

PROPOSED STRATEGIC HOUSING
DEVELOPMENT AT JACOBS ISLAND,
MAHON, CORK

ENGINEERING INFRASTRUCTURE REPORT

Prepared for: Hibernia Star Ltd
Prepared by: Bianca Leonessa
Date: 20th June 2022
Job Number: 21168
Reference: 21168-MMS-00-ZZ-RP-C-0001

MMOS

MURPHY • MATSON • O'SULLIVAN
CONSULTING CIVIL & STRUCTURAL ENGINEERS

MMOS Consulting Civil & Structural Engineers,
The Chapel, Blackrock House, Blackrock Road, Cork, T12 KRK7.
T 00353 (0)21 4317608 mmosengineers.com

Report Title: Engineering Infrastructure Report for Planning

Project Title: Jacobs Island SHD

Prepared for:
Hibernia Star Ltd

REVISION CONTROL TABLE

Document reference: 21118-MMS-00-ZZ-RP-C-0001

Revision	Date	Issue	Author	Checked
00	20.06.22	Issue for Planning	BL	MM

TABLE OF CONTENTS

1. INTRODUCTION	2
1.1 SITE LOCATION	2
1.2 PROPOSED DEVELOPMENT	3
1.3 SCOPE OF REPORT	4
2. FLOOD RISK ASSESSMENT.....	5
2.1 INTRODUCTION AND BACKGROUND	5
2.2 FLOOD RISK IDENTIFICATION	6
2.3 INITIAL FLOOD RISK ASSESSMENT	7
2.4 DETAILED FLOOD RISK ASSESSMENT	10
2.5 CONCLUSION.....	11
3. EXISTING SERVICES	12
4. SURFACE WATER DRAINAGE PROPOSAL	14
5. FOUL DRAINAGE PROPOSAL	16
6. WATER SUPPLY PROPOSALS	18
Appendix A.....	A
Appendix B	B
Appendix C	C
Appendix D.....	D
Appendix E	E
Appendix F	F

1.2 PROPOSED DEVELOPMENT

The Jacob's Island site to the south of the N40 South Ring Road currently has several phases of completed residential development, as well as planning permission for 413 apartments in 6 blocks, under the An Bord Pleanála Reference No. ABP-301991-18, as amended by ABP-310378-21. The proposed development area outlined in red in Figure 2 is the subject of this report for the undeveloped lands on Jacobs Island. The proposed development will tie in with the existing built and permitted developments. This report focuses on the SHD application within the proposed masterplan.



FIGURE 2 – ORIGINAL MASTERPLAN FOR JACOBS ISLAND (1999)

The development will consist of:

The construction of a Strategic Housing Development of 489 no. apartments, creche and offices in 5 no. buildings ranging in height from part-1 to part-8 no. storeys over lower ground and semi-basement podium levels. The development will contain 1 no. studio, 162 no. 1 bedroom apartments and 327 no. 2 bedroom apartments.

- Blocks 12 and 13 will contain ancillary commercial areas including a creche (381 sq m) and offices (4,143 sq m). The development will also contain supporting internal resident amenity spaces (576 sq m) and external communal amenity spaces.
- Block 11 is part-3 to part-6 no. storeys over semi-basement podium and lower ground levels and will contain 101 no. apartments.
- Block 12 is part-1 to part-4 no. storeys over undercroft car parking and lower ground level office building (4,112 sq m) comprising 2,934 sq m of office floor area.
- Block 13 is part-2 to part-8 no. storeys over lower ground levels and will contain a crèche over 2 no. levels (381 sq m) and 39 no. apartments.
- Block 14 is part-3 to part-6 no. storeys over lower ground level and contains 130 no. apartments.
- Block 15 is part-3 to part-6 no. storeys over semi-basement, podium and lower ground level and contains 219 no. apartments and ancillary resident amenity spaces (576 sq m).

The proposed development also provides for hard and soft landscaping, boundary treatments, public realm works, car parking, bicycle parking, bin stores, signage, lighting, PV panels, sprinkler and water tank, substations, plant rooms and all ancillary site development works above and below ground.



FIGURE 3 – PROPOSED SITE PLAN

1.3 SCOPE OF REPORT

This report describes the proposed civil engineering infrastructure for the proposed development and how it connects to the public infrastructure serving the area. This report has been prepared by reviewing available data from the client, design team, local authority sources, national bodies and through onsite surveys completed to date, and it addresses the below:

- Flood Risk,
- Storm Drainage,
- Foul Drainage, and
- Potable Water Supply.

The report should be read in conjunction with the engineering drawings submitted with the planning application.

