APPENDIX 4-9

ENGINEERING SERVICES

REPORT

Engineering Services Report

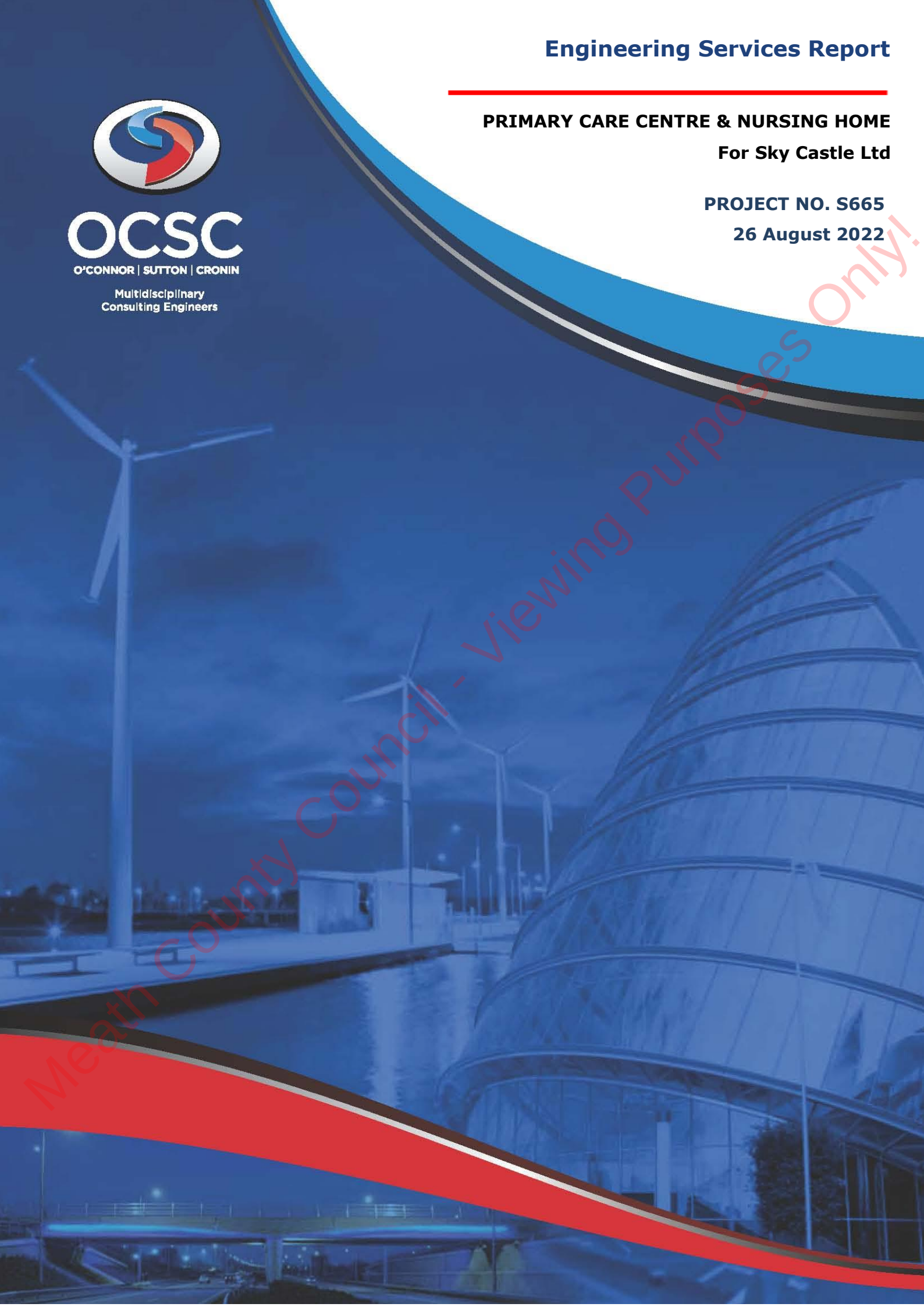
PRIMARY CARE CENTRE & NURSING HOME

For Sky Castle Ltd

PROJECT NO. S665

26 August 2022

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers



Engineering Services Report

PRIMARY CARE CENTRE & NURSING HOME

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PROJECT NO. S665

26 August 2022

Engineering Services Report

for

PRIMARY CARE CENTRE & NURSING HOME,

at Moygaddy, Co. Meath.

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NOTICE

DOCUMENT CONTROL & HISTORY

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Engineering Services Report

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1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *Sky Castle Ltd* to carry out the design of the civil engineering services associated with the proposed Moygaddy Health development, which shall primarily comprise a new primary care centre and nursing home at Moygaddy, Co. Meath, located north east from the town of Maynooth, Co. Kildare.

1.2 Administrative Jurisdiction

The proposed medical development is located in the jurisdiction of Meath County Council (MCC). It is noted that in order to serve the proposed development with water and wastewater infrastructure connections, extensions to and from the existing public services that are located in lands within Kildare County Council's jurisdiction will be required. Therefore, the engineering services design was carried out with reference to the following:

- Meath County Development Plan (2021 – 2027);
- Maynooth Environs Local Area Plan;
- Kildare County Council Development Plan (2017 – 2023);
- Regional Spatial and Economic Strategy;
- Greater Dublin Strategic Drainage Study (GDSDS);
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works).

1.3 Site Location

The subject site is located on the southernmost extent of County Meath, aligning with the county boundary to Co. Kildare, and is approximately 1.30km north from the Maynooth town centre, as shown in **Figure 1.1 - Site Location**, and is immediately bound by:

- R157, to the east;
- Agricultural lands to the west and north; and

- River Ryewater to the south.

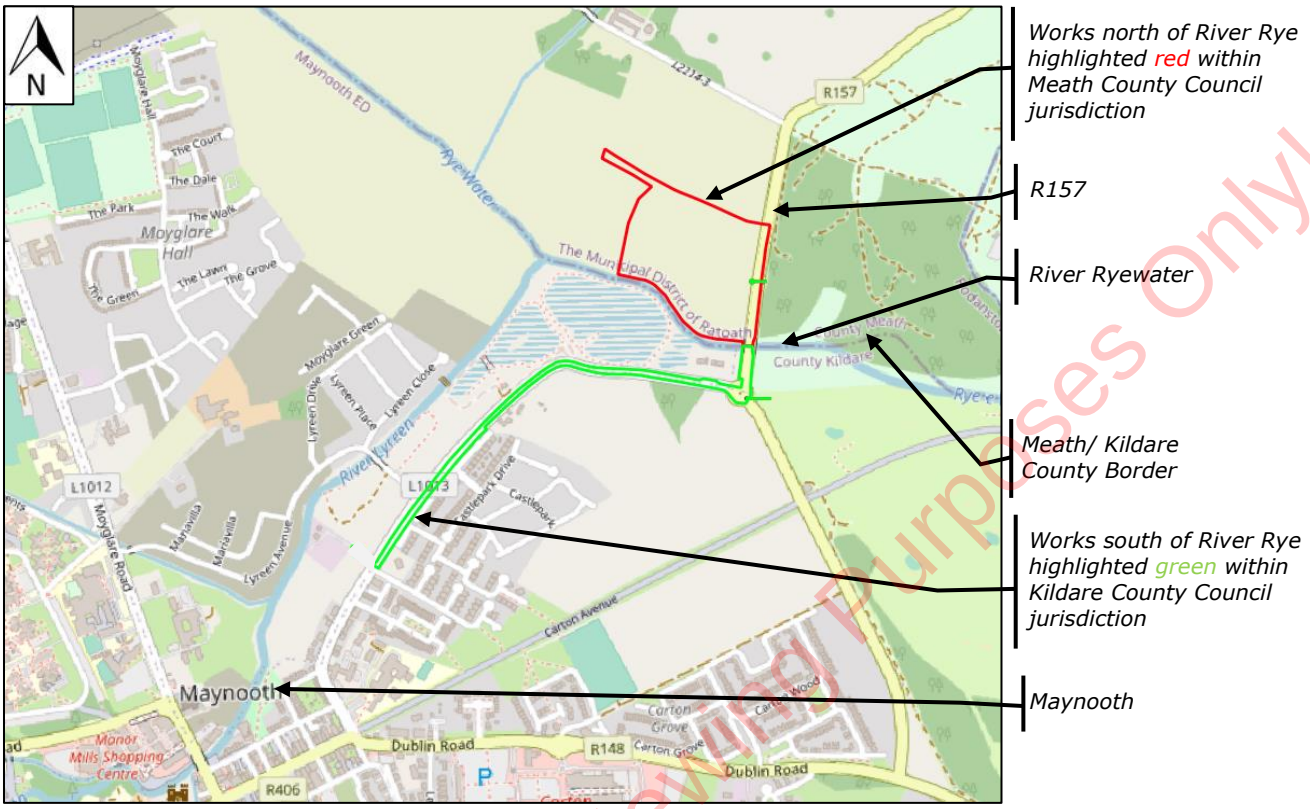

Figure 1.1 - Site Location

It is noted that in order to service the site for wastewater and watermain, to and from public infrastructure, additional infrastructure works are required to be carried out on lands in County Kildare, south of the Kildare Bridge. Details of these works are subject to separate planning application to Kildare County Council.

1.4 Existing Site Overview

The overall gross site area that comprises this planning application is **c.7.9-hectares**, with c.4.8ha of this zoned by Meath County Council for ***G1 - Community Infrastructure***.

The site is currently greenfield and used for agricultural purposes. R157 regional road is located to the east of the subject site. Currently there is no vehicular access to the subject site off the R157. Ground levels across the site fall from northwest to southeast, with a sharp decline at the southern

boundary, which align the river Ryewater. Refer to *Section 3.4.1* for context of existing site levels.

1.5 Proposed Development Context

Planning Permission is sought by Sky Castle Limited for the development of a site which extends to 7.94 hectares, on land to the west of the R157 Dunboyne Road, County Meath, north of the town of Maynooth, in the townland of Moygaddy. This site is located in the Maynooth Environ Lands.

The proposed development comprises:

1. Construction of a new two-storey Nursing Home of 156 no. bedrooms with a Gross Floor Area (GFA) of 8,576m2, including vehicular drop-off area and service road.
2. Construction of a new three-storey Primary Care Centre (PCC) with a Gross Floor Area (GFA) of 3,049m2, including vehicular drop-off area.
3. The development includes a shared surface car park providing 161 no. car parking spaces (comprising of 151 no. standard car parking spaces and 10 no. accessible car parking spaces) and approximately 160 no. bicycle parking spaces.
4. Provision of foul and surface water drainage including an underground wastewater pumping station.
5. Connection to potable water supply at Kildare Bridge.
6. Provision of communal (semi-private) and public open space.
7. Provision of hard and soft landscaping including amenity equipment, fencing and gates.
8. Provision of substation and public lighting.
9. Proposed road improvement and realignment works along the R157 which abuts the Carton Demense Wall which is a Protected Structure (RPS Ref 91556), including:
    i. Construction of a new 2-way, 6m-wide access road from the R157 Dunboyne Road to include a priority T-junction on the R157 which includes a right-turn lane from the R157 into the access road,

ii. Upgrade works to a section of the R157 from the new site entrance south to Kildare Bridge on the R157 (representing delivery of a 15m-wide portion of the Maynooth Outer Relief Road (MOOR)), including creation of a new 2m-wide footpath, 3m-wide cycle lane and pedestrian and cycle link adjacent to Kildare Bridge,

iii. Provision of pedestrian and cycle improvement measures.

10. All other site development works and services ancillary to the proposed development.
11. A Natura Impact Statement (NIS) and Environmental Impact Assessment Report (EIAR) will be submitted to the planning authority with the planning application.

The proposed site layout is shown in **Figure 1.2 – Site Layout** below.

