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PERCOLATION TEST DATA AND SURFACE WATER SOAKAWAY DESIGN

FOR

DWELLING

AT

SUNNYLEA BARN,
NEW ROAD,
QUADRING EAUDIKE,
SPALDING,
LINCOLNSHIRE

FOR

MR L SUTTON

JOB NO.
JC/21/05/6059

DOCUMENT REF;- JC 21/05/6059-PT

CALCULATION STATUS
BUILDING REGULATION APPROVAL

Directors
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J C Ellington BSc. CEng MIStructE FRSA MIoD

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CONTENTS

STRUCTURAL CALCULATION	SHEET No.
Design Brief, Design Philosophy & Scope of Works	3
Extracts of Site Provided by Client	4
Percolation test data and impermeable area calculations	5
Soakaway Design Checks – BRE 365	6 – 13
Soakaway Design Summary	14
Extracts from Wavin Aquacell Literature	15 – 18
Additional Notes	19

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Job.	Percolation Test Results & Soakaway Design Calculations;- **Sunnylea Barn, New Road, Quadring Eaudike, Spalding, Lincs. PE11 4QB**
Job No.	JC/21/05/6059-PT
Client.	Mr L Sutton

Design Codes.

BS EN 752 : Part 2	Drain & Sewer Systems outside Buildings
BRE Digest 365	Soakaway Design
CIRIA Report 156	Infiltration Drainage – Manual of Good Practice
Approved Doc H	Drainage & Waste Disposal.
Guidance Note 46	Surface Water Soakaway Design (LBC)

Existing Info.

Design based on drawings and information provided by the client together with site observations / tests taken by JC Consultancy Ltd Engineer.

Soakaways proposed as Development is extremely small. The development consists of 1No detached Barn Conversion only, with areas available for soakaways both front and rear.

Experience in this area suggests ground conditions locally are generally acceptable for low volume soakaways, however suitable drainage crates by Wavin or similar are normally required in order to satisfy Storm storage capacity.

Design Brief.

Suitable soakaways to be designed to store immediate dwelling storm water run off and allow for the waters efficient infiltration into the ground strata. In addition a soakway to be designed to store and allow for the efficient infiltration into the ground strata for a pumped outlet from a Klargester style Treatment Plant.

Design Philosophy.

Percolation tests carried out in accordance with Design Guidance noted above in order to provide Soil Infiltration Rates.

Data used in accordance with BRE Digest 365 in order to design suitable Soakaways.
Calculation of Storage Volume and Emptying of Soakaways calculated for 1 in 10 year storms in accordance with BRE Digest 365. For a conservative approach emptying of soakaways also calculated for 1 in 100 year storm event with additional allowance for Climate Change has been incorporated within design.

Calculation of Storage Volume and Emptying of Soakaways calculated for 1No, 6 Person Klargester style Treatment plant using interpolated rainfall data to model the maximum 24 hour (Max Daily Flow) of the treatment plant as advised by Kingspan Klargester Technical Data.

Scope of Works.

Only the Items discussed within the Design Brief and Design Philosophy, and listed in the contents have been considered as part of this calculation package.
Therefore, this calculation package does not include any other structural items.

Any further items, outside the Scope of works should be carried out in accordance with Architects / Suppliers / Contractors specifications and Local Authority recommendations.

This calculation package should be read in conjunction with other Site Investigation Reports, and any Geotechnical and Ground Contamination Reports available for the site.

