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

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

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**Re: Soakaway design as per BRE 365 for 263m<sup>2</sup> impermeable area for Brian Dunne, Lynbrook  
Whitechurch Rd, Rathfarnham, Dublin 16, Site A.**

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 m<sup>2</sup>**

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

Storm dur.	Area	Rainfall	20% Allowance for Climate Change
mins.	m <sup>2</sup>	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 =  $2.40 * 10^{-5}$  m/sec

The total impermeable area is c. 263m<sup>2</sup> 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	8.25 sq m
Soil Infiltration Rate	0.0000240m/s
Storm duration in seconds	= 3600s
Total Outflow (6.40 x 0.0000222 x 3600)	0.511 cu. m

Storage Required in Cellular Storage (Inflow – Outflow)	= 14.486 m <sup>3</sup>
Capacity of Pit Required	= 15.25m <sup>3</sup>
Capacity of Pit Required	= 16.50m <sup>3</sup>

The Cellular Storage will have the following dimensions  
 5.5m long, 0.6m deep x 5.0m wide (16.50m<sup>3</sup>)

#### Traynor Environmental Ltd – BRE Digest 365 Calculations

<b>Infiltration Rate</b>	
<b>Test Hole Dimension</b>	
Length (l)	1.10m
Width (m)	0.60m
Depth (m)	1.00m
Drop Time (mins)	130

$$\text{Soil Infiltration Rate, } f = V_{p75-25} / \alpha_{p50} \times t_{p75-25}$$

**Where**

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

$\alpha_{p50}$  = 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

$$V_{p75-25} = 1.10 \times 0.60 \times (0.750 - 0.250) = 0.330\text{m}^3$$

$$\alpha_{p50} = (1.10 \times 0.50 \times 2) + (0.6 \times 0.50 \times 2) = 1.70\text{m}^2$$

$$f = \frac{0.330}{1.70 \times 130 \times 60} = 2.40^{-5}\text{m/s}$$

$$1.70 \times 130 \times 60 = 2.40^{-5}\text{m/s}$$



Inflow and Outflow	
Impermeable Area	263m <sup>2</sup>
Rainfall (Depth)	41.52
Cellular Storage (Length)	5.50
Cellular Storage (Width)	5.0
Cellular Storage (depth)	0.60
Storm Duration (mm)	60

**Inflow to Soakaway Area I:**

$$I = A \times R$$

= impermeable surface area x M60-D min rainfall

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

$$\text{Inflow} = 263\text{m}^2 \times 0.04152 = 15.03\text{m}^2$$

$$A_{50} = (5.50 \times 0.30 \times 2) + (5.00 \times 0.30 \times 2) = 6.30\text{m}^2$$

**Outflow From Soakaway O:**

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

$$\text{Outflow} = 6.30 \times 0.0000240 \times 3600 = 0.544\text{m}^3$$

Volume Required	
Void (Ratio)	0.95

**Soakaway Storage Volume**

= effective storage volume of soakaway with 95% free volume

$$\text{Storage} = 15.03\text{m}^2 - 0.544 = 14.486 \text{ m}^3$$

$$\text{Volume} = \frac{14.486}{0.95} = 15.25\text{m}^3$$

0.95

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:**

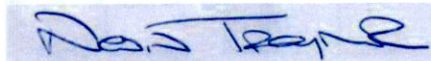
All elements of the soakaway **must** be maintained by suitably qualified professionals *i.e. Silt traps must be regularly cleaned.*

**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

A handwritten signature in blue ink, appearing to read 'Nevin Traynor', is placed on a light blue rectangular background.

