Oak Lodge,
New Road,
Clondalkin
Dublin 22 D22 F516

Engineering Soakaway Design Calculations
Reg Ref SD21B/0530

scdconsulting.ie

SCD Consulting
Engineering & Management

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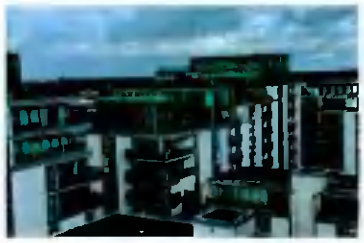
Report:	**Engineering Soakaway Design Calculations**
Project:	Proposed Development at Oak Lodge, New Road, Clondalkin, Dublin 22 D22 F516
Client:	Thomas & Hazel O'Reilly
Project No:	100-30 - **Additional Information** Planning Reg. Ref. D21B/0240
Date:	March 2022



March 2022

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Document Information: -

Proposed Development
Oak Lodge
New Road
Clondalkin
Dublin 22 D22 F516

Project No: - 100- 30 – Additional Information

Document Title: - Engineering Soakaway Design Calculations

Document History: -

ISSUE	DATE	DESCRIPTION	ORIG.	PM	ISSUE CHECK
P1	Mar 2022	Issued for Add. Information	SD	SCD/PH	-

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Contents

Calculation Sheet

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Project No:	100-30	**Date**	MAR 22
Client	THOMAS & HAZEL REILLY	**Checked**	PH
Project	OAK LODGE, CLONDALKIN	**Pages**	1 of 3
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SOAKAWAY DESIGN CALCS

Output

SOAKAWAY PIT TESTS – DATED 5TH MARCH 2022.

EXCAVATE TRENCH 2.0m LONG x 0.6m WIDE x 1.5m DEEP

300x300x300 DEEP TEST HOLE BELOW 1.5m DEPTH

TEST NO 1: HOLE FILLED @ 10AM

75% – 25% DEPTH = 4 MINS

TIME TO EMPTY = 10 MINS

* SEE PHOTO RECORD APPENDIX 'A'

TEST NO 2: HOLE FILLED @ 10.30 AM

75% – 25% DEPTH = 6.5 MINS

TIME TO EMPTY = 15 MINS

TEST NO 3: HOLE FILLED @ 11.00AM

75% – 25% DEPTH = 7 MINS

EMPTY = 19 MINS

$\therefore T_1 = 4$ mins
$T_2 = 6.5$ mins
$T_3 = 7.0$ mins

$T_{MAX} = 7$ mins

ROOF & IMPERMEABLE AREA TO SOAKAWAY

ROOF AREA = $169m^2$

IMPERMEABLE = $41m^2$

TOTAL = $211m^2$.

RETURN PERIOD = 30 YEARS

FROM MET OFFICE RAINFALL DATA (SEE APPENDIX B)

MS-60 = 17.0mm
MS-2DAY = 62.2mm

$\Rightarrow I = 17/62.2 = 0.273$

Calculation Sheet

SCD Consulting

ENGINEERS IRELAND

Project No:	100-30		
Client	THOMAS & HEMA REILLY	**Date**	MAR. 22
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SOAKAWAY DESIGN CALCS

Output

DESIGN IN ACCORDANCE WITH BRE DIGEST 365 (2016)

ALLOWANCE FOR CLIMATE CHANGE : 40%

REVISED $\Gamma = (0.273 \times 0.4) + 0.273 = 0.382$.

SOIL INFILTRATION RATE f

VP 75-25 $= 0.3 \times 0.3 \times (0.15) = 0.0135\ m^3$

$a_{s50} = (3 \times 0.15 \times 4) + (0.3 \times 0.3) = 0.27\ m^2$

t_{75-25} : 7 mins

$$\Rightarrow f = \frac{0.0135}{0.27 \times 7 \times 60}$$

$$= 11.90 \times 10^{-5}\ m/sec$$

INFLOW TO SOAKAWAY (L) $= L = A \times R$

$= 211 \times 0.0158 = 3.33\ m^3$

OUTFLOW FROM SOAKAWAY (O)

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

$\therefore a_{s50} = 2(2.5+W) \times 0.4 \div 2$

$= 1 + 0.4W\ m^2$

$f = 11.90 \times 10^{-5}\ m/s$

$\therefore O = (1 + 0.4W) \times 11.90 \times 10^{-5} \times (D \times 60)$ m3

SOAKAWAY STORAGE VOLUME (S) REQD

$= 2.5 \times 0.4 \times W \times 0.95 = 0.95W\ m^3$

$\therefore$ FOR M10-10 $I - O = S$

$$\Rightarrow 3.33 - (1 + 0.4W) \times 11.90 \times 10^{-5} \times (10 \times 60) = 0.95W$$