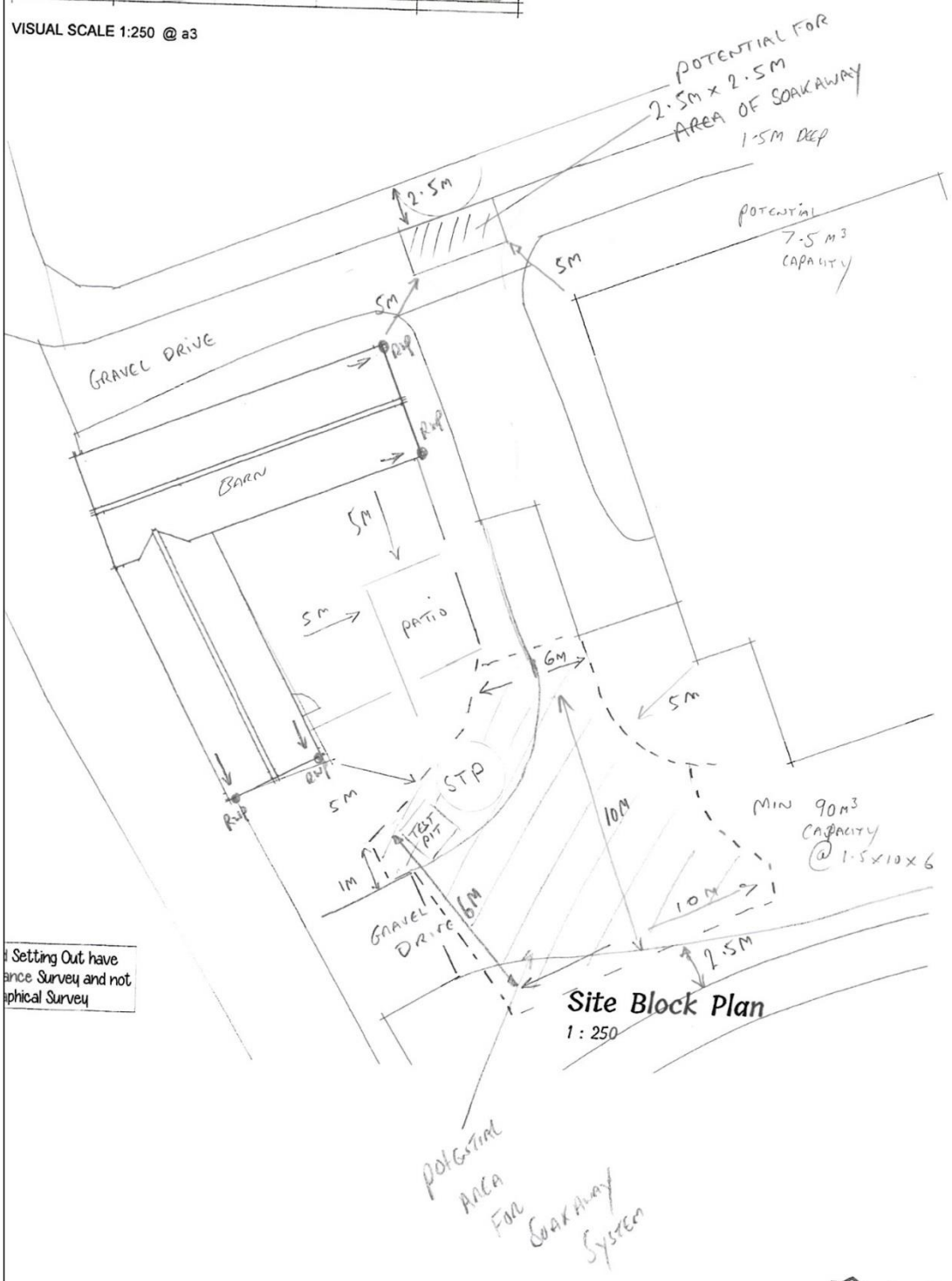
Sunny Lea Barn

ations of existing materials are subject to confirmation on site when it is feasible to expose the relevant areas of construction. All material schedules are given in
y of these material schedules

a3

0m 5m 10m 15m 20m 25m

VISUAL SCALE 1:250 @ a3



Setting Out have
ance Survey and not
aphical Survey

remway

COMMENT	CALCULATION	OUTPUT

SURFACE WATER SOAKAWAY DESIGN;-

PERCOLATION TESTS (CONDUCTED IN TRIAL PIT BY OTHERS);-

LENGTH OF TEST HOLE = 330mm.

WIDTH OF TEST HOLE = 300mm.

DEPTH OF TEST HOLE = 770mm.

FREE VOLUME = 100% (NO FILL USED)

TEST 1 - TIME TO FALL 75% - 25% = 180 MIN

TEST 2 - TIME TO FALL 75% - 25% = 250 MIN

TEST 3 - TIME TO FALL 75% - 25% = 260 MIN

ROOF AREA 1 = APPROX 50.6 m^2

ROOF AREA 2 = APPROX 33.8 m^2

ROOF AREA 3 = APPROX 98.0 m^2

STP = INTERPOLATED TO ACHIEVE MAX DAILY VOLUME;-

SOLUTION; ADOPT 4NO SOAKAWAYS

SEE BRE365 CALCULATIONS OVER.

