Proposed Residential Development at the Former Chivers Factory Site, Coolock Drive, Coolock, Dublin 17

Water Services and Flood Risk Assessment Report

March 2019
Issue 04

1753

CORA Consulting Engineers
Behan House,
10 Lower Mount St
Dublin 2
Tel: 01-661-1100
Fax: 01-661-1119
E: info@cora.ie

CORA
CONSULTING ENGINEERS

Table of Contents

1 Introduction

1.1 General

It is proposed to construct a new residential development on the site of the former Chivers Factory Site on Coolock Drive, Coolock, Dublin. The existing factory buildings shall be completely demolished and the site cleared to allow for the construction of the new development. Site clearance works shall be carried out as part of this planning application.

The new development shall consist of 495 build to rent apartments formed in 4 No. Main Blocks with provisions for parking, open space and other facilities as well as a building that includes a café, gym and crèche.

This report examines the site services currently provided & proposed for the site and shall include drainage provision with regard to the potential for flooding on the site and the area more generally.

1.2 Reference Documents

The following documents were referred to during the preparation of this report:

- Greater Dublin Strategic Drainage Study;
- Greater Dublin Regional Code of Practice for Drainage Works – V6.0;
- Technical Guidance Document to Part H of the Building Regulations – Drainage and Waste Water Disposal – 2010;
- Department of the Environment – Recommendations for Site Development Works for Housing Areas;
- BRE – Green Roofs and Façades;
- CIRIA C753 – The SuDS Manual; and
- CIBSE Guide – Volume B – Installation and Equipment Data

2 Site Details

2.1 General - Layout

The site covers a total area of approximately 3.86Ha which includes 3.61 Ha at the Chivers Factory Site and a further 0.25Ha at lands in Dublin City Council control. The development area for the residential area and amenities covers an area of approximately 2.53Ha. This entire area is considered impermeable with the large factory building and surrounding hard landscaping occupying the site. Nominal areas of soft landscaping feature within the existing site.

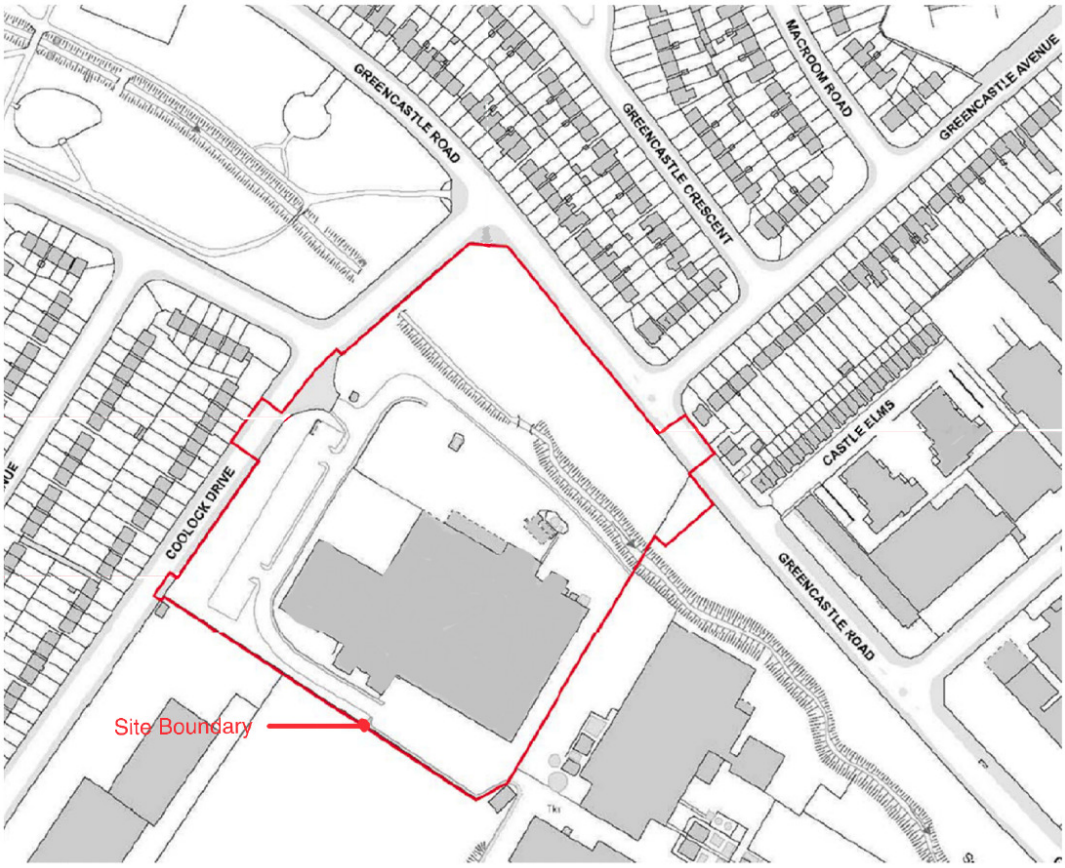
Access to the site is from Coolock Drive on the western boundary. Boundaries to the south and east are to adjoining industrial and retail sites.

