CS CONSULTING

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DUBLIN LONDON LIMERICK

Engineering Services Report

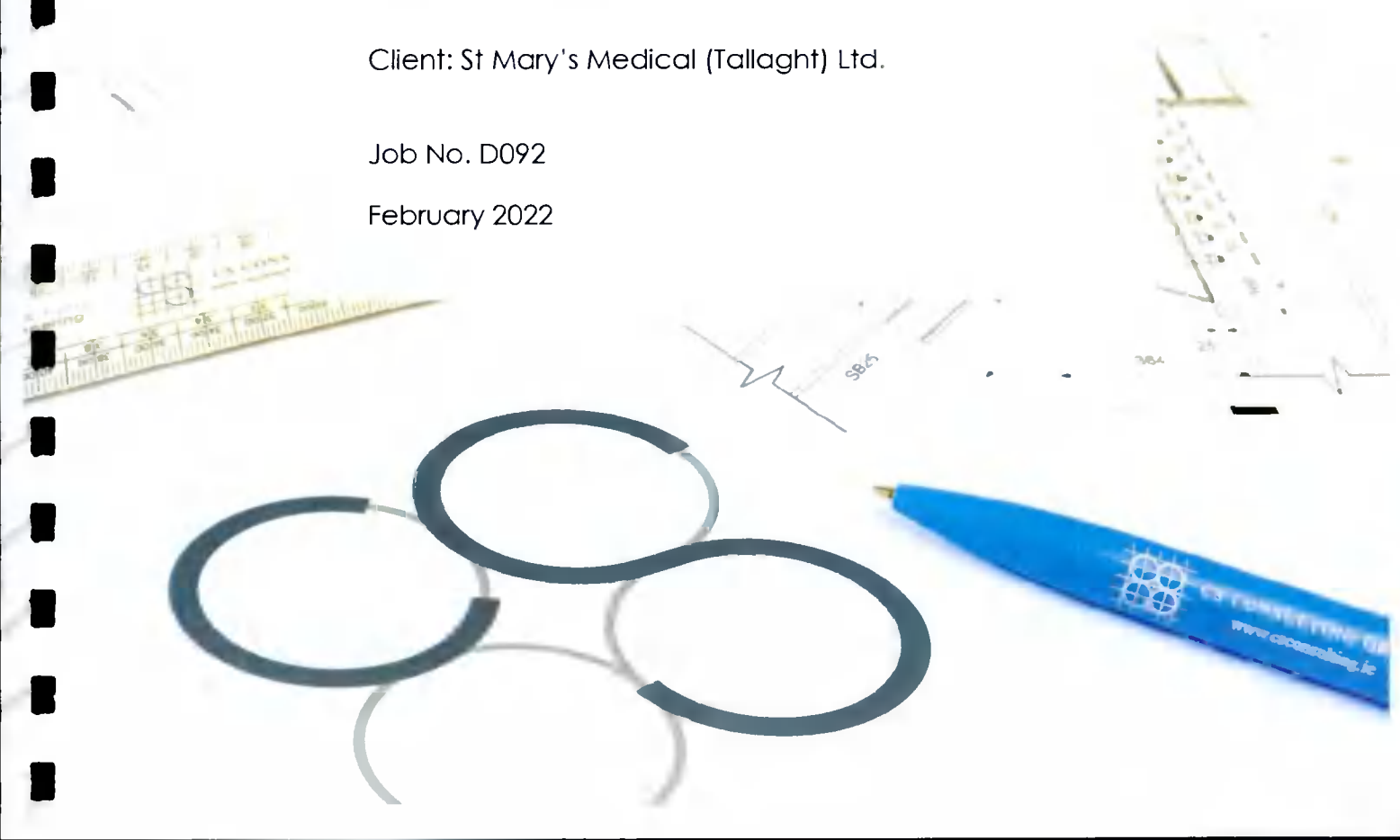
Nursing Home Development

St. Mary's Priory, Old Greenhills Road, Tallaght, Dublin 24

Client: St Mary's Medical (Tallaght) Ltd.

Job No. D092

February 2022



ENGINEERING SERVICES REPORT

NURSING HOME DEVELOPMENT

ST. MARY'S PRIORY, OLD GREENHILLS ROAD, TALLAGHT, DUBLIN 24

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File Location: Job-D092\B_Documents\Civil\Civil Reports

BS 1192 FIELD	D092-CSC-ZZ-XX-RP-C-0001-P3

Job Ref.	Author	Reviewed By	Authorised By	Issue Date	Rev. No.
D092	LJ	GF	GF	03.02.2022	P3
D092	LJ	GF	GF	21.12.2021	P2
D092	PS	JC	NB	21.05.2021	P1

1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by St. Mary's Medical (Tallaght) Ltd to prepare an Engineering Services Report to accompany a planning application for a proposed nursing home development within the grounds of St. Mary's Priory, Tallaght, Dublin 24.

This report assesses the proposed development under the following headings:

- Foul Drainage Infrastructure
- Stormwater Drainage Infrastructure
- Potable Water Infrastructure

In preparing this report, CS Consulting has made reference to the following:

- South Dublin Development Plan 2016–2022
- Regional Code of Practice for Drainage Works
- The Greater Dublin Strategic Drainage Study
- Irish Water Code of Practice for Water
- Irish Water Code of Practice for Wastewater
- Local Authority Drainage Records

The Engineering Services Report is to be read in conjunction with the engineering drawings submitted by CS Consulting and with the various additional information submitted by the other members of the design team.

