Site Drainage Report

Jacobs Island, Cork

Prepared for:	McCarthy Developments
Prepared by:	William O'Sullivan
Date:	10.03.2021
Job Reference:	18032

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REVISION CONTROL TABLE

Job reference: 18032

Revision	Date	Issue	Author	Checked
-	10.03.21	First issue	WOS	MM

1.0 INTRODUCTION

Murphy Matson O'Sullivan Consulting Engineers were requested to carry out a review of the site drainage capacity for Jacobs Island, Cork. This report will detail the extent of the proposed and existing developments and will highlight the capacity of the highest density existing foul pipe run on the site.

We will also explain the potential impact of flooding on the site and will attach the flood maps for the potential flood zones.

2.0 FOUL DRAIN CAPACITY

The sewer identified in Figure 1 below was checked for capacity based on the existing and proposed developments on the site. The foul sewer layout map is presented in Appendix A.

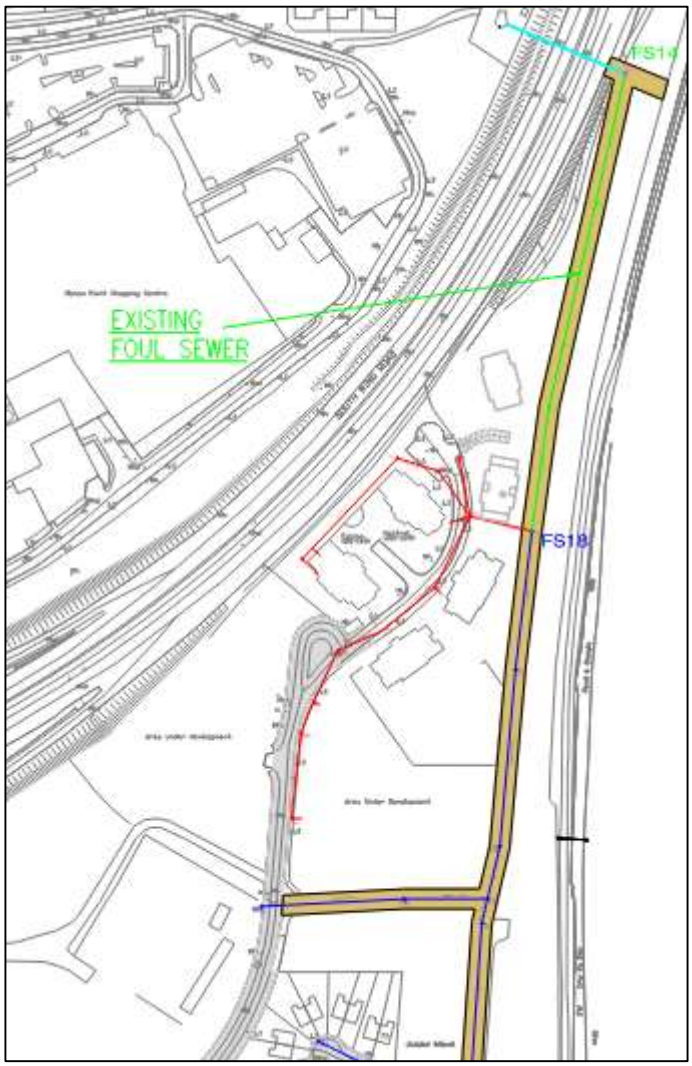

Figure 1 – Existing Foul Sewer Location

The following criteria was used for the calculation of the foul sewer capacity.