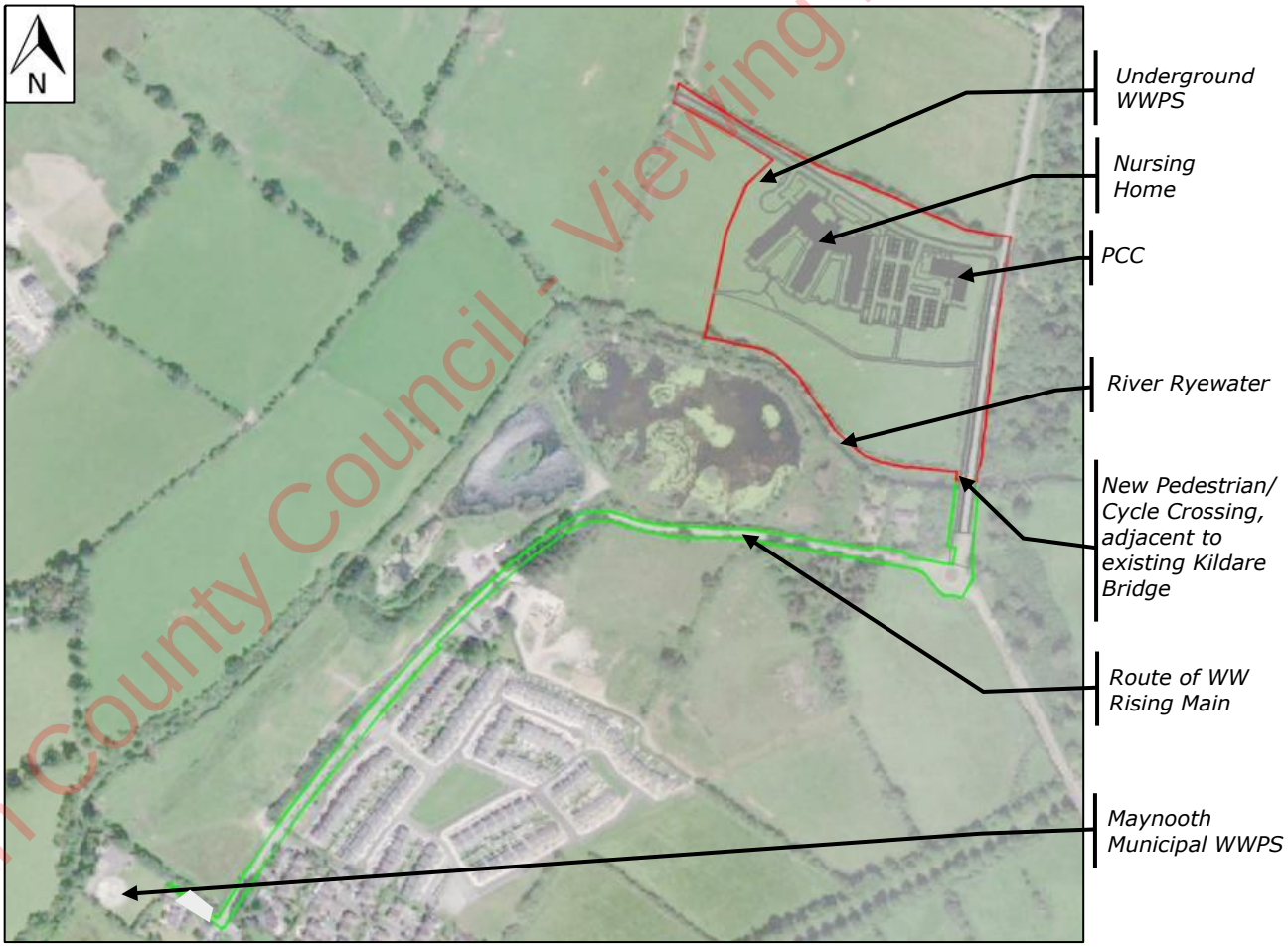

Figure 1.2 - Proposed Development Layout

1.6 Further Development Context

The developer has also committed to submitting a separate planning application to Meath County Council for the development of the Maynooth Outer Orbital Road (MOOR), which is to be routed from Moyglare Hall residential estate, on the north western extent of Maynooth, through the Applicant owned Moygaddy Environs lands and around to meet the R157 road, north from the Bridge. This is to align with the southwestern boundary of the subject application site.

Additional planning applications will be simultaneously submitted to Kildare County Council for the following two infrastructural works, which complement both the proposed development and the delivery of the MOOR:

1. Moyglare Bridge i.e., new bridge structure at southwestern extent of MOOR, including associated water services for extension and connection to public infrastructure;
2. Kildare Bridge upgrade, and associated infrastructure connections i.e., addition of pedestrian and cycle link.

The subject site is part of a larger land-holding, held by Sky Castle Ltd, which is zoned for Residential, Strategic Employment, Tourism, and Community Infrastructure. The applicant – Sky Castle Ltd – intends to submit separate planning applications for a and a Biomedical Office Campus, and a new strategic housing development, with associated infrastructure. These projects are subject to separate, independent planning applications, which will be accompanied by site-specific Engineering Services reports, and associated design drawings.

2 SCOPE OF ENGINEERING SERVICES REPORT

The Engineering Services Report was prepared by reviewing the available data from the Local Authority sources and national bodies *i.e.,* Meath County Council, Irish Water, The OPW, and the wider Design Team. The following services are addressed within this report, with respect to the proposed development:

- Surface Water Drainage;
- Wastewater Drainage;
- Potable Water Supply;
- Roads and traffic infrastructure.

The proposed design for the above engineering services have been carried out in accordance with the following technical guidelines and information:

- Meath County Council Development Plan;
- Kildare County Development Plan;
- Greater Dublin Strategic Drainage Study (GDSDS);
- Greater Dublin Regional Code of Practice for Drainage Works (GDRCOP);
- Irish Water Code of Practice for Wastewater, IW-CDS-5030-03;
- Irish Water Code of Practice for Water Supply, IW-CDS-5020-03;
- The Building Regulations – Technical Guidance Document Part H;
- BE EN 752 – Drainage Outside Buildings;
- BS 7533-13 – Guide for Design of Permeable Pavements;
- CIRIA C753 – The SuDS Manual;
- The Office of Public Works, the Planning System and Flood Risk Management;
- Irish Water Drainage & Watermain Records;
- Design Manual for Urban Roads and Streets.

3 SURFACE WATER DRAINAGE

3.1 Surface Water Design Overview

3.1.1 Design Guidelines Overview

Any planning permission sought on the subject lands are required to adhere to the Local Authority requirements i.e., the Meath County Council Development Plan, the Maynooth Environs Local Area Plan, and as such, the Greater Dublin Strategic Drainage Study (2005).

New development must ensure that a comprehensive Sustainable Drainage System (SuDS), is incorporated into the development. SuDS requires that post development run-off rates be maintained at equivalent, or lower, levels than pre-development levels. Thus, the development must be able to retain, within its boundaries, surface water volumes from extreme rainfall events up to a 1 in 100-year rainfall event, more commonly expressed as a 1.0% AEP (Annual Exceedance Probability), while also allowing for an additional climate change factor of 20% increase in rainfall intensity. Any new development must also have the physical capacity to retain surface water volumes as directed under the Greater Dublin Strategic Drainage Strategy (GDSDS) and, if necessary, release these attenuated surface water volumes to an outfall at a controlled flow rate, not greater than the greenfield runoff equivalent.

A further component of the SuDS protocol is to increase the overall water quality of surface water runoff before it enters a natural watercourse or a public sewer, which ultimately discharges to a water body. This is to ensure the highest possible standard of surface water quality.

The surface water strategy for the proposed development is to include a number of Sustainable Drainage Systems, prior to discharging an attenuated and treated flow to the existing watercourses that align to the southern and eastern boundaries of the main development site. Development discharge rates are to be restricted to less than the calculated greenfield runoff equivalent.

3.2 Surface Water Management Strategy Overview

The proposed surface water network is to consist of a single catchment, in order to best integrate Sustainable Drainage Systems. This catchment area will look to provide treatment to the rainfall runoff, either at source or through site design. Infiltration systems are provided as part of the integrated SuDS network, however, as a results of the failed soakaway tests during site investigation, no infiltration is considered as part of the design. The main functions of the SuDS provided will be for interception and treatment of the rainfall runoff, in order to reduce the runoff volume and increase the runoff quality, prior to discharge from the new development.

The proposed surface water networks are to typically comprise a gravity pipe network, with significant Sustainable Drainage Systems implemented, where practicable.

The attenuation system is to be located within the carpark area due to the site topography, development layout and the flood zone boundary, and the design intent is to reduce the rainfall runoff from the proposed development to ***less than*** the greenfield runoff equivalent; thus, resulting in no adverse impact on the receiving watercourse.

3.3 Consultation

The proposed strategy has been discussed in detail with Meath County Council's (MCC) Drainage Department prior to submission, with all item discussion points addressed as part of the design submission.

3.4 Existing Site Drainage

3.4.1 Existing Site Catchment Areas

The c7.5-hectares that forms this planning application for a new Primary Care Centre and Nursing Home, has a development boundary of approximately 6.6-hectares that does not include works to existing public infrastructure area. The site itself currently has existing hedges and ditches, along its northern and western boundary that acts as a surface water catchment boundary. The entire

site is then graded towards the river Ryewater, which aligns with its southern boundary. Refer to ***Figure 3.1*** for overview of site contours, indicated at 0.25m interval.

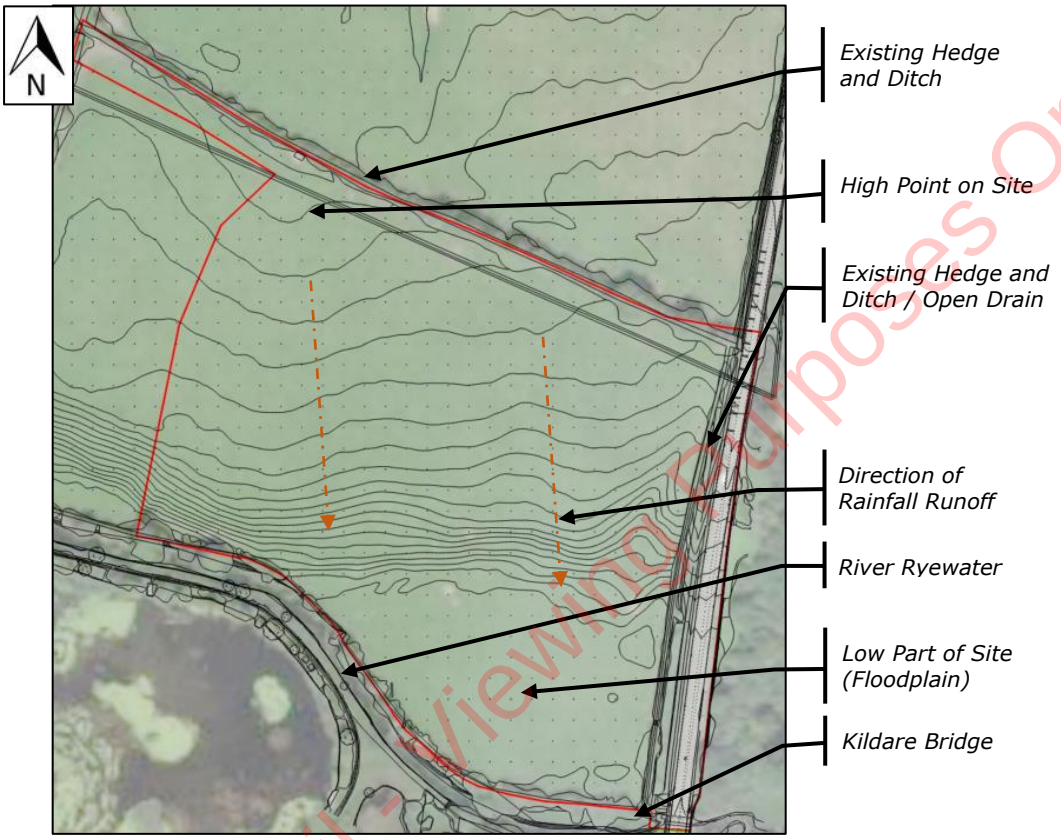

Figure 3.1 – Site Levels and Contour Overview

The subject site itself is currently an unused agriculture field, as shown in the aerial image in **Figure 3.2**.

Figure 3.2 - Aerial Image of Subject Development Site

3.4.2 Existing Surface Water Drainage Infrastructure

There is currently no existing public surface water drainage infrastructure in the immediate vicinity of the site that can serve the proposed development.

The river Ryewater runs along the southern site boundary. The site currently drains naturally to this watercourse, either overland, or via the agricultural drainage ditches that bound the site; refer to **Figure 3.3** for overview of existing natural watercourse in the vicinity of the proposed development.

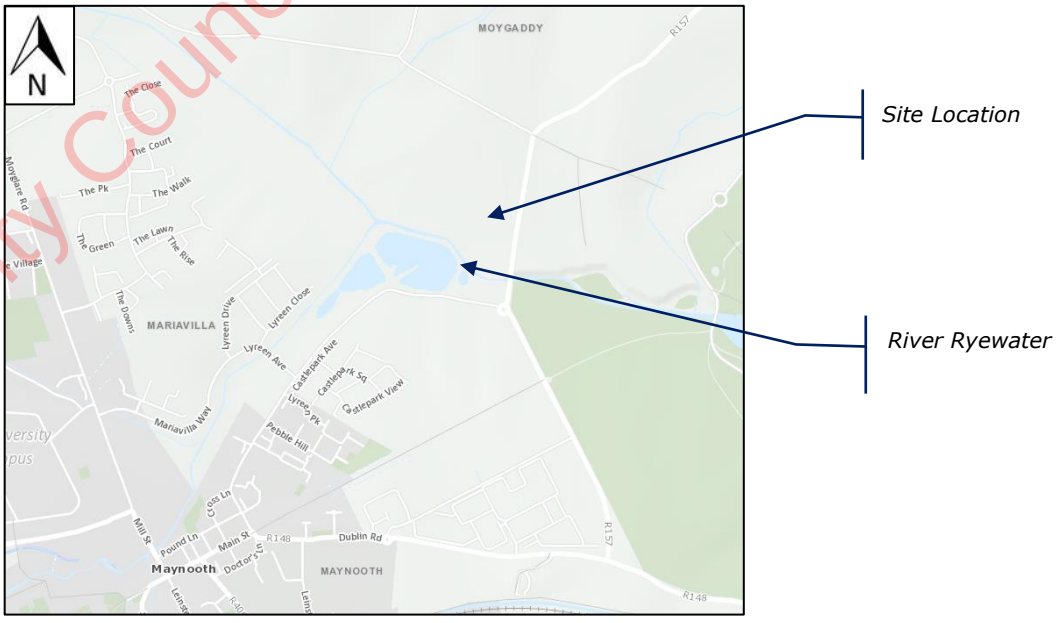

Figure 3.3 - Local Watercourses

3.4.3 Existing Site Rainfall Runoff

All surface water runoff, on the existing site, currently infiltrates to the ground or discharges excess runoff to the river Ryewater, located along the southern site boundary. Refer to *Section 3.4.1* for further details of existing site catchment area context.

