LAND CAPABILITY ASSESSMENT

Ballarat Soil Testing
Specialising in building site soil classification & land capability assessments
ABN 24 586 140 741

SITE:	
Proposed development	Redevelopment of school campus
Property address	186 Bungaree-Wallace Road, Bungaree
Shire council	Hepburn Shire Council

SUMMARY:	
Loading rate	60 x students and 10 x staff • 1400*L/day*.
Secondary treatment device	New Aerated Wastewater Treatment System (AWTS).
Land application system	New subsurface irrigation field of 765m^2 in size • Due to the limited space available to the north of the school building and the Aboriginal cultural heritage overlay in the northeast corner of the site, the field will need to be split into two discrete fields. • The drip irrigation system needs to be installed at a depth of 150 - 250*mm* in situ with a 1*m* spacing between lines.
Soil category (AS/NZ 1547:2012)	5b - moderately structured silty clay (light clay)
Indicative permeability (Ksat)	0.05*m/day*

JOB:	
Reference No	SJ220824
Date	September 13, 2024

PREPARED FOR:	
Client name	St Joseph's
Address	Level 1 - 135 Cardigan Street, Carlton VIC 3053

PREPARED BY:	
Geologist	S. O'Loughlin
Address	313 Scott Street, Buninyong
Telephone	0419 536 910
Email	ballaratsoiltesting@gmail.com

REVIEW:	DATE:	DETAILS:
A	August 26, 2024	Initial draft for submission
B	September 13, 2024	Second draft
C		
D		
E		
F		

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1 Commission

When a property developer, potential buyer or land holder considers subdividing land or building one or more premises, they must first determine whether wastewater can be sustainably managed and absorbed by the land within the property boundaries without negatively impacting the beneficial uses of surface waters and groundwater.

It is the responsibility of the property owner to prove to Council that the proposed onsite wastewater treatment and recycling system will operate sustainably on the property without adverse impacts on public health or the environment.

The objective of this investigation is to conduct a Land Capability Assessment (LCA) and propose a suitable type of onsite wastewater management system for the proposed residential development at the above address.

This document provides a detailed LCA for the allotment, information about the site and soil conditions along with monitoring and management recommendations.

This report has been written to comply with all relevant and current Victorian legislation, guidelines, codes and standards, including:

- Guideline for onsite wastewater management, EPA Victoria, May 2024;
- Guideline for onsite wastewater effluent dispersal and recycling systems, EPA Victoria, May 2024;
- AS/NZS 1547:2012, Onsite domestic wastewater management;
- AS/NZS 1547:2012, Onsite domestic wastewater management;
- AS/NZS 1547:1994, Onsite domestic wastewater management;
- Code of Practice Onsite Wastewater Management, Publication No. 891.4, July 2016, Environmental Protection Authority;
- Land Capability Assessment for Onsite Domestic Wastewater Management, Publication 746.1, March 2003, EPA Victoria;
- Victorian Land Capability Assessment Framework, January 2014, Municipal Association of Victoria.

Exclusion of liability:

- Please be advised, it is the property owner's responsibility when applying for a Planning Permit or Septic Tank Permit, or a consultant might lodge an LCA if they are acting on behalf of the property owner to obtain a Planning or Septic Tank Permit should the property owner direct the consultant to do so.
- It is the responsibility of the property owner to prove to Council that the proposed onsite wastewater treatment and recycling system will operate sustainably on the property without adverse impacts on public health or the environment.
- This LCA document does not substitute a Planning Permit or Septic Tank Permit nor does it provide guidance or recommend the suitability of an allotment for purchase. That is the responsibility of the client. Ballarat Soil Testing assumes no responsibility for the decision of the client to purchase an allotment.

2 Locality and site description

2.1 The site

	Site size, ground surface, gradient and drainage
The site has a total area of:	8736.9m^2
The ground surface is:	Relatively flat.
The gradient of the site is:	Slight slope falling to east in proposed effluent field area.
The drainage on site is:	Good

	Existing use and development on the site
The current use of the site is:	Community hall in former school building.
The buildings or works located on the site are:	School building, church, dwelling and shedding.

	Existing access arrangements
The main vehicle access to the site is provided from:	Driveway access from Bungaree-Wallace Road.
The space available for vehicle maneuverability can be considered:	Fair
The site is located:	Please refer to Appendix 1.

	Existing vegetation
Describe the vegetation on the site, including the type, location, extent and any other relevant information:	Lawn grasses, shrubs and several small trees across proposed effluent field area. Row of large trees along northern boundary which are to be retained.

2.2 The locality and surrounding land

	Existing use and development on adjacent sites
Describe the land and existing land uses around the subject land:	Rural residential and farming. FZ - Farming Zone.

3 Proposed development

3.1 Construction

	Building
The proposed building on site:	Redevelopment of former school building and addition of demountable building requiring new onsite wastewater treatment system.
The proposed maximum occupancy:	60 x students and 10 x staff

3.2 Wastewater

	Target effluent quality
Wastewater system:	Aims to achieve the target effluent quality of BOD <20 mg/L and SS <30mg/L.
Anticipated wastewater load:	Daily household wastewater generation is estimated by multiplying the potential occupancy, which is based on the number of bedrooms (plus one person), by the Minimum Wastewater Flow Rates. Assessments should include any additional room(s) shown on the house plan such as a study, library or sunroom that could be closed off with a door, as a bedroom for the purposes of the following calculations. Assuming the following: • 60 x students and 10 x staff • Water-saving fixtures • Wastewater generation of 20*L/day/person*. Therefore: • Total Design Load = 1400*L/day*.

3.3 Intended water supply and sewer source

	Services
Domestic water supply	Reticulated water supply is provided.
Availability of sewer	No town sewerage system is available.

4 Site and soil assessment

4.1 Work undertaken

	Assessment
Assessor:	Stephen O'Loughlin
Date:	August 22, 2024

4.2 Site assessment

Feature	Description	Level of constraint	Mitigation measures
Aspect (affects solar radiation received)	North	Nil	NN
Climate (difference between annual rainfall and pan evaporation)	**Excess of rainfall over evaporation in the wettest months**	**Major**	**Water and nutrient balance analyses were based on the 9th decile wet year calculated from the mean monthly rainfall data and 9th decile annual rainfall for Bungaree (Kirks Reservoir) and mean evaporation data for Creswick and were undertaken.**
Erosion (or potential for erosion)	Nil	Nil	NN
Exposure to sun and wind	Dappled light	Moderate	The shrubs and several small trees across proposed effluent field area will need to be removed to make way for the required effluent field are. The row of large trees along the northern boundary are to be retained.
Fill (imported)	No fill	Nil	NN
Flood frequency (ARI)	Less than 1 in 100 years	Nil	NN
Groundwater bores	Setback distance from bore complies with requirements Guideline for onsite wastewater management, EPA Victoria, May 2024	Moderate	The proposed septic system will be more than the required 20 metres from the groundwater bore in the allotment to the west.
Land area available for LAA	Exceeds LAA and duplicate LAA and buffer distance requirements	Moderate	Due to the limited space available to the north of the school and the Aboriginal cultural heritage overlay in the northeast corner of the site, the field will need to be split into two discrete fields.

Landslip (or landslip potential)	Nil	Nil	NN
Rock outcrops (% of surface)	<10%	Nil	NN
Slope Form (affects water shedding ability)	Straight side-slopes	Moderate	NN
Slope gradient (%) for subsurface irrigation	<10%	Nil	NN
Soil Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Nil	NN
Stormwater run-on	Low likelihood of stormwater run-on	Nil	None in recommended effluent field areas.
Surface waters - setback distance (m)	Setback distance complies with requirements in Guideline for onsite wastewater management, EPA Victoria, May 2024	Nil	NN
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake	Nil	NN
Soil Drainage (Field Handbook definitions)	Well drained. Water removed from the soil readily, excess flows downward. Some horizons may remain wet for several days after addition	Nil	Shallow subsurface irrigation recommended with Irrigation area sizing using the Nominated Area Water Balance & Storage Calculations allows for the wettest recorded months.