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **50.6** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.450**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1200** mm
Width of pit	w = **2000** mm
Length of pit	l = **2000** mm
Percentage free volume	V_{free} = **100** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **330** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **770** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	d_{75} = (d_{trial} × 0.75) = **577.50** mm
50% depth of pit	d_{50} = (d_{trial} × 0.50) = **385.00** mm
25% depth of pit	d_{25} = (d_{trial} × 0.25) = **192.50** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **180** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **250** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **260** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **260** min
Storage volume from 75% to 25% depth	V_{p75_25} = (l_{trial} × b_{trial} × (d_{75} - d_{25})) × V_{trial} = **0.04** m^3
Internal surface area to 50% depth	a_{p50} = ((l_{trial} × b_{trial}) + (l_{trial} + b_{trial}) × 2 × d_{50}) = **0.58** m^2
Surface area of soakaway to 50% storage depth	A_{s50} = 2 × (l_{trial} + b_{trial}) × d_{trial} / 2 = **0.485** m^2
Soil infiltration rate	f = V_{p75_25} / (a_{p50} × t_{lg}) = **4.18×10^{-6}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **4800000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.39;	9.4;	1.89;	17.7;	0.90;	0.01;	0.89
10	0.54;	13.0;	1.96;	25.4;	1.28;	0.01;	1.27
15	0.65;	15.6;	1.99;	31.1;	1.58;	0.02;	1.56

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Project				Job no.	
Sunnylea Barn, Quadring Eaudike				Jc 6059	
Calcs for				Start page no./Revision	
Soakaway Design Roof 1				7	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
JH	Jun-21	JCE	Jun-21	CN	Jun-21

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
30	0.82;	19.7;	2.03;	39.9;	2.02;	0.04;	1.98
60	1.00;	24.0;	2.01;	48.3;	2.45;	0.07;	2.37
120	1.19;	28.6;	1.98;	56.6;	2.86;	0.14;	2.72
240	1.38;	33.1;	1.95;	64.4;	3.26;	0.29;	2.97
360	1.51;	36.2;	1.92;	69.6;	3.52;	0.43;	3.09
600	1.68;	40.3;	1.89;	76.1;	3.85;	0.72;	3.13
1440	2.03;	48.7;	1.82;	88.7;	4.49;	1.73;	2.75

Required storage volume S_{req} = **3.13** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **4.80** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 21hr 39min 6s

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

∴ SATISFACTORY

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **33.8** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.450**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1200** mm
Width of pit	w = **2000** mm
Length of pit	l = **1000** mm
Percentage free volume	V_{free} = **100** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **330** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **770** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	$d_{75} = (d_{trial} \times 0.75)$ = **577.50** mm
50% depth of pit	$d_{50} = (d_{trial} \times 0.50)$ = **385.00** mm
25% depth of pit	$d_{25} = (d_{trial} \times 0.25)$ = **192.50** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **180** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **250** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **260** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **260** min
Storage volume from 75% to 25% depth	$V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial}$ = **0.04** m^3
Internal surface area to 50% depth	$a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50})$ = **0.58** m^2
Surface area of soakaway to 50% storage depth	$A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2$ = **0.485** m^2
Soil infiltration rate	$f = V_{p75_25} / (a_{p50} \times t_{lg})$ = **4.18×10^{-6}** m/s
Wetted area of pit 50% full	$a_{s50} = l \times d + w \times d$ = **3600000** mm^2

Table equations

Inflow (cl.3.3.1)	$I = M100 \times A$
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	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.39;	9.4;	1.89;	17.7;	0.60;	0.00;	0.59
10	0.54;	13.0;	1.96;	25.4;	0.86;	0.01;	0.85
15	0.65;	15.6;	1.99;	31.1;	1.05;	0.01;	1.04

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
30	0.82;	19.7;	2.03;	39.9;	1.35;	0.03;	1.32
60	1.00;	24.0;	2.01;	48.3;	1.63;	0.05;	1.58
120	1.19;	28.6;	1.98;	56.6;	1.91;	0.11;	1.80
240	1.38;	33.1;	1.95;	64.4;	2.17;	0.22;	1.96
360	1.51;	36.2;	1.92;	69.6;	2.35;	0.33;	2.02
600	1.68;	40.3;	1.89;	76.1;	2.57;	0.54;	2.03
1440	2.03;	48.7;	1.82;	88.7;	2.99;	1.30;	1.69

Required storage volume S_{req} = **2.03** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **2.40** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 18hr 43min 24s

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

∴ SATISFACTORY.