Existing Developments			
Reference	**Development Type**	**No. Units**	
Blocks 1, 2, 5 and 6	Apartments	183	
Phase 1 & 2	Houses	111	
Phase 4	Houses	49	
Proposed Developments			
Reference	**Development Type**	**No. Units**	**Area (m^2)**
Site 1	Apartments	1000	
Site 1	Office		4500
Site 1	Office		4500
Site 2	Apartments	416	
Site 3	Hotel	184	
Block 10	Apartments	61	
Block 10	Retail		1447

Figure 2 – Development Quantities

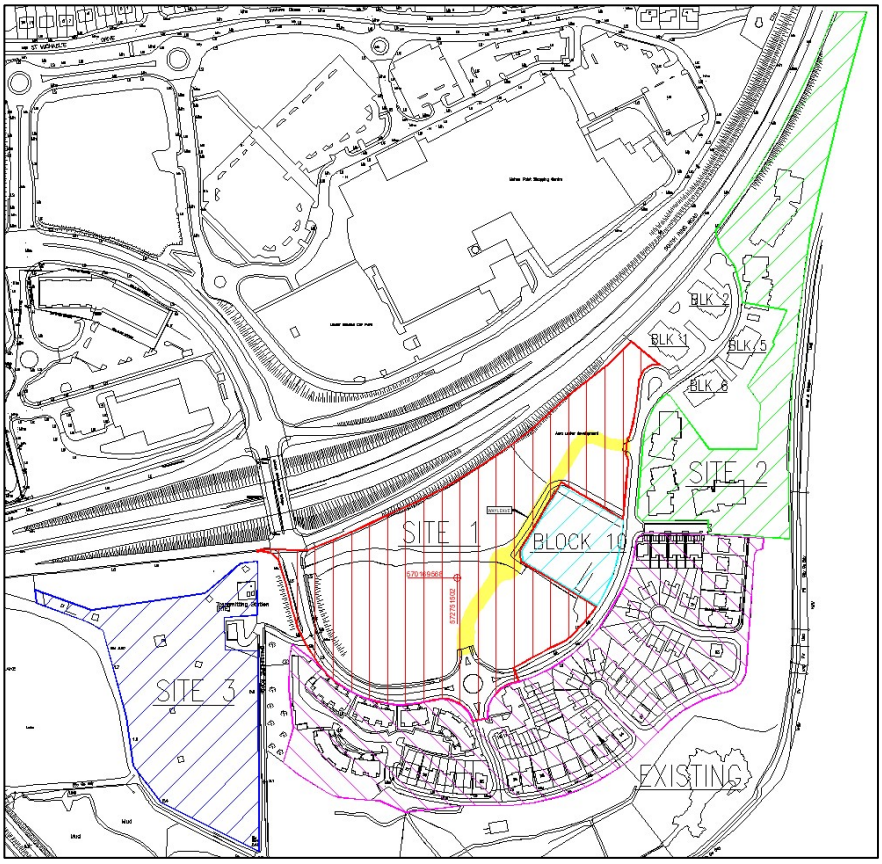

Figure 3 – Site Key Plan

Figure 2 tabulates the existing and proposed developments on the site. Figure 3 shows the locations of the development sites within Jacobs Island.

All the calculations were undertaken to the Irish Water 'Wastewater Code of Practice'. The criteria provided in Appendix C and appendix D were used to calculate to potential flow.

The existing pipe is a 225mm diameter UPVC pipe. Considering that the pipe is existing, we used the roughness factor for a slimed pipe (1.5mm). This will provide a conservative calculation.

The capacity of the pipe in relation to the potential flow, will provide a safety factor of 2.83 DWF. Figure 4 below is taken from the Irish Water 'Wastewater Code of Practice' and indicates the various DWF factors in relation to the expected population. The population of the completed development would be in excess in 5,001 persons. Considering this, we would expect that the factor of 2.83 DWF is suitable. The relevant calculations for the pipe capacity are presented in Appendix A.

Population	Peaking Factor (Pf_{Dom})
0 to 750	6
751 to 1,000	4.5
1001 to 5,000	3.0
5,001 to 10,000	2.5

Figure 4 – Irish Water DWF Factors

3.0 SITE FLOODING POTENTIAL

The Jacobs Island site is located on the edge of the River Lee estuary. Sections of the site are low lying and subject to potential tidal flooding. Site 3 from Figure 3 is the site most susceptible to flooding. Figure 5, Figure 6 and Figure 7 below show aerial views of the Jacobs Island Site under various conditions. Flood maps for the area are presented in Appendix A.