2.0 SITE LOCATION

The proposed development site is located within the grounds of St. Mary's Priory, on the western side of the Old Greenhills Road in Tallaght, Dublin 24. The site is located in the administrative jurisdiction of South Dublin County Council and has a total area of 0.99ha.

Figure 1 – Location of proposed development site
(map data & imagery: EPA, OSM Contributors, Google)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.

The site is bounded to the north by the TU Dublin Tallaght campus, to the east by Old Greenhills Road and Greenhills Road, and on other sides by the

remaining grounds of St. Mary's Priory. The site has street frontage of approx. 95m on Old Greenhills Road and approx. 50m on Greenhills Road.

Figure 2 – Site extents and environs
(map data & imagery: NTA, OSM Contributors, Google)

2.1 Existing Land Use

The subject site is greenfield, forming part of the grounds of St. Mary's Priory.

2.2 Project Description

The proposed development consists of:

(a) construction of a 4 storey nursing home building consisting of (i) 106 no. bedrooms (with ensuite); (ii) associated resident's welfare facilities; (iii) administration areas and staff facilities; (iv) with multi-function space; and pharmacy proposed at ground floor level;

(b) construction of 60 no. one bed independent living units in 3 no blocks as follows: (1) Block A, a 4 story building comprising 11 no. one-bed units; (2) Block B, a part 4/part 5 storey building comprising 35 no. one-bed units; and (3) Block C, a 5 storey building comprising 14 no. one-bed units. Each unit will be provided with private open space in the form of a balcony/terrace (6sq.m).

(c) The development will include communal open space and landscaping (including new tree planting and tree retention), 30 no. car parking spaces (including 3 no. limited mobility parking spaces; 3 no. EV parking spaces and 1 no. car sharing spaces); and 37 no. bicycle parking spaces.

(d) The development will be served by a new pedestrian and vehicular access from Old Greenhills Road through existing boundary wall. Material from the removed wall will be repurposed within the landscape areas; and

(e) The development includes landscaping, boundary treatments (including walls and railings to southern and western boundaries), an ESB Substation, SuDS drainage; road infrastructure and all ancillary site works necessary to facilitate the development.

3.0 FOUL DRAINAGE

3.1 Existing Foul Drainage Infrastructure

Irish Water records show an existing 225mm diameter foul sewer in place in Bancroft Park, to the east of the development site, flowing generally from west to east. The records indicate that a spur from this existing sewer extends as far as the development site's eastern boundary, although the uppermost manhole shown (ref. SMH1011527) is approx. 55m south-east of the site boundary. See **Appendix A** for Irish Water drainage records.

3.2 Proposed Foul Drainage Arrangements

The proposed development is to consist of a 106-bedroom nursing home and 60no. 1-bedroom independent living apartments (each of which may accommodate up to 2no. residents). The Irish Water Wastewater Code of Practice recommends stipulates the following wastewater flow rates:

- 350 l/person/day for nursing homes
- 150 l/person/day for apartments

To these rates are applied a 10% increase to allow for water ingress into sewer pipes.

Therefore, the proposed new development will generate waste in the order of 60.61m³/day, which equates to:

- 0.702 l/s Dry Weather Flow (DWF)
- 4.212 l/s Peak Flow (6 x DWF)

All foul effluent generated from the proposed development from the upper floors shall be collected in separate foul pipes and flow under gravity, via the existing 225mm diameter spur, to the existing 225mm diameter foul sewer in Bancroft Park. This arrangement is subject to confirmation of this spur's existing

gradient; should it not prove possible to use the existing spur, a new foul drainage connection shall be made to the existing 225mm diameter foul sewer in Bancroft Park, at manhole ref. SMH1011527.

The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

The outfall into the public system will be onto Old Greenhills Road and the last private manhole will be designed in accordance with Irish Water requirements. Refer to CS Consulting Drawing **D092-CSC-XX-XX-DR-C-0003** for more details.

4.0 STORMWATER DRAINAGE

4.1 Existing Stormwater Drainage Infrastructure

Irish Water drainage records (see **Appendix A**) show a 225mm diameter public storm drain in Greenhills Road, approx. 15m to the east of the development site. This runs south to north, parallel to the development site's eastern boundary.

4.2 Proposed Stormwater Drainage Arrangements

In accordance with the requirements of SDCC Drainage Division, all new developments are to incorporate the principles of Sustainable Drainage Systems (SuDS). The SuDS principles require a two-fold approach to address storm water management on new developments.

The first aspect is to reduce any post development run-off to pre-development discharge rates. The development is to retain storm water volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1 in 100 year storm event increased by 20% for predicted climate change factors.

To ensure an accurate calculation of the required attenuation for the site Met Éireann was contacted to provide:

a) The SAAR (Standard Annual Average Rainfall) for the area: 1015mm/year

b) The sliding duration table for the site indicating the 1:100 year rainwater intensities to be used

See **Appendix B** for Met Éireann Data.

Using the data supplied by Met Éireann, the greenfield runoff rate has been established as 2.81 l/s/ha and thus based on the development area, a restricted discharge rate of 2.8 l/s will be provided by means of a flow control device.

