LAND CAPABILITY ASSESSMENT

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

SUMMARY:

JOB:	
Reference No	JM180325-10
Date	March 24, 2025

SITE:	
Proposed development	10 x lot subdivision
Property address	106 Old Depot Lane, Mortlake
Shire council	Moyne Shire Council
Soil category (AS/NZ 1547:2012)	5b - moderately structured light clay
Design irrigation rate (DIR)	3*mm/day*

PREPARED FOR:	
Client name	[redacted]
Address	C/- Planit Consulting Pty Ltd, PO Box 112, Geelong VIC 3220

PREPARED BY:	
Geologist	S. O'Loughlin
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Telephone	[redacted]
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REVIEW:	DATE:	DETAILS:
A	March 24, 2025	Initial draft for submission
B		
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 1547:1994, 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 shape, dimensions, size, gradient and drainage
Estimated area of each new allotment:	Ranging from 1.007*ha* to 1.17*ha*.
Ground surface:	Relatively flat across entire site.
Gradient of the site:	Slight slope falling to west-southwest across entire site.
Site drainage:	Good

	Existing use and development on the site
The current use of the site:	Residential, farming and animal grazing.
The buildings or works located on the site:	Weatherboard dwelling and detached shedding in the proposed Lot 7.

	Existing access arrangements
The main vehicle access:	Gate access from Old Depot Lane and Woodhams Lane.
The space available for vehicle maneuverability:	Excellent
Site location:	Please refer to Attachment 1.

	Existing vegetation
Describe the vegetation on the site, including the type, location, extent and any other relevant information:	Pasture grasses across entire site.

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:	Residential to the north of Woodhams Lane which is along the northern boundary of the site. RLZ - Rural Living Zone.

3 Existing dwelling – Lot 7 – new 1.070 ha allotment

3.1 Construction

	Building
The existing buildings on site:	Dwelling and detached shedding.
The number of bedrooms/study is:	4 x bedrooms and 1 x study.
The maximum occupancy is :	6 x persons.

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: • Existing dwelling with 5 x habitable rooms • Water-saving fixtures • 6 x people maximum occupancy • Wastewater generation of 150*L/day/person*. Therefore: • Total Design Load = up to 900*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 Proposed dwelling – Lots 1 to 6 & 8 to 10

4.1 Construction

	Building
The proposed building on site:	New dwelling with onsite wastewater treatment system.
The number of bedrooms/study applicable:	5 x habitable rooms.
The maximum occupancy applicable for each dwelling:	6 x persons.

4.2 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: • Construction of a new dwelling with 5 x habitable rooms • Water-saving fixtures • 6 x people maximum occupancy • Wastewater generation of 150*L/day/person*. Therefore: • Total Design Load = 900*L/day*.

4.3 Intended water supply and sewer source

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

5 Site and soil assessment

5.1 Work undertaken

	Assessment
Assessor:	Stephen O'Loughlin
Date:	March 18, 2025

5.2 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**	**Irrigation area sizing using the Nominated Area Water Balance & Storage Calculations allows for the wettest recorded months.**
Erosion (or potential for erosion)	Nil	Nil	NN
Exposure to sun and wind	Full sun	Nil	NN
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 in Guideline for onsite wastewater management, EPA Victoria, May 2024	Moderate	Effluent fields will be at least 20 metres from the existing groundwater bore that is mapped along the northern boundary of the site.
Land area available for LAA	Exceeds LAA and duplicate LAA and buffer distance requirements	Nil	NN
Landslip (or landslip potential)	Nil	Nil	NN
Rock outcrops (% of surface)	<10%	Nil	NN

Slope Form (affects water shedding ability)	Straight side-slopes	Minor	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	NN
Surface waters - setback distance (m)	Setback distance complies with requirements in Guideline for onsite wastewater management, EPA Victoria, May 2024	Nil	Effluent fields will be at least 30 metres from the drainage channel to the west of the site.
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake	Nil	NN
Soil Drainage (Field Handbook definitions)	Moderately well drained. Water removed somewhat slowly in relation to supply, some horizons may remain wet for a week or more after addition	Moderate	Shallow subsurface irrigation in topsoil recommended. Irrigation area sizing using the Nominated Area Water Balance & Storage Calculations allows for the wettest recorded months.

*NN: not needed

5.3 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.

5.4 Geology

	Geological mapping
Geological Survey Codes:	Qno1
Description:	Undifferentiated lava flows, lava ridges and valley flows; olivine basalt; commonly microvesicular, minor columnar jointing.
Reference:	EDWARDS, J., 1996. Colac 1:250,000 geological map (2nd edition). Department of Manufacturing and Industry Development, Victoria.

5.5 Local Mine Hazards

	DPI Search for Mine Hazard results
Department of Primary Industries records:	"do not indicate the presence of any mining activity on this site, and the site appears to be outside any known mined area."

5.6 Soil

	Soil conditions
The predominant soil profile on site is:	Shallow silty loam and buckshot gravels to depths of up to 300*mm* overlying basaltic silty clay.

5.7 Soil profile determination

	Assessment
Field work:	11 x boreholes were established and excavated in the area of the proposed wastewater management systems across the proposed subdivision.
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 Mortlake's wet temperate climate.
Site and test plan:	Please refer to Attachment 2.
Reporting:	Please refer to Attachment 3.

