City of Greater Geelong & Surf Coast Shire

Code of Practice

Onsite Wastewater Management

Reference:

- **Environmental Protection Authority Victoria – Code of Practice – Onsite Wastewater Management Pub 891.3**
- **Australian/New Zealand Standard 1547:2012 – On-site domestic wastewater management**

Updated February 2014

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1. INTRODUCTION

This Code of Practice has been developed to assist home owners, developers, plumbers and land capability assessors understand the requirements within the City of Greater Geelong and Surf Coast Shire municipalities pertaining to domestic onsite wastewater systems which treat up to a maximum peak daily flow (not average) of 5,000L of wastewater per day in areas not provided with reticulated sewerage. This Code is based on best practice principles in accordance with all relevant legislation, regulations and standards.

1.1 OVERVIEW

Within the City of Greater Geelong and Surf Coast Shire municipalities there are significant numbers of residential, rural and commercial/industrial properties that do not have access to reticulated sewer provided by Barwon Water. Unsewered properties require all sewage including greywater ("Onsite Wastewater") to be treated and disposed/recycled within property boundaries.

This Code of Practice (the "Code") has been developed to assist property owners, plumbers and developers to design, install/alter and manage sustainable onsite wastewater treatment systems primarily for domestic purposes in accordance with the *Environment Protection Act 1970* (the "Act"), Environment Protection Authority Victoria (EPA) Code of Practice Onsite Wastewater Management Publication 891.3, Australian New Zealand Standards 1547:2012 – On-site Domestic Wastewater Management ("AS/NZS 1547:2012), State Environment Protection Policies – Waters of Victoria and Groundwater's of Victoria and Council requirements.

This Code is based on best practice principles in accordance with above mentioned legislation, regulations and standards. For further details please refer to above mentioned documents and in particular EPA Code of Practice Onsite Wastewater Management at http://www.epa.vic.gov.au/~/media/Publications/891%203.pdf and AS/NZS 1547:2012 which can be purchased from Standards Australia at http://www.standards.org.au

1.2 ADVICE FOR APPLICANTS

When you are considering purchasing land or building on a block of land, check with Barwon Water to find out if the property is serviced by reticulated sewer or whether sewer extension work is proposed.

It is strongly recommended to fully investigate the sites capability of sustainably managing onsite domestic wastewater before purchase as the site maybe restricted as to the level of development that can occur. This would require engaging a suitably qualified person to undertake a Land Capability Assessment (See Appendix J).

If the property is unsewered, you will need to either pump your onsite wastewater a long distance to a sewer connection or install an approved onsite wastewater system. Persons considering 'pump to sewer' systems will need to approach Barwon Water to discuss approval and costing for this method of disposal.

If an onsite wastewater system is required to treat your sewage you must apply to council for a 'Permit to Install/Alter a Septic Tank System' prior to installation and an 'Approval to Use a Septic Tank System' prior to using an onsite wastewater system.

Council will only approve Onsite Wastewater Systems that have been approved by the Environment Protection Authority Victoria and have a Certificate of Approval (CA) Number and have estimated daily flow rates not exceeding 5000 litres per day. A full, up-to-date list of all approved systems can be found on the EPA website at www.epa.vic.gov.au/water/wastewater/onsite.asp

Where the flow rate exceeds 5000 litres per day, the Environment Protection Authority Victoria is the regulatory authority responsible for issuing Works Approvals and supervising the Onsite Wastewater System installation.

Councils Environmental Health Officers are responsible for assessing septic tank applications.

1.3 WHEN DO YOU REQUIRE A SEPTIC TANK PERMIT?

A Permit to Install/Alter a Septic Tank is required for both the installation of any new onsite wastewater system or for any works or alterations to an existing system with a **capacity of up to 5000L/day**.

An alteration is repair work to any part of the system including piping, effluent lines, and the tank itself. Installation of any new components such as extra effluent lines, piping work, or replacement of any part of the system are all considered to be an alteration to a system and triggering the requirement for a permit.

As well as alterations to the plumbing of a system, extensions to a dwelling connected to an onsite wastewater system (in particular an increase of bedrooms), or the connection of any additional toilet blocks, sheds, etc. will also require a permit to alter a system. This is due to the increased volume of wastewater that will be entering the system and this must be assessed to ensure that the installed system has the capacity to treat the increased wastewater load.

Under the ***Building Regulations 2006 Section 801*** any building permit issued for a building that will produce wastewater and does not have sewer available requires consent from council. This consent can be achieved by either the issue of a **Permit to Install/Alter a Septic Tank** or by lodging a **consent application under section 801** of the building regulations to install a septic tank system.

If an application for consent is lodged the applicant will still require a permit to install/alter a septic tank. **Therefore it is more cost effective** to apply for a permit to install/alter a septic tank system and bypass the consent stage. In order to apply for a permit you will need to know more information in regards to the system including the type and model number of the system to be installed, location of the system including effluent disposal field, installing plumbers details, and details of the building including number of people using the building, water producing facilities to be installed and water saving ratings.

Please note that under the building regulations a **certificate of occupancy** for a building on septic cannot be issued until an **'Approval to Use'** permit for the system has been granted.

2. ONSITE WASTEWATER TREATMENT SYSTEMS

There basically two stages involved in the process of wastewater treatment

- Treatment of Wastewater; and
- Disposal/Recycling of treated wastewater (effluent disposal)

2.1 COMMON TREATMENT SYSTEMS

There are 4 standard types of treatment which can result in different 'Effluent Quality Standards'

2.1.1 PRIMARY TREATMENT

Pre-Cast Concrete/Approved Plastic Septic Tanks

The most basic method of wastewater treatment which requires minimal maintenance and has no mechanical parts, other than an effluent pump if necessary to pump effluent to the disposal area. The quality of primary treated effluent limits the method of disposal to underneath the ground via trenches or beds. Septic tanks must comply with EPA Certificate of Approval 1.1/03. The manufacture of Septic Tanks must also comply with the requirements of current Australian Standard 1546.1. An Australian Standard stamp on the tank indicates compliance. A septic tank requires to be desludged a minimum of every 3 years to ensure efficient operation.

Composting Toilets (Dry/No Flush)

A preferred option where all land capability criteria is exhausted. May be installed where there are no other options. Decomposed solids must be removed and properly disposed of on a regular basis. An additional approved grey water disposal system, AWTS or Sand Filter will be required to treat kitchen, bathroom and laundry wastes known as greywater.

2.1.2 SECONDARY TREATMENT

Aerated Wastewater Treatment System (AWTS)

These plants can treat wastewater through a combination of biological treatment and aeration, resulting in a higher standard of wastewater effluent. This provides greater options for the disposal of treated effluent although AWTS's will require power to operate and be subject to regular maintenance. Treated effluent is normally disposed of via pressure compensating sub-surface irrigation to a suitably sized and vegetated area.

Septic Tank and Sand Filter System

The primary treated effluent from the septic tank is passed through a body of sand called a Sand Filter. The Sand Filter provides further treatment to the effluent. Treated effluent is normally disposed of via pressure compensating sub-surface irrigation to a suitably sized and vegetated area.

2.1.3 ADVANCED SECONDARY TREATMENT

Greywater Treatment System

Greywater includes water from the shower, bath, basins, washing machine, laundry trough and kitchen (also called sullage). Only EPA approved grey water treatment systems are capable of treating greywater to a standard where the effluent can be re-used indoors for toilet flushing and for use as cold water supply to the

washing machine. Garden irrigation is permitted via pressure compensating sub-surface or surface irrigating, hand held purple hoses attached to child-proof purple standpipes. A separate treatment system is required for toilet water known as blackwater. Further consultation with your local Environmental Health Officer is required if you want to install this system

2.1.4 SECONDARY TREATMENT WITH NUTRIENT REDUCTION

There are several EPA approved secondary treatment systems with nutrient reduction capacity (total nitrogen, nitrates and total phosphorus). Excess nutrients from wastewater can degrade the soil and harm environmentally sensitive areas such as sandy soils with high water tables. Systems with nutrient reduction capacity may be the most appropriate in environmentally sensitive areas. Treated effluent is disposed of via pressure compensating sub-surface irrigation to a suitably sized and vegetated area.

2.2 COMMON EFFLUENT DISPOSAL OR RECYCLING OPTIONS

Depending on quality of the treated effluent it may be disposed or recycled in a number of ways, each with specific criteria to maintain public health and environmental standards. Listed below are the most common means of effluent disposal and recycling in the Geelong and Surf Coast areas. For further options please refer to the current EPA Code of Practice Onsite Wastewater Management and AS/NZS 1547:2012

2.2.1 PRIMARY EFFLUENT STANDARD

Subsoil Absorption Trenches (Conventional Piped Trench)

Trenches are used to dispose of effluent which has only been subjected to primary treatment via a septic tank or excess liquid from a composting toilet. Trenches are typically 300-550mm deep and 300-450mm wide and require minimal maintenance other than maintaining top dressing, keeping vegetation healthy, keeping vehicles and stock away. Effluent disposal trenches will take up considerably more area of land than some other forms of disposal. Dependent on the location of the septic tank and topography of the land, a pump may be required to dispose of the waste to the trenches where gravity flow of wastewater is not possible or distance from the tank to trenches are too far away, although this is not frequent.

A duplicate sized effluent disposal area must be set aside as a reserve area unless a Land Capability Assessment does not require so or otherwise directed by Council.

In certain cases, the length of the trenches may be reduced subject to a Land Capability Assessment confirming a greater level of soil absorption. Trenches have a life expectancy, in terms of performance, of approximately 25 years.

To ensure the proper functioning of Disposal Trenches and Transpiration Beds (see below), Septic Tanks are required to be pumped out and desludged a minimum of once every 3 years.

Septic tank and trenches are not appropriate where there is medium to heavy clay or sandy soils, environmentally sensitive areas or waterways.

Evapotranspiration-absorption Trenches/Beds

Similar method of disposal to effluent disposal trenches, however, these maybe used where limited area exists on the property to install trenches and where the soil has low percolation rates i.e. medium to heavy clay. The maintenance and pump requirements are as per 'Subsoil Absorption Trenches'. These beds have a life expectancy, in terms of performance, of approximately 25 years. This system is not covered within this Code

of Practice due to the limited amount of applications received by council, if you wish to use this option for onsite wastewater please refer to AS/NZS 1547:2012 or discuss with an Environmental Health Officer.

