

PANELAGH ROAD, HAAT

SURFACE WATER

Date 11/10	Job No 14/2200	Page 01
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Reference: HDL DRAWING NO.

14-2200-902 C1 FOR

ALONG AT FOOT OF HARDSTAND.

HARDSTAND ALONG

HARDSTAND ALONG ADJACENT

TO PLOTS LAID TO FALL TO

DISCHARGE SURFACE WATER

TO ACRES ROAD FOLLOW

PAVED WHICH DISCHARGES TO

DETENTION BASIN

FOOT ALONG.

SURFACE WATER RUN OFF

FROM PLOTS SHOWN ON

HDL DRAWING NO. 14-2200-902 C1

ATTACHED DISCHARGES TO

SOAKWAYS:-

SOAKWAYS DESIGNED TO

BEE DIRECT 365

1 IN 100 YEAR STORM

30% CLIMATE CHANGE ADJUSTMENT

SOIL INFILTRATION RATE = 0.0000137 m/s

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SANVELAH ROAD, HAWAII

SULFATE WORK

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ALFA 1 (Plot 10)

Plot ALFA = 90.85 m^2

30% CLIMATE CHANGE

$90.85 \times 1.3 = 118.1 \text{ m}^2$

SOACMANAY SIZE

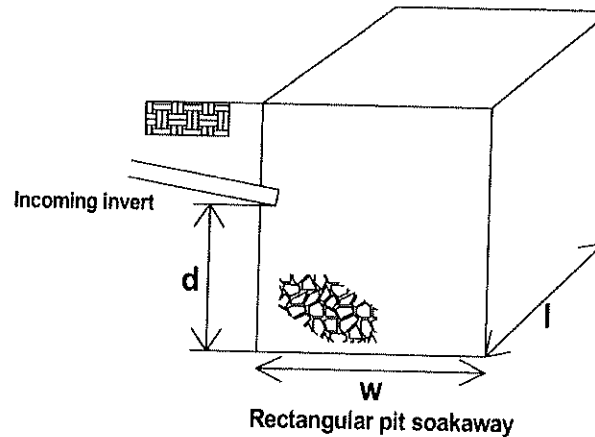
8.0m x 25m x 0.0m BELOW INVERT

FROM CONCRETE PLUT OUT

ADEQUATE

SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01


Rectangular Pit Design

Pit length

 $l = 8000 \text{ mm}$ ✓

Pit width

 $w = 2500 \text{ mm}$ ✓

Pit depth below invert

 $d = 800 \text{ mm}$ ✓

Free volume

 $V_{\text{free}} = 95.0 \%$

Location of soakaway

England and Wales

Return period

100 years

Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)

 $r = 0.35$

Impermeable area

 $A = 118.1 \text{ m}^2$

Soil infiltration rate

 $f = 0.0000137 \text{ m/s}$

Surface area of soakaway to 50% storage depth

$$A_{s50} = 2 \times (l + w) \times d / 2 = 8.400 \text{ m}^2$$

Outflow factor

$$AF = A_{s50} \times f = 115. \times 10^{-6} \text{ m}^3/\text{s}$$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	1.6 m ³	0.0 m ³	1.5 m ³
10 mins	10.1 mm	1.91	19.4 mm	2.3 m ³	0.1 m ³	2.2 m ³
15 mins	12.3 mm	1.95	24.0 mm	2.8 m ³	0.1 m ³	2.7 m ³
30 mins	15.7 mm	2.00	31.4 mm	3.7 m ³	0.2 m ³	3.5 m ³
1 hour	20.0 mm	2.03	40.6 mm	4.8 m ³	0.4 m ³	4.4 m ³
2 hours	24.5 mm	2.01	49.2 mm	5.8 m ³	0.8 m ³	5.0 m ³
4 hours	29.9 mm	1.97	59.0 mm	7.0 m ³	1.7 m ³	5.3 m ³
6 hours	33.8 mm	1.94	65.6 mm	7.7 m ³	2.5 m ³	5.3 m ³
10 hours	38.9 mm	1.90	73.9 mm	8.7 m ³	4.1 m ³	4.6 m ³
24 hours	49.6 mm	1.81	89.9 mm	10.6 m ³	9.9 m ³	0.7 m ³

Required storage volume

$$S_{\text{reqd}} = 5.3 \text{ m}^3$$

Soakaway storage volume

$$S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 15.2 \text{ m}^3$$

Soakaway storage volume- OK

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 6 \text{ hr } 24 \text{ min } 26 \text{ s}$$

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Section

Independent Soakaways - Area 1

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Soakaway discharge time - OK

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SURFACE WATER

AREA 2 (Plot 76)