The Santry River, located in a cutting in the order of 4m below the general site level, forms a natural boundary to the north with the greenfield space located on the north side of the river being an amenity space with further amenity space to the south of the river.

3 Foul Water Drainage

3.1 Existing Drainage

Coolock Drive is served by a 300mm diameter concrete foul sewer which connects to a 450mm diameter trunk sewer just opposite the intersection with Adare Road. This 450mm diameter trunk sewer continues east through the development site running parallel to the Santry River. Public water services records are shown below.



3.2 Proposed Drainage

As the trunk 450mm diameter public foul sewer passes through the development site it is proposed that it be diverted locally such that the sewer is located under a main access road in the new development and the necessary wayleaves are provided. All proposed drainage works shall comply with Irish Water Standards.

Foul discharge calculations from the proposed development are contained within Appendix A of this report. It is proposed that a new connection to the public system be made to the diverted 450mm diameter trunk sewer as shown on CORA Drawing 1753/C001 and C003.

Pre-existing connections to the public system from the former Factory shall be extinguished.

4 Surface Water Drainage

4.1 Existing Drainage

Rainwater run-off from the existing site is collected via gutters and downpipes from the existing factory roof and gulleys in the hard landscaped areas within the site. The surface water from the whole site is discharged to the Santry River.

4.2 Proposed Drainage

It is proposed to provide a fully separated Surface Water Drainage System and to retain Storm Water within the site with minimal run off via terraced swales forming a new wetland landscaping feature at the south bank of the Santry River. The proposed strategy dramatically reduces the run-off from the site to the public system as a sustainable system shall be implemented on site for the first time.

Soakaway tests carried out on the site show that the sub-soils have insufficient permeability for soakaways to be used as the primary treatment for surface water runoff.

The drainage strategy adopted would significantly improve the water quality discharging from the site such that there is indirect run-off to the Santry River. The process follows a treatment train whereby rain-water from the roofs of the buildings passes through a combination of sedum roofs and soft landscaping features at the courtyard levels. Rainwater downpipes discharge into below ground linear bio-retention features that contain suitable materials surrounding a perforated pipe to allow excess run-off fall toward the discharge point at the terraced wetland on the Southern bank of the Santry River. The storm water run-off also serves to irrigate the soft landscaping on the site.

The southern bank shall be regraded with suitable material to allow the run-off to be intercepted and pass through, eventually finding its way naturally to the river. The overall effect being that storm water has a more natural route from the source to the river and the quality is significantly improved through the various treatments.

Hard and soft landscaping on the site are integrated with the drainage strategy to allow run-off from the ground level surfacing to enter the linear bio-retention features via permeable and soft surfacing and through open channel features.

Details of the surface water strategy is shown on CORA drawing nos. 1753/C001, C002 and C004.

See Appendix B of this Report for surface water drainage calculations.

5 Water Supply

The proposed new water supply will be taken from the public network on Coolock Drive where it will be directed around the site in accordance with Irish Water codes of Practice.
Fire hydrants & firefighting strategy shall be covered by the project fire consultant as part of the fire certificate application for the development.

6 Flood Risk Assessment

6.1 Introduction

The purpose of the flood risk assessment is to both identify and quantify the potential of flooding of the proposed development from all potential flood risks including coastal, fluvial, pluvial flooding and from public sewers and groundwater. The risk will be quantified on a numerical scale from 1 (Very Low) to 5 (Very High).

