : 100



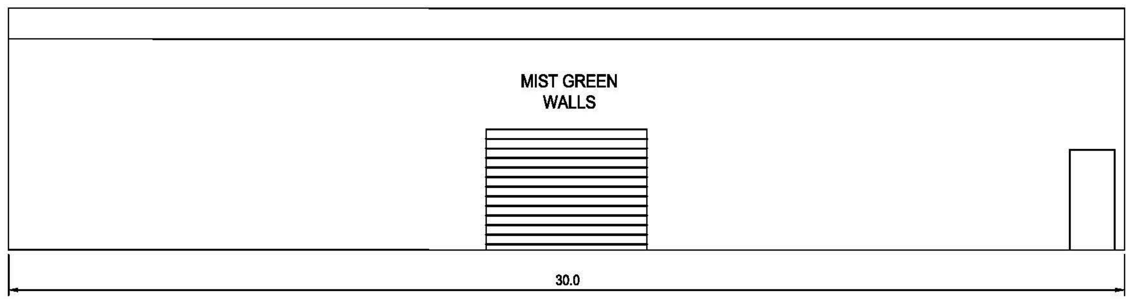
NORTH ELEVATION
SCALE 1 : 100



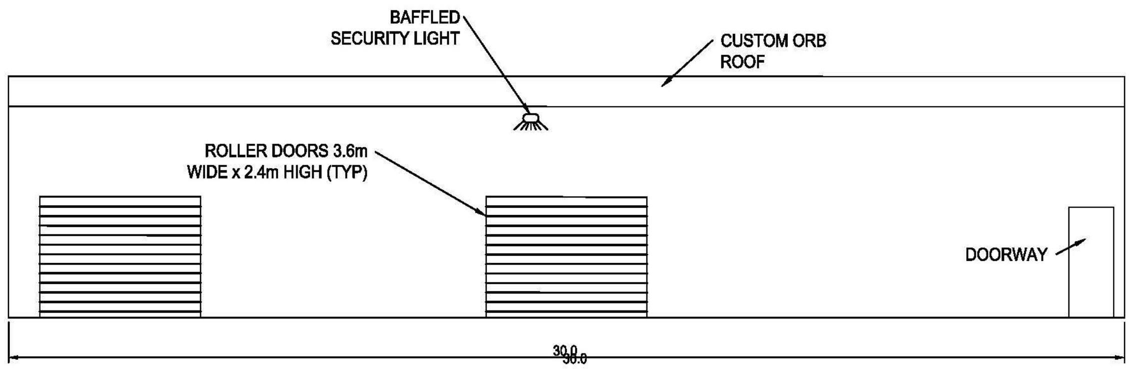
SOUTH ELEVATION
SCALE 1 : 100



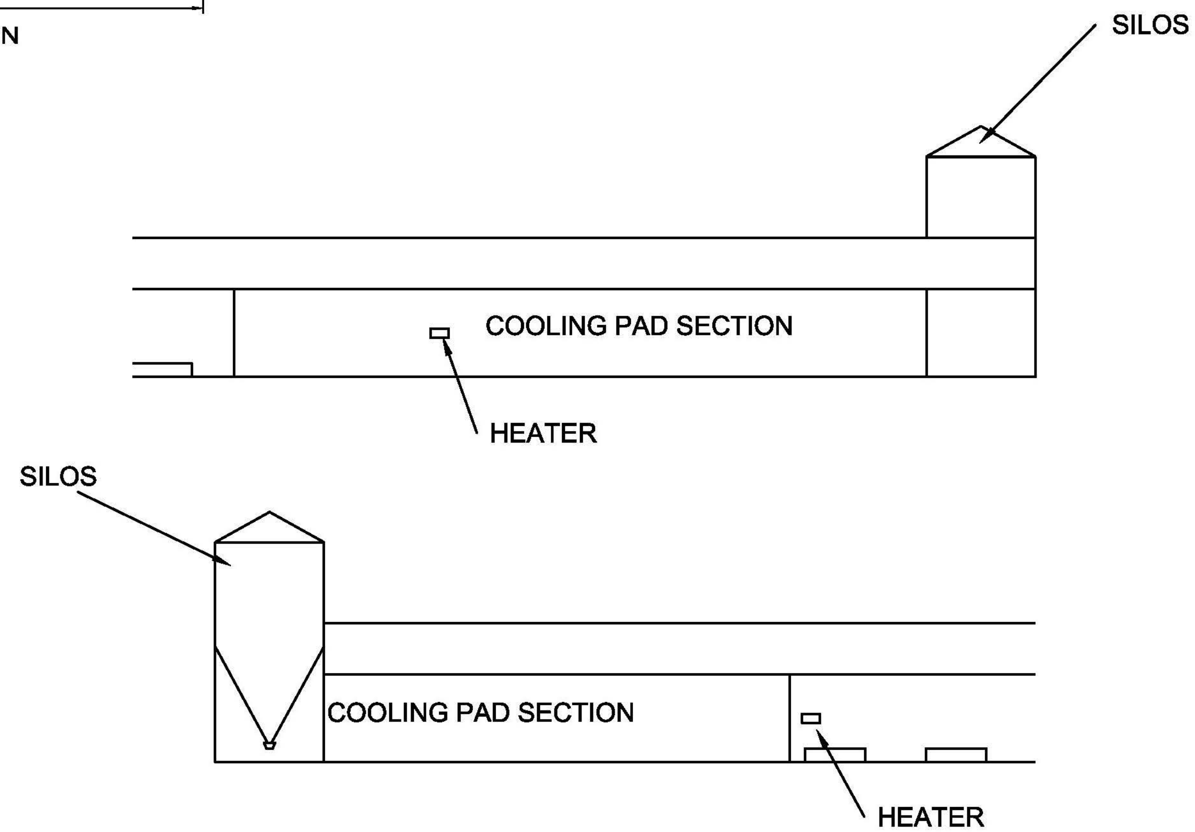
EAST and WEST ELEVATION
NOT TO SCALE



WEST ELEVATION
SCALE 1 : 100



EAST ELEVATION
SCALE 1 : 100



NORTH and SOUTH ELEVATIONS
NOT TO SCALE

No	Revision	Client	Approval	Date
A	For client review -	BW	Bill Williams - CEO ProTen	8/07/2023
B		PROTEN BOARD		8/07/2023
		JW	James Wentworth - CFO ProTen	9/07/2028

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

HAYSHED / SILO ELEVATION DRAWINGS - PROTEN BROILER SHED - Birragurra

SPIRECOM
PROJECT MANAGEMENT C?

Spirecom Pty Ltd
6 Irrewarra Court
SEABROOK, 3028
Victoria
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PROJECT ADDRESS
320 Mooleric Road
BIRREGURRA, VIC, 3242

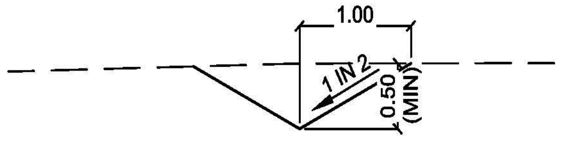
PROJECT DESIGNER: F.Ferreira	
PROJECT CONTACT: F.Ferreira	Scale - 1:500 @ A3 (1:250 @ A3)
PROJECT NO. DISCUSSION PLAN - 6391 VER 1	Sheet 7 of 13
DATE 8/07/2023	REV. DATE

REFRIGERATED CONTAINER (TEMPERATURE-CONTROLLED CONTAINER)

ISO Size Type Code: 45R1 High Cube, 45R9

40'

- Low CO_2 footprint due to less power-consuming refrigeration technology
- Pre-Trip Inspection (PTI) and maintenance procedure prior each shipment
- Container built and tested to fulfill or even exceed industrial standards and regulations
- Constant high airflow for perishable products guarantees best temperature maintenance
- Hygienically designed sealing-free container with side lining protecting scuff lining
- Container certified for cold treatment control e.g. meeting requirement of the USDA
- Contemporary insulation factors
- Low tare weight offers advantage of high payload designed container
- Dedicated equipment available for non-foodstuff cargoes
- Container available to maintain temperature control range as low as -40°C up to +30°C
- Container built to maintain temperature in ambient environment up to 50°C
- Multi-temperature setting (MTS) option available
- “On demand” defrosting assists to avoid unnecessary heat supply
- Reefer containers equipped with de-humidification option (including sensor)
- Maximum stowage height indicated by red line inside the container in order to ensure proper air circulation
- Tailor-made atmosphere (TMA) via gas injection (controlled atmosphere technology) available
- ATO-DLO certified by Agrotechnological Research Institute e.g. for flower bulb transportation, bulb mode option available
- All containers are suitable for shore power supply, voltages: 380V / 50 Hz to 460V / 60Hz
- For the technical specification and illustration of electric plug, see page 48



CUT-OFF DRAIN
NOT TO SCALE

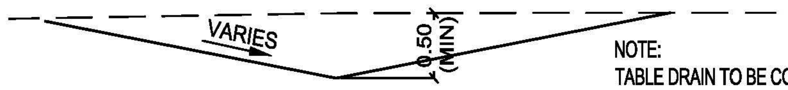
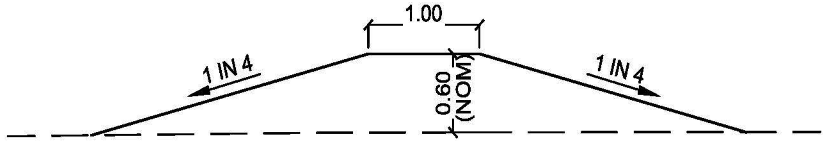


TABLE DRAIN BETWEEN SHEDS
NOT TO SCALE

NOTE:
TABLE DRAIN TO BE CONSTRUCTED BETWEEN CHICKEN SHEDS AS PART OF EARTHWORKS, GRADE FROM EDGE OF SHED TO INVERT AS PER PLAN AND SPEC.



EARTH BUND
NOT TO SCALE

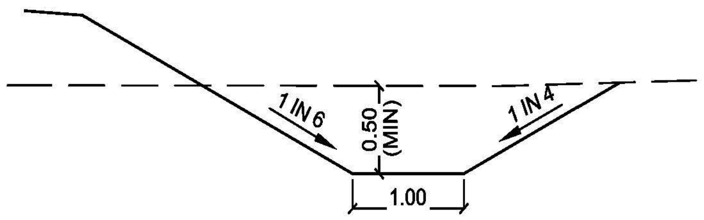
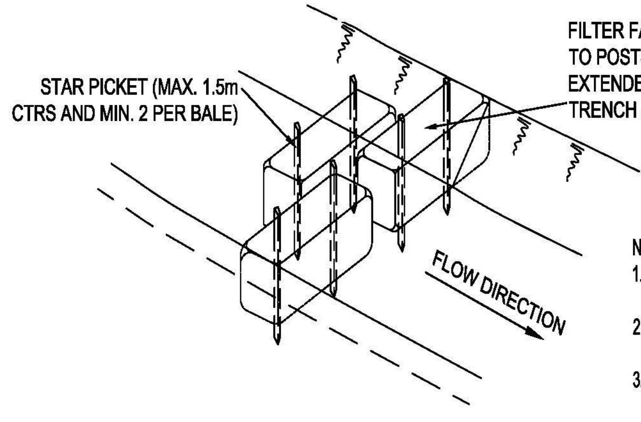
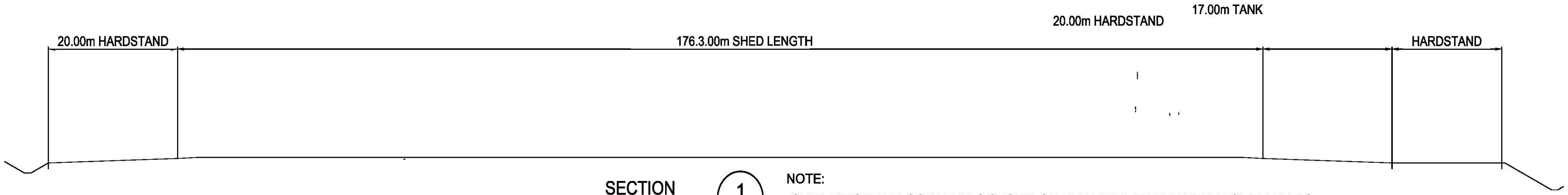


TABLE DRAIN
NOT TO SCALE



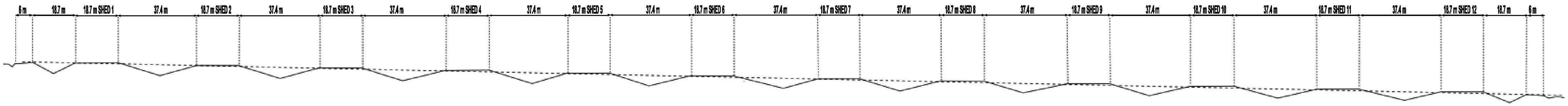
SEDIMENT CONTROL - SILT FENCE
NOT TO SCALE

NOTE:
1. SILT FENCE TO BE INSTALLED ON ALL TABLE DRAINS AT 200m CENTRES AND AT END OF ALL TABLE DRAINS.
2. NUMBER OF HAY BALES WILL VARY DEPENDING OF WIDTH OF TABLE DRAIN. ALL HAY BALES TO BE HELD IN PLACE WITH STEEL FENCES POSTS
3. FILTER CLOTH MATERIAL AS SPECIFIED (TERRAM 1000, POLYFELT TS 500 BIDIM U24 OR EQUIVALENT). FILTER CLOTH TO BE SECURELY FASTENED TO HAY BALES, MINIMUM OVERLAP OF 150mm.
4. SILT FENCES MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIALS REPLACED AS NEEDED.



SECTION 1/2
NOT TO SCALE

NOTE:
SHED FINISHED FLOOR LEVELS SHOWN ON PLAN ARE THE PERIMETER SLAB LEVELS.



SECTION 2/2
NOT TO SCALE

NOTE:
SLABS WILL HAVE A 70mm RISE TO THE CENTRE OF THE SHED
PLEASE REFER TO STRUCTURAL DRAWINGS FOR CONCRETE SLAB LAYOUT

PLEASE REFER TO STRUCTURAL DRAWINGS FOR CONCRETE SLAB LAYOUT

No	Revision	Client	Approval	Date
A	For client review -	BW	Bill Williams - CEO ProTen	8/07/2023
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DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

SITE PADS AND DRAINAGE
PROTEN BROILER SHEDS - Birragurra

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PROJECT DESIGNER:
F.Ferreira

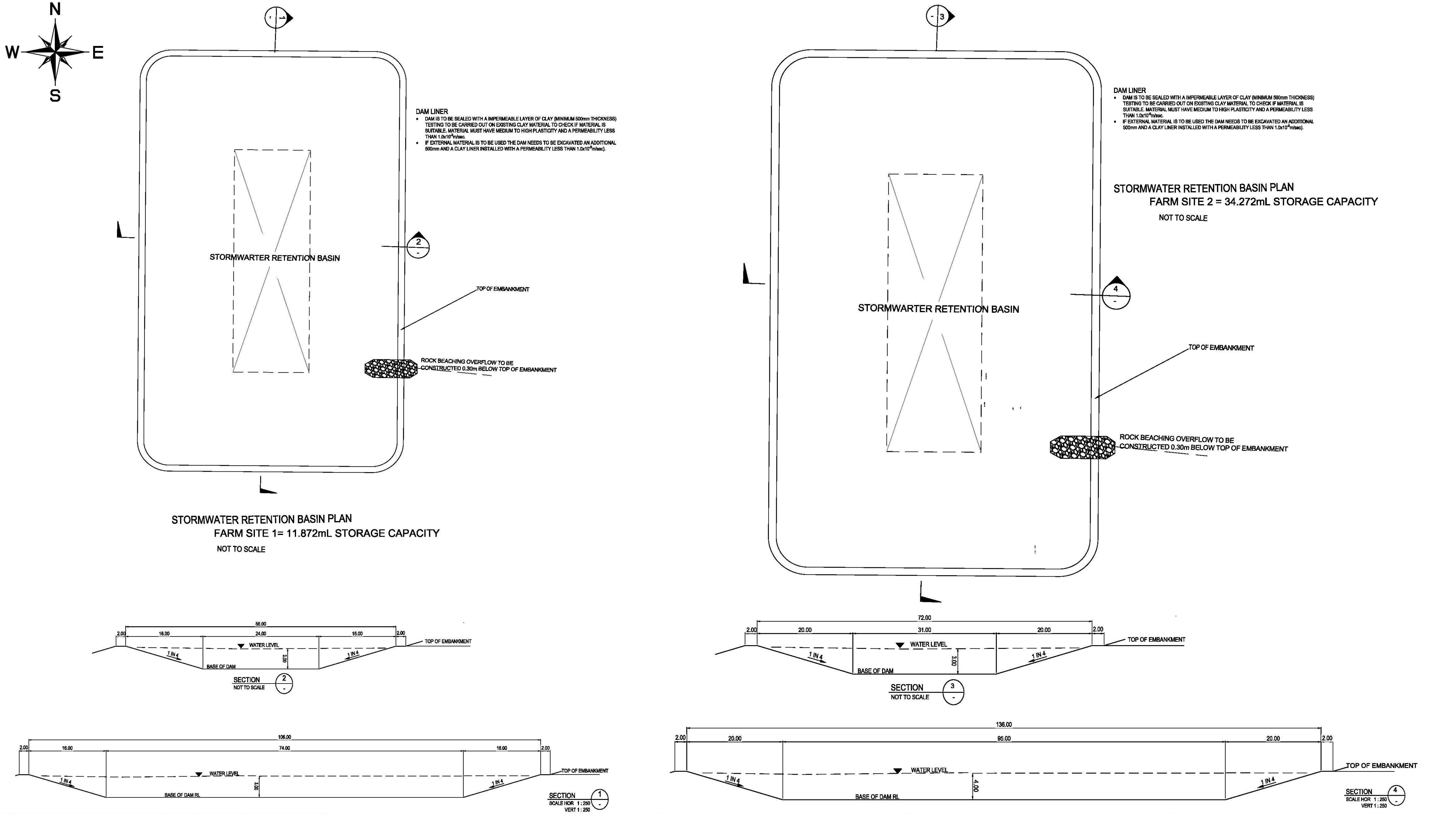
PROJECT CONTACT:
F.Ferreira
Scale - NOT TO SCALE

PROJECT NO.
PLAN - 6391 VER 1

Sheet 9 of 13

DATE
8/07/2023

REV. DATE



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B		PROTEN BOARD		8/07/2023
		JW	James Wentworth - CFO ProTen	9/07/2028

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

STORMWATER RETENTION BASINS
PROTEN BROILER SHEDS - Birragurra

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PROJECT DESIGNER:
F.Ferreira

PROJECT CONTACT:
F.Ferreira
Scale - NOT TO SCALE

PROJECT NO.	
PLAN - 6391 VER 1	Sheet 10 of 13
DATE	REV. DATE
8/07/2023	

ARTISTS IMPRESSION - for illustrative purposes only
(Chadwick 310 Classic Facade Shown)

NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations.
This includes any circulation space req's, noggings and sheeting provisions for future grab rails where required.

PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

CONCEPT	29/06/2022	FLOOR AREAS	TOTAL 261.3 m²
© Copyright Archiman Pty Ltd exclusive to G.J. Gardner Homes Concept plans only, final working drawings may vary		LIVING	193.1 m²
		GARAGE	37.6 m²
		ALFRESCO	19.3 m²
		PORCH	4.3 m²
		VERANDAH	7.0 m²

Min. Lot Width
26 m - 28 m

ARTIST IMPRESSION
N.T.S.

G.J. Gardner.
HOMES

NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations.
This includes any circulation space req's, noggings and sheeting provisions for future grab rails where required.

PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

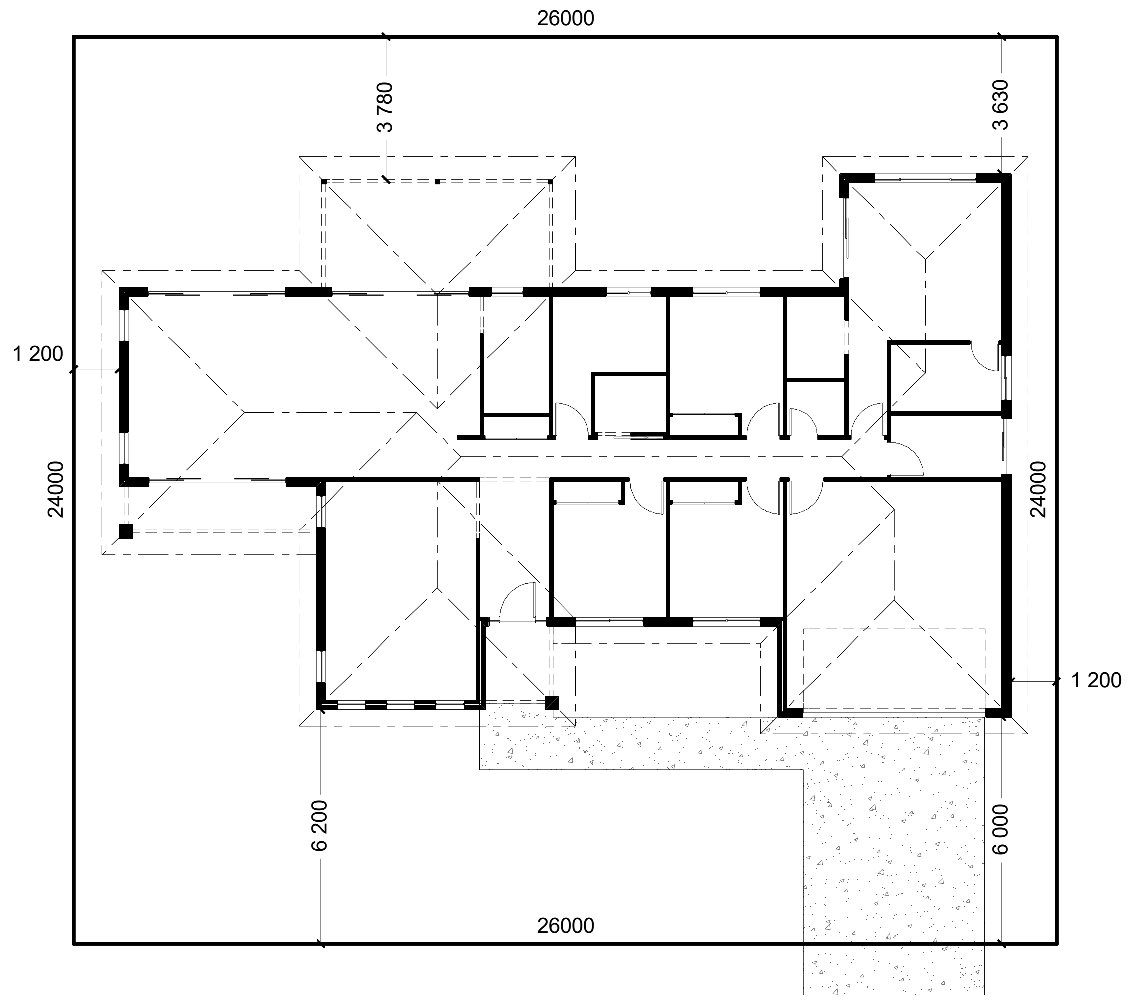
CONCEPT 29/06/2022

FLOOR AREAS	TOTAL 261.3 m²
LIVING	193.1 m²
GARAGE	37.6 m²
ALFRESCO	19.3 m²
PORCH	4.3 m²
VERANDAH	7.0 m²

Min. Lot Width
26 m - 28 m

PRESENTATION PLAN
Scale 1:100 @A3

G.J. Gardner. HOMES



STREET FRONTAGE

INDICATIVE SITE PLAN ONLY. ACTUAL LOT WIDTH, SIZE AND SETBACKS MAY VARY TO SUIT LOCAL REQUIREMENT'S AND MAY REQUIRE A LARGER SITE OR PLAN MODIFICATIONS TO SUIT A PARTICULAR SITE.

NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations. This includes any circulation space req's, noggings and sheeting provisions for future grab rails where required.

PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

CONCEPT **29/06/2022**

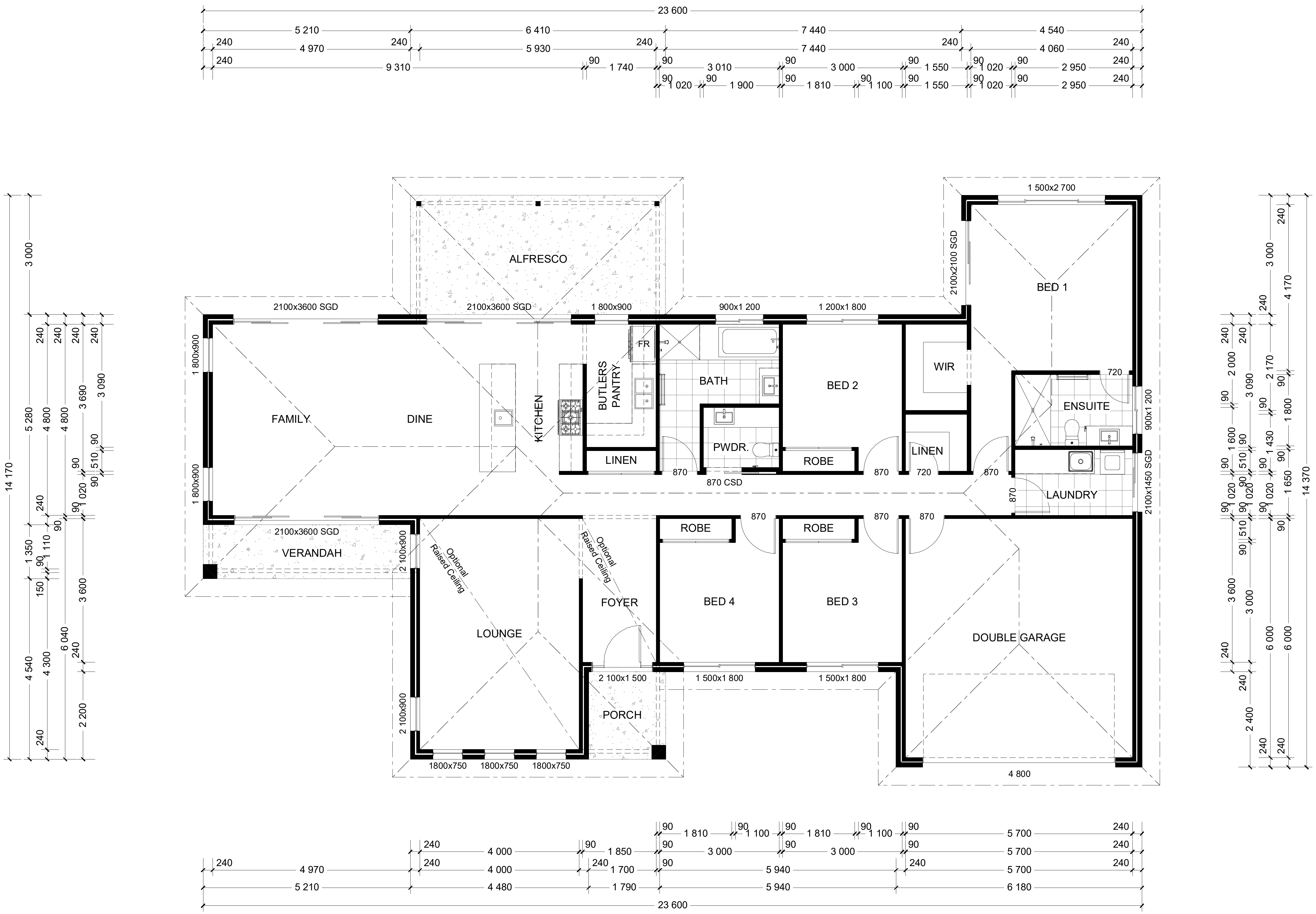
Concept plans only, final working drawings may vary

FLOOR AREAS	TOTAL 261.3 m²
LIVING	193.1 m²
GARAGE	37.6 m²
ALFRESCO	19.3 m²
PORCH	4.3 m²
VERANDAH	7.0 m²

Min. Lot Width
26 m - 28 m

SITE PLAN
Scale 1:200 @A3

G.J. Gardner. HOMES



NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations.
This includes any circulation space req's, noggings and sheeting provisions for future grab rails where required.

PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

CONCEPT 29/06/2022

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FLOOR AREAS	TOTAL 261.3 m²
LIVING	193.1 m²
GARAGE	37.6 m²
ALFRESCO	19.3 m²
PORCH	4.3 m²
VERANDAH	7.0 m²

Min. Lot Width 26 m - 28 m

FLOOR PLAN Scale 1:100 @A3

G.J. Gardner. HOMES

NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations.
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PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

CONCEPT 29/06/2022

Concept plans only, final working drawings may vary

FLOOR AREAS	TOTAL 261.3 m²
LIVING	193.1 m²
GARAGE	37.6 m²
ALFRESCO	19.3 m²
PORCH	4.3 m²
VERANDAH	7.0 m²

Min. Lot Width
26 m - 28 m

ELEVATIONS
Scale 1:100 @A3

G.J. Gardner.
HOMES

ELECTRICAL LEGEND

NOTE:
ALL ELECTRICAL WORK MUST BE COMPLETED TO THE RELEVANT AUSTRALIAN STANDARDS AND THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA.

