Traynor Environmental Ltd.

Belturbet Business Park,
Creeny,
Belturbet,
Co. Cavan.

Tel: 049 9522236
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21/712B TE

30th September 2021

Brian Dunne
c/o McCrae Consulting Engineers
Rear 6B Arbourfield Terrace,
Dundrum Business Park,
Dublin 14,
D14 F5C6

Re: Soakaway design as per BRE 365 for 263m² impermeable area for Brian Dunne, Lynbrook Whitechurch Rd, Rathfarnham, Dublin 16, Site B.

We have designed per BRE Digest 365 based on the total impermeable area as supplied and Met Eireann's Extreme Rainfall Return Periods for Lynbrook, Whitechurch Rd, Rathfarnham, Dublin 16.

Site Information Supplied as part of the layout provided By McCrae Consulting Engineers

House Area -263 m²

Rainfall Information as Per Met Eireann (30 Year Rainfall Returns)

Storm dur.	*Area*	*Rainfall*	*20% Allowance for Climate Change*
mins.	*m²*	*mm.*	*mm.*
5	*263*	*13.0*	*15.6*
10	*263*	*18.1*	*21.72*
30	*263*	*27.1*	*32.52*
60	*263*	*34.6*	*41.52*

Void Ratio

The void ratio for the trench fill was set at 95% (0.95) to accommodate the use of Cellular Storage.

The safety factor was taken as 1.

Soil infiltration rate

Tests carried out at 1.00m below ground level.

Calculated as per BRE365 = 1.62* 10^{-5} m/sec

The total impermeable area is c. 263m² and the runoff co-efficient is set at 1.0 as per BRE365.

Inflow From	
Total Impermeable Area: 263sq m @ runoff coefficient 1.0	*= 15.03cu m*
Total Inflow 263sq m	*= 15.03cu m*

Outflow from Soakaway in model storm	
Internal Surface area to 50% effective depth of Cellular Storage	*7.80 sq m*
Soil Infiltration Rate	*0.0000162m/s*
Storm duration in seconds	*= 3600s*
Total Outflow (9.00 x 0.0000162 x 3600)	*0.524 cu. m*

Storage Required in Cellular Storage (Inflow – Outflow)	*= 14.589 m³*
Capacity of Pit Required	*= 15.26m³*
Capacity of Pit	*= 15.6m³*

The Cellular Storage will have the following dimensions

13m long, 0.6m deep x 2.00m wide (15.6m³)

Traynor Environmental Ltd – BRE Digest 365 Calculations

Infiltration Rate	
Test Hole Dimension	
Length (l)	*1.40m*
Width (m)	*0.60m*
Depth (m)	*1.00m*
Drop Time (mins)	*216*

Soil Infiltration Rate. $f = V_{p75-25} / a_{p50} \times t_{p75-25}$

Where

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and including the base area;

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth

$V_{p75-25} = 1.40 \times 0.60 \times (0.75 - 0.25) = 0.42m^3$

$na_{p50} = (1.40 \times 0.50 \times 2) + (0.6 \times 0.5 \times 2) = 2.00m^2$

$$f = \frac{0.42}{2.00 \times 216 \times 60} = 1.62^{-5} m/s$$

Inflow and Outflow	
Impermeable Area	263m²
Rainfall (Depth)	41.52
Cellular Storage (Length)	13.00
Cellular Storage (Width)	2.00
Cellular Storage (depth)	0.60
Storm Duration (mm)	60

Inflow to Soakaway Area I:

I = A x R

= impermeable surface area x M60-D min rainfall

M60 – 60min Storm Duration, M60-D = 41.52mm = 0.04152m

Inflow = 263m² x 0.04152 = 15.03m²

A_{50} = (13.00 x 0.30 x 2) + (2.00 x 0.30 x 2) = 9.00m²

Outflow From Soakaway O:

O = a_s50 x f x D = Internal surface area of soakaway pit to 50% storage depth (excluding base area) x soil percolation rate x storm duration.

Outflow = 9.00 x 0.0000162 x 3600 = 0.524m³

Volume Required	
Void (Ratio)	0.95

Soakaway Storage Volume S

= effective storage volume of soakaway with 95% free volume

Storage = 15.03m² – 0.524= 14.506 m³

Volume = $\frac{14.506}{0.95}$ = **15.26m³**

Figure 1: Site Layout Lynbrook, Whitechurch Rd, Rathfarnham, Dublin 16 showing Location of Tested Area

NB:
During the design process, a Silt Trap **must** be incorporated into any drains discharging into the soakaway system.

