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Job No:	V24-295
Checked by:	MPH
Design by:	GM

Reference Drawings:

Part of Structure:

LAND CAPABILITY
ASSESSMENT REPORT:

Proposed Lot 2,
6 Cardigan Street, Kirkstall

CLIENT:

[REDACTED]

REPORT BY:

[REDACTED]

CHECKED BY:

[REDACTED]

OUR REFERENCE:

V24-295

DATE ASSESSED:

13th January 2024

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LAND CAPABILITY ASSESSMENT REPORT

Report by [REDACTED]

For and on Behalf of Holmes McLeod Consulting Engineers Pty Ltd
451 Raglan Parade, Warrnambool, VIC 3280

1.0 Introduction

Holmes McLeod Consulting Engineers Pty Ltd has been engaged to undertake a Land Capability Assessment (LCA) for a proposed 2036m² lot at 6 Cardigan Street, Kirkstall VIC by Tom Sheehan. The field investigation and report have been undertaken and prepared by suitably experienced staff. Holmes McLeod Consulting Engineers Pty Ltd has appropriate professional indemnity insurance for this type of work. Our professional indemnity insurance certificate is available on request.

This report is intended to inform Moyne Shire Council about the land capability of the site to support an on-site wastewater treatment and disposal system. This document provides information about the site and soil conditions. It also provides a detailed LCA for the site, and includes a design check for a suitable onsite wastewater management system, including recommendations for monitoring and management requirements.

The site is in the Township Zone. Refer to the attached copy of the Planning Property Report in Appendix B.

The site has sufficient available area for onsite effluent disposal. The land surface slopes slightly towards the South. The average slope is approximately 2-3%. There is a creek approximately 150m to the South West of the proposed lot.

This report will assume a proposed residence with 4 bedrooms, using rainwater supply and full water reduction fixtures. The design daily wastewater flow rate is 600L/Day. The site has no reticulated sewerage system available.

We assess several options for both the treatment system and land application area (LAA). We recommend that effluent on this site should be treated to secondary level by an EPA approved treatment system, and land application can be achieved using sub-surface dripper irrigation.

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2.0 Site Description

Site Address: 6 Cardigan Street, Kirkstall, VIC 3283.
Client: [REDACTED]
Postal Address: 6 Cardigan Street, Kirkstall VIC 3283.
Contact: Mobile: [REDACTED]
Council Area: Moyne Shire
Zoning: Township Zone
Allotment Size: 2036m².
Domestic Water Supply: Rainwater supply.
Anticipated Wastewater Load: Assume 5 persons maximum occupancy. Full WELS rated water saving fixtures are to be used in the proposed residence. Requires 4 Stars or higher for dual-flush toilets, shower-flow restrictors, aerator taps, flow/pressure control valves, and 3 Stars or higher for all appliances (for example. clothes washing machines). Design wastewater flow is 120L/person/day, therefore total design flow, Q = 600L/day.
Availability of Sewer: The area is unsewered and unlikely to be sewerred in the short to medium term future.

3.0 Site Key Features

[REDACTED] undertook site investigations on the 13th of January 2025. A range of site features were assessed in terms of the degree of limitation they present for various onsite wastewater management systems.

The site slopes gently to the south at approximately 1 in 40 fall. There are several medium to large trees on the site. There is no evidence of a shallow watertable, nearby dams, or water bores. There is a creek to the South West of the site over a hundred metres away. The most significant constraint to effluent disposal is poor land application rates due to medium / heavy clay soils.

3.2 Features

Climate:	The site experiences an average annual rainfall of 733.5mm (Warrnambool Airport – BOM Station 90186). Average annual pan evaporation is taken as 1295mm.
Exposure:	The site has moderate sun and wind exposure.
Vegetation:	The site contains grasses and several medium to large trees.
Landform:	The site is well contoured and unlikely to allow ponding of water.
Slope:	The site fall is approximately 2-3% across the proposed land application area.
Fill:	No fill observed on site.

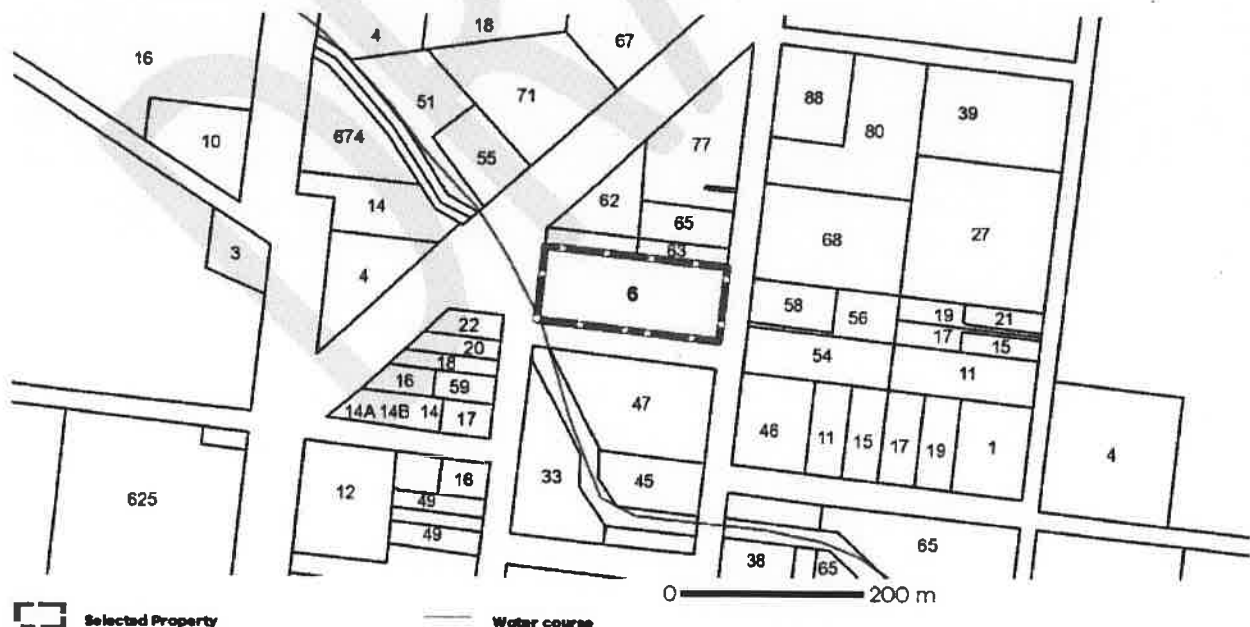
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Rocks and Rock Outcrops:	Some basalt boulders were observed on the site.
Erosion Potential:	There is minimum erosion potential.
Surface Water:	The site is unlikely to allow ponding of water.
Flood Potential:	The site is not in a recognised flood zone.
Stormwater run-on and upslope seepage:	Minimal stormwater run-on expected from upslope.
Groundwater:	Groundwater table was not encountered during excavations.
Site Drainage and Subsurface Drainage:	Surface drainage is good, Subsurface drainage is poor.
Recommended Buffer Distances:	Secondary treated effluent disposal area should be located a minimum of 1.5m from uphill buildings or boundaries, and 3m from downhill buildings or boundaries and 30m from waterways.
Available Land Application Area:	The site has limited land area available for the installation of a new land application system.

