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Fitzsimons Doyle & Associates

FDA CONSULTING

Engineering Services Report

For

Skerries Library

At

Strand Street, Townparks

Skerries

Co. Dublin

Job Title: Skerries Library redevelopment

Job Number: 18-4550

Author: Eamonn Fahy

Approved By: Stephen Hynes

Date: 23/05/19

Document: 18-4550-2019-05-23 D01 Rev. A- planning

1 Contents

2 INTRODUCTION

Fitzsimons Doyle & Associates Consulting Engineers have been appointed to prepare an Engineering Services Report for the proposed redevelopment and extension of the existing library building on Strand Street, Skerries Co. Dublin

In preparing this report, FDA Consulting Engineers have made reference to:

- Technical Guidance Document H Drainage and wastewater disposal
- Sewers for Adoption
- BS-En 12056:2000 Gravity drainage systems inside buildings
- All grease traps in accordance with IS-EN 1825
- EPA Waste Water Treatment Manual

The proposed development involves the demolition of two number houses to the rear of Skerries Library which is located on Strand street and the construction of a new library building to the rear of the existing Library building which is to be retained.

The site is bounded by Floraville Public Park to the north and St Patricks Church to the south. The rear of the proposed site abuts chapel lane and the front of the existing building faces onto Strand Street. As part of the works it is proposed to renovate the paving layouts and streetscape to the front of the existing library building, these works extend to cover the paving in front of the adjoining St. Patricks Church.

The following reports assesses the engineering services and flood risk assessment associated with the proposed development. Reference is to be made to the associated architectural and M&E service drawings related to this development.

3 SITE LOCATION

The site is located fronting onto Strand Street in the centre of Skerries village. The site is bounded by the Floraville Park to the north and St. Patricks church to the south. The proposed site extends to Chapel lane.

