Clutha District Council

Septic Tank Design Guide

For residential septic tanks and disposal fields only. This guide can be used for new systems, for extensions to existing systems and for replacement systems. It is not to be used in unstable or floodable zones.

This is intended as a guide only, but if used correctly will be accepted by Clutha District Council as a means of compliance with the New Zealand Building Code. Council will accept that septic tanks and effluent systems designed using this guide will reasonably comply with AS/NZS 1547:2012 or other guidelines acceptable to Council. Other designs complying with AS/NZS 1547:2012 or ARC TP-58 3rd Edition (with appropriate design information provided) will also be accepted as a means of compliance with the New Zealand Building Code.

A site specific engineers design with producer statements will be required for effluent systems on 4000m^2 or less of usable land area per household unit.

For holding tanks or greywater only systems, please use the greywater disposal and holding tank guide.

Total daily flowrate less than 2000 litres per day	Y	N	Property greater than 4000m^2 usable land area per household unit	Y	N
Ground slope less than 15°	Y	N	System able to be accessed for maintenance	Y	N
Depth to groundwater more than 600mm from bottom of effluent field at all times	Y	N	Disposal field more than 50m from any bore, spring, watercourse, or water body	Y	N
No waste disposal units connected to system	Y	N	No spa pool, swimming pool or stormwater connected	Y	N
Site is not unstable or in flood area	Y	N	Septic tank fitted with solids control filter	Y	N
All parts of system more than 3m from all buildings and 1.5m from all boundaries	Y	N	System clear of 45° line between the bottom of any building foundations and the tank	Y	N
Max length of disposal field 20m for non-dosed systems	Y	N	Disposal field gradient max 1:200	Y	N
Non-dosed disposal field constructed in 2 parts, with alternating use	Y	N	Disposal field width maximum of 2m for single distribution pipe	Y	N
Secondhand tank (if yes, must be certified by an engineer as meeting AS/NZS 1546.1:2008	Y	N	Non-concrete tank (if yes, producer statement will be required from tank installer)	Y	N
Existing septic tank in same position (if yes, tank must be cleaned, checked and have a minimum remaining life of 15 years)	Y	N		Y	N
	Y	N		Y	N

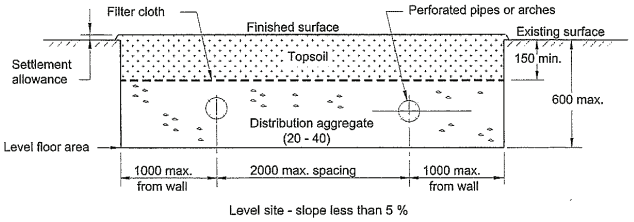
If any of the above conditions cannot be met, then a registered engineer must design the wastewater treatment and effluent disposal system.

I certify that all information I have entered in the guide is correct.

Signed _____ Name: _____ Date _____

Option 1

Conventional bed / trench disposal field designed in accordance with AS/NZS 1547:2012. 100% reserve area must be shown on the plans. Inspection port required in each disposal area.



Level site - slope less than 5 %

Design calculations

1	Sub-Soil category (see back page) at depth of disposal field base	
2	Number of bedrooms	
3	Average daily flowrate (from Table A)	litres
4	Minimum septic tank size (from Table A)	litres
5	Design loading rate (from Table B)	
6	Calculate total disposal area size Area = daily flowrate / design loading rate	m^2
7	How many parts of disposal field	
8	Calculate area of each part of disposal field Total area / number of parts = area each field	m^2
9	Disposal field width selected	m
10	Calculate disposal field length L=area/width	m

Example option 1

3 bedroom home in category 2 sub-soil, water from roof only, 1.2m wide trench selected.

1	Sub-soil category	2
2	Number of bedrooms	3
3	Average daily flowrate (from Table A)	900 liters
4	Minimum septic tank size (from Table A)	3000 liters
5	Design loading rate (from Table B)	20
6	Calculate disposal area size Area = daily flowrate / design loading rate	900 / 20 = 45 m^2
7	How many parts of disposal area	2
8	Calculate area of each part of disposal field Total area / number of parts = area each field	45 / 2 = 22.5 m^2
9	Disposal field width selected	1.2 m
10	Calculate disposal field length L=area/width	22.5 / 1.2 = 18.75 m

Option 2

Conventional bed / trench system designed using NZS 4610:1982 with some updating. Suitable for sub-soils with reasonable drainage only. Soakage testing must be carried out, and results given on back page of guide. Installation of additional disposal fields may be needed for satisfactory performance. 100% reserve area must be shown on plans. Inspection port required in disposal area.

