

**CLASS 4 SYSTEM DESIGN CALCULATIONS**  
**“Classic” Absorption Trench or Filter Bed**

To be submitted with application package

**DAILY SEWAGE FLOW CALCULATION**

Based on Hydraulic Loads for Number of Bedrooms **and** the greater of Fixtures **or** Floor Area.

FIXTURES			
Plumbing Fixture Description	Total # of Fixtures in Final Project Design	Unit	Total # of Fixture Units
Bathroom Group (includes toilet, sink and bathtub and/or shower)		x 6 =	
Toilet (alone)		x 4 =	
Washbasin		x 1.5 =	
Bathtub or Shower		x 1.5 =	
Kitchen Sink		x 1.5 =	
Bar Sink		x 1.5 =	
Dishwasher		x 1.5 =	
Washing Machine		x 1.5 =	
Bidet		x 1 =	
Laundry Tub		x 1.5 =	
Other			
Add units in last column			↓
Total Fixture Units =			

FLOOR AREA	
Proposed	m <sup>2</sup>
Existing	m <sup>2</sup>
Total Finished Footprint:	m <sup>2</sup>

*To convert ft<sup>2</sup> to m<sup>2</sup>  
multiply ft<sup>2</sup> by 0.093*

Residential Occupancy	Final Project Design	(Q) in L	Total
1 Bedroom		750	
2 Bedrooms		1100	
3 Bedrooms		1600	
4 Bedrooms		2000	
5 Bedrooms		2500	
<b>PLUS</b> Additional Flow For:			
Each Bedroom over 5		500	
<b>OR *</b>			
Floor Space for each 10m <sup>2</sup> over 200 m <sup>2</sup> up to 400 m <sup>2</sup>		100	
Floor Space for each 10m <sup>2</sup> over 400 m <sup>2</sup> up to 600 m <sup>2</sup>		75	
Floor Space for each 10m <sup>2</sup> over 600 m <sup>2</sup>		50	
<b>OR *</b>			
Each fixture unit over 20 fixture units		50	
Add units in last column *			↓
Total Daily Design Flow (Q) =			

**\*NOTE:** Where you need to do multiple calculations, signified by the “OR” in the table, do the calculation for daily sewage flow based on bedrooms first, then use the largest additional flow calculation added to the bedroom calculation to determine the Total Daily Sewage Flow (Q)

**TOTAL DAILY DESIGN SEWAGE FLOW (Q) = \_\_\_\_\_ Litres**

## SEPTIC TANK SIZE CALCULATION

To calculate the minimum capacity of your septic tank, use one of the following formulas.  
Minimum tank size is 3600 Litres.

<b>Residential:</b>	(Q)	X 2 =	Litres
<b>Other Occupancies:</b>	(Q)	X 3 =	Litres

## PROPERTY SOIL PROFILE AND PERCOLATION RATE (T) DESCRIPTION

Please refer to the APH website pages titled **Property Soil Profile & Percolation Rate** to find how to determine the percolation rate of the soil on your site. Percolation rate (T) is measured as minutes per centimetre, and measures the rate at which water drains into the soil. Please indicate the (T) of your site, and/or imported fill below.

Soil Type	Coarse Gravel, no fines	Gravel, some small rocks	Gravel-sand mix, some fines	Sand, fairly uniform, some fines	Sandy-loam mix	Silty-loam, almost clay	Clay. Smears well, rolls into ribbons
<b>Percolation Rate (T)</b>	0 to 1	1 to 5	5 to 10	10 to 15	15 to 25	25 to 50	>50

## ON-SITE PROFILE

Soil Depth (metres)	Soil Type (See Above)	Percolation Rate (T)	Depth of Rock/Impervious Soil/Groundwater Table
0.2			
0.4			
0.6			
0.8			
1.0			
1.2			
1.4			
1.6			

<b>Topsoil to be removed:</b> Depth _____m
<b>Usable Existing Soil:</b> Depth _____m
<b>Excavation of Existing Soil:</b> Depth _____m
<b>Imported Fill:</b> Depth _____m
<b>Percolation Rate (T):</b> _____min/cm