In addition, the impact of the proposed development is assessed to examine the impact that the development may have on adjoining properties in relation to flooding.

6.2 Scope

The compilation of the following flood risk assessment is based on a desk study compiling information obtained from Dublin City Council Flood Resilience City Projects Office, Ordnance Survey maps, Dublin Port, on-site topographical survey and the Office of Public Works (OPW) flood maps and reports.

A search was carried out centred on the site of the proposed development: this returned no flood events near the site - See Appendix C of this report.

6.3 Post-Development Flooding Characteristics

The following sources of potential flooding have been considered:

6.3.1 Coastal flooding

The site is approximately 4km from the sea and 38m above sea level. The risk posed from Coastal sources can be classed as zero (Not applicable).

6.3.2 Fluvial flooding

Fluvial or river flooding occurs where the capacity of the conveying watercourse (river or stream) is exceeded as a result of heavy rainfall, or blockage, and water overspills the banks of the water course.

The Santry River is located within the site. However the normal water level in the River is located more than 3m below the site in a V-Shaped cutting and any significant rise in water levels during a storm event shall be well below the general site level.

The current risk posed by Fluvial sources has not produced any flooding on the site and the proposals shall reduce the risk therefore the risk of flooding to the development from Fluvial Sources can be classed as 1 (Very Low).

6.3.3 Pluvial flooding

Pluvial flooding, or flooding from precipitation, occurs where rain water, or other precipitation, flowing over a surface exceeds the infiltration capacity of the ground.

No flooding incidents have been recorded in the site due to pluvial waters incident on the site or in any areas near the site.

The current risk posed by Pluvial sources has not produced any flooding on the site and the proposals shall reduce the risk therefore the risk of flooding to the development from Pluvial Sources can be classed as 1 (Very Low).

6.3.4 Flooding from public sewers

Invert levels of the public sewers near the site indicate that flooding from these sewers is unlikely on the site.

There is no record of this type of flooding in this location and with respect to the relevant levels it is considered unlikely to occur in future. The risk of flooding from public sewers can be classed as 1 (very low).

6.3.5 Flooding from ground water sources

Flooding from ground water sources occurs when the Water Table rises. The typical levels have not presently been determined for the site, however geological tests to date indicate that the water table is in excess of 2m below the general site level which would be consistent for the geological conditions encountered on the site.

Flooding as a result of groundwater occurs when the level of the underlying water table rises, as a result of sustained rainfall, to a level exceeding the ground level. This has not occurred on the site to date

With regard to the above flooding via ground water is considered very unlikely to pose a risk to the development or the area more generally and is classed as 1 (Very Low).

6.4 Conclusion

Based on the assessment above and the proposals for the development of the site was are fo the opinion that he site has a an overall risk level of 1 (vert Low).

Therefore drainage and flood risk issues shall not arise in the proposed development that would be outside the requirements of the Drainage Division of the Local Authority.