3.3 Figure 1: Site Locality Plan



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3.4 Figure 2: Site Aerial Photo



4.0 Soil Assessment and Constraints

The site's soils have been assessed for their suitability for onsite wastewater management by a soil survey as outlined below.

4.1 Soil Survey and Analysis

A soil investigation was carried out on the site to determine suitability for application of treated effluent. A shallow subsoil investigation was conducted in the vicinity of the proposed effluent disposal envelope using a hand auger. Soils encountered in and near the land application area were Category 6 clays with some silt / loam topsoil over.

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4.3 Soil Features:

Soil Depth	Natural clays encountered on site to at least 1.3m deep.	
Depth to watertable	Watertable not encountered. Depth to the watertable assumed to be >5m.	
Coarse Fragments (%)	<10% coarse fragments occur in the soil profile.	
Soil Permeability and Design Loading Rates	<p>Soil permeability was not directly measured but can be inferred with reference to Table 9 of the EPA Code of Practice 891.4 and also Appendix L and M of AS/NZ 1547:2012, which describe conservative Design Loading Rates (DLRs) and Design Irrigation Rates (DIRs) for various effluent application systems according to soil type. Critical soil properties are texture and structure, but depth, colour and degree of mottling are also used to infer drainage conditions.</p> <p>Note that the indicative loading rates below assume secondary treatment systems.</p>	
	Top Soils	Sub Soils
Description	Dark Grey Sandy Gravelly Loam, Fine Grain	Brown Silty Clay, High Plasticity
Soil Category (AS/NZ 1547:2012)	3a	6a
Design Irrigation Rate (DIR mm/day)	5	2
Design Loading Rate (DLR mm/day) for Trenches/Beds	15	5
pH	Not measured	Not measured
Electrical Conductivity	Not measured	Not measured

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5.0 Land Capability Risk Assessment Matrix

Land Features	Land Capability Class Rating					Site Rating
	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)	

General Characteristics

Site drainage	No visible signs of dampness	Moist soil, but no standing water in soil pit		Visible signs of dampness, such as moisture-tolerant plants	Water ponding on surface	1
Runoff	None	Low	Moderate	High - need for diversionary structures	Very High - diversion not practical	2
Flood levels	Never		> 1 in 100	< 1 in 100 and > 1 in 20	< 1 in 20	1
Proximity to watercourses	> 60				< 60	1
Slope %	0 - 2	2 - 8	8 - 12	12 - 20	> 20	2
Landslip	No actual or potential failure		Low potential failure	High potential failure	Present or past failure	1
Groundwater (seasonal watertable depth (m))	> 5	5 - 2.5	2.5 - 2	2.0 - 1.5	< 1.5	1
Rock outcrop (% of land surface containing rocks > 200mm)	0	< 10%	10 - 20%	20 - 50%	> 50%	2
Erosion potential	No erosion potential	Minor	Moderate	High	Severe erosion potential	2
Exposure	High sun and wind		Moderate	Low sun and wind exposure		3
Landform	Hill crests, convex side slopes and plains		Concave slopes and footslopes		Floodplains and incised channels	1
Vegetation Type	Turf or pasture				Dense forest with little understorey	1
Average Rainfall (mm/yr)	< 450	450 - 650	650 - 750	750 - 1000	> 1000	3

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5.1 Land Capability Risk Assessment Matrix (continued)

Land Features	Land Capability Class Rating					Site Rating
	Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)	
General Characteristics						
Pan Evaporation	< 1500	1250 - 1500	1000 -1250		< 1000	2
Fill	No fill		Fill present			1
Soil Profile Characteristics						
Soil permeability category	2 and 3	4		5	1 and 6	5
Profile depth	> 2m	1.5 - 2m	1.5 - 1m	1 - 0.5m	< 0.5m	3
Presence of mottling	None				Extensive	1
Course fragments (%)	< 10	10 - 20	20 - 40		> 40	1
pH	6 - 8		4.5 - 6		< 4.5, > 8	-
Emerson Aggregate	4, 6, 8	5	7	2, 3	1	-
Electrical Conductivity (Ece)(dS/m)	< 0.3	0.3 - 0.8	0.8 - 2	2 - 4	> 4	-
Sodicity ESP%	< 3%		6 - 8	8 - 14	> 14	-
Overall Site Rating						5

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5.2 Site Constraints and Mitigation Measures

As per the above risk assessment table, there are several constraints on this site that should be discussed.

Soil permeability: Due to the presence of Category 6 sub-soils the land application area should be designed appropriately. Secondary treatment of effluent reduces risks associated with land application, and adoption of sub-surface irrigation leads to a very conservative sizing of the irrigation field without the need for additional reserve area.

6.0 The Management Program

This LCA has been prepared to accompany a development application to Moyne Shire for a new wastewater management system. This report will focus on a suitable treatment and land application system to suit the current site conditions in an effort to show what is achievable with minimal cost. 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 report, but an overview is attached in Appendix A.

6.1 Treatment System

To treat domestic wastewater and allow dispersal of the treated effluent, we recommend using a secondary treatment system that meets the Environment Protection Authority requirements for sub-surface irrigation. To achieve secondary treated effluent, a variety of systems are available for selection. These include treatment plants, composting worm farms, reed beds, and sand filters. For secondary treatment, the target effluent quality is:

BODs: < 20mg/L.

TSS: < 30mg/L.