5.8 Soil assessment

Feature	Assessment	Level of Constraint	Mitigation Measures
Soil category (AS/NZ 1547:2012)	5b - moderately structured silty clay (light clay).		
Soil depth	Soil: >100 - 300*mm*	Minor	NN
Soil Permebility & Design Loading Rates	**Subsoil: 5b - moderately structured silty clay (light clay): 0.06 - 0.12 m/day saturated conductivity (K_{sat}) (AS/NZS1547:2012); 5 mm/day Design Loading Rate (DLR) for irrigation system and 3 mm/day Design Irrigation Rate (DIR) for irrigation system (Guideline for onsite wastewater management, EPA Victoria, May 2024).**	**Major**	**Use DIR = 3mm/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, 5c**	**Major**	**Use DIR = 3mm/day in calculations.**
Watertable Depth (m) below the base of the LAA	>2m	Nil	NN

5.9 Groundwater Assessment

	DEPI Groundwater Data Search
Department of Environment and Primary Industries records:	Groundwater depth: < 5*m* Groundwater salinity: 1000 - 3500*mg/L*

5.10 Victorian Planning Provision – Overlays

Overlay	Assessment
Planning Zone:	RLZ - Rural Living Zone
Planning Overlay:	None
Declared Special Water Supply Catchment Area:	None.

5.11 Overall assessment results and land capability rating

Based on the most constraining site features (rainfall and evaporation) and soil assessment (basaltic clays), the overall land capability of the proposed effluent management area is slightly constrained.

However, the site is not in a Declared Special Water Supply Catchment Area.

The effluent management system for each dwelling will be designed, installed and maintained in ways which will mitigate these factors.

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.

6 Wastewater management system – Existing dwelling – Lot 7 – new 1.070 ha allotment

6.1 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 for each allotment, 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.

6.2 Existing treatment system servicing current dwelling

Conventional septic tank with a single length of absorption trench

The existing dwelling is currently serviced via a primary treatment system consisting of a conventional concrete septic tank and a single length of trench while greywater is dispersed on the ground surface to the immediate south of the dwelling.

This system is not appropriate and should be decommissioned and replaced.

The system should be replaced with a secondary treatment system.

6.3 Type of treatment systems available

Aerated Wastewater Treatment System (AWTS) or Sand Filter

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.

6.4 Preferred 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*.

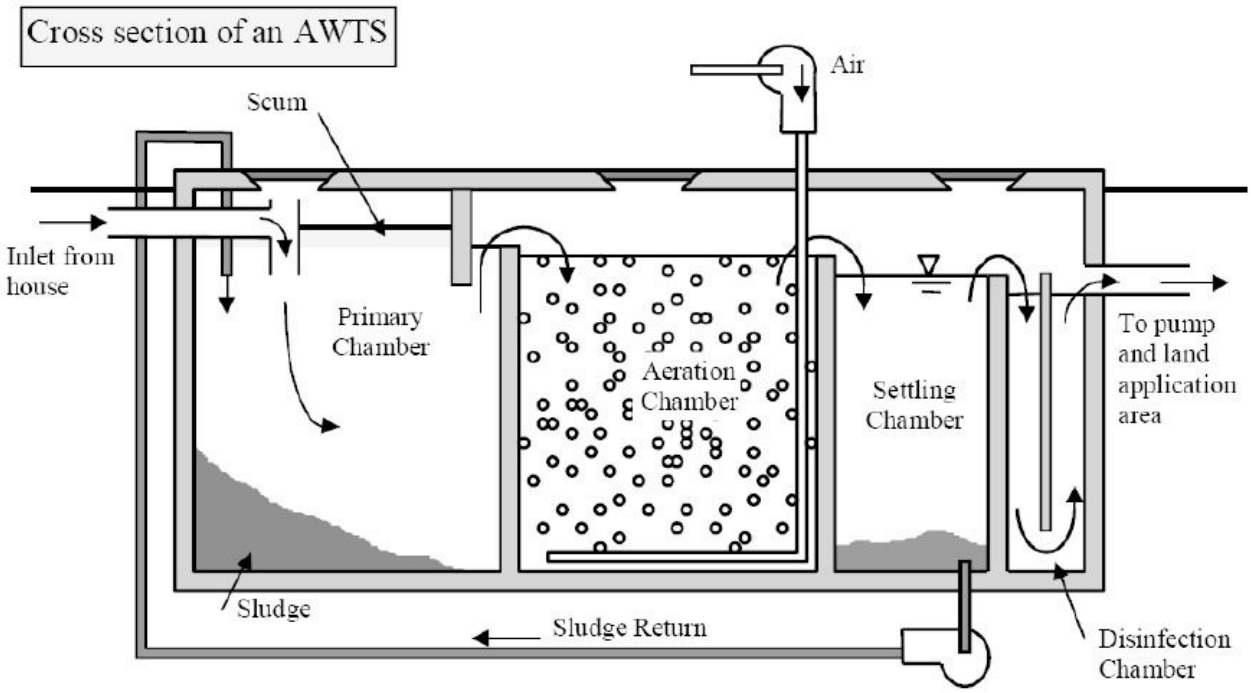
An **Aerated Wastewater Treatment System (AWTS)** is the preferred option and is designed to treat small (<2000*L/day*) wastewater flows. This system consists of a series of treatment chambers combined where air is bubbled through wastewater in a tank provides oxygen to micro-organisms to facilitate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



6.5 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.

6.6 Sizing the irrigation system

To determine the necessary size of the effluent field system, water balance modelling has been undertaken using the method and water balance tool developed for the Victorian Land Capability Assessment Framework (2014). The calculations are summarised below, with full details provided in Attachment 6.

The water balance can be expressed by the following equation:

Precipitation + Effluent Applied = Evapotranspiration + Percolation

	Data used in the water balance
Mean monthly rainfall station:	Mortlake (90058)
Mean monthly pan evaporation station:	Mortlake (90058) - SILO
Design irrigation rate (DIR):	3*mm/day*
Crop factor:	0.6 to 0.8
Rainfall runoff factor:	0.9

Size
As a result of these calculations, the existing 4 x bedroom dwelling with 1 x study requires a 455m^2 subsurface irrigation field.

6.7 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 property boundaries as setbacks allow.

The recommended area is in the paddock to the south of the existing dwelling.

Attachment 4 shows an envelope of land that is suitable for effluent management for the existing dwelling.

