CONSULTING ENGINEERS

ENGINEERING REPORT FOR:

NEW HOUSES AT

ST. FRANCIS, OWENDORE AVENUE, RATHFARNHAM, DUBLIN 14

SOUTH DUBLIN COUNTY COUNCIL

ADDITIONAL INFORMATION REQUEST

DECISION ORDER NUMBER: 1085

REGISTER REFERENCE: SD22A/0288

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Table of Contents

1.0 Introduction

RS Consulting Engineers were requested to prepare a civil engineering part of planning application for demolition of existing detached bungalow and construction of 2 No. 264m² detached two storey 4 bedroom dwelling houses and associated site works. This report should be read in conjunction with all other planning documents.

This report addresses the following items:

- Proposed wastewater drainage system
- Proposed surface water system
- Proposed water connection
- Proposed swept-path analysis

2.0 Proposed wastewater drainage system

- North-west house - it is proposed to re-use existing connection with existing Irish Water wastewater pipe located on public road
- South-east house - it is proposed to tie the new wastewater network into existing foul water system located on public road.

For details, please refer to drawing no. 22-253-C01

All proposed works will be carried out in accordance with South Dublin Council Drainage Department, Irish Water and Building Regulations requirements.

3.0 Proposed wastewater drainage system levels

STRUCTURE ID	COVER LEVEL	ENTRY INVERT LEVEL	INVERT LEVEL	DISTANCE	FALL	PIPE INTERNAL DIAMETER	STRUCTURE DEPTH
(X)	M	M	M	M	1: x	MM	M
F1	49.000		48.100				0.900
F2	48.900	48.025	48.025	4.5	60	100	0.875
SADDLE CONNECTION	48.970	47.940	47.712	5.1	60	100	1.258

4.0 Proposed surface water system

Proposed surface water system was designed for 100 year return period plus 20% increase in rainfall depth for climate change.

SUDS is a fundamental change in the overall approach to drainage design with the primary aim of replicating the natural processes. This involves incorporating source control techniques which endeavour to mimic the natural movement of storm water from a development, reducing flood risk downstream, enhancing water quality and provide an improved environment.

In aiming to achieve this, it was intended that the following systems would be adopted as part of the scheme:

- Permeable Pavement - system A - total infiltration
- Permeable Pavement - system C - no infiltration
- Two separated rainwater harvesting systems

For details, please refer to drawing C01

All proposed works will be carried out in accordance with South Dublin County Council Drainage Department, Greater Dublin Regional Code of Practice for Drainage Works and Building Regulations requirements.

5.0 Proposed Water Connection

- North-west house - it is proposed to re-use existing connection with existing Irish Water water main pipe located on public road
- South-east house - it is proposed to tie the new service pipe and Irish Water approved boundary box into existing water main pipe located on public road.

For details, please refer to drawing no. 22-253-C01

All proposed works will be carried out in accordance with Irish Water and Building Regulations requirements.

6.0 Proposed swept-path Analysis

For details, please refer to drawing no. 22-253-C02 showing full swept-path analysis for 5.079m long large car.