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **98.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.450**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1600** mm
Width of pit	w = **3000** mm
Length of pit	l = **3000** mm
Percentage free volume	V_{free} = **100** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **330** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **770** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	$d_{75} = (d_{trial} \times 0.75)$ = **577.50** mm
50% depth of pit	$d_{50} = (d_{trial} \times 0.50)$ = **385.00** mm
25% depth of pit	$d_{25} = (d_{trial} \times 0.25)$ = **192.50** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **180** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **250** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **260** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **260** min
Storage volume from 75% to 25% depth	$V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial}$ = **0.04** m^3
Internal surface area to 50% depth	$a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50})$ = **0.58** m^2
Surface area of soakaway to 50% storage depth	$A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2$ = **0.485** m^2
Soil infiltration rate	$f = V_{p75_25} / (a_{p50} \times t_{lg})$ = **4.18×10^{-6}** m/s
Wetted area of pit 50% full	$a_{s50} = l \times d + w \times d$ = **9600000** mm^2

Table equations

Inflow (cl.3.3.1)	$I = M100 \times A$
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	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.39;	9.4;	1.89;	17.7;	1.74;	0.01;	1.73
10	0.54;	13.0;	1.96;	25.4;	2.49;	0.02;	2.46
15	0.65;	15.6;	1.99;	31.1;	3.05;	0.04;	3.01

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
30	0.82;	19.7;	2.03;	39.9;	3.91;	0.07;	3.84
60	1.00;	24.0;	2.01;	48.3;	4.74;	0.14;	4.59
120	1.19;	28.6;	1.98;	56.6;	5.55;	0.29;	5.26
240	1.38;	33.1;	1.95;	64.4;	6.31;	0.58;	5.73
360	1.51;	36.2;	1.92;	69.6;	6.82;	0.87;	5.95
600	1.68;	40.3;	1.89;	76.1;	7.46;	1.45;	6.01
1440	2.03;	48.7;	1.82;	88.7;	8.69;	3.47;	5.22

Required storage volume S_{req} = **6.01** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **14.40** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 20hr 47min 13s

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

∴ SATISFACTORY.

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **60.0** m^2 N/A
Return period	Period = **1** yr N/A
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.450** N/A
5-year return period rainfall of 60 minutes duration	M5_60min = **28.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** % N/A

DATA INTERPOLATED TO ACHIEVE MAX DAILY OUTFLOW OF KLARGESTOR STP - SEE TABLE EQ's.

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1200** mm
Width of pit	w = **2000** mm
Length of pit	l = **2000** mm
Percentage free volume	V_{free} = **100** %

Soil infiltration rate (BRE digest 365)

Length of trial pit	l_{trial} = **330** mm
Width of trial pit	b_{trial} = **300** mm
Depth of trial pit (below invert)	d_{trial} = **770** mm
Free volume (if fill used)	V_{trial} = **100** %
75% depth of pit	d_{75} = (d_{trial} × 0.75) = **577.50** mm
50% depth of pit	d_{50} = (d_{trial} × 0.50) = **385.00** mm
25% depth of pit	d_{25} = (d_{trial} × 0.25) = **192.50** mm
Test 1 - time to fall from 75% depth to 25% depth	T1 = **180** min
Test 2 - time to fall from 75% depth to 25% depth	T2 = **250** min
Test 3 - time to fall from 75% depth to 25% depth	T3 = **260** min
Longest time to fall from 75% depth to 25% depth	t_{lg} = max(T1, T2, T3) = **260** min
Storage volume from 75% to 25% depth	V_{p75_25} = (l_{trial} × b_{trial} × (d_{75} - d_{25})) × V_{trial} = **0.04** m^3
Internal surface area to 50% depth	a_{p50} = ((l_{trial} × b_{trial}) + (l_{trial} + b_{trial}) × 2 × d_{50}) = **0.58** m^2
Surface area of soakaway to 50% storage depth	A_{s50} = 2 × (l_{trial} + b_{trial}) × d_{trial} / 2 = **0.485** m^2
Soil infiltration rate	f = V_{p75_25} / (a_{p50} × t_{lg}) = **4.18×10^{-6}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **4800000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M1 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	1 year rainfall, M1 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.39;	10.9;	0.61;	6.7;	0.40;	0.01;	0.39
10	0.54;	15.1;	0.62;	9.4;	0.56;	0.01;	0.55
15	0.65;	18.2;	0.63;	11.5;	0.69;	0.02;	0.67
30	0.82;	23.0;	0.65;	15.0;	0.90;	0.04;	0.86

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	1 year rainfall, M1 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
60	1.00;	28.0;	0.67;	18.8;	1.13;	0.07;	1.06
120	1.19;	33.3;	0.69;	22.9;	1.37;	0.14;	1.23
240	1.38;	38.6;	0.70;	26.9;	1.62;	0.29;	1.33
360	1.51;	42.3;	0.70;	29.8;	1.79;	0.43;	1.35
600	1.68;	47.0;	0.71;	33.6;	2.02;	0.72;	1.29
1440	2.03;	56.8;	0.73;	41.5;	2.49;	1.73;	0.76

Required storage volume S_{req} = **1.35** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **4.80** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 9hr 20min 19s

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

∴ INFLOW WITH F.O.S OF 2.0 (I.E $1.2m^3 \times 2$ ADOPTED).