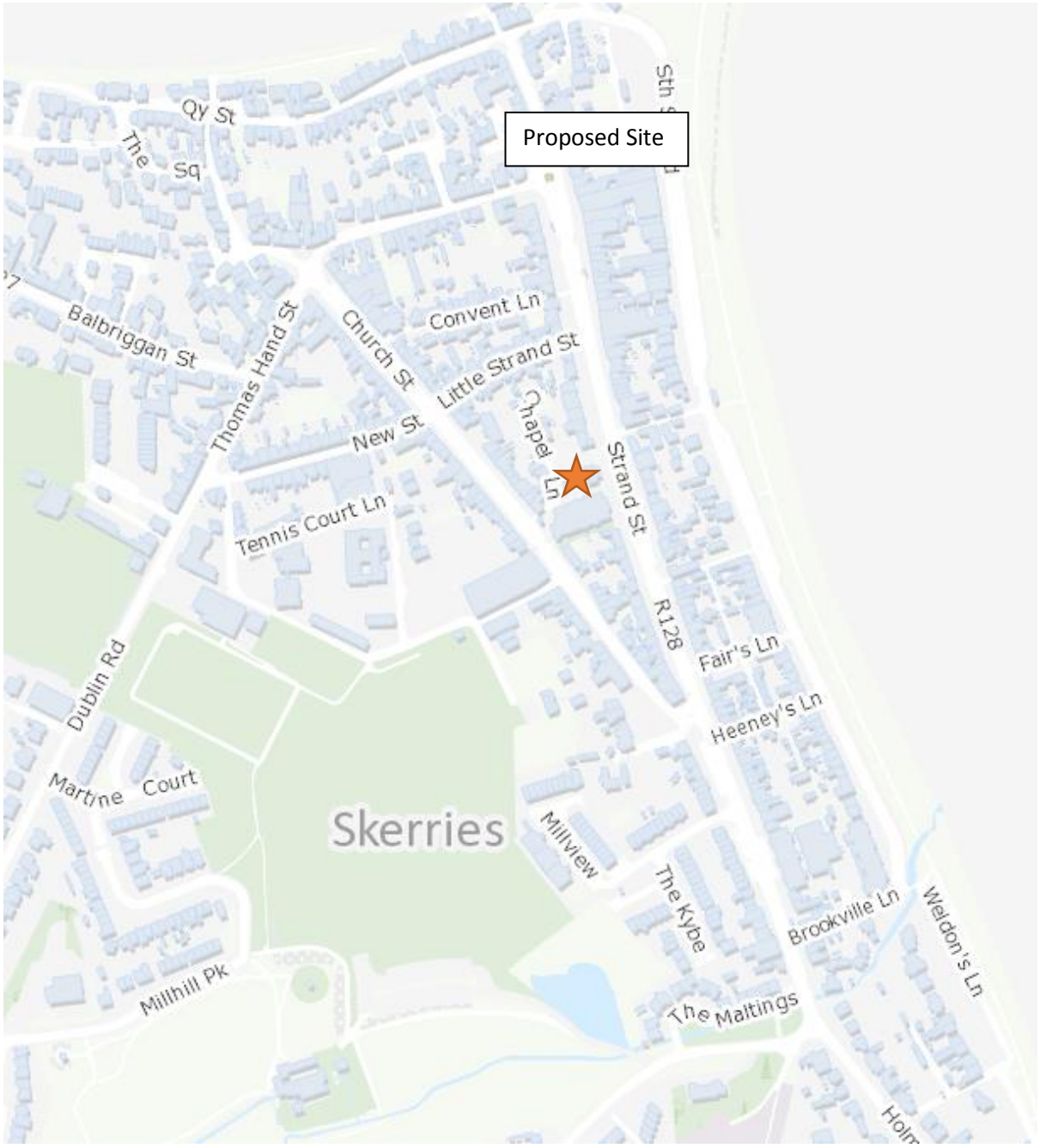


Figure 1 – Site Location Map

= Site location

4 EXISTING SERVICES

4.1 WATER MAINS

The existing building is currently supplied with water mains which serves the existing library building. It is likely that this connection will need to be upgraded to cater for the addition demand. The water connection is currently via Strand street. The two houses to the rear which front onto Chapel Street are assumed to have separate water connections to the mains water system.

4.2 WATER COSNUMPTION

Water consumption is based on 40 litres per day for research and educational developments as per EPA guidelines.

Area of Building:

Proposed Extension Total - 490sqm

Existing building Total 267sqm

Occupancy Load Class 5 Assembly and Recreation: occupancy load ratio 7

Occupancy:

Proposed Library building 70

Existing Library building 43

Total Site occupancy 113

Total Water consumption per day 4,520lt

Water supply to the development will contain 4,520lt of storage on site for use in water applicances

4.3 FOUL WATER SERVICES

There is an existing foul drainage outfall on site which connects the foul water sewer line located in the centre of Stand street. It is proposed to reuse this connection after a full CCTV survey has been completed to confirm the condition size and adequacy of the connection.

The proposed drainage layout for the site is marked on drawing 18-4550_C02_Proposed Drainage which shows connection point to the corporation sewer.

In accordance with GDSDS it is proposed to separate all new surface water drainage and foul drainage. The existing library building will retain the surface water outflow points.

Estimate of foul/wastewater flows

Library Building

Estimate of daily foul dry weather flow 4,520 litres

Average flow rate (8 Hour Day) 0.156 Lt./s

Peak discharge- Residential 6DWF 0.941Lt/s.

A 150mm Diameter pipe at 1:100 diameter flow is sufficient to accommodate foul flows.

flows.

4.4 OILS, FATS AND GREASE TREATMENT

It is proposed to construct a small service kitchen with the new development. This kitchen will be a coffee shop type kitchen with no facilities for cooking provided. There is a low risk of oil and fat addition to the waste water system however if any hot food preparation is to be proposed at a later date this will required to addition of grease separators which shall conform to the Irish Standard EN 1825 Grease Separators – Part 1 (Principals of design, performance, testing, marketing and quality control) and Part II (selection of nominal size, installation, operation and maintenance) published by the National Standards Authority of Ireland. All automatic grease removal units installed shall conform to the standard PDI-G101 Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.

4.5 SURFACE WATER SERVICES

At present the surface water system discharges directly to the public drainage system without restriction or attenuation. The proposed development will increase the amount of impermeable surface area on the site by building on top of the green area to the rear of the existing library building. In accordance with GDSDS all surface water drainage and foul drainage is separated, best practice for SUDS will be maintained on site.

It is proposed to construct a green/sedum roof on the flat roof sections of the development as indicated on drawing 18-4550-C02 Proposed drainage layout. These areas will then be drained to a water attenuation system with a volume of 10m3 (see attached calculation in appendices) with a restricted flow rate of 2lt/sec via a hydrobrake flow control device.

The outflows from the attenuation tank will flow towards strand street and along the front of the existing building to an existing 225mmdiameter surface water sewer line. The local infrastructure map is attached to drawing number 18-4550-C02

As part of the development it is proposed to renovate the paving layout to the front of the existing library building. This renovation will utilize a series of Stockholm tree planting pits which will act as soakaways. Details of this soakway are provided on drawing 18-4550-C03

4.6 SUSTAINABLE URBAN DRAINAGE

Green roof

It is proposed to add a green-roof to the development with an area of 200m^2 covering over 80% of the roof area. This is in compliance with the development plan. It is proposed to store the interception volume generated from the roof. An attenuation tank is proposed to attenuate a 1 in 100 yr storm. Calculations for the attenuated capacity are in Appendix E.