It is proposed to locate an attenuation tank in the north-east section of the development site, with an internal storage volume of 320m³. In conjunction with the effective storage of the development's internal stormwater drainage pipes, this shall provide sufficient attenuation storage to cater for a 1-in-100-year storm event (an estimated total storage requirement of 348m³).

The second aspect is the policy of the Local Authority is to include Sustainable Drainage Systems (SuDS), for all new applications, as such it is proposed to use a range of SuDS devises for the scheme they are listed below:

SuDS proposals are as follows;

- Permeable Paving to all new parking spaces
- Swales
- Green Roofs
- Attenuation tank with flow control device, sized to contain a 1-in-100-year storm event and increased by 20% for predicted climate change to limit discharge from the site during extreme rainfall events.

See CS Consulting drawing no. **D092-CSC-XX-XX-DR-C-0005** for the proposed SuDS layout and CS Consulting drawing no. **D092-CSC-XX-XX-DR-C-0003** for the proposed drainage layout.

5.0 POTABLE WATER SUPPLY

5.1 Existing Potable Water System

Irish Water records (enclosed as **Appendix A**) show a 4"-diameter (100mm approx.) public watermain in Old Greenhills Road, adjacent to the development site.

5.2 Proposed Potable Water System

The proposed development is to consist of a 106-bedroom nursing home and 60no. 1-bedroom independent living apartments (each of which may accommodate up to 2no. residents). The development is expected to have a potable water demand equivalent to its wastewater generation rates. That is:

- 350 l/person/day for the nursing home element
- 150 l/person/day for the independent living apartments

The 10% increase applied to wastewater flow (to allow for water ingress into sewer pipes) does not apply to potable water demand.

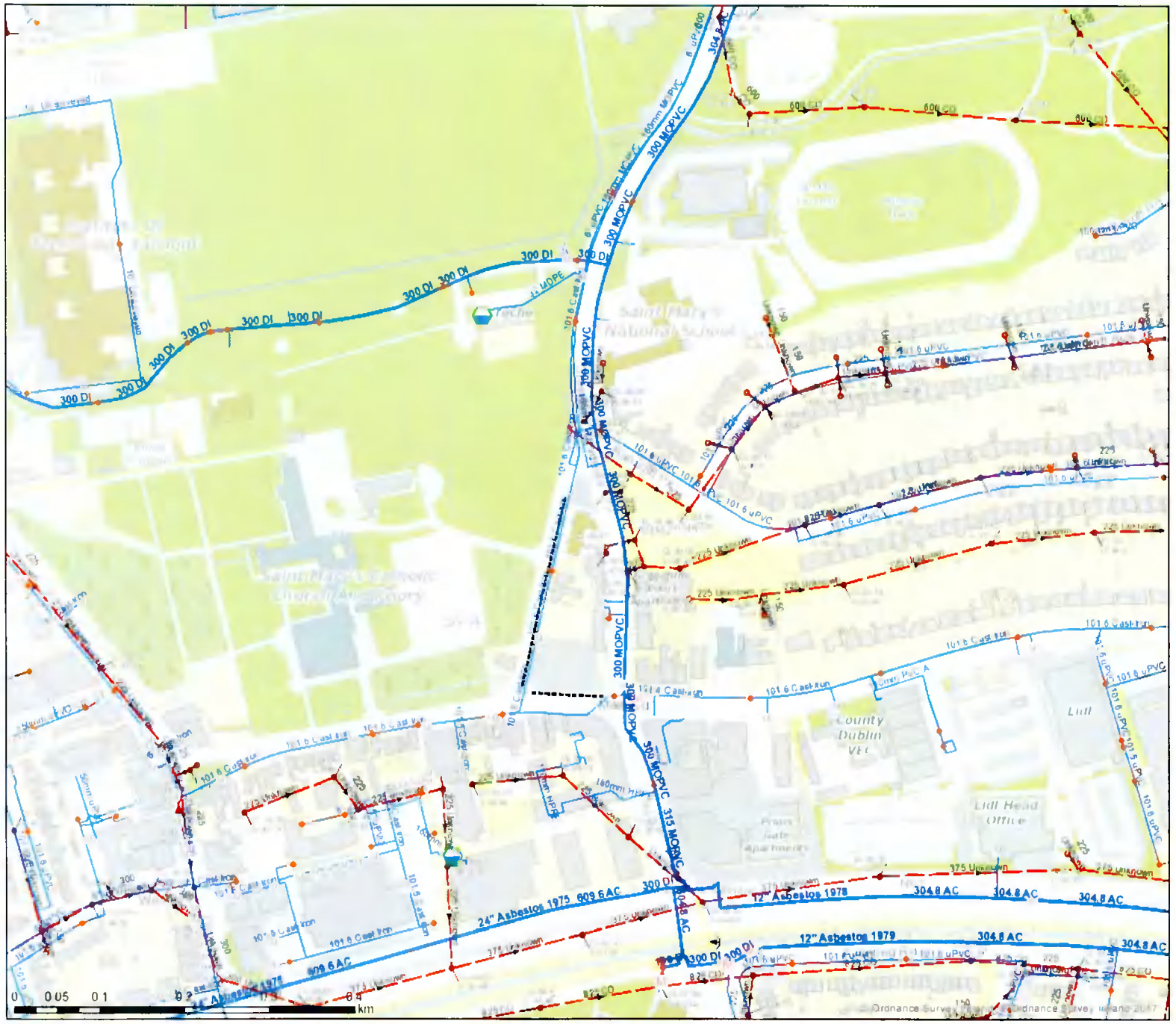
The proposed development will therefore have a daily potable water demand of 55.10m³/day, which equates to:

- 0.638 l/s Average Water Demand (AWD)
- 3.190 l/s Peak Demand (5 x AWD)

It is proposed to supply the development via a new connection to the existing watermain in Old Greenhills Road. This connection shall be 150mm pipework with bulk water meters to Irish Water specifications.