Secondary treated effluent should only be dispersed to land via sub-surface applications. A wide range of available secondary treatment systems with valid certificates for use in Victoria can be viewed at:

<https://www.epa.vic.gov.au/for-community/environmental-information/water/about-wastewater/onsite-wastewater-systems>

6.2 Land Application

A range of possible land applications have been considered, such as absorption trenches, evapotranspiration absorption beds, and mounds. The preferred system is sub-surface irrigation via pressure compensating dripper lines. These drippers will disperse wastewater across a large area into the root zones of plants, and can be used under lawns, and on sloping ground.

Sub-surface irrigation will provide beneficial reuse of the highly treated wastewater, which will lower the water usage for the garden area.

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6.3 Sizing the Land Application System

To determine the necessary amount of irrigated lawn area required a water balance calculation was completed. The calculation can be simply expressed by the equation:

Precipitation + Effluent Applied = Evapotranspiration + Percolation.

The results can be viewed in Appendix A, which show that the required irrigation area is 814m². Refer to the site plan in Appendix A.

6.4 Siting and Configuration of the Land Application Area

The site has sufficient land area available for the proposed irrigation field. The preferred location for the proposed sub-surface dripper irrigation field is on the lawn to the West and South of the proposed building envelope.

The land application area must not be subjected to stock or vehicular traffic, as these could damage the irrigation system and reduce its efficiency. Ride on mowers are acceptable to use on the land application area. Small trees should be planted at least 3m away from the trenches.

Reserve areas are not necessary due to the conservative Design Irrigation Rates used to size irrigated lawns result in fields that are unlikely to fail due to overloaded soils. The system is more likely to fail at the treatment system or in the irrigation lines before soil capabilities are exceeded.

6.5 Irrigation System Description

This report does not include a detailed design of the proposed effluent disposal system. A general description is provided here:

Secondary treated wastewater is pumped into a grid of irrigation lines. These are typically comprised of a feeding manifold, which has multiple pipes running from it at even spacing. These pipes contain dripper outlets at fixed intervals to disperse wastewater out into the soil. These pipes all terminate at a collecting manifold which can send any remaining wastewater into a flush line that loops back into the treatment plant at the start of the process, recycling any un-dispersed water. The drippers themselves should feature an Anti-Siphon mechanism to prevent unwanted particles from being drawn back into the drippers which could cause blockages, and they should be resistant to plant root infiltration.

As effluent is dispersed through the soil the water is absorbed by plants and evaporated into the air through transpiration. Undesirable particles from the effluent remain trapped in the soil of the land application area and are further digested by bacteria over time.

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6.6 Buffer Distances

Buffer distances from Land Application Areas are required to help prevent human contact, maintain public amenity and protect sensitive environments. Council generally adopts the following nominal buffers, as described in the EPA Code of Practice:

- 20m from groundwater bores,
- 30m from non-potable watercourses,
- 100m from potable watercourses,
- 3m from downhill boundaries,
- 1.5m from uphill boundaries, buildings, and swimming pools.

For this site, all buffers are achievable.

7.0 Monitoring, Operation and Maintenance

Maintenance is to be carried out in accordance with the certificate of approval and Council's permit conditions. The system proposed will only function adequately if appropriately maintained. Residents will be required to carry out maintenance as discussed below. Some general guidelines for maintenance are outlined below.

To ensure the treatment system functions adequately residents must:

- Have a suitably qualified maintenance contractor service the treatment plant at regular intervals, as specified by the manufacturer and as required by Council;
(Certain treatment systems may require different maintenance periods, which should be considered when making product selection.)
- Use household cleaning products sparingly and only use products marked "Suitable for Septic Tanks";
- Keep as much fat, grease, and oil out of the system as possible;
- Conserve water. Increasing the hydraulic flow in the system may overload the land application area. AAA rated plumbing is recommended on all future water fixtures to reduce water use.

To maintain the land application area, residents must:

- Regularly harvest/mow vegetation within the land application area and remove this to maximise the uptake of water and nutrients;
- Monitor and maintain the sub-surface irrigation system following the manufacturers recommendations, including flushing the irrigation lines;
- Regularly clean in-line filters;
- Not erect any structures over the land application area;
- Minimise vehicle and stock access to the land application area to prevent compaction;
- Ensure that water cannot pond in the land application area by filling any depressions with good quality topsoil.

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8.0 Stormwater Management

As mentioned previously, stormwater run on is not expected to be a major concern in this case. However, to mitigate the risk of stormwater run on affecting the land application area it is recommended to use surface diversion drains on the high sides of the land application area. This would provide protection from stormwater flows. Alternatively, fill the land application area with sandy loam topsoil to raise the height of the proposed irrigation field to ensure stormwater flows around it.

Stormwater discharge from the structures on site must not run into or across the land application area.

9.0 Conclusions

Following our investigations, we recommend that wastewater on this site be treated in an EPA approved secondary treatment system, and disposed to a land application area consisting of 814m² total area of sub-surface dripper irrigation, to suit a proposed 4 bedroom residence at Lot 2, 6 Cardigan Street, Kirkstall.

Specifically, we recommend the following:

