# 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 | | 20.0 | 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 | 50.0 | 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 | $ET_0$xC | 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 | 620.0 | 560.0 | 620.0 | 600.0 | 620.0 | 600.0 | 620.0 | 620.0 | 600.0 | 620.0 | 600.0 | 620.0 | 620.0 | 560.0 | 620.0 | 600.0 | 620.0 | 600.0 | **7,300.0** |
| Outputs | | ET+B | mm/month | 704.7 | 629.8 | 678.0 | 630.7 | 635.9 | 609.7 | 629.9 | 636.4 | 628.8 | 669.7 | 665.0 | 698.1 | 704.7 | 629.8 | 678.0 | 630.7 | 635.9 | 609.7 | **7,816.7** |
| **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 | 446.4 | 403.2 | 446.4 | 432.0 | 446.4 | 432.0 | 446.4 | 446.4 | 432.0 | 432.0 | 432.0 | 446.4 | 446.4 | 403.2 | 446.4 | 432.0 | 446.4 | 432.0 | **5,256.0** |
| Inputs | | Re+W | mm/month | 537.9 | 495.1 | 552.9 | 594.9 | 643.4 | 628.4 | 672.6 | 679.6 | 619.8 | 622.6 | 578.5 | 566.9 | 537.9 | 495.1 | 552.9 | 594.9 | 643.4 | 628.4 | **7,192.7** |
| **STORAGE CALCULATION (Δ)** | | | | | | | | | | | | | | | | | | | | | | |
| Storage remaining from previous month | | | mm/month | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 | 58.5 | 153.3 | 249.4 | 229.3 | 124.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 | |
| Storage for the month | S | ((Re+W)-(ET+B))/V | mm/month | -370.8 | -299.3 | -278.0 | -79.5 | 16.8 | 41.7 | 94.8 | 96.2 | -20.1 | -104.7 | -192.1 | -291.6 | -370.8 | -299.3 | -278.0 | -79.5 | 16.8 | 41.7 | **-1,386.7** |
| Cumulative Storage | M | | mm | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 | 58.5 | 153.3 | 249.4 | 229.3 | 124.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 | 58.5 | |
| Maximum Storage Depth for Nominated Area | N | | mm | 249.4 | | | | | | | | | | | | | | | | | | |
| Maximum Storage Vol. for Nominated Area | V | NxL | L | 12,472 | | | | | | | | | | | | | | | | | | |
| **BOTTOM AREA REQUIRED FOR ZERO STORAGE** | | | $m^2$ | 36.4 | 37.5 | 39.1 | 46.2 | 50.9 | 52.3 | 55.3 | 55.4 | 49.0 | 45.2 | 41.7 | 38.6 | 36.4 | 37.5 | 39.1 | 46.2 | 50.9 | 52.3 | |

**MINIMUM BOTTOM AREA REQUIRED FOR ZERO STORAGE:** 56 $m^2$

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) =** 59.1

**Minimum trench spacing:** 1m for Soil Categories 1-3; and 1.5m for Soil Categories 4-6

**No. of trenches @ (max) 20m length =** 3

**Total footprint with 1m spacing ($m^2$) =** 143
**Total footprint with 1.5m spacing ($m^2$) =** 164