The proposed watermain infrastructure and routing plan is shown on drawing **D092-CSC-XX-XX-DR-C-0004** included with this submission.

Irish Water Web Map



UISCE ÉIREANN IRISH WATER

Print Date 24/12/2021

Printed by Irish Water

Irish Water Web Map

UISCE ÉIREANN · IRISH WATER

Print Date 24/12/2021

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Appendix B

Met Eireann Data

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 309469, Northing: 227823,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.8,	4.5,	5.5,	6.2,	6.8,	8.7,	10.8,	12.2,	14.3,	16.2,	17.6,	19.9,	21.7,	23.2,	N/A ,
10 mins	3.6,	5.3,	6.3,	7.7,	8.7,	9.5,	12.1,	15.1,	17.1,	19.9,	22.5,	24.6,	27.7,	30.2,	32.3,	N/A ,
15 mins	4.3,	6.3,	7.4,	9.1,	10.2,	11.1,	14.2,	17.7,	20.1,	23.5,	26.5,	28.9,	32.6,	35.6,	38.0,	N/A ,
30 mins	5.6,	8.2,	9.6,	11.7,	13.2,	14.4,	18.2,	22.6,	25.5,	29.7,	33.5,	36.5,	41.1,	44.7,	47.7,	N/A ,
1 hours	7.4,	10.7,	12.5,	15.2,	17.1,	18.5,	23.3,	28.8,	32.5,	37.7,	42.4,	46.0,	51.7,	56.2,	59.8,	N/A ,
2 hours	9.8,	14.0,	16.2,	19.7,	22.0,	23.8,	29.9,	36.8,	41.3,	47.8,	53.6,	58.1,	65.1,	70.6,	75.1,	N/A ,
3 hours	11.5,	16.3,	18.9,	22.9,	25.6,	27.7,	34.5,	42.4,	47.6,	54.9,	61.5,	66.6,	74.5,	80.6,	85.7,	N/A ,
4 hours	12.8,	18.2,	21.1,	25.5,	28.4,	30.7,	38.3,	46.9,	52.6,	60.6,	67.8,	73.4,	82.0,	88.7,	94.2,	N/A ,
6 hours	15.1,	21.3,	24.6,	29.6,	33.0,	35.7,	44.3,	54.1,	60.6,	69.7,	77.8,	84.1,	93.8,	101.3,	107.6,	N/A ,
9 hours	17.7,	24.9,	28.7,	34.5,	38.3,	41.4,	51.2,	62.4,	69.7,	80.1,	89.2,	96.4,	107.3,	115.8,	122.9,	N/A ,
12 hours	19.8,	27.8,	32.0,	38.4,	42.6,	46.0,	56.8,	69.0,	77.1,	88.4,	98.4,	106.2,	118.1,	127.4,	135.0,	N/A ,
18 hours	23.3,	32.5,	37.3,	44.6,	49.5,	53.3,	65.7,	79.6,	88.7,	101.5,	112.9,	121.7,	135.1,	145.6,	154.2,	N/A ,
24 hours	26.1,	36.2,	41.6,	49.7,	55.1,	59.2,	72.8,	88.1,	98.1,	112.1,	124.5,	134.0,	148.7,	160.1,	169.5,	202.3,
2 days	33.0,	44.5,	50.6,	59.5,	65.4,	70.0,	84.6,	100.7,	111.2,	125.7,	138.4,	148.2,	163.0,	174.4,	183.8,	216.3,
3 days	38.5,	51.2,	57.8,	67.4,	73.7,	78.6,	94.1,	111.0,	122.0,	137.0,	150.1,	160.2,	175.4,	187.0,	196.5,	229.3,
4 days	43.3,	57.0,	64.0,	74.3,	81.0,	86.1,	102.3,	120.0,	131.4,	146.9,	160.4,	170.7,	186.3,	198.1,	207.8,	241.0,
6 days	51.8,	67.2,	74.9,	86.2,	93.5,	99.1,	116.6,	135.6,	147.6,	164.1,	178.3,	189.0,	205.2,	217.5,	227.6,	261.8,
8 days	59.4,	76.1,	84.5,	96.6,	104.4,	110.4,	129.1,	149.1,	161.7,	179.0,	193.8,	204.9,	221.8,	234.5,	244.8,	279.9,
10 days	66.3,	84.2,	93.2,	106.1,	114.4,	120.7,	140.3,	161.3,	174.5,	192.4,	207.7,	219.3,	236.6,	249.7,	260.4,	296.3,
12 days	72.7,	91.8,	101.3,	114.8,	123.6,	130.2,	150.7,	172.5,	186.2,	204.7,	220.6,	232.5,	250.3,	263.8,	274.7,	311.4,
16 days	84.8,	105.8,	116.2,	131.0,	140.4,	147.6,	169.7,	193.0,	207.6,	227.2,	243.9,	256.4,	275.1,	289.2,	300.6,	338.8,
20 days	95.9,	118.7,	129.9,	145.7,	155.8,	163.4,	186.9,	211.5,	226.9,	247.5,	265.0,	278.1,	297.5,	312.1,	323.9,	363.5,
25 days	109.0,	133.7,	145.8,	162.8,	173.7,	181.8,	206.8,	232.9,	249.1,	270.7,	289.1,	302.8,	323.1,	338.3,	350.6,	391.6,