7.0 Met Eireann Return Period Rainfall Depths

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 314169, Northing: 228777,

	Interval		Years								
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100
5 mins	2.6,	3.8,	4.5,	5.5,	6.2,	6.8,	8.6,	10.8,	12.2,	14.3,	16.1,	17.6
10 mins	3.6,	5.3,	6.3,	7.7,	8.7,	9.4,	12.0,	15.0,	17.0,	19.9,	22.5,	24.5
15 mins	4.3,	6.3,	7.4,	9.0,	10.2,	11.1,	14.1,	17.7,	20.0,	23.4,	26.5,	28.8
30 mins	5.6,	8.2,	9.5,	11.6,	13.1,	14.2,	17.9,	22.2,	25.1,	29.1,	32.8,	35.7
1 hours	7.4,	10.6,	12.4,	15.0,	16.8,	18.1,	22.7,	27.9,	31.4,	36.3,	40.7,	44.1
2 hours	9.8,	13.9,	16.0,	19.3,	21.5,	23.2,	28.8,	35.1,	39.3,	45.2,	50.5,	54.5
3 hours	11.6,	16.2,	18.7,	22.4,	24.8,	26.8,	33.1,	40.2,	44.8,	51.4,	57.2,	61.7
4 hours	13.0,	18.1,	20.8,	24.8,	27.5,	29.7,	36.5,	44.2,	49.2,	56.3,	62.6,	67.4
6 hours	15.3,	21.1,	24.2,	28.8,	31.9,	34.2,	41.9,	50.5,	56.2,	64.0,	71.0,	76.3
9 hours	18.0,	24.7,	28.2,	33.4,	36.8,	39.5,	48.2,	57.8,	64.0,	72.8,	80.5,	86.4
12 hours	20.2,	27.6,	31.4,	37.1,	40.8,	43.8,	53.1,	63.5,	70.3,	79.7,	88.0,	94.3
18 hours	23.8,	32.2,	36.6,	43.0,	47.2,	50.5,	61.0,	72.7,	80.2,	90.6,	99.8,	106.8
24 hours	26.8,	35.9,	40.7,	47.7,	52.4,	55.9,	67.4,	79.9,	88.0,	99.3,	109.1,	116.6
2 days	33.2,	43.7,	49.1,	56.9,	62.0,	65.9,	78.4,	91.9,	100.5,	112.4,	122.7,	130.6
3 days	38.5,	50.0,	55.8,	64.3,	69.8,	74.0,	87.3,	101.7,	110.8,	123.3,	134.1,	142.2
4 days	43.0,	55.4,	61.7,	70.7,	76.6,	81.1,	95.1,	110.2,	119.8,	132.8,	144.0,	152.5
6 days	51.0,	65.0,	72.0,	82.0,	88.4,	93.3,	108.6,	125.0,	135.3,	149.3,	161.2,	170.3
8 days	58.1,	73.4,	81.0,	91.8,	98.7,	104.0,	120.4,	137.9,	148.8,	163.6,	176.3,	185.8
10 days	64.6,	81.0,	89.2,	100.7,	108.1,	113.7,	131.1,	149.5,	161.0,	176.6,	189.8,	199.8
12 days	70.7,	88.1,	96.8,	109.0,	116.8,	122.7,	141.0,	160.3,	172.3,	188.5,	202.3,	212.7
16 days	81.9,	101.3,	110.8,	124.2,	132.8,	139.2,	159.1,	179.9,	192.9,	210.3,	225.1,	236.1
20 days	92.3,	113.4,	123.7,	138.1,	147.4,	154.3,	175.6,	197.8,	211.6,	230.1,	245.7,	257.4
25 days	104.5,	127.5,	138.7,	154.3,	164.3,	171.7,	194.6,	218.4,	233.1,	252.8,	269.4,	281.8

8.0 Wastewater network hydraulic calculations

Number of Discharge Units per Dwelling:	14	units
Self-cleansing velocity when flowing half full:	0.75 to 3	m/s
Pipe Roughness Co-efficient (K_s):	0.6	for < 30 units
	1.5	for > 30 units

Pipe No.	Total number of dwellings / residential units	Irish Water		Building Regulations		BS 8301:1985		Number of Discharge units	Proposed pipe		Actual		Full Bore		Proportional flow	Discharge Velocity	Proportional Depth
		Minimum gradient	Diameter	Minimum gradient	Diameter	Minimum gradient	Diameter		Proposed gradient	Proposed diameter	Flow Q	Velocity v	Flow Q_p	Velocity v_p	Q/Q_p		
P	No.	1 in	mm	1 in	mm	1 in	mm	units	1 in	mm	l/s	m/s	l/s	m/s	OK?	OK?	OK?
F1-F2	1	60	100	60	100	95	100	14	60	100	2.59	0.75	6.18	0.79	OK	OK	OK
F2-SADD	1	60	100	60	100	95	100	14	60	100	2.59	0.75	6.18	0.79	OK	OK	OK

9.0 Permeable pavement hydraulic calculations

HYDRAULIC CALCULATIONS FOR PERMABLE PAVEMENT - SYSTEM A - TOTAL INFILTRATION - NORTH-WEST HOUSE

	Infiltration rate (m/sec):	Infiltration rate (m/h):
Infiltration test BRE 365	0.00000133	0.00479