LIGHTING *EEF (denotes energy efficient light fittings)

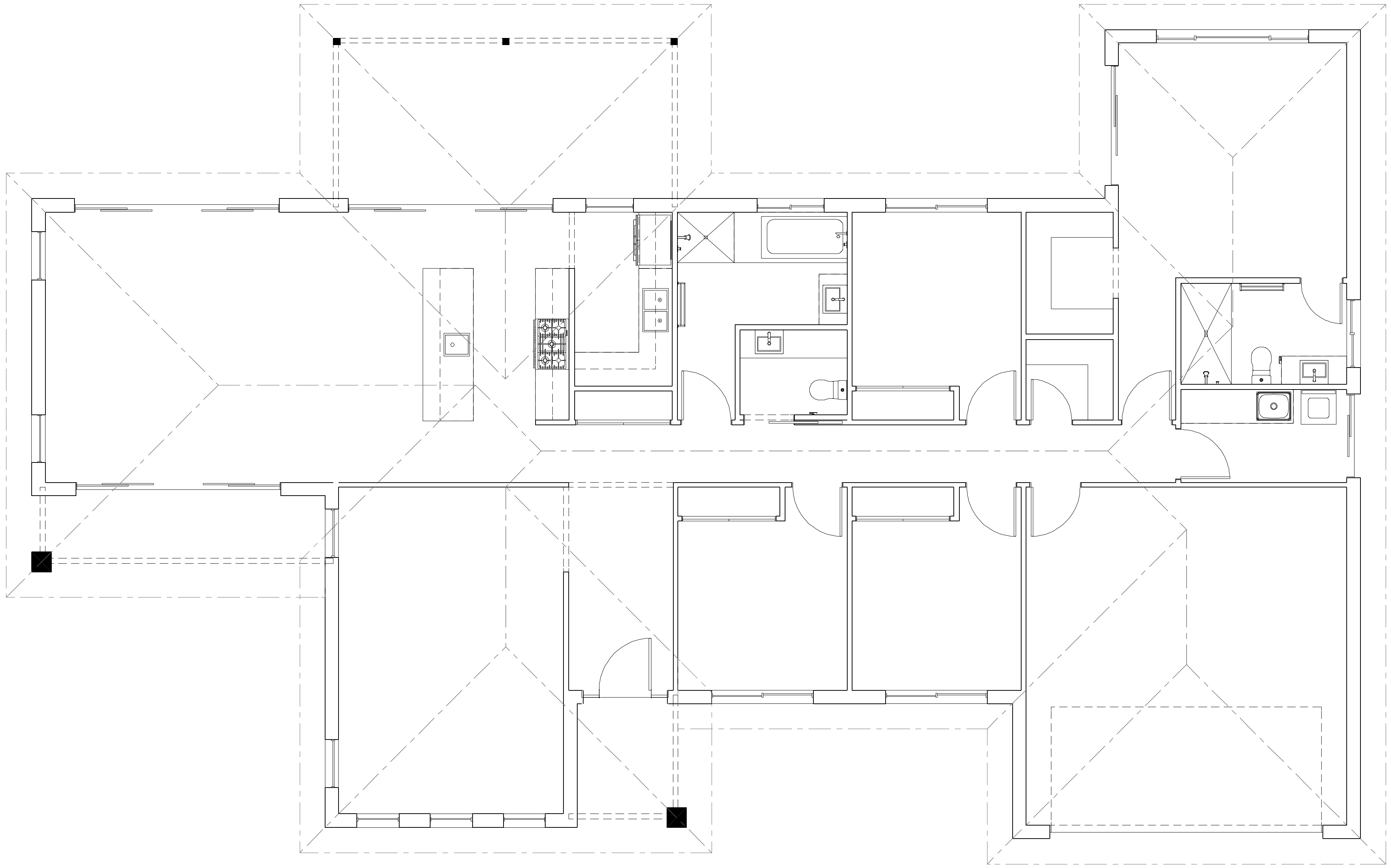
Symbol	Description	Spec.	Extra
	Ceiling Light *EEF	-	-
	Down Light *EEF	-	-
1800 H	Wall Light *EEF approx height	-	-
	Pendant / Track Light *EEF	-	-
	IXL Tastic (or similar)	-	-
	Batten Fluro Light *EEF	-	-
F	Round Fluro Light *EEF	-	-
	Flood / Spot Light *EEF	-	-
	TOTAL LIGHT POINTS	-	-

POWER

Symbol	Description	Spec.	Extra
4	Quad Power Point	-	-
1	Single Power Point	-	-
2	Double Power Point	-	-
W/P 2	Double W/Proof Power Point	-	-
W/P 1	Single W/Proof Power Point	-	-
T.V	T.V.Point	-	-
ph	Phone Point	-	-
	T.V Antenna & Booster inc. SGPO	-	-
D.W	Dishwasher Point	-	-
R.H	Rangehood Point	-	-
M.W	Microwave Point	-	-
O.V	Oven Point	-	-
C.T	Cook Top Iso point	-	-

MISCELLANEOUS

Symbol	Description	Spec.	Extra
E	Exhaust Fan	-	-
	Ceiling Fan (stainless steel)	-	-
	Ceiling Fan & Light (white) *EEF	-	-
	Meter Box	-	-
HWS	Hot Water Service	-	-
SA	Smoke Detectors	-	-
ds	Dimmer Switch	-	-
2 way	Two Way Switch	-	-
AC	A/C Condensor Iso Point	-	-



NCC 22 The bathroom and powder room must be constructed and reinforced in accordance with NCC regulations.
This includes any circulation space req's, noggings and sheeting provisions for future grab rails where required.

PLANS ARE SUBJECT TO LOCAL COUNCIL & DEVELOPERS GUIDELINES (COVENANTS).

CHADWICK 260

Classic Streetscape

Estate Series

CONCEPT 29/06/2022

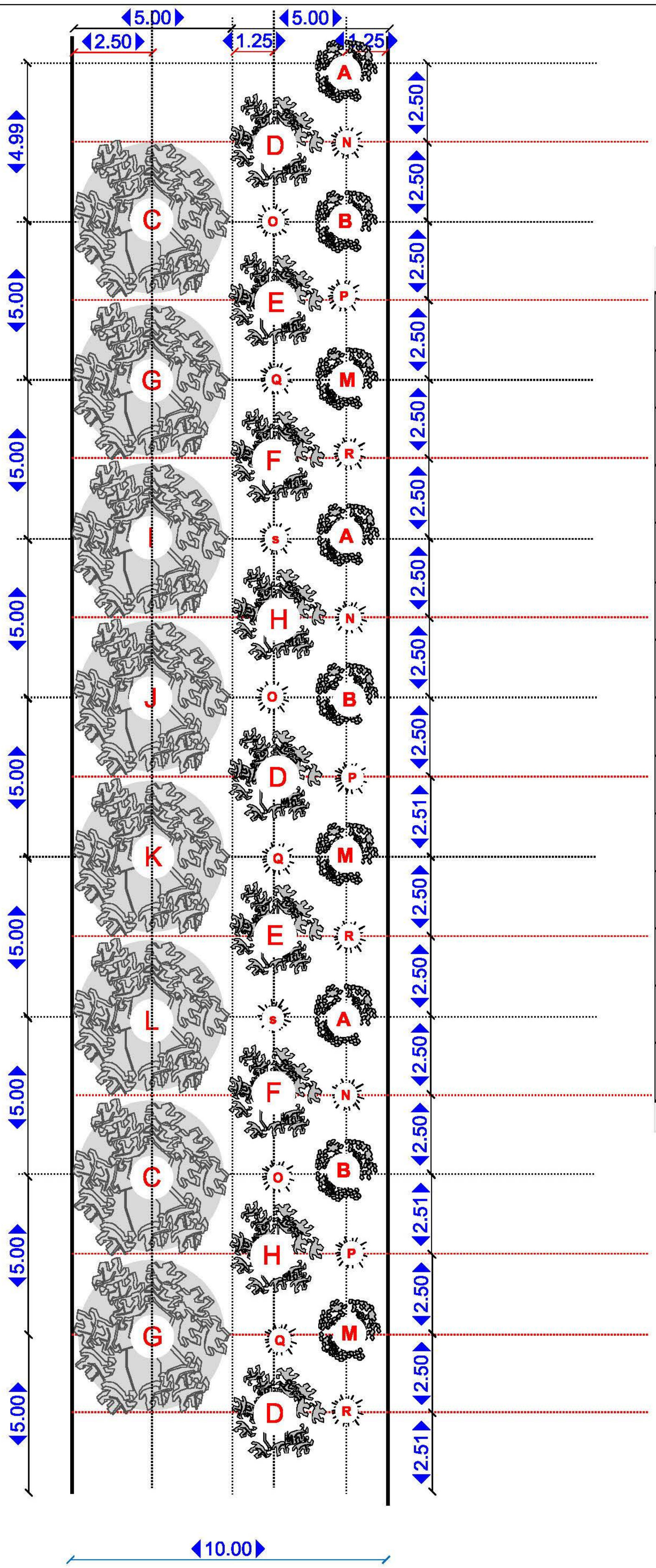
Concept plans only, final working drawings may vary

FLOOR AREAS	TOTAL 261.3 m²
LIVING	193.1 m²
GARAGE	37.6 m²
ALFRESCO	19.3 m²
PORCH	4.3 m²
VERANDAH	7.0 m²

Min. Lot Width
26 m - 28 m

ELECTRICAL PLAN
Scale 1:100 @A3

G.J. Gardner. HOMES



LANDSCAPE PLANTING LAYOUT
10m WIDE LANDSCAPING
Sites 1 and 2

TREE PLANTING INDIGENOUS SPECIES LIST

Botanical Name	Common name	Height Width	ID	Total Tree Plantings
Acacia Genistificola	Spreading Wattle	1-3x 1-2m	A	57
Acacia Hakeoides	Hakea Wattle	1-3x 1-2m	B	57
Acacia melanoxylon	Blackwood	8-20x 5-12m	C	28
Acacia pycnantha	Golden wattle	3-8x 2-5m	D	38
Acacia verticillata	Prickly Moses	1-5x 3-5m	E	38
Allococasuarina Verticillata	Drooping Sheoak	4-10mx 5-6m	F	38
Allococasuarina Littoralis	Black Sheoak	8-12x 4-7m	G	28
Banksia marginata	Silver Banksia	1-8x 1-5m	H	38
Eucalyptus Camaldulensis	Red Gum	12-45x 15- 30m	I	28
Eucalyptus ovata	Swamp Gum	8-30x 5-20m	J	28
Eucalyptus radiata	Narrow-leaf Peppermint	6-20x 6-15m	K	28
Eucalyptus viminalis	Manna Gum	10-40x 8-15m	L	28
Leptospermum Continentale	Prickly Tea- Tree	1-4x 1-2m	M	57
	Total number of trees to be planted			491

GRASS PLANTING INDIGENOUS SPECIES LIST

Botanical Name	Common name	Comments	ID	TOTAL PLANTINGS
Austrostipa stipoides	Prickly spear-grass	Forms large clumps up to about 80 cm in height with smooth inrolled leaves 70 cm long and 1 mm wide with sharp tips.	N	57
Poa Labillardieri	Silver Tussock	The tussock. Softens a landscape. Excellent for water filter	O	57
Poa Morrisi	Velvet Tussock	Small blue leaved tussock for dry gardens	P	57
Themeda Triandra	Kangaroo Grass	Tough mat forming native grass, iconic flower heads	Q	57
Carex Appressa	Tall Sedge	Quick growing. exc for grey water filtering / creeks!	R	57
Carex Fascicularis	Tassel Sedge	Quick growing. exc for grey water filtering / creeks!!	S	57
		Total m² of grases to be planted		342 m²

NOTES

1. ALL TREES AND SHRUBS INCLUDED IN THE ENDORSED, LANDSCAPE PLAN MUST BE PLANTED AND MAINTAINED TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.
2. PLANTINGS SHALL BE CARRIED OUT USING THE APPROVED LANDSCAPE PLAN.
3. PLANTINGS TO BE IN ROWS 3m APART WITH SPACING OF PLANTS AT 4m INTERVALS. PLANTS TO BE PLACED IN BETWEEN THE PLANTS IN THE PREVIOUS ROWS. A MINIMUM OF 3 ROWS SHALL BE PROVIDED.
4. PLANTS TO BE USED SHALL BE AS PER ATTACHED LIST BASED ON INDIGENOUS SPECIES LIST.
5. LANDSCAPING PLANTS SHALL BE PLANTED TO ENSURE THE PROPOSED DEVELOPMENT IS SCREENED FROM THE ADJOINING PROPERTIES. THIS WILL REQUIRE THE PLANTING AND GROUPING OF LARGER TREES WITH INFILL OF SMALLER SHRUBS TO ENSURE A DENSE FOLIAGE IS PROVIDED UPON MATURITY AND TO ENSURE EFFECTIVE SCREENING..
6. REGULAR WATERING WITH WATER CART AND PUMP AND MAINTENANCE SHALL BE CARRIED OUT FOR THE FIRST 3 YEARS, WITH REPLACEMENT OF DEAD TREES TO BE CARRIED OUT AS REQUIRED. MAINTENANCE SHALL OCCUR EVERY 6 MONTHS.
7. PLANT INTO MOIST SOIL IF POSSIBLE IN SPRING, AFTER THE RISK OF FROSTS HAS PASSED, WOULD BE THE IDEAL TIME FOR PLANTING. WATERING AT THE TIME OF PLANTING IS ADVANTAGEOUS AS LONG AS THE SOIL IS NOT WATER-LOGGED AND IF RAIN IS NOT EXPECTED.
8. MULCH CAN BE EVENLY SPREAD OVER THE AREA PRIOR TO THE COMMENCEMENT OF PLANTING. TREE GUARDS HELP CONSERVE WATER AND TO PROTECT AGAINST GRAZING AND RABBITS.

Plant Sizes

Large	Medium	Small	Grass
C	D	A	N
G	E	B	O
I	F	M	P
J	H		Q
K			R
L			S

No	Revision	Client	Approval	Date
A	For client review -	James Wentworth	JW	25/09/2023
B				

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

LANDSCAPING PLAN FARM SITES 1 AND 2

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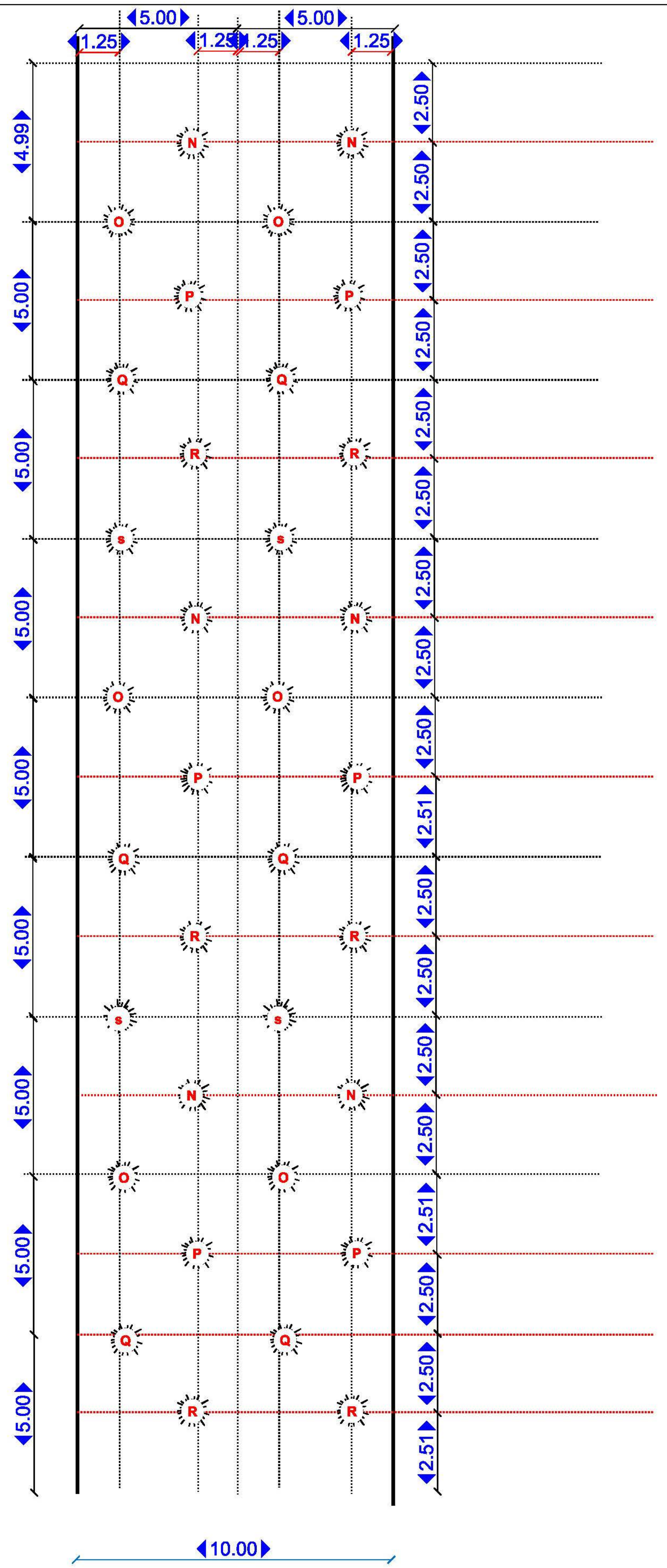
PROJECT CONTACT:
F.Ferreira
Scale - @ A1

PROJECT NO.	
PLAN 6391.1 Ver 2	Sheet 1
DATE 08/07/2023	REV. DATE 25/09/2023



LANDSCAPE PLANTING LAYOUT
10m WIDE LANDSCAPING
Around the perimeter fence of the 4 residences

GRASS PLANTING INDIGENOUS SPECIES LIST = 700m LENGTH X 10m WIDE

Botanical Name	Common name	Comments	ID	TOTAL PLANTINGS
Austrostipa stipoides	Prickly spear-grass	Forms large clumps up to about 80 cm in height with smooth inrolled leaves 70 cm long and 1 mm wide with sharp tips.	N	96
Poa Labillardieri	Silver Tussock	The tussock. Softens a landscape. Excellent for water filter	O	96
Poa Morrisi	Velvet Tussock	Small blue leaved tussock for dry gardens	P	96
Themeda Triandra	Kangaroo Grass	Tough mat forming native grass, iconic flower heads	Q	96
Carex Appressa	Tall Sedge	Quick growing. exc for grey water filtering / creeks!	R	96
Carex Fascicularis	Tassel Sedge	Quick growing. exc for grey water filtering / creeks!!	S	96
		Total m² of grases to be planted		576 m²

NOTES

1. ALL GRASSES INCLUDED IN THE ENDORSED, LANDSCAPE PLAN MUST BE PLANTED AND MAINTAINED TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.
2. PLANTINGS SHALL BE CARRIED OUT USING THE APPROVED LANDSCAPE PLAN.
3. PLANTINGS TO BE IN ROWS 2.5m APART WITH SPACING OF PLANTS AT 2.5m INTERVALS. PLANTS TO BE PLACED IN BETWEEN THE PLANTS IN THE PREVIOUS ROWS. A MINIMUM OF 4 ROWS SHALL BE PROVIDED.
4. PLANTS TO BE USED SHALL BE AS PER ATTACHED LIST BASED ON INDIGENOUS SPECIES LIST.
5. LANDSCAPING PLANTS SHALL BE PLANTED TO ENSURE THE PROPOSED PLANTING IS PROTECTED FROM GRAZERS.
6. REGULAR WATERING BY THE WASTEWATER IRIGATION SYSTEM WHEN NEEDED BY WATER CART AND MAINTENANCE SHALL BE CARRIED OUT FOR THE FIRST 3 YEARS, WITH REPLACEMENT OF DEAD PLANTS TO BE CARRIED OUT AS REQUIRED. MAINTENANCE SHALL OCCUR EVERY 6 MONTHS.
7. PLANT INTO MOIST SOIL IF POSSIBLE IN SPRING, AFTER THE RISK OF FROSTS HAS PASSED, WOULD BE THE IDEAL TIME FOR PLANTING. WATERING AT THE TIME OF PLANTING IS ADVANTAGEOUS AS LONG AS THE SOIL IS NOT WATER-LOGGED AND IF RAIN IS NOT EXPECTED.

A	For client review -	James Wentworth	JW	25/09/2023

DIMENSIONS SHOWN TAKEN FROM TITLE AND IS NOT AS A RESULT OF A SURVEY

LANDSCAPING PLAN AROUND PERIMETER FENCE OF 4 RESIDENCES

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PROJECT DESIGNER: F.Ferreira
PROJECT CONTACT: F.Ferreira
Scale - @ A1
PROJECT NO. PLAN 6391.1 Ver 2
Sheet 1
DATE 08/07/2023
REV. DATE 25/09/2023

APPLICANTS CALCULATIONS

MAXIMUM MOVEMENTS PER WEEK FOR 12 SHEDS (ONE FARM)

WEEK		Week 1							Week 2							Week 3						
ACTIVITY	VEHICLE TYPE	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
LITTER SUPPLY	B - DOUBLE																					
CHICK SUPPLY	RIGID TRUCK	2	2	2	2	2	2															
FEED	B - DOUBLE	2							1	1	1	1	1			1	1	1	1	1	1	1
GAS SUPPLY	RIGID TRUCK	2							2				1			1						
BROILER PICKUP	SEMI - TRAILER																					
SHED CLEAN OUT / MANURE REMOVAL	SEMI TRAILER																					
DEAD BIRD PICK UP	RIGID TRUCK SMALL																					
HEAVY VEHICLES		**6**	**2**	**2**	**2**	**2**	**2**		**3**	**1**	**1**	**1**	**2**			**2**	**1**	**1**	**1**	**1**	**1**	**1**
LIGHT VEHICLE AND STAFF MOVEMENTS	UTE / SEDAN	**2**	**2**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
MOVEMENTS PER DAY		8	4	5	4	4	4	1	5	3	3	4	4	2	1	4	3	3	3	3	3	2
MOVEMENTS PER WEEK								30							22							21

WEEK		Week 4							Week 5							Week 6						
ACTIVITY	VEHICLE TYPE	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
LITTER SUPPLY	B - DOUBLE																					
CHICK SUPPLY	RIGID TRUCK																					
FEED	B - DOUBLE	1	1	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2
GAS SUPPLY	RIGID TRUCK																					
BROILER PICKUP	SEMI - TRAILER									12	12	12			12	12	12	12	12			12
SHED CLEAN OUT / MANURE REMOVAL	SEMI TRAILER																					
DEAD BIRD PICK UP	RIGID TRUCK SMALL				1																	
HEAVY VEHICLES		**1**	**1**	**2**	**4**	**3**	**3**	**3**	**3**	**15**	**15**	**15**	**3**	**3**	**14**	**15**	**15**	**15**	**14**	**2**	**2**	**14**
LIGHT VEHICLE AND STAFF MOVEMENTS	UTE / SEDAN	**2**	**2**	**2**	**2**	**3**	**2**	**1**	**2**	**5**	**5**	**5**	**2**	**2**	**6**	**5**	**5**	**5**	**5**	**2**	**2**	**2**
MOVEMENTS PER DAY		3	3	4	6	6	5	4	5	20	20	20	5	5	20	20	20	20	19	4	4	16
MOVEMENTS PER WEEK								31							95							103

WEEK		Week 7							Week 8							Week 9												
ACTIVITY	VEHICLE TYPE	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	TOTAL	TOTAL PER YEAR PER FARM	AVERAGE MOVEMENTS /DAY PER YEAR- SINGLE SITE	TOTAL PER YEAR FOR WHOLE PROPERTY	AVERAGE MOVEMENTS /DAY PER YEAR- TWO SITES	NIGHT MOVEMENTS PER YEAR FOR WHOLE PROPERTY
LITTER SUPPLY	B - DOUBLE															4	4	4	4	3			19	110		220		
CHICK SUPPLY	RIGID TRUCK																						12	67		134		
FEED	B - DOUBLE	2	2	2	2																		75	416	1	832	2	
GAS SUPPLY	RIGID TRUCK																						6	32	0	64	0	
BROILER PICKUP	SEMI - TRAILER	12	12	12	12																		156	875	2	1,750	5	1,750
SHED CLEAN OUT / MANURE REMOVAL	SEMI TRAILER	5	5	5	5	5	5																30	165	0	330	1	
DEAD BIRD PICK UP	RIGID TRUCK SMALL				1																		2	11	0	22	0	
HEAVY VEHICLES		**19**	**19**	**19**	**20**	**5**	**5**	**0**								**4**	**4**	**4**	**4**	**2**			**299**	**1,674**	**5**	**3,349**	**9**	
LIGHT VEHICLE AND STAFF MOVEMENTS	UTE / SEDAN	**5**	**5**	**5**	**5**	**4**	**4**	**5**	**4**	**4**	**4**	**4**	**4**	**4**	**5**	**4**	**4**	**4**	**4**	**4**	**4**	**2**	**196**	**1,098**	**3**	**2,195**	**6**	437
MOVEMENTS PER DAY		24	24	24	25	9	9	5	4	4	4	4	4	4	5	8	8	8	8	6	4	2	495					
MOVEMENTS PER WEEK								120							29							44	495	2,772		5,544		**2,187**

Mooleric Road Birregurra

Flora and fauna assessment

FINAL REPORT

Prepared for Spirecom Pty Ltd

26 February 2024

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- Spirecom Pty Ltd: Fernando Ferreira
- Victorian Government Department of Environment, Energy and Climate Action for access to the Victorian Biodiversity Atlas, NatureKit and EnSym/Native Vegetation Information Management tool
- Australian Government Department of Climate Change Energy the Environment and Water for access to the Protected Matters Search Tool

Biosis staff involved in this project were:

- Ian Smales (field assistance).
- Sam Panter (mapping).
- Clare McCutcheon, Katrina Sofo, and Ian Smales (quality assurance).

SUMMARY

Biosis Pty Ltd (Biosis) was commissioned by Spirecom Pty Ltd (Spirecom) to undertake a flora and fauna assessment of a proposed water pipeline footprint and a proposed all-weather road. The pipeline will link a proposed poultry development at 320 Mooleric Road with the Birregurra township. The all-weather road will be constructed in an un-named road reserve to the north of the proposed poultry farm. The study area is located in private property and along public roadsides approximately 20 kilometres north-east of Colac, Victoria.

Biosis undertook a flora and fauna assessment of the proposed poultry development (320 Mooleric Road) for Spirecom in June 2023 (Biosis 2023).

Ecological values

Key ecological values identified within the study area are as follows:

- 0.08 hectares of Plains Grassy Woodland Ecological Vegetation Class (EVC) 55. This EVC has a Bioregional Conservation Status (BCS) of Endangered within the Victorian Volcanic Plain Bioregion.
- 0.04 hectares of Grassy Woodland (EVC 175). This EVC has a BCS of Endangered within the Otway Plain Bioregion.
- 0.55 hectares of Plains Grassy Wetland EVC 125. This EVC has a BCS of Endangered within the Victorian Volcanic Plain Bioregion.
- 0.09 hectares of Plains Sedgy Wetland (EVC 647). This EVC has a BCS of Endangered within the Otway Plain Bioregion.
- Habitat for one flora species and eight fauna species listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):
  - Potential habitat for River Swamp Wallaby-grass *Amphibromus fluitans.*
  - Gang-gang Cockatoo *Callocephalon fimbriatum*. Two individuals were recorded using the eucalypts *Eucalyptus* sp. planted along the boundary of a neighbouring property and the study area.
  - Striped Legless Lizard *Delma impar.* Two (potentially three) individuals were recorded on site during targeted reptile surveys in the unnamed road reserve that connects Mooleric Road to the poultry farm site.
  - Potential habitat for Blue-winged Parrot *Neophema chrysostoma*, Growling Grass Frog *Litoria raniformis,* and Yarra Pygmy Perch *Nannoperca obscura*.
  - Potential habitat for wide-ranging species including Grey-headed Flying-fox *Pteropus poliocephalus*, Southern Bent-wing Bat *Miniopterus orianae bassanii*, and White-throated Needletail *Hirundapus caudacutus*.
- Habitat for two threatened flora species and eight additional threatened fauna species listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act):

- Two variants of Purple Blown-grass; *Lachnagrostis semibarbata* var. *filifolia* and *Lachnagrostis semibarbata* var. *semibarbata*.
- Black Falcon *Falco subniger*, Brolga *Grus rubicunda*, Hardhead *Aythya australis*, Little Egret *Egretta garzetta*, Blue-billed Duck *Oxyura australis*, and Platypus *Ornithorhynchus anatinus*.
- The Tussock Skink *Pseudemoia pagenstecheri* (Volcanic Plains form) was recorded during targeted reptile surveys in the unnamed road reserve that connects Mooleric Road to the poultry farm site.
- Burrowing crayfish burrows were recorded on site, which could belong to Hairy Burrowing Crayfish *Engaeus sericatus*.

- The Birregurra Creek flows beneath Birregurra Road where it crosses the study area.

Government legislation and policy

An assessment of the project in relation to key biodiversity legislation and policy is provided and summarised below.