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 C

Attenuation and Drainage Calculations

Project:	Greenhills Road. Tallaght
Project No.:	D092
Calculation:	Attenuation 100-year
Calcs By:	JC
Checked By:	RM
Date:	21/12/21

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Site Location:	Greenhills Road. Tallaght		
Design Storm Return Period:	100 years		
Climate Change Factor:	20 %		
Soil Type:	2		
Total Site Area:	0.99 ha		
Green Roof	0.17 ha	.....@	70% Impervious
Permeable Paving	0.05 ha	.....@	70% Impervious
Hardstand Area:	0.36 ha	.....@	80% Impervious
Softstand Area:	0.42 ha	.....@	20% Impervious
Effective Impermeable Area:	0.37 ha		

Allowable Outflow	**Calculate**	
IH124: $QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$		
AREA:	0.01 km^2	
SAAR:	1015 mm	From Met Office
SOIL:	0.3	
QBAR/ha	2.81 l/s/ha	
Allowable Outflow	**2.8 l/s**	Smallest Allowable Discharge Rate (2l/s)

Storage required =	**348 m^3**	

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71iA) (l/s)	Proposed Runoff (m^3)	Contiguous Land Runoff (m^3)	Total Runoff (m^3)	Allowable Outflow (m^3)	Storage Required (m^3)
5	17.6	21.1	253.4	255	77	0	77	1	76
10	24.6	29.5	177.1	178	107	0	107	2	105
15	28.9	34.7	138.7	140	126	0	126	3	123
30	36.5	43.8	87.6	88	159	0	159	5	154
60	46.0	55.2	55.2	56	200	0	200	10	190
120	58.1	69.7	34.9	35	253	0	253	20	233
180	66.6	79.9	26.6	27	290	0	290	30	260
240	73.3	88.0	22.0	22	319	0	319	40	279
360	84.1	100.9	16.8	17	366	0	366	60	305
540	96.3	115.6	12.8	13	419	0	419	90	328
720	106.1	127.3	10.6	11	461	0	461	121	341
1080	121.6	145.9	8.1	8	529	0	529	181	348
1440	134.0	160.8	6.7	7	583	0	583	241	342
2880	148.1	177.7	3.7	4	644	0	644	483	162
4320	160.1	192.1	2.7	3	696	0	696	724	-27
5760	170.6	204.7	2.1	2	742	0	742	965	-223
8640	188.9	226.7	1.6	2	822	0	822	1448	-626
11520	204.9	245.9	1.3	1	891	0	891	1930	-1039
14400	219.2	263.0	1.1	1	953	0	953	2413	-1459
17280	232.4	278.9	1.0	1	1011	0	1011	2895	-1884
23040	256.3	307.6	0.8	1	1115	0	1115	3860	-2745
28800	277.9	333.5	0.7	1	1209	0	1209	4825	-3616
36000	302.7	363.2	0.6	1	1317	0	1317	6031	-4715

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.500	Minimum Backdrop Height (m)	0.000
Ratio R	0.264	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	0.900
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Inverts

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	21.659	0.108	200.5	0.061	4.00	0.0	0.600	o	300
1.001	23.972	0.120	199.8	0.000	0.00	0.0	0.600	o	300
1.002	37.761	0.189	199.8	0.125	0.00	0.0	0.600	o	300
1.003	18.386	0.092	199.8	0.233	0.00	0.0	0.600	o	300
1.004	18.663	0.093	200.7	0.000	0.00	0.0	0.600	o	300
1.005	22.797	0.091	250.5	0.000	0.00	0.0	0.600	o	300
1.006	2.442	0.012	203.5	0.000	0.00	0.0	0.600	o	225
1.007	22.191	0.111	199.9	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.33	88.295	0.061	0.0	0.0	0.0	1.11	78.2	8.3
1.001	50.00	4.69	88.187	0.061	0.0	0.0	0.0	1.11	78.4	8.3
1.002	50.00	5.25	88.067	0.186	0.0	0.0	0.0	1.11	78.4	25.2
1.003	50.00	5.53	87.878	0.419	0.0	0.0	0.0	1.11	78.4	56.8
1.004	50.00	5.81	87.786	0.419	0.0	0.0	0.0	1.11	78.2	56.8
1.005	50.00	6.20	87.693	0.419	0.0	0.0	0.0	0.99	69.9	56.8
1.006	50.00	4.04	87.600	0.000	2.8	0.0	0.0	0.91	36.3	2.8
1.007	50.00	4.45	87.588	0.000	2.8	0.0	0.0	0.92	36.6	2.8