2.2.2 SECONDARY EFFLUENT STANDARD (WITH OR WITHOUT NUTRIENT REDUCTION)

Pressure Compensating Sub-surface Irrigation

Sub-surface pressure-compensating irrigation (which ensures even distribution of effluent) with a disc or screen filter and scour and vacuum release valves is the default land application system for secondary treated all-waste sewage effluent. Sub-surface irrigation provides the most sustainable use of recycled water because the water is applied directly to the plant roots and is not dissipated by sun or wind, as it is when applied by spray irrigation.

This land application system may be used in conjunction with AWTS's and Sand Filters. Effluent can be recycled via this method and must be pumped. The pump system must have characteristics that match the hydraulic characteristics of the irrigation system.

Surface or Spray Irrigation

Surface spraying or drip irrigation of secondary treated wastewater via a AWTS or Sand Filter is no longer permitted within the City of Greater Geelong or Surf Coast Shire unless the strict requirements of AS/NZS 1547:2012 can be met.

There are environmental risks associated with spray irrigation particularly under wet conditions. There are also health risks associated with spray irrigation due to the potential for contact of effluent with humans and animals. Therefore, effluent for spray or surface irrigation requires continuous disinfection generally by chlorine. Ongoing disinfection of effluent by property owners is often irregular and poses an unacceptable risk to health because of extremely high bacteria levels.

There are now strict requirements under the Australian Standards to enable this method of disposal which includes ensuring that there is no casual access to the spray/surface irrigation area by humans or animals and allow not allowing spray to reach areas normally occupied by humans or animals.

Generally this is not a practical approach given the everyday uses of domestic properties.

3 APPLICATION PROCESS

This section provides an overview of the process to submit an application for permission to install/alter a septic tank system. Follow this process to ensure your application is completed adequately. A thorough and complete application will ensure a quicker turn around time in assessing and making a determination.

It is an offence under the *Environment Protection Act 1970* to install/alter a septic tank system without a permit.

3.1 BEFORE YOU APPLY

The first step in the process is to ensure you have the relevant approvals required from Councils Planning Department. If planning approval is required you must be able to satisfy that all wastewater can be sustainably treated and disposed of within the property.

If you are building you will require a building permit. Part of this process will require you to obtain a 'Permit to Install a Septic Tank System'.

Regulation 801 requires Council to formally consent to the Building Surveyor issuing a Building Permit for the development that the site is suitable for an onsite wastewater system. We therefore require the details of the Building Surveyor on the Application form before the Permit to Install a Septic Tank System can be issued. An appropriate Building Permit and Planning Permit (if required) must be issued by the relevant department before a Septic Tank Permit can be issued.

3.2 PREPARING AND SUBMITTING YOUR APPLICATION

You can access a Septic Tank Application from your relevant Council by accessing the website or use the contact details listed in Section 3.6 to speak to a Council Officer.

The application must be lodged at least 10 working days before the anticipated commencement date. No work may commence until a 'Permit to Install/Alter' has been issued and no part of a septic tank system may be used until an 'Approval to Use' issued. The information required to accompany the application is listed below:

1. A Site/System Plan;
2. An Approved House Plan (floor plan) or House Plan submitted for building/planning approval;
3. Land Capability Assessment (if required);
4. Planning Permit (if applicable);
5. Copy of Certificate of Title of Land; and
6. Appropriate Fee.

3.2.1 SITE/SYSTEM AND HOUSE PLANS

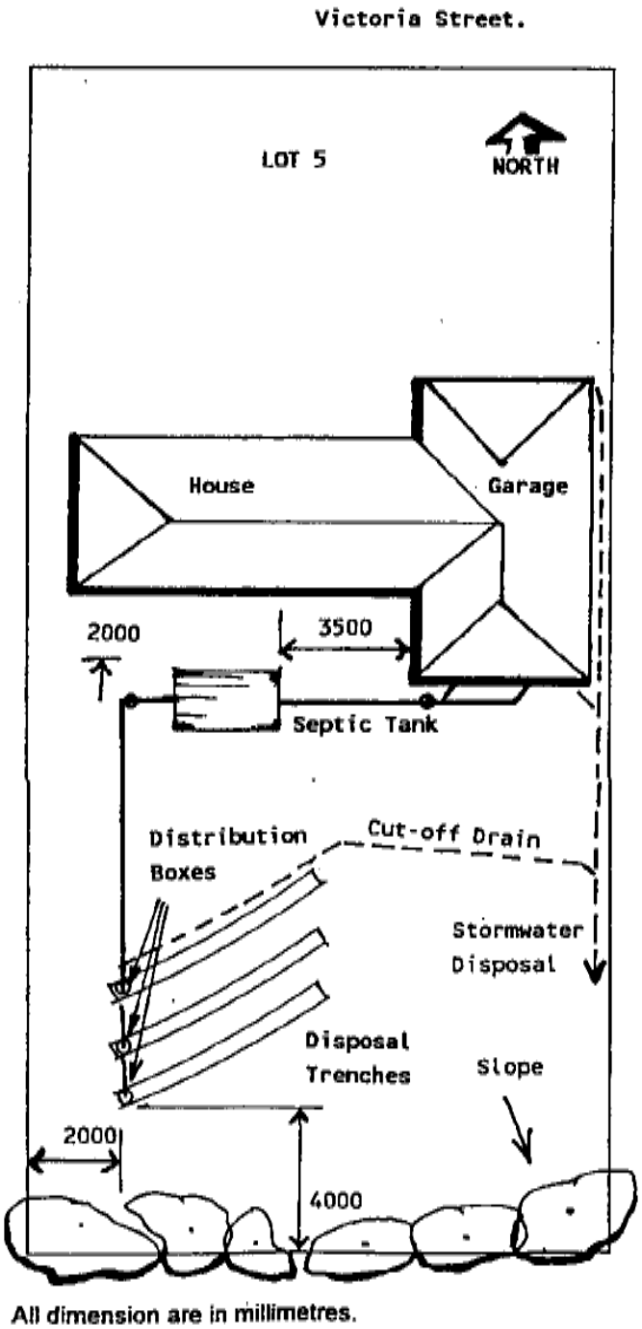
A Site/System Plan must include the following: -

- ☐ Drawn to scale not less than 1:100 on no larger than A3 size paper which includes location and dimensions of all existing and proposed buildings; water pipes and septic tank system;
- ☐ A house (floor) plan;
- ☐ Location and length of all effluent lines/irrigation areas or other effluent disposal method;
- ☐ Distance between the house and the septic tank;
- ☐ Names of the streets at the closest intersection;

- ☐ Direction of north;
- ☐ Location of all vents; and inspection openings;
- ☐ Clearly illustrate all fixtures; and
- ☐ The fall and contours of the land.

Below is an example of an acceptable site plan.

FIGURE 1 – EXAMPLE SITE LAYOUT PLAN



(Environment Protection Authority, Code of Practice – Septic Tanks On-Site Domestic Wastewater Management, Publication 451, March 1996)

An Approved House Plan or House Plan submitted for building/planning approval is acceptable to submit with the application.

3.2.2 LAND CAPABILITY ASSESSMENT

A Land Capability Assessment (LCA) must be submitted with the application, where there may be concern over the sustainability of the site to manage wastewater. Any new subdivisions and smaller blocks will generally require an LCA. Council's own domestic wastewater management plans recognise certain suburbs/areas in the Geelong/Surf Coast region as high risk areas for retaining wastewater onsite. Therefore the following townships areas must have an LCA prior to an onsite wastewater application being considered. Some of these townships are documented as requiring long term investigation of the feasibility of provision of reticulated sewerage due to their high risk classification. See Appendix J for detailed LCA requirements.

City of Greater Geelong	Surf Coast Shire
Breamlea	Moggs Creek
Ceres	Deans Marsh
Anakie (Smaller blocks)	Bellbrae
Ramblers Road (Portarlington)	Moriac
Point Richards Road (Portarlington)	Aireys Inlet (fringe areas)
Saratoga Avenue (Barwon Heads)	Winchelsea (fringe areas)
Stephens Parade (Barwon Heads)	Great Ocean Road

3.2.3 OTHER FACTORS TO CONSIDER

Vegetation Removal

Due to space constraints the installation of an onsite wastewater system may require removal of vegetation to gain access to the site or for ground area to install the system. Be aware of any vegetation protection overlays in your area as it is illegal to remove vegetation in some coastal townships without a permit i.e. Breamlea and other heavily vegetated areas within Surf Coast Shire. Contact council's Planning Department if you are unsure.

What type of System?

Consider the treatment type and wastewater disposal option that best suits your needs and requirements for the property now and into the future. In doing so, it is important to think about long term (10-15 years) considerations such as the location of future buildings, driveways, pools, etc. on site. See Appendix K for factors that should be considered when selecting an appropriate wastewater system.

Pools/Spas

If your property has a pool or a spa/bath greater than a 200 Litre capacity, this will have a considerable impact on the system. The backwash from your pool or spa must not be diverted to your septic tank system. The backwash must be managed in a way as to not pollute the environment.

Estimating Wastewater Flows

Various tables have been provided throughout this code to simplify the calculations of different sizes. If you wish to calculate the estimated volume of wastewater per day then use the following formula: {(No. of Bedrooms + 1) x Daily Wastewater Flow} – from Appendix H, if your property does not fit into this table contact an Environmental Health Officer to discuss.

The size of your proposed system may be reduced by using water saving fixture and appliances. Appliances and fixtures that this applies to are showerheads, washing machines, dishwashers and toilet cisterns. This will become a condition on the permit and proof must be provided that they have been installed, prior to approval

of the system. Installation of full water-reduction fixtures can reduce the daily flows significantly and therefore reduce the size of the onsite wastewater system and disposal area required. Your daily wastewater flows will be increased if installing a spa bath or other extra water producing fixture/s. There are two classes of water saving fixtures; standard fixtures and full water-reduction fixtures.

Full water-reduction fixtures and fittings include Water Efficiency and Labelling Standards Scheme (WELS) rated. Minimum 4 stars for dual flush toilets, shower flow restrictors, aerator taps, flow/pressure control valves and minimum 3 stars for all appliances e.g. washing machines.