Description	Area (m^2)	Runoff coefficient	Net Area (m^2)
Roof, permeable pavement	243.0	0.9	218.7
Open space (garden, grass, plants)	75.0	0.1	7.5
		TOTAL:	226.2

n - porosity of sub-base including surrounding areas:	0.73	
q - infiltration coefficient:	0.004788	m/h
A_D - area to be drained:	226.2	m^2
A_b - base area of infiltration system:	43.7	m^2
R - drainage ratio = A_D/A_b	5.18	
$H_{max} = (D \times (R \times I - q))/n$		

D - storm duration	Rainfall 100 year storm + 20% increase in rainfall depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 314169, Northing: 228777	i - rainfall intensity	H_{max} - maximum depth of water in permeable pavement system:
[h]	[m]	[m/h]	[m]
0.083	0.02112	0.2534	0.149
0.2	0.02940	0.1764	0.207
0.3	0.03456	0.1382	0.243
0.5	0.04284	0.0857	0.300
1.0	0.05292	0.0529	0.369
2.0	0.06540	0.0327	0.451
3.0	0.07404	0.0247	0.505
4.0	0.08088	0.0202	0.547
6.0	0.09156	0.0153	0.610
9.0	0.10368	0.0115	0.676
12.0	0.11316	0.0094	0.724
18.0	0.12816	0.0071	0.791
24.0	0.13992	0.0058	0.835
48.0	0.15672	0.0033	0.796
72.0	0.17064	0.0024	0.738
96.0	0.18300	0.0019	0.668
144.0	0.20436	0.0014	0.505
192.0	0.22296	0.0012	0.322
240.0	0.23976	0.0010	0.126
288.0	0.25524	0.0009	- 0.079
384.0	0.28332	0.0007	- 0.510
480.0	0.30888	0.0006	- 0.958
600.0	0.33816	0.0006	- 1.538

From table above, H_{max} is: 0.835 m

HYDRAULIC CALCULATIONS FOR PERMABLE PAVEMENT - SYSTEM A - TOTAL INFILTRATION - SOUTH-EAST HOUSE

	Infiltration rate (m/sec):	Infiltration rate (m/h):
Infiltration test BRE 365	0.00000133	0.00479

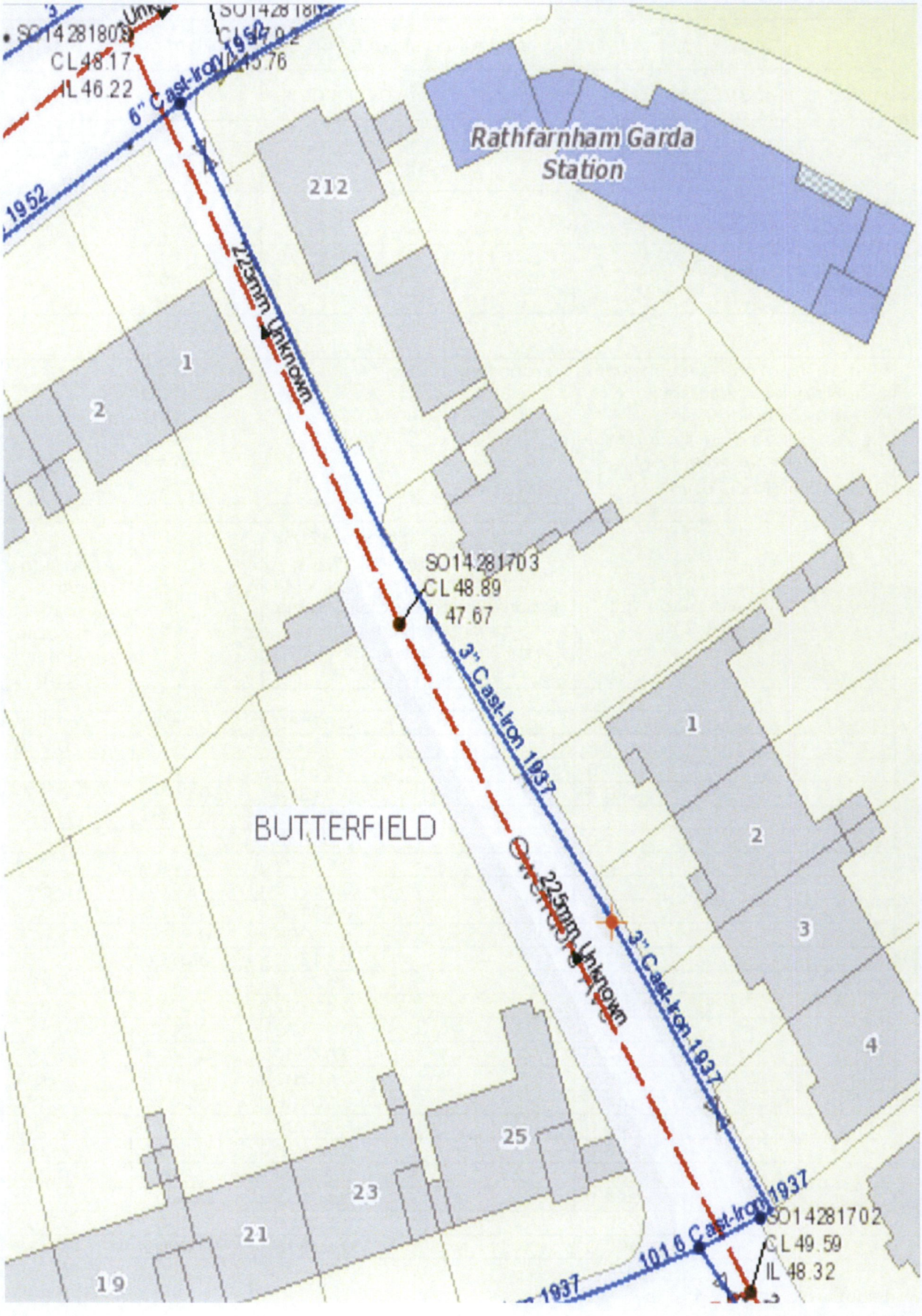
Description	Area (m^2)	Runoff coefficient	Net Area (m^2)
Roof, permeable pavement	247.0	0.9	222.3
Open space (garden, grass, plants)	90.0	0.1	9.0
		TOTAL:	231.3