*NN: not needed

4.3 Soil key features

The site's soils have been assessed for their suitability for onsite wastewater management by a combination of soil survey and desktop review of published soil survey information as outlined below.

4.4 Geology

	Geological mapping
Geological Survey Code:	Qno4
Description:	Sheet flow basalts: stony rise features discernible; negatively magnetized; dominantly fresh alkalic olivine-basalt.
Reference:	TAYLOR, D.H., 1996. Ballarat 1:50,000 geological map. Geological Survey of Victoria.

4.5 Local Mine Hazards

	DPI Search for Mine Hazard results
Department of Primary Industries records:	"do not indicate the existence of any mining activity on or under this site, but the site is within an area of past prospecting or mining activity. Note that there may be unrecorded mine workings present."

4.6 Soil

	Soil conditions
The predominant soil profile on site is:	Shallow fill material to depths of 200 - 300*mm* overlying natural silty clay loam with basaltic silty clay at depths of 500 - 600*mm*.

4.7 Soil profile determination

	Assessment
Field work:	6 x boreholes were established and excavated in the area of the proposed new demountable and northern wastewater effluent field area.
Method of drilling or excavation:	Trailer-mounted soil sampling machine.
Method of classification:	The soil was classified according to AS/NZS 1547-1994/2012 while considering Bungaree's wet temperate climate.
Site and test plan:	Please refer to Attachment 2.
Reporting:	Please refer to Attachment 3 for sample hole results.

4.8 Soil assessment

Feature	Assessment	Level of Constraint	Mitigation Measures
Soil category (AS/NZ 1547:2012)	5b - moderately structured light clay.		
Soil depth	Topsoil: 500 - 600*mm*	Minor	Shallow subsurface irrigation in topsoil recommended.
	Subsoil: >500 - 600*mm*	Minor	NN

Soil Permeability & Design Loading Rates	Subsoil: 5b - moderately structured light clay: 0.06 - 0.12 m/day saturated conductivity (K_{sat}) (AS/NZS1547:2012); 3mm/day Design Irrigation Rate (DIR) for irrigation system (Code of Practice, 2016).	Moderate	Use indicative permeability (ksat) of 0.05m/day in calculations.
Mottling	Very well to well-drained soils generally have uniform brownish or reddish colour	Nil	NN
pH	5.5 - 8 is the optimum range for a wide range of plants	Nil	NN
Rock Fragments	0 - 10%	Nil	NN
Soil Depth to Rock or other impermeable layer	>1.5 m	Nil	NN
Soil Structure (pedality)	Moderately-structured	Nil	NN
Soil Texture, Indicative Permeability	**5b**	**Major**	**Use indicative permeability (ksat) of 0.05m/day in calculations.**
Watertable Depth (m) below the base of the LAA	>2m	Nil	NN

4.9 Groundwater Assessment

	Visualising Victoria's Groundwater Data Search
VVG records:	Groundwater depth: 5 to 10*m* Groundwater salinity: < 500*mg/L*

4.10 Victorian Planning Provision – Overlays

Overlay	Assessment
Planning Zone:	FZ - Farming Zone
Planning Overlay:	ESO1 - Environmental Significance Overlay • Schedule 1 - Special water supply catchment areas DDO2 - Design And Development Overlay • Schedule 2 - Visual amenity and building design
Declared Special Water Supply Catchment Area:	Lal Lal Reservoir.

4.11 Overall assessment results and land capability rating

Based on the most constraining site features and soil assessment, the overall land capability of the proposed effluent management area is constrained:

- The site is in the Lal Lal Reservoir Declared Special Water Supply Catchment Area.
- The area available for an effluent field to the north is quite limited due to gardens and small trees which will have to be removed to make room for the northern primary field.
- Due to the limited space available to the north of the school and the Aboriginal cultural heritage overlay in the northeast corner of the site, the field will need to be split into two discrete fields.

The proposed effluent management area is located above the 1:100 flood level and by using secondary treatment and pressure compensating subsurface irrigation, there will be ample protection of surface waters and groundwater.

5 Wastewater management system

5.1 Overview

This report provides recommendations for treatment and land application systems that are appropriate to the land capability. The following sections provide an overview of a suitable system, with sizing and design considerations and justification for its selection. Detailed design for the system is beyond the scope of this study, but should be undertaken at the time of building application and submitted to Council.

5.2 Type of treatment system installed

Primary Treatment System

The existing former school building is currently serviced by a conventional septic tank. There is no evidence of any absorption trenches on the site.

Due to the limited space available on site and the expansion of the capacity of the school facility, this septic system is not appropriate and should be replaced with a secondary treatment system.

5.3 Type of treatment system required

Secondary Treatment System

To treat domestic wastewater and allow irrigation with the treated effluent, we recommend installing a system that provides secondary treatment to meet Environmental Protection Authority requirements for irrigation. Indicative target effluent quality is:

- BOD <20 mg/L;
- SS <30mg/L.

Several suitable options are available, including a **Aerated Wastewater Treatment System (AWTS) or sand filter**. Either of these options are capable of achieving the desired level of performance and final selection is the responsibility of the property owner, who will forward details to Council for approval.

5.4 Recommended type of treatment system

Aerated Wastewater Treatment System (AWTS)

To treat domestic wastewater and allow irrigation with the treated effluent, we recommend installing a system that provides secondary treatment to meet Environmental Protection Authority requirements for irrigation. The water quality of secondary standard effluent in Victoria is <20 *mg/L* BOD_5, <30 *mg/L* TSS and, where disinfected, *E. coli* <10 *cfu* /100 *mL*.

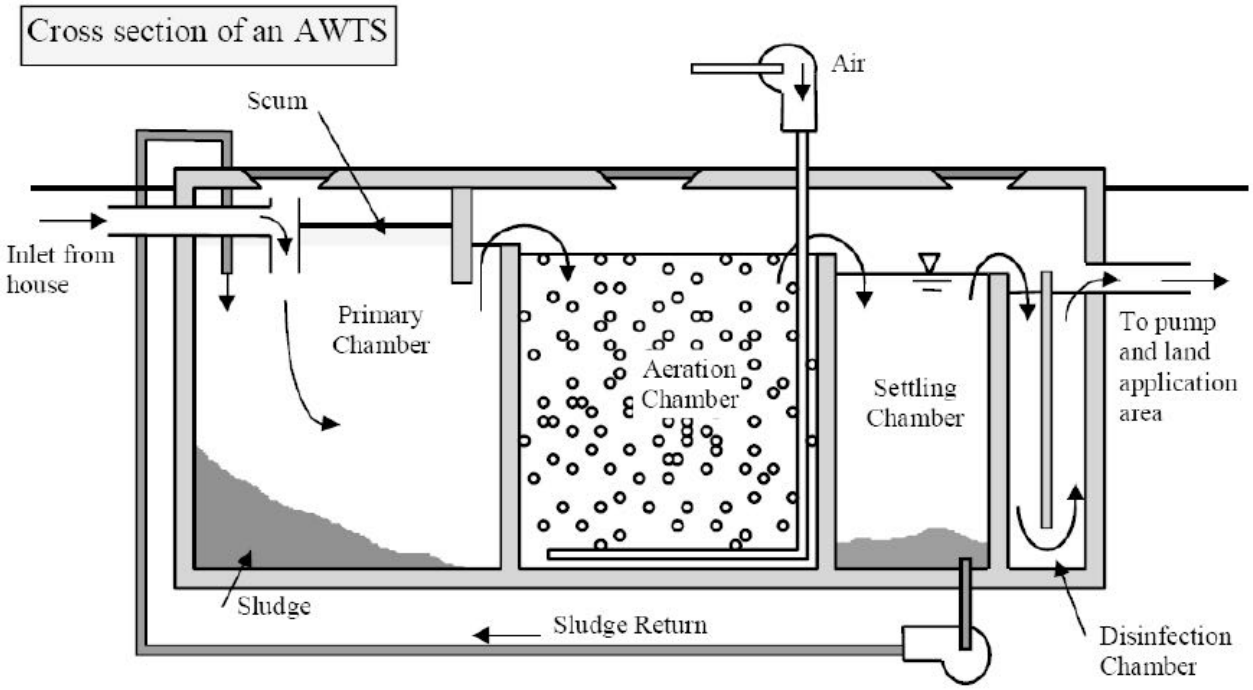
An **Aerated Wastewater Treatment System (AWTS)** is designed to treat small (<2000*L/day*) wastewater flows. This system consists of a series of treatment chambers combined where air is bubbled through wastewater in a tank provides oxygen to micro-organisms to facilitate aerobic biological digestion of the organic matter in the wastewater.