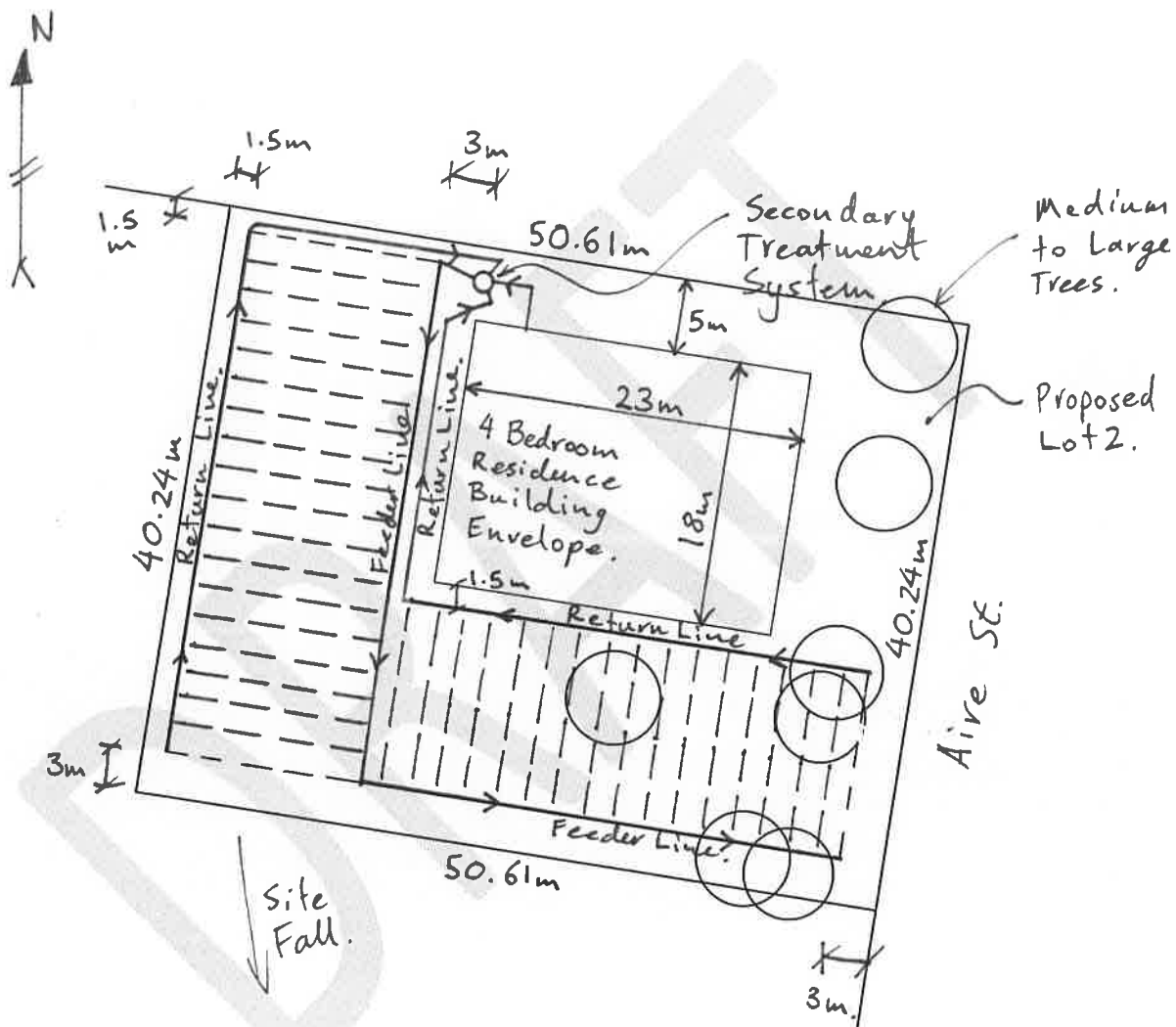
- Secondary treatment of wastewater in an EPA approved secondary treatment system capable of treating 600L/day design flows;
- Land application of wastewater in 814m² minimum irrigated lawn areas;
- Improving the land application area with new topsoil and grasses planted over, restricted access to stock and vehicle traffic, and surface cut off drains for stormwater diversion on the upslope sides of the irrigation area;
- Installation of full WELS-rated water saving fixtures in the residence. Requires 4 Stars or higher for dual-flush toilets, shower-flow restrictors, aerator taps, flow/pressure control valves, and 3 Stars or higher for all appliances (for example. clothes washing machines);
- Use of products acceptable for septic tanks to improve effluent quality and maintain soil properties;
- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations, recommendations made in this report, and recommendations from Council.

APPENDIX A

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Reference Drawings: Lot 2, 6 Cardigan St Kirkstall.

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LIST OF VEGETATION SUITABLE FOR WET SOILS

From Appendix C AS1547 - 1994

(a) Climbers

Lonicera japonica
Hibbertia scandens

Hardenbergia
Pandorea jasminoides

(b) Grasses

Buffalo

Kikuyu (if sunny position)

(c) Ground Cover

Acanthus mollis
Coprosma x kirki

Liriope Muscari (well drained)
Ophiopogon (well drained)

(d) Perennials

Agapanthus preaecox
Aster novi-belgii
Canna x generalis

Gazania x hybrida
Salvia x superba
Stokesia laevis

(e) Shrubs

Abelia x grandiflora
Hebe speciosa
Cassia bicapsularis
Certostigma
Chaenomeles lagenaria
Correa alba
Cotoneaster glaucophyllus (cold climate only)
Cotoneaster lacteus (cold climate only)
Cotoneaster pannosus (cold climate only)
Cuphea ignea
Pyracantha fortuneana
Thunbergia alata

Euphorbia pulcherrima (if drained)
Callistemon Citrinus (if drained)
Jasminum mesnyi (if drained)
Jasminum officinale "Grandiflorum"
Jasminum polyanthum
Lantana camara-(cultivars only)
Lantana montevidensis
Leptospermum flavescens
Nerium oleander (well drained)
Plumbago auriculata
Westringia fruticosa

(f) Trees

Angophora costata
Callistemon salignus
Callistemon viminalis
Casuarina glauca
Casuarina stricta
Eucalyptus botryoides
Eucalyptus robusta
Hakea salicifolia
Hakea salicifolia

Leptospermum laevigatum
Leptospermum petersonii
Melaleuca linariifolia - Clay soil
Melaleuca quinquenervia - Sandy soil
Melaleuca styphelioides - Clay soil
Nyssa sylvatica (well drained)
Photinea x fraseri "Robusta" (well drained)
Tristanopsis laurina

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BUILDING OWNERS GUIDE TO SEPTIC MAINTENANCE

T5.2 Operation and maintenance requirements

This clause provides general advice about operation and maintenance that is specifically relevant to the property owner/occupier of an on-site system. Detailed advice should be provided in the operation and maintenance guidelines for the specific system as designed and installed.