FOR CONSERVATIVE APPROACH STORAGE VOLUME PROVIDED IN EXCESS OF 3x REQUIRED.

∴ SATISFACTORY.

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DETAIL SHEET

CONTRACT / PROJECT
Dwelling;-
Sunnylea Barn,
Quadring Eaudike,
Lincolnshire

JOB No.	JC/21/05/6059
PAGE	14
DATE	Jun 2021
BY	JLH CHKD JCE

SOAKAWAY SUMMARY



Site Block Plan
1 : 250

SUMMARY

1. MIN 2.0m LONG x 2.0m WIDE x 1.20m DEEP SOAKAWAY
2. MIN 2.0m LONG x 1.0m WIDE x 1.20m DEEP SOAKAWAY
3. MIN 3.0m LONG x 3.0m WIDE x 1.60m DEEP SOAKAWAY
4. MIN 2.0m LONG x 2.0m WIDE x 1.20m DEEP SOAKAWAY.

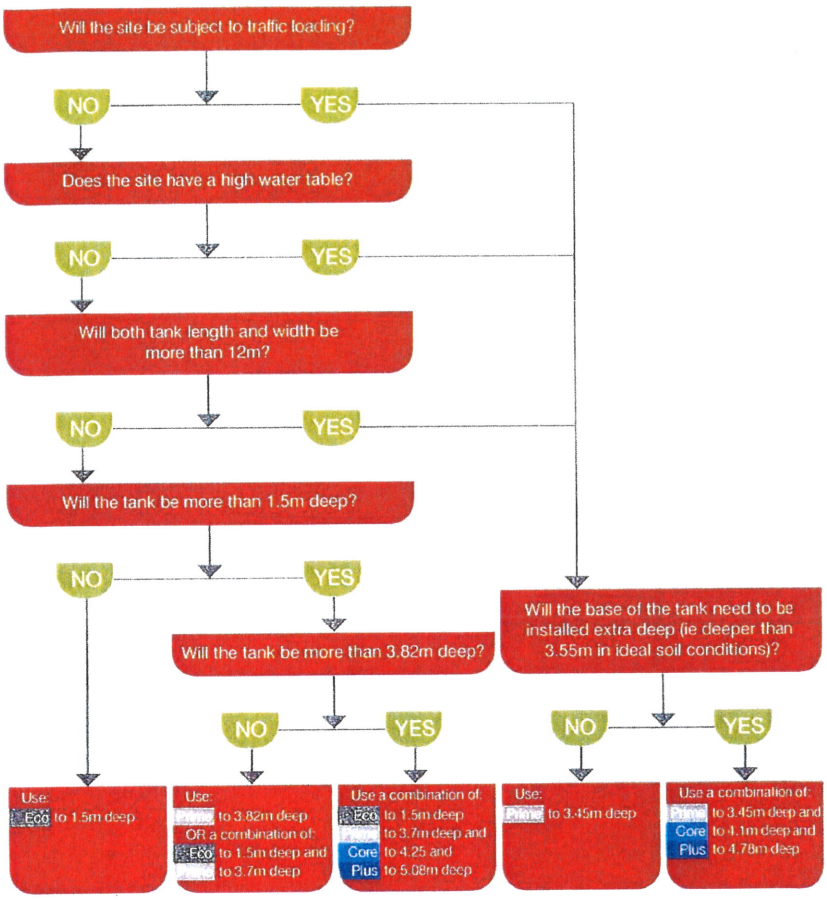
ALL SOAKAWAYS FILLED WITH 'AQUACELL PRIME' CRATES (TRAFFICKED AREA)

t : 01205 317540 e: info@jcconsultancyltd.com
Morgan House, Gilbert Drive, Boston, Lincolnshire. PE21 7TQ

wavin
CONNECT TO BETTER

Unit Selector
AquaCell Systems

The following selector will help you to determine which AquaCell unit, or combination of units, is the correct choice for a particular project.