3.4 ASSESSMENT OF APPLICATION

Once your application is submitted an Environmental Health officer will conduct a site inspection of the property where the septic tank system is to be installed.

a. Your application will be assessed according to the EPA Code of Practice Onsite Wastewater Management, AS/NZS 1547:2012 and other relevant state and local policies. The Council Officer will make a determination of your application and decide to grant a permit, request further information or refuse. If your application is refused the Council Officer will explain in detail and provide alternative options if possible. If you are not satisfied with Councils decision you may appeal through the Victorian Civil and Administrative Tribunal (VCAT)
b. Assuming a Permit is issued your licensed plumber can now begin installing your system. All parts of your septic tank system must be installed by a suitably licensed plumber experienced in wastewater systems and following installation a Plumbing Industry Commission Compliance Certificate must be issued for all works undertaken. During installation of the system an Environmental Health Officer will conduct an inspection which includes the following:-
    - Inspection of all waste pipes from the house to the distribution pit, including pump well warning devices etc.
    - Inspection of absorption lines (trench). Levels may be taken of the trench to check alignment and fall from the septic tank.
    - Inspection of tank/treatment plant prior to backfill.
    - Inspection of sand filter hole with collection pipe at the base, prior to backfill.
    - Inspection of effluent irrigation area, prior to backfill.
    - NOTE: if any of the above works have been completed without an open inspection you may be required to expose portions or parts of the system to enable accurate assessment of works.
c. Once your system is installed and ready to use the following is required: -
    - Inspection of completed irrigation areas where appropriate.
    - Inspection of vents, ORG, etc.
    - Installation of pumps and power supply.
    - Inspection of effluent irrigation area.
    - Sand analysis certificate (if sand filter installed)
    - Certificate of Compliance
    - Confirm commissioning of system and agreement for the system to be maintained by a suitably qualified contractor.
    - Amended Plan (Detailing constructed location of system including effluent lines)
d. Once the Environmental Health Officer is satisfied that the system has been installed and ready to use according to the Permit to Install a “Certificate to Use” will be issued signalling the end of the application process. Your Building Surveyor will require a copy of the Certificate to Use so a “Certificate of Occupancy” can be issued.

3.5 ONGOING USE OF SYSTEM

It is important the ongoing use of the septic tank system is managed appropriately and in accordance with the Permit and relevant EPA approvals. It is the property owner's responsibility to ensure the septic tank system is maintained and is operating adequately for the life of the system.

If you have installed an AWTS or other type of treatment system you may require this system to be maintained by an accredited service technician for that particular system. This will be detailed on the Permit or EPA Certificate of Approval.

A failing septic tank system poses significant risks to the environment and public health. Council responds to complaints in relation to failing septic tank systems and can issue on-the-spot fines to owners/persons not maintaining or operating there system in accordance with Permit conditions.

See Appendix F for more details.

3.6 FURTHER INFORMATION

The following documents can be found at:

http://www.epa.vic.gov.au/water/wastewater/onsite.asp

EPA Code of Practice – Onsite Wastewater Management Publication 891.3, February 2013

EPA Certificates of Approval for Onsite Wastewater Systems

Contact details:

City of Greater Geelong
Environmental Health Services
PO Box 104
GEELONG 3220
Ph: 5272 4411
Fax: 5272 4375
Email: EnvirHealthAdmin@geelongcity.vic.gov.au
Web: www.geelongaustralia.com.au

If you wish to meet with an officer please contact us to make an appointment.

Surf Coast Shire Council
Environmental Health Unit
PO Box 350
TORQUAY 3228
Ph: 5261 0600
Fax: 5261 0525
Email: info@surfcoast.vic.gov.au
Web: www.surfcoast.vic.gov.au

If you wish to meet with an officer please contact us to make an appointment or visit the Council Offices at:
1 Merrijig Drive
TORQUAY VIC 3228

APPENDIX A: SEPTIC TANK AND TRENCHES/BEDS

These requirements listed are not exhaustive but contain a summary of the EPA Code of Practice Onsite Wastewater Management Pub 891.3 and AS/NZS 1547:2012. Please refer to the above documents for full details and requirements.

Table 1 provides required trench lengths for a domestic dwelling depending on soil type, number of bedrooms and types of water fittings/fixtures used.

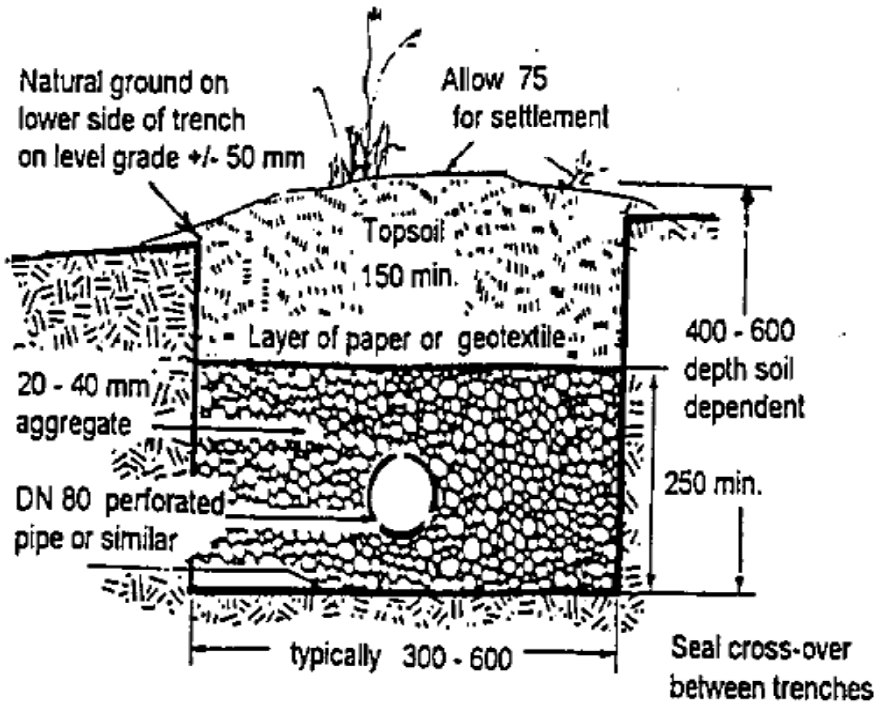
A1 TECHNICAL SPECIFICATIONS

- Minimum septic tank capacity required is 3000 litres.
- Minimum total length of disposal trenches shall be in accordance with the tables below, taking into account the waste generating capacity of the dwelling and the efficiency of the appliances.
- Where soil permeability rates are high (sand or gravel) or very low (medium-heavy clay), a land capability assessment may be required to ensure this disposal system is appropriate.
- In determining wastewater flows based on number of bedrooms, a study/rumpus may be included if of significant size.
- Each run shall be no more than 30m in length.
- Filter cloth must be placed in trenches/beds between aggregate and top soil. Newspaper is no longer permitted.
- To ensure even distribution a distribution boxes must be installed.
- Overflow relief gully required.
- Disposal trenches/beds must be installed in accordance with the standard drawings provided (see over)
- Distance between trenches – minimum 1 metre in sandy/loamy soils and 2 metres in clay soils.
- Refer to Appendix I for required setbacks from property boundaries, buildings, waterways etc.
- Top of backfilled trenches must be mounded with high quality loamy soil to aid in evapotranspiration and support vegetative growth. Backfilling trenches with clay are not permitted as it is likely to 'seal' the system and minimise evapotranspiration.
- If the permeability of the soil is very low (i.e. heavy clay), the soil must be improved by rotary hoeing and adding gypsum to the dedicated wastewater disposal area.
- Slotted pipe must be laid so that slots are not located at the bottom of the pipe.
- The distribution/slotted pipe must be minimum 80mm
- The end of the distribution/slotted pipes must be capped.
- See Figure A1 for example of slotted distribution pipe.
- Construction of trench must be in accordance with Figure A2. See also Figure A3 for typical layout of system.

FIGURE A1 – TYPICAL DIMENSIONS OF TRENCHES/BEDS

	Typical Dimensions (mm)	**Maximum** (mm)	**Minimum** (mm)
Trench Dimensions			
Width	300 – 450	600	200
Depth of aggregate	200 – 400	400	200
Depth of topsoil	100 – 150	150	100
Spacing between adjacent trenches (side wall to side wall)	N/A	N/A	1000
Bed dimensions			
Width	1000 – 4000	4000	1000
Depth of aggregate	300 – 600	600	300
Depth of topsoil	100 – 150	150	100
Spacing between adjacent trenches (side wall to side wall)	N/A	N/A	1000

FIGURE A2 – CONVENTIONAL PIPED TRENCH



(Environment Protection Authority, Code of Practice – Septic Tanks On-Site Domestic Wastewater Management, Publication 451, March 1996)

TABLE 1 – REQUIRED TRENCH LENGTHS[1]

Soil Type	Med-heavy Clays	Light Clays	Clay Loams	Loams	Sandy Loams	Gravel and Sands
Design Loading Rate (mm/day)[2]	N/A	5	10	15	15	N/A[3]
Length of Subsoil/Absorption Trench in metres at 600mm wide						
1 Bedroom						
Standard fixtures	N/A	120	60	40	40	N/A
Full water-reduction facilities	N/A	100	50	33	33	N/A
2 Bedroom						
Standard fixtures	N/A	180	90	60	60	N/A
Full water-reduction facilities	N/A	150	75	50	50	N/A
3 Bedroom						
Standard fixtures	N/A	240	120	80	80	N/A
Full water-reduction facilities	N/A	200	100	67	67	N/A
4 Bedroom						
Standard fixtures	N/A	300	150	100	100	N/A
Full water-reduction facilities	N/A	250	125	84	84	N/A
5 Bedroom						
Standard fixtures	N/A	360	180	120	120	N/A
Full water-reduction facilities	N/A	300	150	100	100	N/A

[1] These calculations are based on the Australian Standard AS/NZS: 1547:2012

[2] The Design Loading Rate are recommended maximum loading rates for treated effluent. A water balance may indicate a reduced application rate is required for a specific site based on local rainfall and evaporation data. An LCA will determine this.