Wastewater from a household is treated in stages in several separate chambers. The first chamber is similar to a conventional septic tank. The wastewater enters the chamber where the solids settle to the bottom and are retained in the tank forming a sludge layer.

Scum collects at the top, and the partially clarified wastewater flows into a second chamber. Here the wastewater is mixed with air to assist bacteria to further treat it.

A third chamber allows additional clarification through the settling of solids, which are returned for further treatment to either the septic chamber or to the aeration chamber. The clarified effluent may also be disinfected in another chamber (usually by chlorination) before irrigation can take place.

Bacteria in the first chamber break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the chamber and must be pumped out periodically.



5.5 Type of land application system

Pressure-compensating subsurface irrigation system

The default land application system for sustainably recycling secondary treated sewage or greywater effluent to land is **pressure-compensating subsurface irrigation** (with disc or mesh filters and scour and vacuum valves) which evenly distributes effluent throughout the irrigation area.

The distribution pipes (drip-lines) fill up with effluent until a certain pressure is reached which opens the emitter valves. More controlled pressure can be applied when the field is divided into two or more zones and these smaller areas are intermittently dosed using a sequencing valve.

Water is not wasted by evaporation or runoff, flexible garden designs are possible, water is delivered to the plants' roots in the topsoil layer and it provides the highest protection for environmental and public health.

In combination with the selected secondary treatment system, these systems will provide even and widespread dispersal of highly treated effluent loads within the root-zone of plants.

Secondary quality effluent is a valuable water and nutrient resource and should be used beneficially to support vegetation growth, not be discharged deep in the soil profile where it provides very little beneficial use to the land or to the residents.

A gravity-flow effluent irrigation system is not allowed, due to the lack of even distribution. Irrigation distribution pipes must not have dripper-holes drilled or cut into them after purchase because the effluent will flow out of the holes in the first few metres of pipe at a far higher rate than the system is designed for and higher than the soil is capable of sustainably absorbing.

5.6 Sizing the irrigation system

Water and nutrient balance analyses were based on the 9th decile wet year calculated from the mean monthly rainfall data and 9th decile annual rainfall for Bungaree (Kirks Reservoir) and mean evaporation data for Creswick and were undertaken in accordance with *Guidelines for Wastewater Irrigation, E.P.A.* Publication 168, April 1991 (Part), *AS/NZS 1547:2012* and in-house methods.

Redistribution of monthly rainfall was adjusted in proportion to the deviation of means from the minimum mean. The rainfall and evaporation data were obtained from the National Climate Centre, Bureau of Meteorology. The data was subsequently analysed and applied to the water and nutrient balance analyses using the Water/Nitrogen Balance spreadsheet developed by Paul Williams & Associates Pty Ltd.

The results of the water and nutrient balance analyses are given in Attachment 5 of this report.

Size

As a result of these calculations, a subsurface irrigation field of at least 765m^2 is required for the proposed redevelopment of the school campus on this site.

5.7 Siting and configuration of the irrigation system

Description

It is preferable to keep the irrigation area as high on the property as possible and a maximum distance from the boundaries as setbacks allow.

Due to the limited space available to the north of the school and the Aboriginal cultural heritage overlay in the northeast corner of the site, the field will need to be split into two discrete fields.

The area in the northern area to the north of the existing school and residence buildings is capable of having 590m^2 installed.

The required additional 175m^2 will need to be installed in the lawn area between the Catholic church and the Clergy accommodation.

Attachment 4 shows an envelope of land that is suitable for effluent management. Final placement and configuration of the irrigation system will be determined by the client and/or system installer, provided it remains within this envelope.

Whilst there is ample area for application of the effluent, it is important that appropriate buffer distances to the waterways be maintained. It is important to note that buffers are measured as the overland flow path for run-off water from the effluent irrigation area.

It is recommended that the owner consult an irrigation expert familiar with effluent irrigation equipment to design the system, and an appropriately registered plumbing/drainage practitioner to install the system. The irrigation plan must ensure even application of effluent throughout the entire irrigation area.

5.8 Site photo

View to west across proposed primary northern effluent field area

5.9 Buffer distances

Description

Setback buffer distances from effluent land application areas and treatment systems are required to help prevent human contact, maintain public amenity and protect sensitive environments. The relevant buffer distances for this site, taken from Table 5 of the Code (2013) are:

- 150 metres from a dam, lake or reservoir (potable water supply);
- 100 metres from waterways (potable water supply);
- 30 metres from waterways, wetlands (continuous or ephemeral, non-potable); estuaries, ocean beach at high-tide mark; dams, lakes or reservoirs (stock and domestic, non-potable);
- 20 metres from groundwater bores in Category 2b to 6 soils; and
- 3 metres if area up-gradient and 1.5 metres if area down-gradient of property boundaries, swimming pools and buildings (conservative values for primary effluent).

All buffer distances are achievable.

5.10 Installation of the irrigation system

Description

Installation of the irrigation system must be carried out by a suitably qualified, licensed plumber or drainer experienced with effluent irrigation systems.

To ensure even distribution of effluent, it is essential that the pump capacity is adequate for the size and configuration of the irrigation system, taking into account head and friction losses due to changes in elevation, pipes, valves, fittings etc. An additional, optional measure to achieve even coverage is to divide the irrigation area into two or more separate sub-zones; dosed alternately using an automatic indexing or sequencing valve.

The irrigation area and surrounding area must be vegetated or revegetated immediately following installation of the system, preferably with turf. The area should be fenced or otherwise isolated (such as by landscaping), to prevent vehicle and stock access; and signs should be erected to inform householders and visitors of the extent of the effluent irrigation area and to limit their access and impact on the area.

Stormwater run-on is not expected to be a concern for the proposed irrigation area, due to the landform of the site and its relatively gentle slopes. However, upslope diversion berms or drains may be constructed if this is deemed to be necessary during installation of the system, or in the future. Stormwater from roofs and other impervious surfaces must not be disposed of into the wastewater treatment system or onto the effluent management system.

5.11 Monitoring, operation and maintenance

Description

Maintenance is to be carried out in accordance with Australian Standards 1546.1 to 1546.4 pursuant to the selected secondary treatment system and Council's permit conditions. The treatment system will only function adequately if appropriately and regularly maintained.

<u>To ensure the treatment system functions adequately, residents must:</u>

- Have a suitably qualified maintenance contractor service the treatment system at the frequency required by Council under the permit to use;
- Use household cleaning products that are suitable for septic tanks;
- Keep as much fat and oil out of the system as possible; and
- Conserve water (AAA rated fixtures and appliances are recommended).

<u>To ensure the land application system functions adequately, residents must:</u>

- Regularly harvest (mow) vegetation within the LAA and remove this to maximise uptake of water and nutrients;
- Monitor and maintain the irrigation system following the manufacturer's recommendations, including flushing the irrigation lines;
- Regularly clean in-line filters;
- Not erect any structures and paths over the LAA;
- Avoid vehicle and livestock access to the LAA, to prevent compaction and damage; and
- Ensure that the LAA is kept level by filling any depressions with good quality topsoil (not clay).

6 Conclusions

As a result of our investigations we conclude that sustainable onsite wastewater management is feasible with appropriate mitigation measures, as outlined, for the proposed school redevelopment at 186 Bungaree-Wallace Road, Bungaree.

Based on the most constraining site features and soil assessment, the overall land capability of the proposed effluent management area is constrained:

- The site is in the Lal Lal Reservoir Declared Special Water Supply Catchment Area.
- The area available for an effluent field to the north is quite limited due to gardens and small trees which will have to be removed to make room for the northern primary field.
- Due to the limited space available to the north of the school and the Aboriginal cultural heritage overlay in the northeast corner of the site, the field will need to be split into two discrete fields.

