

# Nominated Area Water Balance & Storage Calculations - Wick Trench Design (EPA compliant)

Site Address: **Lavers Hill (Wyelangta) Secondary Effluent - Wick Trench 4 bedrooms**

**INPUT DATA** DO NOT MODIFY CELLS IN BLUE

Design Wastewater Flow	Q	900	L/day
Daily DLR		20.0	mm/day
Nominated Land Application Area	L	62.0	m sq
Crop Factor	C	0.5-0.7	unitless
Retained Rainfall	RR	0.85	unitless
Void Space Ratio	V	0.45	unitless
Rainfall Data	Wyelangta		
Evaporation Data	Lavers Hill (Wyelangta)		

Estimated daily load from 4 bedroom residential property, with standard water fixtures and town water  
 Enter DLR from table at right based on Appendix A Table 9 EPA Code of Practice (2013) for limiting soil horizon  
 Used for iterative purposes to determine storage requirements based on nominated trench/bed bottom area  
 Estimates evapotranspiration as a fraction of  $ET_0$ ; varies with season and crop type (from EPA 168)  
 Proportion of rainfall that remains onsite and infiltrates; function of slope/cover, allowing for any runoff  
 Proportion of trench that is available for storage (assumes arch drain)  
 BoM 70th percentile monthly  
 SILO Data Drill Average monthly

Bed Water available (days) = **90**

Soil Category (AS1547:2012)	DLR
Gravels & Sands (1)	NS
Sandy Loams (2) Loams (3) High/Mod Clay Loams (4a)	NS
Weak Clay Loams (4b)	20
Massive Clay Loams (4)	10
Strong Light Clays (5a)	12
Moderate Light Clays (5b)	10
Weak Light Clays (5c)	8
Medium to Heavy Clays (6)	5

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Days in month	D	\	days	31	28	31	30	31	30	31	31	30	31	30	31	31	28	31	30	31	30	<b>365</b>
Rainfall	R	\	mm/month	107.6	108.1	125.3	191.7	231.8	231.1	266.1	274.4	220.9	207.3	172.4	141.8	107.6	108.1	125.3	191.7	231.8	231.1	<b>2,278.5</b>
Potential Evapotranspiration	$ET_0$	\	mm/month	121.0	99.7	82.9	51.2	31.7	21.5	24.9	36.4	52.4	76.5	92.8	111.6	121.0	99.7	82.9	51.2	31.7	21.5	<b>802.6</b>
Crop Factor	C			0.70	0.70	0.70	0.60	0.50	0.45	0.40	0.45	0.55	0.65	0.70	0.70	0.70	0.70	0.70	0.60	0.50	0.45	
<b>OUTPUTS (LOSSES)</b>																						
Evapotranspiration	ET	$ET_0 \times C$	mm/month	84.7	69.8	58.0	30.7	15.9	9.7	9.9	16.4	28.8	49.7	65.0	78.1	84.7	69.8	58.0	30.7	15.9	9.7	<b>516.7</b>
Percolation	B	(DLR) $\times$ D	mm/month	620.0	560.0	620.0	600.0	620.0	600.0	620.0	620.0	600.0	620.0	600.0	620.0	620.0	560.0	620.0	600.0	620.0	600.0	<b>7,300.0</b>
Outputs		ET+B	mm/month	704.7	629.8	678.0	630.7	635.9	609.7	629.9	636.4	628.8	669.7	665.0	698.1	704.7	629.8	678.0	630.7	635.9	609.7	<b>7,816.7</b>
<b>INPUTS (GAINS)</b>																						
Retained Rainfall	Re	R $\times$ RR	mm/month	91.5	91.9	106.5	162.9	197.0	196.4	226.2	233.2	187.8	176.2	146.5	120.5	91.5	91.9	106.5	162.9	197.0	196.4	<b>1,936.7</b>
Applied Effluent	W	(Q $\times$ D)/L	mm/month	450.0	406.5	450.0	435.5	450.0	435.5	450.0	450.0	435.5	450.0	435.5	450.0	450.0	406.5	450.0	435.5	450.0	435.5	<b>5,298.4</b>
Inputs		Re+W	mm/month	541.5	498.3	556.5	598.4	647.0	631.9	676.2	683.2	623.2	626.2	582.0	570.5	541.5	498.3	556.5	598.4	647.0	631.9	<b>7,235.1</b>
<b>STORAGE CALCULATION (<math>\Delta</math>)</b>																						
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	24.8	74.3	177.0	281.2	268.8	172.1	0.0	0.0	0.0	0.0	0.0	0.0	24.8	
Storage for the month	S	((Re+W)-(ET+B))/V	mm/month	-362.8	-292.1	-270.0	-71.8	24.8	49.4	102.8	104.2	-12.4	-96.7	-184.3	-283.6	-362.8	-292.1	-270.0	-71.8	24.8	49.4	<b>-1,292.5</b>
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	24.8	74.3	177.0	281.2	268.8	172.1	0.0	0.0	0.0	0.0	0.0	0.0	24.8	74.3	
Maximum Storage Depth for Nominated Area	N		mm	<b>281.2</b>																		
Maximum Storage Vol. for Nominated Area	V	N $\times$ L	L	<b>17,433</b>																		
<b>BOTTOM AREA REQUIRED FOR ZERO STORAGE</b>																						
			m <sup>2</sup>	45.5	46.9	48.8	57.7	63.6	65.3	69.1	69.2	61.2	56.5	52.1	48.3	45.5	46.9	48.8	57.7	63.6	65.3	

**MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE:** **70** m<sup>2</sup> Value is based on the worst month of the year, so the balance overestimates the storage requirement for all other months. Assumes zero effluent depth (storage) in trench/bed. Model is run for 18-months to ensure trench/bed empties at least once per cycle.

- Wick trench dimensions (mm)
  - Trench Width = **600** Depth = **450**
  - Bed Width = **1,000** Depth = **150**
- Recommended wick trench length (m) = **73.2**
- Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6
- No. of trenches @ (max) 20m length = **4**
- Total footprint with 1m spacing (m<sup>2</sup>) = **197**
- Total footprint with 1.5m spacing (m<sup>2</sup>) = **229**