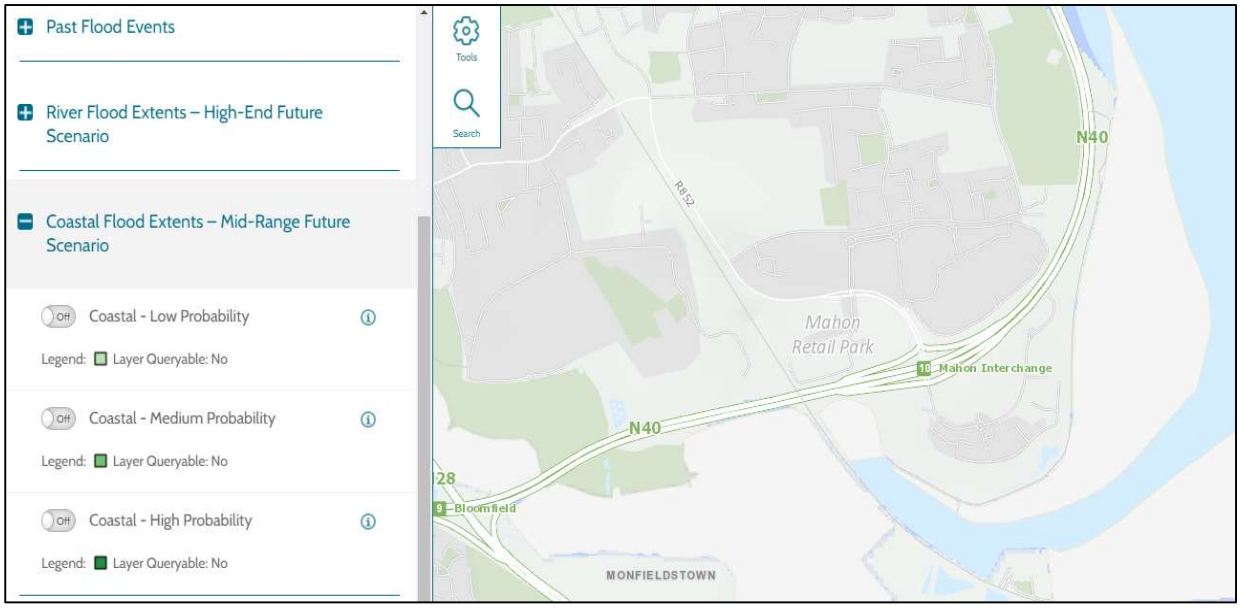

Figure 5 – Jacobs Island Under Normal Conditions

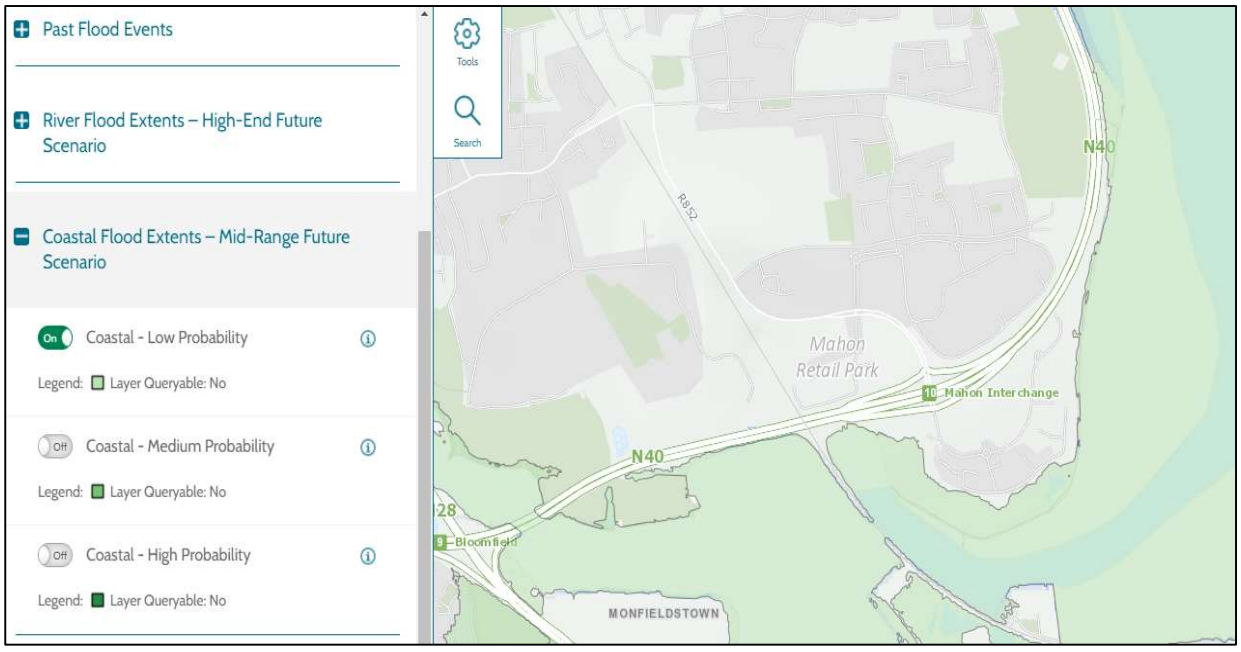

Figure 6 – Jacobs Island Worst Case Flood Prediction

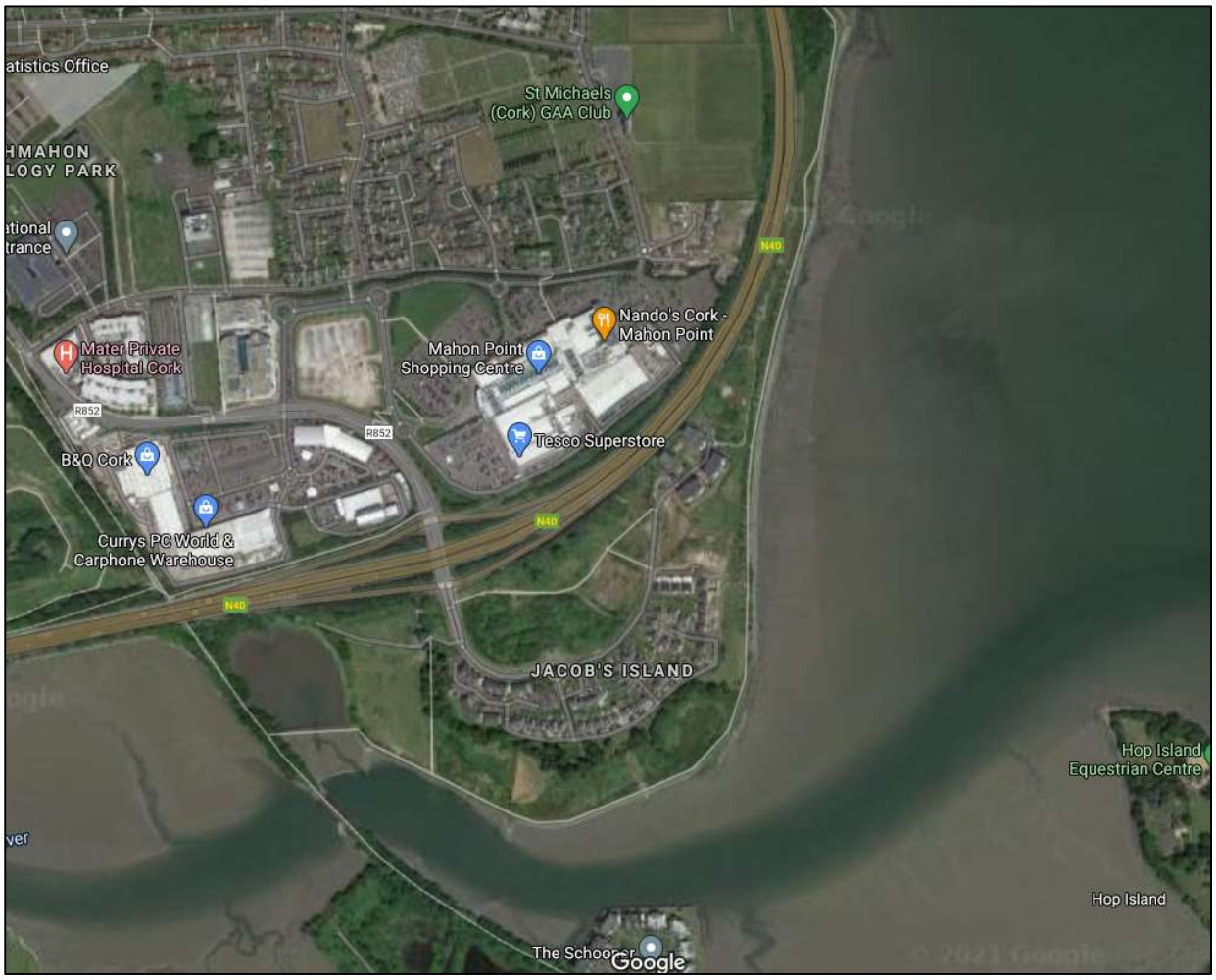

Figure 7 – Jacobs Island Current Aerial View

Figure 5 shows an aerial view of the Jacobs Island site with no predicted flooding shown. Figure 6 shows the worst-case coastal flooding prediction. It can be seen from the image that Site 3 is liable to suffer the worst impact of a potential flood. Considering this, any potential development on this site will have to take the flood potential into account.

4.0 RECOMMENDATIONS

4.1 Foul Drain Capacity

As noted above, the capacity of the highest density existing sewer has a capacity of 2.83 DWF under conservative design conditions. To increase the design flow capacity of the pipes, the pipes could be jet washed to remove any potential slim build up