2. FLOOD RISK ASSESSMENT

2.1 INTRODUCTION AND BACKGROUND

The first stage uses existing information to identify and confirm whether there may be flooding or surface water management issues on a particular site that may warrant further investigation. To initially identify potential flood risks on the site and surrounding areas, a number of existing sources were studied and are described below.

This Flood Risk Assessment (FRA) for the proposed development has been prepared in accordance with the Guidelines for Planning Authorities on 'The Planning System and Flood Risk Management' published in 2009 by the Office of Public Works (OPW) and the Department of the Environment, Heritage and Local Government (DoEHLG). This FRA addresses points 2(i), 2(ii), 2(iii) and 2(iv) of Box 5.1 | Section 5.15 of the guidelines.

The guidelines describe good flood risk practice in planning and development management and seek to integrate flood risk management into the planning process, thereby assisting in the delivery of sustainable development. Planning authorities are directed to have regard to the guidelines in preparation of Development Plans and Local Area Plans, and for development control purposes. For this to be achieved, flood risk must be assessed as early as possible in the planning process.

Other sources of information, attached as appendices, used to compile this FRA include:

- OPW website, www.floodmaps.ie,
- Lee CFRAM Study

The stages involved in the assessment of flood risk are listed in the OPW publication as follows:

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

The OPW publication also outlines a Sequential Approach for determining whether a particular development is appropriate for a specified location in terms of flood risk. The categorization of the site of this development is presented in Section 2.2 below.

As outlined in the OPW publication, new developments are divided into three categories which are as follows: Highly Vulnerable Development, Less Vulnerable Development and Water-compatible Development. The proposed development comes under the heading of Highly Vulnerable Development as it is primarily a residential development.

Geographical areas are similarly divided into three categories, based on their risk of river and tidal flooding. The three categories are as follows:

- Flood Zone A – where the probability of flooding from rivers and the sea is the highest (greater than 1% or 1 in 100 year for river flooding and 0.5% or 1 in 200 year for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% of 1 in 100 year for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 year for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 year for both river and coastal flooding i.e. all areas which are not within Zones A or B).

2.2 FLOOD RISK IDENTIFICATION

The first stage uses existing information to identify and confirm whether there may be flooding or surface water management issues on a particular site that may warrant further investigation. To initially identify potential flood risks on the site and surrounding areas, a number of existing sources were studied and are described below.

The first source considered is the OPW Flood Hazard Mapping service. The OPW map report shows that no flood incidents have been recorded on the full extension of the site, and also don't indicate any flooding events in the immediate area.

All rain falling on the site will undergo two stage treatment, and all stormwater attenuation systems will be sized based on stormwater flows. Therefore, the risk of pluvial flooding on the site of the proposed development is negligible.

The possibility of fluvial or tidal flooding on the site is considered utilising the guidelines outlined in Chapter 3 of the OPW, which is an overall study undertaken by the OPW.

A significant amount of information is available on potential flooding of the site and the Preliminary Flood Risk Assessment (PFRA) map considers flood risk stemming from any major source of flooding such as sea, river, groundwater and rainfall as well as infrastructural sources such as water supply systems, ESB and Waterways Ireland Infrastructure, reservoirs and urban drainage systems.

The site is sloped downwards towards southeast, and no evidence of flooding or flow paths were evident on site. This confirms the proposed development site is as expected and ties in with the complete topographical survey of the site and surrounding area.