A fundamental concept of SUDS is the use of source control, ie the control of runoff at or very near its source. Green roofs can contribute to source control objectives and so they are ideal components of sustainable drainage systems.

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.

Paved areas

It is proposed to use permeable paving and Stockholm tree pits in paving areas to the front of the site to further reduce surface water outflow from the proposed development.

5 FLOOD RISK ASSESSMENT

This report is prepared in accordance with the guidelines described in The Planning System and Flood Risk Management Guidelines for Planning Authorities, November 2009 Published by the Department of the Environment, Heritage and Local Government.

The risk of flooding is considered under the following headings:

- Coastal
- Tidal
- Fluvial
- Pluvial
- Ground water

The proposed development is within the nanny-Dilvin River basin flood risk management plan (UOMO8) and is within the boundary where community's localised measures have been assessed. The below extract from the floodinfo website shows that the flood maps for the area are still under review, however it is indicated that the proposed development does not fall within historical coastal, tidal, fluvival or pluvial flood risks.

Extract from floodinfo.ie

5.1 COASTAL

The site is outside the zone of probable coastal flooding.

5.2 TIDAL

The site is outside the zone of probable Tidal flooding.

5.3 PLUVIAL

The site is outside the zone of probable Pluvial flooding.

5.4 FLUVIAL

The site is outside the zone of probable fluvial flooding.

5.5 GROUND WATER

The site is outside the zone of probable Groundwater flooding.

5.6 CONCLUSIONS

The site lies within Zone C as per Flood Risk Management Guidelines for Planning Authorities based on the CFRAM East Draft Study.

Flood Zone C is defined as where the probability of flooding is low.

In accordance with Table 3.2 of the Flood Risk Management Guidelines, the development is considered appropriate.

6 GAS CONNECTIONS

There is a gas network running through the proposed site and no new connections are required

7 ELECTRICAL SUPPLY

There is an electricity network running in the building and no new connections are required

8 COMMUNICATION NETWORK

There is a telecoms network in the vicinity and no new connections are required.

9 SUMMARY

All foul and surface water will be separated in accordance with GDSDS.

A green roof is proposed as a sustainable drainage system. A concrete tank is proposed for attenuation of the green roof water runoff.

Stockholm tree pits are also proposed as a sustainable drainage system for hardstanding paved car parking areas.

Discharge to the surface water corporation sewer is limited to 2l/s from the development.

The existing foul water network will need surveyed and confirmed if adequate for connection.

The site lies within Zone C as per Flood Risk Management Guidelines for Planning Authorities. The probability of flooding is low. The development is considered appropriate. The area is within a protected flood management zone.

10 APPENDIX

(Drawings)

10.1 Appendix A – Storage Calculations

10.2 Appendix B – Drawings C01/C02/C03

Development Areas

Development site Run-off	Run off coef.	area	
Impermeable Surface	1	159	159
Green roof	1	201	201
Light residential	0.45	0	0
Normal residential	0.6	0	0
Dense residential	0.8	0	0
Green roof	0.3		0
Total area for runoff		Σ=	360 m^2

Rainfall Parameters

Climate Change Factor			1.2
Outflow limit input			2
Outflow limit			2 l/s
		2 / 1e3 x 3.6e3=	7.2 m^3/h
F.O.S			1.25

Interception Volume

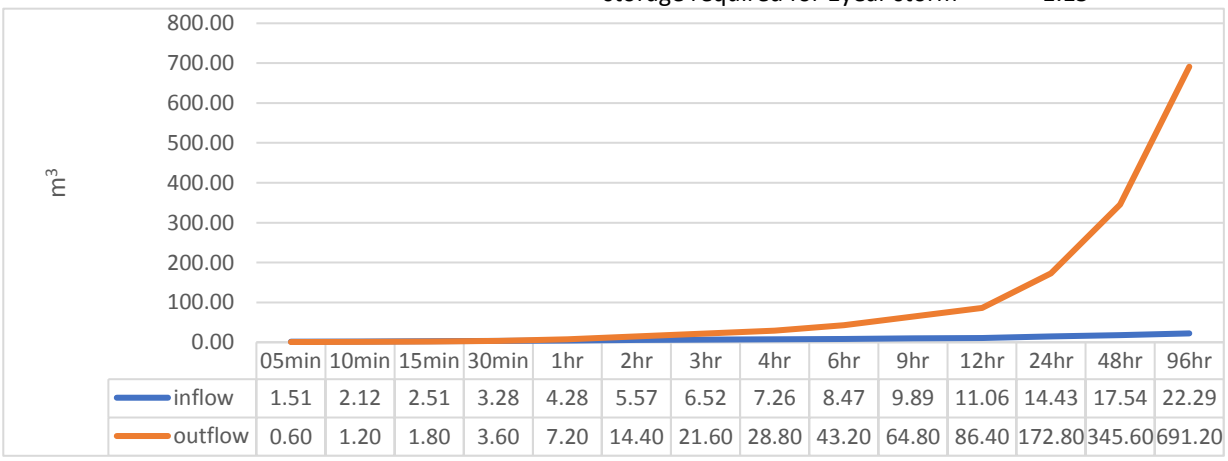
Rainfall Depth			5 mm
Interception Storage		5 / 1e3 x 201=	1.01 m^3