Nevin Traynor

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

For **Traynor Environmental Ltd**

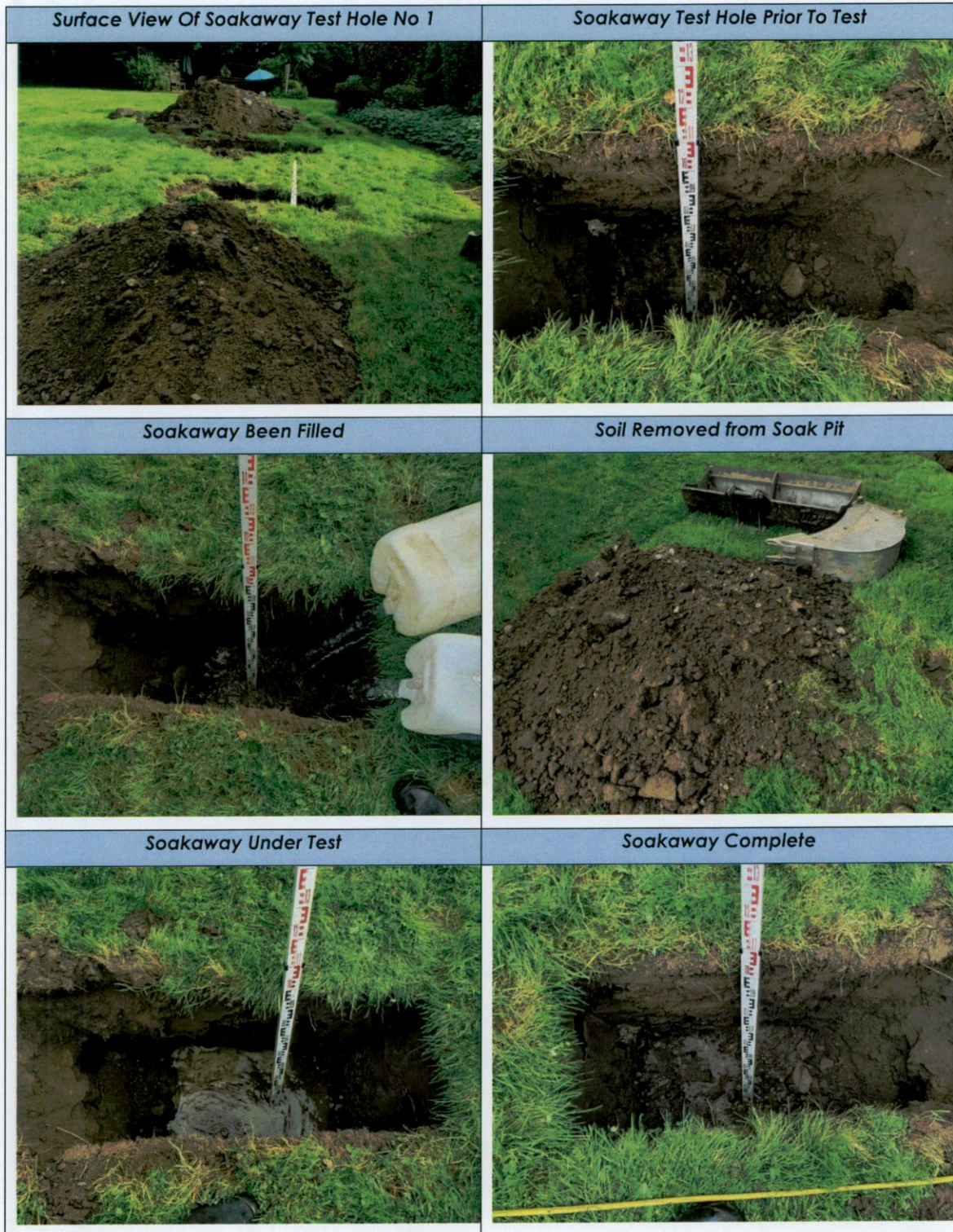
**Encl – Appendices A - D**



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APPENDIX A – SITE PHOTOGRAPHS