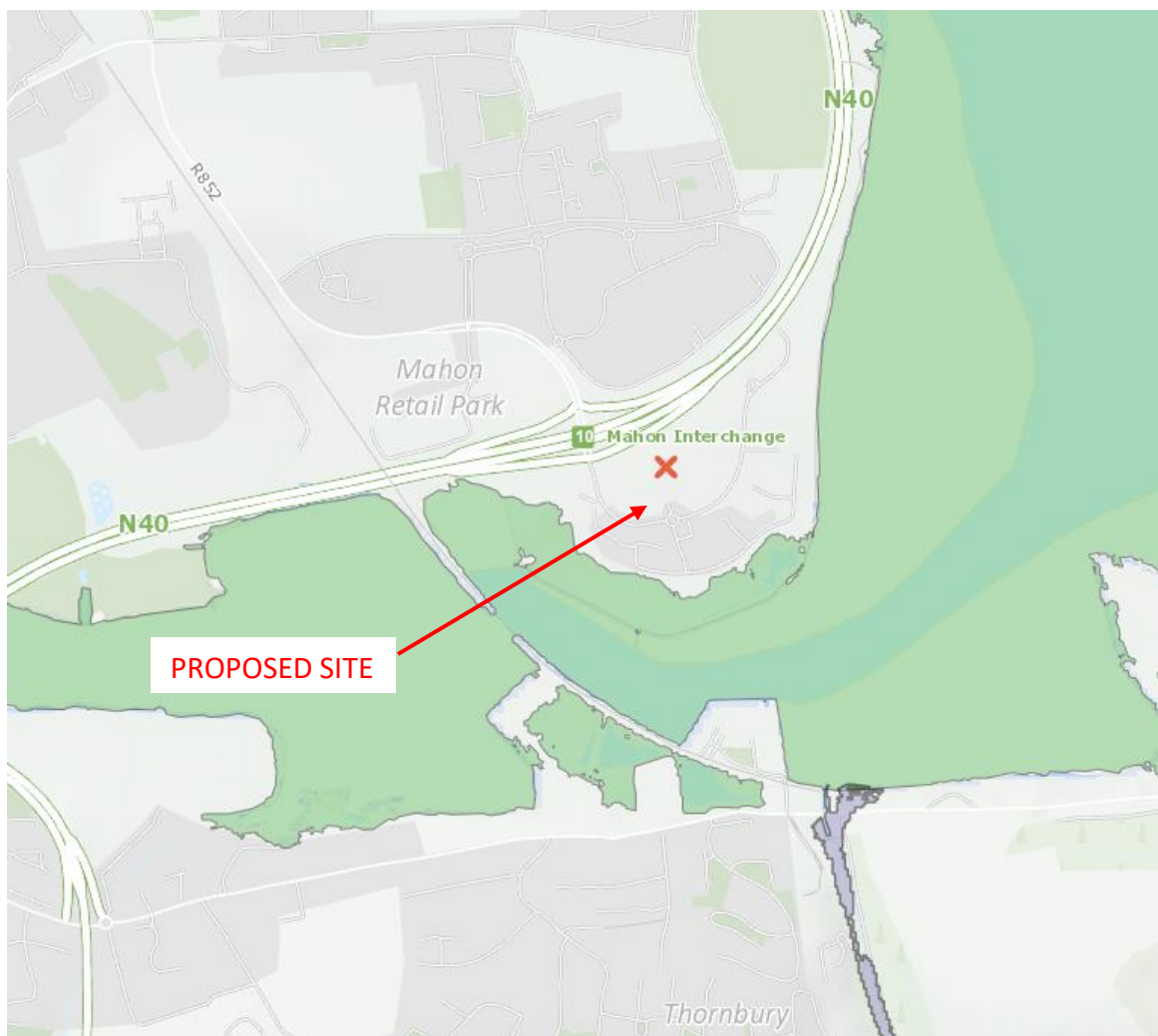


FIGURE 4 – PREDICTED TIDAL AND FLUVIAL FLOOD EXTENTS

Table 1 below is an extract from the OPW publication which states whether a particular development is deemed ‘appropriate’ for a geographical location. As per the flood zone definitions outlined above, the site proposed for the new development is located in Flood Zone C. Thus, the proposed development is deemed ‘Appropriate’ in accordance with the OPW publication.

DEVELOPMENT VULNERABILITY	FLOOD ZONE A	FLOOD ZONE B	FLOOD ZONE C
Highly vulnerable	Justification Test	Justification Test	Appropriate
Less vulnerable	Justification Test	Appropriate	Appropriate
Water-compatible	Appropriate	Appropriate	Appropriate

TABLE 1 – Matrix of Vulnerability

2.3 INITIAL FLOOD RISK ASSESSMENT

The purpose of the initial flood risk assessment is to ensure that all applicable flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and the proposed development are addressed. It also ensures the confidence of existing site flood information and flood defences.

A Source-Pathway-Receptor Model is presented below, in Table 2, to summarize the possible sources of floodwater, the receptors that could be affected by potential flooding with specific reference to the proposed development. It provides the probability and magnitude of the sources, the performance and response of pathways and the consequences of the receptors in the context of the planned development. Subsequently, the appraisal of existing information for each of these sources is presented in further detail for completeness.

SOURCE	PATHWAY	RECEPTOR	LIKELIHOOD	IMPACT	RISK
Tidal	Justification Test	People Property	Very unlikely	High	Low
Fluvial	Site outside fluvial flood zone	People Property	Very unlikely	High	Low
Pluvial	Flooding from surcharging of proposed drainage systems	People Property	Very unlikely	High	Low
Groundwater	Rising groundwater on the site	People Property	Very unlikely	Low	Low
Infrastructural – Human or Mechanical Error	Blockage of new drainage network	People Property	Possible	Low	Low

TABLE 2 – Source-Pathway-Receptor Analysis

1. Tidal

Tidal flooding is caused by higher than normal sea levels, largely as a result of storm surges, resulting in the sea overflowing onto the land. Coastal flooding is influenced by the following factors:

- High tide level;
- Low barometer pressure combined with high winds; and
- Wave action dependent on wind speeds, direction, local topography, and exposure.