NB:

Any paved surface runoff or runoff from a car-parking area **must** pass through an oil interceptor/hydrocarbon retention geotextile before discharge to the soakaway if applicable.

NB:

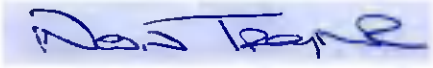
All elements of the soakaway **must** be maintained by suitably qualified professionals *i.e. Silt traps must be regularly cleaned.*

NB:

Please note that all relevant aspects of BRE365 **must** be taken into account in the design and installation of this soakaway system e.g. minimum separation distance of 5m from building foundations and from soil polishing filter for domestic wastewater.

Should you have any queries on this, do not hesitate to contact me.

Yours sincerely



Nevin Traynor

BSc. Env, H.Dip I.T, Cert SHWW, EPA/FAS Cert.

For **Traynor Environmental Ltd**

Encl – Appendices A - D

SOAKAWAY TESTING TO BRE DIGEST 365

COMPLETED BY

TRAYNOR ENVIRONMENTAL LTD

APPENDIX A – SITE PHOTOGRAPHS

Traynor Environmental Ltd.

Photographs From the Soakaway Test No. 1

Surface View Of Soakaway Test Hole No 1	*Soakaway Test Hole Prior To Test*
	
Soakaway Been Filled	*Soil Removed from Soak Pit*
	
Soakaway Under Test	*Soakaway Complete*
	

SOAKAWAY TESTING TO BRE DIGEST 365
COMPLETED BY
TRAYNOR ENVIRONMENTAL LTD
APPENDIX B – TRIAL PIT LOG

Trial Pit Number TP 1	Traynor Environmental Ltd Unit 6, Belturbet Business Park Creeny Belturbet Co. Cavan	Sheet 1 of 1

Project	**Client**
Proposed Development Site at Lynbrook, Whitechurch Rd, Rathfarnham, Dublin 16	*Brian Dunne*

Method	**Ground Level**	**Start Date**
3 ton digger		*24.08.21*

Description	Legend	Reduced Level	Depth	Installation Backfill	Sample Test		Notes
Silt/Clay, Crumb Nature, Low Density Brown Colour			*0.00m - 0.30m*				
Clay intermixed with stone Blocky Nature, Medium Density Grey Colour			*0.30- 0.80m*				
Gravel intermixed with stone Crumb Nature, Medium Density Grey Colour			*0.80m- 1.10m*				
Winter Water Table			*1.10m- 1.30m*				
Groundwater Table			*1.30m- 2.10m*				

Trial Pit Completed at 2.1m BGL.

Remarks:
Bedrock None Encountered
Winter Water Table: 1.10mBGL
Groundwater Table:1.30m BGL
Average soakage characteristics of the subsoil.

Pit Dimensions
Depth: 3.10m
Length: 3.0m
Width: 1.60m
Orientation of Long Side: 000 Degrees