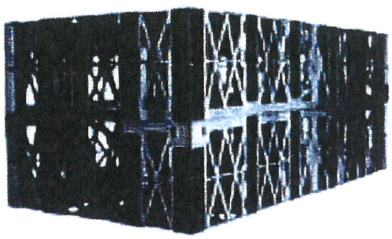
Eco AquaCell Eco (6LB025) *See page 6*

AquaCell Prime (6LB075) *See page 7*

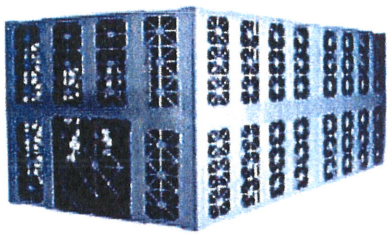
Core AquaCell Core (6LB100) *See page 8*

Plus AquaCell Plus (6LB200) *See pages 9 – 10*

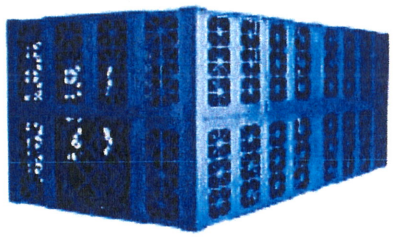
AquaCell Eco



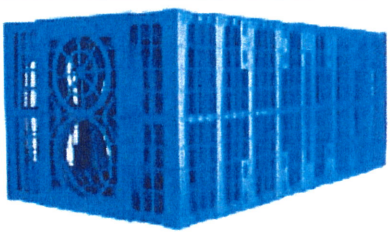
AquaCell Prime



AquaCell Core



AquaCell Plus



Notes:

- AquaCell Eco cannot be used directly with AquaCell Plus
- If tank needs to be inspectable, contact Wavin Technical Design on 0844 856 5161
- Maximum height of tank = 2m (5 units). Any height greater than 2m, please contact Wavin Technical Design on 0844 856 5161
- Allowable maximum depth to base of units is dependent on soil type, angle of shearing resistance, loading and groundwater level
- The above depths are based on 38° angle of shearing resistance and no groundwater. For tanks in high water tables, please contact Wavin Technical Design.

For typical specification of geomembrane, see table on page 13.

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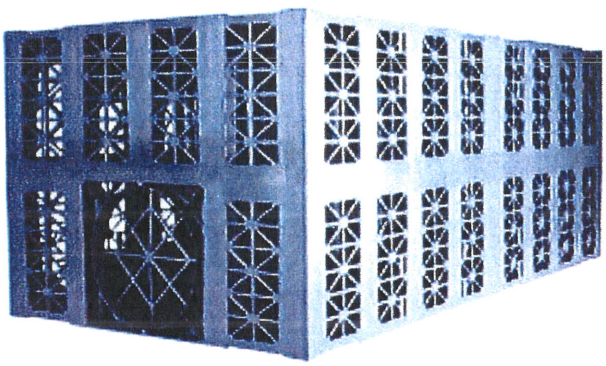
Product Details
AquaCell Prime

(USE IN TRAFFICKED AREAS).

Application

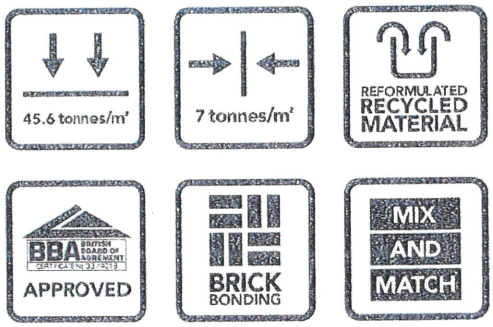
AquaCell Prime is manufactured from specially reformulated, recycled material. It is ideal for use in both shallow and deep applications, subject to either regular traffic loading – such as car parks (for vehicles up to 12 tonnes) or for landscape areas.

Typically AquaCell Prime is suitable for installations to a maximum depth of 3.70m (landscaped) and 3.45m (trafficked), to the base of the units from ground level, in best soil conditions.



Features and benefits

- Manufactured from specially reformulated, recycled material
- Suitable for both soakaway and attenuation applications
- Suitable for use in areas subject to regular traffic loading, i.e. car parks
- Proven vertical loading capacity of: 45.6 tonnes/m²
- Proven lateral loading capacity of: 7 tonnes/m²
- Grey in colour, for ease of identification from other AquaCell units
- BBA approved – Certificate No 03/4018
- Ideal for all types of projects including major attenuation and infiltration schemes



AquaCell Prime

Maximum installation depths (to base units)

Typical soil type	Typical angle of shearing resistance (1) (2) (φ)	Maximum depth of installation – to base of units (m)			
		With groundwater at 1m below ground level and units wrapped in geomembrane		Without groundwater below base of units (normal case)	
		Trafficked areas (cars only) (3)	Non-trafficked areas	Trafficked areas (cars only) (3)	Non-trafficked areas
Stiff over-consolidated clay (e.g. London clay)	24°	1.60	1.78	1.73	1.98
Normally consolidated silty, sandy clay (e.g. alluvium, made ground)	26°	1.75	1.78	2.01	2.27
Loose sand and gravel	30°	1.95	2.08	2.58	2.86
Medium dense sand and gravel	34°	2.04	2.16	2.98	3.24
Dense sand and gravel	38°	2.04	2.24	3.45	3.70

(1) Loosening of dense sand or softening of clay by water can occur during installation. The designer should allow for any such likely effects when choosing an appropriate value of φ.