Legislation / policy	Relevant ecological feature on site	Permit / approval required
EPBC Act	Eight EPBC Act listed fauna species were either recorded, or assessed as having a medium or higher likelihood of occurring within the study area: • Gang-gang Cockatoo (recorded) • Blue-winged Parrot • Grey-headed Flying-fox • Growling Grass Frog • Southern Bent-wing Bat • Striped Legless Lizard • White-throated Needletail • Yarra Pygmy Perch. One EPBC Act listed flora species is assessed as having a medium or higher likelihood of occurrence within the study area: • River Swamp Wallaby-grass.	If direct impacts to the Birregurra Creek remain avoided (avoidance proposed in designs received on 14 December 2023) River Swamp Wallaby-grass and Yarra Pigmy Perch will not be impacted and further surveys will not be required. Habitat for Gang-gang Cockatoo is limited to the roadside eucalypts lining Mooleric Road and Birregurra Road. The pipeline is no longer proposed to impact Mooleric Road, as a result this habitat will not be impacted. Blue-winged Parrot may occur in the broader area on occasion, during which time the study area and adjacent grassy areas may be utilised for foraging. The study area contains habitat that meets the broad definition of 'habitat critical to the survival of the species' (DCCEEW 2023), however, the proposed works are considered unlikely to result in a significant impact on a population of this species based on the scale and nature of impacts. Grey-headed Flying-fox, Southern Bent-

Legislation / policy	Relevant ecological feature on site	Permit / approval required
		wing Bat and White-throated Needletail have the potential to fly and forage throughout the general area but are unlikely to be impacted by the proposed development, as the study area does not support areas of important habitat for these species. The current design will avoid all impacts to potential Growling Grass Frog habitat by directional drilling the pipeline below potential habitat. If this design is altered and impacts to Growling Grass frog habitat are proposed, a referral may be required. Habitat for Striped Legless Lizard is limited to the unnamed road reserve that connects Mooleric Road to the poultry farm site. Targeted surveys for threatened reptiles were undertaken in this section of the study area during October – December 2023, and Striped Legless Lizard were recorded in this area. An EPBC referral is required for the works involved in upgrading the road reserve to an all-weather road. Biosis understands that Spirecom is currently undertaking an EPBC Act referral for the construction of the road.
FFG Act	Two FFG Act listed threatened flora are assessed as having a medium or higher likelihood of occurrence: • Purple Blown-grass (variants *filifolia* and *semibarbata*). Fifteen FFG Act listed threatened fauna species are assessed as having a medium or higher likelihood of occurrence within the study area: • Gang-gang Cockatoo (recorded) • Black Falcon • Blue-billed Duck • Brolga • Grey-headed Flying-fox • Growling Grass Frog • Hairy Burrowing Crayfish	Where the installation of the pipeline is proposed on public roadsides a FFG Act Protected Flora permit will be required for any impacts to the protected or listed flora species. Only two of these species are likely to be impacted by the proposed pipeline and road construction (the remaining two species are the Purple Blown-grass variants, which are unlikely to be impacted by construction): • Up to 20 individuals each of Lemon Beauty-heads and Jersey Cud-weed will be impacted by the proposed construction in the unnamed road reserve and Darcy's Lane. These impacts are likely to occur even if directional drilling avoids impacts to

Legislation / policy	Relevant ecological feature on site	Permit / approval required
	• Hardhead • Little Egret • Platypus • Southern Bent-wing Bat • Striped Legless Lizard • Tussock Skink • White-throated Needletail • Yarra Pigmy Perch. Two protected flora species were recorded on public land during the site assessment: • Lemon Beauty-heads *Calocephalus citreus* • Jersey Cudweed *Laphangium luteoalbum*.	patches of native vegetation. As a result, a FFG Act protected flora permit will still be required. Impacts to Hairy Burrowing Crayfish will be minimised using directional drilling in the paddocks where crayfish burrows were observed. Hairy Burrowing Crayfish mounds were only observed on private property. Habitat for Tussock Skink is limited to the unnamed road reserve that connects Mooleric Road to the poultry farm site. Targeted surveys for threatened reptiles were undertaken in this section of the study area during October – December 2023, and Tussock Skinks were recorded there.
Planning & Environment Act	Study area contains patches of Plains Grassy Woodland EVC 55, Grassy Woodland EVC 175, Grassy Wetland EVC 125 and Plains Sedgy Wetland (EVC 647). Scattered native vegetation also occurs outside the patches of native vegetation.	A planning permit will be required to remove scattered native vegetation that occurs within the study area. Scattered native vegetation occurs outside patches of mapped native vegetation and will likely be impacted in areas where a trench is used to install the pipeline and within the proposed footprint of the all-weather road.
CaLP Act	Five Regionally Controlled (RC) noxious weeds occur within the study area: • Artichoke Thistle *Cynara cardunculus subsp. flavescens* • African Box-thorn *Lycium ferocissimum* • Sweet Briar *Rosa rubiginosa* • Common Blackberry *Rubus anglocandicans* • Gorse *Ulex europaeus.* Three Restricted (R) noxious weeds occur within the study area: • Chilean Needle-grass *Nassella neesiana* • Soursob *Oxalis pes-caprae* • Great Mullein *Verbascum thapsus subsp. thapsus.*	Comply with requirements to control the spread of these species during construction.
Water Act	Birregurra Creek	Birregurra Creek will not be directly impacted by the installation of the pipeline, which is currently proposed to impact adjacent to the road surface of Birregurra

Legislation / policy	Relevant ecological feature on site	Permit / approval required
		Road. This will avoid significant impacts to the creek and the associated native vegetation and fauna habitat. Referral to Corangamite Catchment Management Authority (CMA) will be required if the works plan is altered and the creek will be impacted by the proposed installation of the pipeline.

Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

Based on the current design (provided by Spirecom on 14 December 2023), the proposed construction of the pipeline and the all-weather road will not require the removal of any native patch vegetation. Directional drilling will be used beneath all patches of native vegetation (including a 2m buffer between the start of boring and the patch of vegetation) to ensure impacts are avoided.
Trenching will be used to install the pipeline in areas where native vegetation patches or important fauna habitat have not been mapped. As a result, impacts to scattered native vegetation are still likely to occur. Impacts to scattered native vegetation require a planning permit, but are not assessed under the *Guidelines for the removal, destruction and lopping of native vegetation*.

The six-metre-wide all-weather road has been positioned to avoid impacts to all native vegetation within the unnamed road reserve. Temporary construction fencing has been erected in the unnamed road reserve to ensure impacts to all patches of native vegetation are avoided during construction. It is important to note that construction of the road will still result in impacts to some scattered native vegetation and Striped Legless Lizard habitat.

The following actions have been taken to avoid and/or minimise the impacts of the proposed pipeline development on the landscape:

- Directional drilling will be implemented in areas where the pipeline intersects patches of native vegetation. This will avoid all impacts to patches of native vegetation. Directional drilling will also be used in areas identified as potential habitat for Growling Grass Frog and Hairy Burrowing Crayfish to avoid impacting these threatened fauna species.
- Additionally, directional drilling will be used to install the pipeline above the concrete structure of Birregurra Road, below the road surface crossing the Birregurra Creek. This will avoid impacts to the creek and the associated habitat and vegetation.
- Impacts to high quality vegetation are limited. Much of the vegetation proposed to be impacted by the installation of the pipeline is degraded and no longer supports a diverse mix of native species.
- The placement of the road and implementation of a temporary construction fence will ensure impacts to native vegetation patches are avoided during construction of the six metre-wide all weather road.

A Planning permit will be required for the impacts to scattered native vegetation that are proposed by the construction of the all-weather road and the pipeline.

Recommendations

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan. This will include requirements for environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

Striped Legless Lizard targeted surveys were undertaken in suitable habitat within the northern, unnamed road reserve (east of Mooleric Road) during October – December 2023 (Biosis 2024). Striped Legless Lizards and Tussock Skink were recorded during these surveys. Due to the nature of planned works for an all-weather road within the road reserve, a significant impact on Striped Legless Lizard is likely, therefore an EPBC Act referral will be required.

Additional targeted surveys for threatened flora and fauna will not be required based on the most recent construction design (14 December 2023). Direct impacts to habitat for threatened flora and fauna will be avoided by installing the pipeline using directional drilling in the following areas:

- Beneath all patches of native vegetation that intersect the pipeline. Directional drilling will be used to install he pipeline below ground, avoiding impacts to native vegetation. A buffer of 2 metres between the start of boring and the patch of vegetation will be used to avoid indirect impacts on vegetation from machinery.
- Above the concrete structure of Birregurra Road and below the road surface crossing the Birregurra Creek, avoiding all direct impacts to the creek.
- Beneath the area that is considered a potential Growling Grass Frog movement corridor between the M1 and Birregurra Creek (see figure 2).
- Beneath the areas that support potential Hairy Burrowing Crayfish mounds (see Figure 2).

Targeted surveys for threatened flora and fauna are recommended if the construction design / process is changed and direct impacts to Birregurra Creek are proposed. Targeted surveys are also recommended if changes to the construction design / method result in impacts to the potential Growling Grass Frog habitat between the M1 and Birregurra Creek

If impacts to Growling Grass Frog habitat can no longer be avoided using directional drilling, this may also trigger an EPBC Act referral (subject to the results of targeted surveys).

No-go fencing will need to be installed around native vegetation that occurs within the vicinity of trenches and bore points for the installation of the pipeline. This will avoid unintentional impacts to the vegetation from machinery, trampling etc. during construction. Long-term protection of vegetation adjacent the all-weather road should also be considered to ensure vegetation is protected during on-going use. No-go fencing has already been placed in the unnamed road reserve.

Contents

Tables

Figures

1. Introduction

1.1. Project background

Biosis Pty Ltd (Biosis) was commissioned by Spirecom Pty Ltd (Spirecom) to undertake a flora and fauna assessment of a proposed water pipeline footprint. The pipeline will link a proposed poultry development at 320 Mooleric Road with the Birregurra township. The footprint occurs within public road reserves along Moorelic Road, Darcy's Lane and Birregurra Road (the study area). The study area encompasses the entire road reserve and does not include any private property adjacent to the road reserve.

Biosis undertook a flora and fauna assessment of the proposed poultry farm development (320 Mooleric Road) for Spirecom in June 2023 (Biosis 2023).

1.2. Scope of assessment

The objectives of this investigation are to:

- Describe the vascular flora (ferns, conifers, flowering plants), vertebrate fauna (mammals, birds, reptiles, frogs, fishes) and decapod crustacea (e.g. crayfish).
- Map native vegetation and other habitat features.
- Review the implications of relevant biodiversity legislation and policy, including Victoria's Guidelines for the removal, destruction or lopping of native vegetation ('the Guidelines').
- Identify potential implications of the proposed development and provide recommendations to assist with development design.
- Recommend any further assessments of the site that may be required (e.g. a vegetation impact assessment or targeted searches for threatened species).

1.3. Location of the study area

The study area is located along public road reserves between Ombersley and Birregurra, 20 kilometres north-east of Colac, Victoria (Figure 1). It encompasses approximately 21hectares of public land currently zoned in the Colac Otway Planning Scheme as Transport zone 2 (TRZ2) south of Princes Highway and Farming Zone (FZ) north of the Princes Highway. It occurs within a predominantly agricultural landscape with the surrounding properties cleared for grazing and cropping.

The study area is within the:

- Victorian Volcanic Plain and the Otway Plain Bioregion.
- Barwon River Basin.
- Management area of the Corangamite Catchment Management Authority (CMA).
- Colac Otway Shire local government area.
- Traditional lands of the Eastern Maar.

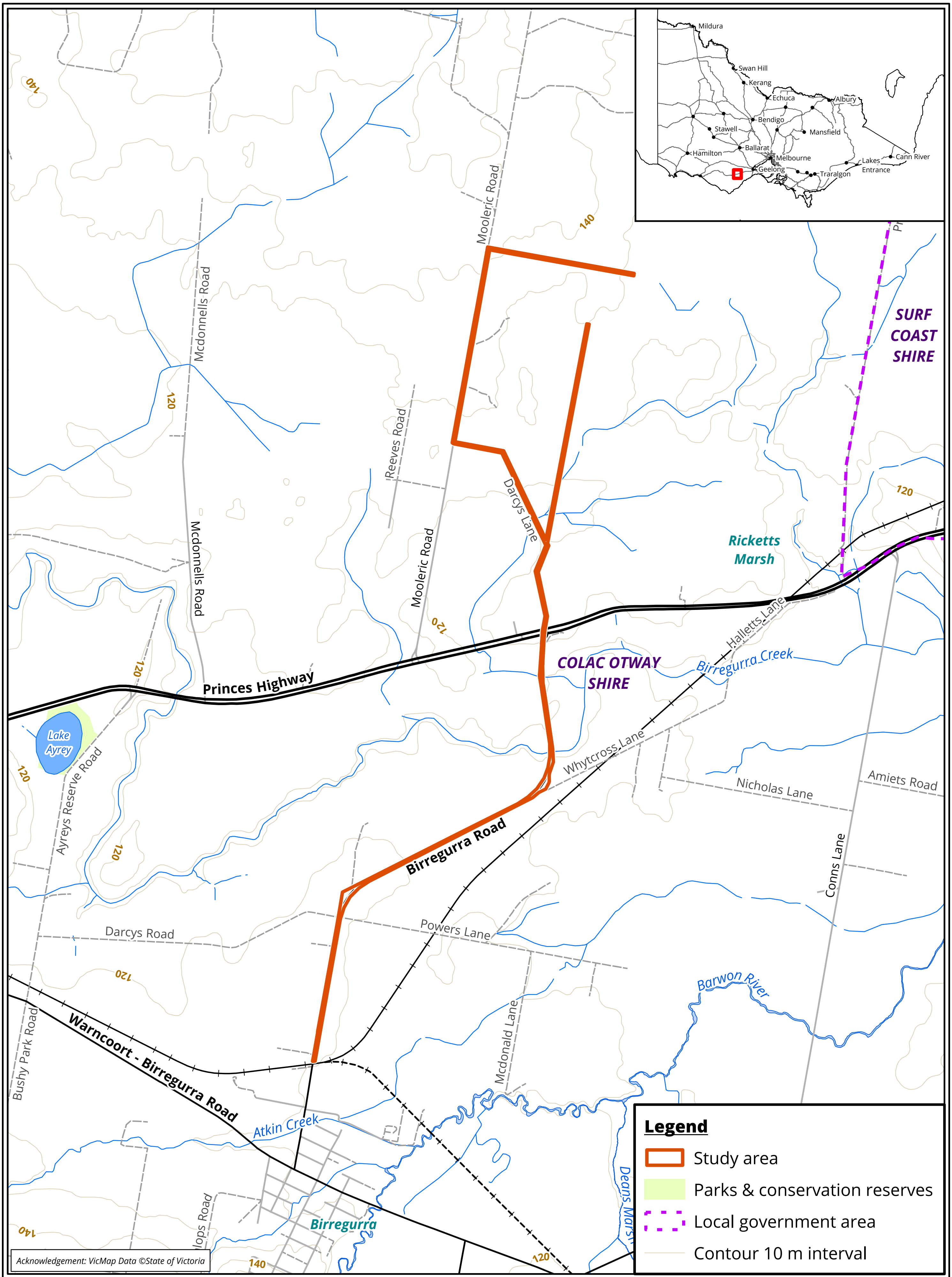


Figure 1 Location of the study area - Birregurra, Victoria

Matter: 39426,
Date: 07 December 2023 ,
Prepared for: SP, Prepared by: HS, Last edited by: spanter
Layout: 39426_F1_Location
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx

0 0.5 1 1.5 2
Kilometres
Scale: 1:40,000 @ A4
Coordinate System GDA 1994 MGA Zone 54
N
00

2. Methods

2.1. Database review

In order to provide a context for the study area, information about flora and fauna from within 5 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases, many of which are maintained by the Victorian Government Department of Energy, Environment and Climate Action (DEECA) or the Australian Government Department of Climate Change, Energy, Environment and Water (DCCEEW). Records from the following databases were collated and reviewed:

- DEECA's Victorian Biodiversity Atlas (VBA), including the 'VBA_FLORA25, FLORA100 & FLORA Restricted' and 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' datasets.
- DCCEEW's Protected Matters Search Tool for matters protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Other sources of biodiversity information were examined including:

- DEECA's NatureKit mapping tool.
- DEECA's Habitat Importance maps.
- DEECA's Native Vegetation Information Management (NVIM) system.
- Planning Scheme overlays relevant to biodiversity based on http://planningschemes.dpcd.vic.gov.au.

Previous biodiversity assessments relevant to the study area were also reviewed, including:

- Biosis (2014). Report prepared for MCG Quarries Pty Ltd. Biosis Project #17781.
- Biosis (2023). 320 Mooleric Road, Birregurra. Flora and Fauna Assessment. Report prepared for Spirecom Pty Ltd. Biosis Project no. 38562. (Biosis 2023).

2.2. Definitions of threatened species or communities

Threatened species or communities include those species or communities that are listed under the EPBC Act and/or *Flora and Fauna Guarantee Act* (1988) (FFG Act). The conservation status of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Conservation status of threatened species and ecological communities

Government level	Conservation status
National	Listed as nationally critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent in Victoria under the FFG Act

Lists of threatened species generated from the databases are provided in Appendix A (flora) and Appendix B (fauna) and the species have been assessed to determine their likelihood of occurrence based on the process outlined below.

2.3. Determining likelihood of occurrence of threatened species

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix A (flora) and Appendix B (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the FFG Act (hereafter referred to as ' threatened species') are assessed to determine their likelihood of occurrence. The habitat value for threatened species is calculated by the Habitat Importance Modelling produced by DEECA (DELWP 2017a). Where threatened species are recorded in the study area this is noted in Appendix A (flora) and Appendix B (fauna).

Threatened species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted surveys for these species is also considered.

2.4. Site investigation

2.4.1. Flora assessment

The flora assessment was undertaken on 5 July 2023 by Hayley Sime (Botanist). A list of species was collected and will be submitted to DEECA for incorporation into the Victorian Biodiversity Atlas (VBA). Planted vegetation will not be included in the VBA submission unless it has naturalised.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01).

The Guidelines classify native vegetation into two categories (DELWP 2017a):

- A **scattered tree** is defined as a native canopy tree that does not form part of a patch of native vegetation.
- A **patch** of native vegetation (measured in hectares) is either:
  - An area of native vegetation, with or without trees, where at least 25% of the total perennial understorey cover is native plants.
  - An area with three or more native canopy trees where the drip line (i.e. the outermost boundary of a tree canopy) of each tree touches the drip line of at least one other tree, forming a continuous canopy.
  - Any mapped wetland included in the Current wetlands map, available in DEECA systems and tools.

Patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are determined by DEECA.

A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type. EVC descriptions provide a list of the typical canopy species. A scattered tree is defined as either small or large, and is determined using the large tree benchmark for the relevant EVC. The extent of a small, scattered tree is the area of a circle with a 10 metre radius (i.e. 0.031

hectares), while the extent of a large scattered tree is a circle with a 15 metre radius (i.e. 0.070 hectares). A condition score is applied to each scattered tree based on information provided by DEECA's NVIM.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation identified in the study area. This assessment is consistent with DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017a). For the purposes of this assessment the limit of the resolution for identification of a patch of native vegetation was taken to be 0.001 habitat hectares (Hha). That is, if a discrete patch of native vegetation was present with sufficient cover but its condition and extent would not have resulted in the identification of at least 0.001 habitat hectares, the vegetation patch of vegetation was not mapped or included in the assessment.

Species nomenclature for flora follows the Victorian Biodiversity Atlas (VBA).

2.4.2. Fauna assessment

The study area was investigated on 5 July and 25 September 2023 by Ian Smales (Principal Zoologist) and Danielle Eastick (Zoologist) to determine its values for fauna. These were determined based on the types and qualities of habitat(s) present. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Particular attention was given to searching for significant species and their habitats. Fauna species were recorded with a view to characterising the values of the site and the investigation was not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

2.4.3. Permits

Biosis undertakes flora and fauna assessments under the following permits and approvals:

- Wildlife Authorisation issued by DEECA under the *Victorian Wildlife Act 1975* (Permit Number 10010193).
- Permit to Take/Keep Protected Flora issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010194).
- Permit to Take Protected Fish issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010195).
- Permit to Conduct Research in areas managed by the Parks Victoria issued by DEECA under the *National Parks Act 1975*, *Crown Land (Reserves) Act 1978* and *Parks Victoria Act 2018* (Permit Number 10010071).
- Permit to catch and release fish issued by the Victorian Fisheries Authority under the *Victorian Fisheries Act 1995* (Permit Number RP 1220, Personal File Number 13041).
- Approvals 18.21 and 20.21 issued by the Wildlife and Small Institutions Animal Ethics Committee of the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR).
- Scientific Procedures Fieldwork Licence issued by the Department of Economic Development, Jobs, transport and Resources (DEDJTR's) Wildlife and Small Institutions Animal Ethics Committee (Licence Number 20020).

2.5. Threatened reptile targeted surveys

Targeted surveys were undertaken for Striped Legless Lizards and Tussock Skink. The primary method used to survey for reptiles within the study area was the placement of artificial shelter (terracotta roof tile) transects, in accordance with the Survey guidelines for Australia's threatened reptiles (DEWHA 2011). Each tile transect consisted of 25 terracotta roof tiles spaced approximately 5 metres apart. Three tile transects were placed in suitable habitat along the northern side of the road reserve (grids 1, 3, 5), and three transects on the south side (grids 2, 4, 6), such that a total of 150 tiles were surveyed.

Tile transects were established within the study area on 22 September 2023, three weeks prior to the initial survey. Tile checks were conducted in the species active period, with a total of ten tile checks completed from 17 October to 22 December 2023 at approximately weekly intervals. Survey grids were decommissioned on 22 December 2023. Transects were sampled across a variety of weather conditions, on days when ambient temperatures did not exceed 28 °C (except for survey 9, which was undertaken at 30°C).

In addition to tile transects, active searching was also undertaken opportunistically throughout the study area while completing tile transect checks. This included lifting rocks and other debris to locate reptiles sheltering beneath. Animals were only briefly handled to obtain a photograph for the purpose of data collection and identification, and were released immediately afterwards at the point of capture. All reptile species encountered within the study area were noted and species records will be submitted to the Department of Energy, Environment and Climate Action (DEECA) for inclusion in the Victorian Biodiversity Atlas (VBA).

2.6. Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as low abundance, patchy distribution, species dormancy, seasonal conditions, and migration and breeding behaviours. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current flora and fauna assessment was conducted in July (winter) which is not an optimal time for survey. However, the conditions were appropriate for assessing the extent of native vegetation and habitats present within the site due to the high weed cover and historical modification of the study area.

As a result, the survey was considered sufficient to assess the general values of the study area.

2.7. Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes.
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice.
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a).
- *Planning and Environment Act 1987* – specifically Clauses 12.01-2, 52.17 and 66.02 and Overlays in the Planning Scheme.

- *Fisheries Act 1995*.
- Noxious weeds and pest animals listed under the *Catchment and Land Protection Act 1994* (CaLP Act).

2.8. Mapping

Mapping was conducted using hand-held GPS-enabled tablets and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the tablets (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans, however, this mapping may not be sufficiently precise for detailed design purposes.

3. Results

The ecological features of the study area are described below and mapped in Figure 2.

Species recorded during the flora and fauna assessment are listed in Appendix A (flora) and Appendix B (fauna). Unless of note, these species are not discussed further.

Threatened species recorded or predicted to occur in the local area are also provided in those appendices, along with an assessment of the likelihood of the species occurring within the study area.

3.1. Vegetation and fauna habitat

Remnant roadside vegetation is often locally and regionally significant, providing habitat for threatened flora and fauna and connectivity in landscapes that have been heavily modified, cleared and degraded (Victorian Landcare 2020). This is especially true where roadsides have been excluded from livestock grazing and, as a result, support higher native biodiversity and structural diversity in the understorey.

The roadsides surveyed within the study area do not support the high native species diversity that is typically expected in roadside reserves. Birregurra's high average annual rainfall (668 millimetres) has resulted in a dominance of weeds such as Toowoomba Canary-grass *Phalaris aquatica* following modification for grazing and agriculture.

The paddocks to the south of the proposed poultry farm support a predominantly introduced suite of vegetation. Pasture species and common weeds such as Toowoomba Canary Grass dominate the cover. A large patch of Grassy Wetland occurs in the south-west corner of the middle paddock (see Figure 2), this patch is relatively low quality due to the sparse cover of rushes *Juncus spp.* and dominance of introduced weeds. Some higher quality patches of Grassy Wetland vegetation occur within the paddock along drainage lines. Areas within the drainage lines that have not been heavily degraded by cattle support some native herb species. These patches support the key diagnostic characters to be considered Seasonal Herbaceous Wetland of the Temperate Lowland Plains, however the patches are too small to qualify as the Threatened Ecological Community.

Darcy's Lane supports four small patches of native vegetation where Common Tussock Grass *Poa labillardierei* and Kangaroo Grass *Themeda triandra* occur at greater than 25% (perennial) cover. The remainder of the reserve is dominated by Toowoomba Canary-grass and Brown-top Bent *Agrostis capillaris.* Native vegetation outside the patches is limited to scattered native rushes (Toad Rush *Juncus bufonius*) native herbs (Lemon Beauty-heads *Calocephalus citreus*) and native grasses (Kangaroo Grass, spear grasses *Austrostipa* spp. and wallaby grasses *Rytidosperma* spp.).

The unnamed government road to the north of the proposed poultry farm supports several small patches of Plains Grassy Wetland EVC 125. Beyond the mapped patches of Plains Grassy Wetland EVC 125, native vegetation is scattered throughout a largely disturbed area that supports predominantly introduced vegetation such as Toowoomba Canary-grass. The soils are black, cracking clays with some surface and embedded rocks.

Tussock grasses (such as Common Tussock-grass) are sparse and appear to have been heavily grazed throughout the road reserve. Despite the relatively low cover of tussock grasses, the site is considered potentially suitable habitat for Striped Legless Lizard *Delma impar* because the property to the north supports moderate quality habitat with large tussock grasses, surface rocks and inter-tussock spaces.

The surface rocks within the road reserve may be utilised by Striped Legless Lizards that could move in from the more suitable habitat to the north. Additionally, Striped Legless Lizards have been recorded in roadsides dominated by Toowoomba Canary-grass in western Victoria. Habitat of this type is known to also support additional small vertebrates including threatened reptiles like the Tussock Skink. Striped Legless Lizard and Tussock Skink were recorded in the road reserve during targeted reptile surveys.

No threatened flora were recorded within the study area during the assessment, and the high level of disturbance (evident through cattle pugging and grazing) means it is unlikely that any threatened flora species persist within the patches of wetland vegetation.

The habitat zones within the unnamed road reserve were assessed for the presence of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (Seasonal Herbaceous Wetlands; threatened ecological community listed under the EPBC Act). Several key species of this threatened community such as Common Spike-sedge *Eleocharis acuta,* Prickfoot *Eryngium vesiculosum* and Small Loosestrife *Lythrum hyssopifolia* were recorded within habitat zone 22 (Figure 1, Appendix A) at a high enough cover to qualify as Seasonal Herbaceous Wetlands. While habitat zone 22 meets the condition thresholds for Seasonal Herbaceous Wetlands, the size threshold is not met (both individually and collectively). Habitat zones 23 and 24 do not support any native forb species and therefore do not meet the size or condition thresholds to be considered Seasonal Herbaceous Wetlands.

The roadsides along Birregurra Road support several patches of Plains Sedgy Wetland (EVC 647) where shallow depressions hold water. These vegetation patches are relatively low quality and are all dominated by a single native sedge, Common Spike-sedge *Eleocharis acuta.* Limited patches of Grassy Woodland (EVC 175) occur along Birregurra Road where Blackwood *Acacia melanoxylon* has recruited.

Birregurra Creek crosses underneath Birregurra Road south of the Princes Highway. While the vegetation near the creek is largely dominated by weeds, a native Swamp Wallaby-grass *Amphibromus* sp. was identified along the margin of the creek, within the study area. There is a medium likelihood that the Swamp Wallaby-grass recorded onsite is the EPBC Act listed River Swamp Wallaby-grass *Amphibromus fluitans*. As a result, additional targeted surveys will be required if impacts to the Birregurra Creek are proposed. The creek also provides habitat for water birds, frogs and fish.

Photos are provided in Appendix C.

Table 2 Summary of vegetation and habitat types within the study area

Vegetation or habitat type	Description	Location	Significant values
Plains Grassy Woodland (EVC 55).	Small patches of Plains Grassy Woodland (EVC 55) occur along Mooleric Road and within Darcy's Lane. These patches support a small native species diversity including wallaby grasses *Rytidosperma* spp., Hedge Wattle *Acacia paradoxa* and Black Wattle *Acacia melanoxylon.* While the Hedge Wattle and Blackwood may have initially been planted along the roadside, it is now recruiting naturally and therefore considered a native vegetation patch.	Small patches along Mooleric Road and Darcy's Lane.	Acacias provide habitat for many common bird species, and grassy understory supports many common reptile species. Blue-winged Parrot may forage in this habitat.
Grassy Woodland (EVC 175).	These patches occur south of the Princes Highway (within the Otway Plain Bioregion). They are similar to the Plains Grassy Woodland patches found to the north of the Princes Highway. They support recruiting Blackwood individuals and a high cover of understorey weeds.	Small patches along Birregurra Road.	Grassy woodland provides similar fauna habitat values to Plains Grassy Woodland.
Plains sedgy Wetland (EVC 647).	Shallow drainage lines along Birregurra Road support Plains Sedgy Wetland (EVC 64)7. These patches are not diverse and most only support Common Spike-sedge *Eleocharis acuta.*	In shallow drainage lines along Birregurra Road.	Drainage lines provide habitat and connectivity for wetland fauna including frogs. Growling Grass Frog may use these drainage lines as corridors between permanent water bodies, such as dams on the adjacent properties.
Plains Grassy Wetland (EVC 125).	Occurs as isolated patches within the paddocks that have been degraded by cattle grazing. The patches are dominated by native grasses such as Tussock Grass. The higher quality examples of this community support native herbs such as Small Loose-strife and Prickfoot. The low-quality examples of this community lack native herb diversity.	South of the proposed poultry farm and in the unnamed road reserve. Occurs in shallow drainage lines and	Drainage lines provide habitat and connectivity for wetland fauna including frogs. Growling Grass Frog may use these drainage lines as corridors between permanent water bodies, such as dams on the adjacent properties. This habitat may support Striped Legless Lizard where it occurs in adjacent higher

Vegetation or habitat type	Description	Location	Significant values
		depressions caused by cattle movement.	quality (and more suitable) habitat.
Predominantly introduced vegetation.	Most of the study area supports modified vegetation dominated by Toowoomba Canary-grass *Phalaris aquatica.* Native vegetation within these areas is limited to some scattered grasses and herbs, however they do not reach a percentage cover high enough to be considered a patch. These areas may have been grazed in the past and have been degraded by vehicle access in some areas.	Majority of the study area.	Predominantly introduced vegetation has limited value to fauna, however highly mobile and wide-ranging species such as White-throated Needletail, Southern Bent-winged Bat, and Black Falcon may forage overhead on occasion. The road easement north of the quarry contains a mix of native and introduced vegetation that support Striped Legless Lizard and Tussock Skink. These two species were recorded during targeted reptile surveys within the road easement.
Planted vegetation.	Several properties adjacent to the study area have linear 'shelterbelt' plantings along the fence line. These plantings predominantly consist of Australian natives (non-indigenous species). However, Radiata Pine *Pinus radiata* have been used in some areas as well.	Adjacent the study area in neighbouring properties.	Planted eucalypts may be occasionally visited, when in flower, by foraging Grey-headed Flying-foxes from the colony at the Colac Botanic Gardens. Gang-gang Cockatoos were recorded utilising these roadside eucalypts.
Birregurra Creek.	A wide, ephemeral waterway (>4 m wide) containing submergent and emergent vegetation, and vegetated banks.	Crosses underneath Birregurra Road south of the Princes Highway.	Potential habitat for threatened fauna species, including Brolga, Blue-billed Duck, Hardhead and Little Egret. Potential occurrence of River Swamp-wallaby Grass. Growling Grass Frog and Platypus may use Birregurra Creek as a corridor to permanent water bodies.