A Site investigation was carried out on site in July 2021, with 3nr. soakaway tests performed to BRE Digest 365 requirements, at locations in the vicinity of open space in the new development. All 3nr. tests failed, with little to no infiltration observed. The existing subsoil was determined to be of stiff clayey substance, consistently across the site. It is noted that groundwater was not observed at the location of SuDS structures, including attenuation systems.

A copy of the site investigation has been submitted as part of this planning application.

Therefore, as a result of the above, **Soil Type 4** has been assigned for rainfall runoff calculations, as discussed and agreed with Meath County Council.

The Standard Average Annual Rainfall (SAAR) value for the development site, as sourced from Met Éireann, is **799mm**.

Using the ICPSuDS Input, (Flood Studies Report, FSR) Method, the rainfall runoff discharging from the total greenfield site area that is to be developed has been estimated at $QBAR_{RURAL}$ **5.6 l/s/ha,** in its existing condition.

Refer to **Figure 3.4** for an excerpt of the results from the MicroDrainage Runoff Calculator, which provides the calculated QBAR (*per hectare*) runoff rate, along with the discharge rate (*per hectare*) for varying Annual Recurrence Intervals (ARI).

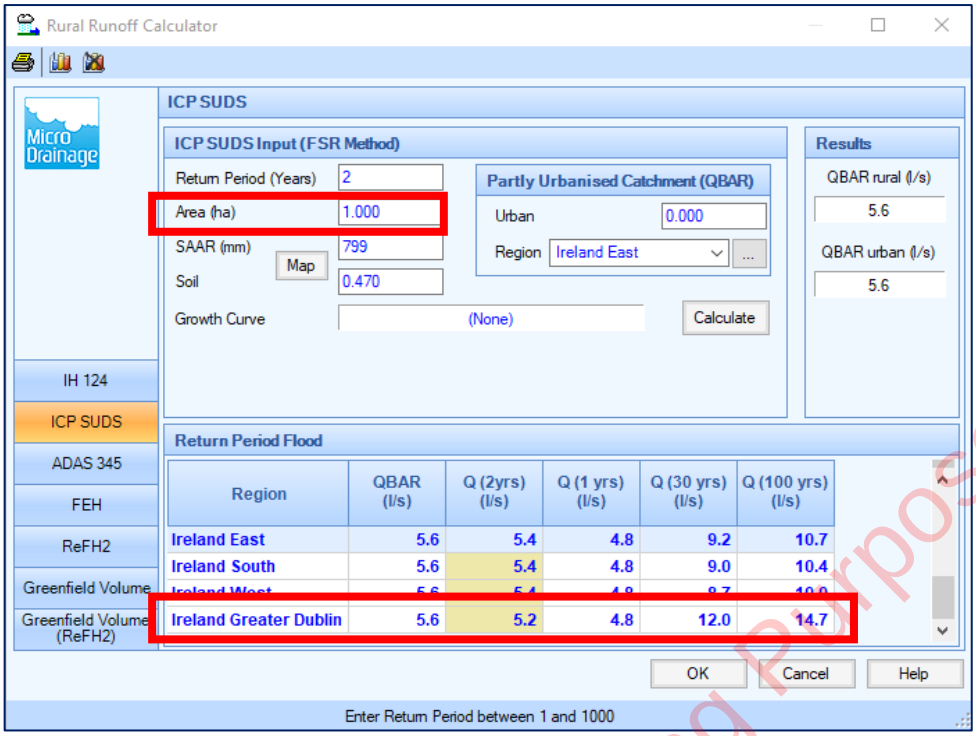

Figure 3.4 - Existing Site Runoff Calculator Results (MicroDrainage Excerpt)

3.5 Proposed Surface Water Drainage Design Strategy

3.5.1 Proposed Surface Water Strategy Overview

It is proposed to separate the surface water and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the adjacent watercourse (for surface water only) and local wastewater sewer network respectively. Refer to *Section 5* for details of the proposed wastewater drainage design.

3.5.2 Climate Change Allowance

As indicated in **Figure 3.11**, the proposed network is to be designed to allow for an additional 20% increase in rainfall intensity, to allow for Climate Change projections, in accordance with the Meath County Council Development Plan and the GDSDS.

All discussion within this report, with regards to surface water network design calculation and results, include for the allowance of an increase of <u>20%</u> in rainfall intensity, as required.

3.5.3 Proposed Surface Water Network Strategy

The proposed surface water network is to consist of a single catchment, in order to best integrate Sustainable Drainage Systems. This catchment area will look to provide treatment to the rainfall runoff, either at source or through site design. Infiltration systems are provided as part of the integrated SuDS network, however, as a results of the failed soakaway tests during site investigation, no infiltration is considered as part of the design. The main functions of the SuDS provided will be for interception and treatment of the rainfall runoff, in order to reduce the runoff volume and increase the runoff quality, prior to discharge from the new development.

The proposed surface water networks are to typically comprise a gravity pipe network, with significant Sustainable Drainage Systems implemented, where practicable.

The attenuation system is to be located within the carpark area due to the site topography, development layout and the flood zone boundary, and the design intent is to reduce the rainfall runoff from the proposed development to ***less than*** the greenfield runoff equivalent; thus, resulting in no adverse impact on the receiving watercourse.

The typical traditional and Sustainable Drainage Systems (SuDS) to be provided, all of which will be designed in accordance with CIRIA C753, the SuDS Manual, and the design guidance material listed in *Section 2* of this report, are listed and detailed in order of general sequence within the drainage network, as follows:

3.5.3.1 Pervious Paving

Pervious pavements provide a pavement finish suitable for both pedestrian and vehicular traffic, while also allowing rainwater to infiltrate the surface layer and into the underlying pervious structural layers. Here, the rainwater is temporarily stored beneath the overlying finished surface before either infiltration to the ground or / and controlled discharge to the main surface water drainage network.

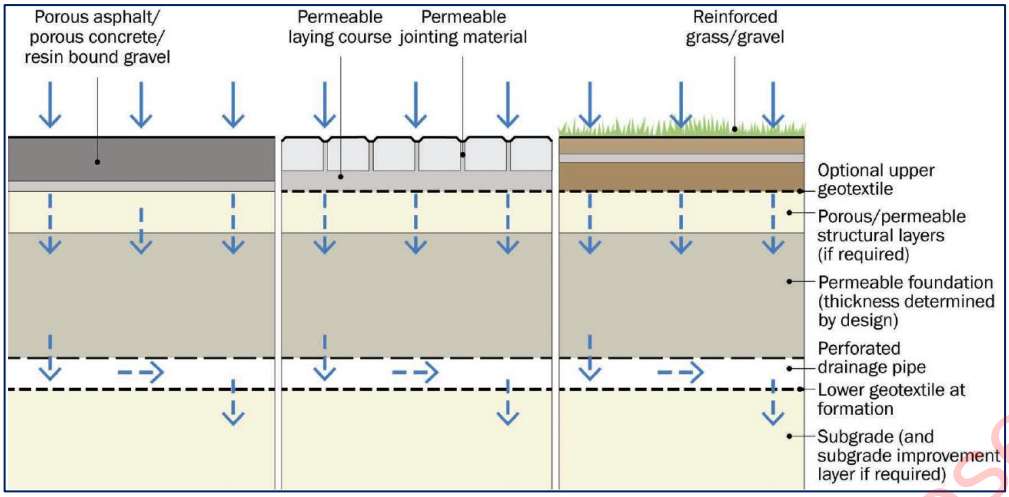

Figure 3.5 - Detail of Type B Pervious Paving (CIRIA C753)

Pervious paving systems are an efficient means of treating the rainwater at source by providing initial interception of the rainwater, reducing the volume and frequency of the runoff and improving the surface water quality by providing at source treatment of the rainfall runoff leaving the site. This is achieved by helping remove and retain pollutants prior to discharge to the drainage system and / or groundwater system.

A **Type B** pervious paving, with a minimum 300mm depth of open graded crushed rock as sub-base course, is to be provided in the car park area. An overflow pipe, from the base-course, will be provided to the drainage network, which will allow for interception of initial rainfall, groundwater discharge, with an attenuated outflow to the main network in extreme rainfall events.

The finished surface of the pervious paving systems is to comprise a *porous asphalt*, or similar approved.

3.5.3.2 Trapped Road Gullies

All road gullies serving the proposed development are to be trapped, to help prevent sediment and gross pollutants from entering the surface water network, and thus improving the water quality discharging from site.

The grated covers are to have a minimum load classification of D400, for frequent vehicular traffic, and shall be lockable, as required by MCC, with 150mm outlet pipes.

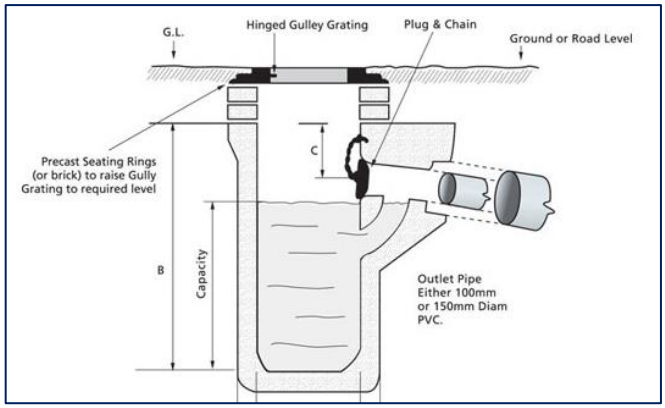

Figure 3.6 - Trapped Road Gully (Typical Detail)

3.5.3.3 Underground Pipe Network

A traditional gravity pipe and manhole network will be provided, to convey the collected rainfall runoff as far as the development's outfall. Manholes are provided for maintenance access at branched connections, change in pipe size and gradient, and at intervals no greater than 90m distance.

3.5.3.4 Silt Traps

All manholes upstream of attenuation systems are to contain a 600mm sump, below invert level of outlet pipe, in order to trap sediment and other gross pollutants, and prevent from entering the downstream watercourse; thus, improving the water quality discharging from site.

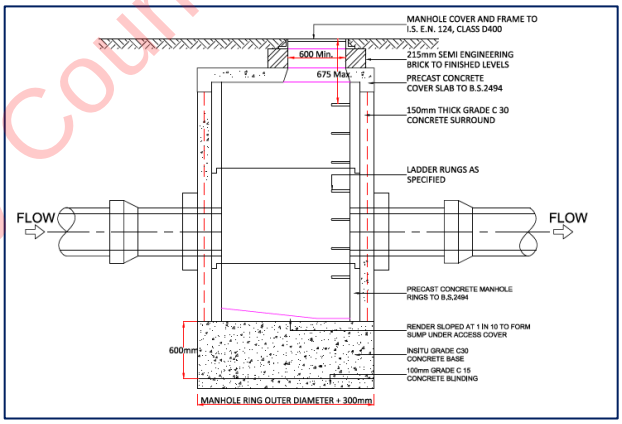

Figure 3.7 - Typical Detail of Silt Trap Manhole

3.5.3.5 *Attenuation Storage Systems*

Unlined proprietary poly-tunnel storage units (or similar approved) are to be provided, underground in the car park area, for the attenuation of rainfall runoff prior to discharge to the existing ditch at the eastern site boundary.

These systems are to provide sufficient temporary storage volume for rainfall events up to, and including, the design 1% AEP rainfall event (including climate change). Typical poly-tunnel storage systems comprise plastic arch-units with open-graded crushed rock bedding and surround. These units are arranged in rows, with an isolator row for efficient operation and maintenance.

These systems also allow for interception of initial rainfall to be provided at the base of the system, by elevating the outlet relative to the systems base.

A minimum total polytunnel storage volume of **877 m³** is required as part of the proposed development.

The attenuation systems are to be installed in the parking area and the design was calculated to support the natural greenfield runoff rate, with the development discharge rate being restricted to a maximum flow rate less than the calculated greenfield runoff rate.

Interception storage for the first 10mm rainfall is to be provided. Volume required is 170 m^3.

Figure 3.8 –Typical Poly-Tunnel Installation Arrangement

3.5.3.6 Flow Control Device

Flow Control device is to be provided immediately downstream of the attenuation system, in order to restrict the surface water discharge from site to a flow rate equivalent, or below, the natural greenfield runoff rate.

It is proposed to provide the Hydro-brake optimum vortex flow control unit (or similar approved by MCC), downstream of the attenuation systems.

Further, it is noted that the required aperture of the proposed Hydro-Brake outlets have been designed to be greater than 150mm diameter, to mitigate the risk of blockage.

