

SURFACE WATER DRAINAGE DESIGN - CLARIFICATION

for

Proposed electric fast charging hub and drive-thru
coffee building

at

Applegreen Naas Road Service Station,
Tootenhill, Rathcoole, Dublin D24DH00

Document Control:

Document: **Surface Water Drainage Design Clarification**
 Client: **Petrogas Group Ltd.**
 Project No: **3644**
 Address: **Applegreen Naas Road Service Station, Tootenhill, Rathcoole,
 Dublin D24DH00**
 Document Ref: **3644-Rep SWD-001**
 Revision No: -

Project Number: 3644 Client: Petrogas Group Ltd.			Document Ref: 3644-Rep SWD-001		
-	Planning Clarification of Additional Information Issue	AOD	JG	JG	07/12/22
Revision	Details of Issue	Prepared by	Checked by	Authorised	Date:

Notice: This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

JA Gorman Consulting Engineers Ltd accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Table of Contents

1	Introduction.....	4
1.1	Background.....	4
2	Surface Water Design	4
2.1	Existing Surface Water.....	4
2.2	Proposed Surface Water Design.....	4
2.3	SUDS Proposals	5
2.4	Contributing Areas	5
2.5	Climate Change	6
2.6	Design Standards.....	6
2.7	Attenuation Tank Designs	7
2.8	Surface Water Design Summary	7
3	Appendices.....	8
	Appendix 3.1 Met Eireann Rainfall Depths for site	
	Appendix 3.2 Attenuation Volume Calculations (30-year and 100-year)	
	Appendix 3.3 Attenuation Tank Details	

1 Introduction

1.1 Background

JA Gorman Consulting Engineers Ltd have prepared this brief report to address Point 3 of South Dublin County Councils request for Clarification of Additional Information on Planning File Ref. SD22A/0114.

This report deals with queries raised in Point 3 only – all other surface water drainage and SUDS measures are covered in The Surface Water and SUDS Drainage Design Report (ref. 3644-Rep SWD-000) submitted as part of earlier additional information response.

2 Surface Water Design

2.1 Existing Surface Water

There is limited drainage infrastructure located on the proposed site. A portion of the area where it is proposed to locate the e-charging bays currently exists as parking. There is also existing parking within the red line site boundary. Please refer to 'areas already connected to service station storm water network' on drawing number P3644-C010 Rev 1. Much of the proposed site is currently hard standing with no drainage infrastructure.

The Surface Water from the adjacent Applegreen Service Station is attenuated in two no. separate underground attenuation tanks before being discharged into the existing underground culvert at greenfield runoff rates. The culvert passes through the Applegreen site from the south-west and passes in a north-east direction under the N7 Nass Road.

2.2 Proposed Surface Water Design

The proposed development will comprise of a new surface water drainage system to collect generated surface water run-off and attenuated it before discharging to the existing underground culvert to the west.

The proposed surface water drainage network for the site is illustrated on drawing number P3644-C008Rev1. The site is designed with impermeable surfaces running to permeable paving infiltration systems and gullies. No surface water or rainwater will discharge into the foul sewer network. The storm network will include connections to:

- Roof drainage
- Surface water gullies
- Infiltration blanket
- Permeable Paving drainage systems located underneath car parking bays
- Attenuation System.

The proposed surface water drainage system will be installed in the access/drive—thru lanes and discharge into a new *stormtech* attenuation system located in the western corner of the site via an infiltration blanket. The surface water discharge from the site will be attenuated by a *Hydrobrake* flow control unit installed in manhole S1.05. A new outfall pipe and manhole will be constructed from the proposed site to the existing

underground culvert at the entrance to the service station as illustrated on drawing number P3644-C008 Rev 1.

The network has been designed (pipe sizes, gradients etc.) using 'BS EN 752:2008 Drain and Sewer Systems outside buildings' and Building Regulations 2010, TGD Part H, and the Greater Dublin Strategic Drainage Study (GSDSDS) and by using the industry standard software package '*Microdrainage*'.

2.3 SUDS Proposals

The proposed developments drainage system has been designed in accordance with the principles of Sustainable Urban Drainage Systems (SuDS) in accordance with the recommendations of the GSDSDS.