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APPENDIX B – TRIAL PIT LOG



<p align="center"><b>Trial Pit Number TP 1</b></p>	<p align="center"><b>Traynor Environmental Ltd Unit 6, Belturbet Business Park Creeny Belturbet Co. Cavan</b></p>		<p align="center"><b>Sheet 1 of 1</b></p>				
<p><b>Project</b> <i>Proposed Development Site at Lynbrook, Whitechurch Rd, Rathfarnham, Dublin 16</i></p>			<p><b>Client</b> <i>Brian Dunne</i></p>				
<p><b>Method</b> 3 ton digger</p>	<p><b>Ground Level</b></p>		<p><b>Start Date</b> 24.08.21</p>				
Description	Legend	Reduced Level	Depth	Installation Backfill	Sample Test		Notes
<p><i>Silt/Clay, Crumb Nature, Low Density Brown Colour</i></p>			<p align="center"><i>0.00m - 0.30m</i></p>				
<p><i>Clay intermixed with stone Blocky Nature, Medium Density Grey Colour</i></p>			<p align="center"><i>0.30- 0.80m</i></p>				
<p><i>Gravel intermixed with stone Crumb Nature, Medium Density Grey Colour</i></p>			<p align="center"><i>0.80m- 1.10m</i></p>				
<p><i>Winter Water Table</i></p>			<p align="center"><i>1.10m- 1.40m</i></p>				
<p><i>Groundwater Table</i></p>			<p align="center"><i>1.40m- 2.10m</i></p>				
<p>Trial Pit Completed at 2.1m BGL.</p>							
<p><b>Remarks:</b> <i>Bedrock None Encountered Winter Water Table: 1.10mBGL Groundwater Table:1.40m BGL Average soakage characteristics of the subsoil.</i></p>		<p><b>Pit Dimensions</b> Depth: 3.10m Length: 3.0m Width: 1.60m Orientation of Long Side: 000 Degrees</p>			<p><b>Photo</b></p> 		

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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,**

DURATION	Interval	Years													
		2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	6months, 1year	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	2.7, 4.0,	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	3.8, 5.6,	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	4.5, 6.6,	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 hour	5.9, 8.6,	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	7.8, 11.2,	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	10.2, 14.7,	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	12.0, 17.2,	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	13.5, 19.2,	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	15.8, 22.4,	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	18.6, 26.2,	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	20.8, 29.3,	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	24.5, 34.3,	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	27.4, 38.3,	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	34.6, 47.1,	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	40.4, 54.1,	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	45.4, 60.3,	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	54.4, 71.2,	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	62.3, 80.7,	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	69.6, 89.4,	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	76.5, 97.6,	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	89.2, 112.6,	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	101.0, 126.6,	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,
25 days	114.9, 142.8,														

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](http://www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf)

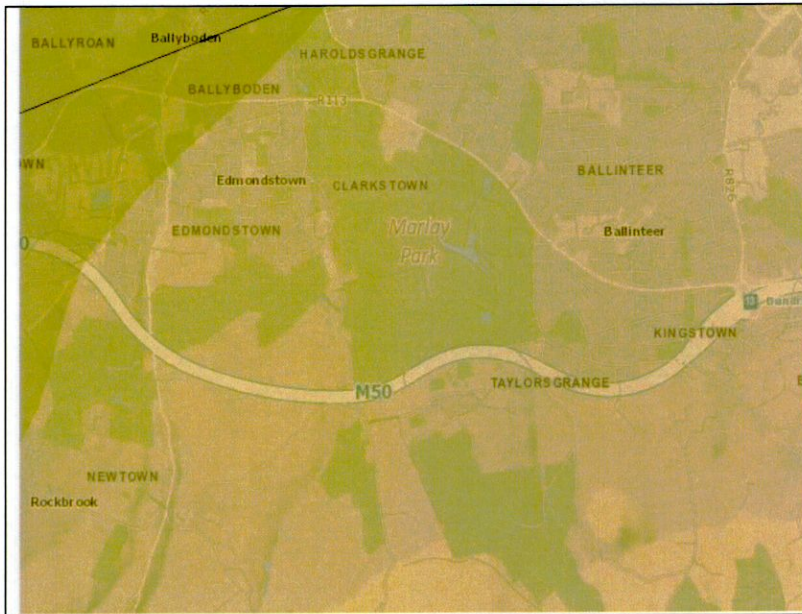
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APPENDIX C – MAPS USED AS PART OF THE DESK STUDY