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.

6.8 Site photo from the proposed Lot 1

Description

7 Wastewater management system – New dwellings – Lots 1 to 6 & 8 to 10

7.1 Type of treatment systems available

Aerated Wastewater Treatment System (AWTS) or Sand Filter

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.

7.2 Preferred 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 the preferred option and is designed to treat small (<2000*L/day*) wastewater flows.

7.3 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.

7.4 Sizing the irrigation system

To determine the necessary size of the effluent field system, water balance modelling has been undertaken using the method and water balance tool developed for the Victorian Land Capability Assessment Framework (2014). The calculations are summarised below, with full details provided in Attachment 6.

The water balance can be expressed by the following equation:

Precipitation + Effluent Applied = Evapotranspiration + Percolation

	Data used in the water balance
Mean monthly rainfall station:	Mortlake (90058)
Mean monthly pan evaporation station:	Mortlake (90058) - SILO
Design irrigation rate (DIR):	3*mm/day*
Crop factor:	0.6 to 0.8
Rainfall runoff factor:	0.9

Size
As a result of these calculations, the following subsurface irrigation field sizes are applicable:

Number of habitable rooms	Number of occupants	Total daily household wastewater	Area of subsurface irrigation bed
4	5	750	380m^2
5	**6**	**900**	**455m^2**
6	7	1050	531m^2
7	8	1200	607m^2

7.5 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, groundwater bore in the north and the drainage channel to the west of the site as setbacks allow. Attachment 5 shows envelopes of land that is suitable for effluent management for the new allotment, although the envelope is much larger than the minimum required. 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.

7.6 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 Guideline for onsite wastewater management, EPA Victoria, May 2024 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). The setback distance in a Special Water Supply Catchment area may be reduced by up to a maximum of 50% conditional on the following requirements (otherwise the setback distances for primary treatment systems apply): • effluent is secondary treated to 20/30 standard as a minimum • a maintenance and service contract, with a service technician accredited by the manufacturer, is in place to ensure the system is regularly serviced in accordance with Council Septic Tank Permit conditions and • Council is satisfied the reduction in set-back distance is necessary to permit the appropriate development of the site and that risks to public health and the environment are minimised. Where an intermittent stream on a topographic or orthographic map is found through ground-truthing to be a drainage line (drainage depression) with no defined banks and the bed is not incised, the setback distance is 40m (SCA 2010). The topography of the drainage line must be visually inspected and photographed during the LCA site inspection and reported upon in writing and photographs in the LCA report. **All buffer distances are achievable.**

8 Installation, monitoring, operation and maintenance

8.1 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.

8.2 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).

9 Conclusions

As a result of our investigations we recommend that sustainable onsite wastewater management systems can be built to meet the needs of a 10 x lot subdivision at 106 Old Depot Lane, Mortlake.

Specifically, we recommend the following:

- Existing dwelling – proposed Lot 7 – 1.070 ha
    - 4 x bedroom dwelling with 1 x study
        - Daily wastewater volume for a 4 x bedroom house with 1 x study, water reduction fixtures and fittings is 900L/day based on 6 x people and 150L/person/day.
    - Required system
        - Primary treatment of wastewater is currently achieved using the existing conventional concrete septic tank and a single length of trench while greywater is dispersed on the ground surface to the immediate south of the dwelling.
            - This system is not appropriate and should be decommissioned and replaced.
        - Secondary treatment is required through the installation of a new Aerated Wastewater Treatment System (AWTS).
        - Land application of wastewater in a new 455m^2 pressure-compensating subsurface irrigation area which should be installed in the paddock to the south of the existing dwelling.

- New dwellings – proposed Lots 1 to 6 & 8 to 10
    - 5 x habitable rooms on each new allotment
        - Daily wastewater volume for a house with 5 x habitable rooms, water reduction fixtures and fittings is 900L/day based on 6 x people and 150L/person/day.
        - Installation of water saving devices in the new residence to reduce the effluent load for onsite disposal.
    - New system for each new dwelling
        - Secondary treatment of wastewater by installation of a new AWTS.
        - Land application of wastewater in a new 455m^2 pressure-compensating subsurface irrigation area which is to be installed downslope and to the west-southwest of each new dwelling.
        - Setback distances as per Guideline for onsite wastewater management, EPA Victoria, May 2024. Wastewater fields are to be installed at least 3 metres from the boundaries of each new allotment.

- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations, Australian Standards 1546.1 to 1546.4 pursuant to the selected secondary treatment system, 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.