3.2. Landscape context

The study area is in a rural farming area and most of the surrounding landscape has been cleared for either grazing or cropping. It is approximately 20 kilometres from Lake Colac and Lake Murdeduke, and a similar distance to the north of the forested area of the Otway Ranges.

The Birregurra Creek passes through the study area (beneath Birregurra Road) providing connectivity between the study area and the Barwon River.

3.3. Threatened species and ecological communities

Threatened species recorded or predicted to occur within 5 kilometres of the study area or from the relevant catchment (aquatic species) are listed in Appendix A (flora) and Appendix B (fauna). An assessment of the likelihood of these species occurring in the study area and an indication of where within the site (i.e. which habitats or features of relevance to the species) is included. A summary of those species recorded or with a medium or higher likelihood of occurring in the study area is provided in Table 3.

Table 3 Summary of EPBC Act and FFG Act listed species most likely to occur in the study area

Species name	Listing status	Area of value within the study area
River Swamp Wallaby-grass *Amphibromus fluitans*	Vulnerable under the EPBC Act.	Margins of the Birregurra Creek
Yarra Pigmy Perch *Nannoperca obscura*	Vulnerable under the EPBC Act and FFG Act.	Birregurra Creek.
Grey-headed Flying-fox *Pteropus poliocephalus*	Vulnerable under the EPBC Act and FFG Act.	May occasionally forage in flowering eucalypts on roadsides.
Gang-gang Cockatoo *Callocephalon fimbriatum*	Endangered under the EPBC Act and FFG Act.	Observed using the roadside eucalypts on Mooleric Road and Birregurra Road.
Blue-winged Parrot *Neophema chrysostoma*	Vulnerable under the EPBC Act.	May forage around roadside overstory and understory vegetation.
White-throated Needletail *Hirundapus caudacutus*	Vulnerable under the EPBC Act and the FFG Act.	Wide-ranging aerial species that may pass through and/or forage over the study area on occasion.
Southern Bent-winged Bat *Miniopterus orianae bassanii*	Critically Endangered under the EPBC Act and FFG Act.	May forage throughout the general area and use Birregurra Creek as water source.
Striped Legless Lizard *Delma*	Vulnerable under the EPBC Act.	Recorded in grassy vegetation in road

Species name	Listing status	Area of value within the study area
impar	Endangered under the FFG Act.	easement north of the quarry.
Tussock Skink *Pseudemoia pagenstecheri* (Volcanic Plains form)	Endangered under the FFG Act.	Recorded in grassy vegetation in road easement north of the quarry.
Growling Grass Frog *Litoria raniformis*	Vulnerable under the EPBC Act and FFG Act.	Birregurra Creek, and drainage lines north of the creek to the dam adjacent to M1 and Birregurra Road intersection.
Brolga *Antigone rubicunda*	Endangered under the FFG Act.	Floodplains off Birregurra Creek and between Mooleric Road and Darcy's Lane.
Little Egret *Egretta garzetta*	Endangered under the FFG Act.	Floodplains off Birregurra Creek and between Mooleric Road and Darcy's Lane.
Hairy Burrowing Crayfish *Engaeus sericatus*	Vulnerable under the FFG Act.	Paddock drainage lines.
Hardhead *Aythya australis*	Vulnerable under the FFG Act.	Birregurra Creek when full.
Blue-billed Duck *Oxyura australis*	Vulnerable under the FFG Act.	Birregurra Creek when full.
Black Falcon *Falco subniger*	Critically Endangered under the FFG Act.	May forage throughout the general area.
Platypus *Ornithorhynchus anatinus*	Vulnerable under the FFG Act.	May use Birregurra Creek as a movement corridor.

3.3.1. Threatened reptiles targeted surveys

Tile surveys for threatened reptiles were undertaken between 17 October and 22 December 2023. Three reptile and two amphibian species were recorded within the study area during the targeted surveys - Striped Legless Lizard, Eastern Three-lined Skink *Acritoscincus duperreyi*, Tussock Skink *Pseudemoia pagenstecheri*, Southern Brown Tree Frog *Litoria ewingii* and Spotted Marsh Frog *Limnodynastes tasmaniensis*. Additionally, one skink *Scincidae* spp. was observed but unable to be identified to the species level during the targeted surveys, as they evaded capture and/or moved too quickly to obtain visual identification. This typically occurred on warmer or more sunny days when individuals were more active.

Four Striped Legless Lizards were recorded during the surveys; one under a tile in Transect 2 (southern boundary of road reserve) and three under tiles within Transect 3 (northern boundary of road reserve; **Error! Reference source not found.**). Head scales were photographed for two of the Striped Legless Lizards captured on Transect 3, and it was determined they were the same individual captured on two separate days. The Striped Legless Lizards observed on Transect 2 and one of the individuals observed on Transect 3 evaded capture and were not able to be photographed. Hence, it is unknown whether the same individual was recorded all four times. However, it is likely that at least two different individuals were recorded as sightings as the capture points on Transect 2 and Transect 3 are located approximately 150 metres apart.

Tussock Skink were recorded on one occasion during the surveys in Transect 5. The unidentified skink that was observed, but not captured, on Transect 1 was also potentially a Tussock Skink due to its colour and size. Tussock Skink are listed as vulnerable under the FFG Act. Based on the results from the current survey, it is reasonable to assume that Tussock Skink are present in moderate abundance throughout the study area.

More information on these surveys can be found in the Striped Legless Lizard report (Biosis 2024).

3.3.2. Threatened ecological communities.

Four EPBC Act listed Threatened Ecological Communities (TECs) are modelled to occur within 5 kilometres of the study area:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.
- Natural Temperate Grassland of the Victorian Volcanic Plain.
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain.
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.

Two FFG Act listed communities are modelled to occur within 5 kilometres of the study area:

- Coastal Moonah (*Melaleuca lanceolata* subsp.*lanceolata*) Woodland Community.
- Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04.

In most cases the patches of native vegetation within the study area do not support the key diagnostic species of these communities and, as a result, the communities are not considered present. Where key diagnostic species are present within the patches (such as Kangaroo Grass and Common Tussock-grass) the patches are too small to be considered Natural Temperate Grassland of the Victorian Volcanic Plain or Seasonal Herbaceous Wetlands of the Temperate Lowland Plains (SHWTLP). Figure 2 shows the location of patches of native vegetation that support the key diagnostic species for SHWTLP but are too small to qualify as the community (both individually and collectively).

As a result, none of the modelled communities are present within the study area. See Appendix A.3 for further justification.

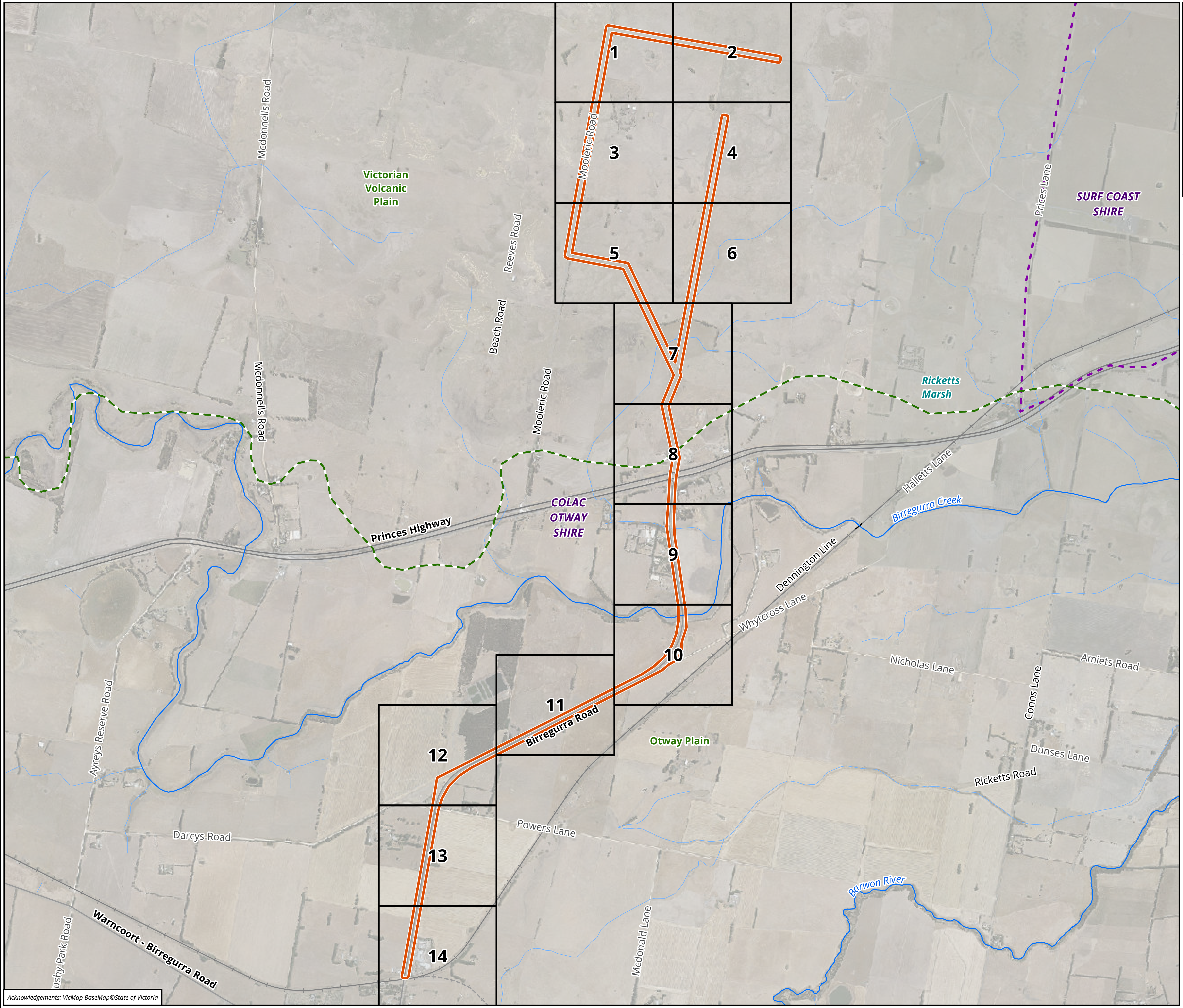
3.4. Further survey recommendations

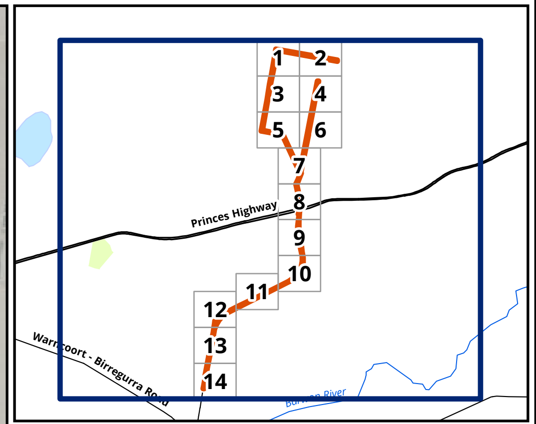
Additional targeted surveys for threatened flora and fauna will not be required based on the most recent construction design (14 December 2023). Direct impacts on habitat for threatened flora and fauna will be avoided by installing the pipeline using directional drilling in the following areas:

- Beneath all patches of native vegetation that intersect the pipeline. Directional drilling will be used to install he pipeline below ground, avoiding impacts to native vegetation. A buffer of 2 metres between the start of boring and the patch of vegetation will be used to avoid indirect impacts on vegetation from machinery.
- Above the concrete structure of Birregurra Road and below the road surface crossing the Birregurra Creek, avoiding all direct impacts to the creek.
- Beneath the area that is considered a potential Growling Grass Frog movement corridor between the M1 and Birregurra Creek (see figure 2).
- Beneath the areas that support potential Hairy Burrowing Crayfish mounds (see Figure 2).

Targeted surveys for threatened flora and fauna are recommended if the construction design / process is changed and direct impacts to Birregurra Creek are no longer avoided. Targeted surveys are also recommended if changes to the construction design / method result in impacts to the potential Growling Grass Frog habitat between the M1 and Birregurra Creek

An EPBC Act referral will be required for impacts on Striped Legless Lizard (proposed by the all-weather road). If impacts to Growling Grass Frog habitat can no longer be avoided using directional drilling, this may also trigger an EPBC Act referral (subject to the results of targeted surveys). Biosis understands that Spirecom are currently undertaking a referral for the impacts to Striped Legless Lizard proposed by the six-metre wide road construction.





Legend

- Study area
- Local government area boundary
- Bioregional boundary

Figure 2.0 Ecological features of the study area: overview

0 200 400 600 800 1,000

Metres

Scale: 1:25,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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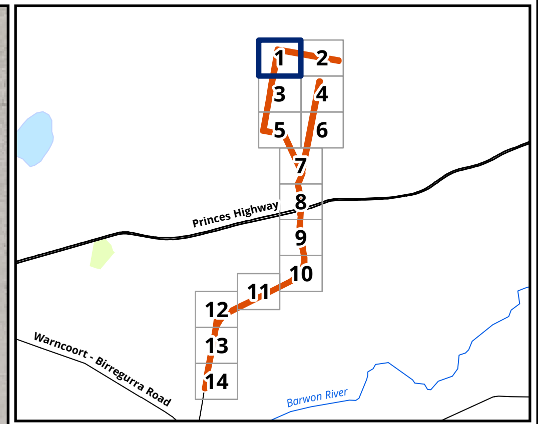

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 2.1 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 20 December 2023 ,
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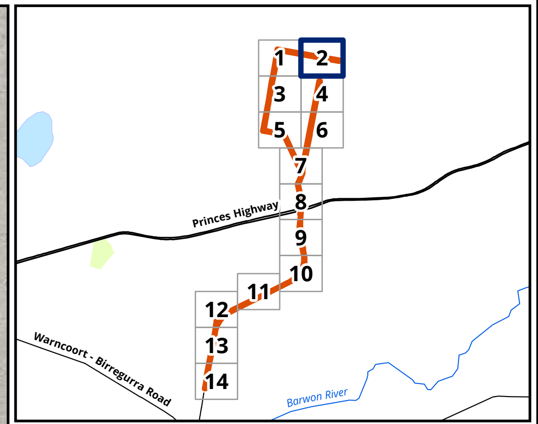

Legend

Study area

Ecological vegetation classes (EVCs)

125 Plains Grassy Wetland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 2.2 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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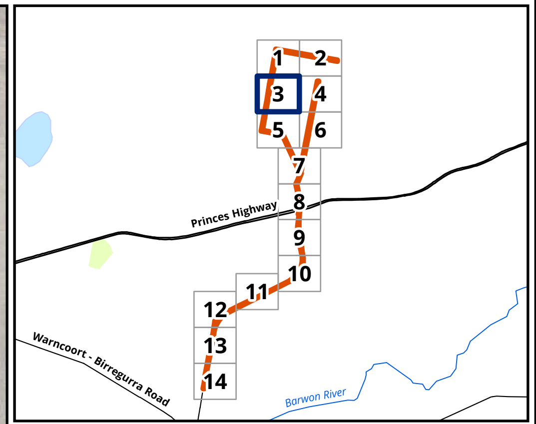

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Figure 2.3 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

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Scale: 1:2,500 @ A3

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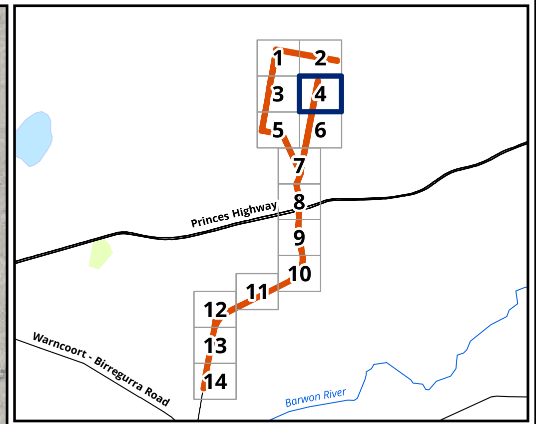

Legend

Study area

Ecological vegetation classes (EVCs)

125 Plains Grassy Wetland

Figure 2.4 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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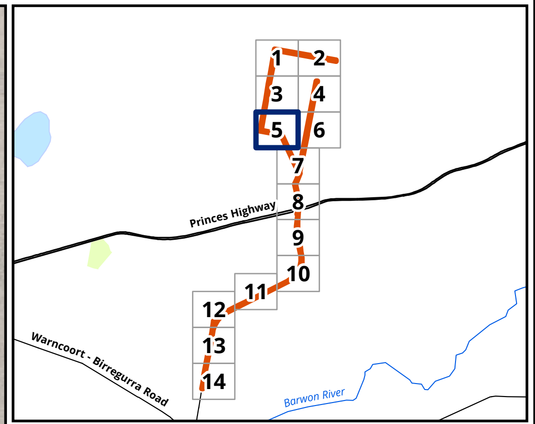

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Figure 2.5 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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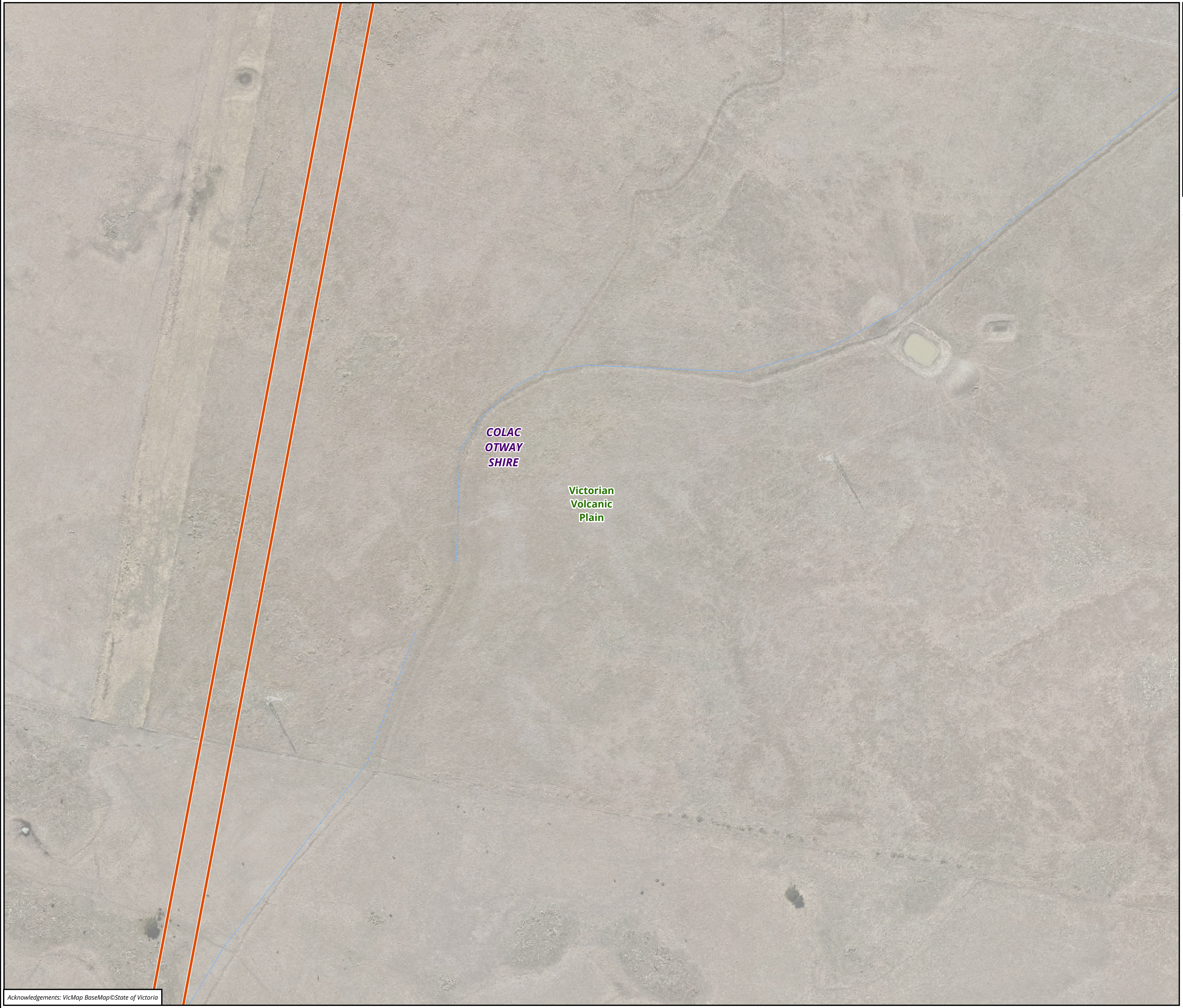
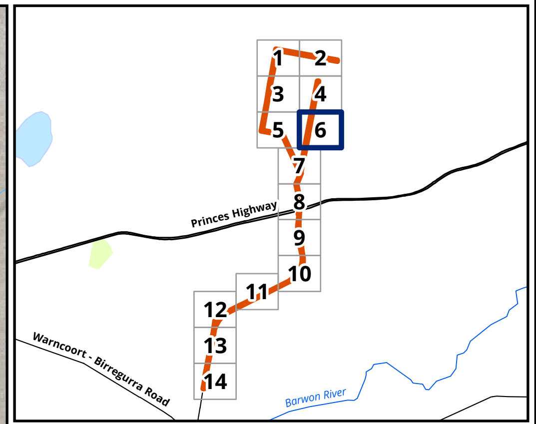


Acknowledgements: VicMap BaseMap©State of Victoria



Legend

Study area

Figure 2.6 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

N

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 20 December 2023 ,
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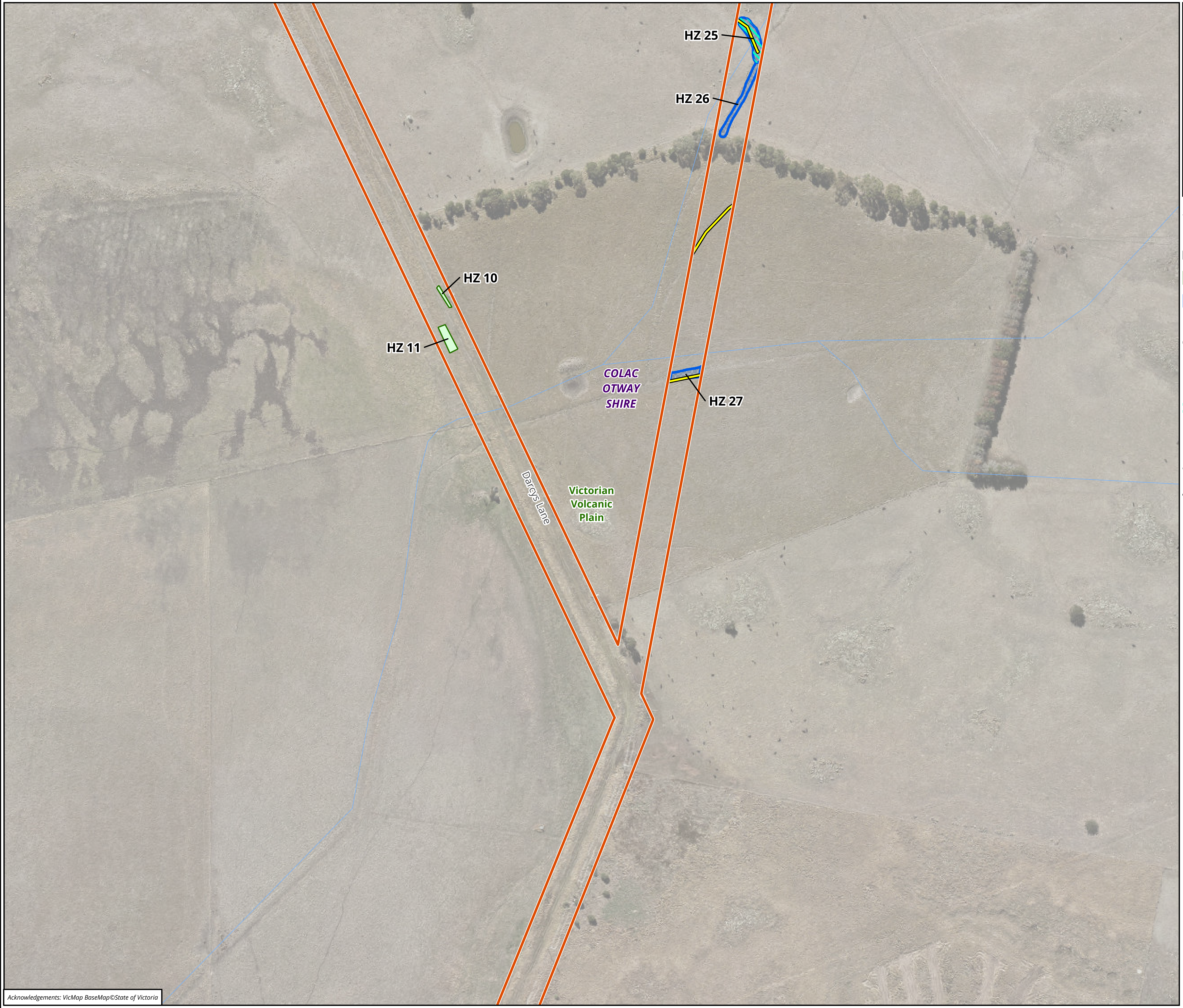

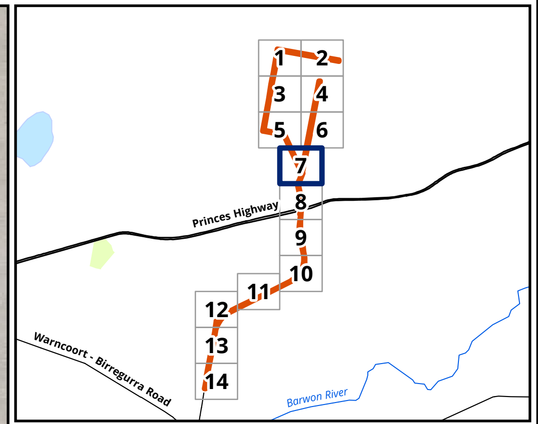

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

125 Plains Grassy Wetland

EPBC listed threatened ecological communities

Potential Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (key diagnostic species present, but wetland too small to qualify as community)

Threatened fauna habitat

Burrowing Crayfish burrows

Figure 2.7 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 20 December 2023 ,
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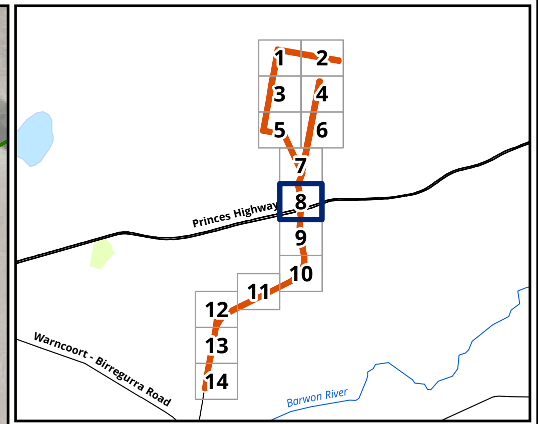