The following SUDS components were identified as being suitable to manage the surface water from the proposed site to

- Reduce surface water runoff
- Reduce pollutant impact
- Attenuate surface water runoff
- Replicate the natural characteristics of rainfall runoff for the site

The relatively small size of this site limits the SuDS options. The GSDSDS recommends the use of unlined pervious paving for small site.

Proposed SUDS Components:

1. Permeable Paving (System B – partial infiltration, Load Category 2) is now proposed at the car parking spaces.
2. Permeable Paving (System B – partial infiltration, Load Category 2) is now proposed for the hardstanding areas including all footpaths at the site.
3. An infiltration blanket with landscaped area is proposed along the eastern boundary to replace the carparking bays.
4. A Stormtech Attenuation system, which has been shown to improve discharge quality, with a by-pass interceptor and a hydro-brake flow control device

2.4 Contributing Areas

The overall site area (inside redline boundary) is 0.27 hectares. This area is broken down into smaller areas of different surface type which have different run-off coefficients as outlined in the table overleaf. The contributing areas are illustrated on drawing number P3644-C010 Rev 1. For the surface water design, the effective contributing area has been calculated as **1,259.10 m²**.

Contribution Areas – Surface Water Network			
	Area (m²)	Runoff Coefficient	Effective Area (m²)
Permeable Areas – Landscaping	532	0.1	53.20
Impermeable Areas - Roads and Hardstanding	776	0.9	698.40
Permeable Paving - Car Parking Bays / Footways	565	0.5	282.50
Roof Areas	225	1.0	225.00
Areas already connected to existing separate service SW network	566	n/a	-
Areas connected to foul drainage network - refuse compound	36	n/a	-
Total	2,700	-	1,259.10

2.5 Climate Change

As part of the proposal, the design software has applied a **20% increase** to the rainfall intensities to allow for climate change and as required by the GDSDS for attenuation storage design.

2.6 Design Standards

The surface water network has been designed to comply with the policies and guidelines outlined in 'BS EN 752:2008 Drain and Sewer Systems outside buildings' and Building Regulations 2010, TGD Part H and the Greater Dublin Strategic Drainage Study (GDSDS). The surface water drainage network has been designed to cater for the **100-year storm event with a 20% additional allowance for climate change** to each pipe run.

The following design parameters apply:

- Return Period 5 years
- Time of Entry 5 minutes
- Pipe Friction 0.6mm
- Minimum Velocity 1.0m/sec
- Standard Average Annual Rainfall 920 mm
- M5-60 17.000 mm
- Ration r 0.250
- Climate Change 20%
- Pipe Cover: 1200mm for Pipes under trafficked areas
900mm for Pipes under footpaths
600mm for Pipes within landscape areas

Where insufficient cover available, the pipes are to be encased in leanmix

2.7 Attenuation Tank Designs

The surface water drainage network was designed in accordance with IS EN 752-4 and by using the industry standard software package, *microdrainage*.

In accordance with the above standard, pipes in surface water sewers have been designed using the modified rational method (Wallingford Method) to calculate the volume of surface water run-off under storm conditions.

Site specific rainfall data has been provided for the site by Met Eireann and is included in Appendix 3.1 of this report. The Met Eireann data has been factored up by 20% to meet the required allowance for climate change.

Design checks were carried out on the 1:30 year and the 1:100 year storm events. The design calculations are presented in Appendix 3.2

- 1:30-year storm event storage volume required = 31.10m³
- **1:100-year storm event storage volume required = 53.30m³**

Storage facilities have been designed onsite to ensure that all surface water attenuated during the 100-year storm event can be stored onsite without giving rise to flooding. Storage will be provided by combination of swale (along eastern boundary) and *Stormtech* (or similar) SC740 chambers to form an attenuation tank.

Storage Volume Required:	53.30m ³
- Storage Volume provide in Infiltration Blanket	<u>8.70m³</u>
>> Storage to be provided in attenuation tank	44.60m³

2.8 Surface Water Design Summary

The combination of the permeable paving, swale and attenuation system provides SUDS measures for this development.