7 Appendix A – Foul Water Calculations

		Job Name: Chivers Site, Coolock	Accommodation Schedule						
		Job No: 334							
Block		Level	Number of Bedrooms Per Unit						
Build to Let			Studio	1 Bed	2 Bed(3 people)	2 Bed	3 Bed	10% larger	Dual Aspect
A1	1	Ground Floor		7		3		10	6
	2	First Floor	4	2		4	2	8	8
	3	Second Floor	2	4		4	2	10	8
	4	Third Floor	4	2		4	2	8	8
	5	Fourth Floor	2	4		4	2	8	8
	6	Fifth Floor	4	2		4	2	8	8
	7	Sixth Floor		4		4		8	8
	8	Seventh Floor		4		4		6	8
	9	Eight Floor		4		4		8	8
	10	Ninth Floor				4		4	4
A2	1	Ground Floor		7		3		10	6
	2	First Floor	4	2		4	2	8	8
	3	Second Floor	2	4		4	2	10	8
	4	Third Floor	4	2		4	2	8	8
	5	Fourth Floor	2	4		4	2	8	8
	6	Fifth Floor	4	2		4	2	8	8
	7	Sixth Floor		4		4		8	8
	8	Seventh Floor		4		4		6	8
	9	Eight Floor		4		4		8	8
	10	Ninth Floor				4		4	4
		Sub-Total A1 & A2	32	66	0	78	20	156	148
			16.33%	33.67%	0.00%	39.80%	10.20%	79.59%	75.51%
		TOTAL UNITS A1 & A2					196		
B	1	Ground Floor	1	7		5	19	31	25
	2	First Floor	3	7		4	6	17	9
	3	Second Floor	3	11	1	19	13	36	22
	4	Third Floor	2	10	1	16	11	32	18
	5	Fourth Floor	4	1	1	5	7	13	13
	6	Fifth Floor	4	1		2	6	9	10
	7	Sixth Floor	1	1			1	2	3
		Sub-Total B1	18	38	3	51	63	140	100
			10.40%	21.97%	1.73%	29.48%	36.42%	80.92%	57.80%
		TOTAL UNITS B					173		
C	1	Ground Floor		3		10	9	21	19
	2	First Floor	2	5		4	1	8	6
	3	Second Floor	3	12		16	2	19	14
	4	Third Floor	2	12		12	2	19	10
	5	Fourth Floor	2	6		3	6	12	12
	6	Fifth Floor	2	6		1	2	6	10
	7	Sixth Floor		2			1	3	3
		Sub-Total C	11	46	0	46	23	85	71
			8.73%	36.51%	0.00%	36.51%	18.25%	67.46%	56.35%
		TOTAL UNITS C					126		
		All Residential	61	150	3	175	106	381	319
		Percentage Breakd	12.32%	30.30%	0.61%	35.35%	21.41%	76.97%	64.44%
		Total # Apartments					495		

CORA CONSULTING ENGINEERS
Behan House
10 Lower Mount Street
Dublin
D02 HT71
t: +353 1 6611100
e: info@cora.ie

Job No.	Ref No.	Rev
1753		PL2
Chivers Site		Page No. 1/1
By: JPC	Checked: KO'M	
Title: FS Drainage: No. of People	Date: 13-Feb-2019	

Drainage Input Data

	Studio	1 Bed	2 Bed (3 People)	2 Bed	3 Bed
No. of People Assumed	2	2	3	4	5

	No. of Bedrooms per Unit				
	Studio	1 Bed	2 Bed (3 People)	2 Bed	3 Bed
Block A1	16	35	0	49	10
Block A2	16	35	0	49	10
Block B	18	45	3	44	67
Block C	16	50	0	52	15
Creche	30	0	0	0	0

	No. of People per Unit					
	Studio	1 Bed	2 Bed (3 People)	2 Bed	3 Bed	
Block A1	32	70	0	196	50	**348 ppl**
Block A2	32	70	0	196	50	**348 ppl**
Block B	36	90	9	176	335	**646 ppl**
Block C	32	100	0	208	75	**415 ppl**
Creche	60	0	0	0	0	**60 ppl**
						1817 ppl

MicroDrainage analysis foul drainage based on No. of Houses (Units) & No. of People per Unit.
As there are varying sizes of units, the analysis will be based on total no. per Block divided by No. of People (3 per House/Unit) divided by amount of manholes per Block.

Block A1:	3	[No. of Manholes in MicroDrainage]
Block A1:	3	[No. of Manholes in MicroDrainage]
Block B:	1	[No. of Manholes in MicroDrainage]
Block C:	1	[No. of Manholes in MicroDrainage]
Creche:	2	[No. of Manholes in MicroDrainage]

Block A1:	116.0	[No. of Houses in MicroDrainage] :	**38.7**	[No. of Houses per Manhole in MicroDrainage]
Block A1:	116.0	[No. of Houses in MicroDrainage] :	**38.7**	[No. of Houses per Manhole in MicroDrainage]
Block B:	215.33	[No. of Houses in MicroDrainage] :	**215.3**	[No. of Houses per Manhole in MicroDrainage]
Block C:	138.33	[No. of Houses in MicroDrainage] :	**138.3**	[No. of Houses per Manhole in MicroDrainage]
Creche:	20.0	[No. of Houses in MicroDrainage] :	**10.0**	[No. of Houses per Manhole in MicroDrainage]

CORA		Page 1
Behan House, 10 Lower Mount Street Dublin D02 HT71	1753 Chivers Site Surface & Foul Drainage	Micro Drainage
Date 13/02/2019 11:29 File 1753 - Surface & Foul Drainage ...	Designed by JPC/KOM Checked by JFC	
XP Solutions	Network 2018.1	