The proposed effluent management area is located above the 1:100 flood level and by using secondary treatment and pressure compensating subsurface irrigation, there will be ample protection of surface waters and groundwater.

Specifically, we recommend the following:

- Redevelopment of former school building and addition of demountable building with 60 x students and 10 x staff
    - The existing former school building is currently serviced by a conventional septic tank. There is no evidence of any absorption trenches on the site. Due to the limited space available on site and the expansion of the capacity of the school facility, this septic system is not appropriate and should be replaced with a secondary treatment system.
    - Installation of an Aerated Wastewater Treatment System providing secondary treatment for the dwelling.
    - Land application of wastewater in a 765m^2 pressure-compensating subsurface irrigation field.
        - The area in the northern area to the north of the existing school and residence buildings is capable of having 590m^2 installed.
        - The required additional 175m^2 will need to be installed in the lawn area between the Catholic church and the Clergy accommodation.
- Installation of water saving devices in the buildings to reduce the effluent load for onsite disposal.
- Use of low phosphorus and low sodium (liquid) detergents to improve effluent quality and maintain soil properties.
- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations, the EPA Certificate of Approval, the Guideline for onsite wastewater management, EPA Victoria, May 2024 and the recommendations made in this report.

If there are any queries regarding the content of this report, please contact this office.

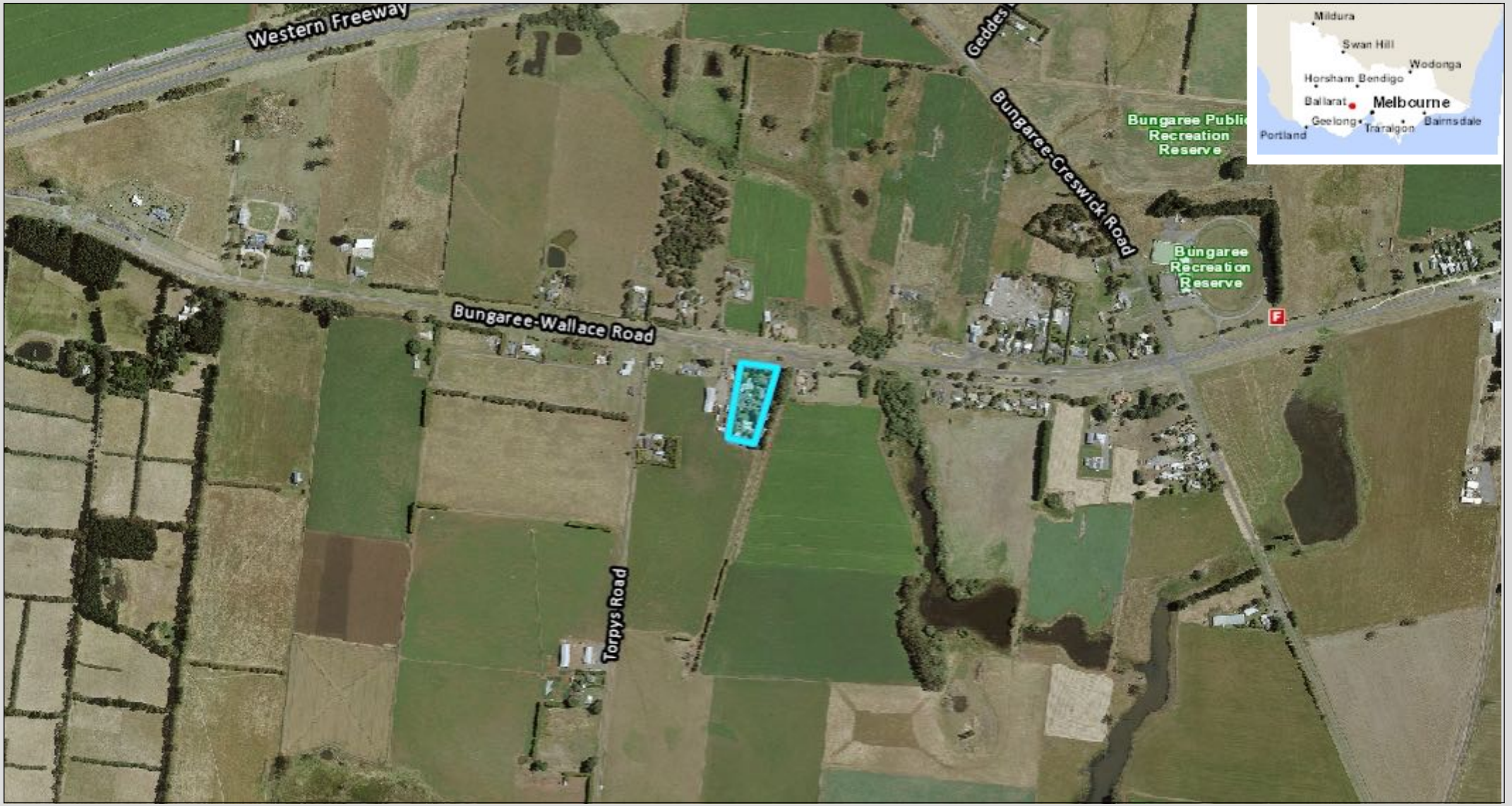
STEPHEN O'LOUGHLIN
Geologist

Attachment 1 – Locality plan

Plan included on next page.

Locality plan

186 Bungaree-Wallace Road, Bungaree



508 0 254 508 Meters

GDA2020_Vicgrid

Map Created on 26-Aug-2024

Scale 1:10,000

Attachment 2 – Soil testing program plan

Plan included on next page.


BH06
BH05
BH04
BH03
BH01
BH02
Sat Jul 6 2024
Imagery © 2024 Nearmap, HERE
10 m
Nearmap

Attachment 3 – Sample hole results

Sample Hole BH01

Depth (mm)	Description	Fill	Moisture	Consistency	Allowable Bearing Pressure (kPa)	Reactivity
100	Bitumin/sand FILL; gry/brwn	–	–	–	–	–
200	Silty clay LOAM; dark brown	–	Slightly moist	Firm	–	–
300	Basalt ROCK	–	–	–	–	–
400 500 600 700 800 900	Silty CLAY; grey/brown; some basalt rock	–	Slightly moist	Stiff	150	High
1000 1100 1200 1300 1400	Silty CLAY; brown; some basalt rock	–	Slightly moist	Stiff	180	High
1500	END OF HOLE					

Sample Hole BH02

Depth (mm)	Description	Fill	Moisture	Consistency	Allowable Bearing Pressure (kPa)	Reactivity
100	Bitumin/sand FILL; gry/brwn	–	–	–	–	–
200 300	Silty clay LOAM; dark brown	–	Slightly moist	Firm	–	–
400 500 600 700 800 900 1000 1100	Silty CLAY; brown	–	Slightly moist	Stiff	150	High
1200 1300 1400	Silty CLAY; brown; some basalt rock	–	Slightly moist	Stiff	180	High
1500	END OF HOLE					

Sample Hole BH03

Depth (mm)	Description	Fill	Moisture	Consistency	Allowable Bearing Pressure (kPa)	Reactivity
100	Bitumin/sand FILL; gry/brwn	–	–	–	–	–
200	Sandy clay loam FILL; grey	–	Slightly moist	Firm	–	–
300 400 500 600 700 800	Silty CLAY; brown; some basalt rock	–	Slightly moist	Stiff	150	High
900 1000 1100 1200 1300 1400	Silty CLAY; brown	–	Slightly moist	Stiff	180	High
1500	END OF HOLE					

Sample Hole BH04

Depth (mm)	Description	Fill	Moisture	Consistency	Allowable Bearing Pressure (kPa)	Reactivity
100	Bitumin/sand FILL; light grey	–	–	–	–	–
200 300 400	Silty clay LOAM; dark brown; some basalt rock	–	Slightly moist	Firm	–	–
500 600 700 800 900 1000 1100	Silty CLAY; brown/red	–	Slightly moist	Stiff	150	High
1200 1300 1400	Silty CLAY; brown	–	Slightly moist	Stiff	180	High
1500	END OF HOLE					