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SWMH1	89.720	1.425	Open Manhole	1050	1.000	88.295	300				
SWMH2	90.100	1.913	Open Manhole	1200	1.001	88.187	300	1.000	88.197	300	
SWMH3	89.850	1.783	Open Manhole	1050	1.002	88.067	300	1.001	88.067	300	
SWMH4	89.850	1.972	Open Manhole	1200	1.003	87.878	300	1.002	87.878	300	
SWMH5	89.720	1.934	Open Manhole	1200	1.004	87.786	300	1.003	87.786	300	
SWMH6	89.500	1.807	Open Manhole	1200	1.005	87.693	300	1.004	87.693	300	
SWMH7	89.500	1.900	Open Manhole	1200	1.006	87.600	225	1.005	87.602	300	77
SWMH8	89.500	1.912	Open Manhole	1200	1.007	87.588	225	1.006	87.588	225	
SWMH9	88.800	1.323	Open Manhole	0		OUTFALL		1.007	87.477	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	SWMH1	89.720	88.295	1.125	Open Manhole	1050
1.001	o	300	SWMH2	90.100	88.187	1.613	Open Manhole	1200
1.002	o	300	SWMH3	89.850	88.067	1.483	Open Manhole	1050
1.003	o	300	SWMH4	89.850	87.878	1.672	Open Manhole	1200
1.004	o	300	SWMH5	89.720	87.786	1.634	Open Manhole	1200
1.005	o	300	SWMH6	89.500	87.693	1.507	Open Manhole	1200
1.006	o	225	SWMH7	89.500	87.600	1.675	Open Manhole	1200
1.007	o	225	SWMH8	89.500	87.588	1.687	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	21.659	200.5	SWMH2	90.100	88.187	1.613	Open Manhole	1200
1.001	23.972	199.8	SWMH3	89.850	88.067	1.483	Open Manhole	1050
1.002	37.761	199.8	SWMH4	89.850	87.878	1.672	Open Manhole	1200
1.003	18.386	199.8	SWMH5	89.720	87.786	1.634	Open Manhole	1200
1.004	18.663	200.7	SWMH6	89.500	87.693	1.507	Open Manhole	1200
1.005	22.797	250.5	SWMH7	89.500	87.602	1.598	Open Manhole	1200
1.006	2.442	203.5	SWMH8	89.500	87.588	1.687	Open Manhole	1200
1.007	22.191	199.9	SWMH9	88.800	87.477	1.098	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	90	0.068	0.061	0.061
1.001	-	-	90	0.000	0.000	0.000
1.002	-	-	90	0.139	0.125	0.125
1.003	-	-	90	0.259	0.233	0.233
1.004	-	-	90	0.000	0.000	0.000
1.005	-	-	90	0.000	0.000	0.000
1.006	-	-	90	0.000	0.000	0.000
1.007	-	-	90	0.000	0.000	0.000
				Total	Total	Total
				0.466	0.419	0.419

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	SWMH9	88.800	87.477	87.590	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	20.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.500	Storm Duration (mins)	15
Ratio R	0.264		

Online Controls for Storm

Depth/Flow Relationship Manhole: SWMH7, DS/PN: 1.006, Volume (m³): 3.7

Invert Level (m) 87.600

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	2.8000	1.400	2.8000	2.600	2.8000	3.800	2.8000	5.000	2.8000
0.400	2.8000	1.600	2.8000	2.800	2.8000	4.000	2.8000	5.200	2.8000
0.600	2.8000	1.800	2.8000	3.000	2.8000	4.200	2.8000	5.400	2.8000
0.800	2.8000	2.000	2.8000	3.200	2.8000	4.400	2.8000	5.600	2.8000
1.000	2.8000	2.200	2.8000	3.400	2.8000	4.600	2.8000	5.800	2.8000
1.200	2.8000	2.400	2.8000	3.600	2.8000	4.800	2.8000	6.000	2.8000

Storage Structures for Storm

Tank or Pond Manhole: SWMH7, DS/PN: 1.006

Invert Level (m) 87.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	188.0	0.600	188.0	1.200	188.0	1.701	0.0	2.400	0.0
0.100	188.0	0.700	188.0	1.300	188.0	1.900	0.0	2.500	0.0
0.200	188.0	0.800	188.0	1.400	188.0	2.000	0.0		
0.300	188.0	0.900	188.0	1.500	188.0	2.100	0.0		
0.400	188.0	1.000	188.0	1.600	188.0	2.200	0.0		
0.500	188.0	1.100	188.0	1.700	188.0	2.300	0.0		