3 Appendices

Appendix 3.1

Met Eireann Rainfall Depths for site

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 300924, Northing: 226418,

DURATION	Interval		Years													
	6months, 1year,		2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.7, 3.9,		4.5,	5.5,	6.2,	6.7,	8.4,	10.4,	11.8,	13.6,	15.4,	16.7,	18.7,	20.4,	21.7,	N/A,
10 mins	3.7, 5.4,		6.3,	7.6,	8.6,	9.3,	11.7,	14.5,	16.4,	19.0,	21.4,	23.2,	26.1,	28.4,	30.2,	N/A,
15 mins	4.4, 6.3,		7.4,	9.0,	10.1,	11.0,	13.8,	17.1,	19.3,	22.4,	25.2,	27.3,	30.7,	33.4,	35.6,	N/A,
30 mins	5.8, 8.3,		9.7,	11.8,	13.2,	14.3,	18.0,	22.2,	25.0,	29.0,	32.6,	35.3,	39.6,	43.0,	45.8,	N/A,
1 hours	7.7, 11.0,		12.8,	15.5,	17.3,	18.8,	23.5,	28.9,	32.5,	37.6,	42.1,	45.7,	51.2,	55.4,	59.0,	N/A,
2 hours	10.2, 14.5,		16.8,	20.4,	22.7,	24.6,	30.7,	37.6,	42.3,	48.8,	54.6,	59.1,	66.1,	71.5,	76.0,	N/A,
3 hours	12.1, 17.1,		19.8,	23.9,	26.7,	28.8,	35.9,	43.9,	49.3,	56.8,	63.5,	68.7,	76.7,	83.0,	88.2,	N/A,
4 hours	13.6, 19.2,		22.2,	26.8,	29.8,	32.2,	40.1,	49.0,	54.9,	63.3,	70.7,	76.4,	85.3,	92.2,	98.0,	N/A,
6 hours	16.0, 22.6,		26.1,	31.4,	35.0,	37.8,	46.9,	57.2,	64.1,	73.7,	82.2,	88.9,	99.1,	107.1,	113.7,	N/A,
9 hours	18.9, 26.6,		30.7,	36.8,	41.0,	44.3,	54.8,	66.8,	74.7,	85.8,	95.7,	103.4,	115.2,	124.3,	131.9,	N/A,
12 hours	21.3, 29.8,		34.4,	41.3,	45.9,	49.5,	61.3,	74.6,	83.3,	95.6,	106.6,	115.1,	128.1,	138.2,	146.6,	N/A,
18 hours	25.1, 35.1,		40.4,	48.4,	53.8,	58.0,	71.7,	87.1,	97.2,	111.4,	124.1,	133.8,	148.9,	160.5,	170.2,	N/A,
24 hours	28.2, 39.4,		45.4,	54.3,	60.3,	64.9,	80.1,	97.2,	108.4,	124.2,	138.2,	149.0,	165.6,	178.5,	189.1,	226.4,
2 days	35.5, 48.1,		54.7,	64.4,	70.9,	75.9,	91.9,	109.6,	121.1,	137.1,	151.1,	161.8,	178.2,	190.8,	201.1,	237.0,
3 days	41.5, 55.3,		62.4,	72.8,	79.7,	85.0,	101.8,	120.2,	132.1,	148.4,	162.7,	173.6,	190.1,	202.8,	213.1,	248.8,
4 days	46.8, 61.6,		69.2,	80.2,	87.4,	93.0,	110.5,	129.6,	141.8,	158.6,	173.2,	184.2,	201.0,	213.8,	224.3,	260.1,
6 days	56.2, 72.7,		81.1,	93.2,	101.0,	107.0,	125.8,	146.1,	159.0,	176.5,	191.7,	203.2,	220.5,	233.6,	244.3,	280.7,
8 days	64.7, 82.7,		91.7,	104.6,	113.0,	119.4,	139.3,	160.6,	174.1,	192.4,	208.1,	220.0,	237.8,	251.2,	262.2,	299.3,
10 days	72.5, 91.8,		101.4,	115.2,	124.0,	130.7,	151.7,	173.9,	187.9,	206.8,	223.0,	235.2,	253.5,	267.3,	278.5,	316.3,
12 days	79.9, 100.4,		110.5,	125.0,	134.3,	141.3,	163.1,	186.2,	200.7,	220.2,	236.9,	249.4,	268.1,	282.2,	293.6,	332.1,
16 days	93.7, 116.3,		127.5,	143.2,	153.2,	160.8,	184.2,	208.8,	224.1,	244.7,	262.2,	275.3,	294.9,	309.5,	321.4,	361.1,
20 days	106.7, 131.2,		143.1,	160.0,	170.7,	178.8,	203.6,	229.5,	245.6,	267.1,	285.3,	299.0,	319.2,	334.4,	346.6,	387.4,
25 days	122.1, 148.6,		161.5,	179.6,	191.1,	199.7,	226.1,	253.4,	270.4,	293.0,	312.0,	326.2,	347.3,	363.0,	375.6,	417.8,