Each flow control chamber is to be fitted with a penstock valve at the inlet and a bypass lever at the outlet (if required), to allow for easy access and maintenance.

Figure 3.9 - Vortex Hydro-Brake Flow Control Unit (Hydro International)

3.5.3.7 Oil Separator

Oil separators are designed to separate gross amounts of oil and large (>250µm) suspended solids from the surface water, mainly through sedimentation process.

The proposed surface water network already provides sufficient mitigation measures, through the provisions listed previously (principally the pervious paving, filter drains, trapped road gullies and silt traps, and the attenuation interception layer). However, a Class 1 bypass fuel separator is to be provided as an additional and final mitigation measure, prior to surface water discharge to both the network and watercourse.

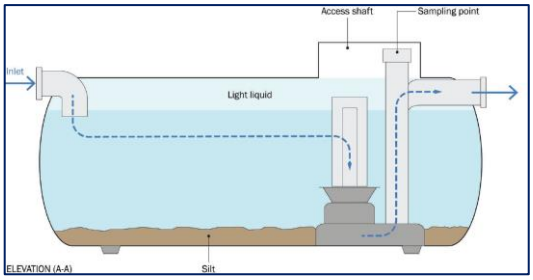

Figure 3.10 - Typical Section Detail of Fuel Separator (CIRIA C753)

3.6 Proposed Surface Water Network Detailed Design

3.6.1 Software Design Criteria

The proposed surface water network is to be designed in accordance with the regulations and guidelines outlined in *Section 2*, using MicroDrainage Network Design package, by Innovyze Inc., which simulates the performance of the integrated drainage network for varying rainfall return periods and storm durations.

The MicroDrainage Network Design software applies the Flood Studies Report (FSR) methodology for analysis of the rainfall profiles. However, the input design parameters that were used, as part of this design, were based on the available Flood Studies Update (FSU) data, *i.e.,* the return period rainfall depths for sliding durations, which determine the $\mathbf{M_{5\text{-}60}}$ and **R** values, and the standard annual average rainfall (SAAR); as sourced from Met Éireann.

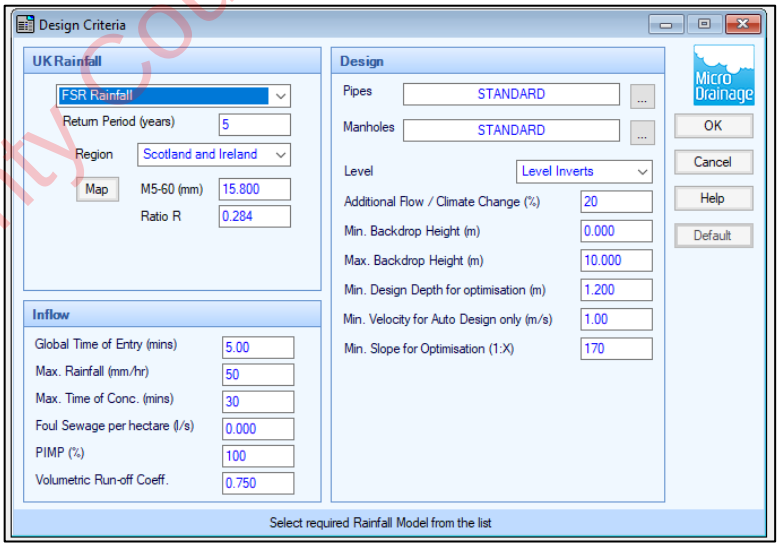

Figure 3.11 - Surface Water Network Design Criteria (MicroDrainage Excerpt)

3.6.2 Proposed Surface Water Catchment Areas

The proposed surface water network is to consist of a single catchment, in order to best integrate Sustainable Drainage Systems. The catchment area will look to provide treatment to the rainfall runoff, either at source or through site design, with all treated rainfall runoff being directed towards the river Ryewater, as is its natural course.

3.6.3 Proposed Development Rainfall Runoff

It is proposed to reduce and restrict the rainfall runoff, discharging from the proposed development, to less than the current greenfield equivalent, $QBAR_{RURAL}$, runoff rate, as per the FSR ICP SuDS method, which is based on the IH124 method for catchments smaller than 25km^2 in area.

This is to be achieved with the provision of a flow restrictor (Hydro-Brake Optimum by Hydro-International, or similar approved) prior to discharging to the existing watercourse at the south eastern corner of the site, with the appropriate measures of attenuation provided. Sub-catchment flow-control devices and associated attenuation are also to be strategically provided, in order to maximise SuDS benefits and avail of the central open space for preliminary attenuation.

Refer to **Figure 3.4**, in *Section 3.4.3*, for an excerpt from the results MicroDrainage Runoff Calculator for the development catchment area, which indicates the greenfield equivalent, $QBAR_{RURAL}$ = 5.61 l/s/ha, along with the calculated runoff for varying Average Recurrence Intervals (ARI).

The design intent is to reduce the rainfall runoff from the proposed development to ***less than*** the greenfield runoff equivalent to **5.5 l/s/ha**; thus, resulting in no adverse impact on the receiving watercourse, as discussed and agreed with MCC Drainage Department.

For the purpose of the surface water network design simulation, we have considered roads and footpaths to be 100% impermeable; giving a *winter* global runoff coefficient, C_v, of 0.84, in accordance with the HR Wallingford and Modified Rational Method for runoff. The proposed parking spaces are to

comprise pervious paving above a drainage layer base course. A reduced percentage impermeable factor of 70% has been applied for these locations, which conservatively accounts for initial interception from the pervious paving build-up.

3.6.4 Proposed Surface Water Pipe Network Design

The overall surface water drainage system, serving both catchments in the proposed development, is to consist of a gravity sewer network that will convey runoff from the roofs and paved areas to the outfall manhole.

The proposed piped-network has been designed in accordance with BS EN 752 and all new infrastructure is to be compliant with the requirements of the GDSDS and the GDRCOP for Drainage Works, with minimum full-bore velocities of 1.0 m/s achieved throughout.

All main surface water carrier pipes have been sized to ensure no surcharging of the proposed drainage network for rainfall events up to, and including, the 1 in 5-year ARI event, with a projected climate change allowance of 20% increase in rainfall intensity, under normal flow conditions.

3.7 Proposed Surface Water Attenuation Storage

Attenuation system are to be provided within the car park area in order to temporarily store excessive rainfall runoff, during significant rainfall events, due to the restricted discharge rates (to less than greenfield equivalent runoff rates) from the development outfalls.

This will be provided initially by provision of pervious paving for car parking areas.

The main development attenuation system will be provided, comprising underground poly-tunnel system, or alternative approved to MCC's satisfaction. These will be designed for provision within the development's car park area, with adequate drainage to maintain functionality.

The polytunnel system shall contain an isolator row, and a high-level 225mm ø overflow distributor pipe.

A minimum total polytunnel storage volume of **877 m³** is required as part of the proposed development.

A layer of interception will also be provided under attenuation systems, in order to promote groundwater recharge during the initial 5 – 10mm rainfall periods, pending results of Site Investigation to confirm groundwater levels.

Interception storage for the first 10mm rainfall is to be provided. Volume required is 170 m^3.

3.8 Surface Water Outfall Locations

The development is to discharge the treated and attenuated rainfall runoff to the existing watercourse along its southern boundary, namely the river Ryewater, with discharge to the existing land drains along the eastern boundary, which will be upgraded as part of the road design that includes new filter drains.

The discharge rates are to be restricted to a flow rate of 5.5 l/s/ha, which is less than the greenfield runoff rate equivalent (5.61 l/s/ha), as discussed and agreed with MCC Drainage Department.

The above is to ensure that there is no increase in flow rates and volumes, from the development site, being discharged to the receiving infrastructure and waterbodies; thus, causing no adverse impact on adjoining and other downstream properties.

The outfall to the river Ryewater shall have a non-return valve fitted to the headwall.

3.9 Realignment of the R157 Maynooth – Dunboyne Road

The existing R157 road currently appears to drain to an open ditch, located alongside the northbound carriageway. As part of the realignment and improvement works associated with the construction of the Maynooth Outer Orbital Road, it is proposed to replace the existing ditch with a filter drain, which will receive the runoff from the adjacent road gullies. This will allow for sustainable drainage provisions for this road upgrade, to reflect the current

condition. The new filter drain will be located along the subject development's eastern site boundary, and will also help convey the treated and attenuated development runoff as far as the river Ryewater, with no adverse impact on the river.

3.10 Water Quality

The quality of the surface water discharging from site is to be improved through the following provisions, which are being considered as part of an integrated drainage network, and each of which is discussed in greater detail in *Section 3.5.3*:

- Pervious Paving in the car park area;
- Intensive landscaping, where practical;
- Filter Trenches, where allowable;
- Trapped road gullies on all road carriageways, to trap silt and gross pollutants;
- Silt traps to be provided on manholes immediately upstream of attenuation systems, as a further preventative measure to trap silt and other gross pollutants;
- Interception provisions at attenuation systems;
- Class 1 bypass fuel separator to be provided prior to discharging from site.
- Upgrade of existing ditch along eastern boundary, to include new filter drains.

3.11 Maintenance

The proposed surface water drainage network is to be carefully designed to minimise risk of blockage throughout the network, mainly through the following provisions that limit and restrict the size of pollutants entering the network:

- Pervious paving;
- Trapped road gullies;
- Silt trap manholes;
- Interception at attenuation systems;

- Filter drains.

Road gullies, silt traps, flow control devices and attenuation systems, should be inspected regularly and maintained, as appropriate and in accordance with manufacturer's recommendations and guidelines.

Items such as the flow controls and fuel separators shall be located so as to provide easy vehicular access for inspection and maintenance.

3.12 Surface Water Impact Assessment

The design criteria for the drainage system are established in *GDSDS-RDP Volume 2*, *Section 6.3.4* and explained further in *GDSDS-RDP Volume 2, Appendix E*. There are four design criteria, each of which has been considered for the subject site:

- River Water Quality Protection;
- River Regime Protection;
- Level of Service (flooding) for the site and;
- River Flood Protection.

3.12.1 Criterion 1 – River Water Quality Protection

It is proposed that the overall drainage system, serving this development, will contain a range of surface water treatment methods, as outlined previously in *Section3.5.3,* which will improve the quality of surface water being discharged from the proposed development.

Gross pollutants, sediments, hydrocarbons, and other impurities, will be removed at source with the following provisions:

a) Intensive landscaping, where practicable;
b) Pervious paving for car parking zones;
c) Interception storage at attenuation systems;
d) All road gullies and linear channel drains are to be trapped;
e) Silt-trap prior to attenuation storage area.

3.12.2 Criterion 2 – River Regime Protection

Surface water discharge from the overall development will be restricted to a maximum flow rate of **5.5 l/s/ha**, which is less than the greenfield runoff equivalent. Refer to *Section 3.6.3* for further details of the proposed development rainfall runoff calculations, as discussed and agreed with MCC Drainage Department.

This will be achieved with the provision of a flow control devices (Hydro-Brake Optimum, by Hydro-International, or similar approved) upstream of the outfall manhole.

3.12.3 Criterion 3 – Level of Service (Flooding) Site

There are four sub-criteria for the required level of service, for a new development; as set out in the *GDSDS Volume 2, Section 6.3.4 (Table 6.3).*

- No flooding on site except where planned (30-year high intensity rainfall event);
- No internal property flooding (100-year high intensity rainfall event);
- No internal property flooding (100-year river event and critical duration for site) and;
- No flood routing off site except where specifically planned. (100-year high intensity rainfall event).

3.12.3.1 Sub-Criterion 3.1

The surface water drainage systems, serving the proposed development, are yet to be designed to accommodate the 100-year return period rainfall event (including an allowance of 20% increase in rainfall intensity for climate change) without flooding. Therefore, the system has capacity for the 30-year return period rainfall event without flooding.

The performance of the proposed drainage system is yet to be analysed for design rainfall events up to, and including, the 1% AEP event (including 20% climate change allowance) using the *MicroDrainage Network Design Software*, by Innovyze Inc. Refer to **Appendix C** of this ESR for details of design criteria, calculations and results. The analyses indicate that no

flooding will occur for design rainfall events up to, and including, the 1% AEP.

3.12.3.2 Sub-Criterion 3.2

The surface water drainage systems, serving the proposed development, are yet to be designed to accommodate the 100-year return period rainfall event (including an allowance of 20% increase in rainfall intensity for climate change) without flooding.

The performance of the proposed drainage system in 100-year return period storm events (including 20% climate change allowance) is yet to be analysed – Refer **Appendix C** of this ESR for calculations. The analyses show that no flooding will occur in 100-year return period storm events.

3.12.3.3 Sub-Criterion 3.3

Details of the flood risk assessment associated with the proposed development is outlined in the Site-Specific Flood Risk Assessment (Document Nr. **S665-OCSC-1B-XX-RP-C-0010**), which is to be submitted under separate cover, as part of this application.

Furthermore, a detailed Flood Risk Assessment of the river Ryewater has been prepared by JBA Consulting, and submitted under separate cover, which assesses potential impact from development across the Applicant's wider land-holding, which makes up the masterplan area of Maynooth Environs.

