MOYNE SHIRE COUNCIL

FACTSHEET 14: EFFLUENT DISPOSAL – WICK TRENCH AND BED SYSTEMS

'Wick' trenches are an emerging technology that may be suitable for small sites with limited space for land application and where low hydraulic conductivity soils need extensive trench lengths. The 'Wick' trench combines absorption and evapotranspiration to best use the available space between trenches in the land application area. They can be used for primary and secondary-treated effluent.

These trenches were developed by Kerry Flanagan Wastewater to use in clay soil areas.

The design is provided as an alternative to standard absorption trenches.

The non-woven, needle punched geotextile fabric (250 g/m² minimum weight) acts as a wick to distribute effluent over a transpiration bed adjacent to the trench.

This provides a larger surface area with more potential for evapotranspiration and greater infiltration capacity than would be available using a standard absorption trench.

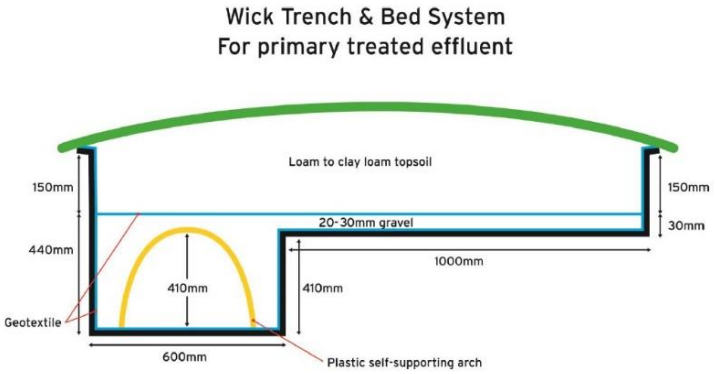

Figure 1 – WT & B system for primary treated effluent.
(Source: Vic EPA 2016)

The 'Wick' trench also allows reserve in the design. It can be used on sloping sites by creating terraces for each trench.

'Wick' trench sizing

Typically, the 'Wick' trench will be built with an evapotranspiration bed approximately twice the width of the trench.

For example, a bed 1,200mm wide with a 600mm wide trench.

The trench is built using an arch trench (Reln) that is a plastic self-supporting arch 410mm wide and 1,500mm long.

The required length of 'Wick' trench can be calculated using the daily design wastewater load (L/day) and the design loading rates (DLR) for absorption trenches and evapotranspiration beds in AS/NZS1547:2012.

For a conservative design, the designer recommends using the formula:

L = Q / DLR x (W/1.2)

Where:

L = total length of 'Wick' trench required in metres

Q = design daily wastewater load in litres a day

DLR = design loading rate for trenches in mm per m_2 per day (from *891.4*)

W = total width of trench and bed in the combined 'Wick' trench

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Example

To size a 'Wick' trench for a typical three-bedroom, five-person home on a Category 4 clay loam soil with tank water supply:

Design daily wastewater load

Q = 3 x 180 L = 540 L

Design loading rate = 10 mm/m$_2$/day for primary treated effluent

1) For an arch trench of 0.6 m width alone, the required trench length is determined by:

L = 540 / (10 x 0.6)
L = 540/6
L = 90 m

Therefore 4 X 22.5 m arch trenches are recommended.

2) For a 'Wick' trench comprising an arch trench of 0.6m width with a 1.2m 'Wick' bed.

L = 540 / (10 x (1.8/1.2))
L = 540 / (10 x 1.5)
L = 540 / 15
L = 36 m

Therefore 3 x 12 m 'Wick' trenches are recommended.

