

**PARALLEL PI LIMITED
61 KIRKSTONE WAY
AMBLECOTE
DY5 3RZ**

RevA.

18/12/28



**DRAINAGE CALCULATIONS FOR
SURFACE WATER SOAKAWAY AT**

PROPOSED NEW RESIDENTIAL DEVELOPMENT AT

**GRAVEL BANK FARM
CAVERSALL COMMON
CAVERSALL
STOKE ON TRENT
ST11 9EU**

CONSIDER AREAS TO BE DRAINED

PLOT 1 HOUSE 117 m^2
GARAGE 23.76 m^2

PLOT 2 HOUSE 140.00 m^2
GARAGE 39.0 m^2

PLOT 3 HOUSE 140.00 m^2
GARAGE 39.00 m^2

ACCESS RD 547.00 m^2
INL DRIVES

1045.76 m^2

REFER TO SP/AVAT CALCULATION

PERCOLATION TEST RESULTS 75% to 25%.
DATE 27/8/25

**Tekla Tedds**

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Project

GRAVEL BANK

Job no.

GB

Calcs for

SOAKAWAY DESIGN

Start page no./Revision

Calcs by

DMR

Calcs date

18/12/2025

Checked by

Checked date

Approved by

Approved date

SOAKAWAY DESIGN**In accordance with BRE Digest 365 - Soakaway design**

Tedds calculation version 2.0.06

Design rainfall intensity

Location of catchment area

Stoke

Impermeable area drained to the system

 $A = 1045.8 \text{ m}^2$

Return period

Period = 200 yr

Ratio 60 min to 2 day rainfall of 5 yr return period

 $r = 0.360$

5-year return period rainfall of 60 minutes duration

 $M5_{60\text{min}} = 20.0 \text{ mm}$

Increase of rainfall intensity due to global warming

 $p_{\text{climate}} = 30 \%$

Note that the following values for Z2 have been extrapolated from the 50 year and 100 year Z2 values due to the limitations of the Wallingford Procedure.

Soakaway / infiltration trench details

Soakaway type

Rectangular

Minimum depth of pit (below incoming invert)

 $d = 1877 \text{ mm}$

Width of pit

 $w = 6000 \text{ mm}$

Length of pit

 $l = 8000 \text{ mm}$

Percentage free volume

 $V_{\text{free}} = 90 \%$ **Soil infiltration rate (BRE digest 365)**

Length of trial pit

 $l_{\text{trial}} = 300 \text{ mm}$

Width of trial pit

 $b_{\text{trial}} = 300 \text{ mm}$

Depth of trial pit (below invert)

 $d_{\text{trial}} = 300 \text{ mm}$

Free volume (if fill used)

 $V_{\text{trial}} = 100 \%$

75% depth of pit

 $d_{75} = (d_{\text{trial}} \times 0.75) = 225.00 \text{ mm}$

50% depth of pit

 $d_{50} = (d_{\text{trial}} \times 0.50) = 150.00 \text{ mm}$

25% depth of pit

 $d_{25} = (d_{\text{trial}} \times 0.25) = 75.00 \text{ mm}$

Test 1 - time to fall from 75% depth to 25% depth

 $T1 = 17 \text{ min}$

Test 2 - time to fall from 75% depth to 25% depth

 $T2 = 19 \text{ min}$

Test 3 - time to fall from 75% depth to 25% depth

 $T3 = 18 \text{ min}$

Longest time to fall from 75% depth to 25% depth

 $t_g = \max(T1, T2, T3) = 19 \text{ min}$

Storage volume from 75% to 25% depth

 $V_{p75-25} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 0.01 \text{ m}^3$

Internal surface area to 50% depth

 $a_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 0.27 \text{ m}^2$

Surface area of soakaway to 50% storage depth

 $A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 0.180 \text{ m}^2$

Soil infiltration rate

 $f = V_{p75-25} / (a_{p50} \times t_g) = 45.0 \times 10^{-6} \text{ m/s}$

Wetted area of pit 50% full

 $a_{s50} = l \times d + w \times d = 26279184 \text{ mm}^2$ **Table equations**

Inflow (cl.3.3.1)

 $I = M200 \times A$

Outflow (cl.3.3.2)

 $O = a_{s50} \times f \times D$

Storage (cl.3.3.3)

 $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	200 year rainfall, M200 (mm)	Inflow (m ³)	Outflow (m ³)	Storage required (m ³)
5	0.36;	9.4;	2.41;	22.5;	23.56;	0.36;	23.20

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	200 year rainfall, M200 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
10	0.51;	13.3;	2.52;	33.4;	34.96;	0.71;	34.25
15	0.62;	16.1;	2.58;	41.6;	43.55;	1.07;	42.49
30	0.79;	20.5;	2.63;	53.9;	56.40;	2.13;	54.27
60	1.00;	26.0;	2.57;	66.9;	69.99;	4.26;	65.72
120	1.22;	31.7;	2.49;	79.0;	82.58;	8.52;	74.05
240	1.48;	38.5;	2.41;	92.7;	96.91;	17.05;	79.86
360	1.67;	43.4;	2.35;	102.0;	106.66;	25.57;	81.09
600	1.90;	49.4;	2.28;	112.5;	117.64;	42.61;	75.03
1440	2.42;	62.9;	2.12;	133.4;	139.50;	102.28;	37.23

Required storage volume

$$S_{\text{req}} = 81.09 \text{ m}^3$$

Soakaway storage volume

$$S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 81.09 \text{ m}^3$$

PASS - Soakaway storage volume

Time for emptying soakaway to half volume

$$t_{s50} = S_{\text{req}} \times 0.5 / (a_{s50} \times f) = 9\text{hr } 30\text{min } 52\text{s}$$

PASS - Soakaway discharge time less than or equal to 24 hours