

Woodborough Annex Soakaway Calculations using the BRE Digest 365 Formulae

11_11_25

The Environment Agency's standing advice for minor extensions will apply

The location postcode SN9 5PL is not affected by either flood zone 2 or 3 nor by 2070-2125 projections.

The design and construction of soakaways should be dealt with in accordance with BRE Digest 365 and the Building Regulations Part H.

The impermeable area is more than 25 sqm (156 sqm) therefore - design rainfall in accordance with BRE Digest 365.

Soakaways to be located at least 5 meters from any building (see soakaway plan attached)

Source-control measures will include permeable surfacing for driveways and hardstanding and rainwater butts for roof water re-use.

Maintenance and management plan -

Exceedance flows will follow the site's natural topography to take advantage of the extensive permeable green space that surrounds the site.

Client maintenance and management plan for two number crate soakaways -

Regular inspections - Inspect the system's inlet and any accessible inspection points at least twice a year, ideally in late autumn and early spring, to check for any signs of blockages or damage.

Clear debris - Regularly remove leaves, silt, moss, and other organic matter from the area around the inlets (gutters, channel drains, and inspection points) to prevent them from entering the pipework.

Check for waterlogging - Be alert for signs of water pooling on the surface above or near the soakaway, as this indicates a potential issue with the system's ability to drain.

Monitor ground conditions - Look for any dips or sinkholes in the ground above the soakaway, which could signal a structural issue or soil compaction.

Percolation Test Results -

400mm total depth of water achieved (effective depth)

75% to 25% fall is 300mm to 100mm (200mm)

Pit dimensions - 2800 long, 300 wide and 1500 deep trench

Drained from 75% to 25% over 10 minutes (600 seconds)

Volume outflowing between 75% and 25% = $2.8 \times 0.3 \times 0.2 = 0.168$ sqm

Mean surface area through which outflow occurs taken to be 50% effective depth plus base of pit = $(2.8 \times 0.2 \times 2) + (0.3 \times 0.2 \times 2) + (2.8 \times 0.3) = 2.08$ sqm

Soil infiltration rate = 0.168 divided by $(2.08 \times 600) = 0.00013461538$

Rainfall ratio from figure 1 taken to be 0.39

M10-15 = 15.5

M10-30 = 19.84

M10-60 = 24.8

M10-120 = 30

M10-240 = 35.6

Inflow to soakaway

$$M10-15 = 156 \times 0.0155 = 2.418 \text{ cubic m}$$

$$M10-30 = 156 \times 0.01984 = 3.095 \text{ cubic m}$$

$$M10-60 = 156 \times 0.0248 = 3.87 \text{ cubic m}$$

$$M10-120 = 156 \times 0.030 = 4.68 \text{ cubic m}$$

$$M10-240 = 156 \times 0.0356 = 5.55 \text{ cubic m}$$

Outflow from soakaway

= internal surface area of soakaway pit to 50% storage depth (excl. base area)

x soil percolation rate x storm duration

Hypothetical pit at 2.4m length by 1.5m depth by Wm width gives -

$$\text{Outflow (cubic m)} = (3.6 + 1.5W) \times 0.00013461538 \times (D \times 60)$$

Assume crate soakaway free volume to be around 90%

$$\text{Soakaway storage volume} = 2.4 \times 1.5 \times W \times 0.9 = 3.24W \text{ cubic m}$$

SATISFACTORY STORAGE VOLUMES:

M10-15

$$2.418 - (3.6 + 1.5W) \times 0.00013461538 \times 900 = 3.24W$$

$$2.418 - (3.6 + 1.5W) \times 0.121153842 = 3.24W$$

$$2.418 - 0.436 - 0.182W = 3.24W$$

$$1.982 - 0.182W = 3.24W$$

$$1.982 = 3.422W$$

$$0.58 = W \text{ for M10-15}$$

For M10-30

$$3.095 - (3.6 + 1.5W) \times 0.000135 \times 1800 = 3.24W$$

$$3.095 - (3.6 + 1.5W) \times 0.243 = 3.24W$$

$$3.095 - 0.8748 - 0.3645W = 3.24W$$

$$2.2202 - 0.3645W = 3.24W$$

$$2.2202 = 3.6045W$$

$$0.62 = W \text{ for M10-30 (PEAK)}$$

For M10-60

$$3.87 - (3.6 + 1.5W) \times 0.000135 \times 3600 = 3.24W$$

$$3.87 - (3.6 + 1.5W) \times 0.486 = 3.24W$$

$$3.87 - 1.7496 - 0.729W = 3.24W$$

$$2.1204 - 0.729W = 3.24W$$

$$2.1204 = 3.969W$$

$$0.53 = W \text{ for M10-60}$$

For M10-120

$$4.68 - (3.6 + 1.5W) \times 0.000135 \times 7200 = 3.24W$$

$$4.68 - (3.6 + 1.5W) \times 0.972 = 3.24W$$

$$4.68 - 3.4992 - 1.458W = 3.24W$$

$$1.1808 - 1.458W = 3.24W$$

$$1.1808 = 4.698W$$

$$0.25 = W \text{ for M10-120}$$

Hypothetical soakaway at 2.5M length by 1.5M effective depth by 0.62 width would be suitable for critical storm duration of one hour (10-year events)

= 2.325 cubic metres total volume required

2 soakaways at 1.5 cubic metres each is more than adequate for M10-30