on the internal wall of the pipes. This would provide an updated safety factor of 3.21 DWF. The jet washing may only be required on pipes that have a shallow fall.

4.2 Site Flooding Potential

Site 3 is the most susceptible to coastal flooding according to the predictive flood maps. Considering this, any potential developments on the site must include flood protection. The flood protection could be in multiple forms. Potential options would be as follows:

- Flood barriers;
- Reinforced concrete retaining walls;
- Coastal embankments.

Each of these options will have financial impacts that must be considered at the initial stages of a project.

Wm O'Sullivan

William O'Sullivan
BEng MEng CEng MIEI MIStructE
Senior Structural Engineer

APPENDIX A DRAWINGS AND CALCULATIONS

SEWER PIPE CALCULATIONS

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Contract		Job ref.	
Jacobs Island			18032
Element:		**Calc. Sheet No.**	
Foul Sewer Design			
Sewer Ref.	**Calculations by**	**Checked by**	**Date**
Summary	WO'S	M.M.	Mar-21

		ISSUE.	1	**REV.**	1

Design Assumptions

Foul Sewer Domestic Per Capita Waste Water Flow *	150	
10% Consumption allowance *	15	
Total Domestic per capita Foul Sewer Design Flow Rate	165	litres / head / day
Flow rate for office with canteen	100	litres / head / day
Flow rate for hotel	250	litres / head / day
Occupancy Rate for studio Dwelling =	2.7	persons *
Occupancy Rate for 1 Bed Dwelling =	2.7	persons *
Occupancy Rate for 2 Bed Dwelling =	2.7	persons *
Occupancy Rate for 3 Bed Dwelling =	2.7	persons *
Occupancy Rate for 4 Bed Dwelling =	2.7	persons *
Occupancy Rate for 5 Bed Dwelling =	2.7	persons *
* based on IW Wastewater code of practice		
Occupancy Rate for hotel =	2.7	persons to allow for guests staying and visiting
Office space	10	sq meters per person
Foul Sewer coefficient of roughness, k_s =	1.500	mm