Photo

SOAKAWAY TESTING TO BRE DIGEST 365

COMPLETED BY

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APPENDIX B – MET EIREANN RAINFALL RETURN PERIODS

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 314707, Northing: 225697,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.7,	4.0,	4.7,	5.8,	6.6,	7.2,	9.1,	11.4,	13.0,	15.2,	17.2,	18.7,	21.2,	23.1,	24.7,	N/A ,
10 mins	3.8,	5.6,	6.6,	8.1,	9.2,	10.0,	12.7,	15.9,	18.1,	21.2,	23.9,	26.1,	29.5,	32.2,	34.4,	N/A ,
15 mins	4.5,	6.6,	7.8,	9.5,	10.8,	11.8,	15.0,	18.7,	21.3,	24.9,	28.2,	30.7,	34.7,	37.9,	40.5,	N/A ,
30 mins	5.9,	8.6,	10.1,	12.4,	13.9,	15.2,	19.2,	24.0,	27.1,	31.6,	35.7,	38.9,	43.8,	47.7,	51.0,	N/A ,
1 hours	7.8,	11.2,	13.1,	16.0,	18.0,	19.6,	24.7,	30.6,	34.6,	40.2,	45.2,	49.2,	55.3,	60.1,	64.1,	N/A ,
2 hours	10.2,	14.7,	17.1,	20.8,	23.3,	25.3,	31.7,	39.1,	44.1,	51.1,	57.4,	62.2,	69.8,	75.7,	80.7,	N/A ,
3 hours	12.0,	17.2,	20.0,	24.2,	27.1,	29.3,	36.7,	45.2,	50.8,	58.8,	65.9,	71.4,	80.0,	86.7,	92.3,	N/A ,
4 hours	13.5,	19.2,	22.3,	27.0,	30.1,	32.6,	40.8,	50.0,	56.2,	64.9,	72.7,	78.8,	88.1,	95.4,	101.5,	N/A ,
6 hours	15.8,	22.4,	26.0,	31.4,	35.0,	37.9,	47.2,	57.8,	64.8,	74.7,	83.5,	90.4,	101.0,	109.3,	116.1,	N/A ,
9 hours	18.6,	26.2,	30.3,	36.5,	40.7,	44.0,	54.6,	66.7,	74.7,	86.0,	96.0,	103.8,	115.8,	125.1,	132.8,	N/A ,
12 hours	20.8,	29.3,	33.9,	40.7,	45.3,	48.9,	60.6,	73.9,	82.7,	95.0,	105.9,	114.4,	127.5,	137.7,	146.1,	N/A ,
18 hours	24.5,	34.3,	39.5,	47.4,	52.7,	56.8,	70.2,	85.3,	95.3,	109.3,	121.7,	131.4,	146.2,	157.7,	167.2,	N/A ,
24 hours	27.4,	38.3,	44.1,	52.8,	58.6,	63.1,	77.9,	94.5,	105.4,	120.8,	134.4,	144.9,	161.0,	173.6,	183.9,	220.2,
2 days	34.6,	47.1,	53.6,	63.3,	69.7,	74.7,	90.7,	108.5,	120.1,	136.1,	150.2,	161.1,	177.6,	190.4,	200.9,	237.3,
3 days	40.4,	54.1,	61.3,	71.8,	78.8,	84.1,	101.2,	120.0,	132.1,	148.9,	163.6,	174.8,	191.9,	205.0,	215.7,	252.8,
4 days	45.4,	60.3,	68.0,	79.2,	86.6,	92.3,	110.3,	130.0,	142.6,	160.1,	175.3,	186.9,	204.5,	217.9,	228.9,	266.7,
6 days	54.4,	71.2,	79.7,	92.1,	100.3,	106.5,	126.1,	147.3,	160.9,	179.5,	195.7,	207.9,	226.4,	240.5,	252.0,	291.4,
8 days	62.3,	80.7,	90.0,	103.4,	112.2,	118.9,	139.9,	162.5,	176.9,	196.5,	213.4,	226.2,	245.6,	260.3,	272.2,	313.0,
10 days	69.6,	89.4,	99.4,	113.8,	123.1,	130.2,	152.4,	176.2,	191.3,	211.8,	229.4,	242.8,	262.9,	278.1,	290.5,	332.5,
12 days	76.5,	97.6,	108.2,	123.3,	133.2,	140.6,	163.9,	188.8,	204.6,	225.9,	244.2,	258.1,	278.8,	294.5,	307.3,	350.5,
16 days	89.2,	112.6,	124.3,	141.0,	151.7,	159.8,	185.1,	211.9,	228.8,	251.6,	271.1,	285.8,	307.8,	324.4,	337.8,	383.1,
20 days	101.0,	126.6,	139.2,	157.1,	168.7,	177.4,	204.4,	233.0,	250.9,	275.0,	295.5,	311.0,	334.0,	351.3,	365.4,	412.6,
25 days	114.9,	142.8,	156.5,	176.0,	188.4,	197.8,	226.8,	257.2,	276.2,	301.8,	323.5,	339.8,	364.1,	382.3,	397.0,	446.4,

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

SOAKAWAY TESTING TO BRE DIGEST 365
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APPENDIX C – MAPS USED AS PART OF THE DESK STUDY