T5.2.1 Advice to a property owner/occupier on use of the system

For the on-site system to work well, there are some good habits to encourage and some bad habits to avoid:

- (a) To reduce sludge building up in the tank:
 - (i) Scrape all dishes to remove fats, grease, and so on before washing
 - (ii) Keep all possible solids out of the system
 - (iii) Don't use a food waste disposal unit unless the system has been specifically designed to carry the extra load (see 5.4.2.2.3), and
 - (iv) Don't put sanitary napkins and other hygiene products into the system;
- (b) To keep the bacteria working in the tank and in the land application area:
 - (i) Use biodegradable soaps
 - (ii) Use a low-phosphorus detergent
 - (iii) Use a low-sodium detergent in dispersive soil areas
 - (iv) Use detergents in the recommended quantities
 - (v) Don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants, and
 - (vi) Don't put chemicals or paint down the drain;
- (c) Conservation of water will reduce the volume of effluent requiring disposal to the land application area, make it last longer and improve its performance. Conservation measures include:
 - (i) Installing water conservation fittings
 - (ii) Taking showers instead of baths
 - (iii) Washing clothes only when there is a full load, and
 - (iv) Using the dishwasher only when there is a full load;
- (d) Avoid overloading the system by spacing out water use as evenly as possible. For example:
 - (i) Do not do all the washing on one day, and
 - (ii) Do not run the washing machine and dishwasher at the same time.

T5.2.2 Advice on maintenance

Maintenance instructions should cover the following matters:

- (a) The primary wastewater treatment unit (septic tank) should:
 - (i) Be inspected at least annually and pumped out regularly once the scum and sludge occupy two thirds of the tank volume, (or two thirds of the first stage of a two-stage system)
 - (ii) Be protected from vehicle access
 - (iii) Have any grease trap inspected at least quarterly and cleaned out regularly
 - (iv) Have the vent and the access cover of the septic tank exposed, and
 - (v) Have any outlet filter inspected and serviced in accordance with the manufacturer's recommendations;
- (b) The land application area should be protected by the following measures:
 - (i) Access to spray or irrigation areas should be restricted and the area never available as play areas for children
 - (ii) Any evapotranspiration areas should be designed to deter pedestrian traffic

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- (iii) No vehicles or stock should be allowed to access any land application area
 - (iv) Deep rooting trees or shrubs should not be grown over absorption trenches or pipes
 - (v) Surface water diversion drains should be maintained upslope of and around the land application area and kept clean to reduce seepage of rainwater into trenches or beds, and
 - (vi) The baffles or valves in the distribution system should be periodically (monthly or seasonally) changed to direct effluent into alternative trenches or beds, as required by the design;
- (c) Evapotranspiration and irrigation areas including areas within trenches and beds should:
- (i) Have their grass mown and plants maintained to ensure that these areas take up nutrients with maximum efficiency
 - (ii) Be checked for wet spots, uneven grass colour, any symptoms of emitter blockage (either evident from under-irrigated dry areas or over-irrigated wet areas)
 - (iii) Have blocked or damaged irrigation lines replaced;
- (d) Spray irrigation areas should have appropriate warning signs always visible to persons undertaking any activity near a spray irrigation area; and
- (e) Equipment should be checked, and:
- (i) The manufacturer's instructions followed for maintaining and cleaning pumps, siphons and septic tank outlet filters and the root intrusion chemical dosing system (if provided)
 - (ii) Disc filters or filter screens on irrigation-dosing equipment cleaned periodically by rinsing back into the primary wastewater treatment unit
 - (iii) Irrigation lines flushed periodically to scour out any accumulated sediment.

T5.2.3 Advice on operating problems

Problems can occur with systems which have not been maintained and where absorption areas have become blocked or clogged. The warning signs include:

- (a) The absorption field becoming wet or soggy with wastewater ponding on the surface of the ground;
- (b) A smell of effluent near the septic tank or absorption area;
- (c) Drains and toilets running slowly; and
- (d) The grease trap being full or blocked.

T5.2.4 Consequences of failure

A failed septic tank and land applications system is a serious health and environmental hazard and can lead to any one or more of the following:

- (a) Spread of infectious diseases;
- (b) Breeding of mosquitoes and attraction of flies and rodents;
- (c) Nuisance and unpleasantness;
- (d) Pollution and infection of waterways, beaches, streams and shellfish beds;
- (e) Contamination of bores, wells and groundwater; and
- (f) Alteration of the local ecology.

In the event of any of the above adverse effects, immediate action should be taken to remedy the situation.

T5.2.5 Advice on property owner/occupier responsibilities

Property owners and occupiers are legally responsible to keep their on-site system in good working order. If any of the warning signs in T5.2.3 are evident, the property owner or occupier should contact a servicing agent right away, and inform the regulatory authority that repair or maintenance work is underway.

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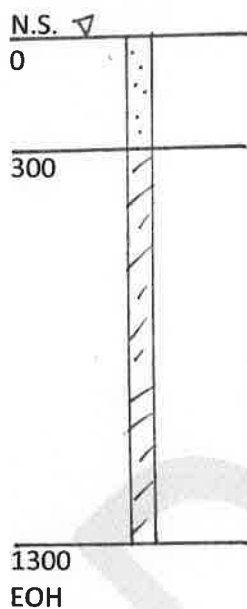
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EFFLUENT CALCULATIONS:

PROPOSED SUBDIVIDED LOT WITH A THEORETICAL NEW RESIDENCE.
 4 BEDROOMS MAXIMUM, ALLOW FOR 5 PERSONS MAXIMUM OCCUPANCY.
 RAINWATER SUPPLY, FULL WATER SAVING FIXTURES ARE TO BE USED.
 EPA VIC CODE OF PRACTICE, TABLE 4: $Q = 120\text{L/PERSON/DAY}$
 $Q = 120 \times 5 = 600\text{L/DAY}$ MAXIMUM FLOW.

SOIL BORE LOG:



GREY SANDY GRAVELLY SILT, FINE GRAIN, SLIGHTLY MOIST, MODERATELY STRUCTURED, DENSE, CATEGORY 3A SOIL.

BROWN SILTY CLAY, HIGH PLASTICITY, SLIGHTLY MOIST, STRONGLY STRUCTURED, STIFF, CATEGORY 6A SOIL.

ADOPT DIR = 2mm/DAY FOR SUB-SURFACE IRRIGATION USING SOIL CATEGORY.