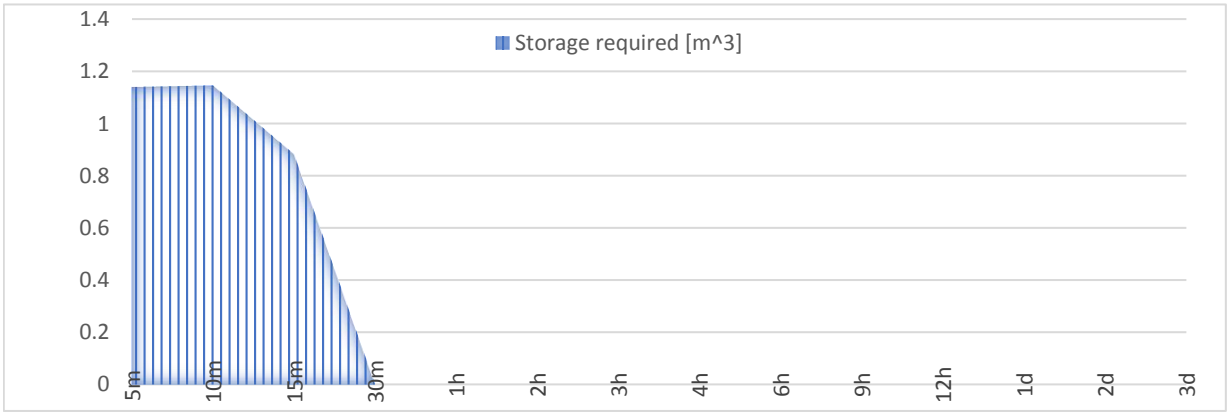
Storage required

Return Period	Critical storm		
1 year	0hr 10min	1.146 - 1.005=	0.14 m^3
10 year	0hr 15min	0 - 0=	2.90 m^3
30 year	0hr 15min	0 - 0=	4.95 m^3
100 year	0hr 30min	0 - 0=	8.21 m^3

1 year storm

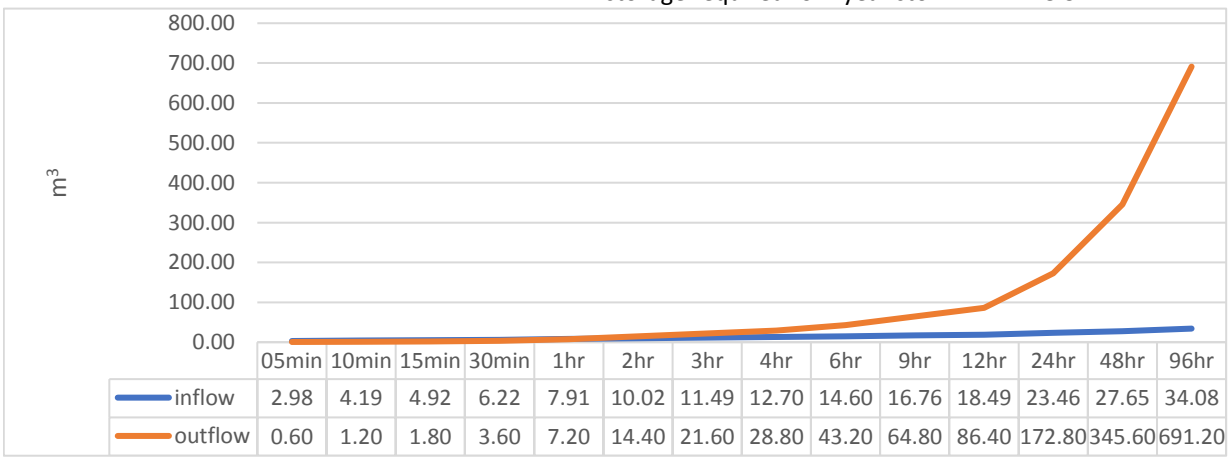
1 year storm	[mm]		[m^3]			
duration	rainfall depth	climate change 20%	inflow	outflow	storage volume	x F.O.S
05min	3.5	4.2	1.51	0.60	0.91	1.14
10min	4.9	5.88	2.12	1.20	0.92	1.15
15min	5.8	6.96	2.51	1.80	0.71	0.88
30min	7.6	9.12	3.28	3.60	-0.32	
1hr	9.9	11.88	4.28	7.20	-2.92	
2hr	12.9	15.48	5.57	14.40	-8.83	
3hr	15.1	18.12	6.52	21.60	-15.08	
4hr	16.8	20.16	7.26	28.80	-21.54	
6hr	19.6	23.52	8.47	43.20	-34.73	
9hr	22.9	27.48	9.89	64.80	-54.91	
12hr	25.6	30.72	11.06	86.40	-75.34	
24hr	33.4	40.08	14.43	172.80	-158.37	
48hr	40.6	48.72	17.54	345.60	-328.1	
96hr	51.6	61.92	22.29	691.20	-668.9	
			storage required for 1year storm			1.15