As noted above, whilst proposed development site is located approximately 200m from the Lough Mahon Estuary the site is not indicated to be in a tidal flood risk area. The Figure 6 below is from the relevant Lee CFRAM Map for the Cork Harbour Area.

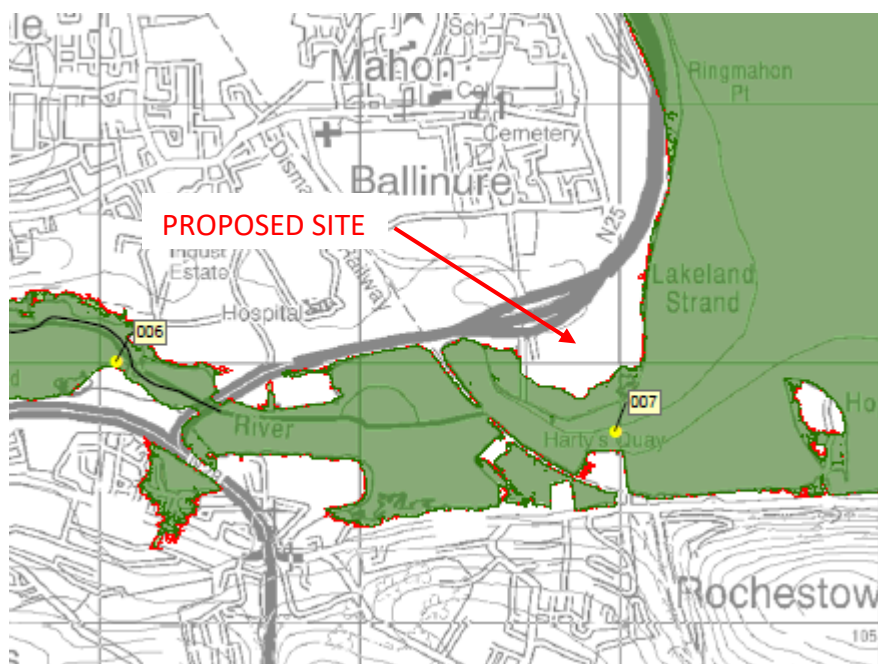


FIGURE 5 – LEE CFRAM MAP FOR CORK HARBOUR AREA

Node 007 on this map identifies the 1 in 1000 year flood return period as a level of +3.46m OD. The lowest occupied proposed finished floor level on the present development is +7.475m OD, which is above the 1 in 1000 year flood level; thus, it is reasonable to conclude that the related risk from tidal flooding is deemed to be sufficiently low to be acceptable.

2. Fluvial

River flooding occurs when the capacity of a watercourse is exceeded, or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying areas. The nearest fluvial source to the development is the River Lee which is approximately 2.0km north-east of the site.

The OPW CFRAM Fluvial Flood Extents Map indicates no fluvial flooding within the development site for the 1% AEP or for more extreme events. The OPW National Flood Hazard Mapping does not indicate any historical fluvial flooding within the development or within close to the proximity of the site also. Thus, it is reasonable to conclude that the related risk from fluvial flooding is deemed to be sufficiently low to be acceptable.

Given the comprehensive and detailed nature of the existing information available regarding flooding, it is not deemed necessary to conduct further investigative studies of the risk of fluvial flooding.

3. Pluvial

In undeveloped land overland flow occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland forming

ponds in natural hollows. From historical records there is no indication of pluvial flooding on the site.

The existing surface water drainage network around the site was originally designed to drain the entirety of the future development lands, which were developed in the early 2000's with sufficient capacity within the drainage system provided to drain the entire site by gravity sewers. The sewers are currently drained to the Lough Mahon estuary where a non-return valve has been provided. The surface water drainage network for the proposed scheme is as set out in section 4 of this report.

Based on the above, the risk of flooding of the proposed site from the drainage system is considered low.

4. Groundwater

Groundwater flooding occurs when the level of water stored in the ground rises, as a result of prolonged rainfall, to meet the ground surface and flows out over it. Groundwater flooding tends to be very local and result from site specific factors such as tidal variations.

Upon completion of a geotechnical investigation report, the impact of groundwater can be assessed accordingly. We note that there is no historical evidence of groundwater flooding on that site extents.