Design calculations

1	Minimum soakage per hour from soakage test	Mm/hr
2	Sub-soil category (see back page) at depth of disposal field base	
3	Number of bedrooms	
4	Average daily flowrate (from Table A)	litres
5	Minimum septic tank size (from Table A)	litres
6	Minimum disposal area size (from Table A)	m^2
7	Number of parts of disposal field	
8	Calculate area of each part of disposal field Total area / number of parts = area each field	m^2
9	Disposal field width selected	m
10	Calclulate disposal field length L=area/width	m

Example option 2

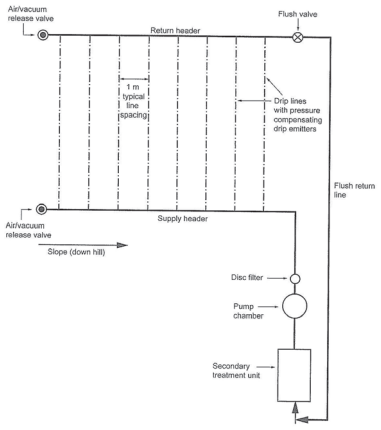
3 bedroom home in category 4 soil, water from water scheme, 2m wide disposal bed selected, in 2 parts

1	Minimum soakage per hour from soakage test	Mm/hr
2	Sub-soil category (see back page) at depth of disposal field base	4
3	Number of bedrooms	3
4	Average daily flowrate (Table A)	1000 litres
5	Minimum septic tank size (from Table A)	3000 litres
6	Minimum disposal area size (table A)	90 m^2
7	Number of parts of disposal field	2
8	Calculate area of each part of disposal field Total area / number of parts = area each field	90 / 2 = 45 m^2
9	Disposal field width selected	2.5 m
10	Calculate disposal field length L=area/width Two disposal fields of 2.5m x 18m needed	45 / 2.5 = 18 m

TABLE A				**Option 2**		**Option 4**	
No. of bedrooms	Septic tank capacity	Average Daily Flow Litres Roof water only	Average Daily Flow Litres Water scheme area / bore	Minimum disposal area m^2 Roof water only	Minimum disposal area m^2 Water scheme area / bore	Minimum disposal area m^2 Roof water only	Minimum disposal area m^2 Water scheme area / bore
Up to 3	3000	900	1000	80	90	400	450
4	3500	1200	1300	100	110	540	580
5	4000	1450	1600	125	140	650	720
6	4500	1700	1900	150	165	760	850

Option 3

Secondary treatment system with subsurface drip irrigation. 100% reserve area required. Irrigation area must be increased by 20% for slopes of 10-20%, and increased by 50% for slopes of 20-30%. Unsuitable for slopes of greater than 30%.



Design calculations

1	Sub-soil category (see back page)	
2	Number of bedrooms	
3	Average daily flowrate (from Table A)	
4	Minimum septic tank size (from Table A)	litres
5	Design irrigation rate (from Table B)	
6	Calculate irrigation area Area = daily flowrate / design irrigation rate	m^2
7	Increase area if sloping site to give total area required area x 1.2 if slope is 10-20% area x 1.5 if slope is 20-30%	m
8	Irrigation area length selected	m
9	Irrigation area width selected (Check length x width = total area required)	m

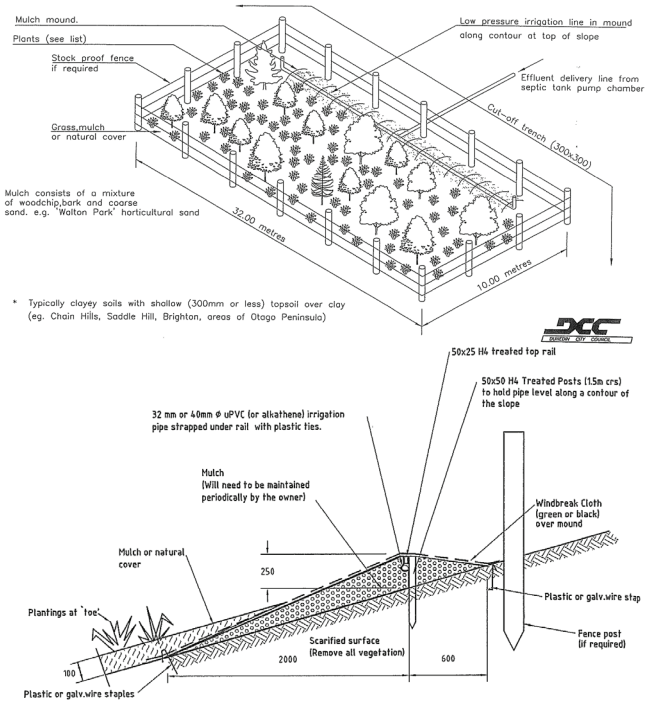
Example option 3

3 bedroom home in category 4 sub-soil, water from roof only, 45 m long garden area suitable for irrigation, 15% slope.

