

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

Site Address: **Beech Forest** Secondary Effluent - Wick Trench 4 bedrooms

INPUT DATA				DO NOT MODIFY CELLS IN BLUE			
Design Wastewater Flow	Q	900	L/day	Estimated daily load from 4 bedroom residential property, with standard water fixtures and town water			
Daily DLR		10.0	mm/day	Enter DLR from table at right based on Appendix A Table 9 EPA Code of Practice (2013) for limiting soil horizon			
Nominated Land Application Area	L	180.0	m sq	Used for iterative purposes to determine storage requirements based on nominated trench/bed bottom area			
Crop Factor	C	0.5-0.7	unitless	Estimates evapotranspiration as a fraction of ET_0 ; varies with season and crop type (from EPA 168)			
Retained Rainfall	RR	0.85	unitless	Proportion of rainfall that remains onsite and infiltrates; function of slope/cover, allowing for any runoff			
Void Space Ratio	V	0.45	unitless	Proportion of trench that is available for storage (assumes arch drain)			
Rainfall Data	Beech Forest			BoM 70th percentile monthly			
Evaporation Data	Beech Forest			SILO Data Drill Average monthly			

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 Enter DLR from table at right based on Appendix A Table 9 EPA Code of Practice (2013) for limiting soil horizon
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 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	88.1	90.8	114.0	178.8	207.7	242.0	232.7	243.6	213.1	187.2	134.1	113.6	88.1	90.8	114.0	178.8	207.7	242.0	2,045.7	
Potential Evapotranspiration	ET_0	\	mm/month	128.0	105.0	87.0	54.0	34.0	22.0	26.0	38.0	55.0	81.0	97.0	118.0	128.0	105.0	87.0	54.0	34.0	22.0	846.0	
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	89.6	73.5	60.9	32.4	17.0	9.9	10.4	17.1	30.3	52.7	67.9	82.6	89.6	73.5	60.9	32.4	17.0	9.9	544.2	
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	399.6	353.5	370.9	332.4	327.0	309.9	320.4	327.1	330.3	362.7	367.9	392.6	399.6	353.5	370.9	332.4	327.0	309.9	4,194.2	
INPUTS (GAINS)																							
Retained Rainfall	Re	$R \times RR$	mm/month	74.9	77.2	96.9	152.0	176.5	205.7	197.8	207.1	181.1	159.1	114.0	96.6	74.9	77.2	96.9	152.0	176.5	205.7	1,738.8	
Applied Effluent	W	$(Q \times D) / L$	mm/month	155.0	140.0	155.0	150.0	155.0	150.0	155.0	155.0	150.0	155.0	150.0	155.0	155.0	140.0	155.0	150.0	155.0	150.0	1,825.0	
Inputs		Re+W	mm/month	229.9	217.2	251.9	302.0	331.5	355.7	352.8	362.1	331.1	314.1	264.0	251.6	229.9	217.2	251.9	302.0	331.5	355.7	3,563.8	
STORAGE CALCULATION (Δ)																							
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	10.1	111.9	183.9	261.6	263.5	155.7	0.0	0.0	0.0	0.0	0.0	0.0	10.1		
Storage for the month	S	$((Re+W)-(ET+B))/V$	mm/month	-377.1	-302.9	-264.4	-67.6	10.1	101.8	72.0	77.7	2.0	-107.8	-230.9	-313.4	-377.1	-302.9	-264.4	-67.6	10.1	101.8	-1,400.8	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	10.1	111.9	183.9	261.6	263.5	155.7	0.0	0.0	0.0	0.0	0.0	0.0	10.1	111.9		
Maximum Storage Depth for Nominated Area	N		mm	263.5																			
Maximum Storage Vol. for Nominated Area	V	$N \times L$	L	47,434																			
BOTTOM AREA REQUIRED FOR ZERO STORAGE				m ²	85.9	91.2	101.8	149.7	185.4	259.1	227.6	232.4	181.1	137.1	106.3	94.2	85.9	91.2	101.8	149.7	185.4	259.1	
MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE:				m ²	260																		

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) =	212.6			
Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6				
No. of trenches @ (max) 20m length =	11			
Total footprint with 1m spacing (m ²) =	580			
Total footprint with 1.5m spacing (m ²) =	685			