Legend

- Study area
- Bioregional boundary

Threatened fauna habitat

- Growling Grass Frog habitat
- Growling Grass Frog movement corridor

Figure 2.8 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

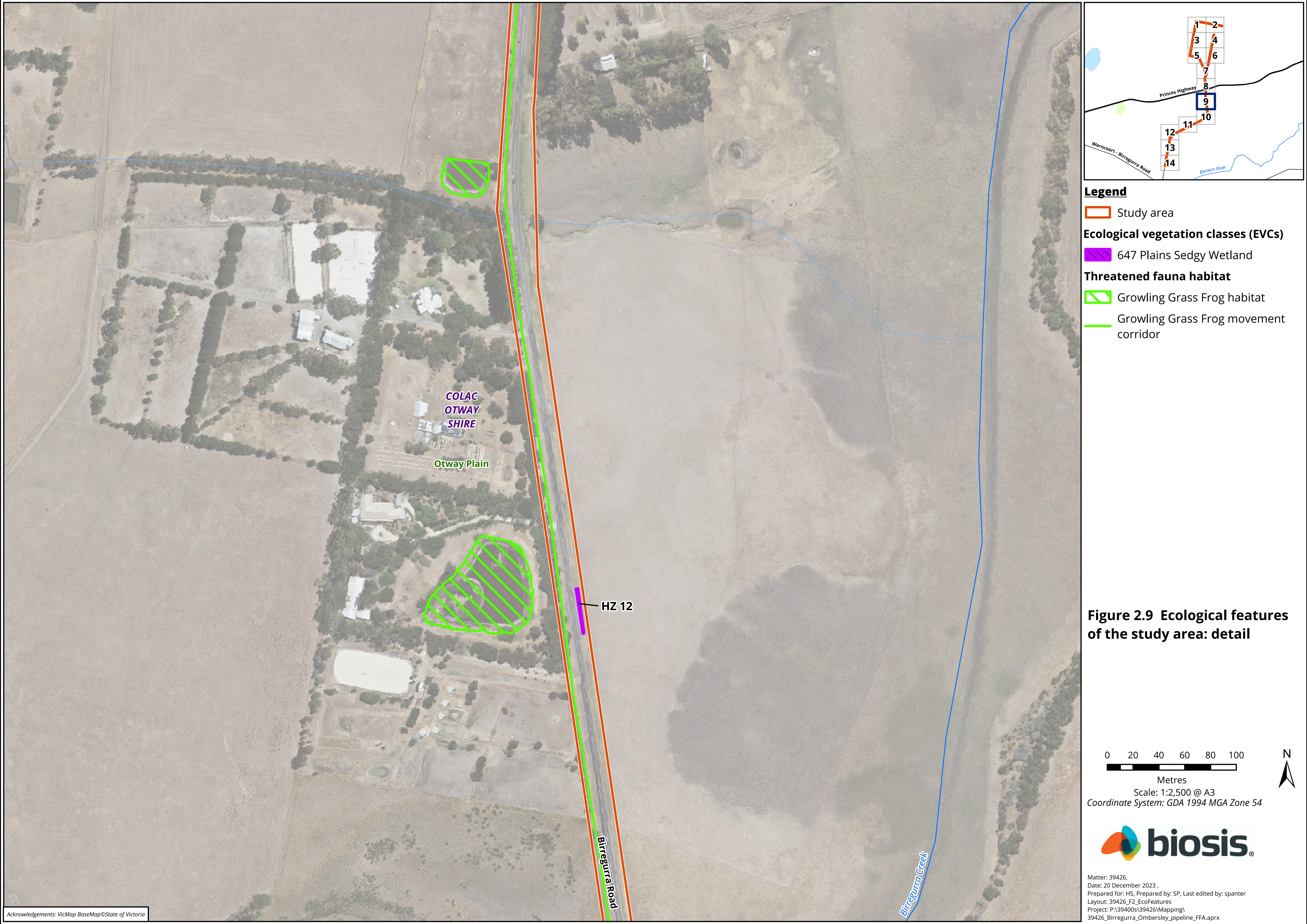
Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx



Legend

Study area

Ecological vegetation classes (EVCs)

647 Plains Sedgy Wetland

Threatened fauna habitat

Growling Grass Frog habitat

Growling Grass Frog movement corridor

Figure 2.9 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

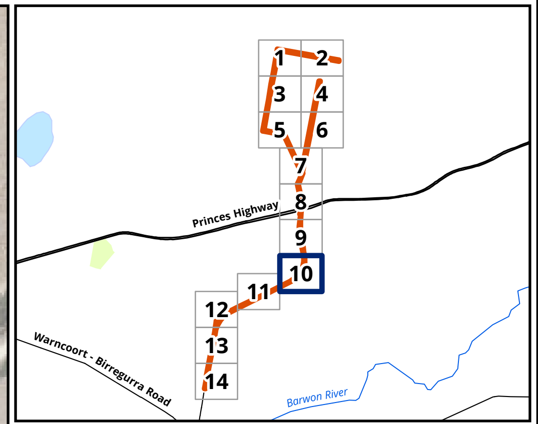
Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx

Acknowledgements: VicMap BaseMap©State of Victoria



Legend

Study area

Ecological vegetation classes (EVCs)

175 Grassy Woodland

Threatened fauna habitat

Growling Grass Frog movement corridor

Figure 2.10 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

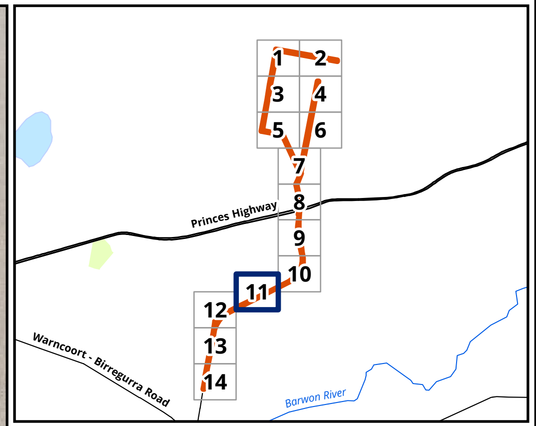
Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx



Legend

Study area

Figure 2.11 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

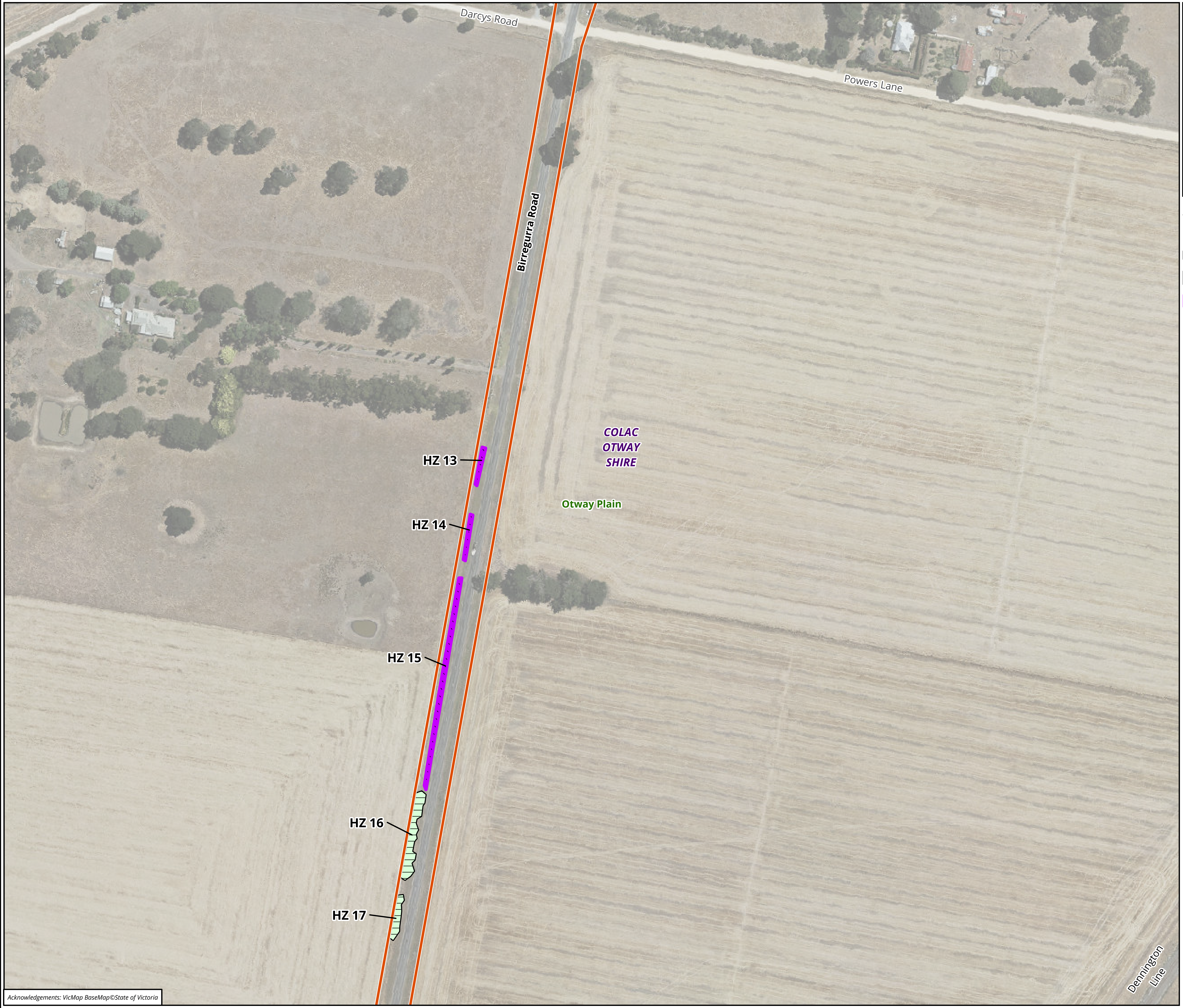
biosis

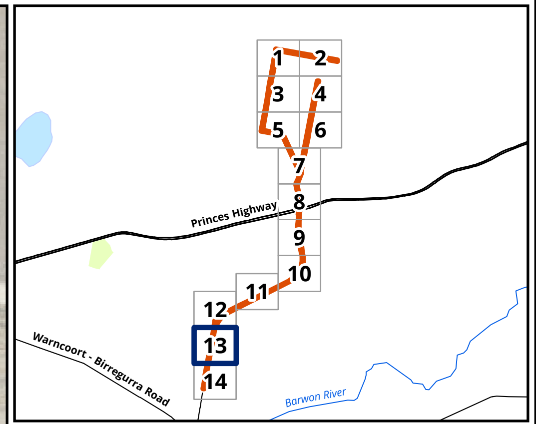
Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx

Figure 2.12 Ecological features of the study area: detail

Scale: 1:2,500 @ A3
Coordinate System: GDA 1994 MGA Zone 54

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx





Legend

Study area

Ecological vegetation classes (EVCs)

175 Grassy Woodland

647 Plains Sedgy Wetland

Figure 2.13 Ecological features of the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx

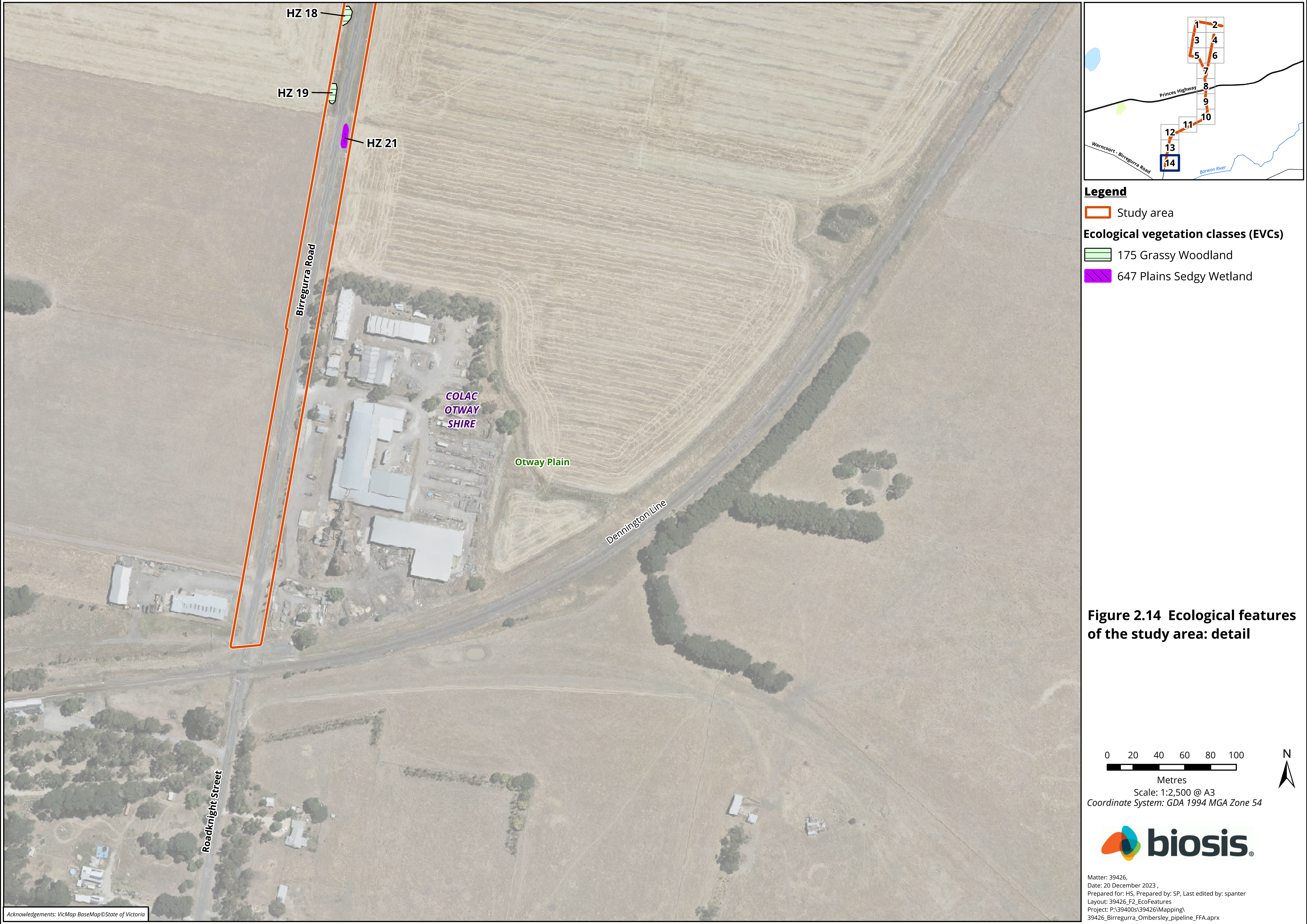


Figure 2.14 Ecological features of the study area: detail

Scale: 1:2,500 @ A3
Coordinate System: GDA 1994 MGA Zone 54

biosis

Matter: 39426,
Date: 20 December 2023 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_F2_EcoFeatures
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx

4. Biodiversity legislation and government policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail. Where available, links to further information are provided.

4.1. Commonwealth

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to result in a significant impact on a Matter of National Environmental Significance (MNES) protected under the Act.

Further information including a guide to the referral process is available at http://www.environment.gov.au/epbc/index.html

The MNES relevant to the project are summarised in Table 4. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

Table 4 Assessment of project in relation to the EPBC Act

MNES	Project specifics	Assessment against significant impact guidelines
EPBC Act listed species	The likelihood of threatened flora and fauna species occurring in the study area is assessed in Appendix A (flora) and Appendix B (fauna). One EPBC Act listed flora species may occur within the study area: • River Swamp Wallaby-grass One EPBC Act listed fauna species was recorded in the study area: • Gang-gang Cockatoo Seven EPBC Act listed fauna species may occur within the study area: • Yarra Pigmy Perch • Blue-winged Parrot • Grey-headed Flying-fox • Southern Bent-winged Bat • White-throated Needletail • Growling Grass Frog • Striped Legless Lizard	If direct impacts to the Birregurra Creek can continue to be avoided (as proposed on 14 December 2023) River Swamp Wallaby-grass and Yarra Pigmy Perch would not be significantly impacted and further surveys will not be required. Habitat for Gang-gang Cockatoo is limited to the roadside eucalypts lining Mooleric Road and Birregurra Road. The pipeline is no longer proposed to impact Mooleric Road, as a result this habitat will not be impacted. Blue-winged Parrot may occur in the broader area on occasion, during which time the study area and adjacent grassy areas may be utilised for foraging. The study area contains habitat that meets the broad definition of 'habitat critical to the survival of the species' (DCCEEW 2023), however, the proposed works are considered unlikely to result in a significant impact on a population of this species based on the scale and nature of impacts.

MNES	Project specifics	Assessment against significant impact guidelines
		Grey-headed Flying-fox, Southern Bent-wing Bat and White-throated Needletail have the potential to fly and forage throughout the general area but are unlikely to be impacted by the proposed development, as the study area does not support areas of important habitat for these species. The current design (proposed by Spirecom on 14 December 2023) will avoid all impacts to potential Growling Grass Frog habitat by directional drilling the pipeline 6m below ground. If this design is altered and impacts to Growling Grass frog habitat are proposed, a referral may be required. Habitat for Striped Legless Lizard is limited to the unnamed road reserve that connects Mooleric Road to the poultry farm site. Targeted surveys for threatened reptiles were undertaken in this section of the study area during October – December 2023, and Striped Legless Lizard were recorded in this area. An EPBC referral is required for the works involved in upgrading the road reserve to an all-weather road. Biosis understands that Spirecom is currently undertaking an EPBC Act referral for the construction of the all-weather road.
EPBC Act listed ecological communities	Of the four Threatened Ecological Communities (TECs) modelled to occur within 5 km of the study area, none are considered present.	No impacts to TECs are likely because the patches that potentially qualify as Seasonal Herbaceous Wetland of the Lowland plains are too small to qualify as the Threatened Ecological Community.
Migratory species	Seventeen migratory species have been recorded or predicted to occur in the project search area (Appendix B.3).	While some of these species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species.
Wetlands of international importance (Ramsar sites).	The study area is identified as being within the catchment of two Ramsar sites: Western District Lakes and Port Phillip Bay (western shoreline) and Bellarine Peninsula.	The study area does not drain directly into either Ramsar site and the development is not likely to result in a significant impact if Birregurra Creek impacts can be avoided.

On the basis of criteria outlined in the relevant Significant Impact Guidelines, it is currently uncertain whether the proposed works will result in a significant impact on a Matter of National Environmental Significance. If targeted surveys determine presence of Striped Legless Lizard, then referral of the proposed action to the Australian Government Minister for the Environment may be required. This will be resolved following completion of targeted surveys (refer to Section 3.4). If the design method or footprint is altered and impacts to Growling Grass Frog habitat can no longer be avoided, a referral may also be required for these impacts.

4.2. State

4.2.1. Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DEECA to 'take' protected flora species. Permit exemptions under the FFG Act generally apply to the non-commercial removal of protected flora from private land, unless there is 'critical habitat' that has been declared on the land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish on private or public land.

Link for further information: https://www.environment.vic.gov.au/conserving-threatened-species/victorias-framework-for-conserving-threatened-species

The FFG Act defines public land as Crown land or land owned by, or vested in, a public authority, while private land is defined as any land other than public land. A public authority is defined in the FFG Act as a body established for a public purpose by or under any Act and includes:

- an Administrative Office
- a Government Department
- a municipal council
- a public entity
- a State-owned enterprise.

The study area is on public land, therefore a protected flora permit will be required to take the two protected flora species recorded within the study area:

- Lemon Beauty-heads *Calocephalus citreus*
- Jersey Cudweed *Laphangium luteoalbum*

Seventeen FFG Act listed fauna species are assessed as having a medium or higher likelihood of occurrence within the study area (Appendix B). Eight of these are also listed as threatened under provisions of the EPBC Act (see above). The proponent is not considered to meet the definition of a public authority, and there is no declared critical habitat within the study area. It is recommended that DEECA should be consulted to determine whether any specific requirements are applicable in this instance. Crayfish mounds that may belong to a FFG Act listed species; Hairy Burrowing Crayfish *Engaeus sericatus* were recorded on private property within the study area. Directional drilling is currently proposed (as of 14 December 2023) beneath the mapped locations of burrows to a depth of 6m to avoid potential impacts to this species.

4.2.2. Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

Five Regionally Controlled noxious weeds were recorded within the study area:

- Artichoke Thistle Cynara *cardunculus subsp. flavescens*
- African Box-thorn *Lycium ferocissimum*
- Sweet Briar *Rosa rubiginosa*
- Common Blackberry *Rubus anglocandicans*
- Gorse *Ulex europaeus*

Three Restricted (R) noxious weeds occur within the study area:

- Chilean Needle-grass *Nassella neesiana*
- Soursob *Oxalis pes-caprae*
- Great Mullein *Verbascum thapsus subsp. thapsus*

The proponent must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Further information is at http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds

4.2.3. Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

Of particular relevance to the development proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the Colac Otway Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 73.01) defines 'native vegetation' as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses'. It is an objective of Clause 12.01-2 of the State Planning Policy Framework (Native Vegetation Management) that removal of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Clause 52.17 (Native Vegetation) requires a planning permit to remove, destroy or lop native vegetation including some dead native vegetation. Decision guidelines that must be considered by the referral or responsible authority are contained in Section 7 of the Guidelines, and referred to in Clause 52.17-4. Clause 52.17 does not apply if a Native Vegetation Precinct Plan corresponding to the land is incorporated in the Scheme. It should be noted that where native vegetation does not meet the definition of a patch or scattered tree, as described in Section 3.1, the Guidelines do not apply. However, a permit may still be required to remove, destroy or lop native vegetation under the provisions of the Scheme.

Under Clause 66.02 a permit application to remove, destroy or lop native vegetation is required to be referred to DEECA as a recommending referral authority if any of the following apply:

- the class of application is on the detailed assessment pathway
- a property vegetation precinct plan applies to the site or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

The study area is not covered by any overlays relevant to biodiversity under the Scheme.

Victoria's Guidelines for the removal, destruction or lopping of native vegetation.

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DELWP 2017a). The Guidelines replaced the previous incorporated document titled Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013) on 12 December 2017.

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for the guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

A detailed assessment of the implications for the project under the Guidelines is provided in Section 5 of this report. Under the Guidelines, there are three assessment pathways for assessing an application for a permit to remove native vegetation: basic, intermediate and detailed.

4.2.4. Environment Effects Act 1978

The *Environment Effects Act 1978* establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables them to assess the potential environmental effects of the proposed development.

The general objective of the assessment process is to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment (DSE 2005b).

The *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978* (DSE 2005b) provide a range of criteria that can be used to determine whether an EES may be required for a project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

However, the guidelines are not binding, and the decision as to whether an EES is required is ultimately at the discretion of the Minister for Planning.

Given the most recent proposed design avoids all impacts to native vegetation and threatened fauna habitat, an EES is unlikely to be triggered by Ecological impacts. Spirecom should still determine whether an EES is triggered by additional, non-ecological, factors.

4.2.5. Water Act 1989

The primary purpose of the *Water Act 1989* is to provide a framework for the allocation and management of surface water and groundwater throughout Victoria. It provides a principal mechanism for maintenance of ecosystem functions including those of aquatic ecosystems. Under By-Laws created by the relevant Authority under the Act, the authorities regulate the works within and in the vicinity of waterways.

4.2.6. Environment Protection Act 2017: Environmental Reference Standards

The *Environment Protection Act 2017* (EP Act) provides a legal framework for the systematic and strategic management of potential and realised environmental impacts. The *Environment Protection Act 2017*, the Environment Protection Regulations 2021 and Environment Reference Standards (ERS) introduced from 1 July 2021 provide a regulatory framework designed to prevent harm by eliminating or minimising risks of harm to human health and the environment.

Under the regulatory changes, SEPP (Waters) will not continue as a subordinate instrument under the EP Act, and its formal statutory role ended on 1 July 2021. Much of the content of SEPP (Waters) has been saved under the Environment Protection Transitional Regulations 2021 for a period of 2 years after the commencement of the Environment Protection Regulations 2021. As SEPP (Waters) contributes to the state of knowledge and provides guidance on compliance with the General Environmental Duty (GED), the policy remains relevant to the protection and management of Victoria's water environments, including surface waters, estuarine and marine waters and groundwaters.

While not being saved under the Environment Protection Transitional Regulations 2021, the following clauses of SEPP (Waters) applicable to the project remain relevant as they provide guidance for compliance with the GED under the *Environment Protection Act 2017*:

Clause 42 – Construction activities:

- Minimise soil erosion, land disturbance and discharge of sediment and other pollutants to surface waters.
- Where construction activities impinge on surface waters, construction managers need to monitor affected surface waters to assess whether beneficial uses are being protected.

Clause 45 – Native vegetation protection and rehabilitation:

- Minimise the removal of and rehabilitate native vegetation within or adjacent to surface waters.

The ERS requires that aquatic ecosystem values be protected. Environmental quality objectives and indicators are defined to protect beneficial uses (i.e. the uses and values of the water environment) and an attainment program provides guidance on protection of the beneficial uses. Impacts to surface water quality as a result of the project must not result in changes that exceed background levels and/or the water quality objectives specified for the Birregurra Creek to protect surface water uses and values.

To ensure that direct and indirect (e.g. runoff) impacts to surface water quality do not exceed the background levels and/or water quality objectives, it is recommended that Spirecom prepare and implement a site-specific Constructional Environmental Management Plan, which includes all EPA approved erosion control measures. These temporary control measures should be inspected during rainfall events to ensure controls are able to prevent/minimize offsite discharges and longer-term impacts. Sediment control measures selected should also reflect the level of protection required to protect the ecological values within Birregurra Creek, downstream of the project area.

Link to further information: http://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf

4.2.7. Regional Catchment Strategy and River Health Strategy

State Planning Policy Framework Clause 14.02-1 (Catchment planning and management) states that planning must consider as relevant, Regional Catchment Strategies (RCS) and any associated implementation plan or strategy including any regional river health and wetland strategies.

Strategies of relevance to the study area are the:

- Corangamite CMA Regional Catchment Strategy https://corangamite.rcs.vic.gov.au/

These documents provide recommendations on the protection of existing high-value rivers and creeks that are in good condition and strategic improvement of other rivers and creeks.

5. Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines were introduced in December 2017 (DELWP 2017). They set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation to ensure that the important biodiversity values of native vegetation continue to be delivered into the future.
- **Minimise** impacts resulting from the removal of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact resulting from the removal of native vegetation.

DEECA has provided biodiversity information tools to assist with determining the assessment pathway associated with the removal of native vegetation and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

It is not possible to determine the extent of vegetation loss without a finalised design or construction footprint. Once impacts are known, the extent of native vegetation loss and subsequent offset requirements can be determined.

5.1. Vegetation quality assessment

The extent of native vegetation patches were mapped within the study area (Figure 2) and the condition was assessed in relation to standard methods provided by DSE (Department of Sustainability and Environment Biodiversity and Natural Resources Division 2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks. DEECA's Native Vegetation Information Management system was also used to determine vegetation extent and condition.

A continuous area of the same EVC is termed a 'habitat zone'. Different habitat zones exists where there are different EVCs present and/or discrete (non-continuous) patches of the same EVC. A separate vegetation quality assessment was conducted for each habitat zone. The vegetation quality assessment score was multiplied by the extent of the habitat zone to give a value in habitat hectares.

The results of the vegetation quality assessments are provided in Appendix D.

Table 5 Vegetation Quality Assessment results – Treed Ecological Vegetation Classes

Site ID			39426 - Pipeline assessment															
Habitat Zone ID			1	2	3	4	5	6	7	8	9	10	11	16	17	18	19	20
EVC #: Name			Plains Grassy Woodland EVC 55											Grassy Woodland EVC 175				
		Max Score	Score															
Site Condition	Large Trees	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tree Canopy Cover	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lack of Weeds	15	2	2	2	7	7	2	2	2	2	2	2	6	6	6	6	0
	Understorey	25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Recruitment	10	10	0	0	10	10	10	10	0	0	0	0	10	10	10	10	10
	Organic Matter	5	5	5	5	3	3	5	5	5	5	5	5	4	4	4	4	4
	Logs	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Site Score		22	12	12	25	25	22	22	12	12	12	12	25	25	25	25	19
Landscape Value	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Distance to Core Area	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total Landscape Score		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Habitat points = #/100		100	24	14	14	27	27	24	24	14	14	14	14	27	27	27	27	21
CONDITION SCORE		1	0.24	0.14	0.14	0.27	0.27	0.24	0.24	0.14	0.14	0.14	0.14	0.27	0.27	0.27	0.27	0.21
Habitat Zone area (ha)			0.019	0.007	0.006	0.026	0.001	0.003	0.008	0.002	0.004	0.002	0.010	0.046	0.018	0.011	0.006	0.012
Habitat Hectares (Hha)			0.005	0.001	0.001	0.007	0.000	0.0007	0.0019	0.0003	0.0006	0.0003	0.0014	0.0124	0.0047	0.0028	0.0016	0.0025

Table 6 Vegetation Quality Assessment results – Non-Treed EVCs

Site ID			39426 - Pipeline assessment											
Habitat Zone ID			12	13	14	15	21	22	23	24	25	26	27	3
EVC #: Name			Plains sedgy Wetland					Plains Grassy Wetland						
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Site Condition	Large Trees	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Tree Canopy Cover	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lack of Weeds	15	2	6	6	6	6	9	9	9	13	13	13	13
	Understorey	25	5	5	5	5	5	10	5	5	10	10	10	10
	Recruitment	10	3	3	3	3	3	3	3	3	3	3	3	3
	Organic Matter	5	3	3	3	3	3	3	3	3	3	3	3	3
	Logs	5	0	0	0	0	0	0	0	0	0	0	0	0
	Total Site Score		13	17	17	17	17	25	20	20	29	29	29	29
	EVC standardiser		1.25	1.25	1.25	1.25	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Adjusted Site Score		16.25	21.25	21.25	21.25	23.12	34	27.2	27.2	39.44	39.44	39.44	39.44
Landscape Value	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0
	Distance to Core Area	5	1	1	1	1	1	1	1	1	1	1	1	1
	Total Landscape Score		2	2	2	2	2	2	2	2	2	2	2	2
Habitat points = #/100		100	18.25	23.25	23.25	23.25	25.12	36	29.2	29.2	41.44	41.44	41.44	41.44
CONDITION SCORE		1	0.18	0.23	0.23	0.23	0.25	0.36	0.29	0.29	0.41	0.41	0.41	0.41
Habitat Zone area (ha)			0.00342	0.0047	0.0052	0.0269	0.004	0.063	0.09	0.05	0.02	0.02	0.012	1.70
Habitat Hectares (Hha)			0.0006	0.0011	0.0012	0.0063	0.0010	0.0227	0.0263	0.0146	0.0083	0.01	0.00	0.70

5.2. Offset requirements

The Guidelines set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation in order to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation' (DELWP 2017).

