CLIENT: Cork City Council
Comhairle Cathrach Chorcaí

PROJECT: CNWQR Phase 1D East

DOCUMENT TITLE: Services Report

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1.0 INTRODUCTION

1.1 Background

Cork City Council intend to construct 14 no. new dwellings on a brown field site on Dunmore Gardens. The proposed development consists of:

- a 3-storey apartment block with 3 no. 2-bedroom units (one on the ground floor apartment and two no. duplex apartments over)
- an adjoining terrace of 6 no. 3-storey, 3-bedroom houses
- a terrace of 5 no. 2-storey, 3-bedroom houses

Cork City Council have engaged DJF Engineering Services Ltd. to provide Engineering services in relation to the preparation of the information package for this development.

1.2 Cork City North West Quarter Regeneration

This project forms part of the CNWQR. Subsequent phases of the CNWQR will include works to the roads and services immediately to the north and east of the site. These works will include road realignment works and the provision of separated main drainage systems.

The services have ben designed to connect to the existing combined sewers in this area while allowing for future connections to new downstream separated main drainage systems constructed as part of future phases of the CNWQR scheme.

1.3 Scope

This Services Report sets out the Engineering approach taken for the proposed development in relation to storm water discharge, foul water discharge, and water & fire fighting supply.

2.0 STORM WATER DISCHARGE

2.1 General

This section sets out how storm water from rainfall on roofs and new hardstanding areas associated with the new development is proposed to be dealt with.

2.2 Existing Drainage

The existing drainage system on Dunmore Gardens is a combined system with storm water and foul water discharging to a combined sewer. There is also a combined sewer under Kilmore Road Lower to the south.

2.3 Proposed Storm Water Drainage

From previous site investigations on the site, the site is underlain by sands and gravels. These soils have a high permeability and therefore an increased capacity for storm water discharge. Further site testing in accordance with BRE Digest is proposed in advance of detailed design. For the purpose of this report, conservative values for soil permeability have been assumed and used in the calculations in the appendices.

Given the limited plot sizes due to the requirements for housing density, it is proposed to discharge storm water from the rear roofs of the housing units to ground via plane infiltration systems positioned in the rear garden of each house.

The proposed storm water design includes several SuDS measures to limit the inflow of storm water to the existing combined sewer network in the area.

These include:

- plane infiltration devices where space is available in the rear gardens of the houses to discharge storm water from rear roofs of houses to ground.
- permeable surfacing for private paths and patios

- perforated oversized pipe to allow infiltration of storm water from the front roofs, the roof of the apartment block and driveways to ground for storm events up to 6 months while also providing attenuation for storm events up to the 100 year storm event. This pipe will be perforated and bedded in filter material and allow for infiltration to ground. Discharge flows from this pipe to the existing combined sewer will also be limited by a "hydrobrake" type flow limiting device to provide attenuation.

Calculations for the proposed plane infiltration systems, and for the oversized pipe for attenuation are included in the appendices. All storm water systems proposed are designed for a 100 year storm plus 20% increase in rainfall depth (for climate change).

2.4 Sustainable Urban Drainage Systems

The proposed storm water design includes several SuDS measures to limit the inflow of storm water to the existing combined sewer network in the area.

These include:

- plane infiltration devices where space is available in the rear gardens of the houses to discharge storm water from rear roofs of houses to ground.
- permeable surfacing for private paths and patios
- perforated oversized pipe to allow infiltration of storm water from the front roofs, the roof of the apartment block and driveways to ground for storm events up to 6 months while also providing attenuation for storm events up to the 100 year storm event.

2.5 Arbutus Drive Drainage

The proposed site layout includes a new cul-de-sac on the eastern side of the site. A later phase of the City North West Quarter Regeneration will involve the

extension of this cul-de-sac to the south to form Arbutus Drive. The location and orientation of this cul-de-sac has been set out as per the CNWQR masterplan.