[3] The exception is where the soil does not have a high perched or high seasonal (winter) water table (see AS/NZS 1547:2012)

APPENDIX B: SEPTIC TANK AND SAND FILTER SYSTEM

These requirements are not exhaustive but summarise the main requirements under the EPA Code of Practice Onsite Wastewater Management and the EPA Certificate of Approval 1.3/03. For exact requirements go to http://www.epa.vic.gov.au/your-environment/water/onsite-wastewater

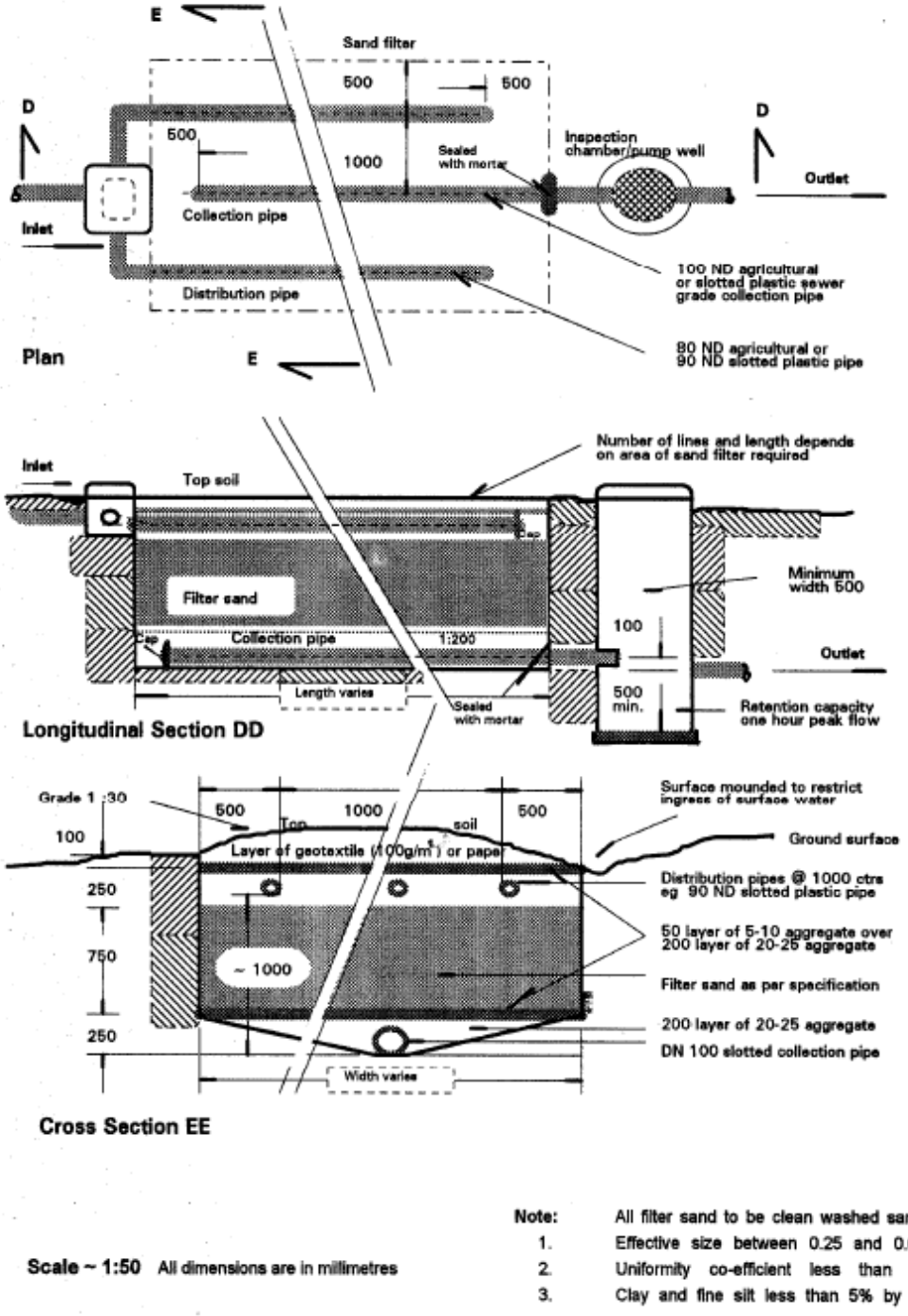
B1 TECHNICAL SPECIFICATIONS

- Minimum septic tank capacity required is 3000 litres.
- Sand filter systems are restricted to treating domestic type sewage with design flows less than 5000 litres per day.
- Filter sand should be supplied by an approved supplier and conform with the requirements of 'Code of Practice for Small Wastewater Treatment Plants and CA 1.3/03 in relation to particle size and consistency (contain less than %5 clay and fine silt, has an effective size between 0.25 and 0.60 mm, has a uniformity co-efficient less than 4). A copy of the Sieve Analysis test is to be provided after installation occurs.
- In determining wastewater flows based on number of bedrooms, a study/rumpus may be included if of significant size.
- Disposal of Effluent shall be in accordance with Pressure Compensating Sub-Surface Irrigation requirements (see Appendix C)
- All effluent must also be retained on-site. Council may consider off-site discharge where the subdivision of the land occurred prior to March 15, 1988 and that there are no means by which the effluent can be retained on site. In such circumstances, approval is required from the EPA, an annual analysis of such effluents will be required by a NATA approved laboratory and copies of the analysis forwarded to Council.
- Installation of kitchen disposal units will increase the Sand Filter capacity by 33% to the specified value
- Imperative that no more than 250-300 mm of good quality topsoil is placed on top of the Sand Filter. This soil must be mounded with high quality organic loam to shed stormwater and support vegetative growth. Backfilling with clay is not permitted as it is likely to 'seal' the system and give rise to anaerobic conditions.
- Plumbing work is to be kept as close to ground level as possible otherwise an extra pump well will need to be installed prior to the sand filter. This will add extra upfront costs as well as additional maintenance and associated repair costs.

TABLE 2 – SAND FILTER SIZING

DWELLING SIZE	1 Bedroom House	2 Bedroom House	3 Bedroom House	4 Bedroom House	5 Bedroom House
Standard fixtures	8 m^2	11 m^2	15 m^2	18 m^2	22 m^2
Full water-reduction facilities	6 m^2	9 m^2	12 m^2	15 m^2	18 m^2

FIGURE B1 – SAND FILTER CONSTRCUTION DIAGRAM



(Environment Protection Auhtority Victoria, Code of Practice Small Wastewater Treatment Plants Publication 500, June 1997)

APPENDIX C: PRESSURE-COMPENSATING SUB-SURFACE IRRIGATION

These requirements are not exhaustive but summarise the main requirements under the EPA Code of Practice Onsite Wastewater Management and AS/NZS 1547:2012. For exact requirements go to http://www.epa.vic.gov.au/your-environment/water/onsite-wastewater

The default land application system for sustainably recycling secondary treated sewage or greywater effluent to land is pressure-compensating sub-surface 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. For a 450 m2 irrigation field with 13 mm diameter pipes, at least 60 L may be required to be pumped into the pipes to reach the required pressure to open the emitters. 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.

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.

Secondary treated effluent should be applied using the design irrigation rates specified in Table 3 as a maximum. 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. The default for recycling secondary quality effluent is sub-surface irrigation because 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.

C1 TECHNICAL SPECIFICATIONS

- The international colour-coded for plumbing installations for recycled water is lilac, but it is generally referred to as purple in Victoria (i.e. 'purple pipe'). The pipework connecting the treatment unit and irrigation area, the pipes in a new irrigation field and have appropriate signage in accordance with the most recent version of AS/NZS 3500: Drainage and Plumbing. Where a treatment system is retrofitted to existing irrigation pipes that are not purple-coloured, the above-ground fixtures such as taps, pumps and hatches, must be covered with purple paint or tape.
- If the permeability of the soil is very low (i.e. heavy clay), the soil in the irrigation area must be improved by rotary hoeing and adding gypsum to the dedicated wastewater disposal area.
- The irrigation area must be a permanent dedicated area for effluent disposal within the property to enhance evapotranspiration and its amenity.
- For pressure compensating pipe vacuum breakers (air valve) must be installed at the high point of the disposal area and a flushing valve must be installed at the low point of the disposal area. This allows for the disposal area to be flushed out preventing any blockages from sludge/scum build-up and therefore prolonging the life of the system. The flushing valve must either be connected so the wastewater is returned to the treatment system (preferable option) or disposed of via sub-soil absorption trenches.
- In determining wastewater flows based on number of bedrooms, a study/rumpus may be included if of significant size.
- Refer to Appendix I for required setbacks from property boundaries, buildings, waterways etc.

TABLE 3 – REQUIRED SUB-SURFACE IRRIGATION AREAS[1]

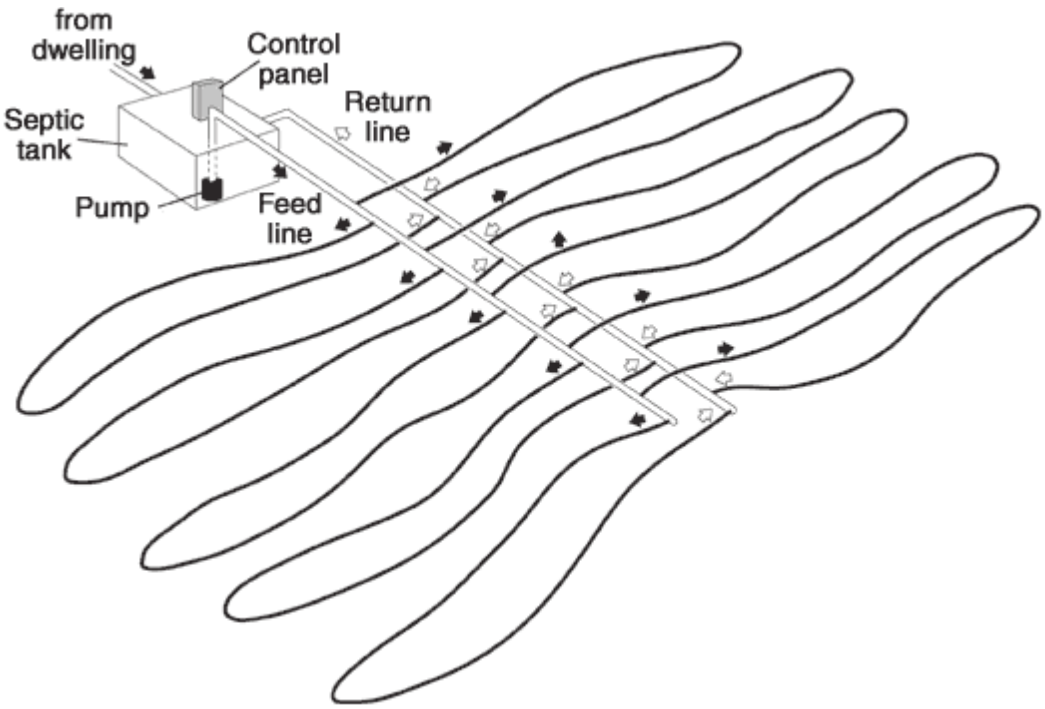
Soil Type	Med-heavy Clays	Light Clays	Clay Loams	Loams	Sandy Loams	Gravel and Sands
Design Irrigation Rate (mm/day)[2][3]	2	3	3.5	4	5	5
Irrigation area required in m2 and/or lineal metres if laid as per Figure C1						
1 Bedroom						
Standard fixtures	180	120	105	90	75	75
Full water-reduction facilities	150	100	90	75	60	60
2 Bedroom						
Standard fixtures	270	180	155	135	110	110
Full water-reduction facilities	225	150	130	115	90	90
3 Bedroom						
Standard fixtures	360	240	205	180	145	145
Full water-reduction facilities	300	200	170	150	120	120
4 Bedroom						
Standard fixtures	450	300	260	225	180	180
Full water-reduction facilities	375	250	215	190	150	150
5 Bedroom						
Standard fixtures	540	360	310	270	220	220
Full water-reduction facilities	450	300	260	225	180	180

[1] These calculations are based on the Australian Standard AS/NZS: 1547:2012.