Plot AREA = 61.74 m²

30% URBAN CHANGE

$61.74 \times 1.3 = 80.3 \text{ m}^2$

SOAKAWAY SIZE

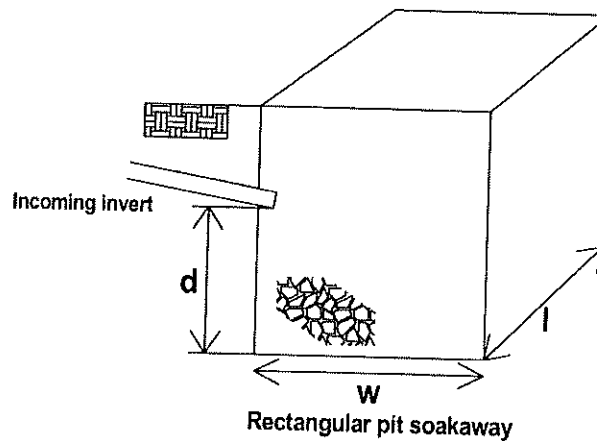
25 x 25 x 0.8 m BELOW GROUND

from computer plot out

ADEQUATE

SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01


Rectangular Pit Design

Pit length	$l = 2500 \text{ mm}$ ✓	Pit width	$w = 2500 \text{ mm}$ ✓
Pit depth below invert	$d = 800 \text{ mm}$ ✓	Free volume	$V_{free} = 95.0 \%$ ✓
Location of soakaway	England and Wales	Return period	100 years ✓
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)		$r = 0.35$ ✓	
Impermeable area	$A = 80.3 \text{ m}^2$ ✓	Soil infiltration rate	$f = 0.0000137 \text{ m/s}$ ✓
Surface area of soakaway to 50% storage depth			

$$A_{s50} = 2 \times (l + w) \times d / 2 = 4.000 \text{ m}^2$$

Outflow factor

$$AF = A_{s50} \times f = 54.8 \times 10^{-6} \text{ m}^3/\text{s}$$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	1.1 m ³	0.0 m ³	1.0 m ³
10 mins	10.1 mm	1.91	19.4 mm	1.6 m ³	0.0 m ³	1.5 m ³
15 mins	12.3 mm	1.95	24.0 mm	1.9 m ³	0.0 m ³	1.9 m ³
30 mins	15.7 mm	2.00	31.4 mm	2.5 m ³	0.1 m ³	2.4 m ³
1 hour	20.0 mm	2.03	40.6 mm	3.3 m ³	0.2 m ³	3.1 m ³
2 hours	24.5 mm	2.01	49.2 mm	4.0 m ³	0.4 m ³	3.6 m ³
4 hours	29.9 mm	1.97	59.0 mm	4.7 m ³	0.8 m ³	3.9 m ³
6 hours	33.8 mm	1.94	65.6 mm	5.3 m ³	1.2 m ³	4.1 m ³
10 hours	38.9 mm	1.90	73.9 mm	5.9 m ³	2.0 m ³	4.0 m ³
24 hours	49.6 mm	1.81	89.9 mm	7.2 m ³	4.7 m ³	2.5 m ³

Required storage volume

$$S_{reqd} = 4.1 \text{ m}^3$$

Soakaway storage volume

$$S_{act} = l \times d \times w \times V_{free} = 4.8 \text{ m}^3$$

Time for emptying soakaway to half volume

$$T_{s50} = S_{reqd} \times 0.5 / (A_{s50} \times f) = 10 \text{ hr } 20 \text{ min } 32 \text{ s}$$

Soakaway storage volume- OK

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Independent Soakaways - Area 2

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Soakaway discharge time - OK

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SURFACE WATER

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AREA 3 (Plot 71)

Roof AREA = 83.85 m²

30% CLIMATE CHANGE

$83.85 \times 1.3 = 109.0 \text{ m}^2$

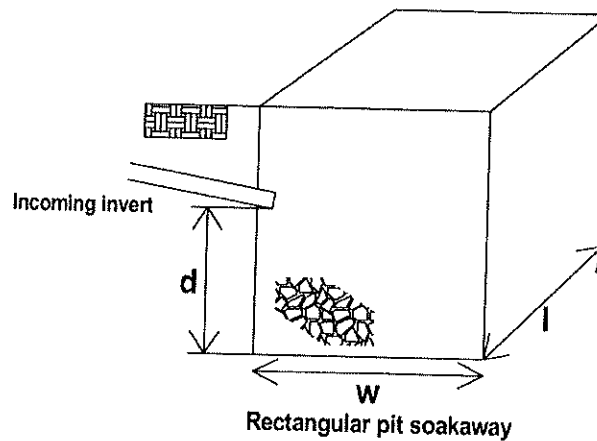
SOAK AWAY SIZE

3.0 x 3.0 x 0.8m SOAK INVERT

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SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