Existing services in this area limit the space for a connection to the existing combined sewer to the north on Dunmore Gardens. Therefore, as a temporary measure until later phases of the CNWQR are completed, it is proposed to connect the two no. proposed stormwater gullies on the cul-de-sac to the existing combined sewer on Kilmore Road Lower. The storm sewer on the cul-de-sac is to be extended in later phases of the CNWQR when this cul-de-sac will be extended to form Arbutus Drive.

3.0 FOUL WATER DISCHARGE

3.1 Existing Drainage

The existing drainage system on Dunmore Gardens is a combined system.

3.2 Proposed Foul Water Drainage

It is proposed to extend the existing combined system west under Dunmore Gardens to allow for connections to the proposed western terrace of 5 no. 2-storey houses. All other units are proposed to connect to the existing combined sewer in accordance with Uisce Eireann details.

A pre-connection enquiry to Uisce Eireann has been submitted for this development. The Uisce Éireann Pre-Connection Enquiry Reference Number is CDS250004613. A confirmation of feasibility has subsequently been received from Uisce Eireann.

4.0 WATER & FIRE FIGHTING SUPPLY

4.1 Water Supply

There is currently no existing Uisce Éireann water supply to the site. It is proposed to connect to the existing watermain on Dunmore Gardens to the north of the site.

A pre-connection enquiry to Uisce Eireann has been submitted for this development. The Uisce Éireann Pre-Connection Enquiry Reference Number is CDS250004613. A confirmation of feasibility has subsequently been received from Uisce Eireann.

4.2 Fire Fighting Supply

There are several existing fire hydrants available for fire fighting in the vicinity of the development. Refer to DJF drawing 5027-DJF-EXE-_0-DR-C-0003 for details. No additional fire hydrants are proposed as all housing units are within 46m of an existing hydrant.

5.0 SITE LAYOUT

5.1 General

Refer to Cork City Council Architect's Site Layout drawing.

5.2 Road Layout

The proposed site layout includes a new cul-de-sac on the eastern side of the site. A later phase of the City North West Quarter Regeneration will involve the extension of this cul-de-sac to the south to form Arbutus Drive. The location and orientation of this cul-de-sac has been set out as per the CNWQR masterplan.

The site layout for this development including driveways and front boundary walls allows for the later development of Christy O'Shea Road to the north of the development as part of subsequent phases of the CNWQR. The future Christy O'Shea Road is planned to replace the existing Dunmore Gardens road to the north of the site and is planned to include a cycle path as well as footpaths and green verges.

6.0 HISTORICAL AERIAL PHOTO OF THE SITE

6.1 General

From Geohive MapGenie Imagery (1996-2000):

7.0 PROPOSED DRAINAGE LAYOUT

7.1 General

Refer to DJF drawings 5027-DJF-EXE-_0-DR-C-0001 & 5027-DJF-EXE-_0-DR-C-0002 for details of the proposed storm and foul drainage.

8.0 PROPOSED WATERMAIN LAYOUT

8.1 General

Refer to DJF drawing 5027-DJF-EXE-_0-DR-C-0003 for details of the existing and proposed water main layout.

9.0 APPENDICES

See overleaf.