(2) The design is very sensitive to small changes in the assumed value of φ, therefore, it should be confirmed by a chartered geotechnical engineer. In clay soils, it may be possible to utilise cohesion in some cases.

(3) Applicable for car parks or other areas trafficked only by cars or occasional refuse collection trucks or similar vehicles (typically one per week).

Assumptions made are:

- ground surface is horizontal
- shear planes or other weaknesses are not present within the structure of the soil

Source: BBA

Product Details
AquaCell Eco

(USE ONLY IN NON-TRAFFICKED LOCATIONS)

Application

AquaCell Eco is manufactured from specially reformulated, recycled material and has been specifically designed for shallow, non-trafficked, landscaped applications. AquaCell Eco is **NOT** suitable for locations subject to high water tables.

AquaCell Eco is typically suitable for installations to a maximum depth of 1.5 metres, to the base of the units from ground level, with a minimum cover depth of 0.3 metres, (Wavin recommendation, is to allow a cover depth of 0.5 metres).

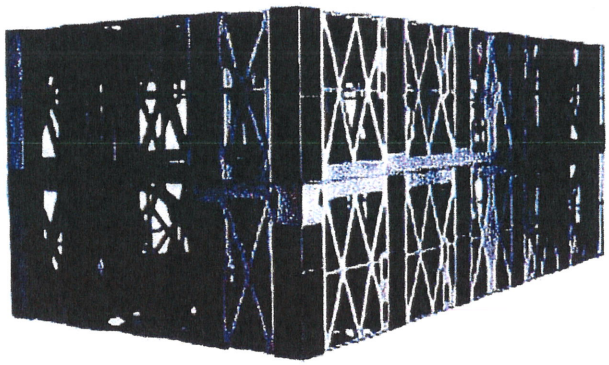
Any installation using AquaCell Eco must **NOT** be subjected to additional loading at any time. Trafficking by construction plant on site, including mechanical equipment, must be avoided.

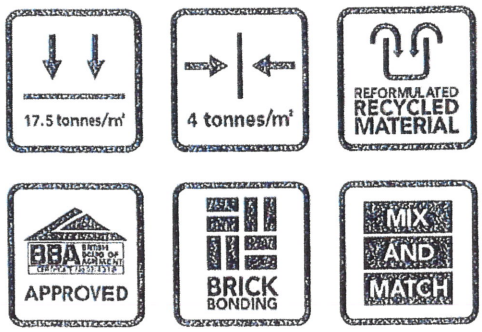
If trafficking of the buried tank by construction plant or, other vehicles is unavoidable, the installation should be constructed using AquaCell Core units (see page 8).

The width of an AquaCell Eco installation should not exceed 12 metres to allow for mechanical backfilling without loading. There is no limit to the length of the installation.

Features and benefits

- Manufactured from specially reformulated, recycled material
- Suitable for both soakaway and attenuation applications
- Proven vertical loading capacity of: 17.5 tonnes/m²
- Proven lateral loading capacity of: 4.0 tonnes/m²
- Integral "hand holds" for ease of carrying/handling
- Black in colour, for ease of identification from other AquaCell units
- BBA approved – Certificate No 03/4018





AquaCell Eco

Maximum installation depths (to base units) and minimum cover depths [1]

Typical soil type	Typical angle of shearing	Maximum depth of installation (m)	Minimum cover depth (m)
Stiff over-consolidated clay (e.g. London clay)	24°	0.95	0.30
Normally consolidated silty, sandy clay (e.g. alluvium, made ground)	26°	1.05	0.30
Loose sand and gravel	29°	1.2	0.30
Medium dense sand and gravel	33°	1.5	0.30
Dense sand and gravel	38°	1.9	0.30

(1) These values relate to installations where the groundwater is a minimum of one metre below the base of the excavation. AquaCell Eco units should not be used where groundwater is present.

