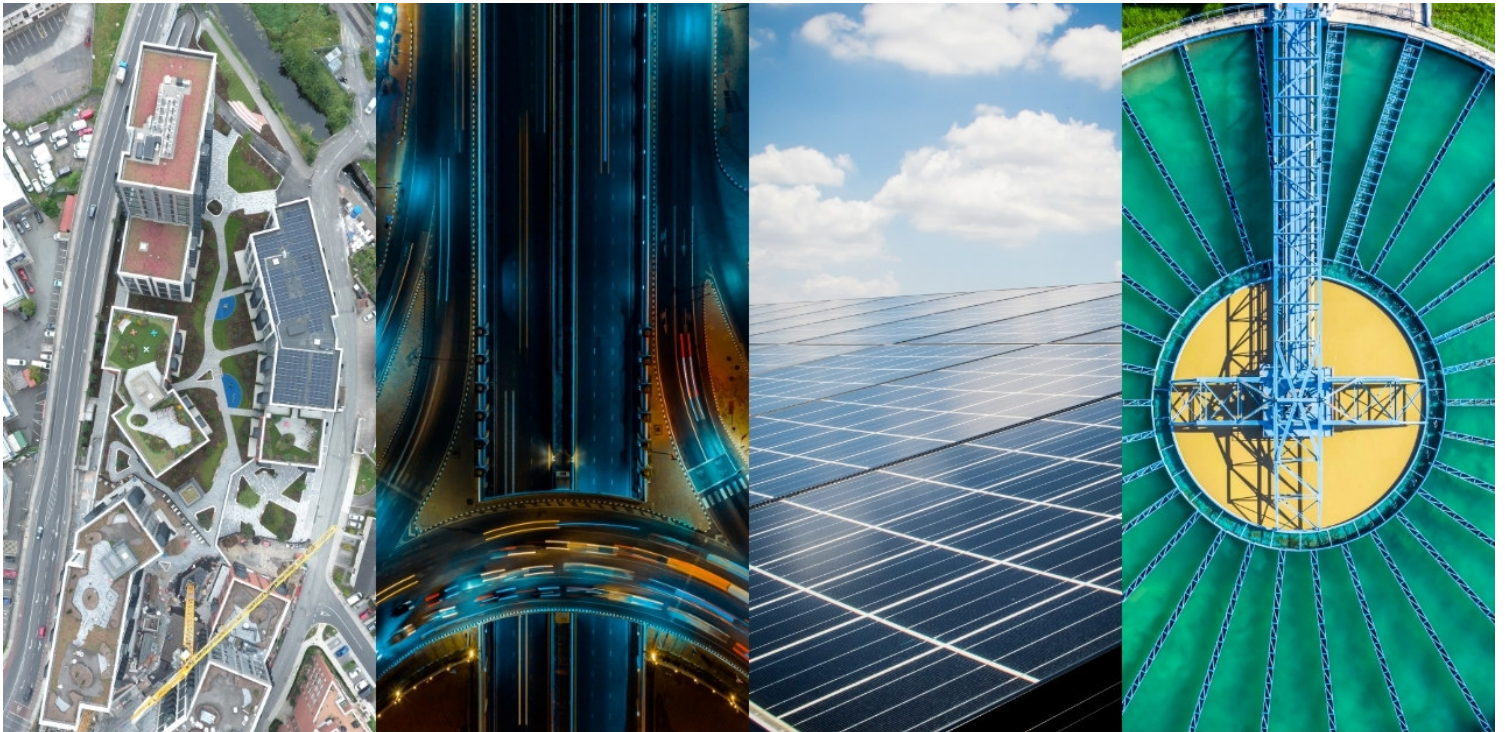


St Edmundsbury Campus Development

Water Services Report

20 April 2026

St Patrick's
Mental Health Services



Formerly JB Barry & Partners who became part of Egis in 2023.

Document Information

GENERAL INFORMATION

Client: The Governors of St Patricks Hospital
Project Title: St Edmundsbury Campus Development
Report Title: Water Services Report
File Name: 22203-JBB-00-XX-RP-C-00004

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1 INTRODUCTION

1.1 General

Egis Engineering Ireland Limited were commissioned by the the Governors of St Patrick's Hospital to prepare a Water Services Report for a proposed St. Edmundsbury Hospital, Lucan, Co. Dublin.