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation.
- **Minimise** impacts resulting from the removal, destruction or lopping of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

The following actions have been taken to avoid and/or minimise the impacts of the proposed pipeline development on the landscape:

- Directional drilling will be implemented in areas where the pipeline intersects patches of native vegetation. This will avoid all impacts to patches of native vegetation. Directional drilling will also be used in areas identified as potential habitat for Growling Grass Frog and Hairy Burrowing Crayfish to avoid impacting these threatened fauna species.
- Additionally, directional drilling will be used to install the pipeline above the concrete structure of Birregurra Road, below the road surface crossing the Birregurra Creek. This will avoid impacts to the creek and the associated habitat and vegetation.
- Impacts to high quality vegetation are limited. Much of the vegetation proposed to be impacted by the installation of the pipeline is degraded and no longer supports a diverse mix of native species.
- The six-metre wide all-weather road proposed within the unnamed road reserve has been positioned to avoid all impacts to native vegetation patches. Additionally, temporary construction fencing has been erected around the patches of native vegetation. It is important to note that the construction of the road will still impact scattered native vegetation patches and Striped Legless Lizard habitat.

The Department of Energy, Environment and Climate Action provides biodiversity information tools to assist with determining the assessment pathway associated with the removal of native vegetation and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

All planning permit applications to remove native vegetation are assigned to an assessment pathway determined by the extent and location of proposed native vegetation removal. The assessment pathway determines the information to be provided in a planning permit application and the decision guidelines the responsible authority (e.g. Council) and/or DEECA as a referral authority will use to assess the permit application.

The biodiversity information tools have two components:

Site-based information

The site-based information is observable at a particular site. Biosis has collected the requisite site-based information for the assessment against the Guidelines.

Landscape scale information

Landscape scale information requires consideration of information beyond the site. This information is managed by DEECA and can be accessed via the NVR Map.

The following section summarises the results of the site-based assessment and the outputs generated by the Native Vegetation Removal Report, which identifies the assessment pathway on which the planning application will be assessed. The full Native Vegetation Removal Report can be viewed in Appendix D.

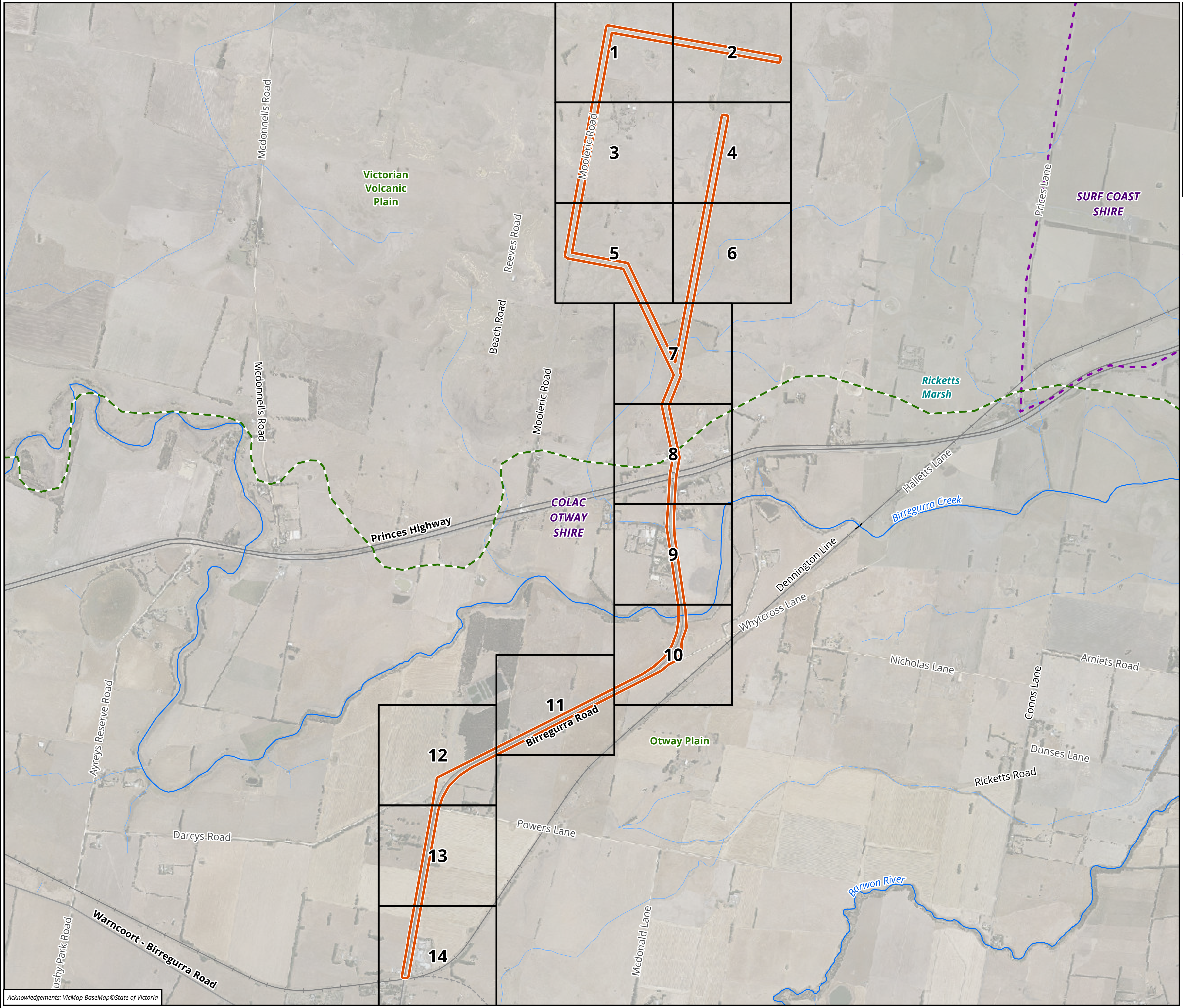
5.3. Proposed removal of native vegetation

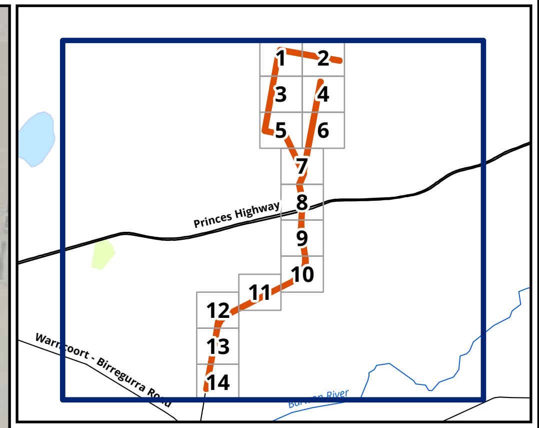
The extent of native vegetation patches and the location of large trees within patches and any scattered trees within the study area were mapped (Figure 2), and the vegetation condition was assessed in relation to standard methods (DSE 2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

Based on the current design (provided by Spirecom on 14 December 2023), the proposed development of the pipeline and the all-weather road will not require the removal of any native patch vegetation.

Directional drilling will be used beneath all patches of native vegetation (including a 2m buffer between the start of boring and the patch of vegetation) to ensure impacts are avoided.
Trenching will be used to install the pipeline in areas where native vegetation patches or important fauna habitat have not been mapped. As a result, impacts to scattered native vegetation are still likely to occur. Impacts to scattered native vegetation require a planning permit, but are not assessed under the *Guidelines for the removal, destruction and lopping of native vegetation* and native vegetation offsets do not need to be secured.

The all-weather road footprint has been placed to avoid impacts to patches of native vegetation. Construction fencing has been erected to stop impacts from machinery to native vegetation during construction. The construction of the road will still impacts scattered native vegetation and Striped Legless Lizard habitat.





Legend

- Study area
- Local government area boundary
- Bioregional boundary

Figure 3.0 Vegetation proposed to be removed within the study area: overview

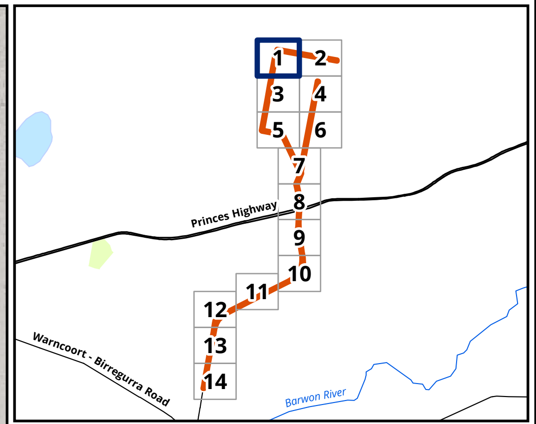
0 200 400 600 800 1,000

Metres

Scale: 1:25,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_FFA_F3_Veg_removal
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx



Legend

Study area

Impact area

Road construction

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 3.1 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

N

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

biosis

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_FFA_F3_Veg_removal
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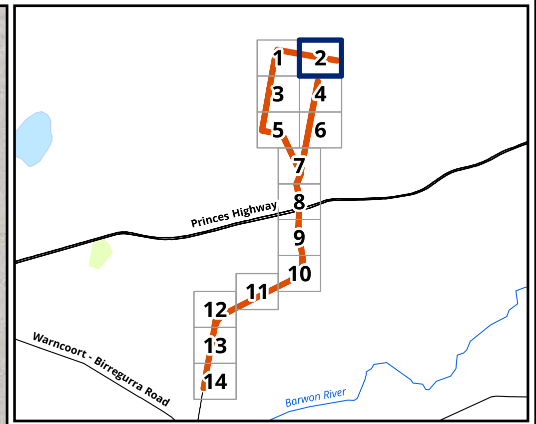

Legend

Study area

Impact area

Road construction

Ecological vegetation classes (EVCs)

125 Plains Grassy Wetland

Other native vegetation

Scattered native vegetation including Basalt Poa. However, not considered native vegetation in the Guidelines.

Threatened fauna habitat

Striped Legless Lizard habitat

Figure 3.2 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100
Metres
N

Scale: 1:2,500 @ A3
Coordinate System: GDA 1994 MGA Zone 54

biosis

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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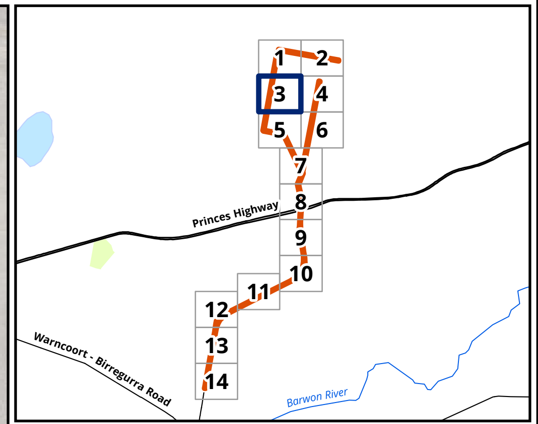

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Figure 3.3 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

N

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

biosis

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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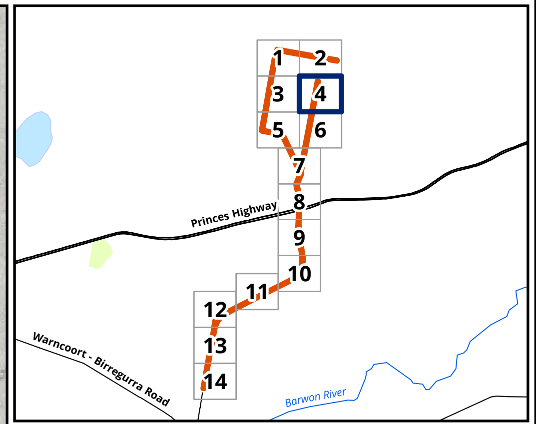

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Directional boring of pipeline (impact to native vegetation patches avoided)

Ecological vegetation classes (EVCs)

125 Plains Grassy Wetland

Figure 3.4 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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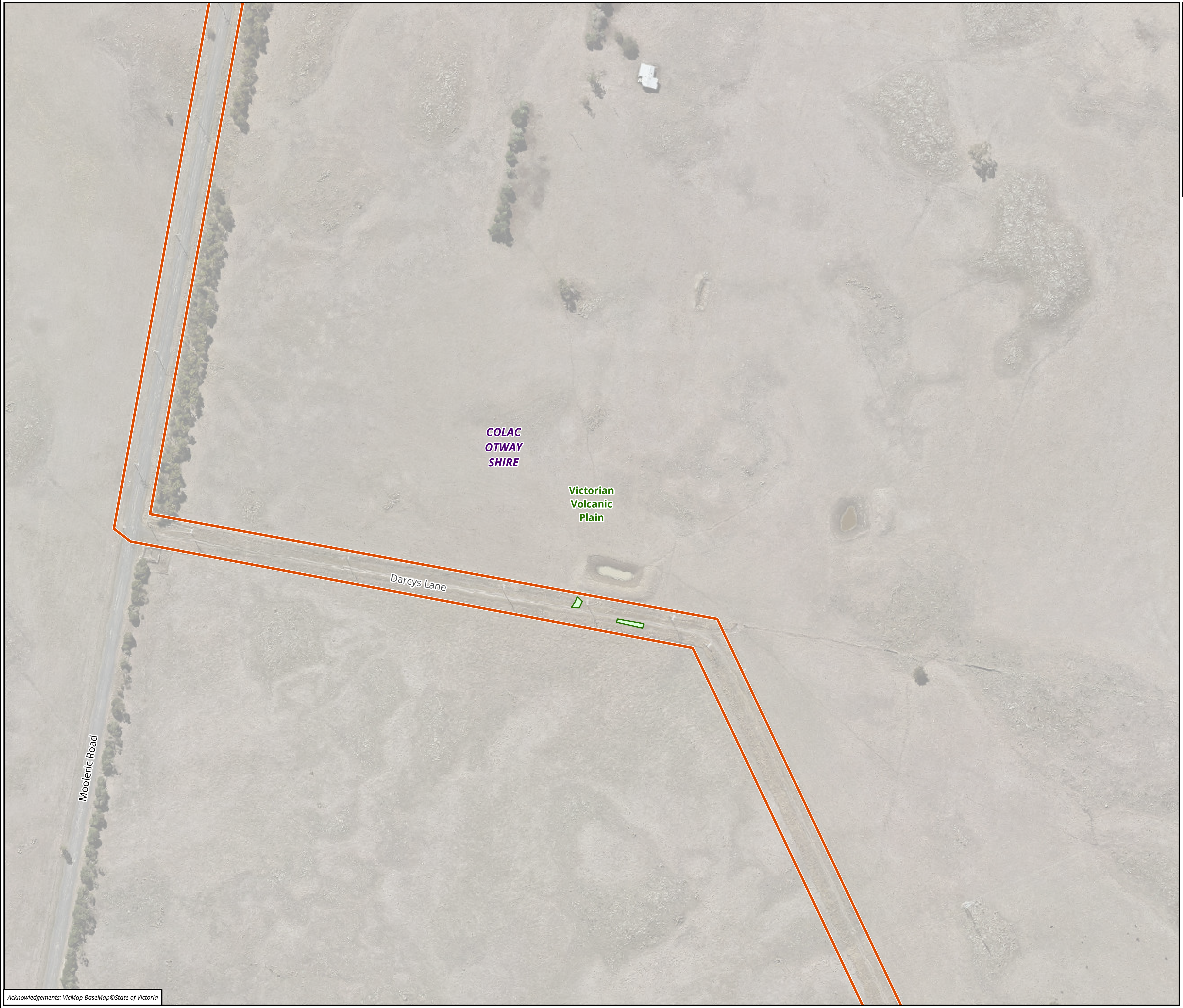

Legend

Study area

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

Figure 3.5 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

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Acknowledgements: VicMap BaseMap©State of Victoria

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Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_FFA_F3_Veg_removal
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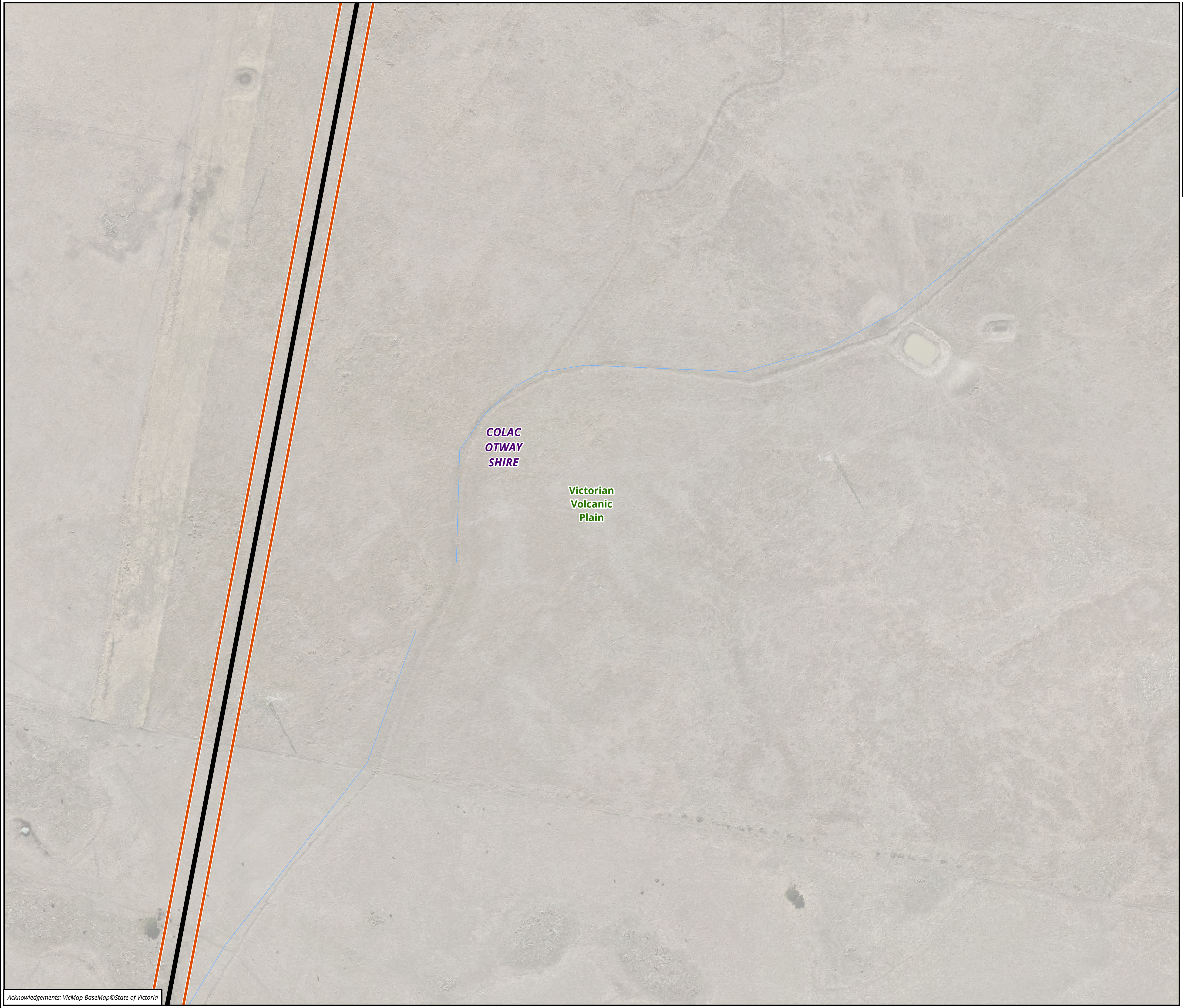

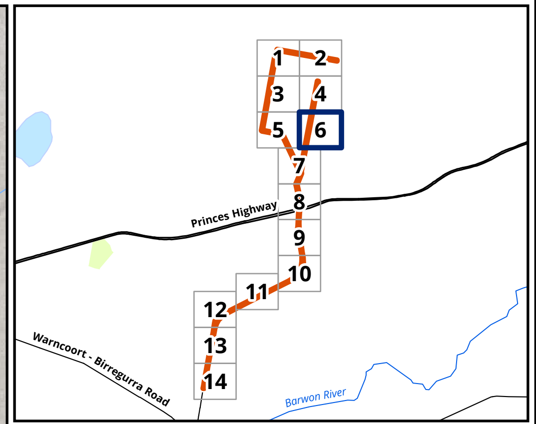

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Figure 3.6 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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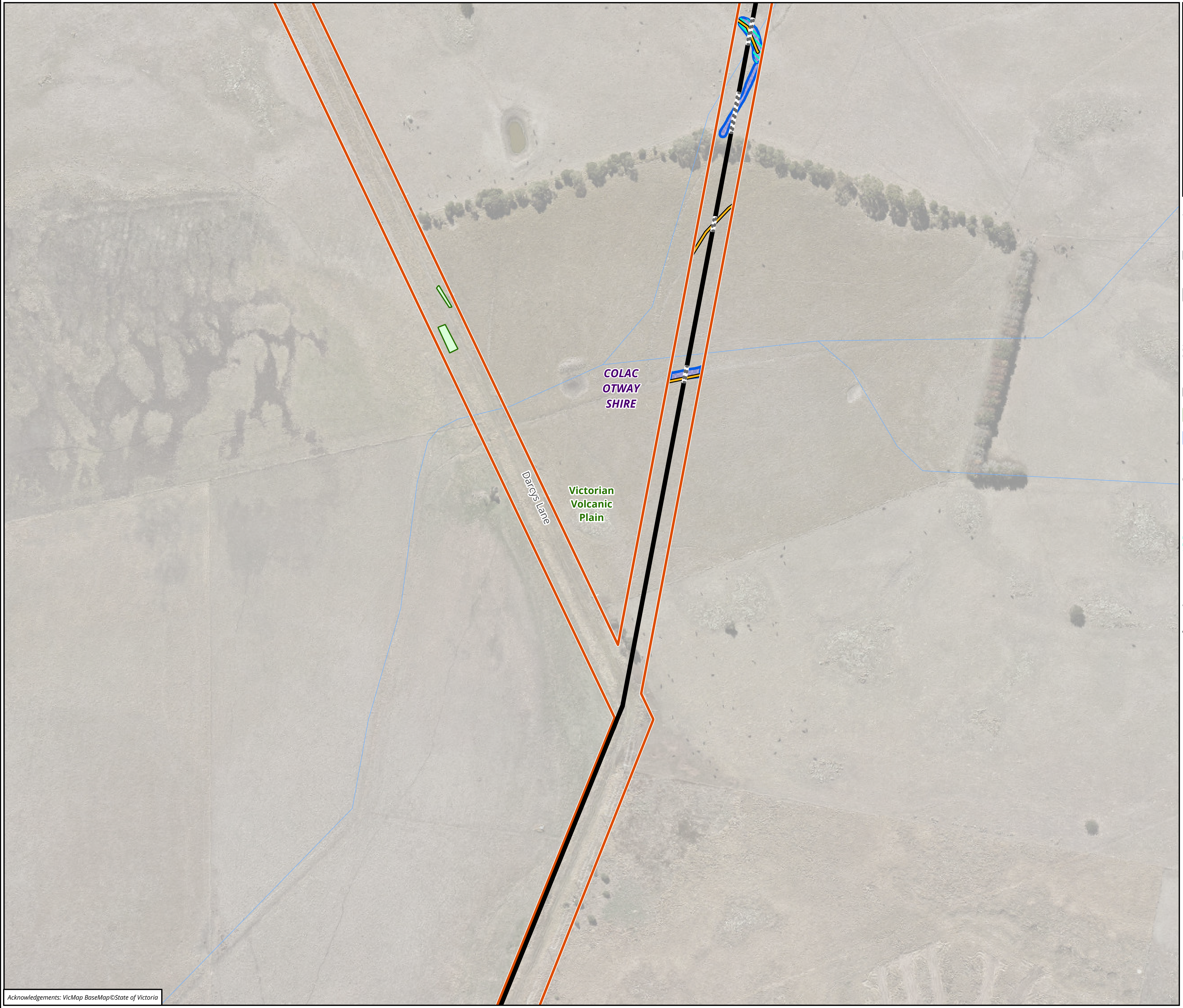

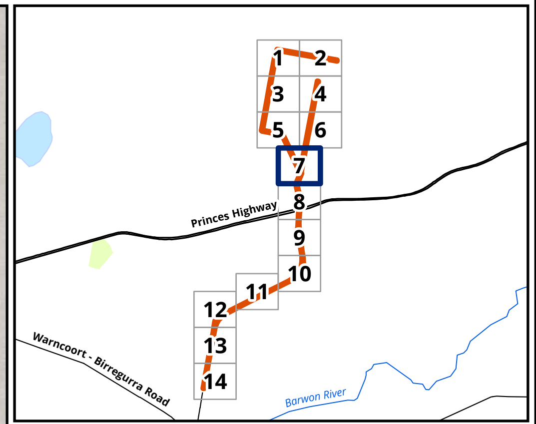

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Directional boring of pipeline (impact to native vegetation patches avoided)

Ecological vegetation classes (EVCs)

55_61 Plains Grassy Woodland

125 Plains Grassy Wetland

EPBC listed threatened ecological communities

Potential Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (key diagnostic species present, but wetland too small to qualify as community)

Threatened fauna habitat

Burrowing Crayfish burrows

Figure 3.7 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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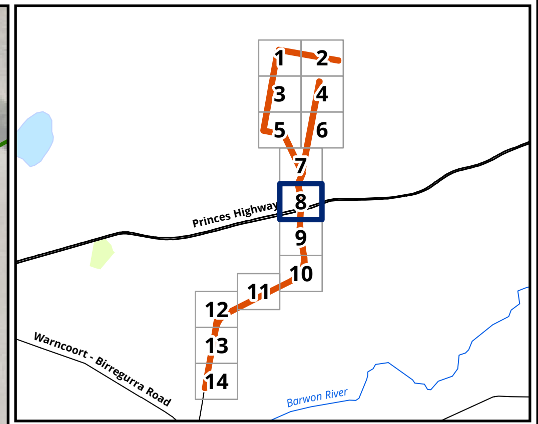

Legend

Study area

Bioregional boundary

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Directional boring of pipeline (impact to native vegetation patches avoided)

Threatened fauna habitat

Growling Grass Frog habitat

Growling Grass Frog movement corridor

Figure 3.8 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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Project: P:\39400s\39426\Mapping\
39426_Birregurra_Ombersley_pipeline_FFA.aprx

Legend

Study area

Impact area

Directional boring of pipeline (impact to native vegetation patches avoided)

Ecological vegetation classes (EVCs)

647 Plains Sedgy Wetland

Threatened fauna habitat

Growling Grass Frog habitat

Growling Grass Frog movement corridor

Figure 3.9 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 26 February 2024 ,
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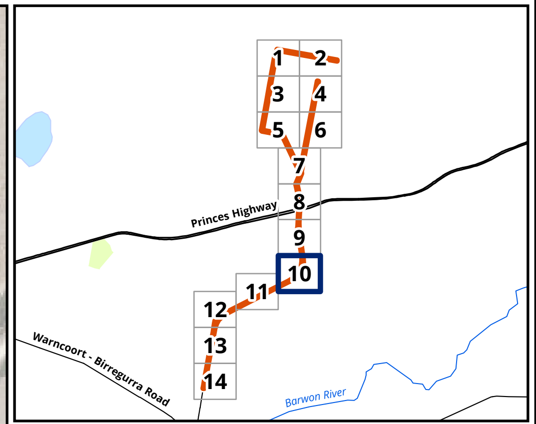

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Directional boring of pipeline (impact to native vegetation patches avoided)

Ecological vegetation classes (EVCs)

175 Grassy Woodland

Threatened fauna habitat

Growling Grass Frog movement corridor

Figure 3.10 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

N

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 26 February 2024 ,
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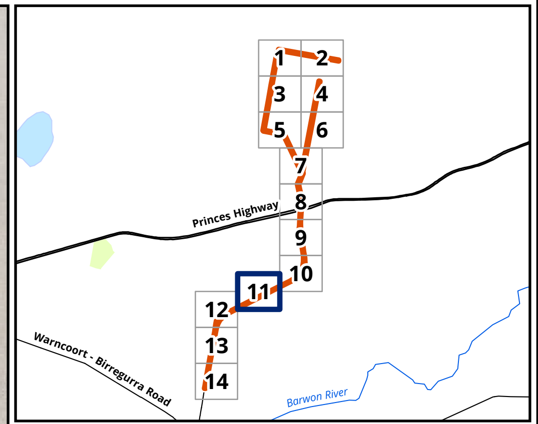