Source: BBA

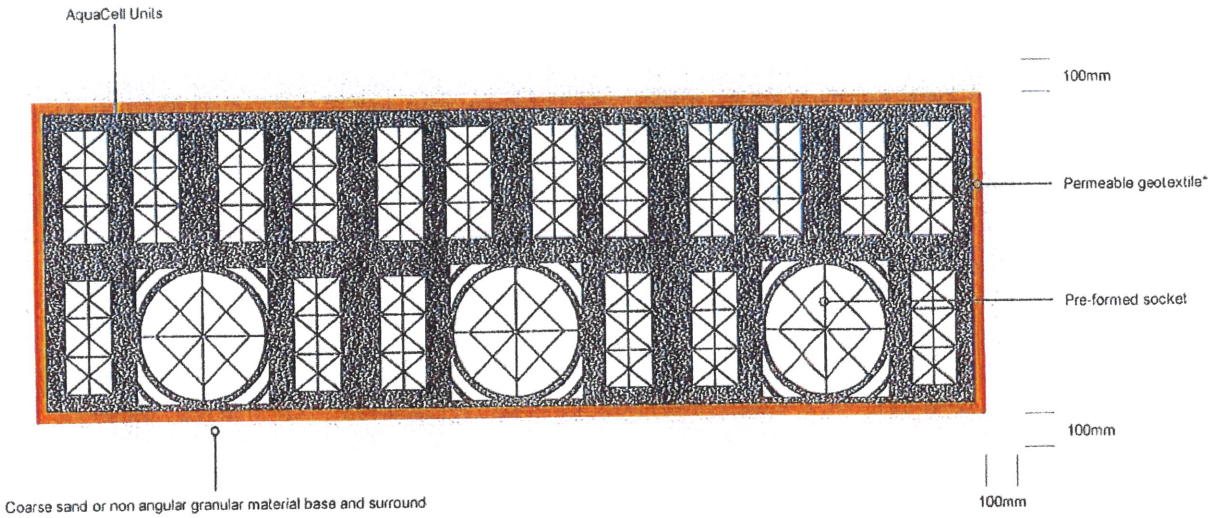
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Installation
AquaCell Units

Typical Soakaway Installation Method

Typical installation procedure

1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell units.
2. Lay 100mm bed of coarse sand or non angular granular material, level and compact.
3. Lay the geotextile* over the base and up the sides of the trench.
4. Lay the AquaCell units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below) – see page 12. For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
5. Fix the Adaptors to the AquaCell units as required and connect pipework.
6. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Domestic Silt Trap (6LB300) or the standard Silt Trap (6LB600) is installed prior to the inlet pipework – see page 17 for installation guidelines.
7. Wrap and overlap the geotextile covering the entire AquaCell structure.
8. Lay 100mm of coarse sand or non angular granular material between the trench walls and the AquaCell structure and compact.
9. Lay 100mm of coarse sand or non angular granular material over the geotextile and compact.
10. Backfill with suitable material.
11. Rainwater from roof areas may discharge directly into the soakaway but rainwater from carparks must discharge through a catchpit manhole and/or a petrol interceptor.



Example shows the use of AquaCell Eco. However, a soakaway can also be installed as shown using either of the other versions of AquaCell units (Prime, Core or Plus) as appropriate.

*The geotextile should be selected according to specific site conditions. Typically, however, a 300g non-woven material will be suitable. Specialist advice should be sought if surrounding soil characteristics exhibit a high degree of fines/low infiltration capacity and/or there is a high risk of damage from ground contaminants.

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Additional Soakaway Notes;-

1) Soakaways to be designed and constructed in accordance with the following documentation;-

BS EN 752 : Part 2	Drain & Sewer Systems outside Buildings
BRE Digest 365	Soakaway Design
CIRIA Report 156	Infiltration Drainage – Manual of Good Practice
Approved Doc H	Drainage & Waste Disposal.
Guidance Note 46	Surface Water Soakaway Design (LBC)

2) Soakaways should be located a minimum of 5 Metres from any buildings (including buildings located over the boundary line)

3) Soakaways should not be located within 2.5 Metres of a boundary or in an area of unstable land, in ground where the water table reaches the bottom of the soakaway at any time of the year, near any drainage field, drainage mound or other soak-away so that the overall soakage capacity of the ground is exceeded and the effectiveness of any drainage field impaired.

4) Soakaways have been designed to suit the investigated ground strata. If differing strata is uncovered during the works, the Engineer is to be informed in order to provide re-design if required.

5) Any soakaway depth indicated within the design package is measured from the underside of the discharge drain pipe (invert)

6) If used, granular material and rubble fill must be separated from the surrounding soil by a suitable geotextile to prevent migration of fines into the soakaway. The top surface of granular material and rubble fill should also be covered with geotextile to prevent the ingress of backfill material.

7) Any Aquacell products specified are to be installed in strict accordance with manufacturers requirements

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