The proposed development comprises the demolition of an existing single storey 52 no. bed psychiatric ward (c. 1,633.00 sq m), located to the south-west of St. Edmundsbury House (RPS 003), and the construction of a single storey 14 no. bedroom in-patient adolescent mental health facility (c. 1,857.10 sq m) in its place, with façade remediation where the former building connected to St. Edmundsbury House; The demolition of 1 no. storey existing shed (c. 17.90 sq m) to the north-west of St. Edmundsbury House and replacement with 1 no. ESB substation unit building (c. 23.60 sq m). The proposed development includes a new 200 no. bed adult inpatient facility ranging from one to two storeys in height and a total floor area of c. 16,283.20sq m, with screened plant at roof level. It will be located within the existing walled garden area (RPS 012) and will incorporate the historic walls and bell tower structures (RPS 013.) The facility will be arranged as a single continuous block comprising 7 no. In-patient wards. The form of the building will create 10 no. new internal courtyards at ground floor & 2 no. terraces at first floor (c. 3696.00 sqm in total); with c. 62lin.m of the north garden wall to be demolished and this stone reincorporated into the proposed hospital structures.

The proposed development also includes for the alteration, refurbishment and conversion of the existing structures within the historic farmyard enclosure (RPS 008), including: coach house building (c. 312.95 sq m) to provide a new consultancy suite (c. 599.50 sq m), including c. 71.5 sq m café; Alteration, conversion and refurbishment of existing barn (c. 183.65 sq m) to form a maintenance facility building and associated offices (c. 374.00 sqm); The demolition of an existing contemporary shed within the historic farm yard (c. 163.75 sq m) and construction of a new single storey energy centre building (c. 114.50 sq m), within the historic farmyard enclosure. In total, c. 210.80 sq m of structures are required to be demolished within the walled garden and farmyard enclosure areas to facilitate the proposed development.

The proposed development also includes the removal and relocation of the existing southern boundary wall to Lucan Road (c. 190lin.m) (Regional Road Number Ref. R835) set back from the existing boundary to facilitate the future junction improvement works to the Lucan Road and Chapel Hill Junction. The junction upgrade works do not form part of this application and will be carried out by South Dublin County Council. The proposed development also comprises the demolition of the existing 2 no. Dean Clinic buildings (single storey and single storey with dormer level) at the existing entrance to the site via the Lucan Road (c. 221.15 sq m and c. 60 sq m respectively) to facilitate the construction of revised access arrangements and widening of the access to the Lucan Road.

The new mental health facility will provide adult and adolescent in-patient service rooms; Adult and adolescent day services rooms; Patient care services rooms; Patient pharmacy; Laboratories; Staff and patient canteen facilities; Consultant and hospital administration accommodation; Staff welfare facilities; Reconfigured and additional new car and cycle parking facilities (with revised total of 214 no. car parking spaces, 2 no. bus parking spaces and 160 no. secure cycle parking spaces); Signage and wayfinding.

The proposed development also includes private and secure patient gardens (c. 9,982 sq m); Plant and associated tanks; Public lighting; All piped infrastructure and ducting and redirection works; Tree removal, including tree removal within the Proposed Liffey Valley Natural Heritage Area (pNHA - 000128); Redirection and undergrounding of existing overhead power lines from the Lucan East 38KV Substation to the existing hospital facility; Controlled access barriers; 2 no. Secure cycle parking stores total c. 107.10 sq m; EV charging facilities; 2 no. Attenuation tanks; Rainwater harvesting tanks; PVs; SUDs including extensive green roof provision; Boundary treatments, including new boundary treatments and the repair and refurbishment of existing stone boundary walls; Waste marshalling compound storage area; Changes in level and retaining walls; Internal roads and paths, including vehicle set down areas; Site clearance works; Services provision and related ducting, piping and cabling; and all associated site development and

excavation works above and below ground. Upon completion, the mental health facility will cumulatively provide 214 no. inpatient beds across the campus, including existing and proposed inpatient beds.