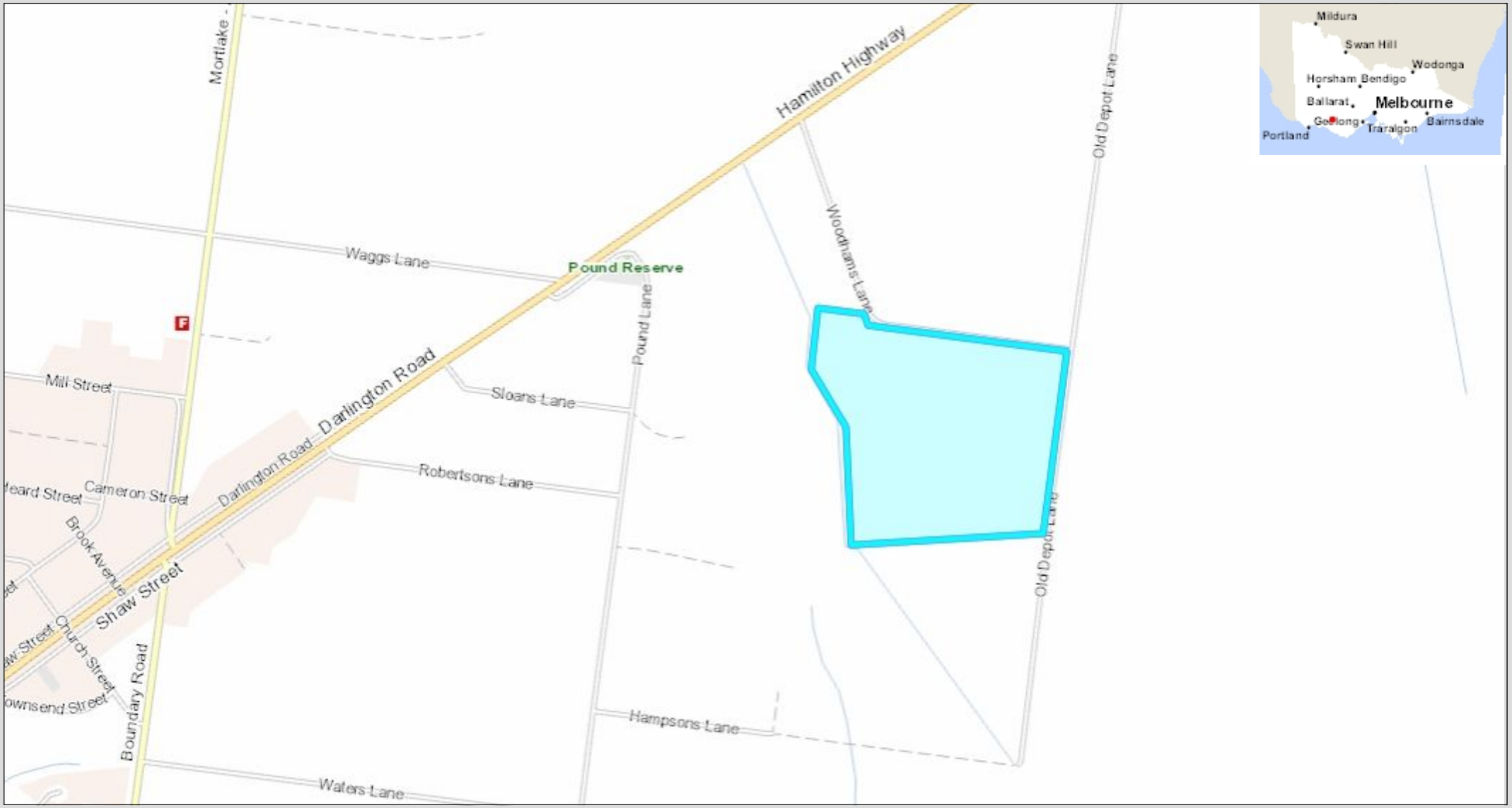
STEPHEN O'LOUGHLIN
Geologist

Attachment 1 – Locality plan

Plan included on next page.

Locality plan

106 Old Depot Lane, Mortlake



508 0 254 508 Meters

GDA2020_Vicgrid

Map Created on 21-Mar-2025

Scale 1:10,000

Attachment 2 – Soil testing program plan

Plan included on next page.

Soil sampling program

106 Old Depot Lane, Mortlake

Attachment 3 – Sample hole results

Tables included on next page.

ATTACHMENT 3: SAMPLE HOLE RESULTS

106 Old Depot Lane, Mortlake – 10 x lot subdivision

Borehole no: 1

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Gravelly FILL	–	Brown	Dry	Firm/friable	–	10
2	200	Silty clay LOAM	–	Grey	Dry	Firm	–	10
3	400	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
4	600	Silty CLAY	–	Light grey	Slightly moist	Stiff	Buckshot (30%)	3
5	>600	Silty CLAY	–	Light grey	Slightly moist	Stiff	–	3

Borehole no: 2

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	300	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	500	Silty CLAY	–	Dark grey	Slightly moist	Stiff	Buckshot (30%)	3
4	>500	Silty CLAY	–	Light brown/grey	Slightly moist	Stiff	–	3

Borehole no: 3

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	300	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>300	Silty CLAY	–	Brown/grey	Slightly moist	Stiff	–	3

Borehole no: 4

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	200	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>200	Silty CLAY	–	Brown/grey	Slightly moist	Stiff	–	3

Borehole no: 5

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	300	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>500	Silty CLAY	–	Dark grey	Slightly moist	Stiff	–	3

Borehole no: 6

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	200	Silty LOAM	–	Grey	Dry	Firm	–	10
2	400	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>400	Silty CLAY	–	Brown/dark grey	Slightly moist	Stiff	–	3

Borehole no: 7

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	400	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>400	Silty CLAY	–	Brown/grey	Slightly moist	Stiff	–	3

Borehole no: 8

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	200	Silty LOAM	–	Grey	Dry	Firm	–	10
2	500	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>500	Silty CLAY	–	Brown/grey	Slightly moist	Stiff	–	3

Borehole no: 9

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	200	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>200	Silty CLAY	–	Brown/grey	Slightly moist	Stiff	–	3

Borehole no: 10

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	200	Silty LOAM	–	Grey	Dry	Firm	–	10
2	400	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>400	Silty CLAY	–	Brown/dark grey	Slightly moist	Stiff	–	3

Borehole no: 11

Layer	Lower depth (mm)	Description	Fill	Colour	Moisture	Consistency	Coarse fragments (%)	DIR (mm/day)
1	100	Silty LOAM	–	Grey	Dry	Firm	–	10
2	300	Buckshot GRAVEL	–	Light grey/red	Dry	Friable	90%	10
3	>500	Silty CLAY	–	Dark grey	Slightly moist	Stiff	–	3

Attachment 4 – Proposed wastewater treatment plan – Existing dwelling – Lot 7 – new 1.070 ha allotment

Plan included on next page.

Wastewater management plan

Lot 7 - 106 Old Depot Lane, Mortlake

Attachment 5 – Proposed wastewater treatment plan – New dwellings – Lots 1 to 6 & 8 to 10

Plan included on next page.


