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	Estimated daily load from 1-3 bedroom residential property, with standard water fixtures and town water
Daily DLR		12.0	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	111.0	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	untiless	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		Wyelangta		BoM 70th percentile monthly
Evaporation Data		Lavers Hill (Wyelangta)		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_0xC	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)xD	mm/month	372.0	336.0	372.0	360.0	372.0	360.0	372.0	372.0	360.0	372.0	360.0	372.0	372.0	336.0	372.0	360.0	372.0	360.0	**4,380.0**
Outputs		ET+B	mm/month	456.7	405.8	430.0	390.7	387.9	369.7	381.9	388.4	388.8	421.7	425.0	450.1	456.7	405.8	430.0	390.7	387.9	369.7	**4,896.7**
INPUTS (GAINS)																						
Retained Rainfall	Re	R*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	(QxD)/L	mm/month	201.1	181.6	201.1	194.6	201.1	194.6	201.1	201.1	194.6	201.1	194.6	201.1	201.1	181.6	201.1	194.6	201.1	194.6	**2,367.6**
Inputs		Re+W	mm/month	292.5	273.5	307.6	357.5	398.1	391.0	427.3	434.3	382.4	377.3	341.1	321.6	292.5	273.5	307.6	357.5	398.1	391.0	**4,304.3**
STORAGE CALCULATION (Δ)																						
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	22.8	70.2	170.9	273.1	258.7	159.9	0.0	0.0	0.0	0.0	0.0	0.0	22.8	
Storage for the month	S	((Re+W)-(ET+B))/V	mm/month	-364.8	-293.9	-272.1	-73.7	22.8	47.4	100.7	102.1	-14.4	-98.8	-186.3	-285.6	-364.8	-293.9	-272.1	-73.7	22.8	47.4	**-1,316.5**
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	22.8	70.2	170.9	273.1	258.7	159.9	0.0	0.0	0.0	0.0	0.0	0.0	22.8	70.2	
Maximum Storage Depth for Nominated Area	N		mm	273.1																		
Maximum Storage Vol. for Nominated Area	V	NxL	L	30,311																		
BOTTOM AREA REQUIRED FOR ZERO STORAGE			m^2	61.1	64.2	69.0	94.8	117.0	124.7	143.3	143.9	107.4	90.9	77.6	67.7	61.1	64.2	69.0	94.8	117.0	124.7	

MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE: 144 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) = 131.1
Minimum trench spacing: 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6

No. of trenches @ (max) 20m length = 7

Total footprint with 1m spacing (m^2) = 361
Total footprint with 1.5m spacing (m^2) = 424