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

Appendix 3.2

Attenuation Volume Calculations

(30 year and 100 year)



STORAGE VOLUME CALCULATIONS

Unit 1, Block B, Forest Park,
Mullingar, Co. Westmeath.
Tel: 044 – 9347338 / 9347341
Fax: 044 – 9347400
Email: info@jagorman.ie
Web: www.jagorman.ie

Project Name AG Rathcoole Coffee Drive Thru & EV Charging
Project Number 3644
Date 30 November 2022
Return Period 30 year
Impermeable Area 1259.1 m²

Storm Duration	Rainfall		Rainfall Intensity (+20%) (mm/hr)	Discharge to Hydrobrake (l/s)	Net Flow (L/s)	Flow to Storage (L/s)	Storage Required (m ³)
	Depth (mm)	Intensity (mm/hr)					
5 min	5	11.8	141.60	5.00	59.43	54.43	16.33
10 min	10	16.4	98.40	5.00	41.30	36.30	21.78
15 min	15	19.3	77.20	5.00	32.40	27.40	24.66
30 min	30	25	50.00	5.00	20.99	15.99	28.77
1 hour	60	32.5	32.50	5.00	13.64	8.64	31.10
2 hours	120	42.3	21.15	5.00	8.88	3.88	27.91
3 hours	180	49.3	16.43	5.00	6.90	1.90	20.49
4 hours	240	54.9	13.73	5.00	5.76	0.76	10.95
6 hours	360	64.1	10.68	5.00	4.48	-0.52	-11.15
9 hours	540	74.7	8.30	5.00	3.48	-1.52	-49.13
12 hours	720	83.3	6.94	5.00	2.91	-2.09	-90.14
18 hours	1080	97.2	5.40	5.00	2.27	-2.73	-177.14
24 hours	1440	108.4	4.52	5.00	1.90	-3.10	-268.22



STORAGE VOLUME CALCULATIONS

Unit 1, Block B, Forest Park,
Mullingar, Co. Westmeath.
Tel: 044 – 9347338 / 9347341
Fax: 044 – 9347400
Email: info@jagorman.ie
Web: www.jagorman.ie

Project Name AG Rathcoole Coffee Drive Thru & EV Charging
Project Number 3644
Date 30 November 2022
Return Period 100 year
Impermeable Area 1259.1 m²

Strom Duration	Rainfall		Rainfall Intensity (+20%) (mm/hr)	Discharge to Hydrobrake (l/s)		Net Flow (L/s)	Flow to Storage (L/s)		Storage Vol Required (m ³)
	Depth (mm)	Intensity (mm/hr)		Hydrobrake (l/s)	Flow (L/s)		Storage (L/s)	Required (m ³)	
5 min	5	16.7	200.40	5.00	84.11	79.11	23.73	23.73	
10 min	10	23.2	139.20	5.00	58.42	53.42	32.05	32.05	
15 min	15	27.3	109.20	5.00	45.83	40.83	36.75	36.75	
30 min	30	35.3	70.60	5.00	29.63	24.63	44.34	44.34	
1 hour	60	45.7	45.70	5.00	19.18	14.18	51.05	51.05	
2 hours	120	59.1	29.55	5.00	12.40	7.40	53.30	53.30	
3 hours	180	68.7	22.90	5.00	9.61	4.61	49.80	49.80	
4 hours	240	76.4	19.10	5.00	8.02	3.02	43.43	43.43	
6 hours	360	88.9	14.82	5.00	6.22	1.22	26.32	26.32	
9 hours	540	103.4	11.49	5.00	4.82	-0.18	-5.77	-5.77	
12 hours	720	115.1	9.59	5.00	4.03	-0.97	-42.09	-42.09	
18 hours	1080	133.8	7.43	5.00	3.12	-1.88	-121.84	-121.84	
24 hours	1440	149	6.21	5.00	2.61	-2.39	-206.87	-206.87	