Sample Hole BH05

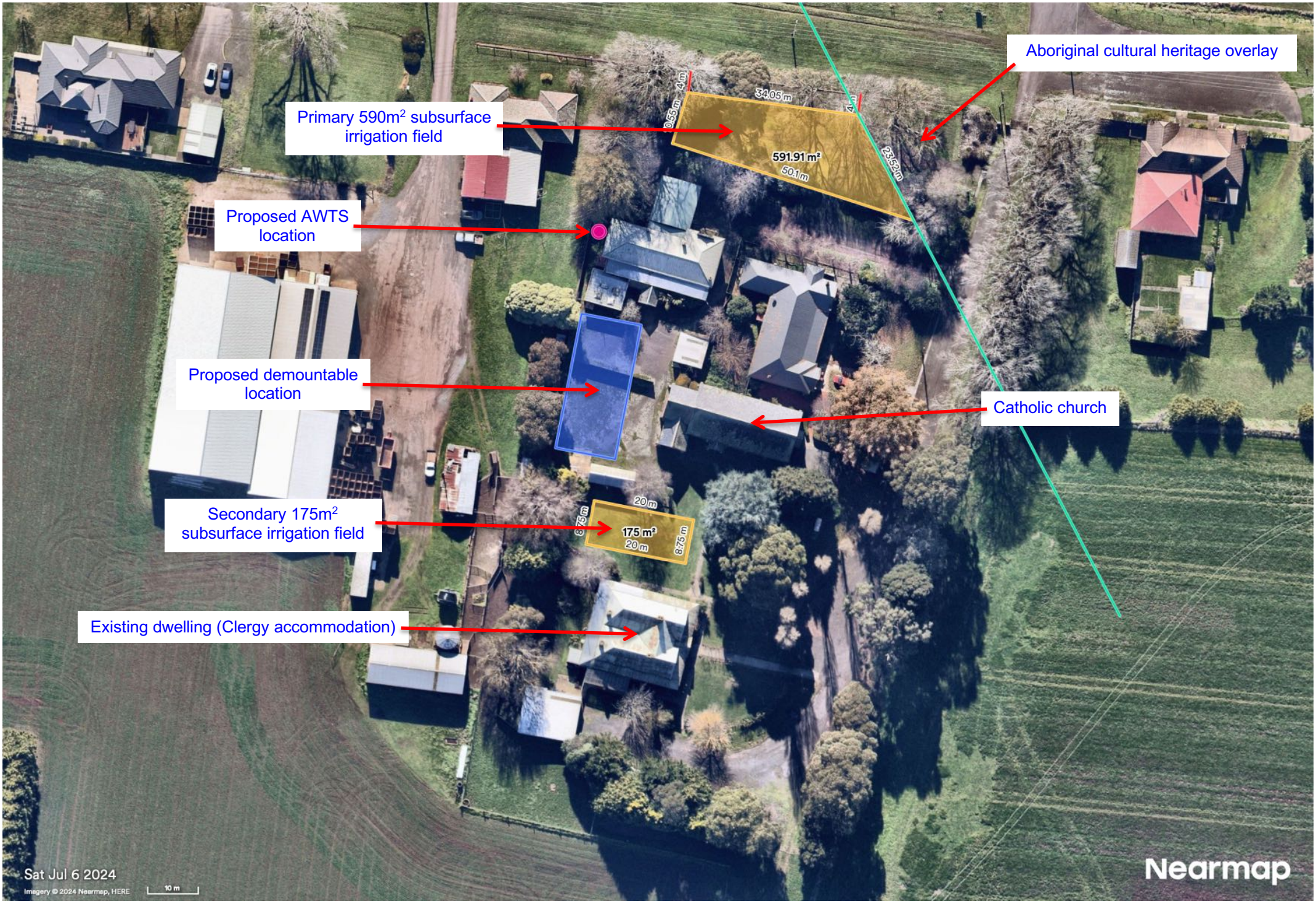
Depth (mm)	Description	Fill	Moisture	Consistency	DIR (mm/day)	Indicative permeability (Ksat)
100 200	Sandy FILL; light grey	–	Slightly moist	Soft	0.5 - 1.5	4
300	Brick RUBBLE; red	–	–	–	–	–
400 500 600	Silty clay LOAM; grey	–	Slightly moist	Firm	3.5	0.12
700 800 900 1000	Silty CLAY; brown/orange/ grey	–	Slightly moist	Stiff	3	0.06
1100 1200 1300 1400	Silty CLAY; brown/grey	–	Moist	Stiff	3	0.06
1500	END OF HOLE					

Sample Hole BH06

Depth (mm)	Description	Fill	Moisture	Consistency	DIR (mm/day)	Indicative permeability (Ksat)
100 200	Gravelly FILL; roadbase	–	Dry	Soft	5	> 3.0
300 400 500	Silty clay LOAM; brown	–	Slightly moist	Firm	3.5	0.12
600 700 800 900 1000 1100 1200 1300 1400	Silty CLAY; brown; some basalt rock	–	Slightly moist	Stiff	3	0.06
1500	END OF HOLE					

Attachment 4 – Proposed wastewater treatment plan

Plan included on next page.


Aboriginal cultural heritage overlay
Primary 590m² subsurface irrigation field
Proposed AWTS location
Proposed demountable location
Catholic church
Secondary 175m² subsurface irrigation field
Existing dwelling (Clergy accommodation)
34.05 m
591.91 m²
50.1 m
23.52 m
0.53 m
4 m
20 m
175 m²
8.75 m
Sat Jul 6 2024
Imagery © 2024 Nearmap, HERE
10 m
Nearmap

Attachment 5 – Water balance calculations

Spreadsheet included on next page.

Ballarat Soil Testing

Water/Nitrogen Balance (20/30 irrigation): With no wet month storage

Rainfall station: Bungaree (Kirks Reservoir) 87014
Evaporation station: Creswick 88019

Location: 186 Bungaree-Wallace Road, Bungaree
Date: August 26, 2024
Client: St Joseph's

ITEM		UNIT	#	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Days in month:			D	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0	365.0
Evaporation (Mean):		mm	A	207.7	184.8	127.1	81.0	49.6	27.0	27.9	43.4	66.0	111.6	129.0	155.0	1210.1
Rainfall (9th decile wet year adjusted):		mm	B1	50.0	46.2	50.6	77.4	103.5	107.7	107.9	124.0	113.0	103.8	83.1	66.6	1033.8
Effective or retained rainfall:		mm	B2	42.5	39.3	43.0	65.8	88.0	91.6	91.7	105.4	96.0	88.2	70.7	56.6	878.7
Peak seepage loss (1):		mm	B3	142.6	128.8	142.6	138.0	142.6	138.0	142.6	142.6	138.0	142.6	138.0	142.6	1679.0
Evapotranspiration (I x A):		mm	C1	93.5	83.2	57.2	36.5	22.3	12.2	12.6	19.5	29.7	50.2	58.1	69.8	544.5
Waste loading / Outputs (C1 + B3 - B2):		mm	C2	193.6	172.7	156.8	108.7	77.0	58.6	63.4	56.7	71.7	104.6	125.4	155.8	1344.8
Net evaporation from lagoons (10(0.8A - B1 x lagoon area (ha)):		L	NL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Volume of wastewater:		L	E	43400.0	39200.0	43400.0	42000.0	43400.0	42000.0	43400.0	43400.0	42000.0	43400.0	42000.0	43400.0	511000.0
Total irrigation water ((E - NL)/G):		mm	F	56.7	51.2	56.7	54.9	56.7	54.9	56.7	56.7	54.9	56.7	54.9	56.7	668.0
Irrigation area (E / C2) annual:		sqm	G	224.2	227.0	276.9	386.5	563.9	717.1	684.2	765.0	586.2	415.0	335.0	278.6	765.0
Surcharge:		mm	H	-136.9	-121.4	-100.0	-53.8	-20.2	-3.7	-6.7	0.0	-16.8	-47.9	-70.5	-99.0	0.0
Actual seepage loss:		mm	J	5.7	7.4	42.6	84.2	122.4	134.3	135.9	142.6	121.2	94.7	67.5	43.6	1002.2
Crop factor:			I	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	*Shade*
Rainfall retained:	85	%	K													
Lagoon area:	0	ha	L													
Wastewater (irrigation):	1400	L	M													
Seepage loss (peak):	4.6	mm	NL	0.7	0.7	0.7	0.6	0.5	0.45	0.4	0.45	0.55	0.65	0.7	0.7	*Pasture*
Irrigation area (no storage):	765.0	sqm	P2	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	*Shade*
Application rate:	1.8	mm	Q	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	*Buffalo*
Nitrogen in effluent:	30	mg/L	R	1	1	1	1	1	1	1	1	1	1	1	1	*Woodlot*
% N lost to soil processes:	20	%	S													
Crop N uptake:	220	kg/ha/y	T													
	60.27	mg/sqm/day														
Average daily seepage:	2.7	mm	U													
Total N loss to soil:	8400	mg/day	V													
Remaining N load after soil loss:	33600	mg/day														
Area for N uptake (no storage):	557	sqm	W													
Application rate:	2.5	mm	X													