Capacity Calculations

	Design Flow for 1 DWF (l/s)	Pipe Diameter	Gradient = 1 in	Pipe Capacity (l/sec)	Velocity (m/s)	Factor of DWF provided
Existing Sewer	11.93	225	182	33.74	0.85	2.83

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Contract		Job ref.	
Jacobs Island		18032	
Element:		**Calc. Sheet No.**	
Foul Sewer Design			
Sewer Ref.	**Calculations by**	**Checked by**	**Date**
-	WO'S	WO'S	Mar-19

		ISSUE.	1	REV.	1

Daily Foul Water Discharge (DWF)

Ref.	Development Type	Units	Beds	Population	Area	Design Flows				Flow	
		(No.)	(No.)	(No.)	(Sq.m)	(l/hd/day)	(l/100sq.m)	(l/room/d)	(l/seat)	(Litres)	
JACOBS ISLAND BLOCKS 1,2,5 & 6 (Existing)											
Block 1,2,5,6 (183 Apartments)											
	1 bed Apartment	30	1	2.7		165				13365	
	2 bed Apartment	153	2	2.7		165				68162	
JACOBS ISLAND HOUSING PHASES (Existing)											
Phase 1 & 2 (111 units)											
	Duplex Houses	32	3	2.7		165				14256	
	Duplex Houses	46	2	2.7		165				20493	
	Courtyard	12	2	2.7		165				5346	
	Courtyard	6	3	2.7		165				2673	
	Houses	11	4	2.7		165				4901	
	Houses	4	5	2.7		165				1782	
Phase 4 (49 Houses)											
	Houses	8	3	2.7		165				3564	
	Houses	30	4	2.7		165				13365	
	Houses	11	5	2.7		165				4901	
						Total Design Flow, 1DWF (Litres)			=	**152807**	**Litres**
						Total Flow, 1 DWF (Litres/sec)			=	**1.7685938**	**l/s**

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Contract	Job ref.
Jacobs Island	18032
Element:	**Calc. Sheet No.**
Foul Sewer Design	