INFILTRATION BLANKET

Unit 1, Block B, Forest Park,
Mullingar, Co. Westmeath.
Tel: 044 – 9347338 / 9347341
Fax: 044 – 9347400
Email: info@jagorman.ie
Web: www.jagorman.ie

Project Name AG Rathcoole Coffee Drive Thru & EV Charging
Project Number 3644
Date 30 November 2022
Return Period 100 year
Impermeable Area 430 m²

Storm Duration	Rainfall		Rainfall Intensity (mm/hr)	Rainfall Intensity (+20%) (mm/hr)	Discharge via Flow Control Device (l/s)	Net Flow (L/s)	Flow to Storage (L/s)	Storage Vol Required (m ³)
	Depth (mm)	(mins)						
5 min	5	16.7	200.40	240.48	6.00	6.00	22.72	6.82
10 min	10	23.2	139.20	167.04	6.00	6.00	13.95	8.37
15 min	15	27.3	109.20	131.04	6.00	6.00	9.65	8.69
30 min	30	35.3	70.60	84.72	6.00	6.00	4.12	7.41
1 hour	60	45.7	45.70	54.84	6.00	6.00	0.55	1.98
2 hours	120	59.1	29.55	35.46	6.00	6.00	-1.76	-12.70
3 hours	180	68.7	22.90	27.48	6.00	6.00	-2.72	-29.35
4 hours	240	76.4	19.10	22.92	6.00	6.00	-3.26	-46.98
6 hours	360	88.9	14.82	17.78	6.00	6.00	-3.88	-83.73
9 hours	540	103.4	11.49	13.79	6.00	6.00	-4.35	-141.05
12 hours	720	115.1	9.59	11.51	6.00	6.00	-4.63	-199.81
18 hours	1080	133.8	7.43	8.92	6.00	6.00	-4.93	-319.76
24 hours	1440	149	6.21	7.45	6.00	6.00	-5.11	-441.52

Infiltration Blanket:

Proposed Length
Proposed Depth
Proposed Width
Void Space

18 m
2.3 m
0.7 m
0.3 %

(1m deep with 300mm top soil over)

Available Volume

8.7 m³

Infiltration Blanket is okay

Appendix 3.3

Attenuation Tank Details



INPUTS

Project Name Costa Coffee Drive Rathcoole
 Project Reference JN200567
 Date 06-Dec-22
 Designer LP
 Liner Permeable
 Chamber Model SC740
 Required Storage Volume 45 m³
 Stone Porosity 40%
 Excavation Batter 60 °
 Stone Above Chambers 0.15 m
 Stone Foundation Depth 0.15 m
 Chamber Separation 0.15 m
 Spacing at Sides 0.3 m
 Spacing at Ends 0.3 m
 No. of Rows 4
 No. of Chambers per Row 4
 Manholes - 1500mm dia. 1
 Isolator Rows 1

RESULTS

System Volume and Bed Size

Installed Storage Volume 45.2 m³
 Height per Chamber 0.762
 Width per Chamber 1.295
 Length per Chamber 2.169
 Depth of System 1.062 m
 Tank Overall Installed Width at Base 6.2 m
 Tank Overall Installed Length at Base 9.7 m
 Area of Dig at Base of System 60 m²
 Area of Dig at Top of System 81 m²

System Components

Chambers 16
 Endcaps 8
 Amount of Stone Required (m3) 55 m³
 Amount of Stone Required (tonne) 90 m³
 Volume of excavation (not including top-fill) 75 m³