Wastewater management plan
106 Old Depot Lane, Mortlake
WOODHAMS LANE
OLD DEPOT LANE
LEGEND
Indicative building envelope for dwelling with 5 x habitable rooms
Indicative AWTS location
Indicative area available for required 455m^2 subsurface irrigation field
Recommended area for required 455m^2 subsurface irrigation field
5
1.019ha
6
7
1.070ha
8
9
10
1.009ha
Google Earth
Image © 2025 Airbus
N
200 m

Attachment 6 – Water balance calculations

Spreadsheets included on next page.

Victorian Land Capability Assessment Framework

Irrigation area sizing using Nominated Area Water Balance & Storage Calculations

Site Address:	106 Old Depot Lane, Mortlake		
Date:	March 21, 2025	**Assessor:**	S. O'Loughlin - Ballarat Soil Testing

INPUT DATA

Design Wastewater Flow	Q	900	L/day	Based on maximum potential occupancy and derived from Table 4 in the EPA Code of Practice (2013)
Design Irrigation Rate	DIR	3.0	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	455	m^2	[1]
Crop Factor	C	0.6-0.8	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	0.9	unitless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	Mortlake (90058)			
Mean Monthly Pan Evaporation Data	Mortlake (90058) - SILO			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	36.9	31.1	31.2	43.9	58.5	52.7	62.5	66.1	58.5	53.3	48.6	39.3	**582.6**
Evaporation	E		mm/month	205.4	170.8	139.9	83.9	51.4	35.8	41.0	56.9	78.4	113.4	141.3	182.9	**1301.0**
Crop Factor	C		unitless	0.80	0.80	0.70	0.70	0.60	0.60	0.60	0.60	0.80	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	164	137	98	59	31	21	25	34	63	91	113	146	**981.4**
Percolation	B	DIRxD	mm/month	93.0	84	93.0	90.0	93.0	90.0	93.0	93.0	90.0	93.0	90.0	93.0	**1095.0**
Outputs		ET+B	mm/month	257.3	220.6	190.9	148.7	123.8	111.5	117.6	127.2	152.7	183.7	203.0	239.3	**2076.4**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	33.21	27.99	28.08	39.51	52.65	47.43	56.25	59.49	52.65	47.97	43.74	35.37	**524.34**
Applied Effluent	W	(QxD)/L	mm/month	61.3	55.4	61.3	59.3	61.3	59.3	61.3	61.3	59.3	61.3	59.3	61.3	**722.0**
Inputs		RR+W	mm/month	94.5	83.4	89.4	98.9	114.0	106.8	117.6	120.8	112.0	109.3	103.1	96.7	**1246.3**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-162.8	-137.2	-101.5	-49.9	-9.9	-4.7	0.0	-6.4	-40.7	-74.4	-99.9	-142.7	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	124	131	171	247	392	421	455	412	270	206	170	137	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 455.0 m^2

CELLS

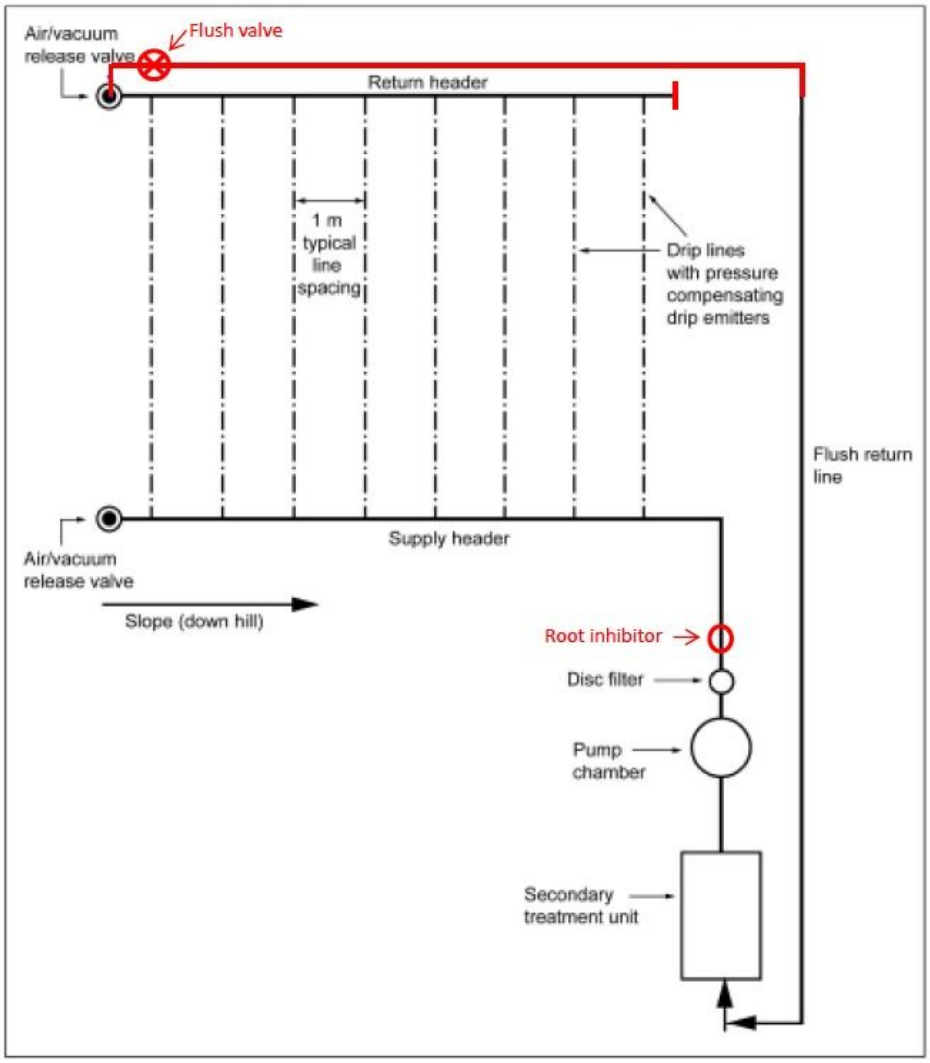
	Please enter data in blue cells
XX	Red cells are automatically populated by the spreadsheet
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