These documents confirm that there is no adverse flood risk impact on the subject development, and no adverse flood risk as a result of the subject development.

3.12.3.4 Sub-Criterion 3.4

The surface water drainage systems, serving the proposed development, are designed to accommodate the 100-year return period rainfall event (including an allowance of 20% increase in rainfall intensity for climate change) without flooding, so no flood routing off site will be experienced for such a rainfall event.

The performance of the proposed drainage system in 100-year return period storm events (including 20% climate change allowance) is analysed – Refer **Appendix C** of this ESR for calculations. The analyses show that no flooding will occur in 100-year return period storm events.

Details of the flood risk assessment associated with the proposed development is outlined in the Site-Specific Flood Risk Assessment (Document Nr. **S665-OCSC-1B-XX-RP-C-0010**), which is submitted under separate cover, as part of this application.

3.12.4 Criterion 4 – River Flood Protection

As outlined in *Section 3.12.2* (Criterion 2), the surface water runoff from the development's catchment will be limited to a maximum of **5.5 l/s/ha**, which is less than the calculated greenfield equivalent.

Refer to *Section 3.6.3.* of this report for further details on the limiting discharge rates. The *GDSDS Volume 2, Appendix E* states that this practice ensures *"that sufficient stormwater runoff retention is achieved to protect the river during extreme events".*

Attenuation storage is to be provided for the 100-year return period rainfall event (including an increased 20% rainfall intensity; to allow for climate change). Discharge from site is to be achieved through the use of a vortex flow control device (e.g., Hydro-Brake Optimum, by Hydro-International, or similar approved), which will reduce the risk of blockage present with other flow devices.

Refer to **Appendix C** of this ESR for details of hydraulic modelling calculations of attenuation and flow control facilities, as carried out using MicroDrainage software by Innovyze Inc.

3.13 Taking in Charge

It is proposed that all of the new surface water infrastructure within the access road, **is** to be offered to be taken in charge by Meath County Council. Surface water infrastructure serving the Nursing Home, PCC, internal road, footpaths and parking spaces, **is not** to be offered to be taken in charge by Meath County

Council (refer to Figure 3.12), as these areas will be transferred to a management company that will take responsibility for management, inspection and maintenance.

Figure 3.12 - Surface Water Network Design Layout

4 NEW PEDESTRIAN / CYCLE BRIDGE STRUCTURE

There will be a new pedestrian / cycle bridge structure provided at the Kildare Bridge, in order to improve connectivity between the proposed development and Maynooth.

The new pedestrian/cycle bridge, which is to be located adjacent, and west of, to the existing Kildare Bridge will be formed of precast concrete beams sitting on an integral abutment bank seat. The clear span of the bridge is 17m between abutments, uninterrupted across the existing Kildare Bridge's arches. A 1m bearing length is provided at each end, resulting in a 19m long precast MY7 beam. A concrete infill is to be placed in between and over the top of the beams to complete the full depth of the deck, measuring 725mm.

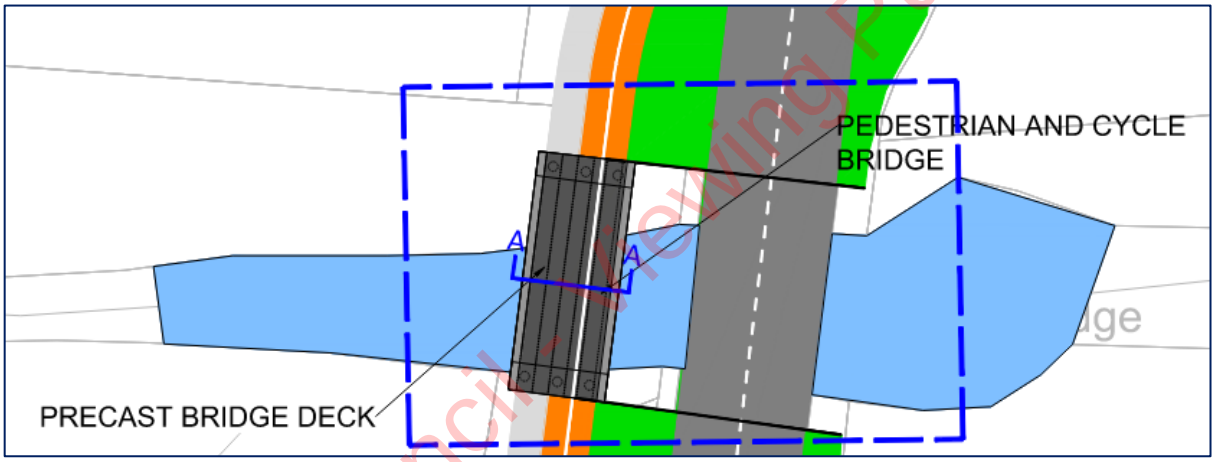

Figure 4.1 - Schematic Plan of new Pedestrian and Cycle Bridge Structure

The soffit of the precast beams matches the crown of the intrados of the adjacent masonry arch road bridge. The abutments are built-up on the existing embankments and sit outside the existing walled banks of the watercourse so as not to affect the current flood catchment area. There is no skew on the bridge deck.

A pedestrian parapet forms the edge of the bridge deck.

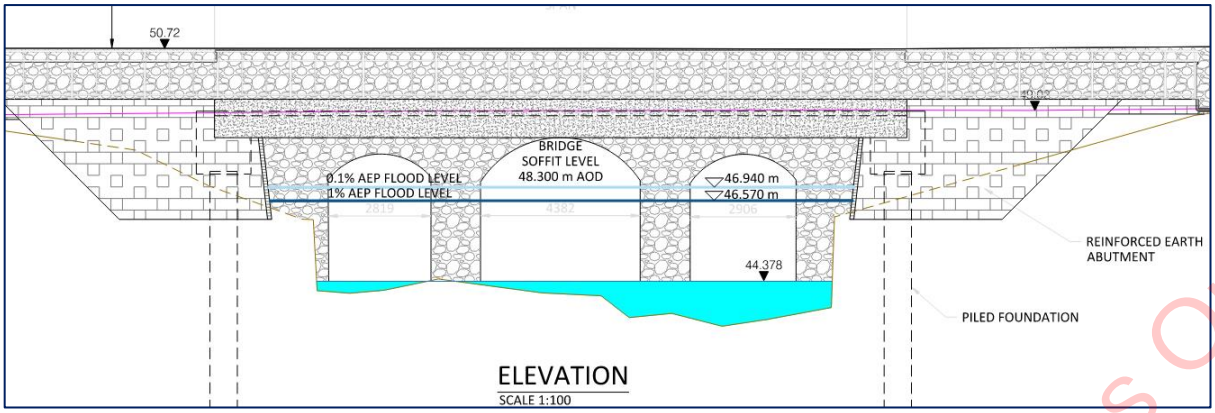

Figure 4.2 - Proposed Pedestrian / Cycle Bridge (Elevation)

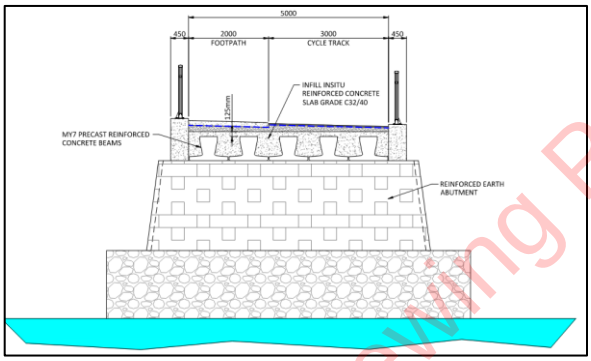

Figure 4.3 - Proposed Pedestrian / Cycle Bridge (Section)

The abutment bank seats are supported off a single row of 750mm diameter CFA piles. The connection between the precast bridge beams and the abutment is integral. To minimise maintenance, no bearings or expansion joints are required. The abutment will be finished with earthwork retaining panels on all sides.

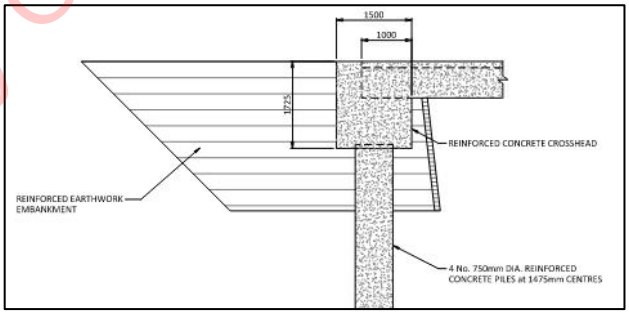

Figure 4.4 - Proposed Pedestrian / Cycle Bridge (Integral Abutments)

The surfacing material consists of a mortar build-up to drainage falls, a waterproofing course and an anti-slip wearing course, Eliminator and Safetrack SC or similar approved.

There are no proposed services in the bridge deck. However, further to our discussions with Irish Water, we understand that they are to tunnel underneath the river Ryewater's bed, in order to install a new high pressure wastewater transmission line under the river Ryewater, to the west of the existing bridge. This is located approximately 20m away from the existing bridge structure, and the new pedestrian / cycle structure has been sited in a location that is sufficiently far away from Irish Water's proposed work zone, so as not to cause any impact. An additional wastewater rising main is to be provided, serving new development in the Moygaddy area, and routed alongside the new bridge infrastructure, in order to facilitate routed connection to the existing Maynooth Municipal Wastewater Pumping Station. Refer to Section 6 for further information.

Durability to the bridge structure is provided by the concrete cover and the concrete mix design in accordance with IS EN 1992 and DN-STR-03012-03. All steel elements including fixings are to be fully galvanised.

Refer to engineering design drawings S665-OCSC-XX-XX-DR-S-1707 & 1708 for design information. Refer to OCSC Bridge Options Report, S665-OCSC-XX-XX-RP-C-0010, submitted separately to this ESR, for detailed discussion on the proposed bridges.

Furthermore, due to the single span nature of construction, there will be no increased risk of blockage to the Kildare Bridge once the cycleway / pedestrian bridge has been installed.

As a precautionary design measure, the potential impact of the proposed pedestrian / cycle bridge structure was further assessed by JBA Consulting, as part of a wider flood study of the Moygaddy Environs, with the conclusions from JBA indicating that the proposed bridge structure has '*no impact on flood following its construction*'.

Refer to JBA Consulting's Masterplan Flood Risk Assessment for further details.

5 WASTEWATER DRAINAGE

5.1 Overview

All proposed wastewater sewer design is to be carried out in accordance with Irish Water's Code of Practice for Wastewater Infrastructure. The existing site is currently greenfield, with no existing wastewater infrastructure in the immediate vicinity, however appropriate connection points have been identified at Maynooth municipal wastewater pumping station, in county Kildare, south of the river Ryewater/Kildare Bridge.

5.2 Consultation

A Pre-Connection Enquiry Form has been submitted to Irish Water for review, for both the proposed development, as well as for the Applicant's wider land holding, which forms part of the masterplan development for the Maynooth Environs lands. Irish Water (IW) issued a Confirmation of Feasibility Letter (Refer Appendix D) for the proposed development, subject to upgrade works being carried out.

OCSC and the applicant have had continued correspondence and meetings with Irish Water with respect to required upgrade works, and have committed to working with Irish Water in order to provide a strategic Wastewater Pumping Station (WWPS) within the applicant owned lands, at Moygaddy. The provision of strategic WWPS, centralised on the Maynooth Environs lands, will allow for new development in this area to be served by wastewater infrastructure, and subsequently allow expansion in order to serve the entire Maynooth Environs lands, as future phasing of development is brought on board.

The strategy of providing a WWPS, as noted, includes provision of rising main infrastructure to specifically serve the subject development, and the pipe will be routed along the Dunboyne Road, and routed across (under) the river Ryewater, adjacent to the Kildare Bridge, so that a connection to the gravity infrastructure upstream of the Maynooth municipal WWPS can be achieved.

Further consultation between the Applicant and Irish Water has been had in relation to Irish Water's Capital Project, which is for the provision of new high

pressure rising main infrastructure to serve Maynooth Town from the Maynooth municipal WWPS, as far as Leixlip wastewater treatment plant. These ongoing works are to greatly improve the performance and capacity of the municipal WWPS, with a section of the new pipeline infrastructure to be provided in Applicant-owned lands. This is discussed further in *Section 5.4*.

5.3 Existing Wastewater Drainage

There is currently no existing wastewater infrastructure in the immediate vicinity of the site. The nearest public wastewater infrastructure is Maynooth's public Wastewater Pumping Station (WWPS).