9.1 Met Eireann Rainfall Data

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 165779, Northing: 73147,

	Interval		Years													
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	3.1,	4.1,	4.6,	5.3,	5.9,	6.2,	7.5,	8.8,	9.7,	10.9,	11.9,	12.7,	13.9,	14.8,	15.6,	N/A ,
10 mins	4.3,	5.7,	6.4,	7.5,	8.2,	8.7,	10.4,	12.3,	13.5,	15.2,	16.6,	17.7,	19.4,	20.7,	21.7,	N/A ,
15 mins	5.0,	6.7,	7.5,	8.8,	9.6,	10.2,	12.2,	14.4,	15.9,	17.8,	19.5,	20.8,	22.8,	24.3,	25.6,	N/A ,
30 mins	6.7,	8.8,	9.9,	11.5,	12.5,	13.3,	15.8,	18.5,	20.3,	22.7,	24.7,	26.3,	28.7,	30.5,	32.0,	N/A ,
1 hours	9.0,	11.7,	13.1,	15.0,	16.3,	17.3,	20.4,	23.8,	25.9,	28.8,	31.4,	33.3,	36.2,	38.3,	40.1,	N/A ,
2 hours	12.1,	15.5,	17.2,	19.7,	21.3,	22.6,	26.4,	30.5,	33.1,	36.7,	39.7,	42.0,	45.5,	48.1,	50.3,	N/A ,
3 hours	14.4,	18.3,	20.3,	23.1,	24.9,	26.3,	30.7,	35.3,	38.3,	42.2,	45.7,	48.2,	52.1,	55.0,	57.4,	N/A ,
4 hours	16.2,	20.6,	22.8,	25.9,	27.9,	29.4,	34.1,	39.2,	42.4,	46.7,	50.4,	53.2,	57.3,	60.5,	63.0,	N/A ,
6 hours	19.3,	24.3,	26.8,	30.3,	32.6,	34.3,	39.7,	45.4,	49.0,	53.8,	57.9,	61.0,	65.6,	69.1,	72.0,	N/A ,
9 hours	22.9,	28.7,	31.5,	35.5,	38.1,	40.1,	46.1,	52.5,	56.5,	61.9,	66.5,	70.0,	75.1,	79.0,	82.2,	N/A ,
12 hours	25.9,	32.2,	35.4,	39.8,	42.6,	44.7,	51.4,	58.3,	62.6,	68.5,	73.5,	77.2,	82.7,	86.9,	90.3,	N/A ,
18 hours	30.8,	38.0,	41.6,	46.6,	49.8,	52.3,	59.7,	67.5,	72.4,	78.9,	84.4,	88.6,	94.7,	99.3,	103.1,	N/A ,
24 hours	34.8,	42.8,	46.7,	52.2,	55.7,	58.3,	66.5,	74.9,	80.2,	87.2,	93.2,	97.7,	104.3,	109.3,	113.3,	126.6,
2 days	44.0,	53.4,	57.9,	64.3,	68.3,	71.3,	80.6,	90.1,	96.0,	103.9,	110.6,	115.5,	122.8,	128.2,	132.6,	147.2,
3 days	51.7,	62.2,	67.3,	74.3,	78.8,	82.1,	92.3,	102.8,	109.2,	117.8,	125.0,	130.4,	138.3,	144.2,	148.9,	164.6,
4 days	58.5,	70.0,	75.6,	83.3,	88.1,	91.7,	102.7,	114.0,	120.9,	130.1,	137.8,	143.6,	152.0,	158.3,	163.3,	179.9,
6 days	70.7,	84.0,	90.4,	99.1,	104.6,	108.7,	121.2,	133.9,	141.6,	151.9,	160.5,	166.9,	176.2,	183.2,	188.7,	207.1,
8 days	81.8,	96.6,	103.6,	113.3,	119.4,	124.0,	137.6,	151.6,	160.1,	171.3,	180.7,	187.6,	197.8,	205.3,	211.4,	231.2,
10 days	92.1,	108.3,	116.0,	126.5,	133.1,	138.0,	152.9,	167.9,	177.1,	189.2,	199.3,	206.7,	217.6,	225.7,	232.1,	253.3,
12 days	101.8,	119.3,	127.6,	138.9,	146.1,	151.3,	167.2,	183.3,	193.1,	206.0,	216.7,	224.6,	236.2,	244.7,	251.6,	274.0,
16 days	120.2,	140.1,	149.4,	162.2,	170.2,	176.1,	193.9,	211.9,	222.8,	237.1,	249.0,	257.8,	270.6,	280.1,	287.6,	312.4,
20 days	137.5,	159.5,	169.9,	184.0,	192.8,	199.3,	218.9,	238.6,	250.5,	266.1,	279.1,	288.6,	302.5,	312.8,	321.0,	347.8,
25 days	158.2,	182.7,	194.2,	209.8,	219.6,	226.8,	248.3,	270.0,	283.1,	300.2,	314.4,	324.8,	340.0,	351.2,	360.1,	389.3,