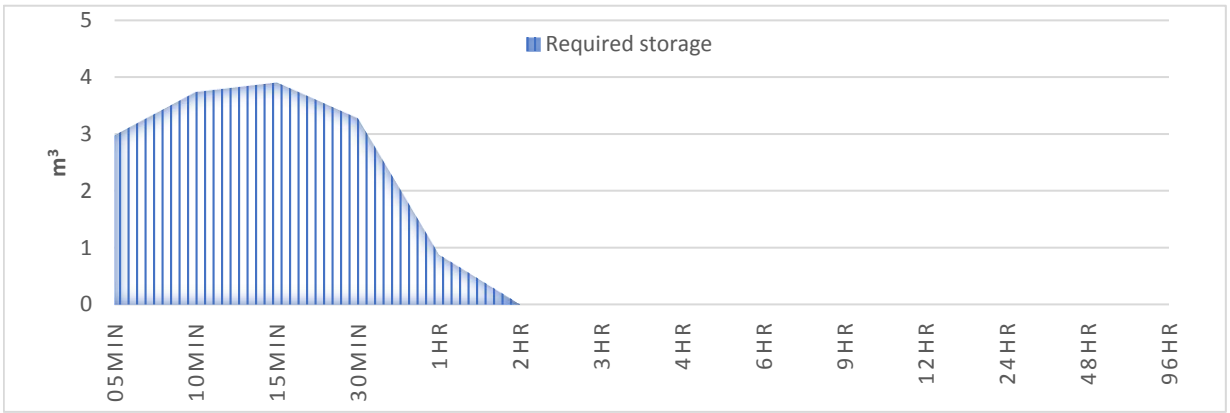




10 year storm

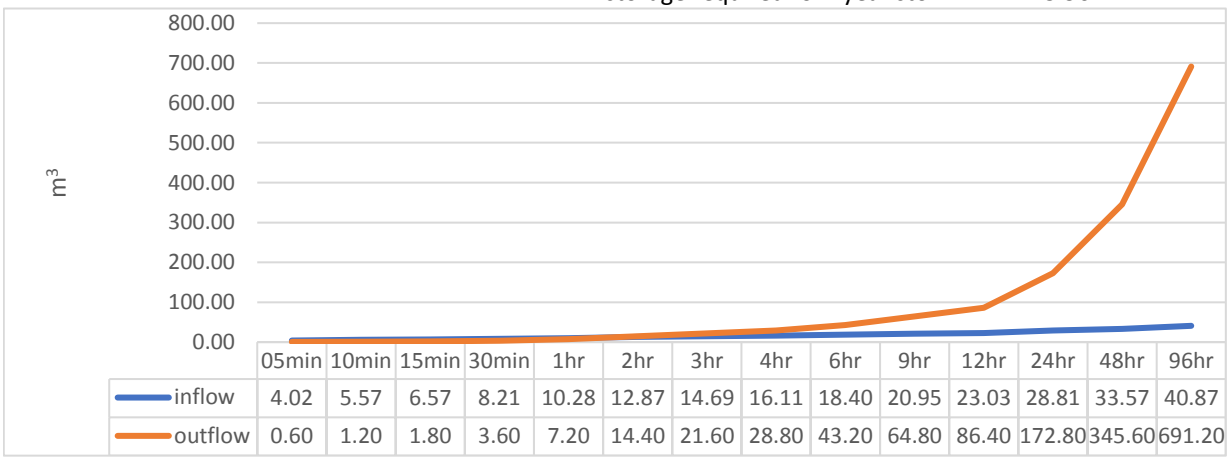
10 year storm	cumulative[mm]		[m^3]			
duration	rainfall depth	climate change 20%	inflow	outflow	storage volume	x F.O.S
05min	6.9	8.28	2.98	0.60	2.38	2.98
10min	9.7	11.64	4.19	1.20	2.99	3.74
15min	11.4	13.68	4.92	1.80	3.12	3.91
30min	14.4	17.28	6.22	3.60	2.62	3.28
1hr	18.3	21.96	7.91	7.20	0.71	0.88
2hr	23.2	27.84	10.02	14.40	-4.38	
3hr	26.6	31.92	11.49	21.60	-10.11	
4hr	29.4	35.28	12.70	28.80	-16.10	
6hr	33.8	40.56	14.60	43.20	-28.60	
9hr	38.8	46.56	16.76	64.80	-48.04	
12hr	42.8	51.36	18.49	86.40	-67.91	
24hr	54.3	65.16	23.46	172.80	-149.34	
48hr	64	76.8	27.65	345.60	-317.95	
96hr	78.9	94.68	34.08	691.20	-657.12	
			storage required for 1year storm			3.91