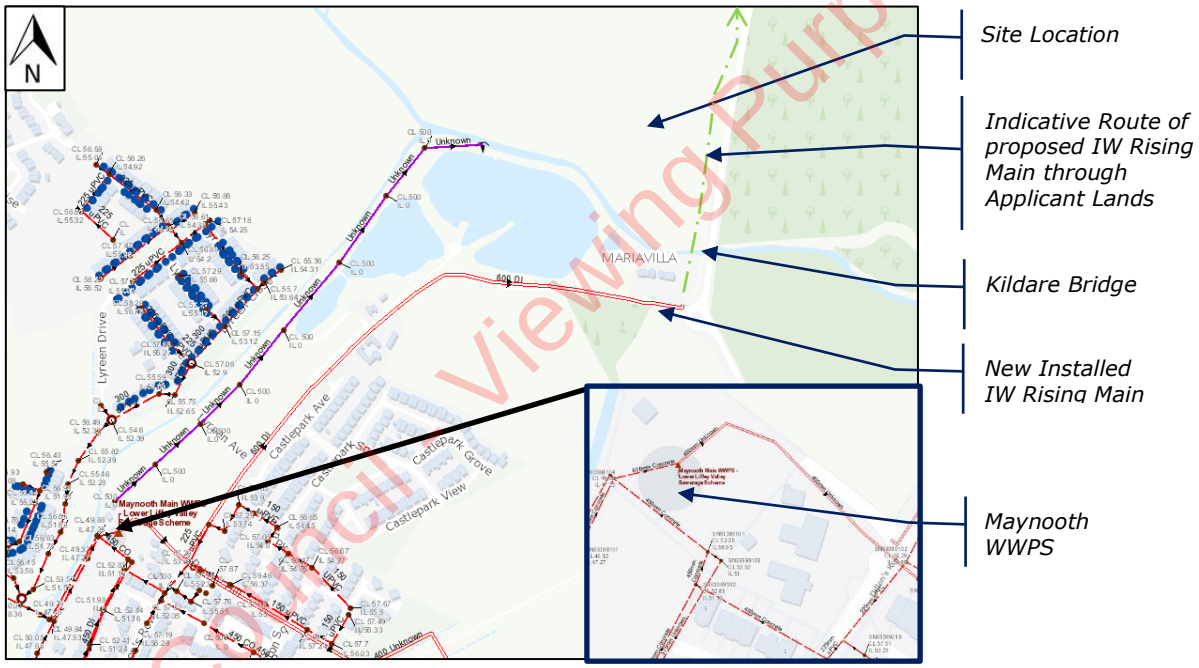

Figure 5.1 –Existing Wastewater Network and Maynooth WWPS

It is noted that Irish Water have separate designs in place to install a high pressure rising main from the existing public WWPS at Maynooth, to the Leixlip Wastewater Treatment Plant, in order to significantly increase the capacity and performance of the Maynooth WWPS.

The route of this new Irish Water infrastructure is to align with the eastern boundary of the subject site, and discussions are ongoing between the applicant, Irish Water and the Local Authorities to ensure that this new

strategic infrastructure can be delivered by Irish Water in conjunction with the wider masterplan for Maynooth Environs.

Maynooth Town is served by a municipal WWPS, at its eastern extent, which discharges wastewater effluent to Leixlip Wastewater Treatment Plant. There is a gravity wastewater network on the Dunboyne Road, adjacent to the Maynooth WWPS.

5.4 New Irish Water Infrastructure

As part of Irish Water's Strategic Capital Investment Programme, Irish Water are currently undergoing design and construction of a new wastewater rising main that will improve the capacity and performance of the nearby Maynooth public Wastewater Pumping Station, and the associated capacity improvements will also serve the proposed development.

The proposed rising main is to be routed north and east, towards the public Wastewater Treatment Plant at Leixlip, with a section of the route located within the eastern part of the Moygaddy Environ's LAP lands, including this subject development site, which are owned by the Applicant as part of their wider land-holding.

A section of the new wastewater rising main is to be accommodated just inside the eastern boundary of the site, as indicated in **Figure 5.2.**

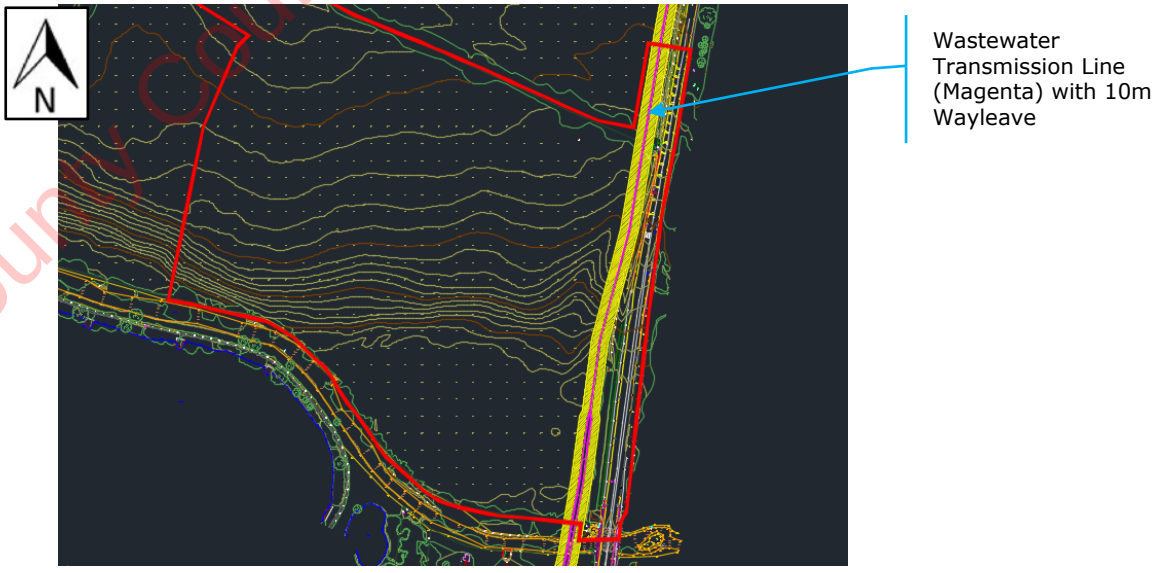

Figure 5.2 - Route of High-Pressure Wastewater Transmission Line

The Developer has been in detailed consultation with Irish Water, for design development of the section of new wastewater rising main, in order to help accommodate the new strategic infrastructure within their lands, and the subject development has been sufficiently set back from the centreline of the rising main route, at a distance greater than the required 5m, so as not to impact on its route and future operation.

5.5 Proposed Wastewater Drainage Strategy

It is proposed to separate the wastewater and surface water drainage networks, which will serve the proposed development independently.

Refer to *Section 3* for details of the proposed surface water drainage design strategy.

Wastewater, within the development, will flow by gravity towards the proposed new wastewater pumping station, which will be located to the west of the nursing home, on the north-western side of the subject site. The proposed wastewater drainage network comprises of a series of 150mm diameter pipes.

All wastewater from the development is to discharge from the new Moygaddy WWPS to the existing Maynooth WWPS located to the south west of the proposed development. This is subject to agreement with Irish Water.

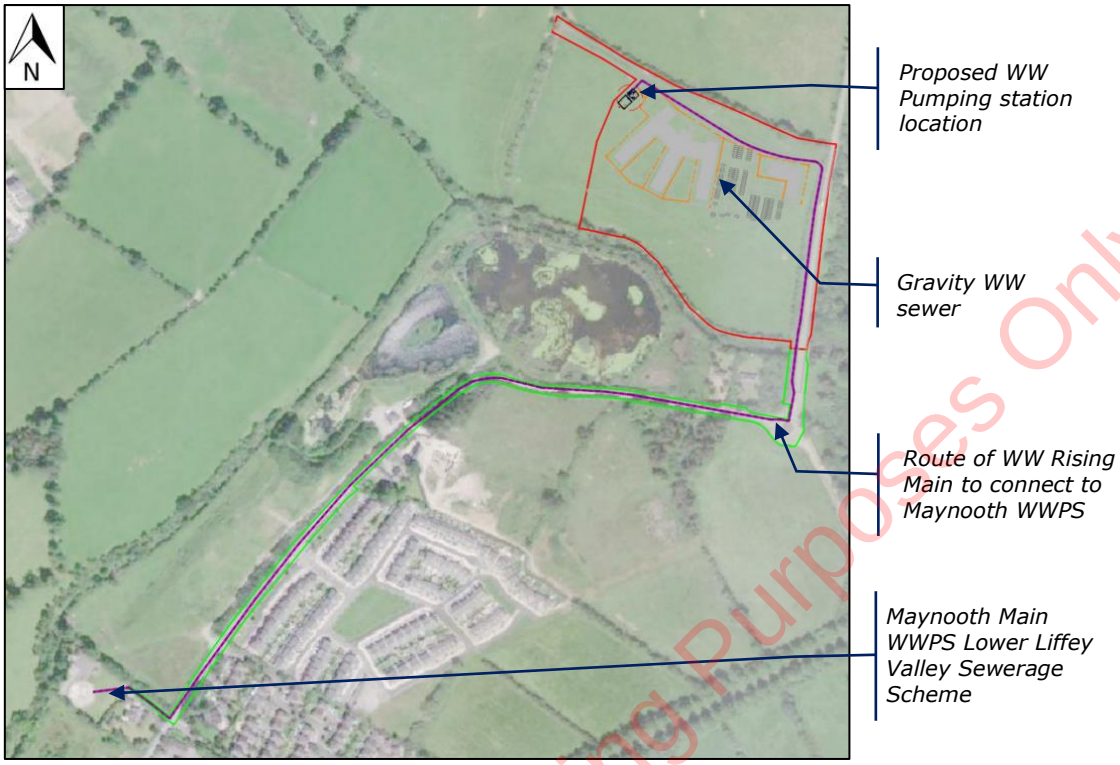

Figure 5.3 –Proposed WW Drainage Layout

The new underground WWPS shall discharge pumped effluent via rising main – with additional rising main laid alongside to accommodate for greater loadings in future phases – as far as the gravity public infrastructure upstream of the Maynooth municipal WWPS. In order to achieve this, the rising main will need to cross the river Ryewater, adjacent to the new pedestrian / cycle bridge structure that is to be constructed adjacent to the Kildare Bridge. It is proposed that this rising main is to be routed under the river Ryewater, alongside the aforementioned new strategic high pressure rising mains that are to be installed by Irish Water to upgrade the Maynooth WWPS.

Refer to **Figure 5.4** for typical detail of a rising main crossing to the west of the Kildare Bridge structure, as per Irish Water Standard Detail Drawing Nr. STD-WW-24, details of which are to be agreed with Irish Water at connection offer stage. The construction methodology proposed is aligned with Irish Water's proposals for the separate Strategic Capital Programme rising main.

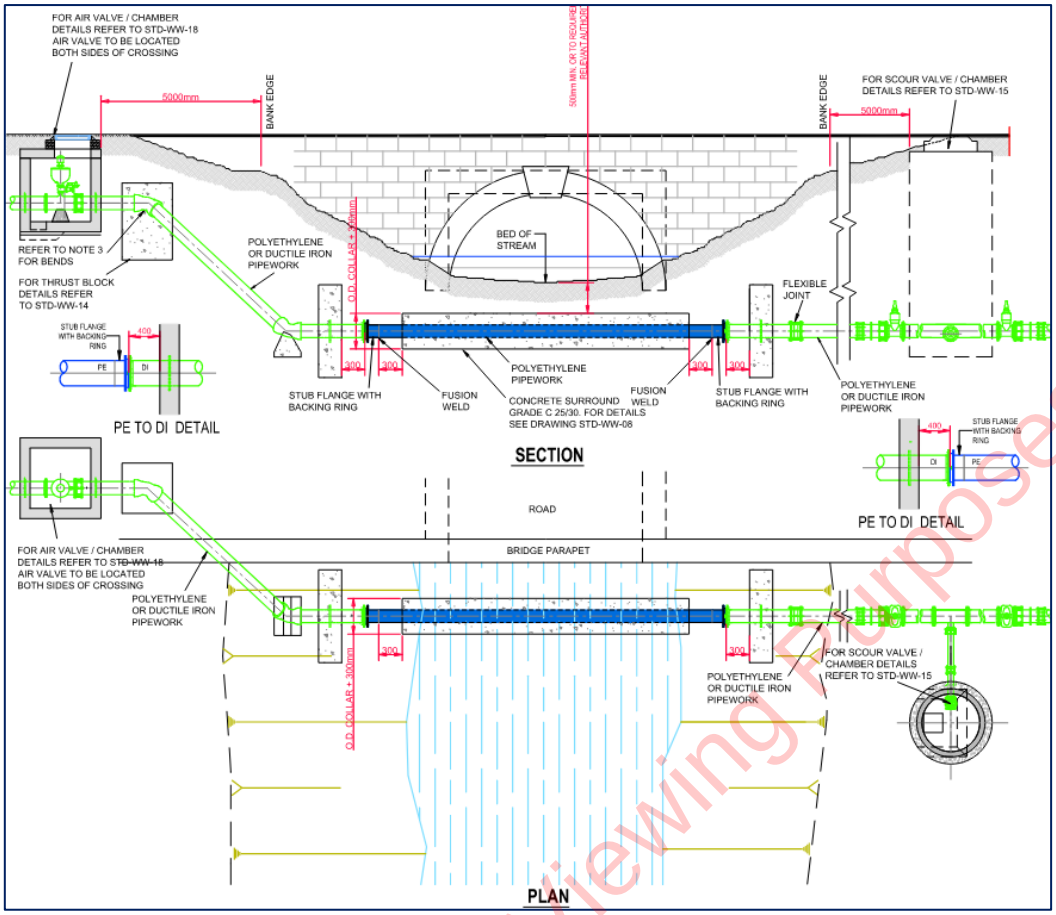

Figure 5.4 - Typical Detail of Rising Main Crossing at Bridge

All infrastructure is to be designed in accordance with the Irish Water Code of Practice for Wastewater Infrastructure, and shall be agreed at New Connection Application stage, prior to construction.