The proposed development site is located along the Lucan Road approximately 1km north east of Lucan centre as shown in Figure 1 below:



FIGURE 1 - LOCATION OF PROPOSED DEVELOPMENT (SOURCE: GOOGLE MAPS, ANNOTATION BY EGIS)

1.2 Purpose

This Report addresses the following:

- Water Supply,
- Foul Sewer Design,
- Surface Water Design,
- Operations/Maintenance of SuDS Devices

2 WATER SUPPLY

2.1 Connection

The proposed watermain layout and connection point are shown in Drawing 22203-JBB-00-XX-DR-C-01400 accompanying this application. The proposed development will be connected to an existing 200 mm diameter watermain located across Lucan Road from the existing entrance to the site.

A Pre-Connection Enquiry was submitted to Irish Water on the 28th November 2022. A Confirmation of Feasibility was received on the 17th May 2023 with an updated confirmation provided on 29th September 2025. A copy of CDS25004860 is contained in Appendix 1. It is noted that the CoF states that the water connection is feasible without an infrastructure upgrade by Irish Water, to the network.

2.2 Daily Water Demand

The daily water demand for the proposed development is estimated, based on Section 3.7.2, Irish Water's Code of Practice for Water Infrastructure (July 2020 -Rev 2), as follows:

1. IN-PATIENT WATER DEMAND (ESTIMATED - 215 BEDS)

Daily Demand: $215 \times 350 \text{ l/head/day} = 75,250 \text{ litres}$

Average Demand: $75,250 / 24 \times 3600 = 0.87 \text{ l/sec}$

Average Day Peak Week Demand: $0.87 \times 1.25 = 1.09 \text{ l/sec}$

Peak Demand: $1.09 \times 5 = 5.44 \text{ l/sec}$

2. STAFF WATER DEMAND (ESTIMATED - 453)

Daily Demand: $453 \times 100 \text{ l/head/day} = 45,300 \text{ litres}$

Average Demand: $45,300 / 24 \times 3600 = 0.52 \text{ l/sec}$

Average Day Peak Week Demand: $0.52 \times 1.25 = 0.66 \text{ l/sec}$

Peak Demand: $0.66 \times 5 = 3.28 \text{ l/sec}$

3. DAY SERVICE USERS WATER DEMAND (ESTIMATED - 200)

Daily Demand: $200 \times 60 \text{ l/head/day} = 12,000 \text{ litres}$

Average Demand: $12,000 / 24 \times 3600 = 0.14 \text{ l/sec}$

Average Day Peak Week Demand: $0.14 \times 1.25 = 0.17 \text{ l/sec}$

Peak Demand: $0.17 \times 5 = 0.87 \text{ l/sec}$

4. VISITORS WATER DEMAND (ESTIMATED - 180)

Daily Demand: $180 \times 40 \text{ l/head/day} = 7,200 \text{ litres}$

Average Demand: $7,200 / 24 \times 3600 = 0.08 \text{ l/sec}$

Average Day Peak Week Demand: $0.08 \times 1.25 = 0.10 \text{ l/sec}$

Peak Demand: $0.10 \times 5 = 0.52 \text{ l/sec}$

5. TOTAL WATER DEMAND

Daily Demand: $75,250 + 45,300 + 12,000 + 7,200 = 139,750 \text{ litres}$

Average Demand: $0.87 + 0.52 + 0.14 + 0.08 = 1.62 \text{ l/sec}$

Average Day Peak Week Demand: $1.09 + 0.66 + 0.17 + 0.10 = 2.02 \text{ l/sec}$

Peak Demand: $5.44 + 3.28 + 0.87 + 0.52 = 10.11 \text{ l/sec}$

2.3 Watermain Works

For firefighting purposes, the watermain will be installed in accordance with the requirements of Technical Guidance Document B of the Building Regulations. Hydrants will be provided around the site and have been located in accordance with Technical Guidance Document B of the Building Regulations.

Watermain works will be strictly in accordance with Irish Water Code of Practice and Standard Details.

Pressure boosting, if required will be to the requirements of Irish Water's Code of Practice. Design details for pressure boosting will be agreed with Irish Water.

New emerging water conservation technologies will be monitored during the course of the project and may be used subject to their efficiency and the approval of Irish Water.