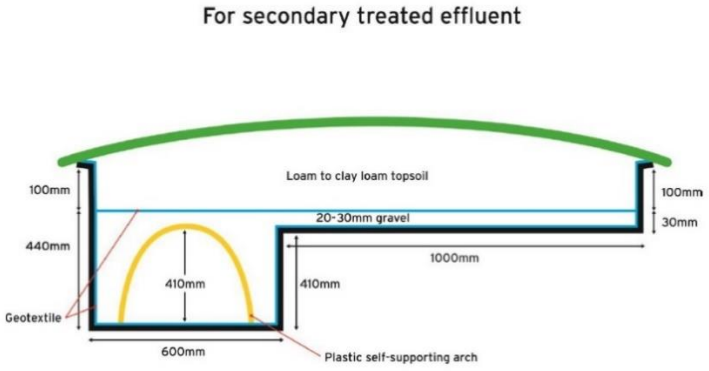

Figure 2 – WT & B system for secondary treated effluent.
(Source: Vic EPA 2016)

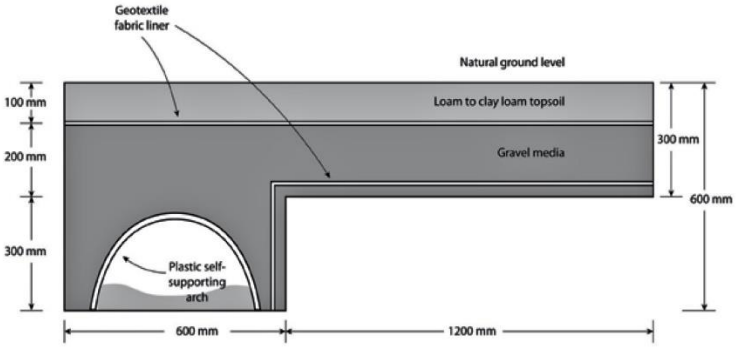

Figure 3 – WT & B cross-section
(Source: Sydney Catchment Authority 2016).

The following points should be noted when installing a 'Wick' trench:

- Avoid uneven areas when choosing where to put the trench. If a level area cannot be used, terrace the area for the trench.
- Ensure the trench has a uniform depth of soil across the finished surface for even, uniform performance along the trench.
- Avoid filling hollows across the contour as this may interfere with effluent distribution.
- The original ground level of the land application area should be 100 to 150mm below the invert of the tank outlet.
- If the tank outlet invert is 400mm from the top of the tank, the ground level where the trench will be built must be at least 550mm lower than the ground where the tank is located.
- Where it is impossible to achieve 550mm height separation between the tank and trench, use a pump and pump well to load the trench.
- The septic tank must be desludged at appropriate intervals to ensure that sludge does not flow into the trench, reducing trench performance.

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‘Wick’ trench installation

1. Set out the trench area and instruct the excavator operator where to cut.

Figure 4 – WT & B initial excavation stage.
(Source: Sydney Catchment Authority 2016)

2. Excavate the transpiration pan while digging the trench for the self-supporting drain.

3. Excavate the pan 300 millimetres deep and the trench 600 millimetres deep. Levels need to be continuously checked.

4. After excavation is complete, lay the liner fabric (not geotextile fabric) in the trench and position the self-supporting arch trench.

5. Lay the geotextile fabric only on the side of the trench and then so it continues across into the pan area. This is the ‘wick’. Do not use geotextile fabric on the bottom of the trench as it will clog.

6. Spread clean 20mm gravel across the pan and into the trench. Gravel should be as clean as possible. Some recycled gravel may not be washed (check with your supplier).

7. Place another layer of geotextile fabric over the top of the trench.

8. Select a good permeable soil for back filling. Never backfill with the clay soil from the lower soil horizons.

9. Ensure that connection points can be inspected whether pumped or gravity fed. Use inspection openings at trench entry points and connection points to other trenches.

10. Install a mica-flap vent at ground level, at the end of the trench to allow air to flow through the trench, up the drain line into the tank, and continue up the drainage and expel through the roof vent. This will improve the environment in the system by increased aeration.

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Figure 5 – Laying the geotextile fabric and arch drain.
(Source: Sydney Catchment Authority 2016).

Figure 6 – Back-filling with aggregate.
(Source: Sydney Catchment Authority 2016).

For more information see: http://www.epa.vic.gov.au/~/media/Publications/891%204.pdf

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Information Guide adapted from existing Vic EPA & Sydney Catchment Authority resources.
Moyne Shire Council acknowledges these sources.