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

9.2 SuDS calculations for permeable surfacing to walkways & patios

HYDRAULIC CALCULATION FOR SUDS COMPONENTS: PERMEABLE SURFACE CONSTRUCTED WITH NATURAL STONE OR FLAGS WITH 10MM THICK SPACERS SYSTEM A - TOTAL INFILTRATION FOR BACK PATIOS AND WALKWAYS AROUND HOUSES AND APARTMENT BLOCK

Infiltration rate: 1.0E-06 m / sec = 0.003600 m / h

Note: For details please refer to Ground Investigation Report: infiltraton rate for sandy gravelly clay

n - total porosity of system directly over infiltration base	0.30	
q - infiltration coefficient:	0.003600	m/h
A_D - area to be drained:	319	m^2
R - Run-off Co-efficient:	0.90	
A_b - base area of infiltration system:	255	m^2
R - drainage ratio = A_D/A_b	1.13	

$H_{max} = (D \times (R \times I - q))/n$

D - storm duration	Rainfall (100 year storm + 20% increase in depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 165779, Northing: 073147	i - rainfall intensity	H_{max} - maximum depth of water in sub-base with 30% air voids
[h]	[m]	[m/h]	[m]
0.083	0.0152	0.1829	0.056
0.2	0.0212	0.1274	0.078
0.3	0.0250	0.0998	0.091
0.5	0.0316	0.0631	0.112
1.0	0.0400	0.0400	0.138
2.0	0.0504	0.0252	0.165
3.0	0.0578	0.0193	0.181
4.0	0.0638	0.0160	0.191
6.0	0.0732	0.0122	0.203
9.0	0.0840	0.0093	0.207
12.0	0.0926	0.0077	0.203
18.0	0.1063	0.0059	0.183
24.0	0.1172	0.0049	0.152
48.0	0.1386	0.0029	- 0.056
72.0	0.1565	0.0022	- 0.277
96.0	0.1723	0.0018	- 0.506
144.0	0.2003	0.0014	- 0.977
192.0	0.2251	0.0012	- 1.460
240.0	0.2480	0.0010	- 1.950
288.0	0.2695	0.0009	- 2.445
384.0	0.3094	0.0008	- 3.448
480.0	0.3463	0.0007	- 4.461
600.0	0.3898	0.0006	- 5.738

From table above, H_{max} is: 0.207 m

9.3 Plane infiltration system calculations for Houses 1 to 5

HYDRAULIC CALCULATION FOR SUDS COMPONENTS: PLANE INFILTRATION SYSTEMS AT THE BACK GARDENS FOR HOUSES 1 TO 5

Infiltration rate: 1.0E-06 m / sec = 0.003600 m / h

Note: For details please refer to Ground Investigation Report: infiltraton rate for sandy gravelly clay

n - total porosity of system directly over infiltration base	0.40	
q - infiltration coefficient:	0.003600	m/h
A_D - area to be drained:	30	m^2
R - Run-off Co-efficient:	0.90	
A_b - base area of infiltration system:	8.0	m^2
R - drainage ratio = A_D/A_b	3.40	

$H_{max} = (D \times (R \times I - q))/n$

D - storm duration	Rainfall (100 year storm + 20% increase in depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 165779, Northing: 073147	i - rainfall intensity	H_{max} - maximum depth of water in sub-base with 40% air voids
[h]	[m]	[m/h]	[m]
0.083	0.0152	0.1829	0.129
0.2	0.0212	0.1274	0.179
0.3	0.0250	0.0998	0.210
0.5	0.0316	0.0631	0.264
1.0	0.0400	0.0400	0.330
2.0	0.0504	0.0252	0.410
3.0	0.0578	0.0193	0.464
4.0	0.0638	0.0160	0.506
6.0	0.0732	0.0122	0.568
9.0	0.0840	0.0093	0.632
12.0	0.0926	0.0077	0.679
18.0	0.1063	0.0059	0.741
24.0	0.1172	0.0049	0.780
48.0	0.1386	0.0029	0.745
72.0	0.1565	0.0022	0.681
96.0	0.1723	0.0018	0.600
144.0	0.2003	0.0014	0.405
192.0	0.2251	0.0012	0.184
240.0	0.2480	0.0010	- 0.053
288.0	0.2695	0.0009	- 0.303
384.0	0.3094	0.0008	- 0.828
480.0	0.3463	0.0007	- 1.378
600.0	0.3898	0.0006	- 2.089