3 FOUL DRAINAGE

3.1 Connection

The proposed foul layout and connection point are shown in Drawing 22203-JBB-00-XX-DR-C-01401 accompanying this application.

A Pre-Connection Enquiry was submitted to Irish Water on the 28th November 2022. A Confirmation of Feasibility was received on the 17th May 2023 and a copy is contained in Appendix 1. It is noted that the CoF states that the foul connection is feasible without an infrastructure upgrade by Irish Water, to the network.

The proposed development will be connected to an existing 225mm diameter foul sewer located across Lucan Road from the existing entrance to the site.

3.2 Estimated Dry Weather Flow (DWF)

The estimated Dry Weather Flow (DWF) from the proposed development, based on Section 3.6 and Appendix C, Irish Water's Code of Practice for Wastewater Infrastructure (July 2020 – Rev 2) is estimated as follows:

1. IN-PATIENT FOUL DISCHARGE (ESTIMATED - 215 BEDS)

Daily Discharge: $215 \times 350 \text{ l/head/day} = 75,250 \text{ litres}$

1DWF: $75,250 / 24 \times 3600 = 0.87 \text{ l/sec}$

6DWF: $0.87 \times 6 = 5.23 \text{ l/sec}$

2. STAFF FOUL DISCHARGE (ESTIMATED - 453)

Daily Discharge: $453 \times 100 \text{ l/head/day} = 45,300 \text{ litres}$

1DWF: $45,300 / 24 \times 3600 = 0.52 \text{ l/sec}$

6DWF: $0.52 \times 6 = 3.15 \text{ l/sec}$

3. DAY SERVICE FOUL DISCHARGE (ESTIMATED - 200)

Daily Discharge: $200 \times 60 \text{ l/head/day} = 12,000 \text{ litres}$

1DWF: $12,000 / 24 \times 3600 = 0.14 \text{ l/sec}$

6DWF: $0.14 \times 6 = 0.83 \text{ l/sec}$

4. VISITORS FOUL DISCHARGE (ESTIMATED - 180)

Daily Discharge: $180 \times 40 \text{ l/head/day} = 7,200 \text{ litres}$

1DWF: $7,200 / 24 \times 3600 = 0.08 \text{ l/sec}$

6DWF: $0.08 \times 6 = 0.50 \text{ l/sec}$

5. TOTAL FOUL DISCHARGE

Daily Discharge: $75,250 + 45,300 + 12,000 + 7,200 = 139,750$ litres

1DWF: $0.87 + 0.52 + 0.14 + 0.08 = 1.62$ l/sec

6DWF: $5.23 + 3.15 + 0.83 + 0.50 = 9.70$ l/sec

3.3 Foul Drainage Works

Within the development, it is proposed to lay 225mm diameter foul drains at 1:170, at a minimum gradient of 1 in 200 to achieve self-cleansing velocities.

All sewers on site will be uPVC pipes, which (incl. fittings) will comply with the provisions IS EN 1401 2009/2012. Pipes to be application area code "UD", Stiffness Class 8kN/m² and in accordance with Irish Water Standards.

The foul and storm sewer networks will be on separate systems. No surface water will be discharged into the foul sewer system.

Foul sewer construction will comply with the Irish Water Code of Practice and Standard Details.

4 SURFACE WATER DESIGN

4.1 Connection

The proposed development will be connected to an existing 300mm diameter stormwater sewer located outside the existing entrance to the site. Details of the proposed surface water network and SuDS measures for the proposed development are shown on drawings 22203-JBB-00-XX-DR-C-01401 and 01402.

The foul and storm sewer networks will be on separate systems. No surface water will be discharged into the foul sewer system.

4.2 Discharge Analysis

Flows from the proposed development will be connected via SUDS measures (described below) and attenuated in the Stormtech subsurface detention/attenuation system and in the permeable paving for the 100-year critical storm event + 20% for climate change prior to discharge to the existing surface water network via the hydrocarbon interceptor. The Stormtech system, proposed in two locations, will have a total effective storage volume of 2374m³ and the Permeable Paving, which also is proposed in two locations, will have an effective storage volume of 558m³, providing a combined total effective storage volume of 2935m³. The attenuated runoff rate will be limited to 2l/sec/ha by means of a hydro-brake flow control device, located in manhole S1.2, for the 100-year critical storm.