Code of Practice used:
IW-CDS-5020-03
IW-CDS-5030-03

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)	0.200
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
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

IW: cl. 3.7.2
Average Value

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)	Section Type	Auto Design
F1.000	7.714	0.096	80.4	0.000	215	0.0	1.500	o	150	Pipe/Conduit	
F1.001	9.043	0.113	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F2.000	7.097	0.089	79.7	0.000	138	0.0	1.500	o	150	Pipe/Conduit	
F2.001	7.454	0.093	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.002	49.293	0.616	80.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F3.000	16.515	0.206	80.2	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
F4.000	4.818	0.060	80.3	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F5.000	4.329	0.054	80.2	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F4.001	9.819	0.123	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.001	58.355	0.729	80.0	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
F3.002	5.906	0.074	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	

Block B
Block C
Block A1
Creche
Creche
Block A1

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	33.246	0.000	0.0	215	0.0	65	0.92	0.98	17.3	6.7
F1.001	33.150	0.000	0.0	215	0.0	65	0.92	0.98	17.3	6.7
F2.000	33.239	0.000	0.0	138	0.0	51	0.81	0.98	17.3	4.3
F2.001	33.150	0.000	0.0	138	0.0	51	0.81	0.98	17.3	4.3
F1.002	33.037	0.000	0.0	353	0.0	71	1.02	1.28	51.0	11.0
F3.000	33.150	0.000	0.0	39	0.0	27	0.56	0.98	17.3	1.2
F4.000	33.150	0.000	0.0	10	0.0	14	0.36	0.98	17.3	0.3
F5.000	33.150	0.000	0.0	10	0.0	14	0.36	0.98	17.3	0.3
F4.001	33.090	0.000	0.0	20	0.0	20	0.45	0.98	17.3	0.6
F3.001	32.944	0.000	0.0	98	0.0	43	0.74	0.98	17.3	3.1
F3.002	32.214	0.000	0.0	98	0.0	43	0.74	0.98	17.3	3.1

CORA		Page 2
Behan House, 10 Lower Mount Street Dublin D02 HT71	1753 Chivers Site Surface & Foul Drainage	Micro Drainage
Date 13/02/2019 11:29 File 1753 - Surface & Foul Drainage ...	Designed by JPC/KOM Checked by JFC	
XP Solutions	Network 2018.1	

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)	Section Type	Auto Design
Block A1	F6.000	5.578	0.070	79.7	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
Block A2	F7.000	6.485	0.081	80.1	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
	F6.001	28.614	0.358	80.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
	F1.003	45.291	0.226	200.0	0.000	0	0.0	1.500	o	450	Pipe/Conduit	
Block A2	F8.000	27.110	0.339	80.0	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
Block A2	F9.000	21.839	0.273	80.0	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
	F8.001	2.256	0.028	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
	F1.004	25.246	0.126	200.0	0.000	0	0.0	1.500	o	450	Pipe/Conduit	
	F1.005	21.453	0.107	200.0	0.000	0	0.0	1.500	o	450	Pipe/Conduit	

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)
F6.000	33.150	0.000	0.0	39	0.0	27	0.56	0.98	17.3	1.2
F7.000	33.150	0.000	0.0	39	0.0	27	0.56	0.98	17.3	1.2
F6.001	33.069	0.000	0.0	78	0.0	34	0.66	1.28	51.1	2.4
F1.003	29.845	0.000	0.0	529	0.0	87	0.77	1.27	202.7	16.5
F8.000	33.150	0.000	0.0	39	0.0	27	0.56	0.98	17.3	1.2
F9.000	33.150	0.000	0.0	39	0.0	27	0.56	0.98	17.3	1.2
F8.001	32.811	0.000	0.0	78	0.0	38	0.69	0.98	17.3	2.4
F1.004	29.619	0.000	0.0	607	0.0	93	0.80	1.27	202.7	19.0
F1.005	29.492	0.000	0.0	607	0.0	93	0.80	1.27	202.7	19.0

Flow into Public Sewer from Proposed Development

8 Appendix B – Surface Water Calculations

CORA CONSULTING ENGINEERS

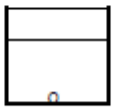
Behan House
10 Lower Mount Street
Dublin
D02 HT71
t: +353 1 6611100
e: info@cora.ie