Summary of Results for 15 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	89.372	0.777	0.000	0.31	0.0	21.1	SURCHARGED
1.001	SWMH2	89.350	0.863	0.000	0.35	0.0	24.6	SURCHARGED
1.002	SWMH3	89.330	0.963	0.000	0.84	0.0	61.0	SURCHARGED
1.003	SWMH4	89.191	1.013	0.000	2.10	0.0	141.8	SURCHARGED
1.004	SWMH5	88.766	0.680	0.000	2.08	0.0	140.6	SURCHARGED
1.005	SWMH6	88.354	0.361	0.000	2.26	0.0	139.7	SURCHARGED
1.006	SWMH7	88.011	0.186	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 30 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	89.095	0.500	0.000	0.27	0.0	18.8	SURCHARGED
1.001	SWMH2	89.075	0.588	0.000	0.29	0.0	20.1	SURCHARGED
1.002	SWMH3	89.056	0.689	0.000	0.77	0.0	55.9	SURCHARGED
1.003	SWMH4	88.941	0.763	0.000	1.89	0.0	127.8	SURCHARGED
1.004	SWMH5	88.605	0.519	0.000	1.88	0.0	127.1	SURCHARGED
1.005	SWMH6	88.274	0.281	0.000	2.05	0.0	126.8	SURCHARGED
1.006	SWMH7	88.157	0.332	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 45 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.798	0.203	0.000	0.23	0.0	15.6	SURCHARGED
1.001	SWMH2	88.781	0.294	0.000	0.23	0.0	15.7	SURCHARGED
1.002	SWMH3	88.764	0.397	0.000	0.65	0.0	47.3	SURCHARGED
1.003	SWMH4	88.681	0.503	0.000	1.59	0.0	107.4	SURCHARGED
1.004	SWMH5	88.450	0.364	0.000	1.58	0.0	106.6	SURCHARGED
1.005	SWMH6	88.250	0.257	0.000	1.73	0.0	106.9	SURCHARGED
1.006	SWMH7	88.242	0.417	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 60 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.605	0.010	0.000	0.20	0.0	13.9	SURCHARGED
1.001	SWMH2	88.592	0.105	0.000	0.19	0.0	13.3	SURCHARGED
1.002	SWMH3	88.578	0.211	0.000	0.55	0.0	39.7	SURCHARGED
1.003	SWMH4	88.524	0.346	0.000	1.36	0.0	91.9	SURCHARGED
1.004	SWMH5	88.366	0.280	0.000	1.35	0.0	91.1	SURCHARGED
1.005	SWMH6	88.312	0.319	0.000	1.46	0.0	90.4	SURCHARGED
1.006	SWMH7	88.305	0.480	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 90 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.455	-0.140	0.000	0.17	0.0	11.5	OK
1.001	SWMH2	88.445	-0.042	0.000	0.15	0.0	10.6	OK
1.002	SWMH3	88.435	0.068	0.000	0.42	0.0	30.6	SURCHARGED
1.003	SWMH4	88.423	0.245	0.000	1.04	0.0	70.5	SURCHARGED
1.004	SWMH5	88.412	0.326	0.000	1.04	0.0	70.0	SURCHARGED
1.005	SWMH6	88.402	0.409	0.000	1.13	0.0	69.7	SURCHARGED
1.006	SWMH7	88.396	0.571	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 120 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.493	-0.102	0.000	0.14	0.0	9.6	OK
1.001	SWMH2	88.491	0.004	0.000	0.13	0.0	9.2	SURCHARGED
1.002	SWMH3	88.490	0.123	0.000	0.37	0.0	26.5	SURCHARGED
1.003	SWMH4	88.485	0.307	0.000	0.88	0.0	59.8	SURCHARGED
1.004	SWMH5	88.476	0.390	0.000	0.88	0.0	59.2	SURCHARGED
1.005	SWMH6	88.467	0.474	0.000	0.95	0.0	58.7	SURCHARGED
1.006	SWMH7	88.462	0.637	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 180 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.580	-0.015	0.000	0.11	0.0	7.5	OK
1.001	SWMH2	88.579	0.092	0.000	0.10	0.0	7.2	SURCHARGED
1.002	SWMH3	88.578	0.211	0.000	0.29	0.0	20.8	SURCHARGED
1.003	SWMH4	88.574	0.396	0.000	0.69	0.0	46.5	SURCHARGED
1.004	SWMH5	88.567	0.481	0.000	0.68	0.0	46.0	SURCHARGED
1.005	SWMH6	88.561	0.568	0.000	0.74	0.0	45.7	SURCHARGED
1.006	SWMH7	88.557	0.732	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 240 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.642	0.047	0.000	0.09	0.0	6.1	SURCHARGED
1.001	SWMH2	88.641	0.154	0.000	0.08	0.0	5.9	SURCHARGED
1.002	SWMH3	88.640	0.273	0.000	0.23	0.0	17.0	SURCHARGED
1.003	SWMH4	88.636	0.458	0.000	0.57	0.0	38.2	SURCHARGED
1.004	SWMH5	88.631	0.545	0.000	0.56	0.0	38.0	SURCHARGED
1.005	SWMH6	88.626	0.633	0.000	0.61	0.0	37.8	SURCHARGED
1.006	SWMH7	88.622	0.797	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 360 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.719	0.124	0.000	0.07	0.0	4.6	SURCHARGED
1.001	SWMH2	88.719	0.232	0.000	0.06	0.0	4.4	SURCHARGED
1.002	SWMH3	88.718	0.351	0.000	0.18	0.0	12.7	SURCHARGED
1.003	SWMH4	88.715	0.537	0.000	0.43	0.0	28.9	SURCHARGED
1.004	SWMH5	88.711	0.625	0.000	0.43	0.0	28.7	SURCHARGED
1.005	SWMH6	88.707	0.714	0.000	0.46	0.0	28.6	SURCHARGED
1.006	SWMH7	88.704	0.879	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 720 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.802	0.207	0.000	0.04	0.0	2.8	SURCHARGED
1.001	SWMH2	88.802	0.315	0.000	0.04	0.0	2.7	SURCHARGED
1.002	SWMH3	88.801	0.434	0.000	0.11	0.0	7.8	SURCHARGED
1.003	SWMH4	88.800	0.622	0.000	0.27	0.0	17.9	SURCHARGED
1.004	SWMH5	88.797	0.711	0.000	0.26	0.0	17.8	SURCHARGED
1.005	SWMH6	88.794	0.801	0.000	0.29	0.0	17.8	SURCHARGED
1.006	SWMH7	88.791	0.966	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 1440 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.791	0.196	0.000	0.03	0.0	1.8	SURCHARGED
1.001	SWMH2	88.791	0.304	0.000	0.02	0.0	1.7	SURCHARGED
1.002	SWMH3	88.790	0.423	0.000	0.07	0.0	4.9	SURCHARGED
1.003	SWMH4	88.788	0.610	0.000	0.16	0.0	11.1	SURCHARGED
1.004	SWMH5	88.786	0.700	0.000	0.16	0.0	11.1	SURCHARGED
1.005	SWMH6	88.783	0.790	0.000	0.18	0.0	11.1	SURCHARGED
1.006	SWMH7	88.780	0.955	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Summary of Results for 2880 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SWMH1	88.628	0.033	0.000	0.02	0.0	1.1	SURCHARGED
1.001	SWMH2	88.628	0.141	0.000	0.02	0.0	1.1	SURCHARGED
1.002	SWMH3	88.628	0.261	0.000	0.04	0.0	3.1	SURCHARGED
1.003	SWMH4	88.626	0.448	0.000	0.10	0.0	7.0	SURCHARGED
1.004	SWMH5	88.623	0.537	0.000	0.10	0.0	7.0	SURCHARGED
1.005	SWMH6	88.620	0.627	0.000	0.11	0.0	6.9	SURCHARGED
1.006	SWMH7	88.617	0.792	0.000	0.10	0.0	2.8	SURCHARGED
1.007	SWMH8	87.631	-0.182	0.000	0.08	0.0	2.8	OK