A MicroDrainage analysis incorporating a limited discharge rate of 7.2l/sec is included in Appendix 2.

The surface water drainage system shall be in accordance with the "Greater Dublin Regional Code of Practice for Drainage Works, Version 6, April 2006.

4.3 SuDS Strategy

SuDS (Sustainable Urban Drainage Systems) are defined in the SuDS Manual, CIRIA 753, 2015 as follows:

"Drainage Systems that are considered to be environmentally friendly, causing minimum or no long-term detrimental impact"

The SuDS strategy for the development will provide a comprehensive approach to the management of surface water on the site both for water quality and water quantity. The treatment train approach has been adopted for the design of the surface water system for the development. SuDS measures considered are contained in Appendix 3. This approach uses suitable SuDS measures in providing source control. The surface water treatment train is defined in Appendix A, Glossary, Volume 3, Environmental Management of the Greater Dublin Strategic Drainage Study.

The Treatment Train Schematic below outlines the proposed SuDS devices working in series prior to discharge to the existing surface water network. Flows from the development will be limited to 7.2l/sec via 1 No. hydro-brake located within manhole S1.2 for the 1 in 100 Year critical storm event + 20% allowance for climate change in accordance with GSDSD requirements.

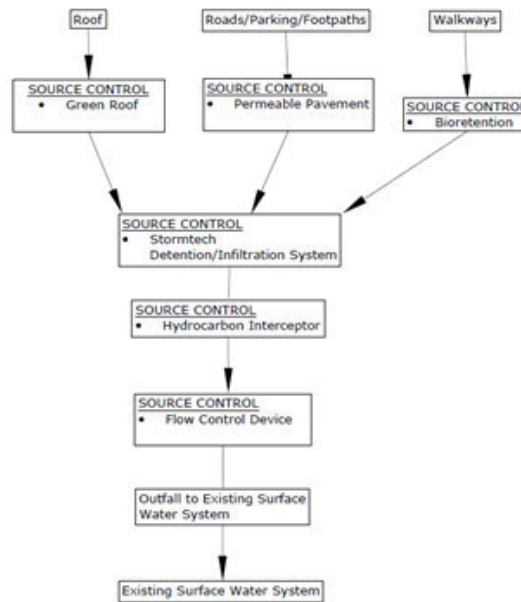


FIGURE 2 - TREATMENT TRAIN SCHEMATIC

4.4 SuDS Source Control Measures

The proposed SuDS source control measures for the Development are described separately below.

TABLE 1 – SOURCE CONTROL MEASURES

Source Control Measures	Location / Treatment Area
Green Roof	Roof (60% min)
Bioretention	Footpaths/Walkways
Permeable Paving	Parking Bays

	Roads/Footpaths/ Parking/Roofs
Attenuation (Stormtech)	
	Roads/Footpaths/ Parking/Roof
Hydrocarbon Interceptor	

The green roof for this development will be designed and supplied by an approved supplier and subject to the approval of the Engineer and the Water Services Department SDCC.

The proposed green roof will be in accordance with the Green Roofs Guidance Document, South Dublin County Development Plan 2022 – 2028 and the SuDS Manual, CIRIA 753, 2015.

Bioretention Areas/Tree Pits will be provided to cater for walkways as shown on drawing 22203-JBB-00-XX-DR-C-01402.

The Stormtech system (described earlier) will incorporate the following:

- Pre-treatment control (deep sump manhole with a 90 degree bend on the outlet) upstream of the system.
- Isolator row – patented technique for Total Suspended Solids (TSS) removal.

The pre-treatment and isolation systems are easily inspected and maintained (via the jet vac process). Further information on Stormtech is available on www.stormtech.com.

A hydrocarbon interceptor will be provided for the proposed development as shown on the drawings.

The surface water run-off from the Development will pass through a minimum of 2 SuDS devices. This treatment approach for the proposed SuDS measures meets with the requirement of Volume 2, New Development, of the Greater Dublin Strategic Drainage Study.

