

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

Site Address: **Beech Forest** 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	237.0	m sq
Crop Factor	C	0.4-0.7	unitless
Retained Rainfall	RR	0.85	unitless
Void Space Ratio	V	0.45	unitless
Rainfall Data	Beech Forest		
Evaporation Data	Beech Forest		

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	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	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	337.6	297.5	308.9	272.4	265.0	249.9	258.4	265.1	270.3	300.7	307.9	330.6	337.6	297.5	308.9	272.4	265.0	249.9	3,464.2
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	94.2	85.1	94.2	91.1	94.2	91.1	94.2	94.2	91.1	94.2	91.1	94.2	94.2	85.1	94.2	91.1	94.2	91.1	1,108.9
Inputs		Re+W	mm/month	169.1	162.2	191.1	243.1	270.7	296.8	292.0	301.2	272.3	253.3	205.1	190.7	169.1	162.2	191.1	243.1	270.7	296.8	2,847.7
STORAGE CALCULATION (Δ)																						
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	12.7	117.0	191.6	271.9	276.4	171.2	0.0	0.0	0.0	0.0	0.0	0.0	12.7	
Storage for the month	S	$((Re+W)-(ET+B))/V$	mm/month	-374.5	-300.6	-261.8	-65.1	12.7	104.3	74.6	80.3	4.5	-105.2	-228.4	-310.8	-374.5	-300.6	-261.8	-65.1	12.7	104.3	-1,370.0
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	12.7	117.0	191.6	271.9	276.4	171.2	0.0	0.0	0.0	0.0	0.0	0.0	12.7	117.0	
Maximum Storage Depth for Nominated Area	N		mm				276.4															
Maximum Storage Vol. for Nominated Area	V	$N \times L$	L				65,515															

BOTTOM AREA REQUIRED FOR ZERO STORAGE m^2 85.0 91.5 105.3 179.4 252.3 488.7 368.3 384.6 242.4 157.7 111.4 95.4 85.0 91.5 105.3 179.4 252.3 488.7

MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE: **489** 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) = **280.0**
- Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6
- No. of trenches @ (max) 20m length = **14**
- Total footprint with 1m spacing (m^2) = **743**
- Total footprint with 1.5m spacing (m^2) = **880**