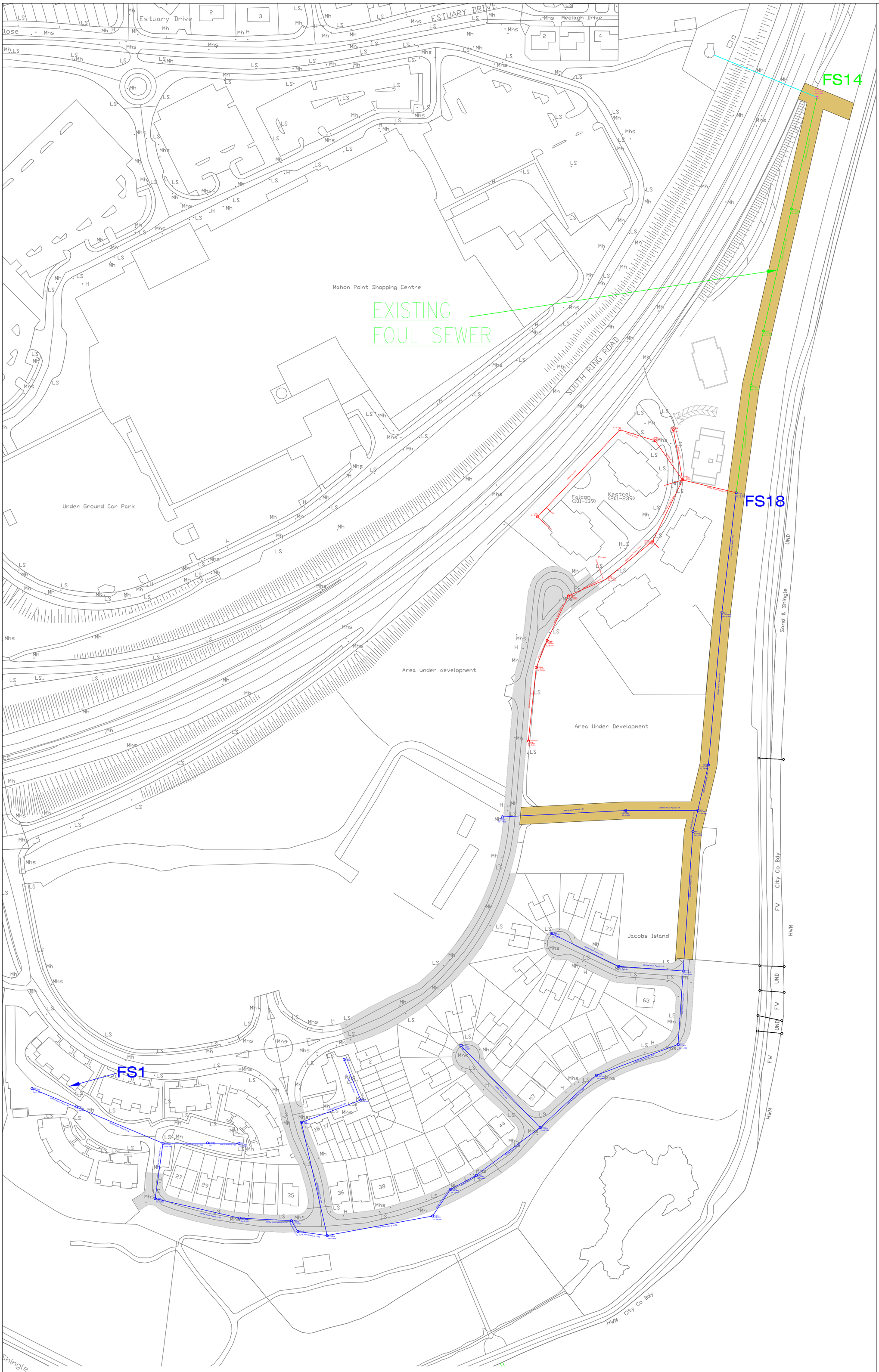
Sewer Ref.	Calculations by	Checked by	Date
-	WO'S	WO'S	Mar-19

		ISSUE.	1	REV.	1

Daily Foul Water Discharge (DWF)

Ref.	Development Type	Units	Beds	Population	Area	Design Flows				Flow	
		(No.)	(No.)	(No.)	(Sq.m)	(l/hd/day)	(l/100sq.m)	(l/room/d)	(l/seat)	(Litres)	
JACOBS ISLAND PROPOSED BLOCKS											
Site 1 - Former OCP Land											
	Apartments	1000		2.7		165				445500	
	4500 m^2 Office			450		100				45000	
	4500 m^2 Office			450		100				45000	
Site 2 - Undeveloped McCarthy Developments Site											
	Apartments	416		2.7		165				185328	
Site 3 - RTE Site											
	Hotel	184		2.7		250				124200	
JACOBS ISLAND Block 10											
	Retail				1447		400			5788	
	Residential (61 Units)										
	Studio Apartments	1	1	2.7		165				446	
	1 bed Apartments	26	1	2.7		165				11583	
	2 bed Apartments	34	2	2.7		165				15147	
						Total Design Flow, 1DWF (Litres)			=	**877992**	**Litres**
						Total Flow, 1 DWF (Litres/sec)			=	**10.161939**	**l/s**

DRAWINGS



FOUL SEWER LAYOUT

Scale: NTS

PROPOSED WAYLEAVE OVER PUBLIC SEWER MEASURING THE SMALLER OF 5.0m FROM CENTRE LINE OF SEWER OR DISTANCE TO SITE BOUNDARY.

Notes:

1. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
2. CONTRACTOR TO ENSURE FULL COORDINATION WITH ALL OTHER UNDERGROUND SERVICES PRIOR TO COMMENCEMENT OF WORKS.
3. ALL MANHOLE COVERS (IN PAVED / PAVEMENT AREAS) TO BE ABLE TO ACCOMODATE FINISHES TO MATCH SURROUNDING AREA.