Interception Storage

The total area (hardstanding, roofs & permeable paving) which drains positively to the surface water network is 23,218m² which preferably requires a 10mm interception storage volume of 232.2m³.

Proposed SuDS Devices and Interception storage will be provided by the following:

- Permeable Paving is proposed in the parking areas, totalling 5575m². Fin Drain outlets from the permeable paving will be set at 50mm above the bed formation (assumed 30% voids) to achieve interception storage equivalent to 15mm storage depth.

The total interception volume provided in the permeable paving equals 84m³ (5575 x 0.05 x 0.3)

The untanked permeable paving will take advantage of available infiltration into the sub-soil and the interception storage provided is potentially higher than the 84m³ calculated. It is anticipated that any water below the fin drain invert will disperse through infiltration to subsoil or evaporation.

- The Green Roof is proposed over a total area of 13,241 m² which equates to 90% of the overall roof area 14,414 m². The green roof will include a drainage mat which will provide a minimum of 10mm of interception storage per 1m², allowing for a total interception storage of 132.4 m³ (488 x 0.01) at roof level.
- The Stormtech system will provide an interception storage volume of 128.5m³ (i.e. 1397 m² (L x W) x 0.23D x 0.4Void Ratio) within the 230mm depth of stone below the Stormtech chambers. It is anticipated that any water within this layer of stone will infiltration to subsoil.

Interception Storage Summary

Total Area (hardstanding, roofs & permeable paving) = 23,218m²

Required Interception Storage (10mm) = 232.2m³

(0.01m x 2,020m²)

Provided Interception Storage = 345m³

(Permeable Paving, Green Roof, Stormtech)

The total provided interception storage is 345m³ which is 33% more than the minimum requirement. As full interception storage has been provided, treatment storage is not required.

5 OPERATIONS/MAINTENANCE OF SUDS DEVICES

The SuDS components proposed will be operated and maintained strictly in accordance with the requirements of the SuDS Manual, CIRIA 753, 2015 to ensure that "water quality standards are maintained".

Each SuDS component is referenced below to the relevant operation and maintenance sections of CIRIA 753, 2015 where appropriate.

- Green roofs will be operated and maintained in accordance with Part D, Sub-Section 12.12 including Table 12.5 and Section 32 of CIRIA 753.
- Permeable pavements will be operated and maintained in accordance Part D, Sub-Section 20.14 including Table 20.15 and Section 32 of CIRIA 753.

- Tree pits/Bioretention areas will be operated and maintained in accordance with Part D, Sub-Section 18.12 including Table 18.3 and Section 32 of CIRIA 753.
- Hydrocarbon interceptors will be operated and maintained in accordance with Part D Sub-Section 14.12 including Table 14.2 and Section 32 of CIRIA 753.
- Waste management of the various SuDS components will be carried out strictly in accordance with Section 33 of CIRIA 753.
- The hydro-brake unit will be maintained in accordance with the Manufacturer's requirements. Normally it is recommended that the unit be initially inspected monthly for three months and thereafter at six monthly intervals with a hose down if necessary. The required maintenance procedures will be included in the Operating and Maintenance Manual for the project.

6 FLOOD RISK ASSESSEMENT (FRA) REPORT

A Flood Risk Assessment is included as a separate document in the Planning Application Documentation

7 RELEVANT DRAWINGS

Drawing No	Title
22203-JBB-00-XX-DR-C-01400	Watermain Layout
22203-JBB-00-XX-DR-C-01401	Foul & Storm Sewers Layout
22203-JBB-00-XX-DR-C-01402	SuDS Devices Layout
22203-JBB-00-XX-DR-C-01405	Typical Foul Sewer Details
22203-JBB-00-XX-DR-C-01406	Typical Surface Water Drainage Details
22203-JBB-00-XX-DR-C-01407	Typical SuDS Devices Details
22203-JBB-00-XX-DR-C-01408	Typical Watermain Details Sheet 1
22203-JBB-00-XX-DR-C-01409	Typical Watermain Details Sheet

APPENDIX 1 UISCE EIREANN CONFIRMATION OF FEASIBILITY

CONFIRMATION OF FEASIBILITY

Barry Kavanagh
Egis
Classon House
Dundrum Business Park
Dublin
D14T9T0

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

29 September 2025

Our Ref: CDS25004860 Pre-Connection Enquiry Site At, St Edmundsbury Hospital, Lucan, Dublin

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 Business Connection of 1 unit(s) at Site At, St Edmundsbury Hospital, Lucan, Dublin, (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/

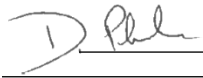
Where can you find more information?