From table above, H_{max} is: 0.780 m

9.4 Plane infiltration system calculations for Houses 6 to 11

HYDRAULIC CALCULATION FOR SUDS COMPONENTS: PLANE INFILTRATION SYSTEMS AT THE BACK GARDENS FOR HOUSES 6 TO 11

Infiltration rate: 1.0E-06 m / sec = 0.003600 m / h

Note: For details please refer to Ground Investigation Report: infiltraton rate for sandy gravelly clay

n - total porosity of system directly over infiltration base	0.40	
q - infiltration coefficient:	0.003600	m/h
A_D - area to be drained:	24	m^2
R - Run-off Co-efficient:	0.90	
A_b - base area of infiltration system:	6.5	m^2
R - drainage ratio = A_D/A_b	3.29	

$H_{max} = (D \times (R \times I - q))/n$

D - storm duration	Rainfall (100 year storm + 20% increase in depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 165779, Northing: 073147	i - rainfall intensity	H_{max} - maximum depth of water in sub-base with 40% air voids
[h]	[m]	[m/h]	[m]
0.083	0.0152	0.1829	0.125
0.2	0.0212	0.1274	0.173
0.3	0.0250	0.0998	0.203
0.5	0.0316	0.0631	0.255
1.0	0.0400	0.0400	0.320
2.0	0.0504	0.0252	0.397
3.0	0.0578	0.0193	0.449
4.0	0.0638	0.0160	0.489
6.0	0.0732	0.0122	0.548
9.0	0.0840	0.0093	0.610
12.0	0.0926	0.0077	0.654
18.0	0.1063	0.0059	0.713
24.0	0.1172	0.0049	0.749
48.0	0.1386	0.0029	0.709
72.0	0.1565	0.0022	0.640
96.0	0.1723	0.0018	0.554
144.0	0.2003	0.0014	0.352
192.0	0.2251	0.0012	0.125
240.0	0.2480	0.0010	- 0.119
288.0	0.2695	0.0009	- 0.374
384.0	0.3094	0.0008	- 0.910
480.0	0.3463	0.0007	- 1.470
600.0	0.3898	0.0006	- 2.193

From table above, H_{max} is: 0.749 m

9.5 SuDS infiltration calculation for 300mm diam. Pipe

HYDRAULIC CALCULATION FOR SUDS COMPONENTS: PROPOSED 300Ø UPVC PERFORATED PIPE LAID IN 900 WIDE X 600 HIGH TRENCH FILLED WITH FILTER MATERIAL TO CLAUSE 505 TYPE B WITH 40% AIR VOIDS

Infiltration rate: 1.0E-06 m / sec = 0.003600 m / h

Note: For details please refer to Ground Investigation Report: infiltraton rate for sandy gravelly clay

n - total porosity of system directly over infiltration base	0.48	
q - infiltration coefficient:	0.003600	m/h
A_D - area to be drained:	820	m^2
R - Run-off Co-efficient:	0.90	
A_b - base area of infiltration system:	73	m^2
R - drainage ratio = A_D/A_b	10.05	