5. Infrastructural

Proper operation and maintenance of the drainage system will be implemented in accordance with CIRIC 753, The SUDS Manual to reduce any risk of human or mechanical error causing flood risk from blockages.

2.4 DETAILED FLOOD RISK ASSESSMENT

The purpose of Stage 3, a detailed flood risk assessment, involves examining potential residual risks in detail and proposing measures to mitigate or eliminate the same from the identified source.

1. Check does the development increase flood risk elsewhere?

Presently, the site is brownfield, and the introduction of SUDS measures as detailed in this report will reduce both the outflow volume and peak outflow rate from the new proposed development and as a result will provide a reduction in peak flow contribution to the combined public sewer in a storm event. Thus, there is no increase to flood risk elsewhere.

2. Check possibility of new surface water network flooding?

During preliminary design or the proposed storm network design, a climate change factor of 10% was applied to storm events.

2.5 CONCLUSION

The flood risk assessment has been carried out in accordance with the OPW Publication “The Planning System and Flood Risk Assessment Guidelines for Planning Authorities” and conclude the following:

- The site-specific flood risk assessment for the construction of the development was undertaken in accordance with the requirements of the “Planning System and Flood Risk Management Guidelines for Planning Authorities”, and other relevant documents and publications.
- The proposed type of development for this site is to be primarily residential. This is categorized by the guidelines as highly vulnerable development and, as its location is within Flood Zone C, the development is deemed to be ‘Appropriate’.
- A justification test is not required.
- The development’s drainage design includes for a 10% climate change allowance.
- There is no risk of flooding affecting the site from tidal or fluvial sources.
- The proposed development will not increase the stormwater runoff rate when compared to the existing site and satisfies the requirement of the SFRA to reduce flooding and improve water quality.
- Any flood events do not cause flooding of the proposed development, and the proposed development does not affect the flood storage volume or increase flood risk elsewhere.
- Thus, the residual risks of flooding can be managed by incorporation of good building practice in design and construction of ground floor level and associated drainage systems, and by maintenance and management of the property.

As outlined above, the proposed development has been demonstrated to be in compliance with the core objectives of the Planning System and Flood Risk Management Guidelines.

3. EXISTING SERVICES

The surface water network for the entire Jacobs Island development was completed as part of the original works under planning reference 00/24609. This infrastructure was designed for all future development (i.e., all development envisaged under the 00/24609 planning application).

The installed surface water drainage network included a large 600 mm diameter and 900 mm diameter surface water sewers adjacent to the fore shore to an outfall located to the north of the site. The surface water sewer outfalls directly into the Lough Mahon Estuary via a non-return valve.

As is similar with the surface water network, the wastewater sewer network for the entire Jacobs Island development was completed as part of the original works and this infrastructure will cater for the development works that are proposed under this application. This wastewater sewer network is completely separated to the surface water network throughout the site.

In 2013 a taking in charge process was undertaken in conjunction with Cork City Council and during this process the constructed sewage network was signed off by Cork City Council following the process of CCTV surveys and visual inspections. In addition, a report that reviewed the design and future capacity of the existing sewers was undertaken and provided to Cork City Council by MMOS. A copy of this report is enclosed in appendix C of this report.

Existing records drawing for local sewers are included in Appendix C, and the proposed connection points for the development can be seen below in Figure 6.