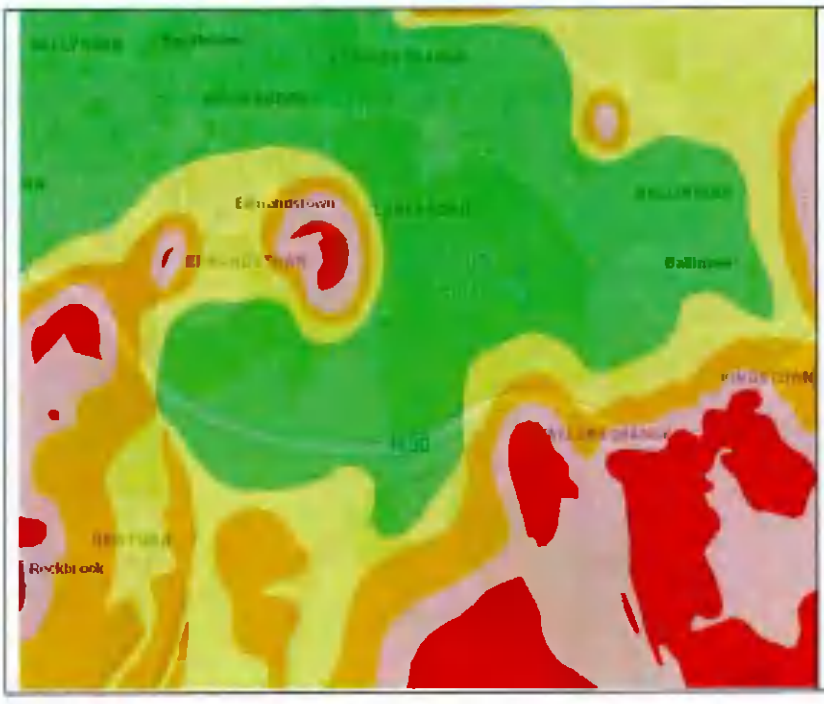
Traynor Environmental Ltd.

Maps Used As Part of the EPA Site Suitability Assessment

Groundwater/Aquifer Map

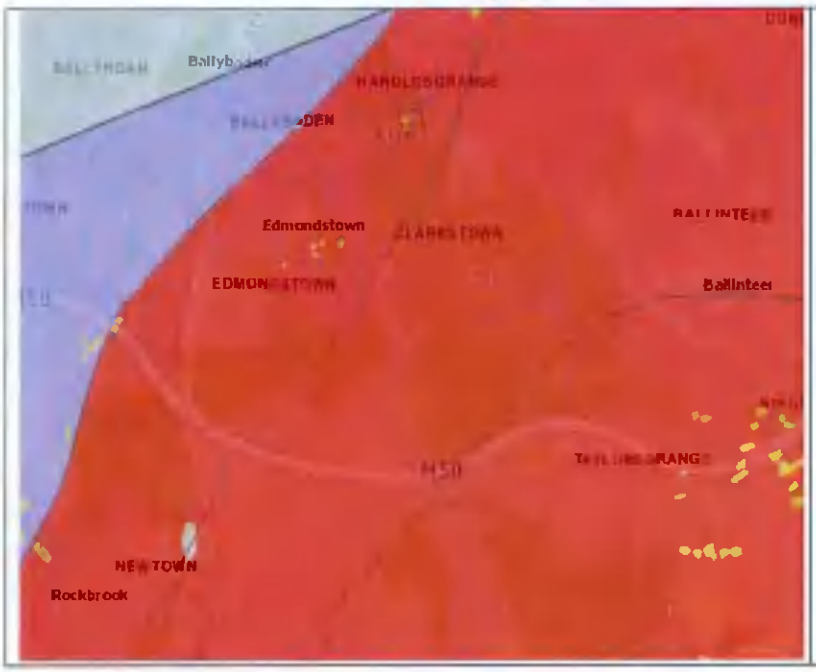
From the GSI Groundwater Aquifer Map Site is classified as Pl– Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones

Vulnerability Map



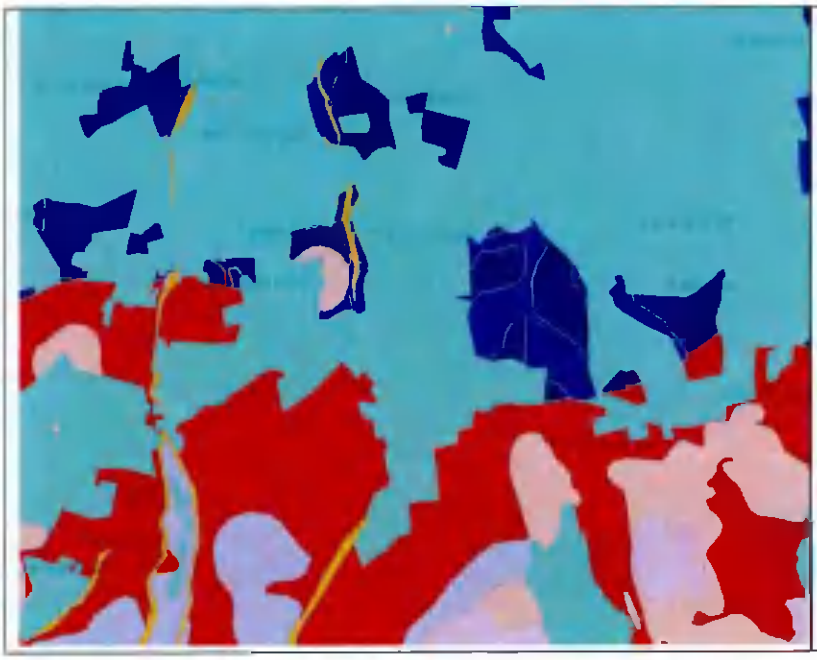
From the GSI Vulnerability Map Site is classified as Low