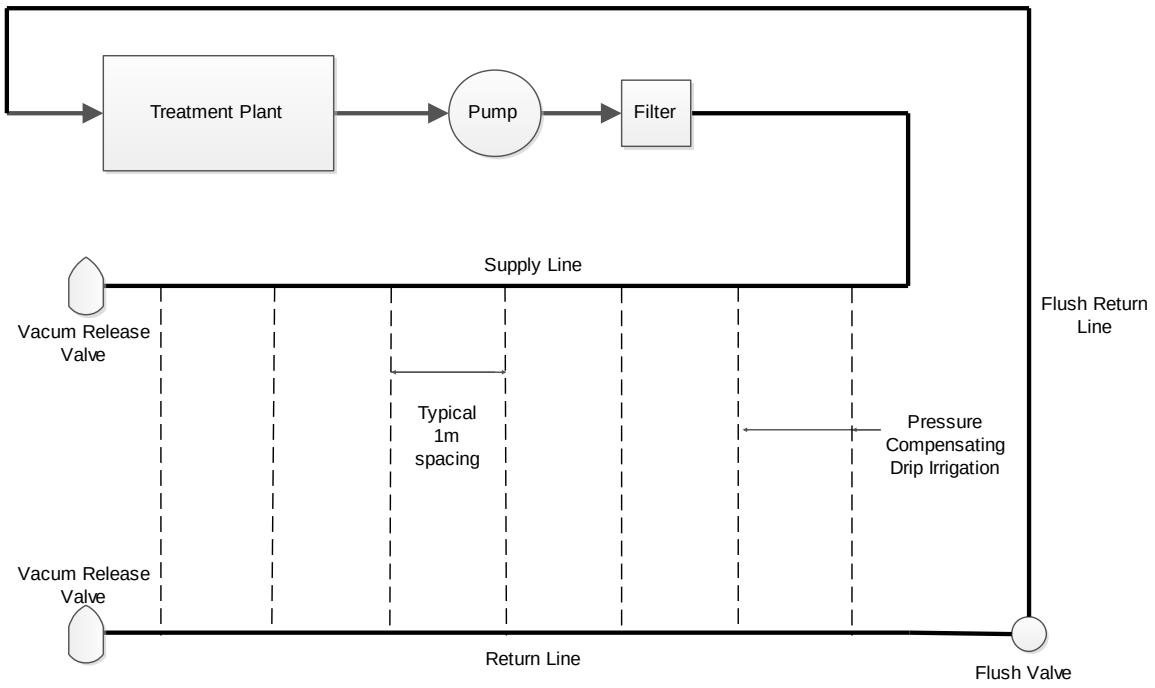
[2] The Design Irrigation Rate is recommended maximum loading rates for secondary treated effluent. A water balance may indicate a reduced application rate is required for a specific site based on local rainfall and evaporation data. An LCA will determine this.

[3] Lower application rates may be required to make allowance for reduced soil permeability in sodic and dispersive soils, and sandy soils with seasonally high water tables. An LCA will determine this.

FIGURE C1 – SUB-SURFACE IRRIGATION SYSTEM – EXAMPLE LAYOUT OF COMPONENTS



(Designing and Installing On-Site Wastewater Systems – A Sydney Catchment Authority Current Recommended Practice – May 2012)



APPENDIX D: PUMPING SYSTEMS

Find attached below an extract from the EPA Code of Practice for Small Wastewater Treatment Plants, Publication 500, June 1997. This stipulates requirements for pump pits/chambers for the installation of Sand Filters. A pump pit maybe required for Septic Tanks where treated effluent is required to be pumped to the effluent disposal area.

8 PUMPING SYSTEMS

8.1 Objectives

This relates to pumpsets designed to cope with flows of less than 100 kilolitres per day.

The pumping of wastewater should be avoided where practicable, by locating or designing the treatment system to make pumping unnecessary. Where unavoidable because of site conditions or the treatment system to be used, the following items should be taken into consideration when designing the system.

a) The location of pump wells is normally determined by site conditions but if practicable they should be located after a settling tank.

b) The selection of pumps should be governed by the volume of waste to be pumped. Pumps may also serve as a dosing device and/or flow equaliser for the plant.

c) Multiple pumps with automatic operation and changeover must be installed in all systems except for single dwellings or premises where the daily flow is less than 1000 litres.

8.2 Suggested measures

Pump wells are constructed in accordance with section 3 and Figure 12.

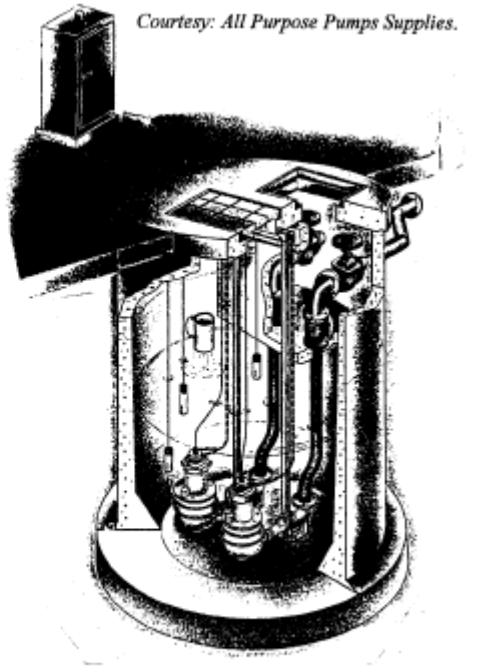
Pump stop and start (cut-out/in) levels to be located so that the duty pump will discharge a volume of liquid equal to approximately one (1) hour of MDF.

In emergency situations – such as power failure the well has an additional liquid storage capacity of at least (1) hour of MDF between pump cut-in and well inlet levels.

Alarm systems and controls are provided in an accessible location to indicate failure of the pumping system. The system has a suitable and permanently installed visual/audible warning device with mute facility. In the case of remote systems – such as those serving subdivisions – a telemetry alarm system with interrogation facilities should be installed to monitor the works. Pumps and control switches of a type suitable for wastewater works are installed in accordance with manufacturer's specifications.

Table 8: Impeller clearance and rating of pumps

Raw sewage (non-cutter type)	**Nominal**
Solid clearance	65 mm
Pressure main	80 mm
Power rating	0.75 kW
Settled/treated effluent	**Nominal**
Solid clearance	10 mm
Pressure main	25 mm
Power rating	0.25 kW
Cutter/grinder type pumps	**Nominal**
Pressure main	40 mm
Power rating	0.75 kW



Courtesy: All Purpose Pumps Supplies.

Packaged pump stations ensure best practice installation and performance.

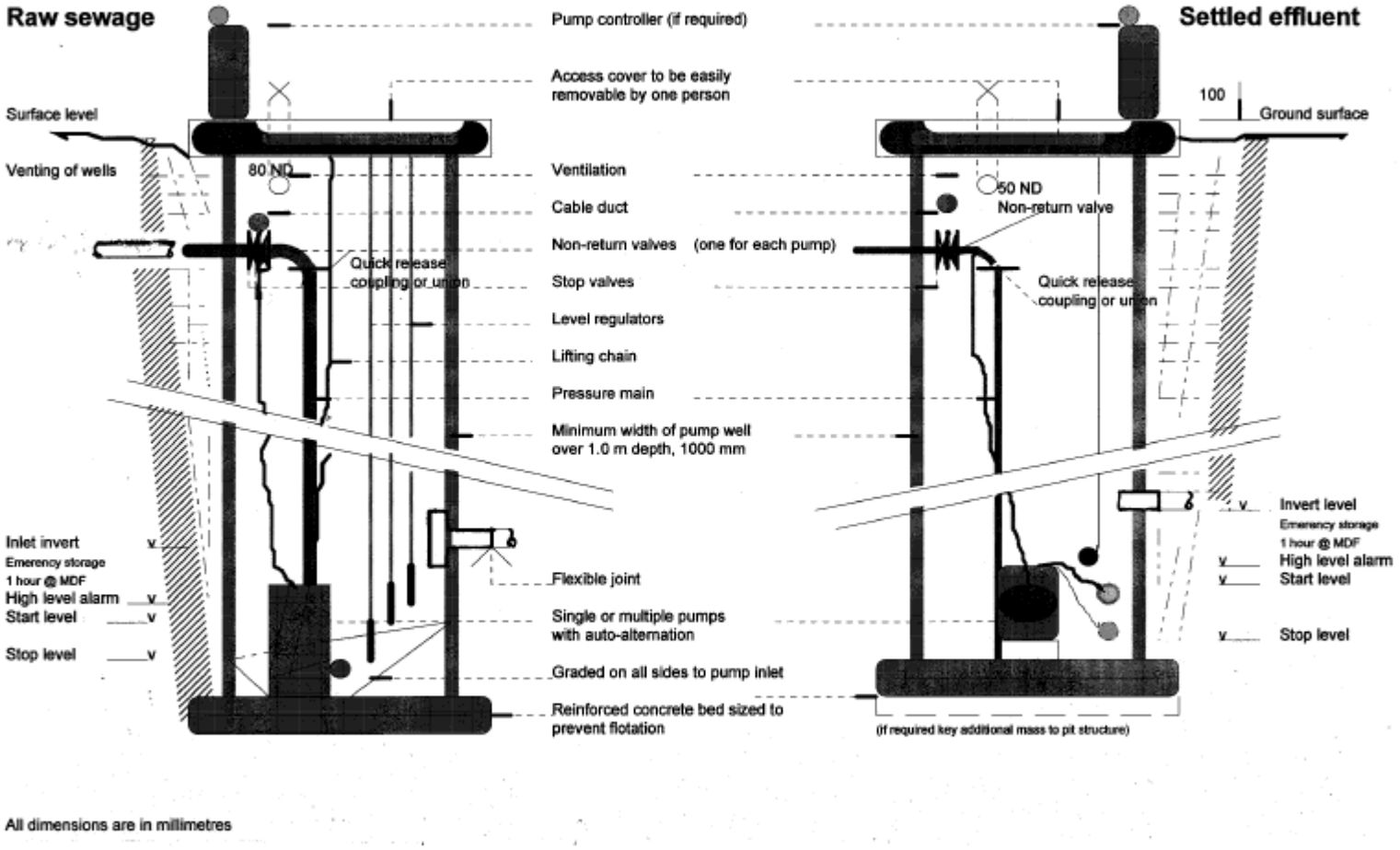


Figure 12: Pump wells installation

DESIGN EXAMPLE – PUMP WELL AND PUMPS

Requirement

Settled wastewater from a septic tank serving a 20 site camping park is required to be pumped to a stabilisation pond system located 150m away. The invert depth of the tank outlet is 1.6 m below the surface level and the proposed pond water level is 3 m above this level.