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Figure 3.11 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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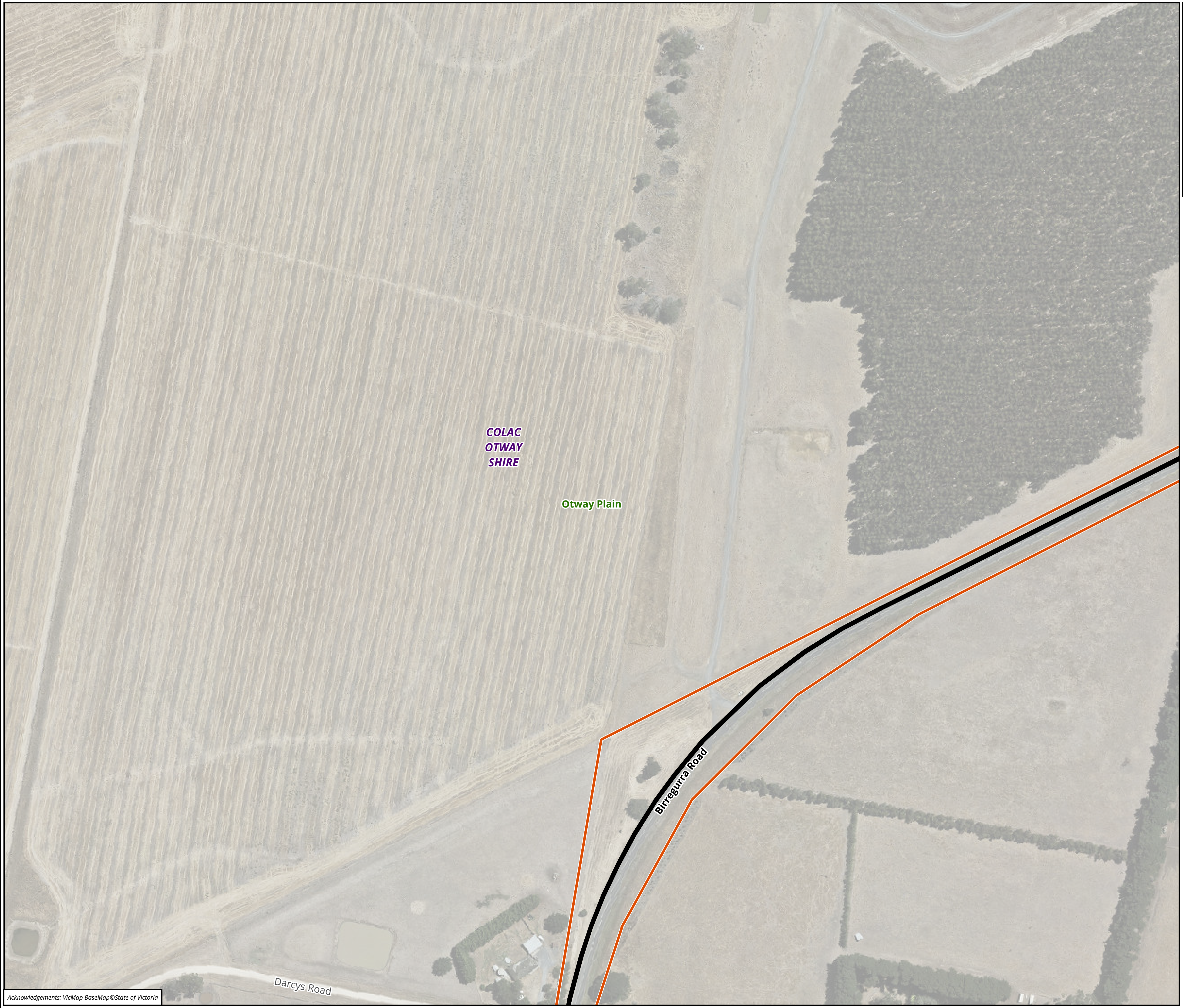

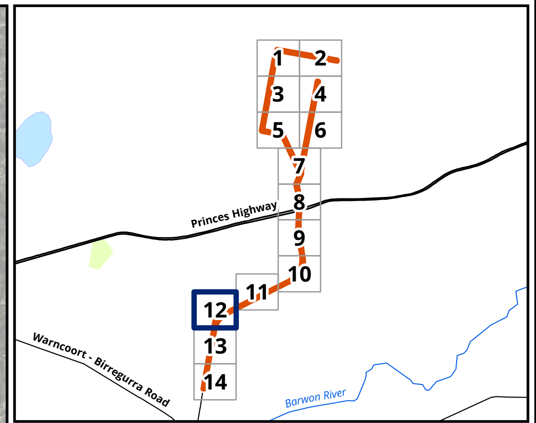

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Figure 3.12 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

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Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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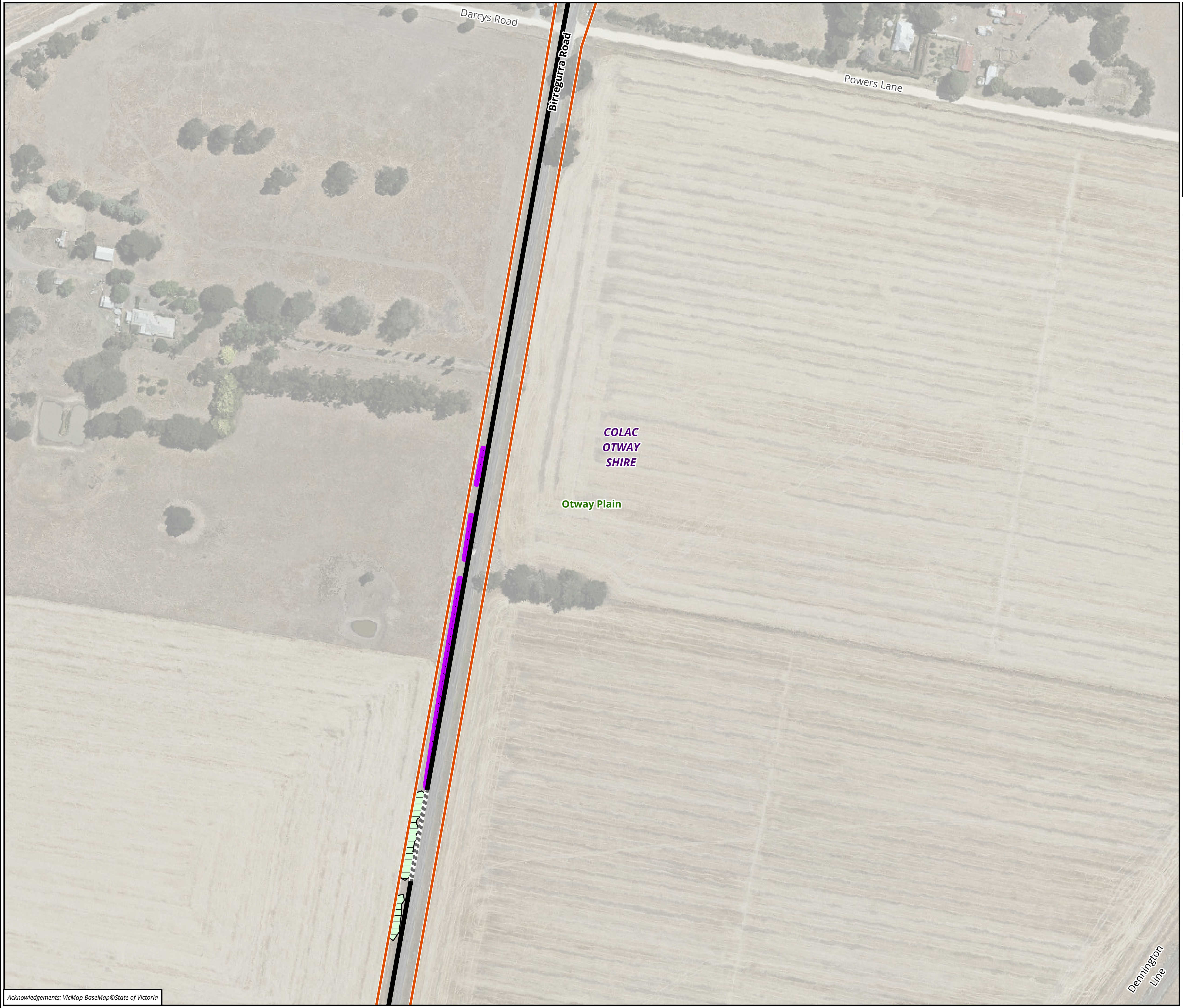

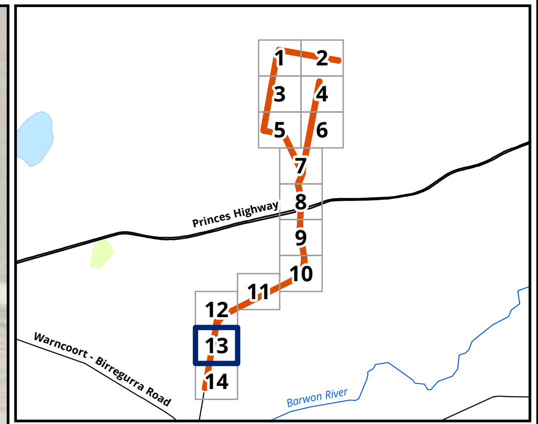

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Directional boring of pipeline (impact to native vegetation patches avoided)

Ecological vegetation classes (EVCs)

175 Grassy Woodland

647 Plains Sedgy Wetland

Figure 3.13 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

N

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

biosis.

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
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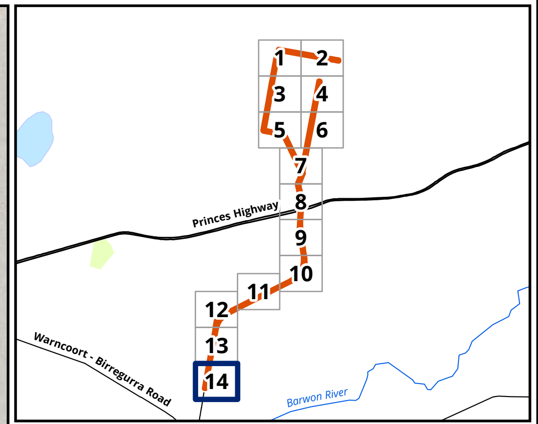

Legend

Study area

Impact area

Trenching (impacts to scattered native vegetation likely, no impacts to patch vegetation)

Ecological vegetation classes (EVCs)

175 Grassy Woodland

647 Plains Sedgy Wetland

Figure 3.14 Vegetation proposed to be removed within the study area: detail

0 20 40 60 80 100

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

Matter: 39426,
Date: 26 February 2024 ,
Prepared for: HS, Prepared by: SP, Last edited by: spanter
Layout: 39426_FFA_F3_Veg_removal
Project: P:\39400s\39426\Mapping\39426_Birregurra_Ombersley_pipeline_FFA.aprx

6. Key ecological values and recommendations

This section identifies the key ecological features of the study area, provides an outline of potential implications of proposed development on those values and includes recommendations to assist Spirecom to design a development to minimise impacts on biodiversity.

The primary measure to reduce impacts to biodiversity values within the study area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat. It is critical that this be considered during the design phase of the project, when key decisions are made about the location of infrastructure including sheds, access roads, parking areas, services and temporary material storage. The results of this assessment should therefore be incorporated into the project design, by adding the flora and fauna mapping information into the planning maps and investigating options to retain as much of the mapped vegetation/habitats as possible.

A summary of potential implications of development of the study area and recommendations to minimise impacts during the **design phase** of the project is provided in Table 7.

Table 7 Summary of key ecological values, potential implications of developing the study area and recommendations to minimise ecological impacts during the design phase.

Ecological feature (Figure 2)	Implications of development	Outcomes / Recommendations
Native vegetation	Native patch vegetation and native trees are not proposed to be impacted by the current design of the all-weather road and pipeline installation (as of 14 December 2023). Scattered native vegetation will be impacted by the construction of the road in the un-named road reserve and by the installation of the pipeline.	No-go fencing will need to be installed around native vegetation that occurs within the vicinity of the trenches and bore points for the installation of the pipeline. Fencing has already been erected in the un-named road reserve. This will avoid unintentional impacts to the vegetation from machinery, trampling etc. during construction. Long-term protection of vegetation adjacent the all-weather road should also be considered to ensure vegetation is protected during on-going use.
Threatened species and ecological communities	Eight fauna species of national significance were assessed as having a medium or higher likelihood of occurrence within the study area: • Gang-gang Cockatoo (recorded in planted vegetation overhanging the study area) • Blue-winged Parrot • Grey-headed Flying-fox • Growling Grass Frog • Southern Bent-wing Bat • Striped Legless Lizard • White-throated Needletail	Current design proposes to use directional drilling to install the pipeline above the concrete structure of Birregurra Road, below the road surface crossing the Birregurra Creek. This will avoid impacts to the creek and the associated habitat and vegetation. This will eliminate the need to survey for River Swamp Wallaby-Grass as it is only likely to occur along the margins of the creek, as well as Yarra Pigmy Perch. This method will also minimise impacts to Little Egret, Brolga, Blue-billed Duck, Hardhead and Platypus. Targeted surveys were undertaken for Striped

Ecological feature (Figure 2)	Implications of development	Outcomes / Recommendations
	• Yarra Pigmy Perch One EPBC Act listed flora species is assessed as having a medium likelihood of occurrence: • River Swamp Wallaby-grass. Nine additional fauna species of state significance are assessed as having a medium or higher likelihood of occurrence within the study area: • Grey Goshawk • Black Falcon • Blue-billed Duck • Brolga • Hairy Burrowing Crayfish • Hardhead • Little Egret • Platypus • Tussock Skink None of the vegetation recorded within the study area fulfills the key diagnostic characters of the Threatened Ecological Communities that are modelled to occur within the study area.	Legless Lizard in October – December 2023. Striped Legless Lizard were recorded in the unnamed road reserve where works are proposed for an all-weather road. Biosis understands that Spirecom are undertaking a referral for the impacts to Striped Legless Lizard from the construction of the road reserve. Impacts on Growling Grass Frog habitat are currently avoided due to the use of directional drilling beneath the movement corridor between the M1 and Birregurra Creek (Figure 2 and Figure 3). If impacts to Growling Grass Frog habitat cannot not be avoided, targeted surveys and an EPBC Act referral may be required. Burrowing Crayfish burrows were observed within the study area, however identity of the species is unknown. Due to the small impact area of the pipe alignment, it is unlikely that the current works will have a significant impact on Hairy Burrowing Crayfish. The pipeline will be installed using directional drilling below areas that support Burrowing crayfish mounds, this will further increase the likelihood of avoiding impacts to the species. The remaining EPBC Act and FFG Act fauna recorded or considered likely to occur within the study area are unlikely to be significantly impacted by the installation of water pipes or road construction along a portion of the unnamed road reserve between the poultry farm and Mooleric Road.

Construction and post-construction management

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan. This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

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APPENDICES

Appendix A. Flora

The following abbreviations and symbols are relevant to this Appendix.

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (public land only)	
SP	State prohibited species	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	
R	Restricted species	
Other		
#	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

Appendix A.1. Flora species recorded from the study area

Table 8 Flora species recorded from the study area

Status	Scientific Name	Common Name
Indigenous species		
	Acacia melanoxylon	Blackwood
	Acaena spp.	Sheep's Burr
	Amphibromus spp.	Swamp Wallaby-grass
	Austrostipa spp.	Spear Grass
P	*Calocephalus citreus*	Lemon Beauty-heads
	Carex spp.	Sedge
	Cynodon dactylon	Couch
	Drosera hookeri	Branched Sundew
	Eleocharis acuta	Common Spike-sedge
	Epilobium billardiereanum	Variable Willow-herb
	Eragrostis spp.	Love Grass
	Eryngium ovinum	Blue Devil
	Eucalyptus spp.	Eucalypt
	Geranium spp.	Crane's Bill
	Isolepis fluitans	Floating Club Sedge
	Juncus bufonius	Toad Rush
	Juncus spp.	Rush
P	*Laphangium luteoalbum*	Jersey cudweed
	Lythrum hyssopifolia	Small Loosestrife
	Montia australasica	White Purslane
	Poa labillardierei	Common Tussock-grass
	Ranunculus spp.	Buttercup
	Rytidosperma spp.	Wallaby Grass
	Themeda triandra	Kangaroo Grass
Introduced species		
	Agrostis capillaris	Brown-top Bent
	Brassica spp.	Turnip
	Briza maxima	Large Quaking-grass
	Bromus diandrus	Great Brome

Status	Scientific Name	Common Name
	Bromus hordeaceus	Soft Brome
	Centaurium erythraea	Common Centaury
RC	*Cynara cardunculus* subsp. *flavescens*	Artichoke Thistle
	Cyperus eragrostis	Drain Flat-sedge
	Erigeron bonariensis	Flaxleaf Fleabane
	Holcus lanatus	Yorkshire Fog
	Hypochaeris glabra	Smooth Cat's-ear
	Lactuca serriola	Prickly Lettuce
	Lepidium africanum	Common Peppercress
	Lolium rigidum	Wimmera Rye-grass
RC	*Lycium ferocissimum*	African Box-thorn
R	*Nassella neesiana*	Chilean Needle-grass
R	*Oxalis pes-caprae*	Soursob
	Paspalum distichum	Water Couch
	Phalaris aquatica	Toowoomba Canary-grass
	Plantago coronopus	Buck's-horn Plantain
	Plantago lanceolata	Ribwort
	Romulea rosea	Onion Grass
RC	*Rosa rubiginosa*	Sweet Briar
RC	*Rubus anglocandicans*	Common Blackberry
	Sanguisorba minor	Salad Burnet
	Solanum nigrum s.s.	Black Nightshade
	Sporobolus africanus	Rat-tail Grass
	Trifolium arvense var. *arvense*	Hare's-foot Clover
RC	*Ulex europaeus*	Gorse
R	*Verbascum thapsus* subsp. *thapsus*	Great Mullein
	Vicia sativa subsp. *cordata*	Common Vetch

Appendix A.2. Listed flora species

The following table includes threatened flora species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 8 May 2023). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur. A proportion of the flora habitat descriptions have been reproduced with permission from the Royal Botanic Gardens Victoria (RBGV 2020).

Table 9 Threatened flora species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Amphibromus fluitans	River Swamp Wallaby-grass	VU			PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	Medium	No recent or historical records within 5 km. However, an *Amphibromus* species was recorded within the Birregurra Creek. It is not the correct time of year to identify to species level. As a result, further surveys are recommended to determine the species if impacts to Birregurra Creek cannot be avoided.
Dianella amoena	Matted Flax-lily	EN	cr	2013	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	Low	Several recent records within 5 km. Vegetation within the study area too heavily modified to support this species.
Dodonaea procumbens	Trailing Hop-bush	VU			PMST	Sandy or clay soils in low-lying, winter-wet areas in grasslands, woodlands,	Low	No recent or historical records within 5 km. Woodlands and open forests absent from the study area. Low-lying wet areas are

Scientific name	Common name	Conservation status		Most recent	Other records	Habitat description	Likely occurrence	Rationale for likelihood ranking
						and low-open forest.		predominantly swamped by Toowoomba Canary-grass.
Glycine latrobeana	Clover Glycine	VU	v	2016	PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	Low	Several recent records within 5 km. Vegetation within the study area too heavily modified to support this species.
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	e		PMST	Low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions.	Low	No recent or historical records within 5 km. Swampy areas are dominated by Toowoomba Canary-grass.
Lepidium aschersonii	Spiny Peppercress	VU	e		PMST	Heavy clay soils near salt lakes on the volcanic plains; disjunct records near Lake Omeo.	Negligible	No recent or historical records within 5 km. Salt lakes not present within the study area.
Lepidium hyssopifolium s.s.	Basalt Pepper-cress	EN	e		PMST	Basalt plains grassland and woodland communities.	Low	No recent or historical records within the study area. Plains Grassland habitat too modified to support suitable habitat for this species.
Leucochrysum albicans subsp. tricolor	White Sunray	EN	e		PMST	Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	Low	No recent or historical records within 5 km. The species is restricted to only a handful of populations. Modified vegetation within the study area unlikely to support suitable habitat for this species.

Scientific name	Common name	Conservation status		Most recent	Other records	Habitat description	Likely occurrence	Rationale for likelihood ranking
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	cr		PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	Low	No recent or historical records within 5 km. Swards of Toowoomba Canary-grass too dense to also support this species.
Poa sallacustris	Salt-lake Tussock-grass	VU	cr		PMST	Grasslands and herblands on the sloping verges of saline lakes.	Negligible	No recent or historical records within 5 km. Sloping verges of saline lakes are not present within the study area.
Prasophyllum spicatum	Dense Leek-orchid	VU	cr		PMST	Heath and heathy woodlands.	Negligible	No recent or historical records, heathland habitat is not present within or adjacent to the study area.
Pterostylis chlorogramma	Green-striped Greenhood	VU	e		PMST	Heathy woodland; more specific habitat requirements are poorly known.	Negligible	No recent or historical records, heathland habitat is not present within or adjacent to the study area.
Rutidosis leptorhynchoides	Button Wrinklewort	EN	e		PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	Low	No recent or historical records within 5 km. Vegetation within the study area too modified to support this species.
Senecio macrocarpus	Large-headed Fireweed	VU	cr		PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or	Low	No recent or historical records within 5 km. Dominance of weeds such as Toowoomba Canary-grass across most of the study area makes it unlikely to support this species.

Scientific name	Common name	Conservation status		Most recent	Other records	Habitat description	Likely occurrence	Rationale for likelihood ranking
						drought conditions in summer.		
Senecio psilocarpus	Swamp Fireweed	VU			PMST	Seasonally inundated herb-rich swamps, growing on peaty soils or volcanic clays.	Low	No recent or historical records within 5 km. The wetland vegetation within the study area is not herb-rich and lacks native species diversity.
Swainsona murrayana	Slender Darling-pea	VU	e		PMST	Around lakes and on flats that are subject to seasonal inundation.	Negligible	No recent or historical records within 5 km. Lakes and flats do not occur within the study area.
Thelymitra epipactoides	Metallic Sun-orchid	EN	e		PMST	Moist or dry sandy loams or loamy sands, primarily in coastal heaths, grasslands and woodlands, but also in similar communities at drier inland sites.	Low	No recent or historical records within 5 km. Coastal habitats absent from the study area.
Thelymitra matthewsii	Spiral Sun-orchid	VU	e		PMST	Typically on well-drained soils on slightly elevated sites, but also on coastal sandy flats. Often in open situations following disturbance.	Low	No recent or historical records within 5 km. Coastal habitats absent from the study area.
Xerochrysum palustre	Swamp Everlasting	VU	cr		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	Low	No recent or historical records within 5 km. the swamps dominated by Common Spike-sedge lack native diversity and have a high cover of weeds. As a result, there is little suitable habitat for this species.
State significance								

Scientific name	Common name	Conservation status		Most recent	Other records	Habitat description	Likely occurrence	Rationale for likelihood ranking
Calotis anthemoides	Cut-leaf Burr-daisy		cr	2010		Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion.	Low	One recent record within 4 km. Vegetation within the study area too heavily modified to support suitable habitat for this species. Swampy vegetation supported very low species diversity.
Comesperma polygaloides	Small Milkwort		cr	2010		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	Low	Two recent records within 4 km. Vegetation within the study area either highly modified or swamped by Toowoomba Canary-grass. As a result, there is no suitable habitat for this species.
Coronidium gunnianum	Pale Swamp Everlasting		cr	2011		Widespread and sometimes locally common, particularly in high-rainfall areas of Victoria; often in moist sites in open forests and woodlands.	Low	Many recent records within 5 km of the study area. Open forest and woodland habitats do not occur within the study area. Soils prone to inundations were also dominated by weeds or a single native species.
Cullen parvum	Small Scurf-pea		e	1973		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	Low	One historical record within 4 km. Given the low number of records within 5 km and the heavily modified vegetation with the study area, there is unlikely to be any suitable habitat for this species.
Lachnagrostis semibarbata var. filifolia	Purple Blown-grass		e	2011		Wet marshes and slightly saline swamps and depressions, on heavy	Low	Two recent records within 4 km. Swampy vegetation within the study area limited to degraded drainage lines along roadsides

Scientific name	Common name	Conservation status		Most recent	Other records	Habitat description	Likely occurrence	Rationale for likelihood ranking
						soils away from the coast.		dominated by weeds and often with very low native species diversity.
Lachnagrostis semibarbata var. semibarbata	Purple Blown-grass		e	2011		Wet marshes and slightly saline swamps and depressions in plains communities.	Low	Many records within 5 km in relatively intact grasslands to the north of the study area. Study area separated from these properties by several paddocks and roadsides. Study area itself also heavily modified and unlikely to support the species.
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle		e	2008		Near coastal heath/scrub, rocky coast and foothill outcrops.	N/A	Any records of this species within 5 km are likely to be planted and occur well outside the natural distribution of the species.
Microseris scapigera s.s.	Plains Yam-daisy		cr	2013		Damp depressions in grasslands, woodlands, stream banks, alpine herbfields and around the margins of saline lakes and flats.	Low	One recent record within 5 km. The vegetation within the study area is highly modified and unlikely to support this species.
Tripogonella loliiformis	Rye Beetle-grass		e	2010		Dry sites in association with escarpments and rocky outcrops.	Low	One recent record within 5 km. Escarpments and rocky outcrops are not present.

Appendix A.3. Threatened ecological communities

The following table includes the threatened ecological communities that have potential to occur within the project area. The list of threatened ecological communities has been compiled with reference to characteristics of FFG Act threatened communities (SAC 2013) and predictive output from the PMST (accessed on 8 May 2023).

Table 10 Threatened ecological communities predicted to occur within 5 km of the project area.

Community Name	Conservation status	Source	Description
National significance			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	PMST	The key diagnostic canopy species for this Threatened Ecological Community (White Box, Yellow Box and Blakely's Red Gum) do not occur within or adjacent the study area. The treed vegetation that occurs alongside the study area is largely planted.
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	PMST	This community is considered present in Grassland vegetation where at least one native grass genera provide the dominant cover (for example Poa or Kangaroo grass). While these requirements are fulfilled in some mapped patches of vegetation, the patches are all well below 0.05 hectares and therefore do not qualify as the threatened community. As a result, this community is not present.
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	PMST	While some of the key defining characters are present (such as native grasses as the dominant species) the patches are all well below 0.5 hectares and therefore do not qualify.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	PMST	The wetlands identified within the study area are too small, have too few native species and are dominated by a contra- indicative species (Common Spike-sedge).
State significance			
Coastal Moonah (Melaleuca lanceolata subsp. lanceolata) Woodland Community	Threatened		This community is not present within the study area.
Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04	Threatened		The study area lacks a sparse layer of canopy trees and EVCs synonymous with this community (Plains Grassy Woodland EVC 55, Grassy Woodland EVC 175) are not present. As a result, this community does not occur within the study area.

Appendix B. Fauna

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (fish only)	

Appendix B.1. Fauna species recorded from the study area

Table 11 Vertebrate fauna recorded from the study area (present assessment)

Status	Scientific name	Common name
Indigenous species		
	Accipiter novaehollandiae	Grey Goshawk
	Acritoscincus duperreyi	Eastern Three-lined Skink
	Anas superciliosa	Pacific Black Duck
	Anthochaera carunculata	Red Wattlebird
	Anthus novaeseelandiae	Australasian Pipit
	Aquila audax	Wedge-tailed Eagle
EN, e	*Callocephalon fimbriatum*	Gang-gang Cockatoo
	Corvus mellori	Little Raven
	Cracticus tibicen	Australian Magpie
	Crinia signifera	Common Froglet
VU, e	*Delma impar*	Striped Legless Lizard
	Egretta novaehollandiae	White-faced Heron
	Elanus axillaris	Black-shouldered Kite
	Eolophus roseicapilla	Galah
	Falco berigora	Brown Falcon
	Falco cenchroides	Nankeen Kestrel
	Macropus giganteus	Eastern Grey Kangaroo
	Malurus cyaneus	Superb Fairy-wren
	Limnodynastes tasmaniensis	Spotted Marsh Frog
	Litoria ewingii	Southern Brown Tree Frog
	Ocyphaps lophotes	Crested Pigeon
e	*Pseudemoia pagenstecheri*	Tussock Skink
	Ptilotula penicillata	White-plumed Honeyeater
	Rhipidura leucophrys	Willie Wagtail
Introduced species		
	Acridotheres tristis	Common Myna
	Alauda arvensis	European Skylark
	Carduelis carduelis	European Goldfinch

Appendix B.2. Listed fauna species

The following table includes a list of threatened fauna species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 8 May 2023). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur.