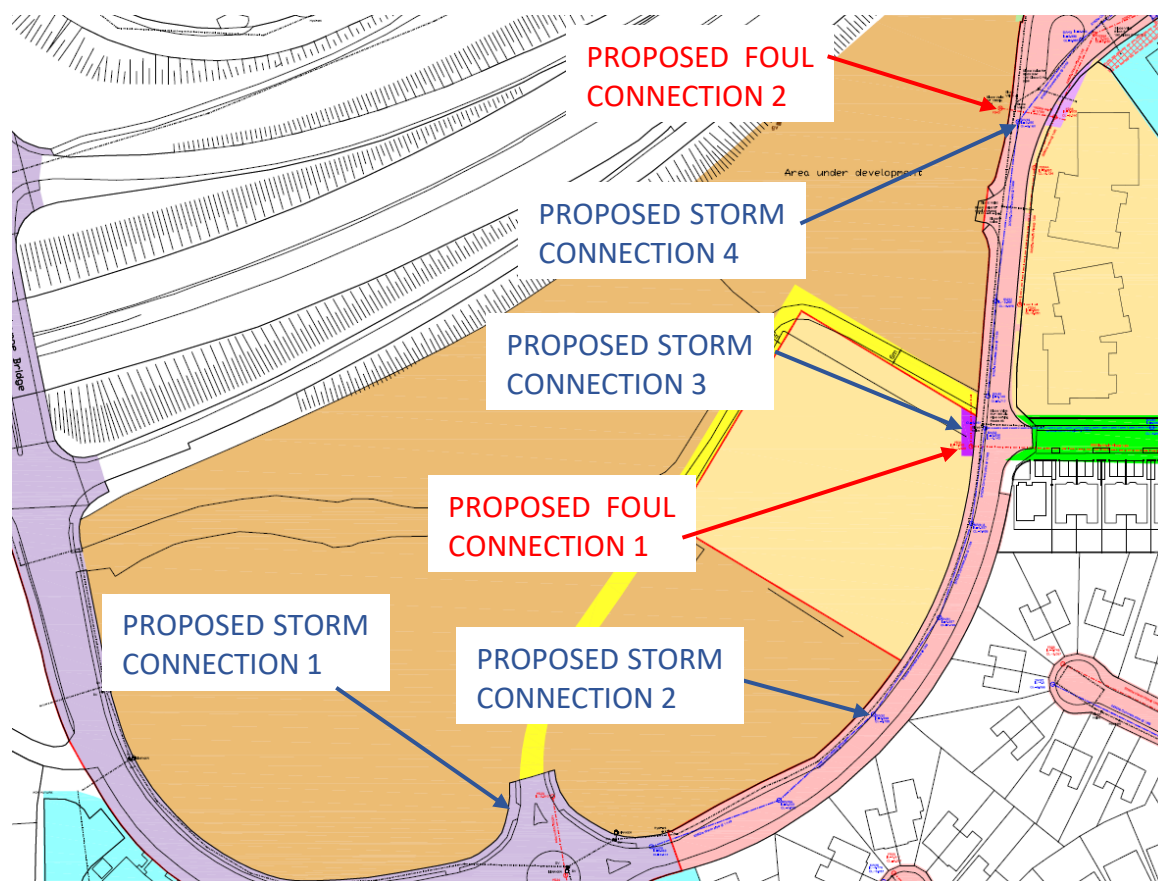


FIGURE 6 – EXISTING DRAINAGE RECORDS

Jacobs Island is provided with water services at the southwestern and northern end of the site. Both connections are 200 mm diameter water connections. A full network of water supply services has been completed throughout the Jacobs Island development and has been taken in charge by the local authority.

The available watermain records are included in Appendix C of this report. The proposed connection points and existing watermain lines can be seen below in Figure 7.