Cronin & Sutton Consulting		Page 1
31a Westland Square Pearse Street Dublin 2	D092-GREENHILLS NURSING HOME SURFACE WATER NETWORK +20% CLIMATE CHANGE	Micro Drainage
Date DECEMBER 2021 File D092-SW NETWORK.MDX	Designed by DD Checked by	
Micro Drainage	Network W.12.6	

MH Name	SWMH4	SWMH3	SWMH2	SWMH1
Hor Scale 700 Ver Scale 100 Datum (m) 86.000				
PN		1.002	1.001	1.000
Dia (mm)		300	300	300
Slope (1:X)		199.8	199.8	200.5
Cover Level (m)	89.850	89.850	90.100	89.720
Invert Level (m)	87.878	88.067 / 88.067	88.187 / 88.187	88.295
Length (m)		37.761	23.972	21.659

MH Name	SWMH9	SWMH8	SWMH6	SWMH5	SWMH4
Hor Scale 700 Ver Scale 100 Datum (m) 85.000					
PN		1.007	1.005	1.004	1.003
Dia (mm)		225	300	300	300
Slope (1:X)		199.9	250.5	200.7	199.8
Cover Level (m)	88.800	89.500	89.500	89.720	89.850
Invert Level (m)	87.477	87.588	87.602 / 87.693	87.693 / 87.786	87.786 / 87.878
Length (m)		22.191	22.797	18.663	18.386

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	0.000
Persons per House	2.70	Min Design Depth for Optimisation (m)	0.000
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
F1.000	25.576	0.426	60.0	0.000	0	0.0	1.500	o	225
F1.001	26.716	0.267	100.0	0.000	0	0.0	1.500	o	225
F1.002	45.690	0.457	100.0	0.000	0	0.0	1.500	o	225

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	89.295	0.000	0.0	0	0.0	0	0.00	1.48	59.0	0.0
F1.001	87.869	0.000	0.0	0	0.0	0	0.00	1.15	45.6	0.0
F1.002	87.602	0.000	0.0	0	0.0	0	0.00	1.15	45.6	0.0

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	225	FFMH1	89.720	89.295	1.200	Open Manhole	1050
F1.001	o	225	FFMH2	90.100	87.869	2.006	Open Manhole	1200
F1.002	o	225	FFMH3	89.850	87.602	2.023	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	25.576	60.0	FFMH2	90.100	87.869	2.006	Open Manhole	1200
F1.001	26.716	100.0	FFMH3	89.850	87.602	2.023	Open Manhole	1200
F1.002	45.690	100.0	FFMH4	89.600	87.145	2.230	Open Manhole	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.002	FFMH4	89.600	87.145	87.145	0	0

MH Name	FFMH3	FFMH2	FFMH1	
Hor Scale 700 Ver Scale 100 Datum (m) 86.000				
PN		F1.001	F1.000	
Dia (mm)		225	225	
Slope (1:X)		100.0	60.0	
Cover Level (m)	89.850	90.100	89.720	
Invert Level (m)	87.602	87.869	87.869 88.295	
Length (m)		26.716	25.576	

MH Name	FFMH4	FFMH3	
Hor Scale 700 Ver Scale 100 Datum (m) 85.000			
PN		F1.002	
Dia (mm)		225	
Slope (1:X)		100.0	
Cover Level (m)	89.600	89.850	
Invert Level (m)	87.145	87.602	
Length (m)		45.690	