- **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

Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	<ul style="list-style-type: none"> • Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	<ul style="list-style-type: none"> • A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	<ul style="list-style-type: none"> • Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	<ul style="list-style-type: none"> • All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. <p>*Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works</p>
Fire flow Requirements	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • What to do? - Contact the relevant Local Fire Authority
Plan for disposal of storm water	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Uisce Éireann's network(s)?	<ul style="list-style-type: none"> • Requests for maps showing Uisce Éireann's network(s) can be submitted to: datarequests@water.ie

<p>What are the design requirements for the connection(s)?</p>	<ul style="list-style-type: none"> The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
<p>Trade Effluent Licensing</p>	<ul style="list-style-type: none"> Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ <p>**trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)</p>

APPENDIX 2 SURFACE WATER CALCULATIONS

MicroDrainage Analysis GSDS Critical Storm 1, 30 and 100 year return periods + 20% for climate change

Classon House
 Dundrum Business Park
 Dublin 14

Saint Edmundsbury Hospital
 1, 30, 100 YR + 20% @ 2L/sec
 C4 Limited to 2 L/Sec



Date 06/06/2024
 File 22203-JBB-00-XX-MD-C-00902_C4_P...

Designed by SW
 Checked by SW

Innovyze

Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	17.200	Add Flow / Climate Change (%)	0
Ratio R	0.307	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	18.000	0.900	20.0	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S1.001	15.954	0.245	65.0	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S1.002	40.000	0.067	600.0	0.100	0.00	0.0	0.600	o	600	Pipe/Conduit	🔒
S1.003	6.739	0.143	47.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.10	41.300	0.050	0.0	0.0	0.0	2.94	116.9	6.8
S1.001	50.00	5.27	40.400	0.100	0.0	0.0	0.0	1.62	64.6	13.5
S1.002	50.00	5.94	39.210	0.200	0.0	0.0	0.0	0.99	279.0	27.1
S1.003	50.00	6.00	39.143	0.200	0.0	0.0	0.0	1.91	76.0	27.1

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S4.3	43.750	41.300	2.225	Open Manhole	1200
S1.001	o	225	S4.3	41.900	40.400	1.275	Open Manhole	1200
S1.002	o	600	S4.2	41.660	39.210	1.850	Open Manhole	1500
S1.003	o	225	S4.1	41.200	39.143	1.832	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	18.000	20.0	S4.3	41.900	40.400	1.275	Open Manhole	1200
S1.001	15.954	65.0	S4.2	41.660	40.155	1.280	Open Manhole	1500
S1.002	40.000	600.0	S4.1	41.200	39.143	1.457	Open Manhole	1500
S1.003	6.739	47.1	S	41.200	39.000	1.975	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.050	0.050	0.050
1.001	-	-	100	0.050	0.050	0.050
1.002	-	-	100	0.100	0.100	0.100
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.200	0.200	0.200

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S	41.200	39.000	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	17.200	Storm Duration (mins)	30
Ratio R	0.307		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S4.1, DS/PN: S1.003, Volume (m³): 14.5

Unit Reference MD-SHE-0064-2300-1700-2300
 Design Head (m) 1.700
 Design Flow (l/s) 2.3
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 64
 Invert Level (m) 39.143
 Minimum Outlet Pipe Diameter (mm) 100
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	2.3	Kick-Flo®	0.569	1.4
Flush-Flo™	0.279	1.7	Mean Flow over Head Range	-	1.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.800	1.6	2.000	2.5	4.000	3.4	7.000	4.4
0.200	1.7	1.000	1.8	2.200	2.6	4.500	3.6	7.500	4.6
0.300	1.7	1.200	2.0	2.400	2.7	5.000	3.8	8.000	4.7
0.400	1.7	1.400	2.1	2.600	2.8	5.500	4.0	8.500	4.8
0.500	1.6	1.600	2.2	3.000	3.0	6.000	4.1	9.000	5.0
0.600	1.4	1.800	2.4	3.500	3.2	6.500	4.3	9.500	5.1