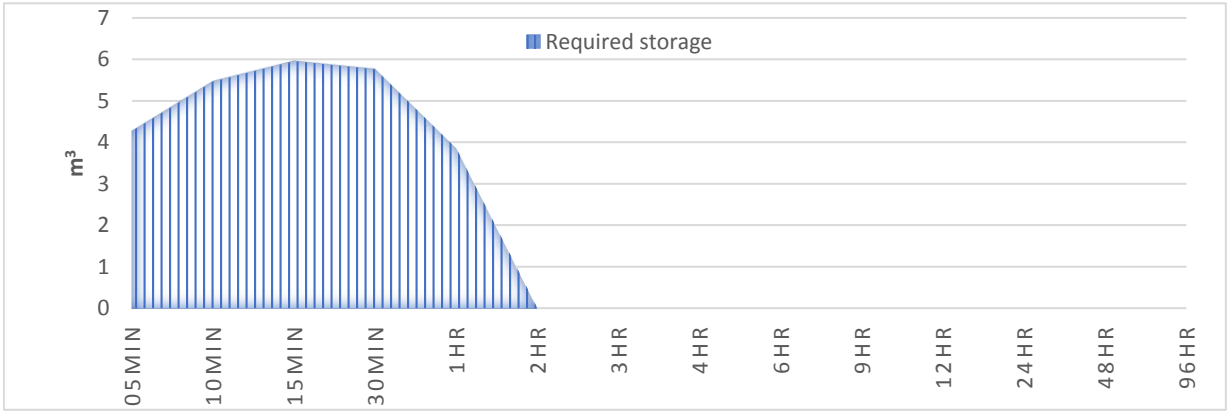




30 year storm

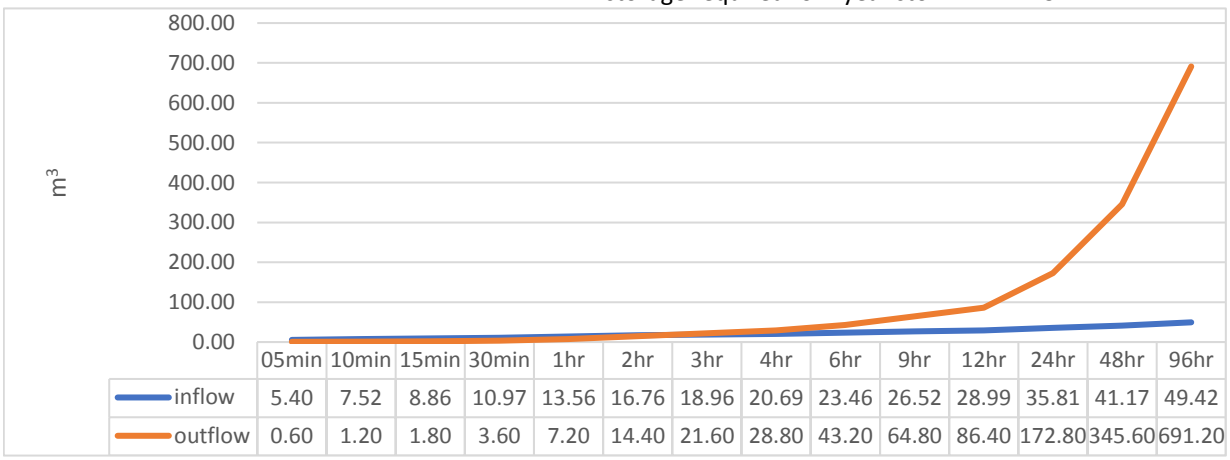
30 year storm	[mm]		[m^3]			
duration	rainfall depth	climate change 20%	inflow	outflow	storage volume	x F.O.S
05min	9.3	11.16	4.02	0.60	3.42	4.27
10min	12.9	15.48	5.57	1.20	4.37	5.47
15min	15.2	18.24	6.57	1.80	4.77	5.96
30min	19	22.8	8.21	3.60	4.61	5.76
1hr	23.8	28.56	10.28	7.20	3.08	3.85
2hr	29.8	35.76	12.87	14.40	-1.53	
3hr	34	40.8	14.69	21.60	-6.91	
4hr	37.3	44.76	16.11	28.80	-12.69	
6hr	42.6	51.12	18.40	43.20	-24.80	
9hr	48.5	58.2	20.95	64.80	-43.85	
12hr	53.3	63.96	23.03	86.40	-63.37	
24hr	66.7	80.04	28.81	172.80	-143.99	
48hr	77.7	93.24	33.57	345.60	-312.03	
96hr	94.6	113.52	40.87	691.20	-650.33	
			storage required for 1year storm			5.96