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Victorian Land Capability Assessment Framework

Please read the attached notes before using this spreadsheet

Irrigation area sizing using Nominated Area Water Balance for Zero Storage

Site Address: Proposed Lot 2, 6 Cardigan Street, Kirkstall

Date: 16-01-25 Assessor: George McLeod BE

INPUT DATA

Design Wastewater Flow Q 600 L/day Based on maximum potential occupancy and derived from Table 4 in the EPA Code of Practice (2013)

Design Irrigation Rate DIR 2.0 mm/day Based on soil texture class/permeability and derived from Table 9 in the EPA Code of Practice (2013)

Nominated Land Application Area L 267 m²

Crop Factor C 0.6-0.8 unitless Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type²

Rainfall Runoff Factor RF 0.8 unitless Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff

Mean Monthly Rainfall Data Warrnambool Airport (90186) BoM Station and number

Mean Monthly Pan Evaporation Data HAMILTON RESEARCH (090103) BoM Station and number

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R		mm/month	38.9	30.5	45.2	52.8	74.6	79.3	83.8	89.1	73.8	69.1	51	45.4	733.5
Evaporation	E		mm/month	207.7	192.1	151.9	87	49.6	36	43.4	58.9	78	108.5	132	167.4	1312.5
Crop Factor	C		unitless	0.80	0.80	0.70	0.70	0.80	0.80	0.80	0.80	0.70	0.80	0.80	0.80	
Retained Rainfall	RR	RxRF	mm/month	29.175	22.875	33.9	39.6	55.95	59.475	62.85	66.825	55.35	51.825	38.25	34.05	550.125
Applied Effluent	W	(QxD)/L	mm/month	69.7	62.9	69.7	67.4	69.7	67.4	69.7	69.7	67.4	69.7	67.4	69.7	820.2
Inputs		RR+W	mm/month	98.8	85.8	103.6	107.0	125.6	126.9	132.5	136.5	122.8	121.5	105.7	103.7	1370.3

STORAGE CALCULATION

Storage remaining from previous month	S	(RR+W)-(ET+R)	mm/month	0.0	0.0	0.0	0.0	0.0	33.9	79.1	123.6	162.8	170.9	143.6	83.7	
Storage for the month	M		mm	-129.3	-123.9	-64.8	-13.9	33.9	45.3	44.5	39.1	8.2	-27.3	-59.9	-92.2	
Cumulative Storage	N		mm	0.0	0.0	0.0	0.0	33.9	79.1	123.6	162.8	170.9	143.6	83.7	0.0	
Maximum Storage for Nominated Area	V	NxL	L	170.93	45638											

LAND AREA REQUIRED FOR ZERO STORAGE m² 93 90 138 221 519 814 738 610 304 192 141 115

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 814.0 m²

CELLS

XX	XX
----	----

Please enter data in blue cells

Red cells are automatically populated by the spreadsheet

Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

¹ This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

² Values selected are suitable for pasture grass in Victoria

Reference Drawings:

Part of Structure:

Victorian Land Capability Assessment Framework

Please read the attached notes before using this spreadsheet									
Nitrogen Balance									
Site Address:		Proposed Lot 2, 6 Cardigan Street, Kirkstall							
SUMMARY - LAND APPLICATION AREA REQUIRED BASED NITROGEN BALANCE									
INPUT DATA ¹									
Wastewater Loading									
Hydraulic Load	600	L/day		Crop N Uptake	220	kg/ha/yr	which equals	60.27	mg/m ² /day
Effluent N Concentration	25	mg/L							
% N Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal							
Total N Loss to Soil	3000	mg/day							
Remaining N Load after soil loss	12000	mg/day							
NITROGEN BALANCE BASED ON ANNUAL CROP UPTAKE RATES									
Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)									
Minimum Area required with zero buffer	199	m ²		Nominated LAA Size	267	m ²			
Nitrogen				Predicted N Export from LAA	-1.49	kg/year			
				Minimum Buffer Required for excess nutrient	0	m ²			
CELLS									
Please enter data in blue cells									
Red cells are automatically populated by the spreadsheet									
Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS									
NOTES									
¹ Model sensitivity to input parameters will affect the accuracy of the result obtained. Where possible site specific data should be used. Otherwise data should be obtained from a reliable source such as:									
- EPA Guidelines for Effluent Irrigation									
- Appropriate Peer Reviewed Papers									
- Environment and Health Protection Guidelines: Onsite Sewage Management for Single Households									
- USEPA Onsite Systems Manual									

APPENDIX B

PROPERTY REPORT



Energy,
Environment
and Climate Action

From www.land.vic.gov.au at 16 January 2025 03:04 PM

PROPERTY DETAILS

Address: **6 CARDIGAN STREET KIRKSTALL 3283**

Crown Description: **This property has 8 parcels. See table below**

Standard Parcel Identifier (SPI): **See table below**

Local Government Area (Council): **MOYNE**

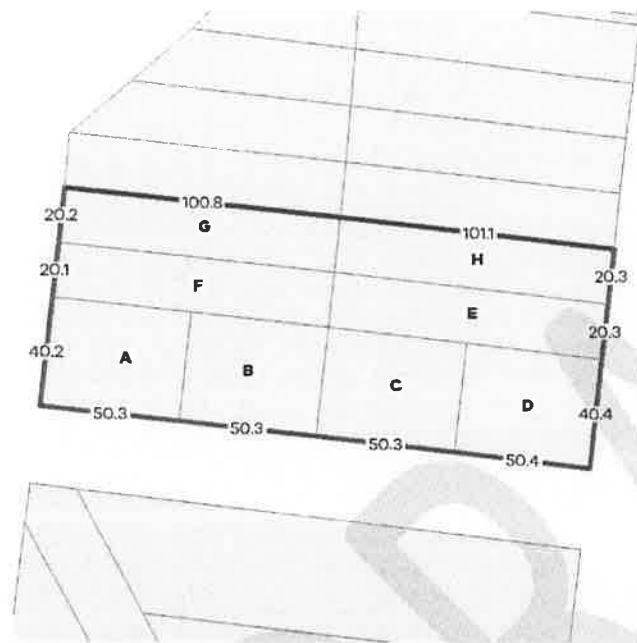
Council Property Number: **504403**

Directory Reference: **Vicroads 510 H2**

www.moyne.vic.gov.au

SITE DIMENSIONS

All dimensions and areas are approximate. They may not agree with those shown on a title or plan.



Area: 16268 sq. m (1.63 ha)

Perimeter: 565 m

For this property:

— Site boundaries

— Road frontages

Dimensions for individual parcels require a separate search, but dimensions for individual units are generally not available.

Calculating the area from the dimensions shown may give a different value to the area shown above.

For more accurate dimensions get copy of plan at [Title and Property Certificates](#)

PARCEL DETAILS

The letter in the first column identifies the parcel in the diagram above.

