

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

Site Address: **Lavers Hill (Wyelangta) Secondary Effluent - Wick Trench 1-3 bedrooms**

INPUT DATA			
DO NOT MODIFY CELLS IN BLUE			
Design Wastewater Flow	Q	720	L/day
Daily DLR		8.0	mm/day
Nominated Land Application Area	L	290.0	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 1-3 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	365
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	2,278.5
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	802.6
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	516.7
Percolation	B	(DLR) $\times$ D	mm/month	248.0	224.0	248.0	240.0	248.0	240.0	248.0	248.0	240.0	248.0	240.0	248.0	248.0	224.0	248.0	240.0	248.0	240.0	2,920.0
Outputs		ET+B	mm/month	332.7	293.8	306.0	270.7	263.9	249.7	257.9	264.4	268.8	297.7	305.0	326.1	332.7	293.8	306.0	270.7	263.9	249.7	3,436.7
<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	1,936.7
Applied Effluent	W	(Q $\times$ D)/L	mm/month	77.0	69.5	77.0	74.5	77.0	74.5	77.0	77.0	74.5	77.0	74.5	77.0	77.0	69.5	77.0	74.5	77.0	74.5	906.2
Inputs		Re+W	mm/month	168.4	161.4	183.5	237.4	274.0	270.9	303.2	310.2	262.2	253.2	221.0	197.5	168.4	161.4	183.5	237.4	274.0	270.9	2,842.9
<b>STORAGE CALCULATION (<math>\Delta</math>)</b>																						
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	22.5	69.7	170.2	272.1	257.4	158.4	0.0	0.0	0.0	0.0	0.0	0.0	22.5	
Storage for the month	S	((Re+W)-(ET+B))/V	mm/month	-365.1	-294.1	-272.3	-74.0	22.5	47.2	100.5	101.9	-14.6	-99.0	-186.6	-285.9	-365.1	-294.1	-272.3	-74.0	22.5	47.2	-1,319.5
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	22.5	69.7	170.2	272.1	257.4	158.4	0.0	0.0	0.0	0.0	0.0	0.0	22.5	69.7	
Maximum Storage Depth for Nominated Area	N		mm	<b>272.1</b>																		
Maximum Storage Vol. for Nominated Area	V	N $\times$ L	L	<b>78,897</b>																		

**BOTTOM AREA REQUIRED FOR ZERO STORAGE**  $m^2$  92.5 99.9 111.9 200.4 334.0 405.7 702.7 717.2 266.5 183.7 136.3 108.6 92.5 99.9 111.9 200.4 334.0 405.7

**MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE:** **718**  $m^2$  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) = **342.6**
- Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6
- No. of trenches @ (max) 20m length = **18**
- Total footprint with 1m spacing ( $m^2$ ) = **962**
- Total footprint with 1.5m spacing ( $m^2$ ) = **1,140**