n - porosity of sub-base including surrounding areas:	0.78	
q - infiltration coefficient:	0.004788	m/h
A_D - area to be drained:	247.0	m^2
A_b - base area of infiltration system:	44.9	m^2
R - drainage ratio = A_D/A_b	5.50	
$H_{max} = (D \times (R \times I - q))/n$		

D - storm duration	Rainfall 100 year storm + 20% increase in rainfall depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 314169, Northing: 228777	i - rainfall intensity	H_{max} - maximum depth of water in permeable pavement system:
[h]	[m]	[m/h]	[m]
0.083	0.02112	0.2534	0.148
0.2	0.02940	0.1764	0.206
0.3	0.03456	0.1382	0.242
0.5	0.04284	0.0857	0.299
1.0	0.05292	0.0529	0.367
2.0	0.06540	0.0327	0.449
3.0	0.07404	0.0247	0.504
4.0	0.08088	0.0202	0.546
6.0	0.09156	0.0153	0.609
9.0	0.10368	0.0115	0.676
12.0	0.11316	0.0094	0.724
18.0	0.12816	0.0071	0.793
24.0	0.13992	0.0058	0.839
48.0	0.15672	0.0033	0.811
72.0	0.17064	0.0024	0.762
96.0	0.18300	0.0019	0.701
144.0	0.20436	0.0014	0.557
192.0	0.22296	0.0012	0.394
240.0	0.23976	0.0010	0.218
288.0	0.25524	0.0009	0.032
384.0	0.28332	0.0007	- 0.359
480.0	0.30888	0.0006	- 0.768
600.0	0.33816	0.0006	- 1.298

From table above, H_{max} is: 0.839 m

10.0 Irish Water Web Map showing existing services



Appendix A: Infiltration Test

Existing ground water and rock not recorded at 1.0m BCL

Infiltration test photographs

Infiltration Test

Trial Pit Dimensions:

Length =	1 m
Width =	1 m
Depth =	1 m
Effective Depth =	0.5 m

Volume Outflowing between 75% and 25% effective depth:

V_{p75} = 0.25 m^3

Mean Surface Area through which outflow occurs:
(pit sides to 50% effective depth and pit base)

a_{p50} = 2 m^2

Time for outflow between 75% and 25% effective depth:

t_{p75-25} = 1560 minutes

Soil infiltration rate:

f = 1.33547E-06 m/s

Infiltration calculation