* NOTE SHED ROOF WATER TO PERMEABLE PAVING AT CAR PARKING AREA

FOR M10-10
= 113mm
= 0.0113m
40% CC
⇒ 158mm
= 0.0158m

D = STORM DURATION

ASSUME SOAKAWAY DIMS
2.5m WIDE
× 0.5m
EFFECTIVE STORAGE

PROPOSED SOAKAWAY SYSTEM
LAVIN AQUACELL ECO 1.0m × 0.5m × 0.4m DEEP
95% VOID
Ref no

M10-10

Calculation Sheet

SCD Consulting

ENGINEERS IRELAND

Project No:	100-30		
Client	TOM & HAZEL REILLY	**Date**	MAR 22
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SOAKAWAY DESIGN Cont'd

Output

REQUIRED SOAKAWAY WIDTH = 3.22m

FOR 5720m² DRAINED M10-15

REQUIRED W = 3.85m

FOR M10-30 W = 4.62m

FOR M10-60 W = 4.3m.

FOR M10-120 W = 5.60m

FOR 1 HOUR EVENT
SOAKAWAY 2.5m x 0.4m x 4.5m
WALL
SURFACE

USE SOAKAWAY 2.5m LONG x 4.5m WIDE
x 0.4m EFFECTIVE
DEPTH

TIME TO HALF EMPTY t_{50}

$= 5 \times 0.5 / a_{50} \times f$

$= \left(0.95 \times 4.5\right) \times 0.5 \Big/ \left(1.64 \times 4.5\right) \times 11.90 \times 10^{-5} \times 3600$

$= 2.0425 / 1.165$

1.75 HOURS

OK.

15
L = 13.2 x 0.4 + 13.2
= 18.62mm
= 3.929m³

30
L = (16.9 x 0.4) + 16.9
= 23.66mm
= 4.992m³

60
L = (21.5 x 0.4) + 21.5
= 30.1mm
= 6.351m³

120
L = (27.4 x 0.4) + 27.4
= 38.36mm
= 8.094m³

240
L = (34 x 0.4) + 34
= 47.72mm
L = 10.28m³

Appendices

Appendix A

(Percolation test procedure and Photos)

Trial Hole No 1. Results – 9th March 2022

0.0m - 0.3m	Brown silty topsoil with tree and vegetation roots
0.3m – 0.8m	Firm brown/grey mottled gravelly clay with angular/sub angular limestone cobbles and some boulders
0.8m – 1.5m	Very stiff brown gravelly clay with sub angular limestone cobbles and boulders

Trial Hole No 1- Excavated

Trial Hole No 1 – Soil Profile

Trial Hole No 1 - Water test for seepage

Trial Hole No 1 – Water empty 300mm in 19 mins

Soakpit No 1 Test Hole – Location

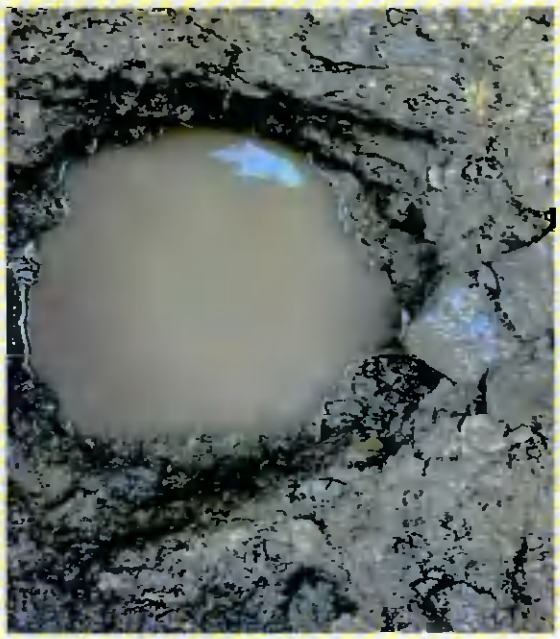
SoakPit Test Hole No 1 – Excavated to 1.5m deep

Soakpit No 1 Test Hole – Soil Profile

Soakpit Test Hole 2 (Test Zone)

