

Fill in values for pink cell colours

Vp = 14 sec/mm
 Infiltration Rate 0.26 m/hr
 Treatment Plant Size 35 PE
 Treatment Plant Cycles per Day 4 cycles

The calculation below determines the number of tunnels required in the drainage solution. The use of tunnels as a drainage field for the effluent from a treatment plant is normally suitable due to the very clean nature of the discharge when compared to septic tanks.

However, it is still advised that this is checked with Building Control to confirm that it is acceptable for this project.

The infiltration capacity of a tunnel is calculated by assuming the water discharge infiltrates through the side of the tunnel into the surrounding gravel at up to half the depth of the tunnel.

Taking the length of the tunnel as 1m and the height as 0.5m the area through which the discharge can infiltrate (on both sides) is:

$$1 \times 0.25 + 1 \times 0.25 = 0.5\text{m}^2$$

The results of the Percolation Test carried out show that the soil has a **VP value of:** 14 sec/mm

The number of tunnels required is calculated from the greater of the following 2 sets of calculations:

1) Volume required based on the infiltration rate of the soil:

Based on the soil having a VP value of:

14 sec/mm

The infiltration rate can be calculated to be:

0.257 m/hr

(Please Note: It is assumed that the percolation test has been carried out in the location the drainage field is to be installed, if this is not the case then further tests should be carried out as soil infiltration rates can vary even over a small area.)

Therefore the volume that can be infiltrated by one tunnel in one hour is:

$$0.5\text{m}^2 \times 0.257 \text{ m/hr} = 0.129 \text{ m}^3/\text{hr}$$

and:

$$0.129 \text{ m}^3/\text{hr} \times 24 = 3.086 \text{ m}^3/\text{day}$$

The daily outflow per/person from a domestic treatment plant 150 litres. With our:

35 PE plant, the daily outflow is therefore:

5250 litres/day

or 5.25 m³/day

Therefore, the number of tunnels required is:

$$5.25 / 3.086$$

$$\rightarrow 1.701$$

$$\text{or } \boxed{2 \text{ tunnels}}$$

Infiltration Rate

2) Volume required to store tank discharge cycle:

Number of Cycles per Day:

4

Storage volume per tunnel:

0.3 m³

The daily outflow per/person from a domestic treatment plant 150 litres. With our:

35 PE plant, the daily outflow is therefore:

5250 litres/day

$$\rightarrow 5.25 \text{ m}^3/\text{day}$$

Volume of water discharge per cycle:

$$5.25 / 4$$

$$1.3125 \text{ m}^3$$

Therefore the number of tunnels required:

$$1.313 / 0.3$$

$$\rightarrow 4.38$$

$$\text{or } \boxed{5 \text{ tunnels}}$$

Volume Discharged

From the above calculations, the higher requirement for the number of tunnels is:

5 tunnels

Taking this requirement, and applying a safety factor of 2, the number of tunnels required is:

10 tunnels

10 tunnels

Therefore based on the information provided, the number of tunnels required in the drainage solution is:

10 nr

Proposed excavation size to implement drainage solution would be:

$$12.65 \text{ m} \times 1.8\text{m} = 22.77 \text{ m}^2$$

$$10 \text{ tunnels} \times 1 \text{ tunnels} = 10 \text{ tunnels}$$

or

Proposed excavation size to implement drainage solution would be:

$$6.83 \text{ m} \times 3.1\text{m} = 21.16 \text{ m}^2$$

$$5 \text{ tunnels} \times 2 \text{ tunnels} = 10 \text{ tunnels}$$

NB: depth depends on invert level.

Our 'list' price on the supply of the drainage solution, using the proposed layout would be:

Tunnel Length = 5

Tunnel Width = 2

Textile Required (linear meters) = 6

Textile Round up to nearest 5 = 10

Description	Art. Code	Qty	Price	Sub-Total
Infiltration Tunnel	230010	10	£65.00	£650.00
Set of Tunnel End Plates	231004	2	£34.00	£68.00
200mm Inspection Shaft, 1m length	322026	2	£46.00	£92.00
Ventilation Pipe with plastic cover	369017	2	£54.00	£108.00
100g non-woven geotextile (5.25m width)	TERREX-NW9	52.5	£1.25	£65.63
			Total =	£983.63

*Disclaimer: We hope you found this calculation informative. Details are provided for guidance purposes, no responsibility is taken for any errors. Further information can be found on the with the 'Building Regulation Section H', 'General Binding Rules', Code of Practice for Drainage Fields (BS-6297-2007) or the GOV.UK website.