Crop factor

Species	*kg/ha/yr*	*pH*	*Species*	*kg/ha/yr*	*pH*	*Species*	*kg/ha/yr*	*pH*
Ryegrass	200	5.6-8.5	Bent grass	170	5.6-6.9	Grapes	200	6.1-7.9
Eucalyptus	90	5.6-6.9	Couch grass	280	6.1-6.9	Lemons	90	6.1-6.9
Lucerne	220	6.1-7.9	Clover	180	6.1-6.9	C cunn'a	220	6.1-7.9
Tall fescue	150-320	6.1-6.9	Buffalo (soft)	150-320	5.5-7.5	P radiata	150	5.6-6.9
Rye/clover	220		Sorghum	90	5.6-6.9	Poplars	115	5.6-8.5

Nitrogen uptake

Weather data

Rainfall station: Bungaree (Kirks Reservoir) 87014

Mean monthly rainfall:	mm	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
		48.5	46.2	48.9	65.2	81.1	83.7	83.8	93.6	86.9	81.3	68.7	58.6	848.2

Rainfall data & 9th decile redistribution

Rainfall to be redistributed (9th decile):	1033.8	mm/yr
Minimum mean rainfall:	46.2	mm
9th decile (annual) - mean rainfall (annual):	187.3	mm

	mm	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean rainfall	mm	48.5	46.2	48.9	65.2	81.1	83.7	83.8	93.6	86.9	81.3	68.7	58.6	846.5
Deviation from minimum mean	mm	2.3	0	2.7	19	34.9	37.5	37.6	47.4	40.7	35.1	22.5	12.4	292.1
Redistributed rainfall (1)	mm	50.0	46.2	50.6	77.4	103.5	107.7	107.9	124.0	113.0	103.8	83.1	66.6	1033.8

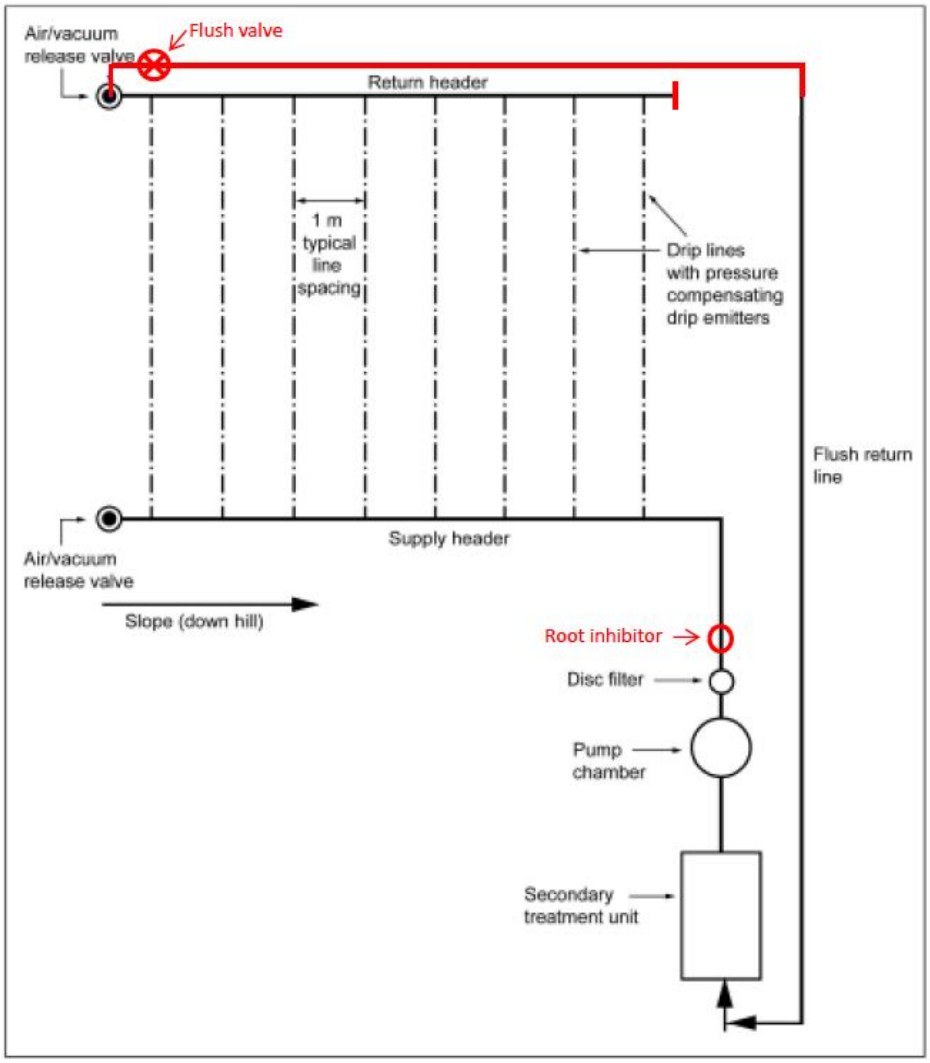
(1) The distribution is adjusted in proportion to the deviation of means from the minimum mean

Evaporation station: Creswick 88019

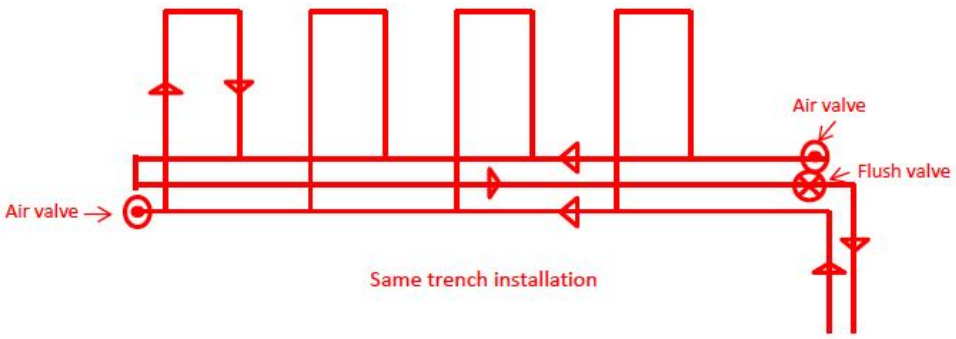
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Days in month:	31	28	31	30	31	30	31	31	30	31	30	31	365
Mean daily evaporation: mm	6.7	6.6	4.1	2.7	1.6	0.9	0.9	1.4	2.2	3.6	4.3	5	40.0
Mean monthly evaporation: mm	207.7	184.8	127.1	81.0	49.6	27.0	27.9	43.4	66.0	111.6	129.0	155.0	1210.1

Proposed number of students:	60		
Proposed number of staff:	10		
Design hydraulic flow rate:	20	L/d	School - child care - per day pupil and staff
Design wastewater flow (Q):	1400	L/d	
Design irrigation rate (DIR):	3	mm/d	
Indicative permeability (Ksat):	0.05	m/d	
	50.00	mm/day	
Peak seepage loss:	4.6	mm/day	(Seepage loss (peak) equals deep seepage plus lateral flow: 5.5mm (<10% ksat)

Attachment 6 – Subsurface irrigation system example



Revised Figure M1 Page 167 AS/NZS1547:2012 to ensure effective distribution and flushing



Attachment 7 – VicPlan Planning Property Report

Report included on next page.