$H_{max} = (D \times (R \times I - q))/n$

D - storm duration	Rainfall (6 months storm + 20% increase in depth (climate change) Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 165779, Northing: 073147	i - rainfall intensity	H_{max} - maximum depth of water in system
[h]	[m]	[m/h]	[m]
0.083	0.0032	0.0389	0.067
0.2	0.0044	0.0266	0.092
0.3	0.0053	0.0211	0.109
0.5	0.0070	0.0139	0.142
1.0	0.0092	0.0092	0.186
2.0	0.0124	0.0062	0.244
3.0	0.0145	0.0048	0.281
4.0	0.0164	0.0041	0.314
6.0	0.0194	0.0032	0.362
9.0	0.0229	0.0025	0.412
12.0	0.0258	0.0022	0.450
18.0	0.0305	0.0017	0.503
24.0	0.0344	0.0014	0.541
48.0	0.0425	0.0009	0.529
72.0	0.0492	0.0007	0.490
96.0	0.0553	0.0006	0.438
144.0	0.0661	0.0005	0.304
192.0	0.0760	0.0004	0.150
240.0	0.0852	0.0004	- 0.016
288.0	0.0938	0.0003	- 0.195
384.0	0.1102	0.0003	- 0.574
480.0	0.1255	0.0003	- 0.972
600.0	0.1439	0.0002	- 1.488

From table above, H_{max} is: 0.541 m

9.6 QBAR calculation

Report IoH 124 Method of Calculating Q_{bar}

SOIL INDEX

$S_1 \ldots S_5$ denotes the proportions of the catchment covered by each of the soil classes 1 to 5.

S_1 =	0 %	
S_2 =	0 %	
S_3 =	0 %	
S_4 =	100 %	RUNOFF POTENTIAL: HIGH
S_5 =	0 %	

$$SOIL = \frac{(0.15S_1 + 0.30S_2 + 0.40S_3 + 0.45S_4 + 0.5S_5)}{S_1 + S_2 + S_3 + S_4 + S_5}$$

SOIL = **0.45** %

AREA = **0.5** Km^2 50 Ha

SAAR = **1089** mm MET EIREANN DATA
Irish Grid: Easting: 166000, Northing: 73000

$Q_{bar} = 0.00108 \times (AREA\ km^2)^{0.89} \times (SAAR\ mm)^{1.17} \times (SOIL\ \%)^{2.17}$

Q_{bar} = 0.368 m^3/s 368.4 l/s 7.4 l/s/ha

9.7 Storm water attenuation calculation

STORM WATER ATTENUTATION CALCULATION FOR PROPOSED 300Ø UPVC PERFORATED PIPE LAID IN 900 WIDE X 600 HIGH TRENCH FILLED WITH FILTER MATERIAL TO CLAUSE 505 TYPE B WITH 40% AIR VOIDS

Total Site Area =	2,321	m^2
Total Site Area =	0.2321	ha
Q_{bar}	7.4	l/s/ha
Below calculation are for proposed warehouse extension:		
100 year throttle rate growth curve factor (Irish) =	1.90	
100 year greenfield limiting discharge rate =	3.3	l/s

Catchment area description	Area (m^2)	Runoff coefficient	Net Area (m^2)
Front roofs of houses + whole roof of apartment block	428.2	0.90	385.4
Private driveways	391.4	0.90	352.3
TOTAL:	819.6		737.6

100 year storm + 20% increase for climate change in rainfall depth

Permissible Volume (l)= Actual Achievable Outflow (l/s) x time (s)
Actual Volume (l)= (Impermeable Area x depth of rainfall)
Storage capacity (l)= Actual - Permissible Volumes

Rainfall data:

Met Eireann Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 165779, Northing: 73147

Duration	Rainfall	Permissible Volume	Actual Volume	Storage capacity
min	mm	m^3	m^3	m^3
5	15.240	1.0	11.2	10.3
10	21.240	2.0	15.7	13.7
15	24.960	2.9	18.4	15.5
30	31.560	5.9	23.3	17.4
60	39.960	11.7	29.5	17.7
120	50.400	23.5	37.2	13.7
180	57.840	35.2	42.7	7.4
240	63.840	47.0	47.1	0.1
360	73.200	70.5	54.0	- 16.5
540	84.000	105.7	62.0	- 43.8
720	92.640	141.0	68.3	- 72.6
1,080	106.320	211.5	78.4	- 133.0
1,440	117.240	282.0	86.5	- 195.5
2,880	138.600	563.9	102.2	- 461.7
4,320	156.480	845.9	115.4	- 730.4
5,760	172.320	1,127.8	127.1	- 1,000.7
8,640	200.280	1,691.7	147.7	- 1,544.0
11,520	225.120	2,255.6	166.1	- 2,089.6
14,400	248.040	2,819.5	183.0	- 2,636.5
17,280	269.520	3,383.4	198.8	- 3,184.6
23,040	309.360	4,511.2	228.2	- 4,283.0
28,800	346.320	5,639.0	255.5	- 5,383.6
36,000	389.760	7,048.8	287.5	- 6,761.3