Rev	Description	Date
P01	ISSUED FOR INFORMATION	09.03.21

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PROJECT
JACOBS ISLAND DEVELOPMENT

CLIENT
McCARTHY DEVELOPMENTS

TITLE
FOUL SEWER LAYOUT

DRAWN BY	CHECKED BY	APPROVED
WOS	WOS	MM

SCALE (@ A1)	PROJECT NUMBER
NTS	18032

DOCUMENT REFERENCE
18032-MMS-ZZ-ZZ-DR-C-11001

STATUS: S2

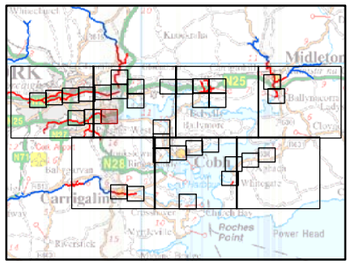
REV: P01

PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-DICIPLINE-NUMBER

N

0.1 0.05 0 0.1 0.2 0.3 0.4
Kilometres

Location Plan :



DEPTH MAP 0.5% AEP

Legend Depth Grid:

- 0 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 1.50 m
- 1.50 - 2.00 m
- > 2.00 m
- River Centreline

USER NOTE :

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Dublin 2
Ireland

Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map :
DOUGLAS

Map Type :	DEPTH		
Return Period :	0.5% AEP EVENT		
Source :	TIDAL FLOODING		
Map area :	URBAN AREA		
Scenario :	CURRENT		
Figure By :	Valeria Medina	Date :	19 January 2010
Checked By :	Juan Fernandez	Date :	19 January 2010
Approved By :	Jenny Pickles	Date :	19 January 2010

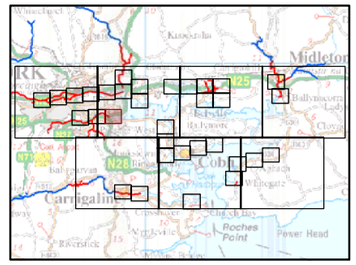
Figure No. : M9/UA/DEP/200/020
Revision : 0

Drawing Scale : 1:5,000
Plot Scale : 1:1 @ A3

N

0.1 0.05 0 0.1 0.2 0.3 0.4
Kilometres

Location Plan :



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (> 40m) (10% and 0.1% AEP)
- High Confidence (<20m) (0.5% AEP)
- Medium Confidence (<40m) (0.5% AEP)
- Low Confidence (>40m) (0.5% AEP)
- River Centreline
- Node Point
- 001 Node Label (refer to table)

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Ireland

Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map :
DOUGLAS

Map Type :	FLOOD EXTENT		
Source :	TIDAL FLOODING		
Map area :	URBAN AREA		
Scenario :	CURRENT		
Figure By :	Valeria Medina	Date :	21 June 2012
Checked By :	Paul Dunne	Date :	21 June 2012
Approved By :	Clare Dewar	Date :	21 June 2012

Figure No. : M9/UA/EXT/CURS/020

Revision : 1

Drawing Scale : 1:5,000

Plot Scale : 1:1 @ A3

FOUL SEWER

STORM SEWER

WATER MAIN

POTENTIAL FUTURE
DEVELOPMENT LOCATION

DENOTES PREDICTED
EXTENT OF FLOODING

RTE Site - Jacobs Island

Scale 1:750

Rev	Sts	Description	Date
P01	S2	Issued for Information	18.01.21
P02	S2	Flood Map Added	10.03.21

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PROJECT
Jacobs Island
RTE Site

CLIENT
McCarthy Developments

TITLE
Site Location Plan & Services

DRAWN BY	CHECKED BY	APPROVED BY
TOC	WOS	MM

SCALE	PROJECT NUMBER
1:750	18032

DOCUMENT REFERENCE
18032-MMS-ZZ-ST-SK-C-0250

STATUS: S2

REV: P02

PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-DICIPLINE-NUMBER