Rectangular Pit Design

Pit length	$l = 3000 \text{ mm}$	Pit width	$w = 3000 \text{ mm}$
Pit depth below invert	$d = 800 \text{ mm}$	Free volume	$V_{\text{free}} = 95.0 \%$
Location of soakaway	England and Wales	Return period	100 years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)		$r = 0.35$	
Impermeable area	$A = 109.0 \text{ m}^2$	Soil infiltration rate	$f = 0.0000137 \text{ m/s}$
Surface area of soakaway to 50% storage depth	$A_{50} = 2 \times (l + w) \times d / 2 = 4.800 \text{ m}^2$		
Outflow factor	$AF = A_{50} \times f = 65.8 \times 10^{-6} \text{ m}^3/\text{s}$		

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	1.4 m ³	0.0 m ³	1.4 m ³
10 mins	10.1 mm	1.91	19.4 mm	2.1 m ³	0.0 m ³	2.1 m ³
15 mins	12.3 mm	1.95	24.0 mm	2.6 m ³	0.1 m ³	2.6 m ³
30 mins	15.7 mm	2.00	31.4 mm	3.4 m ³	0.1 m ³	3.3 m ³
1 hour	20.0 mm	2.03	40.6 mm	4.4 m ³	0.2 m ³	4.2 m ³
2 hours	24.5 mm	2.01	49.2 mm	5.4 m ³	0.5 m ³	4.9 m ³
4 hours	29.9 mm	1.97	59.0 mm	6.4 m ³	0.9 m ³	5.5 m ³
6 hours	33.8 mm	1.94	65.6 mm	7.1 m ³	1.4 m ³	5.7 m ³
10 hours	38.9 mm	1.90	73.9 mm	8.1 m ³	2.4 m ³	5.7 m ³
24 hours	49.6 mm	1.81	89.9 mm	9.8 m ³	5.7 m ³	4.1 m ³

Required storage volume $S_{\text{reqd}} = 5.7 \text{ m}^3$

Soakaway storage volume $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 6.8 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{50} = S_{\text{reqd}} \times 0.5 / (A_{50} \times f) = 12 \text{ hr } 5 \text{ min } 33 \text{ s}$$

Soakaway storage volume- OK

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Independent Soakaways - Area 3

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Soakaway discharge time - OK

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Area 4 (Plots 22-25)

Plot Area = 236.73 m².

30% URMATE CHANGE

$236.73 \times 1.3 = 307.7 \text{ m}^2.$

SOAKAWAY SIZE

12.0 m x 2.0 m x 0.8 m BELOW INVERT

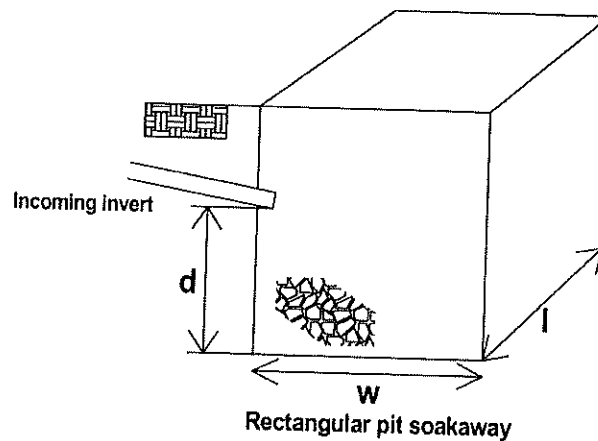
FROM COMPLETE FLOW OUT

ADEQUATE

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SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



Rectangular Pit Design

Pit length	$l = 12000 \text{ mm}$ ✓	Pit width	$w = 2000 \text{ mm}$ ✓
Pit depth below invert	$d = 800 \text{ mm}$ ✓	Free volume	$V_{\text{free}} = 95.0 \%$ ✓
Location of soakaway	England and Wales	Return period	100 years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)		$r = 0.35$	
Impermeable area	$A = 307.7 \text{ m}^2$	Soil infiltration rate	$f = 0.0000137 \text{ m/s}$ ✓

Surface area of soakaway to 50% storage depth
 $A_{s50} = 2 \times (l + w) \times d / 2 = 11.200 \text{ m}^2$