Refer to OCSC Bridge Options Report, S665-OCSC-XX-XX-RP-C-0010, submitted separately to this ESR, for detailed discussion on the proposed bridges.

5.6 Proposed Wastewater Pumping Station

The proposed underground wastewater pumping station, which is to be located west from the proposed nursing home, is to take the discharge from the gravity wastewater network of the new development site and transfer it to the Maynooth Municipal Wastewater Pumping Station initially through a 100mm diameter rising main to allow for the initial low flow rates during the early phases of the development, and then through an additional larger rising main

of 150mm diameter to allow for the future phasing of the development in the Moygaddy area.

The route of the proposed twin rising main can be seen in *Figure 5.3,* which is to cross under the river Ryewater, adjacent to the Kildare Bridge, along the Dunboyne Road to the public gravity network upstream of the Maynooth Municipal Wastewater Pumping Station.

The WWPS is to be designed to allow for future expansion as additional development phases are brought through for planning and construction and the details shall be agreed with Irish Water at new connection application stage, as required. The new WWPS and all associated infrastructure shall be provided to Irish Water for taking in charge.

5.7 Taking In Charge

Wastewater infrastructure serving nursing home and PCC, will be offered to be taken in charge by Irish Water. The new wastewater pumping station, and associated infrastructure, is also to be offered to be taken in charge by Irish Water.

6 POTABLE WATER SUPPLY

6.1 Overview

All proposed potable water design has been carried out in accordance with Irish Water's Code of Practice for Water Infrastructure, IW-CDS-5020-03.

6.2 Consultation

A Pre-Connection Enquiry Form has been submitted to Irish Water for review, for both the proposed development, as well as the wider land holding, which forms part of the Maynooth Environs. Irish Water issued a Confirmation of Feasibility Letter (Refer Appendix D of this ESR) for the proposed development, subject to upgrade works being carried out.

OCSC and the applicant have continued correspondence with Irish Water with respect to proposed upgrade works, and have committed to working with Irish Water to resolve all infrastructure works in order to facilitate the proposed development.

6.3 Connection to the Existing Network

There is a 200mm watermain just south from the Kildare bridge, south of the proposed development. An extension from the existing 200mm watermain is to be provided along the MOOR road, to the connection point at the site boundary. It is anticipated that a metered 150mm high density polyethylene connection will be required to serve each building, each of which will have their own individual water meter. Internal distribution network of 150mm HDPE watermain will be provided to serve the proposed nursing home and primary care centre.

The proposed development will be subject to a New Connection Agreement with Irish Water, with all details in accordance with their requirements.

An individual connection agreement will be sought for each of the Primary Care Centre and the Nursing Home, to reflect the fact that they will be operated independently of each other.

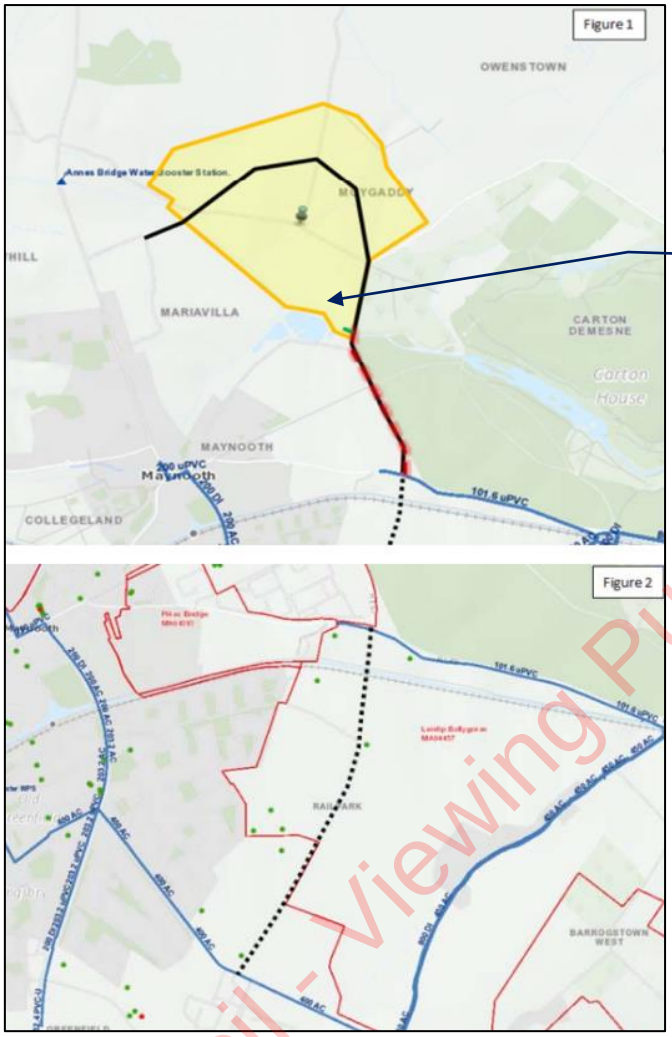

Figure 6.1 – Extract from the CoF

6.4 Water Meters

A bulk water meter is to be provided at the connection to the public watermain, at the development entrance, with individual meters provided at the connection to each of the Primary Care Centre and the Nursing Home. All metering is to be provided in accordance with Irish Water's requirements.

6.5 Taking In Charge

It is proposed new watermain infrastructure within the access road, is to be offered to be taken in charge by Irish Water. Watermain infrastructure serving the Nursing Home and PCC, will be offered to be taken in charge by Irish Water.

7 ROADS AND TRAFFIC

7.6 Design Standards

The proposed development will incorporate a series of design measures, which will be detailed hereinafter, to promote more sustainable modes of transport and support vulnerable road users in line with the core principles of the Design Manual for Urban Roads and Streets (DMURS).

While DMURS is the principle design guideline for the roads elements of this project, the extended list of the main standard documents relied on is:

- National Cycle Manual;
- Traffic Signs Manual 2019;
- DN-PAV-03021: Pavement & Foundation Design;
- GE-STY-01024: Road Safety Audit;
- DN-GEO-03060: Geometric Design of Junctions;
- Traffic Management Guidelines
- NRA IAN 02/11 Interim Requirements for the Use of Eurocodes for the Design of Road Structures Amendment No. 1.

7.7 Proposed Road Network

The proposed development provides for the upgrade of the R157 from Kildare Bridge south of the proposed site to the proposed development entrance along the R157 as well as the creation of new internal access roads and car parking.

A separate application will be made to Kildare County Council for the upgrade of the R157 south of the Kildare bridge. This overlap of applications will ensure unimpeded access to the proposed development lands along the R157 for pedestrian and cyclists.

The upgrade of the proposed section of the R157 will take cognisance of the existing approved Part VIII design by Meath County Council Reference P8/10011, and the strategic plan for the Maynooth Outer Relief Road (MOOR), and will ensure this design implements the latest design standards in agreement with Meath County Council Transportation Section.

The internal road layout and carpark access route will consist of a 6.0m wide carriageway that allows for access to perpendicular parking in line with section 4.4.9 of DMURS. The development will access off a new priority type junction to the R157. The proposed development entrance will take the form of a simple priority T-Junction. This junction was assessed in detail within the final Traffic Impact Assessment.

7.8 Road Classification

The development entrance and internal roads are being designed in accordance with the DMURS, with specific consideration given to the sections including:

- Section 4.3.1 Footways, Verges and Strips
- Section 4.3.2 Pedestrian Crossings
- Section 4.3.3 Corner Radii
- Section 4.3.5 Cycle Facilities
- Section 4.4.1 Carriageway Widths
- Section 4.4.2 Carriageway Surfaces
- Section 4.4.3 Junction Design
- Section 4.4.4 Forward Visibility
- Section 4.4.9 On-Street Parking and Loading

The internal access roads will initially be a cul-de-sac and will be used exclusively by the development and not for local traffic. It is noted, however, that as the masterplan envisages the development of adjoining lands in the future, the carriageway widths in the development have been upsized to cater for occasional larger vehicles and all other design parameters have been chosen under DMURS.

Table 3.1 of DMURS illustrates how this road hierarchy relates to other relevant documents. An extract of DMURS can be seen in *Figure 7.1*, following.

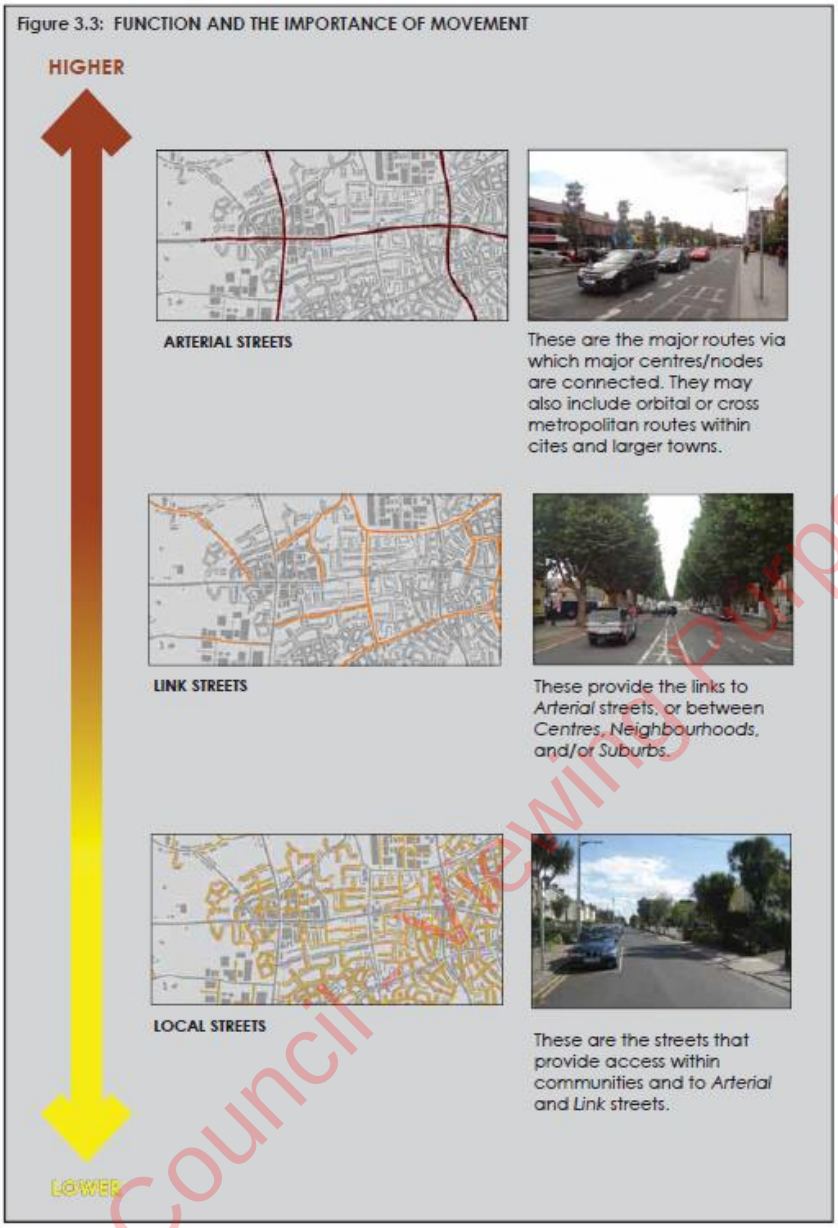

Figure 7.1 – DMURS Street Classification

DMURS Description	Roads Act/NRA DMRB	Traffic Management Guidelines	National Cycle Manual
Arterial	National	Primary Distributor Roads	Distributor
Link	Regional (see note 1)	District Distributor Local Collector (see Notes 1 and 2)	Local Collector
Local	Local	Access	Access

Notes

Note 1: Larger Regional/District Distributors may fall into the category of *Arterial* where they are the main links between major centres (i.e. towns) or have an orbital function.

Note 2: Local Distributors may fall into the category of *Local* street where they are relatively short in length and simply link a neighbourhood to the broader street network.

Table 3.1: Terminology used within this Manual compared with other key publications.

Figure 7.2 – DMURS Street Hierarchy

7.9 Road Design Speeds

The internal road has been designed to a Design Speed of 10-30 kph with geometric parameters chosen under DMURS. This is reflected in Table 4.1 below extracted from DMURS

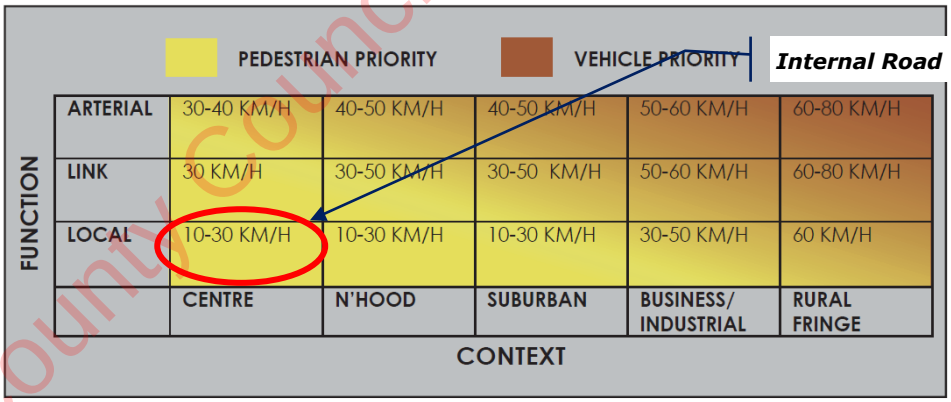

Table 4.1: Design speed selection matrix indicating the links between place, movement and speed that need to be taken into account in order to achieve effective and balanced design solutions.