Table 12 Threatened fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Pedionomus torquatus	Plains-wanderer	CR	cr	1927	PMST	Native grassland with a sparse, open structure.	Negligible	Study area is outside the species current range. Species extent within Victoria is limited to northern arid grasslands.
Climacteris picumnus	Brown Treecreeper	VU			PMST	Open eucalypt forests, woodlands and Mallee, often where there are stands of dead trees.	Negligible	No local records. No suitable wooded habitat within the study area.
Anthochaera phrygia	Regent Honeyeater	CR	cr		PMST	A range of dry woodlands and forests dominated by nectar-producing tree species.	Negligible	No suitable habitat and no previous local records.
Eulamprus tympanum marnieae	Corangamite Water Skink	EN	e		PMST	Basalt rock outcrops and stonewalls associated with remnant vegetation and adjacent to permanent or ephemeral wetlands.	Low	No suitable habitat and no previous local records. Study area is outside the known distribution of the species.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll	EN	e		PMST	Rainforest and wet and dry sclerophyll forests and woodlands.	Negligible	No local records. No suitable wooded habitat within the study area. Species unlikely to persist in cleared agricultural landscapes.
Botaurus poiciloptilus	Australasian Bittern	EN	cr	1994	PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	Low	No suitable habitat within study area.
Nannoperca obscura	Yarra Pygmy Perch	VU	v		PMST	Lakes, pools and slow-flowing streams with abundant aquatic vegetation.	Medium	No local records, but some potential suitable habitat in Birregurra creek and connections to records in the broader catchment.
Falco hypoleucos	Grey Falcon	VU	v		PMST	Lightly timbered plains and Acacia scrub.	Negligible	No local records. No suitable coastal heathy woodland or semi-arid habitat within the study area.
Rostratula australis	Australian Painted-snipe	EN	cr		PMST	Shallows of well-vegetated freshwater wetlands.	Low	No local records, and no suitable habitat within study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Pseudomys novaehollandiae	New Holland Mouse	VU	e		PMST	Coastal heathland, heathy woodland and dry sclerophyll forest.	Negligible	No local records. No coastal heathy woodland habitat.
Prototroctes maraena	Australian Grayling	VU	e		PMST	Adults inhabit cool, clear, freshwater streams.	Low	No records within the local area. Occurs in the Barwon River but closest records within the catchment are over 60 km downstream, and species requires connectivity to the ocean.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	v		PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	Medium	Study area is approx. 20 km from a camp at Colac Botanic Gardens. Species may occasionally forage in flowering eucalypts along roadside.
Lissolepis coventryi	Swamp Skink	EN	e		PMST	Densely vegetated swamps and associated watercourses, and adjacent wet heaths, sedgelands and saltmarshes.	Low	No local records. No suitable vegetated swamp or saltmarsh habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Calidris ferruginea	Curlew Sandpiper	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	Low	No local records. Species is primarily coastal, unlikely to visit the study area. No suitable shallow wetland habitat.
Numenius madagascariensis	Eastern Curlew	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, coastal lagoons and bays.	Low	No local records. Species is primarily coastal, unlikely to visit the study area. No suitable shallow wetland habitat.
Callocephalon fimbriatum	Gang-gang Cockatoo	EN	e	2016	PMST	S Vic to E NSW. Forests and woodlands from coast to alpine areas. Autumn-winter dispersal from highlands to lower elevations. Forages in eucalypts, acacias and some exotic garden trees and shrubs.	Recorded	Recorded using the eucalypts along Mooleric Road.
Neophema chrysostoma	Blue-winged Parrot	VU		2002	PMST	A range of coastal, sub-coastal and semi-arid regions throughout south-eastern Australia. Nests in tree hollows in coastal eucalypt forests and woodlands. Feeds on seeds of a range of native grasses and herbs.	Medium	Numerous records from the broader region. Individuals may utilise the study area on occasion.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Hirundapus caudacutus	White-throated Needletail	VU	v	1977	PMST	An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	Medium	Species is highly mobile and widely distributed across eastern Australia. Species is likely to fly over the study area occasionally.
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	e		PMST	Heathland, shrubland, sedgeland, heathy open forest and woodland; also exotic vegetation, such as blackberry thickets and rank grasses where native vegetation has been removed.	Negligible	No local records. No suitable heathy woodland habitat.
Aphelocephala leucopsis	Southern Whiteface	VU			PMST	Open forests and woodlands with a grassy and/or shrubby understorey.	Low	No local records. Minimal wooded habitat within the study area, negligible grassy and/or shrubby understorey.
Petaurus australis	Yellow-bellied Glider	VU	v		PMST	Sclerophyll forest with large hollow-bearing trees, prefers mature eucalypt dominated forest and woodland. Distributed along South-eastern Australia.	Negligible	No local records. No suitable tall contiguous forest within the study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Miniopterus orianae bassanii	Southern Bent-winged Bat	CR	cr		PMST	Woodlands, grasslands, pasture especially near wetlands. Roosts in caves, crevices in cliff faces and in mines.	Medium	No suitable roosting habitat in study area, but may forage over the study area at night.
Grantiella picta	Painted Honeyeater	VU	v	2020	PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	Low	Outside core distribution. Minimal woodland and forest habitat. No Mistletoes recorded within the study area.
Stagonopleura guttata	Diamond Firetail	VU	v	1941	PMST	Open forests and woodlands with a grassy ground layer.	Negligible	Over 80 years since last local record. No suitable grassy woodland habitat.
Galaxiella pusilla	Dwarf Galaxias	VU	e		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	Low	No local records, not known from the broader catchment area.
Perameles gunnii	Eastern Barred Bandicoot	EN	e	1949		Natural temperate grasslands and grassy woodlands.	Negligible	Occurrence is highly localised and linked to reintroduction and recovery efforts. Nearest extant population occurs over 85 km north-east.
Potorous tridactylus trisulcatus	Long-nosed Potoroo	VU	v		PMST	Forest, heathy woodlands and heathlands.	Negligible	No local records and no suitable habitat.
Delma impar	Striped Legless	VU	e	2008	PMST	Natural temperate grassland,	Recorded	Grassland in road easement running

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
	Lizard					grassy woodland and exotic grassland.		from East to West from chicken farm site to Mooleric Road has some potential habitat, especially close to lightly embedded rocks. Unlikely to occur elsewhere within the study area.
Melanodryas cucullata	Hooded Robin	EN	v		PMST	Woodlands of eucalypt, Mallee, semi-cleared farmland.	Low	No local records. Minimal wooded habitat within the study area.
Pseudomys fumeus	Smoky Mouse	EN	e		PMST	Coastal heath and heathy woodland, wet forest, sub-alpine heath and dry sclerophyll forest.	Negligible	No suitable habitat in study area.
Litoria raniformis	Growling Grass Frog	VU	v	2020	PMST	Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	Medium	Several recent local records. Potential habitat for movement corridors in roadside drains on Birregurra Road between M1 and Birregurra Creek. Birregurra Creek contains seasonally suitable habitat.
Synemon plana	Golden Sun Moth	VU	v	2017	PMST	Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic	Low	Recent records in local area, but no suitable habitat in study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
						grassland dominated by Chilean needle grass.		
Lathamus discolor	Swift Parrot	CR	cr		PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas.	Low	No local records. Minimal suitable foraging habitat is fragmented, low quality, and isolated in cleared landscape.
Antechinus minimus maritimus	Swamp Antechinus	VU	v		PMST	Dense wet heath and heathy woodland, sedgeland and dense tussock grassland.	Low	No local records and no suitable habitat, species considered unlikely to occur within the study area.
State significance								
Actitis hypoleucos	Common Sandpiper		v		PMST	Migrates to Australia from Eurasia in August where it inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	Negligible	No local records. No suitable wetlands with muddy margins.
Lewinia pectoralis	Lewin's Rail		v	1911		Swamps, dense riparian vegetation and saltmarsh.	Negligible	No local records since 1911 or suitable habitat present in study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Ardeotis australis	Australian Bustard		cr	1921		Grassland, open dry woodlands of Mallee and mulga, arid heathland saltbush and bluebush.	Low	No local records since 1921.
Grus rubicunda	Brolga		e	2021		Shallow freshwater and brackish wetlands, crops, grassland and pasture.	Medium	Local recent records. Some suitable foraging habitat in Birregurra Creek and adjacent floodplain, and in floodplain between Moorleric Road and Darcy's Lane.
Egretta garzetta	Little Egret		e	2002		Swamps, billabongs, floodplain pools, mudflats, mangroves and channels; breeds in trees standing in water.	Medium	Suitable habitat in Birregurra Creek.
Anseranas semipalmata	Magpie Goose		v	1994		Swamps, lakes, sewage ponds, flooded pasture, dams.	Low	No recent records in local area, but some suitable habitat on Birregurra Creek.
Spatula rhynchotis	Australasian Shoveler		v	2019		Variety of wetlands, with a preference for large, permanent, freshwater lakes/swamps with dense fringing vegetation.	Low	Minimal suitable wetland habitat. Species prefers large densely vegetated wetland habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Stictonetta naevosa	Freckled Duck		e	1994		Large freshwater wetlands, generally with dense vegetation.	Low	No recent local records. Some suitable habitat in Birregurra Creek.
Aythya australis	Hardhead		v	2018		Deep freshwater swamps and wetlands, with abundant aquatic and terrestrial vegetation for roosting. Can occur in sheltered estuaries.	Medium	Recent local records. Some suitable habitat in Birregurra Creek.
Oxyura australis	Blue-billed Duck		v	2017		Open or densely vegetated wetlands.	Medium	Recent record in local area. Some suitable habitat in Birregurra Creek.
Biziura lobata	Musk Duck		v	1979		Deep, permanent freshwater wetlands with areas of open water and patches of dense aquatic vegetation.	Low	No recent records in local area. Birregurra Creek is not permanently flowing.
Accipiter novaehollandiae	Grey Goshawk		e	2016		Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	Recorded	Species is occasionally recorded within the region and was recorded in tall pine trees during project investigations. Overall lack of trees in the study area mean that there is little habitat and the species is unlikely to be resident.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Falco subniger	Black Falcon		cr	2019		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks. Primarily occurs in arid and semi-arid zones in the north, north-west and west of Victoria.	Medium	Several records throughout the region. Species may hunt over the study area occasionally.
Tyto novaehollandiae	Masked Owl		cr	1995		A variety of lowland forests and woodlands.	Negligible	No suitable forest and woodland habitat in study area.
Gelochelidon macrotarsa	Australian Gull-billed Tern		e	1996		Floodplains, saltmarsh, claypans and flooded pasture.	Low	No recent local records. Species may occasionally pass through the study area, or forage within flooded pasture on occasion.
Hydroprogne caspia	Caspian Tern		v	1955		Estuaries, inlets, bays, lagoons, inland lakes, flooded pasture, sewage ponds.	Low	Historic record from 1955. May use Birregurra Creek when flooded.
Tringa nebularia	Common Greenshank		e	1978	PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	Low	No recent local records. No suitable shallow marshy wetland habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Sminthopsis crassicaudata	Fat-tailed Dunnart		v	2011		Inhabits sparse grasslands and open shrubland habitats, usually where there is a significant component of bare ground and suitable refuge sites such as surface rocks or logs where it constructs nests of grass or other dried plant material.	Low	Not enough habitat structure (e.g. rocks) within the grassy sections of the study area to support this species.
Ornithorhynchus anatinus	Platypus		v	2002		A variety of freshwater waterbodies, particularly those with stable banks suitable for burrows, and shallow waters for foraging.	Medium	Records in Barwon River. Area may be used as a movement corridor, however water within Birregurra Creek in study area is ephemeral and does not contain enough overstory vegetation and for it to be used a permanent habitat.
Pseudemoia pagenstecheri	Tussock Skink		e	2008		On the ground in a range of grasslands or sparse grassy woodlands from alps to coast.	Medium	Grassland in road easement running from East to West from chicken farm site to Mooleric Road has some potential habitat, but it is highly grazed and tussocks are patchy.
Chelodina expansa	Broad-shelled Turtle		e	1999		Typically found in turbid water at the bottom of rivers and permanent streams and waterholes, lying concealed among debris or among root-mats.	Low	Out of range records from Barwon River from 1999, but Birregurra Creek is not a permanent water body so is not suitable for this species.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Hyridella narracanensis	Narracan Corrugated Mussel		e	1931		Found in areas that are well-shaded by overhanging vegetation, in shallow water with moderate currents over sandy, compacted substrata with low organic content. It requires clean, clear water that is permanently flowing and where there is a water current flowing steadily over a sandy bed	Negligible	No suitable habitat in study area.
Engaeus sericatus	Hairy Burrowing Crayfish		v	2008		Burrows are connected to the water table, typically adjacent to creeks or on floodplains. Although it is widespread in Victoria, most records are found in an area extending from the Otways, west to Port Fairy and north to Ballarat.	Medium	Burrowing Crayfish burrows were observed in drainage lines within the study area, however we are unable to determine the species from the burrow.

Appendix B.3. Migratory species (EPBC Act listed)

Table 13 Migratory fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Most recent record
Migratory species		
Gallinago hardwickii	Latham's Snipe	2018
Plegadis falcinellus	Glossy Ibis	2018
Hirundapus caudacutus	White-throated Needletail	1977
Apus pacificus	Fork-tailed Swift	PMST
Pandion haliaetus	Osprey	PMST
Hydroprogne caspia	Caspian Tern	1955
Charadrius bicinctus	Double-banded Plover	1980
Numenius madagascariensis	Eastern Curlew	PMST
Actitis hypoleucos	Common Sandpiper	PMST
Tringa nebularia	Common Greenshank	1978
Calidris ferruginea	Curlew Sandpiper	PMST
Calidris ruficollis	Red-necked Stint	1980
Calidris acuminata	Sharp-tailed Sandpiper	2003
Calidris melanotos	Pectoral Sandpiper	PMST
Motacilla flava	Yellow Wagtail	PMST
Rhipidura rufifrons	Rufous Fantail	1911
Myiagra cyanoleuca	Satin Flycatcher	PMST

Appendix C. Photos of the study area

Photo 1 **Potential Striped Legless Lizard habitat on road easement at the northern end of the study area. Photo taken 5 July 2023 facing west.**

Photo 2 **Potential Growling Grass Frog habitat (left) and movement corridor (right). Photos taken 5 July 2023 facing west and south (respectively).**

Photo 3 **Example of planted natives in neighbouring properties that might be impacted by works in the road reserve. Photo taken 5 July 2023 facing south.**

Photo 4 **Swamp Wallaby-grass (potentially an EPBC Act listed species) occurring on the banks of the Birregurra Creek.**

Photo 5 Plains Sedgy Wetland vegetation in shallow drainage lines. Photo taken on 5 July 2023 facing south.

Photo 6 Plains Grassy Woodland vegetation. Photo taken 5 July 2023 facing south

Photo 7 Grassy Woodland vegetation. Photo taken 5 July 2023 facing north.

VEHICLE MOVEMENTS

Birregurra FARM

Application for Planning Permit – 2 x 12 Shed Free Range Broiler Farms and associated development.

Government Road-Birregurra

Report Number 3-101-25 (a)

September 2023

Pro Ten Pty Ltd

Suite1103/ Level 11/ 99Mount Street,

North Sydney, NSW 206

Contents

1.0 Introduction

Pro Ten Pty Ltd propose to develop a Free-Range Broiler Production farm in Birregurra, together with associated buildings and works, including access tracks.

The proposed development, Birregurra Farm, will consist of two lots of ten (12) Free range Broiler Production sheds of 176m in length and 18.7m wide, storage rooms, amenities / office buildings, workshops, managers housing and mains generator sheds. Access road and hardstands will also be constructed, connecting the sheds and associated buildings together.

This report considers the traffic impact of the proposed development during construction and the facilities operation. This report has been prepared to establish best access routes to the site and to confirm the condition of the existing roads.

The report is based on the existing available traffic volumes on the road network and road condition information obtained from VicRoads, a drive through survey of selected council / public roads in the vicinity and an assessment of the likely traffic volumes generated by the construction and operation of the Birregurra Farm.

2.0 Location and Land Use

The Development Site is located approximately 15.4km west of Winchelsea (Distances taken in a straight line from the town of Winchelsea). It is positioned within the Plan and Lot 1\TP247757, Lot 4\TP247757, Lot 6\TP247757, Lot 3\TP372519 and Lot 4\TP 372519 and comprises approximately 126 hectares (ha) of rural land (Farming Zone) within the Colac Otway Shire. The general locality of the Development Site is shown on Figure 2.1 and shows the extent of the Birregurra Farm complex.

The current land use is agricultural, primarily, Cropping and livestock grazing and there is a residence on the property. The current zone identified by the Colac Otway Shire Planning Scheme is 'Farming'.

The topography of the site is generally very gentle lasered sloping to the northeast at the top (Northern area) of the farm and sloping South at the bottom (Southern area) of the farm with a higher lying area down the centre of the farm. A typical elevation of 122m AHD in the south and north of the property and 125 AHD in the centre area of the property.
The centre of the property coordinates is 38°16'27.43"S and 143° 49'00.81"E in DMS (Degrees Minutes Seconds).

Traffic, site access, on farm roads and parking

Access to the property for all vehicles, including heavy vehicles will be via Mooleric Road and current unused Government Road.

Access to the site is proposed via Mooleric Road.

The proposed site access has been designed in accordance with Austroads Guide to Road Design Part 4A. The turning treatment design has been undertaken using a design speed of 80 km/h on Mooleric Road and 40km/h on the Government Road once this road is constructed.

A rural basic right-turn treatment has been proposed for approaching northbound vehicles. The treatment will provide vehicles, including B doubles, turning right onto the Government Road from Mooleric Road and then right onto the site from the Government Road.

This Report includes an assessment of traffic volumes, site distances and proposed access from Mooleric Road and Government Road.

The internal driveway will be constructed to accommodate heavy vehicles in all-weather events.

Anticipated vehicle movements to be generated by the proposal will include:

- Traffic generated by on site employees, full time employees and necessary part time employees to assist with placement and pick-up of birds.
- Chick delivery.
- Gas delivery
- Bedding in.
- Litter out.
- Feed delivery
- Bird pick-up.

Based on analysis contained within this Report there is an estimated 12.6 vehicle movements per day.
The additional vehicle movements generated by the proposed activity is negligible, the estimated vehicle movements can be accommodated by the surrounding road network and intersections and the proposed access to the site accords with the relevant design standards.

Figure 2.1 Birregurra Farm Location

3.0 Transport Route

The major arterial road near the site is the Princess Highway which is under the care and management of VicRoads to the south of the new development This is a TRZ2 designated road . Secondary double lane sealed road is the Mooleric Road – TRZ3, situated at the west of the property, which is under care of the shire. Princess Highway runs east west to the south of the property. Mooleric Road has a safe designated B-Double intersection with Princess Highway and runs towards the north passing west of the property. The Government Road when developed, will be an all-weather unsealed road and will be used as an access to sites 1 and 2 development sites. Construction of Birregurra Farm will involve transportation of both raw construction materials and individual components to site. Raw construction material deliveries will come from Melbourne / Geelong and will access site from the west, via the Princess Highway and then along, Mooleric Road onto Government Road onto the property to each site entrances for the new developments.

Potential transport routes to the site from Geelong were researched using VicRoads *B- doubles & Higher Mass Limits Trucks (May 2004)* publication.

3.1 Transport to site

Construction vehicles that are transporting materials to the site will primarily use the Princess Highway and then turn right into to Mooleric Road then onto Government, until they reach the entrance to Birregurra farm. The trucks will then enter the site using the entrance onto the property, for site 1 and 2 Government Road onto the Birregurra Farm sites 1 and 2 construction sites.

3.2 Road Classification and Condition

The above-mentioned roads up to the development sites are approved Over Dimensional Routes. In addition, the roads have been used for the construction materials and other heavy transport materials to and from the adjacent Quarry. The Princess Highway is currently used as existing over Dimensional Route being double carriageway sealed vehicle road, this road is satisfactory for the transportation of construction materials.

4.0 Access Route

4.1 Access Considerations

As previously mentioned, the major arterial road to the site is the Princess Highway, which is under the care and management of VicRoads – TRZ 2 road. All other roads within and surrounding the site are local roads under the care and management of Colac Otway Shire TRZ 3 and TRZ 4 roads.

The existing condition of the current access road was determined by a visual assessment of the roads surrounding the site. The inspection involved a visual drive through to observe the pavement condition of the current access road combined with on-foot inspections to measure traffic lane widths and shoulders at the significant intersection- proposed farm entrance. The site inspection considered the following:

- Sight distances achievable along intersection road -
    - Proposed farm entrance/exit to Government Road – sites 1 and 2
- Horizontal and vertical alignment of the road,
- Width of the road reservation, and
- Presence of roadside vegetation.

4.2 Site Investigation

The alignment of the Government Road to Mooleric Road, the exit is generally straight and very flat with good visuals all around. For rural roads with a speed limit of 60km/h and grade 2% or less, AUSTROADS *Guide to Traffic Engineering Practice – Part 5 – Intersections at Grade* specifies an Approach Stopping Distance (ASD) of 210 meters and a Safe Intersection Sight Distance (SISD) of over 300 meters. Accordingly, potential intersection locations easily achieved the minimum site distance of 300m.

The access locations examined during the visual inspection are highlighted in Figure 4.1 and a summary of the results are presented in Table 4.1. Detailed observations recorded during the inspection taken to supplement the observations are provided in Appendix A and B.

Figure 4.1 Potential access roads to farm 1 and 2 inspected on site visit.

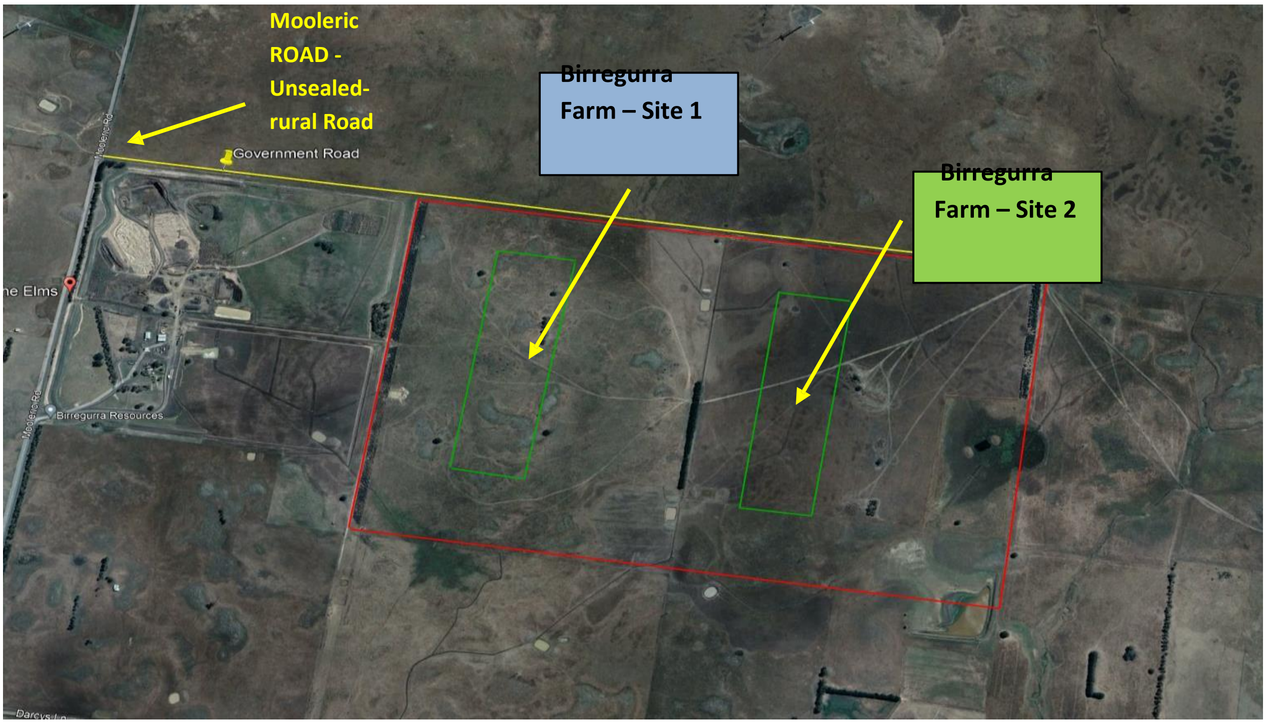

Table 4.1 Access Location

ACCESS ROAD TO SITE		
From	**Onto**	**Description**
Princess Highway From Geelong or Colac Dual double lane sealed carriage way. (100 km / hour road)	Mooleric Road Dual sealed carriage way up to 320 Mooleric Road and then all-weather unsealed dual carriage way to the Government Road junction. (60 km / hour road)	• Sight distance is 300 plus meters in both directions. • No vegetation needs to be removed.
Mooleric Road All-weather unsealed dual carriage way onto the unused Government Road junction. (60 km / hour road)	Government Road Currently unused - PROPOSED – All weather unsealed single carriage way constructed on the unused Government Road. Birregurra Farm - Site 1 Entrance / Exit Road (40 km / hour road - PROPOSED)	• Sight distance is 300 plus meters in both directions. • No vegetation needs to be removed. • Government Road to be developed to Single all weather carriage way.

Government Road Currently unused - PROPOSED – All weather unsealed single carriage way constructed on the unused Government Road. (40 km / hour road - PROPOSED)	Birregurra Farm - Site 1 Entrance / Exit Road PROPOSED – All weather unsealed single carriage way constructed (20 km / hour road - PROPOSED)	• Sight distance is 300 plus meters in one direction (R) road ends at entrance / exit of the farm site. • No vegetation needs to be removed. • Government Road to be developed to Single all weather carriage way.
Birregurra Farm - Site 1 Entrance / Exit Road PROPOSED – All weather unsealed single carriage way constructed (20 km / hour road - PROPOSED)	Government Road Currently unused - PROPOSED – All weather unsealed single carriage way constructed on the unused Government Road. (40 km / hour road - PROPOSED)	• Sight distance is 300 plus meters in one direction (L) Road ends at entrance /exit of the farm site. • No vegetation needs to be removed. • Government Road to be developed to Single carriage way.
Government Road Currently unused - PROPOSED – All weather unsealed single carriage way constructed on the unused Government Road. (40 km / hour road - PROPOSED)	Mooleric Road All-weather unsealed dual carriage way onto the unused Government Road junction. (60 km / hour road)	• Sight distance is 300 plus meters in both directions. • No vegetation needs to be removed. • Double carriage way – All weather unsealed road.
Mooleric Road Dual unsealed all weather carriage way up to 320 Mooleric Road and then sealed dual carriage way to Princess Highway junction. (60 km / hour road)	Princess Highway To Geelong or Colac Dual double lane sealed carriage way. (100 km / hour road)	• Sight distance is 300 plus meters in both directions. • No vegetation needs to be removed. • Double Dual cartridge way – sealed Road

5.0 Traffic Impacts

Traffic generated by the site will mainly be construction vehicles delivering materials, and construction workers during the construction phase. It is assumed that the construction phase of the project may take up to 12 months. When the farm comes into operation traffic generation is anticipated to be as per the table of vehicle movements provided.

5.1 Construction Phase

A relatively small amount of traffic will be generated by the construction of the Free-Range Broiler Production sheds - Birregurra Farm.

The general construction activities involved are likely to include:

- Construction of the internal access tracks to the farm sites / shed's locations.
- Stripping and stockpiling of topsoil,
- Excavation and construction of the foundations and hardstands for the farm sheds,

- Erection of the sheds and associated buildings.
- Installation of underground amenities e.g., cabling, and water
- The reinstatement of the site.
- Construction of the Government Road for access to sites 1 and 2

5.1.1 Traffic Generation

All the construction activities will require employees to travel each day to and from the site. It is expected that there will be on average 10 workers on site during most of the construction period.

The number of construction trucks to the site is estimated to be approximately 284 during the construction period, and light vehicles used by construction staff will be approximately 10 vehicles per day, as outlined in Table 5.1.

Table 5.1 Construction related vehicles visiting the two construction sites (single way traffic only)

Materials	No. of Construction Trucks
Shed Materials	40
Sand and aggregate	100
Cement	140
Water tankers (On site water supply)	4
TOTAL	**284**
Construction staff	**10 light vehicles per day during construction**

5.1.2 Traffic Distribution

Based on proximity to the site, it has been assumed that most construction workers will travel from Geelong / Colac, however some may travel from towns to the east of the site.

Trucks bringing structural materials to the site would most likely travel from Geelong via Winchelsea. While concrete trucks and non-structural equipment will be from Colac.

5.1.3 Proposed Access Road Upgrades

The truck and vehicle traffic generated by the construction of the Birregurra Farm will result in an increase in the average daily traffic volumes on the surrounding road network over the construction period. This impact will however not be enough to warrant an upgrade (widening of the road) of the roads in the areas.

5.2 Operational Phase

The operational phase of the Birregurra Farm (Per site) is not expected to generate significant volumes of traffic (**See traffic volumes per site on supplied table 6**). The number of permanent staff on site is not expected to exceed 5 people per site and therefore no further measures would be required to manage this traffic.

Table 6 Estimated Traffic Generation per Production Year (PER SITE)

Activity	Vehicle Type	Vehicles (One Way Vehicle Trips) PER ANNUM, PER SITE
Heavy Vehicles		
Delivery of shed bedding material – Free Range sheds	Twin axle rigid truck	110
Delivery of chicks	Twin axle rigid truck	67
Delivery of feed- Free Range sheds	Semi-trailer	416
Delivery of gas (LPG)	Rigid tanker	32
Broiler pick up	Semi-trailer	875
Removal of shed litter material	Semi-trailer	165
Removal of dead birds	Twin axle rigid truck	11
	Heavy Vehicle Sub-Total	**1679**
Light Vehicles		
Staff visits and catching crew	Car	730
Tradesman	Ute/Van	58
Maintenance	Van	26
Shed litter material removal contractors	Car	93
Shed wash down contractors	Car	187
	Light Vehicle Sub-Total	**1094**
	TOTAL	**2773**

6.0 Conclusion

This assessment of the traffic issues for the construction of the Proposed Birregurra Farm at Government Road Birregurra, VIC, 3242, has concluded the following:

- The farm will generate a maximum demand of approximately 3 staff vehicles and 5 trucks per day during operational phase.
- The main access point is off the Government Road.
- All the above-mentioned roads in Table 4.1 can absorb the additional vehicles in the peak hour.
- Vehicles departing the site are expected to experience no delays.

As per the data contained herewith regarding traffic movements provided, we request that the Shire should Take the details herewith supplied into consideration that there are no traffic related reasons why a planning permit for the Birregurra Farm should not be issued.

Photo 1
Turnoff from Government Road onto Birregurra Farm Entrance / Exit to farm Site 1 and 2

FROM SITE 1 EXIT ENTRANCE ONTO GOVERNMENT ROAD

Photo 2
Eastern view from Government Road towards Birregurra Farm Entrance / Exit to farm Sites 1 and 2

GOVERNMENT ROAD TO MOOLERIC ROAD INTERSECTION

Photo 3
Mooleric Road unsealed shoulders onto Government Road to be constructed.

MOOLERIC ROAD AND GOVERNMENT ROAD INTERSECTION

Photo 4
Mooleric Road All weather unsealed Road up to Quarry entrance.

MOOLERIC ROAD TOWARDS PRINCESS HIGHWAY INTERSECTION

Photo 5
Intersection – Mooleric Road and Princess Highway

Photo 6 a and 6 b
Eastern view Princess Hwy from Geelong to right turn into meridian strip and view to the left Princess Hwy from Colac to enter Mooleric Road

Photo 7
Intersection – Mooleric Road and Princess Highway from direction of Geelong

Photo 8
Intersection – Mooleric Road and Princess Highway from direction of Colac