Outflow factor
 $AF = A_{s50} \times f = 153. \times 10^{-6} \text{ m}^3/\text{s}$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	4.0 m ³	0.0 m ³	4.0 m ³
10 mins	10.1 mm	1.91	19.4 mm	6.0 m ³	0.1 m ³	5.9 m ³
15 mins	12.3 mm	1.95	24.0 mm	7.4 m ³	0.1 m ³	7.3 m ³
30 mins	15.7 mm	2.00	31.4 mm	9.7 m ³	0.3 m ³	9.4 m ³
1 hour	20.0 mm	2.03	40.6 mm	12.5 m ³	0.6 m ³	11.9 m ³
2 hours	24.5 mm	2.01	49.2 mm	15.1 m ³	1.1 m ³	14.0 m ³
4 hours	29.9 mm	1.97	59.0 mm	18.1 m ³	2.2 m ³	15.9 m ³
6 hours	33.8 mm	1.94	65.6 mm	20.2 m ³	3.3 m ³	16.9 m ³
10 hours	38.9 mm	1.90	73.9 mm	22.7 m ³	5.5 m ³	17.2 m ³
24 hours	49.6 mm	1.81	89.9 mm	27.7 m ³	13.3 m ³	14.4 m ³

Required storage volume $S_{\text{reqd}} = 17.2 \text{ m}^3$

Soakaway storage volume $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 18.2 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 15 \text{ hr } 35 \text{ min } 14 \text{ s}$$

Soakaway storage volume- OK

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Independent Soakaways - Area 4

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Soakaway discharge time - OK

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SURFACE WATER

Area 5 (Plots 32-41)

Roof Area = 569.56 m²

30% CLIMATE CHANGE

$569.56 \times 1.3 = 740.4 \text{ m}^2$

SOAKAWAY SIZE

24.0 x 2.5 x 0.8m BELOW INLET.

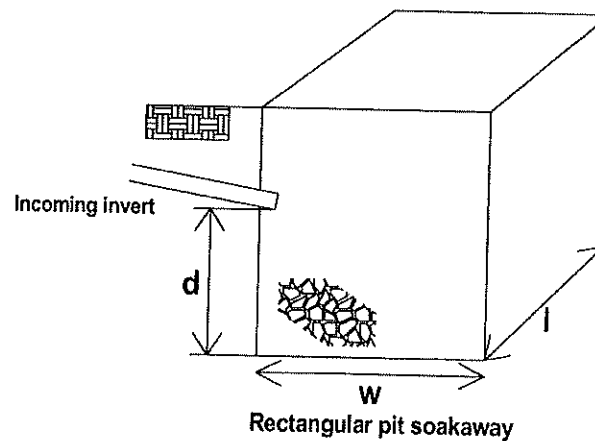
FROM COMPUTE PLANT OUT

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SOAKAWAY DESIGN – BRE DIGEST 365

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Rectangular Pit Design

Pit length	$l = 24000 \text{ mm}$ ✓	Pit width	$w = 2500 \text{ mm}$ ✓
Pit depth below invert	$d = 800 \text{ mm}$ ✓	Free volume	$V_{\text{free}} = 95.0 \%$
Location of soakaway	England and Wales	Return period	100 years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)		$r = 0.35$	
Impermeable area	$A = 740.4 \text{ m}^2$ ✓	Soil infiltration rate	$f = 0.0000137 \text{ m/s}$
Surface area of soakaway to 50% storage depth			

$$A_{50} = 2 \times (l + w) \times d / 2 = 21.200 \text{ m}^2$$

Outflow factor $AF = A_{50} \times f = 290. \times 10^{-6} \text{ m}^3/\text{s}$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	9.7 m ³	0.1 m ³	9.6 m ³
10 mins	10.1 mm	1.91	19.4 mm	14.3 m ³	0.2 m ³	14.2 m ³
15 mins	12.3 mm	1.95	24.0 mm	17.8 m ³	0.3 m ³	17.5 m ³
30 mins	15.7 mm	2.00	31.4 mm	23.2 m ³	0.5 m ³	22.7 m ³
1 hour	20.0 mm	2.03	40.6 mm	30.1 m ³	1.0 m ³	29.0 m ³
2 hours	24.5 mm	2.01	49.2 mm	36.5 m ³	2.1 m ³	34.4 m ³
4 hours	29.9 mm	1.97	59.0 mm	43.7 m ³	4.2 m ³	39.5 m ³
6 hours	33.8 mm	1.94	65.6 mm	48.5 m ³	6.3 m ³	42.3 m ³
10 hours	38.9 mm	1.90	73.9 mm	54.7 m ³	10.5 m ³	44.3 m ³
24 hours	49.6 mm	1.81	89.9 mm	66.6 m ³	25.1 m ³	41.5 m ³

Required storage volume $S_{\text{reqd}} = 44.3 \text{ m}^3$

Soakaway storage volume $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 45.6 \text{ m}^3$

Soakaway storage volume- OK

Time for emptying soakaway to half volume

$$T_{50} = S_{\text{reqd}} \times 0.5 / (A_{50} \times f) = 21 \text{ hr } 10 \text{ min } 15 \text{ s}$$

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Independent Soakaways - Area 5

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