1. Determine the daily flow (MDF) and peak hourly flow (PHF)

Assume 3.5 people per site @ 100 litres per person and a peak to average hourly flow ratio of 6 (Table 2 and Figure 4)

a) Daily flow = 20 sites x 3.5 people x 100 litres/person
= 7,000 litres per day (7 kL/d)

b) Average hourly flow = 7,000/24
= 292 litres per hour

c) Peak hourly flow = 292 x 6
= 1,752 litres per hour

2. Determine size of pump well

a) Pump well capacity between well inlet and invert to accommodate discharge volume and emergency storage (Figure 12)
= Pump cycle + emergency storage
= 2h@MDF
= 2 x 292
= 584 litres

b) Calculated pump cycle capacity plus emergency storage – assuming a pump well diameter of 1,050 mm
Well depth = $4 \times 0.584/3.14 \times (1.05)^2$
= 0.67m (Cut-in /out 350 mm)
(Inlet/cut-in 350 mm)

c) Check if mass of pump well is sufficient to prevent well floating to external hydrostatic forces when empty.
Mass of pump well = mass of liquid displaced
Mass of RCP + T & B slabs = mass of water displaced by well
= 2.4×655 kg/m + $3.14/4\,(1.05 + 0.15)^2 \times 2{,}500$ kg/m^3 x
= $3.14/4\,(1.2)^2 \times 2.4 \times 1{,}000$ kg/m = m^3
Depth of top and bottom slabs 'd' = 0.4 m

Construction pump well using 2 No. 1.2 m x 1,050 mm RCPs walls 70 mm thick, top slab 100 mm and base slab 300 mm deep.

3. Selection of pump size

i) Hydraulic capacity (PHF) = 1,752 L/h (0.5 L/s)
ii) Total pumping head = static discharge head + other head losses

From pump manufacturer's tables and data sheets select pumps (duty and standby) for hydraulic capacity of 0.5 L/s at total pumping head.

APPENDIX E: GENERAL CONDITIONS OF INSTALLATION

Suitable plants and grasses must be planted over and around effluent disposal areas. The vegetation must also be kept healthy and viable. The maintenance of healthy vegetation is essential to dispose of effluent through evapotranspiration.

Unless in accordance with specified variations, all materials, fixtures, pipes or other appliances and all plumbing works shall be in accordance with the Victorian Plumbing Regulations 1998. All plumbing works associated with the onsite wastewater system including the irrigation field must be installed by a licensed plumber.

All installations must comply with the Environment Protection Authority Code of Practice – Onsite Wastewater Management 2012 Publication 891.3, Australian Standard/New Zealand Standard 1547:2012 – On-site domestic wastewater management.

Effluent disposal area must be protected from vehicular traffic and livestock during and after construction. This may require the erection of a fence or suitable barrier.

Effluent disposal area must be protected from storm water run-off. Cut-off drains may be required.

All sewer drains must have minimum ground cover of 300mm and provided with accessible inspection openings under public thoroughfares, rights of way and other places subject to heavy vehicular traffic, must have a minimum cover of 750mm. Drains under other driveways in unpaved ground or on ground paved with flexible surface such as bitumen must have a minimum cover of 450mm. If this cover cannot be achieved the drains must be cast iron or encased in reinforce concrete.

A minimum fall of 300mm is required between invert of the outlet of the septic tank and the bottom of the first effluent disposal trench or bed.

A drainage vent must be provided within 8 metres of the head of any drains so as to provide protection to all water traps from siphonage.

All septic tanks are to be laid level on suitable bedding, with inlet and outlet markings correctly orientated.

All concrete pre-cast septic tanks designed to serve less than 10 persons shall conform to Australian/New Zealand Standard 1546.1:1998 – On-site domestic wastewater treatment units and marked accordingly. Back filling around tanks shall be in layers consolidated in a manner that will not produce undue strain on the tank.

No tank shall be constructed or installed closer than 2 metres to the foundation of any house or other building or the boundary of any allotment. This distance may need to be increased if the excavation for the tank is greater than 2.5 metres. Advice on this matter should be sought from Council's Building Department or a private building surveyor.

Inspection openings on the septic tank shall be brought up to and permanently marked at ground surface level. Inspection openings shall be fitted with child-proof airtight covers which are capable of being readily removed and replaced by one adult.

APPENDIX F: REQUIREMENTS FOR ONGOING USE OF SYSTEM

The successful functioning of the system relies on the ability of plants to use your wastewater. You must therefore maintain healthy growth of grasses and plants over and around the disposal area. A list of suitable plants is at Appendix G.

All wastes must be contained within the property boundaries. Council will not approve systems which treat wastes for discharge off the property.

Effluent disposal area must be protected from vehicular traffic and livestock during and after construction. This may require the erection of a fence or suitable barrier.

Effluent disposal area must be protected from storm water run-off. Cut-off drains may be required.

Aerated Wastewater Treatment Systems (AWTS) must be maintained and serviced in accordance with the manufacturer's instructions and the relevant EPA Certificate of Approval. A maintenance logbook is to be kept and copies of maintenance certificates are to be forwarded to Council.

The septic tank system must at all times be maintained to prevent a nuisance or other condition liable to be dangerous to health or offensive.

The septic tank system shall be desludged a minimum of once every three years to ensure the efficient performance of the overall system.

Do not install a swimming pool closer than 6 metres from the effluent disposal area.

Do not place soil over the effluent disposal system so that the layer of aggregate is further from final surface than approximately 175 mm.

Treated/recycled wastewater may be used to irrigate the base of fruit trees but must not come into contact with the edible parts of herbs, vegetables or fruit.

APPENDIX G: SUITABLE VEGETATION FOR EFFLUENT DISPOSAL AREAS

The following plants are known to occur in the Geelong and Surf Coast areas and are adapted to wet or boggy areas or can tolerate periods of inundation*.

Botanical Name	Common Name	Height
Alyxia buxifolia	Sea Box	To 2m
Atriplex semibaccata	Creeping Saltbush	To 40cm
Atriplex paludosa	Marsh Saltbush	To 1.6m
Baumea acuta	Pale Twig-sedge	To 50cm
Baumea juncea	Bare Twig-sedge	To 90cm
Carex appressa	Tall sedge	To 1.5m
Carex breviculmis	Common Grass-sedge	To 30cm
Dianella longifolia	Pale Flax-lily	To 1.3m
Dianella tasmanica	Tasman Flax-lily	To 1m
Eleocharis acuta	Common Spike-sedge	To 60cm
Eleocharis sphacelata	Tall Spike-sedge	To 2m
Gahnia filum	Chaffy Saw-sedge	To 1m
Gahnia sieberiana	Red-fruited Saw-sedge	To 2-3m
Goodenia ovata	Hop Goodenia	To 2m
Indigofera australis	Austral Indigo	To 1.5m
Isolepis inundata	Swamp Club-sedge	To 40cm
Isolepis nodosa	Knobby Club-rush	To 1m
Juncus kraussii	Sea Rush	To 1.2m
Juncus procerus	Tall Rush	To 1.8m
Leptospermum lanigerum	Woolly Tea-tree	To 6m
Leptospermum myrsinoides	Heath Tea-tree	To 1.5m
Lomandra longifolia	Spiny-headed Mat-rush	To 1m
Melaleuca ericifolia	Swamp Paperbark	To 7m
Melaleuca lanceolata	Moonah	To 10m
Melaleuca squarrosa	Scented Paperbark	To 3m
Patersonia fragilis	Short Purple-flag	To 60cm
Patersonia occidentalis	Long Purple-flag	To 80cm
Prosanthera melissifolia	Balm Mint Bush	To 2.5m
Schoenus brevifolius	Zig-zag Bog-sedge	To 80cm
Schoenus lepidosperma	Slender Bog-sedge	To 45cm
Schoenus tesquorum	Soft Bog-sedge	To 45cm

*This reference list may be of assistance to you but the City of Greater Geelong/Surf Coast Shire and its employees do not guarantee that the reference list is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaim all liability for any error, loss or other consequence which may arise from you relying on any information in this reference list.

APPENDIX H: MINIMUM DAILY WASTEWATER FLOW RATES AND ORGANIC LOADING RATES

For ease of access below is table extracted from the EPA Code of Practice Onsite Wastewater Management Publication 891.3. Please go to http://www.epa.vic.gov.au/~/media/Publications/891%203.pdf for detail.

Source	Design hydraulic flow rates for all water supplies (L/person.day) [1]	Organic material loading design rates (g BOD/person.day)[2]
Households with extra wastewater producing facilities[3]	220	60
Households with standard water fixtures	180	60
Households with full water-reduction fixtures[4]	150	60
Motels/hotels/guesthouse		
- per bar attendant	1000	120
- bar meals per diner	10	10
- per resident guest and staff with in-house laundry	150	80
- per resident guest and staff with out-sourced laundry	100	80
Restaurants (per potential diner)		
- premises <50 seats	40	50
- premises >50 seats	30	40
- tearooms, cafés per seat	10	10
- conference facilities per seat	25	30
- function centre per seat	30	35
- take-away food shop per customer	10	40
Public areas (with toilet, but no showers and no café)		
- public toilets	6	3
- theatres, art galleries, museum	3	2
- meeting halls with kitchenette	10	5
Premises with showers and toilets		
- golf clubs, gyms, pools etc. (per person)	50	10
Hospitals - per bed	350	150
Shops/shopping centres		
- per employee	15	10
- public access	5	3
School – child care	20	20
- per day pupil and staff	20	20
- resident staff and boarders	150	80
Factories, offices, day training centres, medical centres	20	15
Camping grounds		
- fully serviced	150	60
- recreation areas with showers and toilets	100	40

[1] When calculating the flow rate for an existing commercial premise, use this table or metered water usage data from the premise's actual or pro-rata indoor use.

[2] The organic loading rate must be considered as well as the hydraulic flow rate when selecting the most suitable treatment system.

[3] Extra water producing fixtures include, but are not limited to, spa baths.

[4] WELS-rated water-reduction fixtures and fittings - minimum 4 Stars for dual-flush toilets, shower-flow restrictors, aerator taps, flow/pressure control valves and minimum 3 Stars for all appliances (e.g. water-conserving automatic clothes washing machines).