1	Sub-soil category	4
2	Number of bedrooms	3
3	Average daily flowrate (from Table A)	900 liters
4	Minimum septic tank size (from Table A)	3000 liters
5	Design irrigation rate (from Table B)	3.5
6	Calculate irrigation area Area = daily flowrate / design irrigation rate	900 / 3.5 = 257 m^2
7	Increase irrigation area for slope Area x 1.2 for slope 10-20%	257 x 1.2 = 308m^2
8	Irrigation area length selected	45 m
9	Irrigation area width selected (Check length x width = irrigation area)	7 m 45 x 7 = 315, area OK

Option 4

Evapotranspiration system for sub-soils of low permeability. Requires plantings to aid evapotranspiration. Unsuitable for areas close to houses or neighboring properties, as system may smell. Boundary separation of 20m preferred.



Design calculations

1	Sub-soil category (see back page)	
2	Number of bedrooms	
3	Average daily flowrate (from Table A)	
4	Minimum septic tank size (from Table A)	litres
5	Minimum disposal area (from Table A)	m^2
6	Disposal field width selected	m
7	Disposal field length selected (check length x width = area needed)	m

Example option 4

4 bedroom home in category 3 sub-soil, water from water scheme, 50m long garden area suitable for effluent disposal.

1	Sub-soil category	3
2	Number of bedrooms	4
3	Average daily flowrate (from Table A)	1300 liters
4	Minimum septic tank size (from Table A)	3500 liters
5	Minimum disposal area (from Table A)	580 m2
6	Disposal field length selected	50 m
7	Disposal field width selected (check length x width = area)	12 m 50 x 12 = 600, area OK

TABLE B (Refer to last page for information on soil)			**Option 1**	**Option 3**
Sub-Soil Category	Sub-Soil Type	Indicative Drainage Class	Design Loading Rate DLR mm/day	Design Irrigation Rate DIR mm/day
1	Gravels and sands	Rapidly drained	20	5
2	Sandy loam	Well drained	20	5
3	Loams	Moderately well drained	15	4
4	Clay loams	Imperfectly drained	10	3.5
5	Light clays	Poorly drained	5	3
6	Medium to heavy clays	Very poorly drained	N/A – unsuitable for septic tanks	2

Sub-Soil Type Evaluation

This information is for use with this design guide only. The information is a very simplified version of a complex process.

The selection of the sub-soil category is vital for the design of the septic tank and effluent trench. If there is any doubt about the sub-soil category, then use the next highest category for the design. This will give longer trench lengths and will help avoid premature effluent trench failure.

Sub-Soil Category	Sub-Soil Type	Drainage Quality	Guidance Notes
1	Gravels and sands	Rapidly drained	Typically includes sand and fine gravelly soil. Most commonly located along coastal strips and river borders. If rolled in the hand will not stick together. Not ideal for effluent trenches.
2	Sandy loams	Drained well	Mainly sand or fine gravel but containing traces of loam. Will slightly stick together when rolled but will not form a ball. Sand grains can be felt.
3	Loams	Moderately well drained	Generally described as top soil. Feels spongy when squeezed. Will form a thick ribbon 25mm long when squeezed between thumb and finger. May feel greasy. Good farming and gardening soil.
4	Clay Loams	Imperfectly drained	Clayey soils with some top soil mixed. Can be rolled into a ball with a spongy feel. Will form a ribbon 40-50mm long when squeezed between thumb and finger.
5	Light Clays	Poorly drained	Forms a smooth ball that can be rolled into a rod. Will form a ribbon 50-75mm long when squeezed between thumb and finger. Not ideal for effluent trench disposal.
6	Medium to heavy clays		Handles like plasticine. Can be rolled into rods without fracture. Will form a ribbon 75mm long or more when squeezed between thumb and finger. Not suitable for effluent trenches.

Percolation Test

(For assessing suitability of site for sub-surface disposal of septic tank effluent)

1. Several test holes to be spaced over intended absorption area.
2. Holes to be of at least 100mm diameter with vertical sides and dug or bored to depth of proposed trench. Sides should be scratched with a sharp tool to remove any smeared soil surfaces.
3. Hole to be filled with water to ground level. This level to be maintained for at least 4 hours but preferably overnight.
4. Top up level of water to reach original level and then measure the drop in the water level every 30 minutes for 4 hours – refilling if necessary for rapidly draining soil. If soil has good drainage, measurements should be taken at 5 – 10 minute intervals for the first hour.
5. Results to be entered below:

TIME PERIOD (MINS)	HOLE NO.							
	1	2	3	4	5	6	7	8
30 minutes								
1 hours								
1 hour 30 minutes								
2 hours								
3 hours								
3 hours 30 minutes								
4 hours								