From table above, required storage volume is:	17.7	m^3
From table above, critical storm duration is :	60	min
Maximum hydrobrake discharge :	3.3	l/s

9.8 Storm water network calculations

Rainfall Intensity roof =	75	mm/hr	RSDW, DOE, 1998, 3.4
Rainfall Intensity paved =	50	mm/hr	RSDW, DOE, 1998, 3.4
Storm Return Period =	5	years	RSDW, DOE, 1998, Table 3.1
Self cleansing Velocity =	0.8-3	m/s	RSDW, DOE, 1998, 3.4
Roof Vol. run-off coeffiecient =		0.9	
Paved Vol. run-off coeffiecient =		0.9	
Pipe Roughness K_s =	0.6	mm	

Pipe No.	Impermeable Area (A_p)		Gradient	Diameter	Actual Rate of Flow	Accumulative Rate of Flow	Discharge Velocity	Capacity Full bore flow	Full Bore Velocity	Proportional flow	Discharge Velocity	Proportional Depth
	Roof (A_{p1})	Paved (A_{p2})			Q	Q_t	v	Q_p	v_p	Q/Q_p		
	m^2	m^2	1 in	mm	l/s	l/s	m/s	l/s	m/s	OK?	OK?	OK?
S1-S2	151	209	40	300	5.4	5.4	1.13	176.0	2.49	OK	OK	OK
S2-S3-S4	293	391	80	300	10.4	10.4	1.08	124.2	1.76	OK	OK	OK
S4-S5-S6	428	391	100	300	12.9	12.9	1.06	111.0	1.57	OK	OK	OK
S6-S7			60	225	3.3	3.3	0.88	67.2	1.69	OK	OK	OK

9.9 Foul water network calculations

Number of Discharge Units per Dwelling:	14	
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.	Accumulative No. of residential units	Irish Water		Building Regulations		BS 8301:1985		Number of Discharge units	Actual		Full Bore		Proportional flow	Discharge Velocity	Proportional Depth	Proposed Network	
		Fall	Internal Ø	Fall	Internal Ø	Fall	Internal Ø		Flow Q	Velocity v	Flow Q_p	Velocity v_p	Q/Q_p			Fall	Internal Ø
P	No.	1 in	mm	1 in	mm	1 in	mm	units	l/s	m/s	l/s	m/s	OK?	OK?	OK?	1 in	mm
WASTEWATER OUTLET FROM EACH HOUSE	1.0	N/A	N/A	60	100	90	100	14	2.59	0.77	6.35	0.81	OK	OK	OK	60	100
WASTEWATER OUTLET APARTMENT BLOCK (3 APARTMENTS)	3.0	60	150	100	100	100	150	42	3.19	0.76	17.72	1.00	OK	OK	OK	60	150

9.10 Uisce Eireann Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Fergus Humphries

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Douglas Road
Cork
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Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

15 July 2025

Our Ref: CDS25004613 Pre-Connection Enquiry
Site at, Knocknaheeny, Dunmore Gardens, Cork City

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 14 unit(s) at Site at, Knocknaheeny, Dunmore Gardens, Cork City, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible without infrastructure upgrade by Uisce Éireann
- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

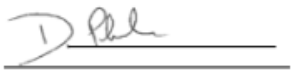
Where can you find more information?

- **Section A -** What is important to know?

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit **www.water.ie/connections, email newconnections@water.ie** or contact 1800 278 278.

Yours sincerely,



Dermot Phelan
Connections Delivery Manager