APPENDIX I: SETBACK DISTANCES FOR PRIMARY AND SECONDARY TREATMENT PLANTS AND EFFLUENT DISPOSAL/IRRIGATION AREAS

For ease of access below is table extracted from the EPA Code of Practice Onsite Wastewater Management Publication 891.3. Please go to http://www.epa.vic.gov.au/~/media/Publications/891%203.pdf for detail.

Landscape feature or structure	Setback distances (m) [1, 2, 6, 10, 19]		
	Primary treated effluent	Secondary sewage and greywater effluent	Advanced secondary greywater effluent [3]
Building			
Wastewater field up-slope of building [7]	6	3	3
Wastewater field down-slope of building	3	1.5	1.5
Wastewater up-slope of cutting/escarpment [12]	15	15	15
Allotment boundary			
Wastewater field up-slope of adjacent lot	6	3	1
Wastewater field down-slope of adjacent lot	3	1.5	0.5
Services			
Water supply pipe	3	1.5	1.5
Wastewater up-slope of potable supply channel	300	150	150
Wastewater field down-slope of potable supply channel	20	10	10
Gas supply pipe	3	1.5	1.5
In-ground water tank [14]	15	4	3
Stormwater drain	6	3	2
Recreational areas			
Children's grassed playground [15]	6	3 [16]	2 [16]
In-ground swimming pool	6	3 [16]	2 [16]
Surface waters (up-slope of:)			
Dam, lake or reservoir (potable water supply) [8, 13]	300	150 [4]	150
Waterways (potable water supply) [9, 13]	100	100 [4, 17]	50
Waterways, wetlands (continuous or ephemeral, non-potable); estuaries, ocean beach at high-tide mark; dams, lakes or reservoirs (stock and domestic, non-potable) [8, 9]	60	30	30
Groundwater bores			
Category 1 and 2a soils	NA [11]	50 [5]	20
Category 2b to 6 soils	20	20	20
Watertable			
Vertical depth from base of trench to the highest seasonal water table [18]	1.5	1.5	1.5
Vertical depth from irrigation pipes to the highest seasonal water table [18]	NA	1.5	1.5

1. Distances must be measured horizontally from the external wall of the treatment system and the boundary of the disposal/irrigation area, except for the 'Watertable' category which is measured vertically through the soil profile. For surface waters, the measuring point shall be from the 'bank-full level'.
2. Primary water-based sewerage systems must only be installed in unsewered areas; secondary sewerage systems must only be installed and managed in sewered areas by Water Corporations; secondary greywater systems can be installed in sewered and unsewered areas.
3. Advanced secondary treated greywater of 10/10/10 standard.
4. The setback distances are conditional on the following requirements (otherwise the setback distances for primary effluent apply):
    - effluent is secondary treated to 20/30 standard as a minimum;

- effluent is applied to land via pressure-compensating sub-surface irrigation installed along the contour; and
- a maintenance and service contract, with a service technician accredited by the manufacturer, is in place to ensure the system is regularly serviced in accordance with the relevant CA and Council Septic Tank Permit conditions.

5. The setback distance to a groundwater bore in Category 1 and 2a soils can be reduced to 20 m where treated and disinfected greywater or sewage (20/30/10 or better standard) is applied via pressure-compensating sub-surface irrigation and the property owner has a service contract.
6. Effluent typically contains high levels of nutrients that may have a negative impact on native vegetation and promote the growth of weeds. When determining setbacks, Council should consider not only the potential impact of nutrients from the proposed onsite wastewater management system, but the cumulative impact of the existing onsite wastewater management systems in the area.
7. Establishing an effluent disposal/irrigation area upslope of a building may have implications for the structural integrity of the building. This issue is beyond the scope of this Code and should be examined by a building professional on a site-by-site basis.
8. Does not apply to dams, lakes and reservoirs located above ground-level which cannot receive run-off.
9. Means a waterway as defined in the Water Act 1989.
10. The setback distances for flat land are equivalent to 'down-slope' setback distances.
11. See Table 9 of the EPA Code of Practice for other land application options for Category 1 and 2a soils.
12. A cutting or escarpment from which water is likely to emanate.
13. Applies to land, adjacent to a dam, lake, reservoir or waterway that provides water for a public potable water supply, which is:
    - a. subject to a Planning Scheme Environmental Significant Overlay (ESO) that designates maintenance of water quality as the environmental objective to be achieved (contact the relevant Water Authority to determine whether the ESO is in a potable water supply catchment); and
    - within a Special Water Supply Area listed in Schedule 5 of the Catchment and Land Protection Act 1994.
14. It is recommended that any primary or secondary treatment system and its associated land application system are installed downslope of an in-ground water tank.
15. Means a school, council, community or other children's grassed playground managed by an organisation which may contain play equipment.
16. Sub-surface irrigation only.
17. Where 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 40 m (SCA 2010). The topography of the drainage line must be visually inspected and photographed during the LCA site inspection and reported upon in writing and photographs in the LCA report.
18. The highest seasonal watertable occurs when the watertable has risen up through the soil profile and is closest to the ground surface. This usually occurs in the wettest months of the year.
19. See Section 3.9 of the EPA Code of Practice for more details on setback distances.

APPENDIX J: LAND CAPABILITY ASSESSMENT REQUIREMENTS

For ease of access the information below has been extracted from the EPA Code of Practice Onsite Wastewater Management Publication 891.3. Please go to http://www.epa.vic.gov.au/~/media/Publications/891%203.pdf for detail.

J1 LAND CAPABILITY ASSESSMENT

In unsewered areas, a land capability assessment (LCA) should be undertaken for each site that requires the installation of an onsite wastewater treatment system, unless Council is satisfied the site is low risk or sufficient information (e.g. soil permeability rates, soil types, depths to watertable, fractured rock and other limiting factors) has already been gathered about the site. The information may have been obtained through previous Council investigations such as a regional, catchment or township-based land capability assessments. However, a large area LCA is only a general guide because soils and landscapes can be highly variable within an allotment and between neighbouring properties. A 'best practice' regional or catchment-scale LCA will identify high, medium and low risk areas and can recommend minimum lot sizes as well as the most appropriate management solutions.

An LCA is mandatory for any allotment within a Special Water Supply Catchment Area. In potable water supply catchments, a greater density of rural lifestyle allotments not only involves potential pathogen contamination risks from onsite wastewater management systems, but also added risk factors such as domestic animals, horses, chemical sprays and increased traffic.

It is very important an LCA is performed early in the planning phase of land developments. An LCA should be conducted before rezoning, or subdivision if the land does not require rezoning. The information gathered through the LCA process is used to determine the areas most and least capable of managing wastewater onsite and the required size of the lots to ensure sustainable onsite wastewater management.

Land capability assessments should only be conducted, or overseen and signed-off, by suitably qualified, experienced and independent soil scientists and/or hydro-geologist (with suitable professional indemnity insurance) who can analyse the capacity of the land to sustainably absorb treated wastewater onsite without negatively impacting householder and public health and local environmental health [e.g. land, vegetation, surface waters and groundwater. On the basis of the information collected, the land capability assessor will recommend the required effluent quality and design the land application system. The Council officer's role is to assess land capability assessment reports and applications for Planning and Septic Tank Permits, not do the LCAs or design the land application areas. Unsewered residential developments and new buildings should only proceed on land the local Council has determined, after review of the LCA report and from consideration of local knowledge, has an acceptable capability for sustainable onsite wastewater management.

The objectives of the land capability assessment process are to:

- assess the capability of the site to sustainably utilise and manage wastewater within the allotment boundaries
- assess the capability of catchments to sustainably utilise and manage wastewater within sub-catchments or specific regions
- determine high risk and sensitive areas within allotments and within catchments
- gather the relevant geographical and social information to adequately inform the process of designing the best practicable and most sustainable type of onsite wastewater treatment and effluent recycling/disposal system that should protect the health of the householders and the community and protect the local environment from pollution

- formulate a sustainable management plan (in accordance with the EPA Code and the conditions in the treatment system CA and the Council Permit) that:
    - must be carried out by the property owner to ensure that impacts on the environment or public health do not occur or are minimised; and
    - will ensure the beneficial reuse of the treated water, organic matter and nutrients (where applicable).

J1.1 LCA PROCEDURE

Land capability assessors should follow the conservative and 'best practice' Model LCA Report [MAV & DSE, 2006 (as amended)] procedures for carrying out land and soil assessments and hydrological calculations for designing land application areas. Either the constant-head Soil Permeability method or site-and-soil evaluation procedures detailed in Part 5.2 of AS/NZS 1547:2012 (as amended) are to be employed to analyse and estimate the permeability of the soil.

Note: The soil percolation (falling-head) test method is no longer allowed as it is not based on valid scientific evidence and it tends to produce data that results in the land application area being undersized.

Soil permeability testing conducted in situ using the constant head well permeameter method (AS/NZS 1547) to determine the likely rate of flow of wastewater through the soil of the dispersal area is best practice. In situ permeability testing must be conducted on the limiting soil layer (frequently the B horizon) unless soil saturation or high swelling clays or cracked low-to-moderate swelling clays are present. The visual or tactile estimation of indicative permeability based on the latest version of AS/NZS 1547 'Site-and-Soil Evaluation' procedures, which includes soil texture, structure and swell potential tests, may be used as a substitute for actual measurements of soil permeability.

Although the Model LCA Report [MAV & DSE, 2006 (as amended)] recommends digging pits to identify the soil profiles, the procedure of augering the soil to at least 2 m and laying the retrieved soil on the ground in sequence for description, identification (bore logging) and photographing is also valid. However, should there be a dispute or any doubt or uncertainty regarding the soil category derived by visual/tactile methods, in situ permeability testing must be undertaken.

When conducting LCAs assessors must take into consideration the following issues:

- Soil permeability testing is not appropriate when soils are waterlogged.
- Soil that is frequently or seasonally waterlogged is a good indication the land is not capable of dispersing wastewater and therefore must not have wastewater applied to it.
- A distinction must be made between temporary perched water tables lying over a subsurface layer of lower permeability after a heavy rainfall and permanent shallow ground water tables.
- Soil permeability testing is not appropriate in any soils with low to moderate shrink/swell properties when there are desiccation cracks due to prolonged dry weather or in soils with high shrink/swell properties at any moisture content.
- Shrink/swell soils must be tested for soil permeability in moist condition when no drying cracks are visible.

A best practice procedure for land capability assessment is a 12-stage process:

1. List the relevant LCA criteria for the site in consultation with the developer or householder, Council Town Planners and the Environmental Health CDOs. This will determine whether a detailed or more basic land capability report is required by Council.