Lot/Plan or Crown Description	SPI	Lot/Plan or Crown Description	SPI
TOWNSHIP OF KIRKSTALL		TOWNSHIP OF KIRKSTALL	
A Allot 1 Sec. 9	1-9\PP5424	E Allot 5 Sec. 9	5-9\PP5424
B Allot 2 Sec. 9	2-9\PP5424	F Allot 6 Sec. 9	6-9\PP5424
C Allot 3 Sec. 9	3-9\PP5424	G Allot 7 Sec. 9	7-9\PP5424
D Allot 4 Sec. 9	4-9\PP5424	H Allot 8 Sec. 9	8-9\PP5424

UTILITIES

Rural Water Corporation: **Southern Rural Water**

Urban Water Corporation: **Wannon Water**

Melbourne Water: **Outside drainage boundary**

Power Distributor: **POWERCOR**

STATE ELECTORATES

Legislative Council: **WESTERN VICTORIA**

Legislative Assembly: **SOUTH-WEST COAST**

PROPERTY REPORT



Energy,
Environment
and Climate Action

PLANNING INFORMATION

Property Planning details have been removed from the Property Reports to avoid duplication with the Planning Property Reports from the Department of Transport and Planning which are the authoritative source for all Property Planning information.

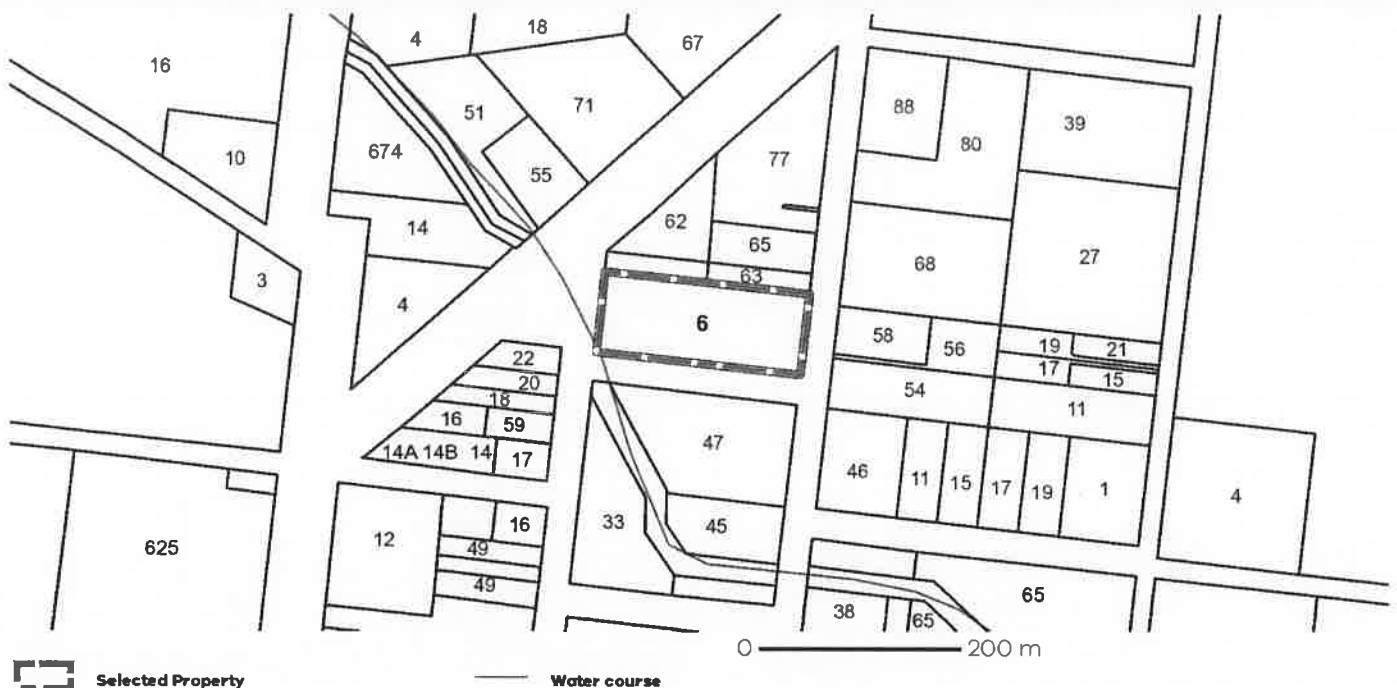
The Planning Property Report for this property can found here - [Planning Property Report](#)

Planning Property Reports can be found via these two links

Vicplan <https://mapshare.vic.gov.au/vicplan/>

Property and parcel search <https://www.land.vic.gov.au/property-and-parcel-search>

Area Map



PLANNING PROPERTY REPORT



Department
of Transport
and Planning

From www.planning.vic.gov.au at 16 January 2025 03:06 PM

PROPERTY DETAILS

Address: **6 CARDIGAN STREET KIRKSTALL 3283**
Crown Description: **More than one parcel - see link below**
Standard Parcel Identifier (SPI): **More than one parcel - see link below**
Local Government Area (Council): **MOYNE**
Council Property Number: **504403**
Planning Scheme: **Moyne**
Directory Reference: **Vicroads 510 H2**

www.moyne.vic.gov.au

[Planning Scheme - Moyne](#)

This property has 8 parcels. For full parcel details get the free Property report at [Property Reports](#)

UTILITIES

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

STATE ELECTORATES

Legislative Council: **WESTERN VICTORIA**
Legislative Assembly: **SOUTH-WEST COAST**

OTHER

Registered Aboriginal Party: **Eastern Maar Aboriginal Corporation**

[View location in VicPlan](#)

PLANNING SUMMARY

Bushfire Prone Area This property is in a designated bushfire prone area.