PLANNING PROPERTY REPORT

Environment, Land, Water and Planning

From www.planning.vic.gov.au at 26 August 2024 01:13 PM

PROPERTY DETAILS

Address:	**186 BUNGAREE-WALLACE ROAD BUNGAREE 3352**
Lot and Plan Number:	**Lot 1 TP910718**
Standard Parcel Identifier (SPI):	**1\TP910718**
Local Government Area (Council):	**MOORABOOL** www.moorabool.vic.gov.au
Council Property Number:	**245950**
Planning Scheme:	**Moorabool** Planning Scheme - Moorabool
Directory Reference:	**Vicroads 76 H2**

UTILITIES

Rural Water Corporation:	**Southern Rural Water**
Urban Water Corporation:	**Central Highlands Water**
Melbourne Water:	**Outside drainage boundary**
Power Distributor:	**POWERCOR**

STATE ELECTORATES

Legislative Council:	**WESTERN VICTORIA**
Legislative Assembly:	**EUREKA**

OTHER

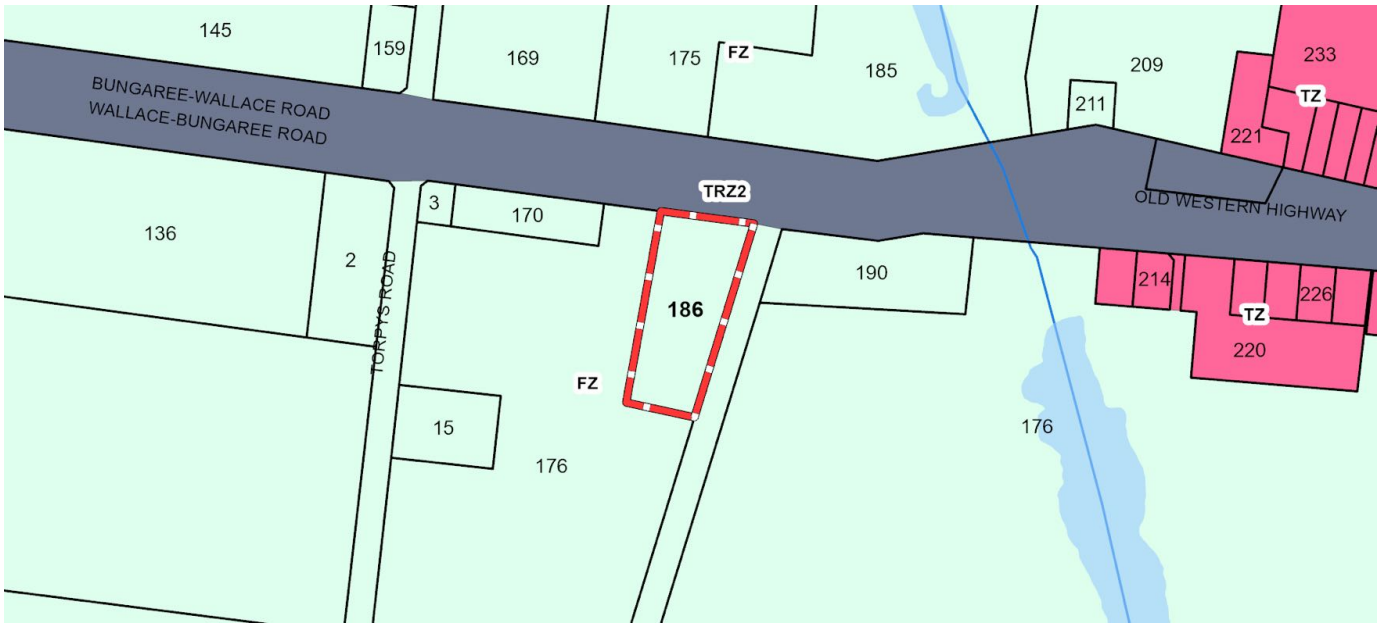
Registered Aboriginal Party:	**Wadawurrung Traditional Owners Aboriginal Corporation**

View location in VicPlan

Planning Zones

FARMING ZONE (FZ)

SCHEDULE TO THE FARMING ZONE (FZ)



FZ - Farming | **TRZ2 - Principal Road Network** | **TZ - Township**

Water area | **Water course**

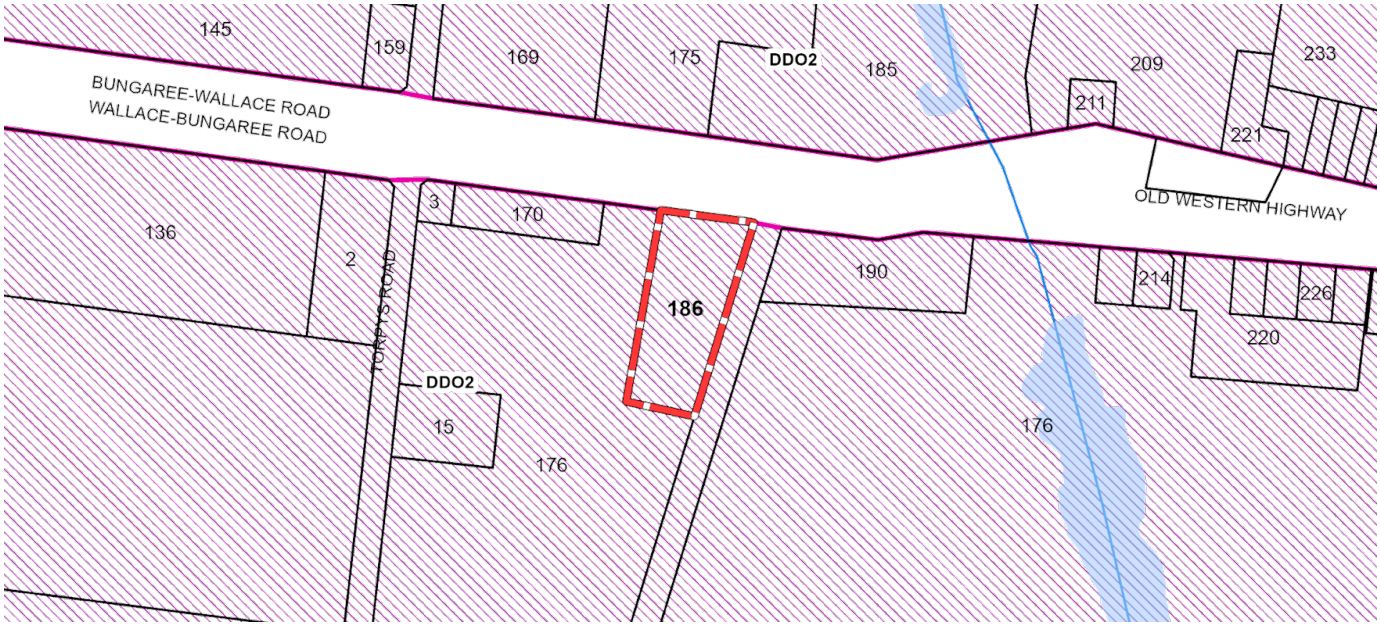
Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

PLANNING PROPERTY REPORT

Planning Overlays

DESIGN AND DEVELOPMENT OVERLAY (DDO)

DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 2 (DDO2)



DDO - Design and Development Overlay **Water area** **Water course**

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

ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)

ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)