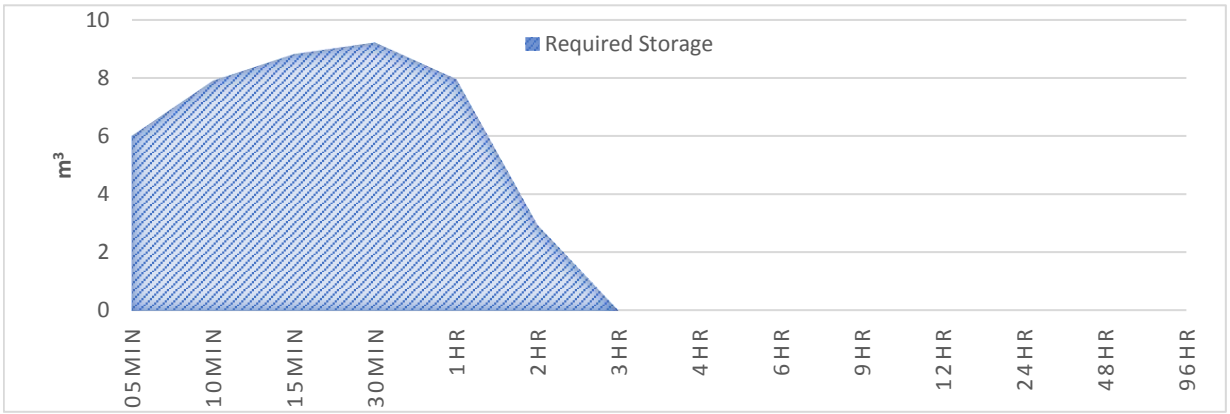




100 year storm

100 year storm	[mm]		[m^3]			
duration	rainfall depth	climate change 20%	inflow	outflow	storage volume	x F.O.S
05min	12.5	15	5.40	0.60	4.80	6.00
10min	17.4	20.88	7.52	1.20	6.32	7.90
15min	20.5	24.6	8.86	1.80	7.06	8.82
30min	25.4	30.48	10.97	3.60	7.37	9.22
1hr	31.4	37.68	13.56	7.20	6.36	7.96
2hr	38.8	46.56	16.76	14.40	2.36	2.95
3hr	43.9	52.68	18.96	21.60	-2.64	
4hr	47.9	57.48	20.69	28.80	-8.11	
6hr	54.3	65.16	23.46	43.20	-19.74	
9hr	61.4	73.68	26.52	64.80	-38.28	
12hr	67.1	80.52	28.99	86.40	-57.41	
24hr	82.9	99.48	35.81	172.80	-136.99	
48hr	95.3	114.36	41.17	345.60	-304.43	
96hr	114.4	137.28	49.42	691.20	-641.78	
			storage required for 1year storm			9.22





Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 325464, Northing: 260390,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.5,	4.1,	4.8,	5.3,	5.7,	6.9,	8.3,	9.3,	10.5,	11.6,	12.5,	13.8,	14.8,	15.7,	N/A ,
10 mins	3.6,	4.9,	5.6,	6.7,	7.4,	7.9,	9.7,	11.6,	12.9,	14.7,	16.2,	17.4,	19.3,	20.7,	21.9,	N/A ,
15 mins	4.2,	5.8,	6.6,	7.9,	8.7,	9.3,	11.4,	13.7,	15.2,	17.3,	19.1,	20.5,	22.7,	24.3,	25.7,	N/A ,
30 mins	5.6,	7.6,	8.6,	10.1,	11.2,	11.9,	14.4,	17.2,	19.0,	21.5,	23.7,	25.4,	27.9,	29.9,	31.5,	N/A ,
1 hours	7.4,	9.9,	11.2,	13.1,	14.3,	15.3,	18.3,	21.6,	23.8,	26.8,	29.4,	31.4,	34.4,	36.7,	38.6,	N/A ,
2 hours	9.8,	12.9,	14.5,	16.8,	18.3,	19.5,	23.2,	27.2,	29.8,	33.3,	36.4,	38.8,	42.3,	45.0,	47.2,	N/A ,
3 hours	11.5,	15.1,	16.9,	19.5,	21.2,	22.5,	26.6,	31.1,	34.0,	37.9,	41.3,	43.9,	47.8,	50.7,	53.2,	N/A ,
4 hours	12.9,	16.8,	18.8,	21.6,	23.5,	24.9,	29.4,	34.2,	37.3,	41.5,	45.2,	47.9,	52.1,	55.2,	57.8,	N/A ,
6 hours	15.2,	19.6,	21.9,	25.1,	27.2,	28.8,	33.8,	39.2,	42.6,	47.2,	51.2,	54.3,	58.8,	62.3,	65.1,	N/A ,
9 hours	17.9,	22.9,	25.5,	29.1,	31.4,	33.2,	38.8,	44.8,	48.5,	53.7,	58.1,	61.4,	66.4,	70.2,	73.3,	N/A ,
12 hours	20.1,	25.6,	28.4,	32.3,	34.9,	36.8,	42.8,	49.2,	53.3,	58.8,	63.5,	67.1,	72.4,	76.4,	79.7,	N/A ,
18 hours	23.7,	29.9,	33.0,	37.5,	40.3,	42.5,	49.2,	56.3,	60.8,	66.9,	72.0,	75.9,	81.8,	86.2,	89.7,	N/A ,
24 hours	26.6,	33.4,	36.8,	41.6,	44.7,	47.0,	54.3,	61.9,	66.7,	73.2,	78.8,	82.9,	89.1,	93.8,	97.6,	110.4,
2 days	32.8,	40.6,	44.4,	49.9,	53.3,	55.9,	64.0,	72.4,	77.7,	84.8,	90.8,	95.3,	101.9,	106.9,	111.0,	124.6,
3 days	37.8,	46.4,	50.7,	56.6,	60.4,	63.2,	71.9,	81.0,	86.7,	94.3,	100.7,	105.4,	112.5,	117.9,	122.1,	136.5,
4 days	42.2,	51.6,	56.1,	62.5,	66.5,	69.6,	78.9,	88.6,	94.6,	102.6,	109.3,	114.4,	121.9,	127.4,	131.9,	147.0,
6 days	50.0,	60.5,	65.6,	72.8,	77.3,	80.7,	91.0,	101.7,	108.3,	117.0,	124.4,	129.9,	138.1,	144.1,	149.0,	165.2,
8 days	56.9,	68.5,	74.1,	81.8,	86.8,	90.4,	101.6,	113.2,	120.3,	129.7,	137.7,	143.6,	152.3,	158.7,	164.0,	181.2,
10 days	63.2,	75.7,	81.7,	90.1,	95.4,	99.3,	111.3,	123.6,	131.2,	141.3,	149.7,	155.9,	165.1,	172.0,	177.5,	195.7,
12 days	69.1,	82.5,	88.9,	97.8,	103.4,	107.6,	120.3,	133.4,	141.4,	151.9,	160.8,	167.4,	177.1,	184.3,	190.0,	209.1,
16 days	80.1,	95.0,	102.2,	112.1,	118.3,	122.9,	136.9,	151.2,	160.0,	171.5,	181.2,	188.4,	198.9,	206.7,	213.0,	233.6,
20 days	90.2,	106.6,	114.4,	125.2,	131.9,	136.9,	152.1,	167.6,	177.0,	189.5,	199.9,	207.5,	218.8,	227.2,	233.9,	255.9,
25 days	102.2,	120.2,	128.7,	140.5,	147.8,	153.3,	169.8,	186.6,	196.8,	210.2,	221.4,	229.7,	241.9,	250.8,	258.0,	281.7,

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