Test No 1 Pit 300 x 300 x 300 deep

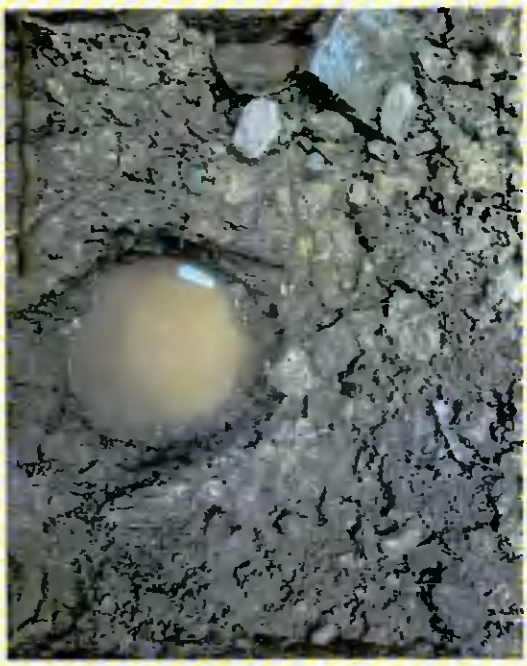
Test No 1 75% Level 10:04



Test No 1 25% Level 10:08

Test Hole No 1 Empty 10:14

Test No 2 75% Level 10:34



Test No 2 25% 10:40+

Test No 2 Empty 1 10:45

Test No 3 75% Level 11:04

Test No 3 25% Level 11:11

Test No 3 Empty 11:19

Appendix B

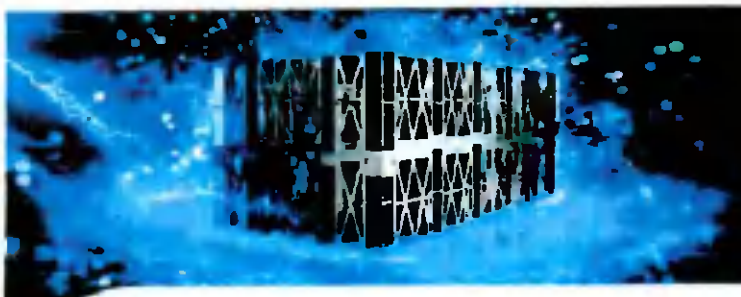
(Design data)