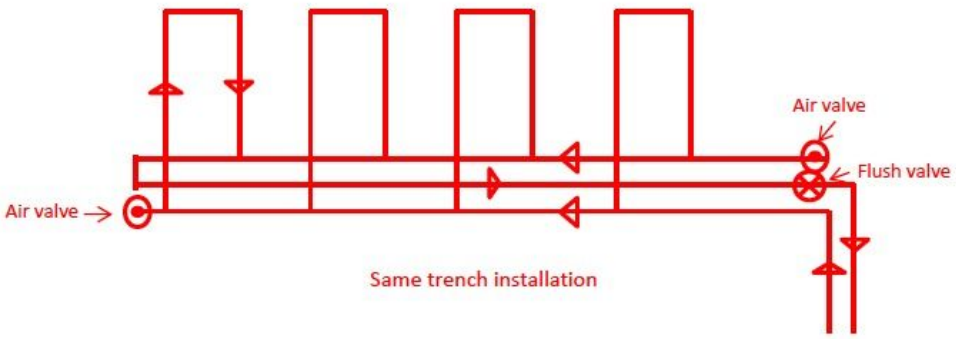
[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for pasture grass in Victoria

Attachment 7 – Subsurface irrigation system example



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



Attachment 8 – Plumber septic system inspection report

Document included on next page.

ROSSY'S PLUMBING
128 Butterworth Road Smythes Creek Vic 3351
AH: 53 424 375 Mobile: 0418 307 173 Fax: 53 424 178
Email: dmross1@bigpond.com
DANIEL ROSS GENERAL PLUMBING & SEPTIC SPECIALIST SMYTHES CREEK LIC No 43748 ABN 21 951 053 822

Septic Report

After my inspection of the septic system at 106 Old Depot Lane, Mortlake, I can confirm the following:

-Currently the waste from the toilet only, appears to be discharging into a std 3,000 ltr septic tank located approximately 6m away. The waste pipe is on top of the ground and is poorly supported so not up to current plumbing codes.

-The property has an Absorption trench heading south from the septic tank. Length and condition is unknown but is assumed to be approximately no more than 30m x .6m wide. This does not appear to cross any property boundaries.

-The grey water from all other fixtures is combined in a common pipe and discharges to the south of the building approximately 3m away. This is also not up to current council, EPA or plumbing codes as it is discharging on top of the ground and creating a boggy mess.

-The property doesn't have an Overflow relief gully.

-The system is very primitive and poses a public health risk.

-I would recommend the de-commissioning of the existing septic tank and the installation of a new Taylex AWTS (Septic Treatment Plant).

-I would also recommend the replacement of all wastewater pipework from the edge of the house into the new AWTS. This should be buried at a depth of 300mm plus.

-New sub surface drip irrigation lines (L.A.A.) should be fitted to the front or back yard after the removal of existing sheds, fences, rubbish, trees etc to enable installation and adequate function of the drippers. Alternatively they could be located in the paddock to the south but would need to be fenced to prevent stock traffic damage.

Toilet pipe on left and other waste pipes on the right. location

Existing Septic tank circled in red, showing above ground sewer inlet pipe from toilet.

Grey water pipe discharging on top of ground to left of pic

Grey water discharge area to the south of the house in front yard

Assumed location of absorption trench from septic tank

If you have any questions or queries re this property please don't hesitate to contact me.

Kind regards,

Kind Regards,

Daniel Ross
Rossy's Septics and Wastewater
M 0418307173
E dmross1@bigpond.com
ABN 21 951 053 822
LIC 43748

Attachment 9 – VicPlan Planning Property Report

Report included on next page.

PLANNING PROPERTY REPORT

Department of Transport and Planning

From www.planning.vic.gov.au at 21 March 2025 02:18 PM

PROPERTY DETAILS

Address:	**106 OLD DEPOT LANE MORTLAKE 3272**
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** www.moyne.vic.gov.au
Council Property Number:	**503676**
Planning Scheme:	**Moyne** Planning Scheme - Moyne
Directory Reference:	**Vicroads 90 F3**

This property has 2 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:	**LOWAN**