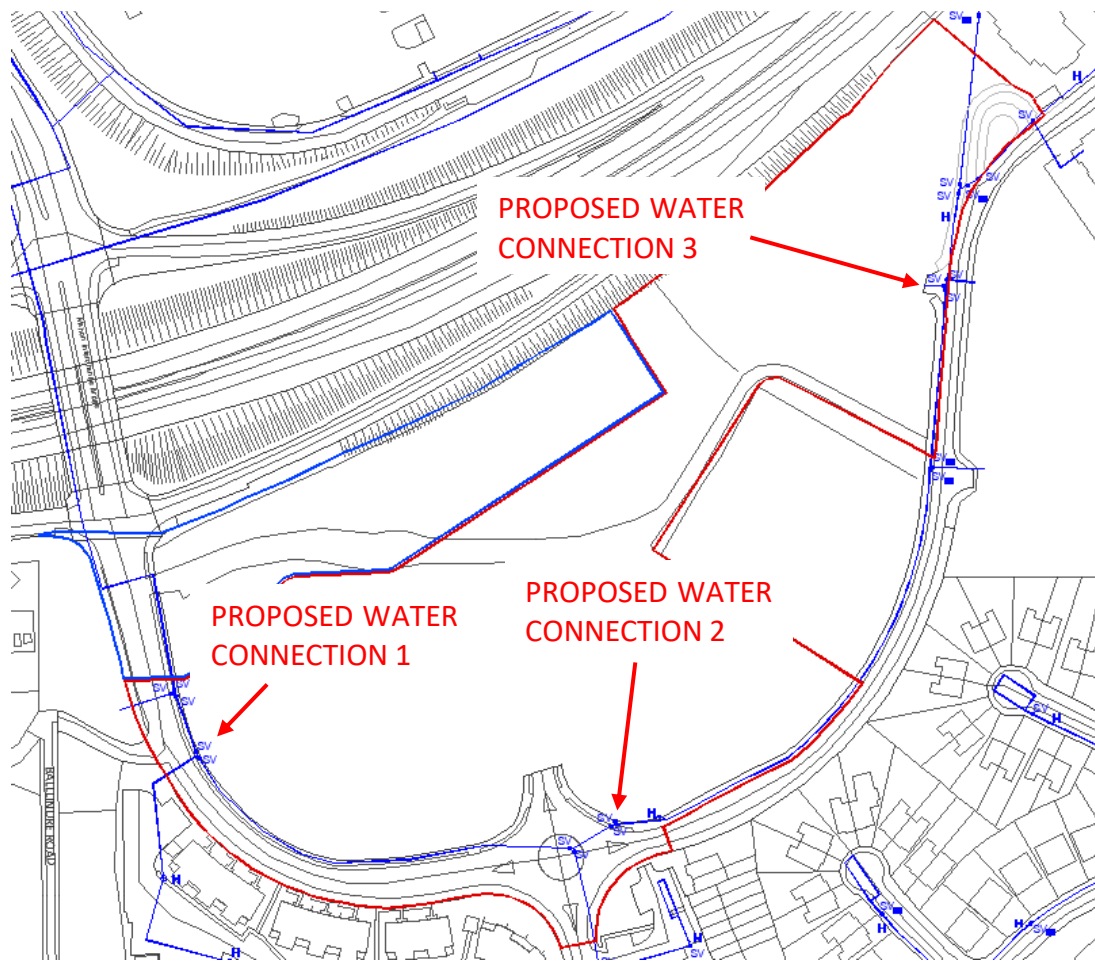


FIGURE 7 – EXISTING WATERMAIN RECORDS

4. SURFACE WATER DRAINAGE PROPOSAL

The proposed surface water drainage will be gathered in a dedicated system and will collect runoff from all impermeable areas, such as roofs, terraces, and hardstanding areas within the land boundary.

The surface water drainage will be designed in accordance with the following criteria

- BS EN752:2008 – Drain and Sewer Systems outside Buildings
- BS 8515:2009 – Rainwater Harvesting Systems, Code of Practice (where applicable)
- Minimum pipe diameter will be 225mm on the main network.
- All pipe runs shall be designed to achieve a minimum self-cleansing velocity of 1 m/s.
- A roughness value (k) of 0.6mm is used in the network design

The Greater Dublin Strategic Drainage Study (GDSDS) Vol. 2 Section E2.1 requires provision of interception and/or treatment volume for River Water Quality Protection.

It is noted that the point of outfall of the sewer is directly into the Lough Mahon and as recognised in the Greater Dublin Strategic Drainage Study (GDSDS) attenuation is not required in such circumstance where the point of outfall is into an estuary, as specifically advised in section 6.3.3.4., as follows.

“Where there is little downstream to be concerned about with respect to flooding (discharging to the estuary or sea), criteria on flow rates and volumes of discharge are of little relevance. Water quality is the only issue needing to be addressed (primarily sedimentation)”

Attenuation is not therefore proposed for the current application; however, hydrocarbon interceptors will be provided for all discharge generated off the newly added carparking area and traffic routes.

As per SuDS proposals, the following measures will be considered.

- Open green areas and podium landscaping which will provide interception storage for between 5-10mm of rainfall and provide treatment by filtration through the planter soils. These planted areas will also provide a medium for removal of pollutants and will improve the quality of surface run-off discharging into the surface water drainage system.
- Petrol and Oil (Hydrocarbon) interceptors will be provided at all surface water discharge points of the development to the existing surface water drain. This is intended to prevent any deterioration of water quality in downstream watercourses. These interceptors will also include silt collection and storage capacity to prevent silt discharge from the development to the receiving environment.
- Non-return valves will be provided prior to the connection to the existing drainage

network.

- In addition, tree pits, swales, soakaways, and another SuDS measure will be considered following an onsite infiltration test.

Details of the proposed surface water drainage layout are shown indicatively on proposed services drawing presented in Appendix D of this report. It should be noted that all storm drainage works will be undertaken in accordance with the local authority requirements and Irish Water standard details as required.

5. FOUL DRAINAGE PROPOSAL

The foul drainage for the proposed development has been designed as a completely separate system to the storm. All foul drainage for the above ground units will be drained and gathered in stacks below basement floor level. The foul is to be collected beneath the ground floor slab and directed to the proposed new foul network onsite, which is proposed to discharge to the existing manholes as previously shown in Figure 7.

The proposed development is to comprise 489 residential units plus 4,493m² of non-residential areas that comprise an office building and a creche. However, the drainage scheme for this phase of the development will take in consideration the incoming flow from future works related to the masterplan, that involves an additional area of 10,632m² of office building and a 165-bed hotel.