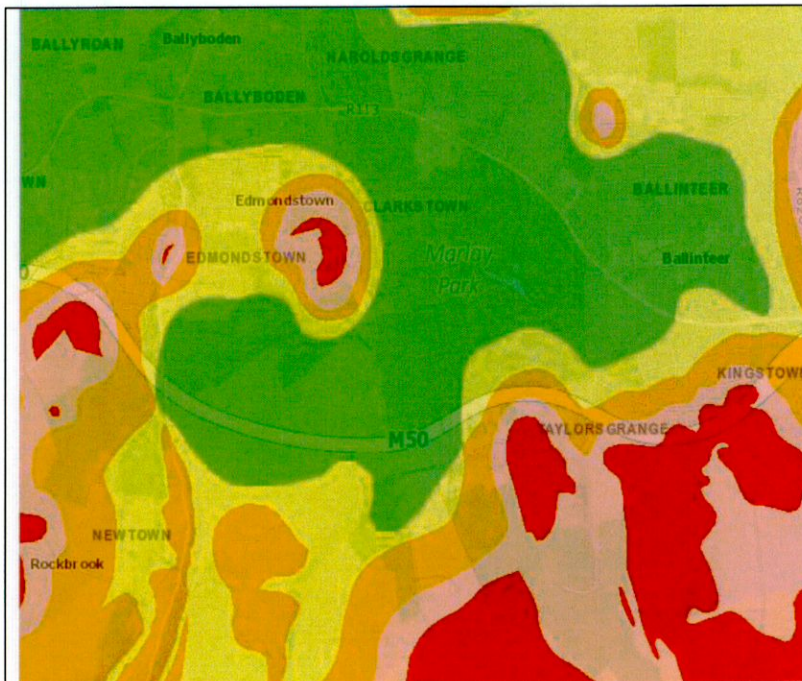
### Maps Used

#### Groundwater/Aquifer Map



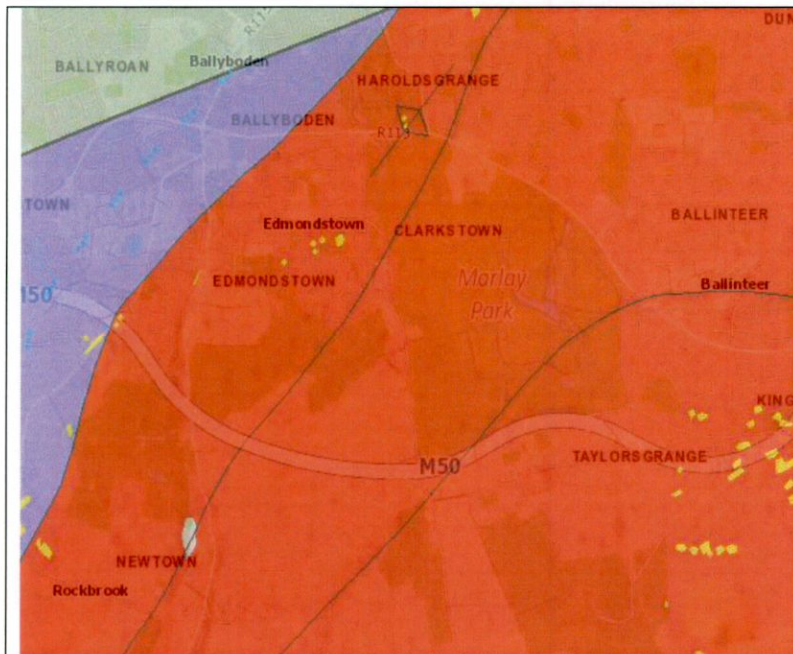
*From the GSI Groundwater  
Aquifer Map Site is  
classified as P1- Poor  
Aquifer - Bedrock which is  
Generally Unproductive  
except for Local Zones*

#### 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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**TRAYNOR ENVIRONMENTAL LTD**

**APPENDIX D – INSURANCE**

**Griffiths & Armour Europe DAC**

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The Sweepstakes      +353 (0)1 634 0001  
Bellebridge              info@griffithsandarmour.com  
Dublin 4                  griffithsandarmour.com

**Griffiths & Armour**

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**PROFESSIONAL INDEMNITY INSURANCE**

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

**Insured:** Traynor Environmental Ltd

**Address:** Betturbet Business Park  
Creeny  
Betturbet  
Co. Cavan  
H14AY94

**Lead Insurer(s):** Axs 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.