2. Gather and collate a land, surface water and groundwater inventory and climatic information (www.bom.gov.au – 'climate data' and 'design rainfalls for engineers') to develop water balances for the site. Particular attention must be given to features or factors that may impose a constraint on the application of treated wastewater to land, including constraints on adjacent land, such as bores used for domestic water supply, dams and/or waterways. For groundwater and bore water information consult: http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=water (also see Maps in this Code).
3. Gather any Council, Water Corporation, Catchment Management Authority and State Government requirements, including restrictions, caveats, planning/building/bushfire/flood zones, Environmental Significant Overlays, potable water supply and Special Water Supply Catchment information (including Special Area Plans) and maps. Overlay this information on a base map which shows all title boundaries, especially where the property is comprised of more than one title.
4. Visit the site and carry out a site inspection and field investigations including (but not limited to) soil profiling, soil texture classification and/or soil permeability tests. Where there is a risk of land slippage a geotechnical assessment may be needed to determine the extent, especially if the soil is likely to be saturated during winter.
5. Collate and analyse the information in relation to both the development site and any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water and groundwater.
6. Assess the capacity of the land to assimilate the treated wastewater based on the data collected and the total dissolved salts (TDS) in the potable water supply (see Section 2.3.4 and Appendix G) for both levels of effluent quality – primary and secondary.
7. Based on the LCA criteria, the data collected and the owner's requirements, calculate the size and design the layout of the most appropriate type of land application area (LAA) in accordance with this Code and the most recent version of Australian Standard AS/NZS 1547 and the Model LCA Report [MAV & DSE, 2006(as amended)]. This determines the effluent quality that the treatment system must achieve.
8. On the basis of the effluent quality required for the land application system, the property owner selects an applicable onsite treatment system(s) (see the EPA website for the list of currently approved systems).
9. Create a site plan(s) to scale showing the dimensions and, where relevant, include the following details:
    a. the site address, including lot number and street number
    b. title boundaries
    c. Council zoning and Environmental Significant Overlays
    d. type of catchment (e.g. a potable or other special water supply catchment)
    e. direction of north
    f. location, depth and specified use of the groundwater bores on the site and adjacent properties from the register of the relevant Rural Water Corporation
    g. contour lines (at 1 to 10 m intervals), direction of slope and slope analysis
    h. location of soil profile test pits or auger holes
    i. a log of all soil test pits and auger holes
    j. depth to groundwater table in winter
    k. presence of soil/water features indicative of springs and prolonged surface ponding or topsoil waterlogging
    l. rock outcrops
    m. shallow bedrock and other impervious layers
    n. location of surface water onsite and on adjoining properties and applicable setback distances (see Appendix I)
    o. drainage lines and springs
    p. flood potential (1% and 5% Annual Exceedance Probability contour lines), location of floodways (see Maps for water resources)
    q. landslip potential and erosion potential

r. location and types of trees and other vegetation cover
s. relevant setback distances (see Appendix I)
t. proposed stormwater cut-off drains adjacent to land application area and treatment system
u. location of actual and proposed buildings, sheds, driveways, paths and paddocks
v. type and location of actual and proposed infrastructure, especially drains
w. landuse, vegetation, bores and any constraints on adjoining properties
x. the location and dimensions of the proposed wastewater treatment plant
y. the location and dimensions of the proposed land application area, and
z. the location and dimensions of the duplicate reserve area (see Section 3.10 of the EPA COP).

10. Develop a management plan that addresses any site or local constraints, risks and potential impacts, and procedures for the householder to carry out, to sustainably manage the treatment plant and the effluent recycling/disposal area.
11. Write a report which details the LCA objectives, process, findings and proposed onsite treatment, land application and management strategies. Clearly identify any assumptions and design requirements that should be included on the Council Permit (e.g. assumed water conservation fixtures and fittings or required surface water drainage diversions).
12. The site and land capability assessment report submitted to Council should include the following items:
    a. location map
    b. the site plan to scale (detailed in Stage 9)
    c. Certificate of Title for the property, including property description and plan
    d. building floor plans
    e. design maximum peak daily hydraulic flow
    f. design maximum daily organic load
    g. water balance calculations
    h. nutrient balance calculations (where applicable for sensitive sites)
    i. the site management plan including wastewater system design and installation plan
    j. any other documentation supporting the risk management of the proposed onsite wastewater treatment and land application system.

When analysing the LCA report, Council will overlay and consider other relevant issues and determine the appropriateness, or otherwise, of the proposal. The practicality of the proposed land application system, the management plan in the larger context of the sustainability of the catchment and the community may also be considered. Council will refer the LCA report to the relevant Water Corporation for their consideration and decision as part of any Planning Permit application that requires referral under the planning scheme for that Council. The Water Corporation has the right to object to any planning proposals which may negatively impact the beneficial uses of groundwater or surface water within its catchments.

The onus of proof rests with the proponent to demonstrate that the proposal is environmentally sustainable. Council will not approve applications if the proponent's LCA report and supporting information is inadequate or if the proposed management plan is impracticable (that is beyond the capacity of those who would be responsible for managing the onsite wastewater system). Council and the Water Corporation (where relevant) must be satisfied that the treatment type, land application type and area, and the management plan are appropriate for the site and the residents and capable of protecting public health and the environment.

Note: Property owners must submit an application for a Planning Permit (where applicable) and an application for a Septic Tank Permit to Council and include a site plan detailing the relevant items listed in Stage 9 above with the LCA report. Where any items have been omitted, an explanation as to why those items are not relevant must be provided. All data collected and the calculations used should be provided to demonstrate the suitability or otherwise of the soils. If Council is not satisfied the Land Capability Assessor

has conducted a full and thorough LCA, Council may return the LCA to the applicant detailing the deficiencies and refuse to issue a permit.

J1.2 LAND CAPABILITY ASSESSOR REQUIREMENTS

Developers or individual landowners (not EPA or Councils) are responsible for engaging a suitably qualified soil science professional to undertake an assessment of the capability of the site, land and development proposal (a land capability assessment) to sustainably contain and manage wastewater on their property. The assessment must be sufficiently rigorous and provide sufficient information to allow Council to be fully informed when assessing the report and preparing Permit conditions for the development. The assessment of a particular site must be more than an audit of the provisions and recommendations set out in this Code. It must demonstrate, to Council's satisfaction, the suitability or otherwise of the site and include all the technical data gathered by the assessor.

Land capability assessors may need to provide Councils with verification of the following requirements:

Qualifications
The assessor must have suitable professional training and experience. Personnel undertaking or supervising data gathering and assessment should have a relevant and acceptable tertiary-level scientific qualification from a reputable training institution in a discipline such as civil or geotechnical engineering, soil science, agricultural science, environmental science, chemistry or physical geography. The qualifications should include specific knowledge of soil, soil hydrological and soil chemical processes.

Experience
Knowledge of similar work having been undertaken or references from Councils and other bodies may allow Council officers, developers or individual landholders to judge the competency and capacity of individuals and organisations to carry out land assessments.

Professional membership
The assessor should be an accredited member of an appropriate professional body. In some instances, professional bodies will certify the competence of members to undertake particular works.

Professional indemnity
Individuals should hold relevant indemnity insurance to a level that will offer protection to Council if problems arise in the future due to inadequate assessment. Land assessors should not undertake assessments in areas where they do not hold insurance. Council may wish to verify the status of the policy with the insurance underwriter or actually see the relevant parts of the indemnity policy.

Independence
Assessors need to fully appreciate the consequences of their advice over the long term and follow professional Code of Ethics and Rules of Conduct. Engineers Australia advise their members that 'Consultants should place their responsibility for the welfare, health and safety of the community and environment before their responsibility to sectional or private interests' (Engineers Australia 2010). Assessors need to satisfy themselves that their recommended type of effluent recycling/disposal system and associated management program are the most appropriate in the circumstances and are suited to the proponent. It is recommended that land capability assessors familiarise themselves with the expectations of individual Councils through consultation with the relevant staff before conducting a land capability assessment.

APPENDIX K: FACTORS TO CONSIDER WHEN SELECTING A SYSTEM

Physical features
Dimensions of the treatment plant
Location of treatment unit – above-ground or below-ground
Number and power of pumps, aerators and other electrical components
Size of effluent storage tank
Type of treatment processes
Type of disinfection used if applicable
Chemicals used
Capital and installation costs
Council Permits – e.g. Permit to Install, Permit to Alter and Certificate to Use
Capital and delivery charge for the treatment system components including the septic tank, sump and sump pump (if applicable) and effluent storage tank
Cost of manoeuvring the treatment unit into the back yard (i.e. is vehicular access or a crane required or can it be carried by several people?)
Cost of digging the hole and removing the debris (if applicable)
Concrete pad (if required)
Cost of electrician's work to lay power cords to connect the treatment plant to the house, including a dedicated weather-proof power point and any modifications required to the switch board
For greywater systems – cost of internal plumbing for toilet flushing, washing machine, backflow prevention device and automatic diversion valve to sewer
Cost of the plumber/drainer digging trenches and laying pipes to connect the treatment system to the house
Cost of land application/irrigation system including ancillary equipment (e.g. effluent pump, disc or mesh filter, vacuum breakers, scour valves, soil moisture sensors or rain gauges)
Cost of the audio-visual alarm system and/or remote monitoring system
Performance
Minimum and maximum daily volumes that can be effectively treated
Effluent quality (primary, secondary 10/10/10, 10/10, 20/30/10 or 20/30)
Commissioning time to achieve approved effluent quality
Total pump run time per day
How does the system cope with: large shock loads or surge flows? • toxic substances like bleach, oil, paint thinners etc.? • 24-hour power failure? 72-hour power failure? • being switched off for 1 week, 1 month, 3 months? • no inflow for 1 week, 1 month, 3 months?
kWh of electricity per kilogram of BOD removed
Estimated lifetime of the treatment systems and its component parts
Sustainability features of the treatment system
Maintenance
Desludging frequency or what is the fate of the biosolids?
Number of service visits per year
Number of hours of maintenance per year
Expected maintenance tasks during each service call
Qualifications and training of service technicians
Ongoing costs
Electricity usage per day; electricity cost per kL of wastewater; electricity cost per year
Service fees per year (labour and travel costs)
Annual cost of chemicals used
Annual cost of replacing the UV lamp, membranes
Annual cost of testing any backflow prevention devices
Average annual cost of consumables, spare parts, pumps and desludging per year (annualised over 30 years)
Annual effluent monitoring cost
Cost of desludging the system every 3 to 5 years
Total annual cost to run the treatment plant (including annualised spare parts and desludging)