OTHER

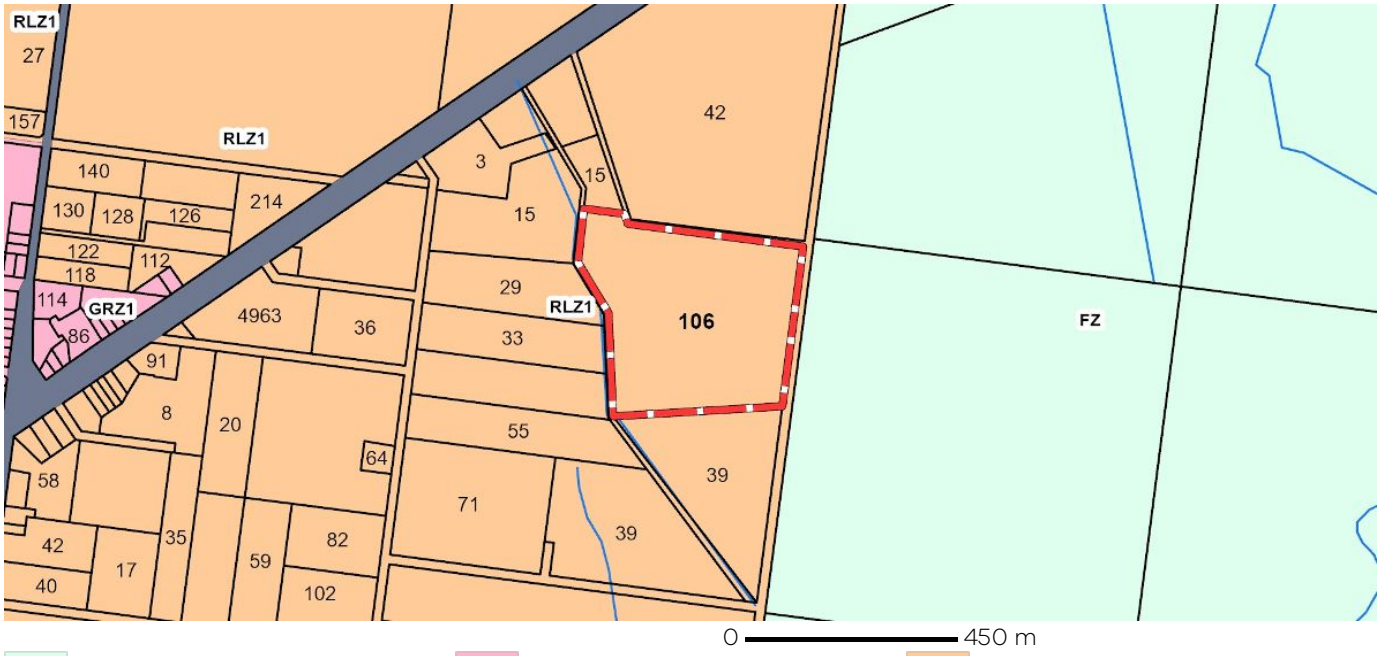
Registered Aboriginal Party:	**Eastern Maar Aboriginal Corporation**

View location in VicPlan

Planning Zones

RURAL LIVING ZONE (RLZ)

RURAL LIVING ZONE - SCHEDULE 1 (RLZ1)



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

PLANNING PROPERTY REPORT

Department of Transport and Planning

Planning Overlay

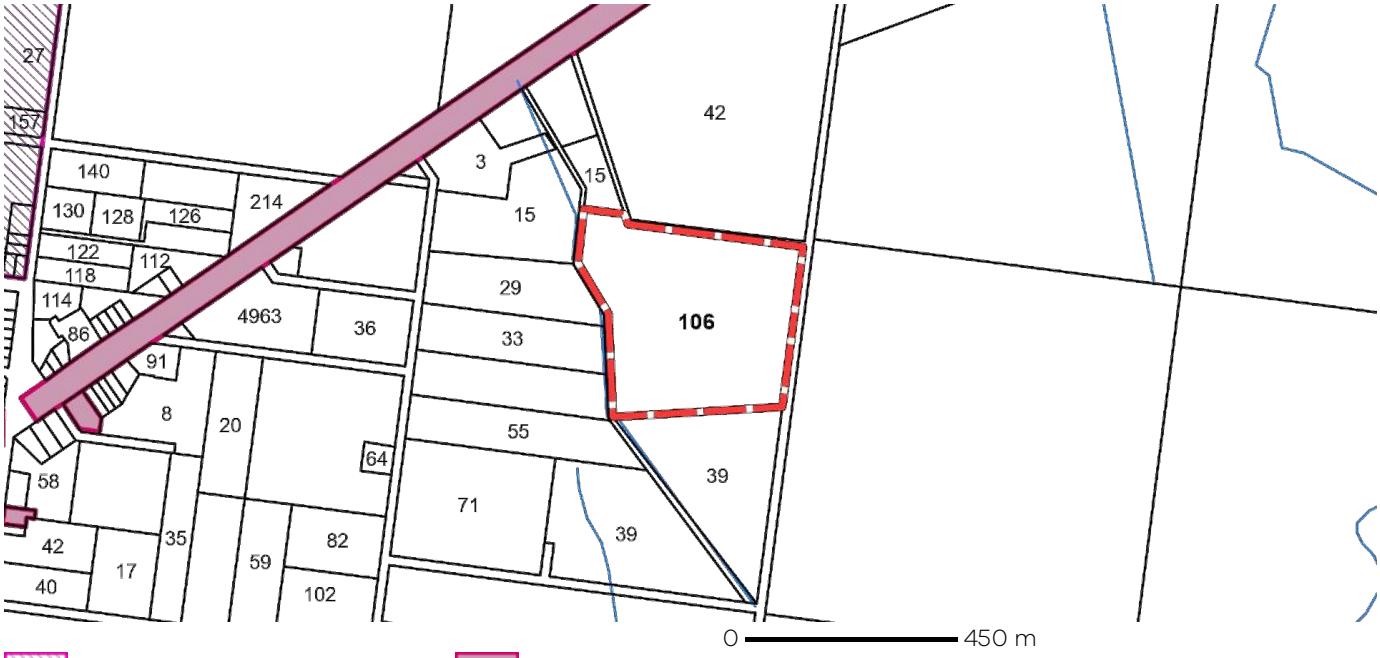
None affecting this land - there are overlays in the vicinity

OTHER OVERLAYS

Other overlays in the vicinity not directly affecting this land

DESIGN AND DEVELOPMENT OVERLAY (DDO)

HERITAGE OVERLAY (HO)



DDO - Design and Development Overlay HO - Heritage Overlay 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

Department of Transport and Planning

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.