ESO - Environmental Significance Overlay **Water area** **Water course**

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

PLANNING PROPERTY REPORT

Areas of Aboriginal Cultural Heritage Sensitivity

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

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

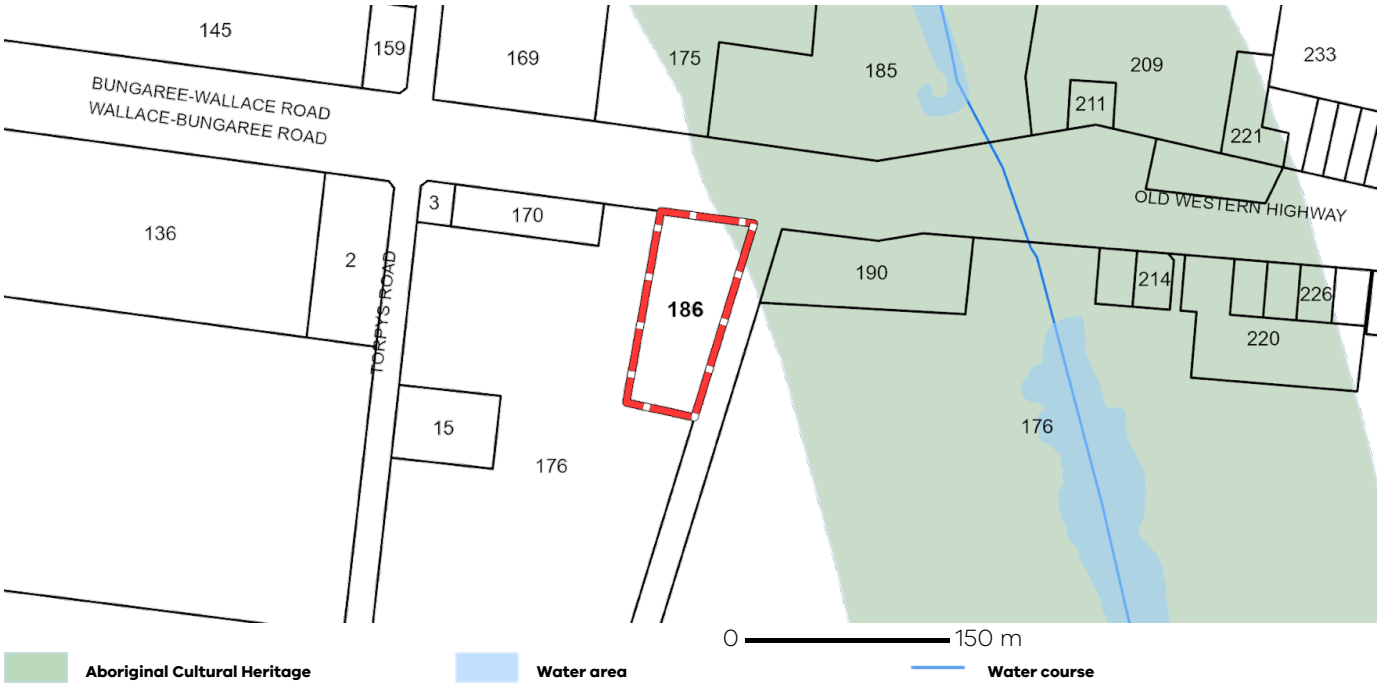
Under the Aboriginal Heritage Regulations 2018, 'areas of cultural heritage sensitivity' are one part of a two part trigger which require a 'cultural heritage management plan' be prepared where a listed 'high impact activity' is proposed.

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

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

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

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



PLANNING PROPERTY REPORT

Further Planning Information

Planning scheme data last updated on 21 August 2024.

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

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

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

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

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

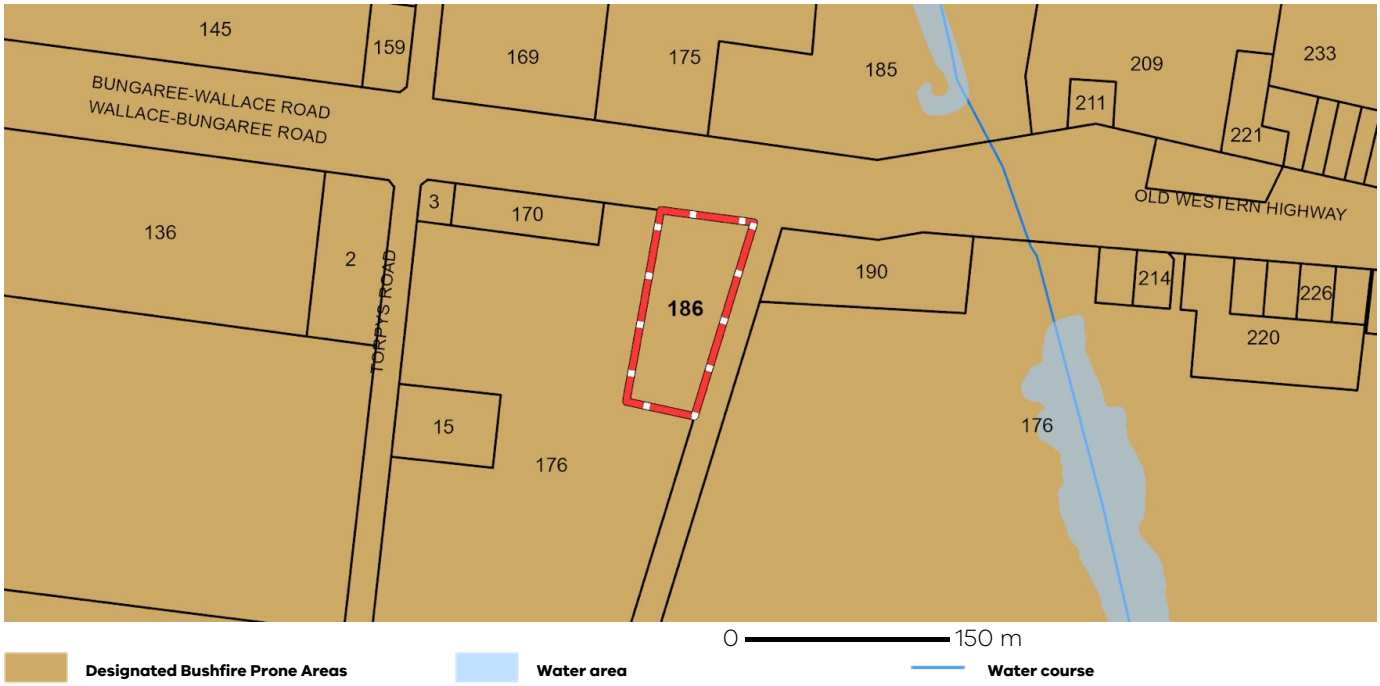
PLANNING PROPERTY REPORT

Designated Bushfire Prone Areas

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

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

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



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

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

Create a BPA definition plan in VicPlan to measure the BPA.

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

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

Native Vegetation

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

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

You can find out more about the natural values on your property through NatureKit NatureKit (environment.vic.gov.au)

Attachment 8 – Reducing Wastewater

In accordance with the principles of the waste hierarchy, the following steps are recommended to limit the amount of wastewater generated and beneficially use the resultant water resource onsite:

	Suggestions
1. Avoid generating excess wastewater by:	a) constructing a house with fewer bedrooms b) installing a dry composting toilet c) not installing a spa d) not installing a bath (low flow rate shower only) e) not installing a kitchen food waste grinder.
2. Reduce the volume of wastewater generated by installing:	High 'Water Efficiency Labelling Scheme' (WELS)-rated water-efficient fittings (minimum '3 Stars' for appliances and minimum '4 Stars' for all fittings and fixtures): a) water-efficient clothes washing machines (front or top loading) b) dual-flush (6.5/3.5L or less) toilets c) water-efficient shower roses d) water-efficient dishwashers e) aerated taps f) hot and cold water mixer taps (especially for the shower) g) flow restrictors h) hot water system fitted with a 'cold water diverter' which recirculates the initial flow of cold water until it is hot enough for a shower.
3. Reuse (another use without any treatment) wastewater by:	a) washing fruit and vegetables in tap water in a container and reusing the water for another purpose in the house such as watering pot plants b) collecting the initial cold water from showers in buckets and using it for another purpose such as soaking feet, hand washing clothes or washing the car on the lawn.
4. Recycle wastewater after treatment by using it to:	a) water gardens and lawn areas b) flush toilets with effluent from an EPA-approved 10/10/10 greywater system c) supply effluent to the cold water tap of the washing machine from an EPA-approved 10/10/10 greywater treatment system