Bedrock Map



From the GSI Bedrock Map the Site is classified as GII- Granites & other Igneous Intrusive rocks

Teagasc Subsoil Map



From the GSI Teagasc Subsoil Map Site is classified as Fine loamy drift with siliceous stones

SOAKAWAY TESTING TO BRE DIGEST 365

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APPENDIX D – INSURANCE

Traynor Environmental Ltd.

Griffiths & Armour Europe DAC
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griffithsandarmour.com

Griffiths & Armour

PROFESSIONAL INDEMNITY INSURANCE

We confirm the following details relating to our client's Professional Indemnity Insurance:

Insured:	Traynor Environmental Ltd
Address:	Belturbet Business Park Creeny Belturbet Co. Cavan H14AY94
Lead Insurer(s):	Axis Specialty Europe SE
Period of Insurance:	12 July 2021 to 11 July 2022
Policy Number:	20/1/04786
Limit of Indemnity:	€1,500,000 any one claim and unlimited in the period of insurance

Signed:

Graeme Tinney
Chief Executive Officer
Griffiths & Armour Europe DAC

Date: **22 June 2021**

The policy is subject to the insuring agreements, exceptions, exclusions, limitations, conditions and declarations contained therein. The above is accurate at the date of signature. No obligation is imposed herein on the signatory to advise of any alteration.

Permeable Paving Design

CLIENT:	Brian Dunne, Lynbrook ,Whitechurch Rd, Rathfarnham, Dublin 16
ATCE JOB NO.:	Traynor Env
JOB DESCRIPTION:	Proposed Development at Lynbrook ,Whitechurch Rd, Rathfarnham, Dublin 16
Paving Design	Overall

Input Data

Impermeable Area to be drained	**Ai**		m2		Soil permeability	2.01E-05	m/s
Permeable area to be drained	**Ap**	485	m2		Factor of Safety	3	
Ratio of 60min-2day M5 - r	**r**	0.4			Stone Void Ratio	0.300	

	M10-5min	M10-10min	M10-15min	M10-30min	M10-60min
Design Rainfall-R (mm)	15.6	21.7	25.6	32.5	41.5
Storage depth (mm)	52	72	85	108	137

TRAYNOR ENVIRONMENTAL LTD

EPA SEWAGE LOADING SIZING CHART - Nicola Lynch & Brian Dunne & Ciara Lynch & Richard O'Farrell

Situation	Source	Litres/day Person	BOD5 g/d Person	PE Organic Loading	Number of Persons	Population (Organic)	Hydraulic Loading (Lit)	Organic Loading (gr)	Pupulation (Hydraulic)
Domestic	Normal Resident	150	60	1.00	6	6	900	360	6.00
Industrial	Office and/or factory without canteen	30	20	0.33		0	0	0	0.00
	Office and/or factory with canteen	60.0	30.0	0.5		0	0	0	0.00
	Open Industrial Site e.g. Quarry	40.0	25.0	0.4		0	0	0	0.00
School	Non- residential with cooking on-site Students	60.0	30.0	0.5		0	0	0	0.00
6hr Shock	Non-residential with no-cooking on site	35	20	0.33		0	0	0	0.00
Football clubs	Players incl. showers	30	20	0.33		0	0	0	0.00
	Spectators - Toilet blocks	8	10	0.17		0	0	0	0.00
Amenity Sites	Restuarants	15	15	0.25		0	0	0	0.00
	Function rooms	10	10	0.17		0	0	0	0.00
	Toilet blocks (per use)	8	10	0.17		0	0	0	0.00
	Toilet blocks (long stay car parks)	10	15	0.25		0	0	0	0.00
	Golf clubs	25	15	0.25		0	0	0	0.00
	Squash, with club house	25	15	0.25		0	0	0	0.00
	Swimming	10	10	0.17		0	0	0	0.00
						6	900	360	6.00

Loadings	
Population Org	***6.00PE***
Hydraulically	***6.00PE***

Treatment System Proposed: O'Reilly Oakstown Treatment System, Sand Filter & Gravel Base