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 307199, Northing: 231026,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.5,	4.1,	5.1,	5.8,	6.3,	8.1,	10.2,	11.6,	13.6,	15.5,	16.9,	19.2,	21.0,	22.4,	N/A ,
10 mins	3.3,	4.9,	5.8,	7.1,	8.1,	8.8,	11.3,	14.2,	16.2,	19.0,	21.6,	23.6,	26.7,	29.2,	31.3,	N/A ,
15 mins	3.9,	5.7,	6.8,	8.4,	9.5,	10.4,	13.3,	16.7,	19.0,	22.3,	25.4,	27.7,	31.4,	34.3,	36.8,	N/A ,
30 mins	5.1,	7.5,	8.8,	10.8,	12.2,	13.3,	16.9,	21.1,	24.0,	28.0,	31.7,	34.5,	39.0,	42.5,	45.5,	N/A ,
1 hours	6.7,	9.7,	11.4,	13.9,	15.7,	17.0,	21.5,	26.7,	30.2,	35.1,	39.6,	43.0,	48.4,	52.7,	56.2,	N/A ,
2 hours	8.8,	12.7,	14.8,	18.0,	20.1,	21.8,	27.4,	33.8,	38.0,	44.0,	49.4,	53.6,	60.1,	65.2,	69.5,	N/A ,
3 hours	10.4,	14.8,	17.2,	20.8,	23.3,	25.2,	31.5,	38.7,	43.5,	50.3,	56.3,	61.0,	68.3,	73.9,	78.6,	N/A ,
4 hours	11.7,	16.5,	19.2,	23.1,	25.8,	27.9,	34.8,	42.7,	47.9,	55.2,	61.7,	66.8,	74.7,	80.8,	85.9,	N/A ,
6 hours	13.7,	19.3,	22.3,	26.9,	29.9,	32.3,	40.1,	48.9,	54.8,	63.0,	70.3,	76.0,	84.7,	91.5,	97.2,	N/A ,
9 hours	16.1,	22.5,	26.0,	31.2,	34.6,	37.3,	46.2,	56.1,	62.7,	71.9,	80.1,	86.4,	96.2,	103.7,	110.0,	N/A ,
12 hours	18.0,	25.2,	28.9,	34.6,	38.4,	41.4,	51.0,	61.9,	69.0,	79.0,	87.8,	94.7,	105.2,	113.4,	120.1,	N/A ,
18 hours	21.2,	29.4,	33.7,	40.2,	44.5,	47.8,	58.7,	70.9,	78.9,	90.1,	100.0,	107.7,	119.4,	128.5,	136.0,	N/A ,
24 hours	23.8,	32.8,	37.5,	44.6,	49.4,	53.0,	64.9,	78.2,	86.9,	99.0,	109.7,	118.0,	130.6,	140.4,	148.5,	176.5,
2 days	29.8,	40.0,	45.3,	53.1,	58.2,	62.2,	74.9,	88.9,	97.9,	110.4,	121.3,	129.7,	142.4,	152.2,	160.2,	187.8,
3 days	34.6,	45.7,	51.5,	59.9,	65.4,	69.6,	83.0,	97.6,	107.0,	119.9,	131.2,	139.7,	152.7,	162.6,	170.7,	198.6,
4 days	38.8,	50.8,	56.9,	65.8,	71.6,	76.0,	90.0,	105.3,	115.0,	128.3,	139.8,	148.6,	161.8,	171.9,	180.2,	208.3,
6 days	46.2,	59.6,	66.3,	76.0,	82.3,	87.1,	102.2,	118.5,	128.9,	142.8,	154.9,	164.0,	177.8,	188.2,	196.7,	225.6,
8 days	52.7,	67.3,	74.5,	85.0,	91.7,	96.8,	112.8,	129.9,	140.7,	155.4,	167.9,	177.4,	191.6,	202.4,	211.1,	240.7,
10 days	58.7,	74.3,	82.0,	93.1,	100.2,	105.6,	122.4,	140.3,	151.5,	166.7,	179.7,	189.5,	204.2,	215.2,	224.2,	254.5,
12 days	64.3,	80.8,	89.0,	100.6,	108.1,	113.7,	131.3,	149.8,	161.4,	177.1,	190.5,	200.6,	215.7,	227.0,	236.2,	267.1,
16 days	74.7,	92.8,	101.8,	114.4,	122.5,	128.5,	147.4,	167.2,	179.5,	196.1,	210.2,	220.8,	236.5,	248.3,	257.9,	290.0,
20 days	84.3,	103.9,	113.5,	127.0,	135.6,	142.1,	162.0,	182.9,	195.9,	213.2,	228.0,	239.0,	255.3,	267.6,	277.5,	310.6,
25 days	95.6,	116.8,	127.1,	141.6,	150.8,	157.7,	178.9,	200.9,	214.6,	232.9,	248.3,	259.8,	276.8,	289.6,	299.9,	334.1,

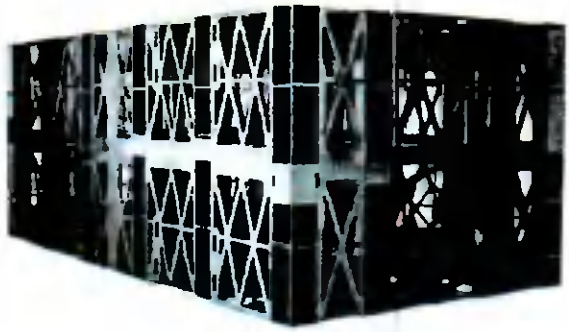
NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

r VALUE = $17.0/62.2 = 0.273$



PRODUCT INFORMATION SHEET

AquaCell Eco



Description

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.

Technical specification

Cat code	6LB025	**Void ratio**	95%
Colour	Black	**Material**	Recycled PP
Dimensions	1m x 0.5m x 0.4m	**Vertical loading**	21.3 tonnes/m² (213 kN/m²)
Weight	7kg	**Lateral loading**	5.2 tonnes/m² (52 kN/m²)
Storage volume	190 litres	**BBA approval**	Certificate 03/4018

Maximum installation depths

	Maximum depth of installation – to base of units (m)[1]		
Typical soil type	**Soil weight kN/m³**	**Angle of internal friction Φ (degrees)[2,3]**	**Landscaped areas**
Over consolidated stiff clay	20	24	1.53
Silty sandy clay	19	26	1.68
Loose sand and gravel	18	30	2.08
Medium dense sand and gravel	19	34	2.35
Dense sand and gravel	20	38	2.68

Minimum cover depths

	Landscaped areas
Minimum cover depth (m)	0.30[3]

1. These values relate to installations where the groundwater is a minimum of one metre below the base of the excavation
2. AquaCell Eco units should not be used where groundwater is present
3. 0.5m cover is required where a ride-on mower may be used

Assumptions made:
- Ground surface is horizontal
- Shear planes or other weaknesses are not present within the structure of the soil

Source: BBA

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