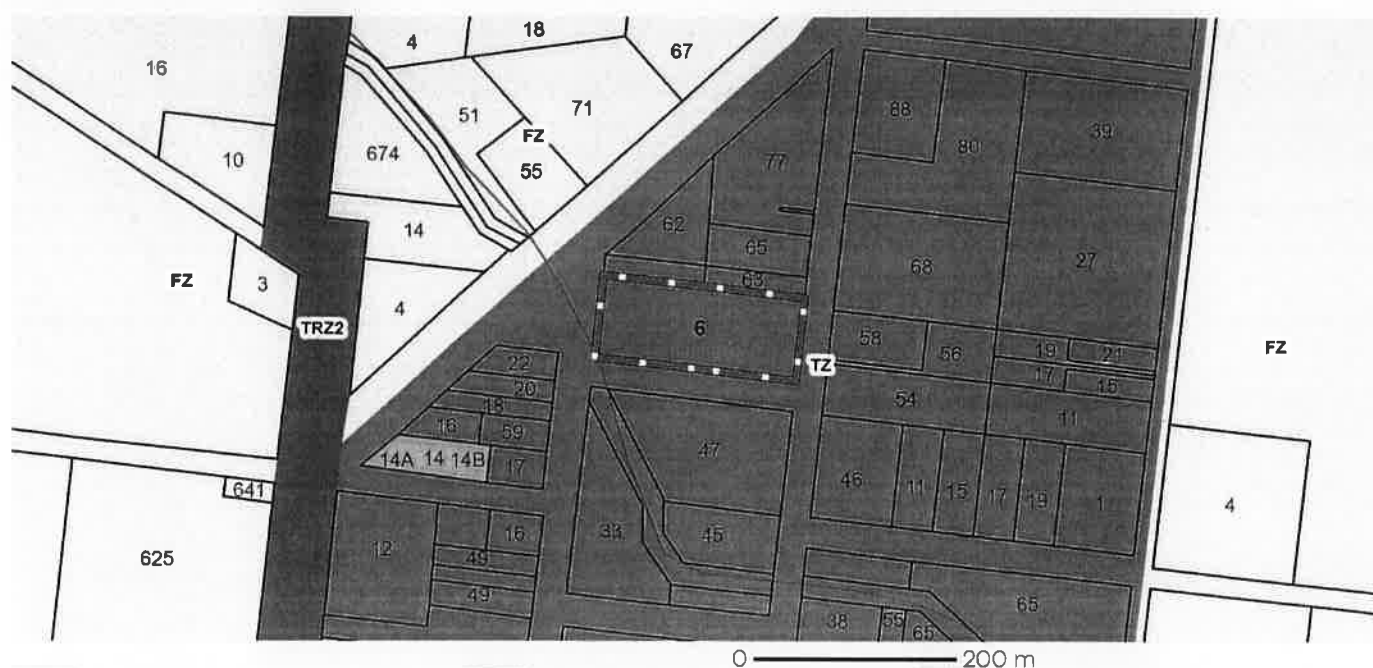
Planning Zone [TOWNSHIP ZONE \(TZ\)](#)
[SCHEDULE TO THE TOWNSHIP ZONE \(TZ\)](#)

Planning Overlay None

Planning Zones

[TOWNSHIP ZONE \(TZ\)](#)

[SCHEDULE TO THE TOWNSHIP ZONE \(TZ\)](#)



Legend:
FZ - Farming
TZ - Township
TRZ2 - Principal Road Network
PPRZ - Public Park and Recreation
Water course

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

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

Planning Overlays

No planning overlay found

Further Planning Information

Planning scheme data last updated on 16 January 2025.

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 affect the land. To obtain a Planning Certificate go to Titles and Property Certificates at Landata - <https://www.landata.vic.gov.au>

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

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

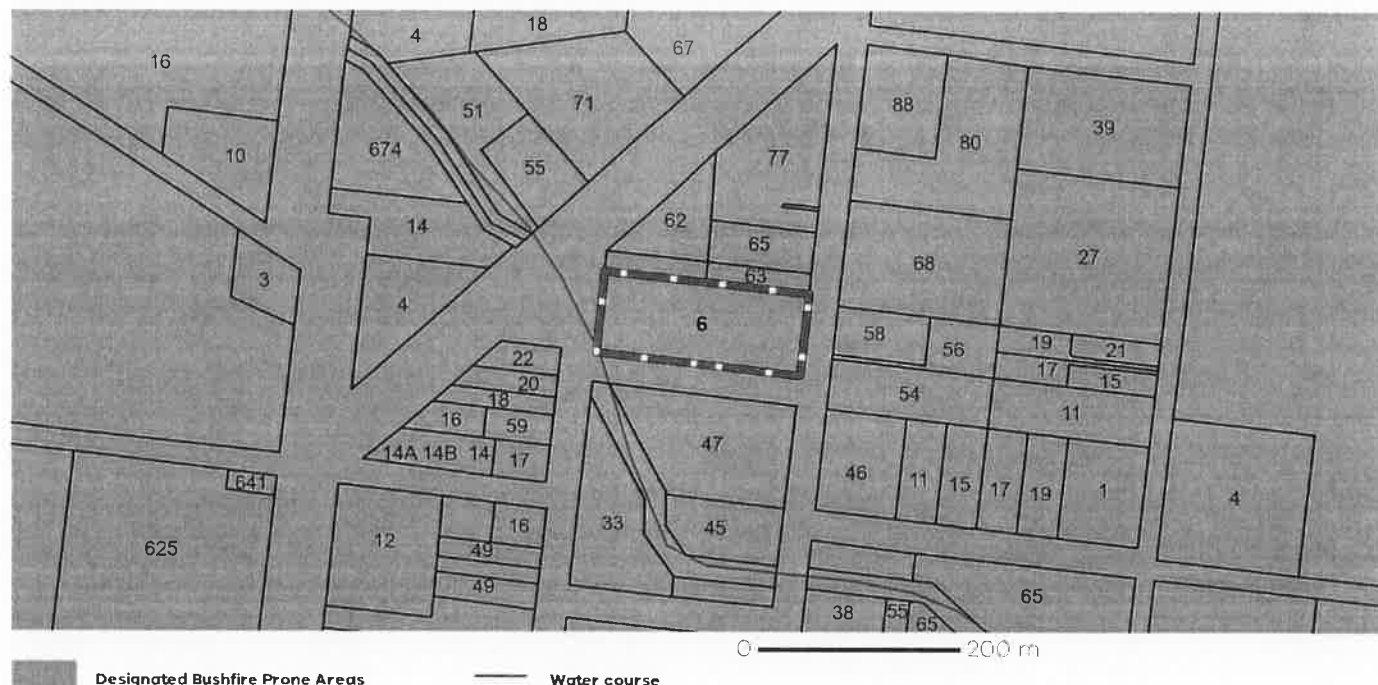
For other information about planning in Victoria visit <https://www.planning.vic.gov.au>

Designated Bushfire Prone Areas

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

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

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



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

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

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

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

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

Native Vegetation

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

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