

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

Site Address: **Lavers Hill (Wyelangta) Secondary Effluent - Wick Trench 5 or more bedrooms**

INPUT DATA			
DO NOT MODIFY CELLS IN BLUE			
Design Wastewater Flow	Q	1,080	L/day
Daily DLR		10.0	mm/day
Nominated Land Application Area	L	241.0	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 5 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	
OUTPUTS (LOSSES)																						
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	310.0	280.0	310.0	300.0	310.0	300.0	310.0	310.0	300.0	310.0	300.0	310.0	310.0	280.0	310.0	300.0	310.0	300.0	3,650.0
Outputs		ET+B	mm/month	394.7	349.8	368.0	330.7	325.9	309.7	319.9	326.4	328.8	359.7	365.0	388.1	394.7	349.8	368.0	330.7	325.9	309.7	4,166.7
INPUTS (GAINS)																						
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	138.9	125.5	138.9	134.4	138.9	134.4	138.9	138.9	134.4	138.9	134.4	138.9	138.9	125.5	138.9	134.4	138.9	134.4	1,635.7
Inputs		Re+W	mm/month	230.4	217.4	245.4	297.4	336.0	330.9	365.1	372.2	322.2	315.1	281.0	259.5	230.4	217.4	245.4	297.4	336.0	330.9	3,572.4
STORAGE CALCULATION (Δ)																						
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	22.4	69.5	169.9	271.7	257.0	157.8	0.0	0.0	0.0	0.0	0.0	0.0	22.4	
Storage for the month	S	((Re+W)-(ET+B))/V	mm/month	-365.2	-294.2	-272.4	-74.1	22.4	47.1	100.4	101.8	-14.7	-99.1	-186.7	-286.0	-365.2	-294.2	-272.4	-74.1	22.4	47.1	-1,320.7
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	22.4	69.5	169.9	271.7	257.0	157.8	0.0	0.0	0.0	0.0	0.0	0.0	22.4	69.5	
Maximum Storage Depth for Nominated Area	N		mm	271.7																		
Maximum Storage Vol. for Nominated Area	V	N \times L	L	65,472																		
BOTTOM AREA REQUIRED FOR ZERO STORAGE				110.4	117.3	128.0	193.1	259.9	286.1	357.1	359.5	229.7	182.4	148.3	125.1	110.4	117.3	128.0	193.1	259.9	286.1	

MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE: **360** m² 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**
 - Bed Width = **1,000**
 - Depth = **450**
 - Depth = **150**
- Recommended wick trench length (m) = **284.7**
- Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6
- No. of trenches @ (max) 20m length = **15**
- Total footprint with 1m spacing (m²) = **798**
- Total footprint with 1.5m spacing (m²) = **945**