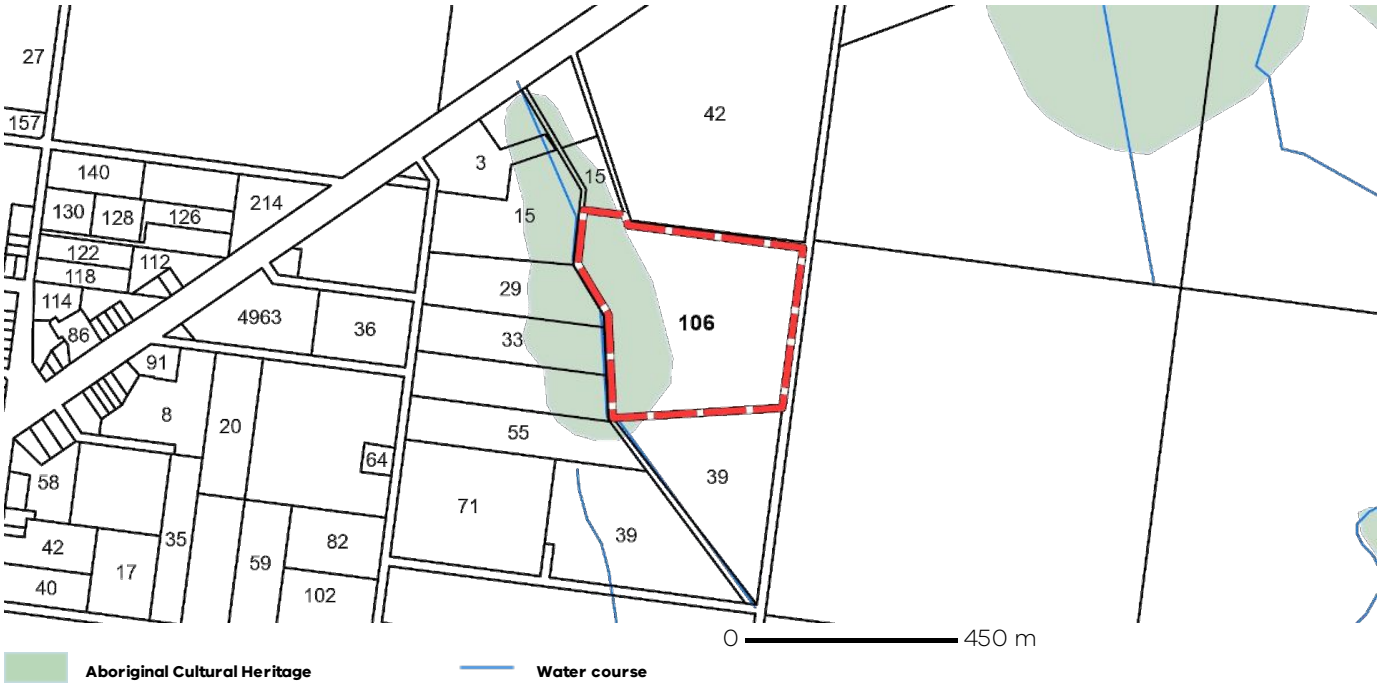
Under the Aboriginal Heritage Regulations 2018, 'areas of cultural heritage sensitivity' are one part of a two part trigger which require a 'cultural heritage management plan' be prepared where a listed 'high impact activity' is proposed.

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

Department of Transport and Planning

Further Planning Information

Planning scheme data last updated on 21 March 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 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

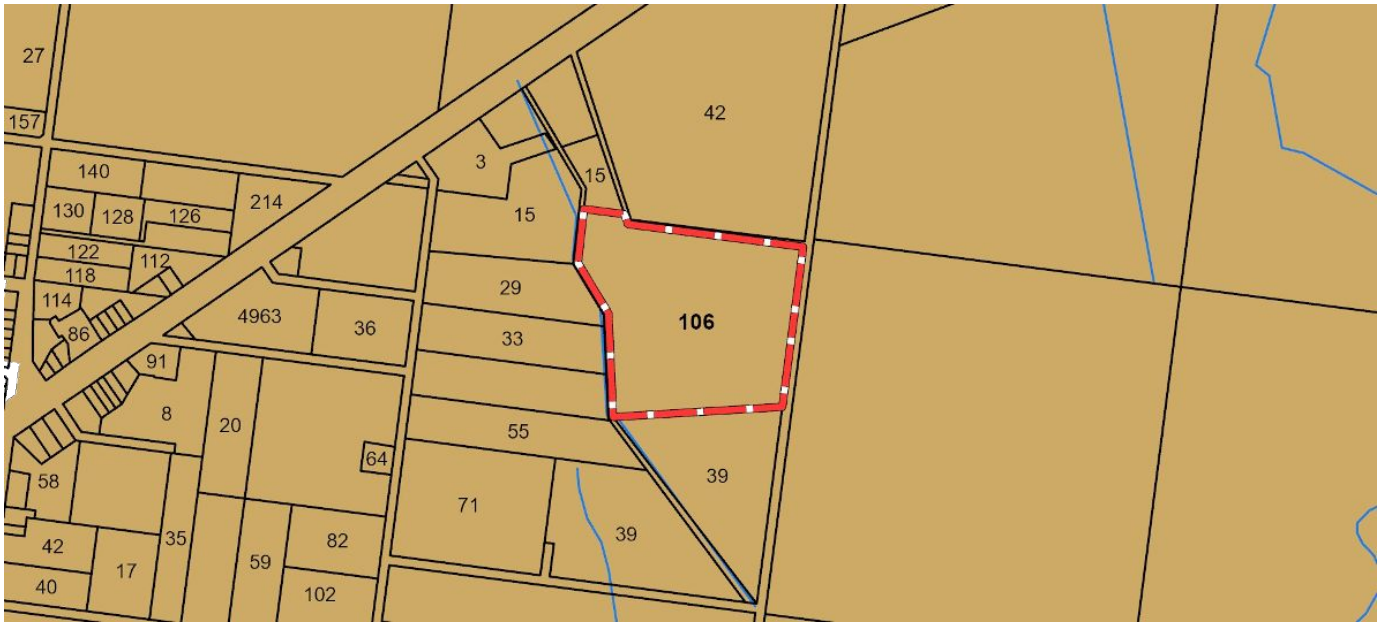
Department of Transport and Planning

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 10 – 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