## LEACHING BED CALCULATIONS

Choose **EITHER** Absorption Trenches **OR** Filter Bed

### ABSORPTION TRENCHES

$$\text{Length of Distribution Pipe} = \frac{(Q) \text{ _____ } \times (T) \text{ _____}}{200} = \text{_____ metres}$$

Note:

- Absorption Trenches shall not be installed in soils with (T) less than 1 or greater than 50.
- The *total* length of Distribution Pipe shall not be less than 40 metres.
- The pipes shall be laid in multiple runs, each the same length not exceeding 30 metres.
- If native soils have a (T) of greater than 15, any imported soils must have a (T) **not less** than 75% of the native soils **unless** the native soil (T) is used in the above calculation **or** the system is fully raised with imported soil used for the contact area (mantle).

**OR**

### FILTER BED

#### BASE OF FILTER MEDIUM

Shall extend to a thickness of 250mm over the following area:

$$\text{Base Filter Area} = \frac{(Q) \text{ _____ } \times (T) \text{ _____}}{850} = \text{_____ m}^2$$

but shall not be smaller than the **Surface Loading Area**.

Note:

- (T) is the lesser of 50 or the (T) of underlying native soil.
- Soil in the Filter Bed Area must be engineered filter sand meeting the requirements of Section 8.7.5.2 of Part 8 of the Building Code.

#### SURFACE LOADING AREA

<b>If (Q) is 3000 L or less:</b>	(Q) _____	÷ 75 =	_____ m <sup>2</sup>
<b>If (Q) is more than 3000 L:</b>	(Q) _____	÷ 50 =	_____ m <sup>2</sup>

Note:

- The effective area of the Surface Loading Area in each filter bed shall be at least 10 m<sup>2</sup> and not more than 50 m<sup>2</sup>.
- If more than 1 Filter Bed is required, they shall each be separated by at least 5 m between the distribution pipes of each bed.
- The lines of distribution pipe shall be evenly spaced over the Surface Loading Area.

## CONTACT AREA CALCULATION (Mantle)

The Mantle must be at least 250 mm deep and extend a minimum of 15 metres beyond the outer Distribution Pipes in any direction in which the effluent will move horizontally (i.e. drain away from Distribution Pipes).

Choose (T) range from the provided chart. Divide (Q) by Loading Rate (LR) for the minimum Contact Area.

Percolation Time (T) of Native Soil	Loading Rate (LR)
1 < T ≤ 20	10
20 < T ≤ 35	8
35 < T ≤ 50	6
T > 50	4

Contact Area	(Q) _____ ÷ (LR) _____ =	m <sup>2</sup>
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*To convert to square feet multiply m<sup>2</sup> by 10.76*

If you do not have a minimum of 250 mm of useable soil on the property (unsaturated soil with a (T) between 1 and 50) that extends 15 m beyond the end of the Distribution Pipe in any direction in which the effluent will move horizontally you will need to import a Contact Area (Mantle) that meets these requirements.

## PUMP CHAMBER SIZE CALCULATION (if required)

If you must pump effluent uphill or over a long distance, there is no minimum size required, however, consider the volume of effluent that may back into the system should the pump fail and size the chamber accordingly.

**If the length of Distribution Pipe to be used is 150 metres or more**, the minimum size of the pump chamber shall be no less than 75% of the total volume of the Distribution Pipe. This is the minimum volume your pump must deliver within 15 minutes each time it cycles.

Distribution Pipe Diameter	Calculate based on design pipe length:	Minimum Volume of Pump Chamber:
3"	3.4 x _____ m of distribution pipe =	Litres
4"	6.0 x _____ m of distribution pipe =	Litres

**TRANSFER THE ABOVE CALCULATIONS TO THE APPROPRIATE PLACES ON THE "DESIGN LAYOUT ON-SITE SEWAGE SYSTEMS AND BUILDING PERMITS" FORM**

**YOU MUST STILL SUBMIT THESE PAGES WITH YOUR APPLICATION**