Job No.	Ref No.	Rev
1753		PL1
Chivers Site		Page No. 1/1
By: JPC		Checked: KO'M

Title: SW Drainage: Filter Drain - Flow Through Calculation (Typ. Design for 2.0m Width)

Date: 10-Oct-2018

Calculation of Storage Volume & Infiltration for Filter Drain



Length, l =	82700 mm	
Effective Width, w =	2000 mm	
Depth, d =	1000 mm	
Free Volume, V_{free} =	30%	
M5-60min from Met Éireann Data =	15.5 mm	
M5-60m/M5-2d from Met Éireann Data, r =	0.276	
Region	Greater Dublin	
Duration,	15 mins	
Impermeable Area, A =	3390 m²	
Coefficient of Permeability of Filter Media, k =	0.0005 m/s	
Hydraulic Gradient, i =	1.0 m/m	[1.0 for Vertical Flow over Short Distances]
Cross Sectional Flow Area, A =	165.4 m²	

Darcy's Law: **Q = Aki** [Rate of Flow from Point of Entry to Perforated Pipe]

Q = 0.0827 m³/s

Rainfall Event	Rainfall for 15min mm	Rainfall Intensity mm/hr	Rate of Flow, Q (m³/s)	
1 year	5.7 mm	22.8 mm	0.019	Flow is Greater than 1 year Flow
2 year	6.6 mm	26.4 mm	0.022	Flow is Greater than 2 year Flow
5 year	9.5 mm	38.0 mm	0.032	Flow is Greater than 5 year Flow
10 year	11.7 mm	46.8 mm	0.04	Flow is Greater than 10 year Flow
30 year	15.9 mm	63.6 mm	0.054	Flow is Greater than 30 year Flow
100 year	22.0 mm	88.0 mm	0.075	Flow is Greater than 100 year Flow

Rainfall Values are taken from Met Éirean Data for the site (see separate data sheet)

9 Appendix C – National Flood Hazard Mapping

OPW *National Flood Hazard Mapping*

Summary Local Area Report

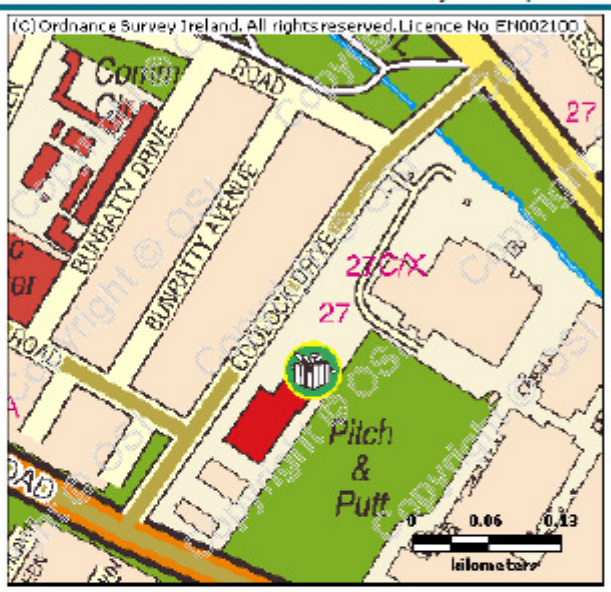
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 196 396

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:5,229

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

6 Results

1. Flooding at Clanmoyle Road, Donnycarney, Dublin 5 on 24th Oct 2011 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 24/Oct/2011 Flood Quality Code:3
2. Howth Road Harmonstown June 1963 County: Dublin Additional Information: Reports (3) Press Archive (2) More Mapped Information	Start Date: 11/Jun/1963 Flood Quality Code:3
3. Donnycarney Wad June 1963 County: Dublin Additional Information: Reports (3) Press Archive (2) More Mapped Information	Start Date: 11/Jun/1963 Flood Quality Code:3
4. Dublin Area 020709 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 02/Jul/2009 Flood Quality Code:3
5. Naniken River Artane Dec 1954 County: Dublin	Start Date: 08/Dec/1954 Flood Quality Code:3

Report Produced: 21-Mar-2018 11:48