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Storage Structures for Storm

Cellular Storage Manhole: S4.1, DS/PN: S1.003

Invert Level (m) 39.143 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.70
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	71.0	71.0	1.200	71.0	161.0	1.201	0.0	161.0

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
S1.000	S4.3	2.771	0.716	0.000	3.487
S1.001	S4.3	1.696	0.634	0.000	2.331
S1.002	S4.2	4.330	11.310	0.000	15.639
S1.003	S4.1	3.635	0.268	59.657	63.560
Total		12.432	12.928	59.657	85.016

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.000 Cv (Summer) 0.750
 Region Scotland and Ireland Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 20, 20, 20

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S4.3	15 Winter	100	+20%					41.368	-0.157	0.000
S1.001	S4.3	360 Winter	100	+20%	100/240 Winter				40.942	0.317	0.000
S1.002	S4.2	360 Winter	100	+20%	30/60 Winter				40.939	1.129	0.000
S1.003	S4.1	360 Winter	100	+20%	1/30 Winter				40.939	1.571	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S4.3	0.20			20.7	OK	
S1.001	S4.3	0.12			6.7	SURCHARGED	
S1.002	S4.2	0.05			12.9	SURCHARGED	
S1.003	S4.1	0.04			2.3	FLOOD RISK	

APPENDIX 3 SUDS MEASURES CONSIDERED

Project – Saint Edmundsbury Hospital, Lucan

In accessing the various “SuDS Systems and techniques available for use in the proposed development, the “Greater Dublin Strategic Drainage Study” (GSDSDS) and “CIRIA Document 522 – Sustainable Urban Drainage Systems” were consulted to establish a suitable set of drainage features (**treatment train**)

Type of System	Device	Primary Function	Primary Characteristics	Consideration	Comments
Source Control	Avoiding foul connections to storm systems	Avoid direct pollution of storm system	Maintaining principle of separate drainage systems	Incorporated	Separate foul and surface water drainage systems provided. CCTV survey and “As Built” mapping of drainage system on completion by Contractor to ensure adherence to this principle.
Pollution Prevention	Management of pollution sources	Prevention of polluted runoff.	Interception of pollutants in runoff	Incorporated	A Bypass Separator will be installed to remove any potential pollutants.
Source Control	Green-Roof	Minimize runoff and wash off of pollutants	Interception of pollutants in runoff and attenuation of flows	Incorporated	Minimum 60% of the roof area will be a green roof.
Infiltration Systems	Underground Detention/Infiltration System	Minimize runoff, flow attenuation encourage stormwater to soak into the ground while filtering pollutants	Permeable features allowing Infiltration and attenuation of flows	Incorporated	Surface water drainage to be collected on site via Stormtech underground detention/attenuation system or similar approved to cater for the 1 in 100-year critical storm event plus 20% for climate change.
Source Control	Bio Retention	Minimize runoff, flow attenuation encourages stormwater to soak into the ground while filtering pollutants	Pervious surface on footpaths	Incorporated	Bio retention (tree pits) will be provided to cater for run-off from footpaths/pathways.
Source Control	Permeable Pavement. Minimising impermeable areas	Minimize runoff and wash off of pollutants	Pervious surface on parking areas.	Incorporated	Surface water drainage from paved areas to be collected on site via Permeable Paving which in turn is connected to the Stormtech detention/attenuation system

Infiltration Systems	Ponds, Basins	Encourage stormwater to soak into the ground while filtering pollutants	Permeable features allowing Infiltration	Not Incorporated	Not Incorporated due to site constraints
Infiltration Systems	Infiltration trenches, swales	Encourage stormwater to soak into the ground while filtering pollutants	Permeable features allowing Infiltration	Not Incorporated	Not Incorporated due to site constraints
Source Control	Rainwater Harvesting	Rainwater Harvesting	Minimize runoff, flow attenuation, water re-use	Not Incorporated	Surface water drainage from Green Roof overflow to be collected on site via Stormtech underground detention/attenuation system.



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