There are two discharge points to existing foul sewer manholes (FS31 and FS35) and therefore, there are two foul networks discharges and the foul flow for each network has been estimated by the below:

- **NETWORK 1:** *Comprises Hotel (B16), Office (B17), Creche, and residential units within blocks 10, 13, 14 and 15.*

Residential Discharge

Average DWF	=	2.315 l/s
Peak DWF	=	12.56 l/s

Commercial Discharge

Average DWF	=	2.512 l/s
Peak DWF	=	11.30 l/s

Total Discharge to FS31

Average DWF	=	4.830 l/s
Peak DWF	=	23.87 l/s

- **NETWORK 2:** *Comprises Office (B12) and residential units on block 11.*

Residential Discharge

Average DWF	=	0.521 l/s
Peak DWF	=	3.125 l/s

Commercial Discharge

Average DWF	=	0.560 l/s
Peak DWF	=	2.521 l/s

Total Discharge to FS35

Average DWF	=	1.081 l/s
Peak DWF	=	5.646 l/s

It is noted that a portion of the foul sewer before the proposed foul connection to FS31 is permitted under ABP-301991-18 SHD and a wayleave will be agreed between landowner and Irish Water.

The Board will note that Irish Water have confirmed that connection to their water and wastewater networks can be facilitated and that the Confirmation of Feasibility has been obtained and is included in the Appendix F.

In the Confirmation of Feasibility dated 28th of September 2021, Irish Water indicated that “Upgrades required at Mahon South Pump Station and to the existing downstream 225mm diameter foul sewer in order to facilitate this connection. It will be necessary to carry out further detailed studies and investigations at connection application stage to determine the full extent of the upgrades”. This matter was discussed at the Tri-Partite Meeting of 4th of March 2022 and during which Mr. Simon Lyons, Senior Executive Engineer Cork City Council queried the accuracy of Irish Water’s assessment of the need to upgrade the existing infrastructure and the Mahon Pump Station. This reflected his report contained as an appendix to the Cork City Council’s Submission on Section 5 Consultation dated 25th of November 2021 and where he noted:

The Applicant is liaising with Irish Water and a Confirmation of Feasibility has been issued. I would question Irish Water’s assertion that the Mahon South pumping station requires upgrade works. This pump station has sufficient capacity for the proposed development. Perhaps the incoming pipe work from the Jacobs Island site requires upgrading. Irish Water and / or the Applicant should clarify exactly what upgrade works are envisaged, and agree these with the Drainage Section of Cork City Council, prior to submission of the full application.

To date it has not been possible to clarify what upgrades, if any, are required to the Mahon Pump Station or the incoming pipe from Jacob’s Island, and as outlined in the Confirmation of Feasibility, Irish Water consider that this will be dealt with at connection application stage. While the nature and extent of any required upgrades have yet to be determined any works will involve the upgrade of pipes and pumps and which can be carried out by Irish Water as exempted development in accordance with Schedule 2, Part 1, Class 58 of the Planning and Development Regulations, 2001 - 2021.

Details of the proposed foul drainage layout are shown indicatively on proposed services drawing presented in Appendix D of this report. It should be noted that Irish Water has also issued a Statement of Design Acceptance, verifying that the proposed foul sewer network within the development is according to the Irish Water standards. This statement is also attached to Appendix F.

6. WATER SUPPLY PROPOSALS

The proposals for the water supply will involve taking a feed from the existing watermain located outside the site running along the residential access roads. Sluice valves will be provided at appropriate locations to facilitate isolation and purging of the system. Details of the proposed watermain layout are shown on services drawing included in Appendix E.

The proposed water demand for the development has been estimated as 5.736 l/s in the average hours, and 28.68 l/s in the peak hours.

As per Irish Water requirements, the proposed development will have an onsite water storage tank to satisfy the 24-hour water demand storage requirement to cater for possible shut-downs in the system.

Irish Water have confirmed that connection to their water network can be facilitated, via the Confirmation of Feasibility, which is included in Appendix F. We note that the site layout has changed since the pre connection enquiry stage, and the number of units in the scheme has been reduced, so the confirmation of feasibility from Irish Water is provided for a number of units bigger than the present development.

Irish Water has also issued a Statement of Design Acceptance verifying that the proposed watermain network within the development is according to the Irish Water standards. This statement is also attached to Appendix F. Details of the proposed watermain layout are shown indicatively on proposed services drawing presented in Appendix E of this report.

Appendix A

- (i) Flood Maps

Appendix B

- (i) Existing Topographical and Site Survey

Appendix C

- (i) Existing Drainage and Watermain Records

Appendix D

- (i) Proposed Storm Layout Plan
- (ii) Proposed Foul Layout Plan

Appendix E

- (i) Proposed Watermain Layout

Appendix F

- (i) Confirmation of Feasibility
- (ii) Statement of Design Acceptance