Figure 7.3 – DMURS Design Speeds

It is envisaged at this stage that a Design Speed of 50kph will be chosen for the upgrade of the R157 to tie in with the design of the Maynooth Outer Relief Road and the wider strategic road network including the recently approved Maynooth Eastern Ring Road planning reference P82019-08.

7.10 Horizontal and Vertical Geometry

The internal road alignments will be designed so that the geometric elements, including horizontal and vertical curvature, super elevation and sight distance will be in line with DMURS, having values consistent with the design speeds.

The relevant horizontal and vertical geometric design values are shown in DMURS *Table 4.3* below. A standard carriageway cross fall of 2.5% will be adopted throughout with super elevation applied if necessary, noting that adverse camber is allowable under DMURS designs in accordance with *Table 4.3*. A cross fall of 2.5% will also be used for footpaths and cycle facilities.

HORIZONTAL CURVATURE

Design Speed (km/h)	10	20	30	40	50	60
Minimum Radius with adverse camber of 2.5%	-	11	26	56	104	178
Minimum Radius with superelevation of 2.5 %	-	-	-	46	82	136

VERTICAL CURVATURE

Design Speed (km/h)	10	20	30	40	50	60
Crest Curve K Value	N/A	N/A	N/A	2.6	4.7	8.2
Sag Curve K Value	N/A	N/A	2.3	4.1	6.4	9.2

Table 4.3: Carriageway geometry parameters for horizontal and vertical curvature.

Figure 7.4 – DMURS Geometric Parameters

7.11 Road Cross Section

7.11.5 Carriageway

As mentioned previously, the internal road layout will consist of a 6.0m wide carriageway that allows for access to perpendicular parking within the proposed carpark in line with section 4.4.9 of DMURS.

7.11.6 Footpaths

The width of the footpaths has been determined by reference to DMURS *Section 4.3.1* with a minimum required width of 1.8 m based on the space needed for two wheelchairs to pass each other.

7.11.7 Cycle Facilities

The cycle lanes along the R157 will be designed in accordance with the National Cycle Manual (NCM). Based on the Cycle Width Calculator in the NCM the appropriate cycle path width will be 1.75m giving room for a single file lane with overtaking room. The cycle paths will be separated from traffic by a kerb and verge and there will be a vertical separation on the inside, between the cycle path and footpath.

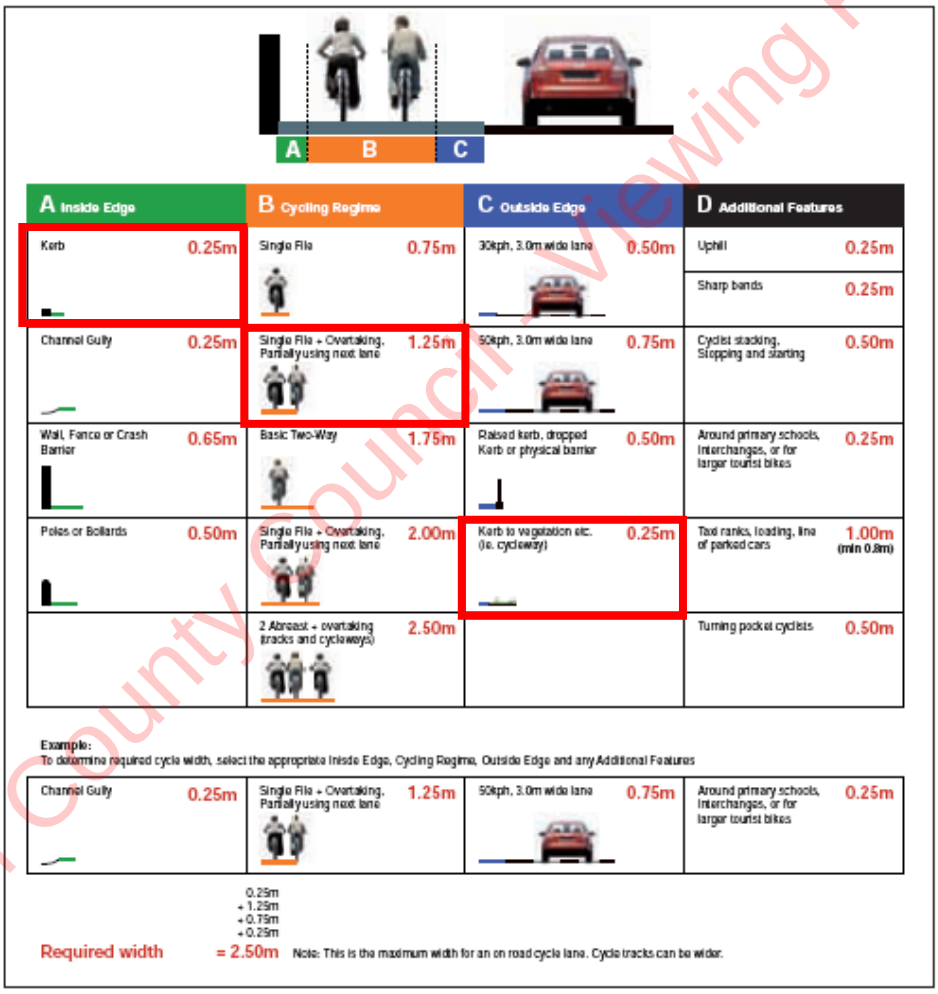

Figure 7.5 – NCM Width Calculator

7.12 Road Junctions

The development's junction with the R157 has been designed with the primary principle of providing safe and consistent layouts in order to present a uniformity of approach to drivers and other road users. In addition, junctions will have sufficient capacity to accommodate design year peak traffic flows thus optimising network capacity. The primary junction strategy objectives has been:

- To optimise road safety by ensuring adequate visibility and consistency;
- To ensure capacity for the design year;
- To function as traffic calming measures;
- To provide safe crossing facilities for pedestrians and cyclists.

The operation of the junction is assessed using traffic modelling software and is detailed in a standalone Traffic Impact Assessment.

Junctions have been sized and designed to accommodate future elements of the Moygaddy Masterplan.

7.13 Consultation

OCSC have had interactions with Kildare County Council and Meath County Council on this scheme in relation to the transportation related elements of the scheme, as detailed below:

- OCSC met with Meath County Council on 19 July 2021 to open preliminary discussions on the design of the MOOR. In attendance was Martin Murry (Director of Services for Infrastructure) and Nicholas Whyatt (Senior Engineer Transportation). Since this meeting, a Traffic Modelling Scoping Report has been issues to MCC.
- As noted previously, although the scheme is planned within the Meath County Council jurisdiction, a separate application will be made to KCC for infrastructure within the County. It is however noted that as the largest nearby urban centre is within KCC jurisdiction, they have been consulted as a stakeholder. OCSC met with KCC on 9 August 2021, and 23 September 2021. In attendance was Brigette Rea, Daragh Conlan,

George Willoughby, Jonathan Hennessy, and Lisa Kirwan, all from KCC. The same Traffic Modelling Scoping Report has also been issues to KCC.

- A submission was made on the Maynooth Transport Strategy as part of public consultation no. 1 on the 12th of November 2021. This submission outlines the proposed plans for the area and noted that it should be considered as part of the future Transport Strategy.
- A submission was made to BusConnects on the 15th of November 2021 noting the upcoming proposals as part of the MOOR that noted the BusConnects project should take cognisance of the upcoming works.

OCSC received a number of comments from Meath County Council's Transportation Department as part of their Opinion Report. Following this, further workshopping was done on the MOOR. A meeting was held on 14/07/2022 with various stakeholders at MCC, after which a number of comments were received. Subsequent to this, these comments have been incorporated into the design.

Annexure A details the responses to the comments from the Opinion Report, as well as the comments received and addressed as part of the subsequent MOOR design meeting.

7.14 Traffic Impact

A Traffic Impact Assessment was carried out which considers the current traffic flows and capacity in accordance with the Traffic and Transport Assessment Guidelines May 2014 from Transport Infrastructure Ireland. The Traffic Impact Assessment was done by means of Vissim Micro-Simulation software at the request of Kildare County Council. More details of the TIA can be found in the TIA document submitted under separate cover.

7.15 Site Accessibility

The Moygaddy site is located within walking distance of the town centre of Maynooth that is well serviced by a number of existing public transport options.

The proposed site is a 26 minute walk (2.1km) from the existing Maynooth Train Station that provides convenient access along the Dublin Sligo train line that provides intermediate stops at Carrick on Shannon, Longford, Mullingar, Enfield and Drumcondra. The imminent DART+ Programme will also provide higher frequency connections and capacity to the Maynooth line connecting to Dublin Connolly & Dockland stations.

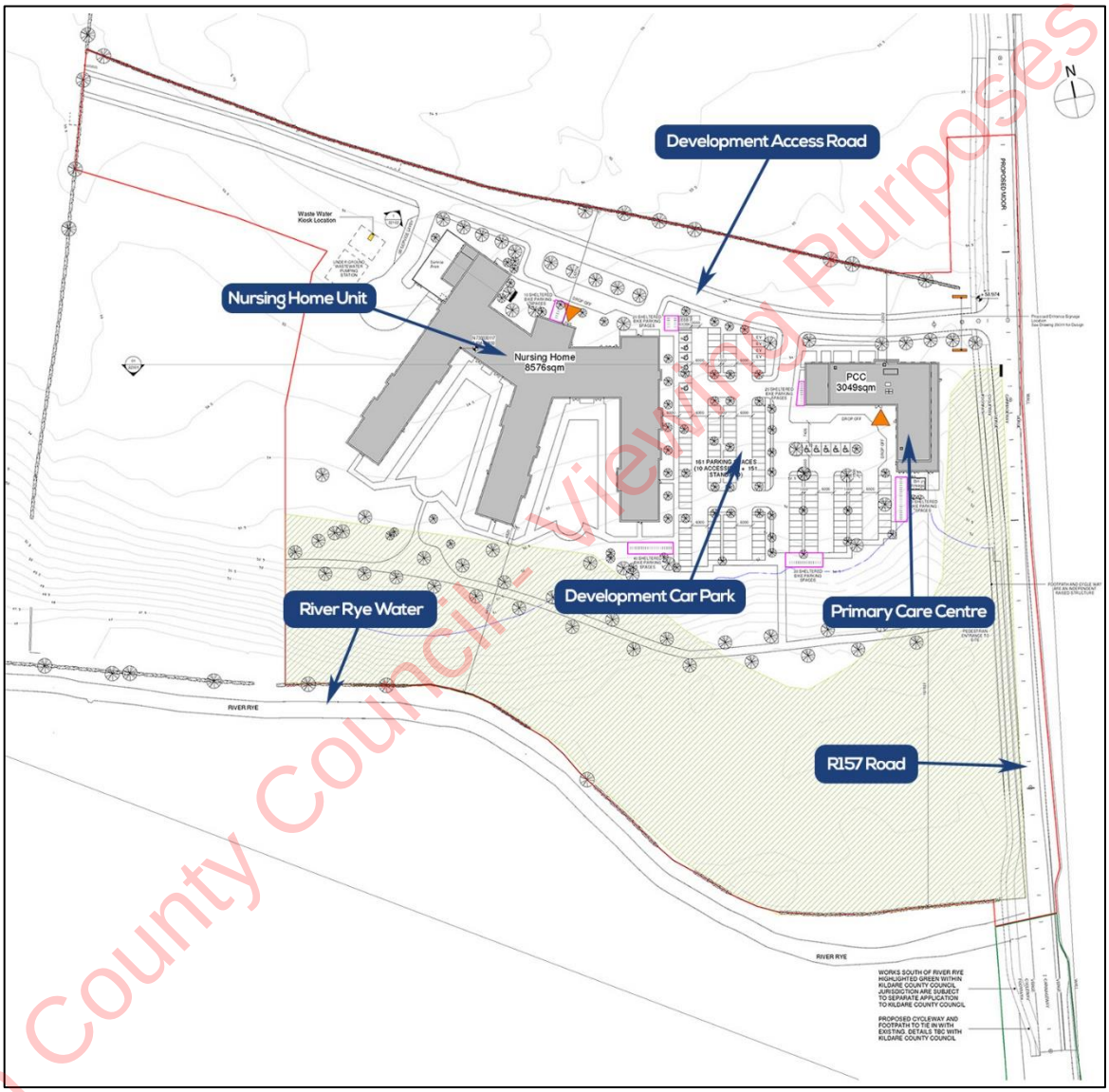

Figure 7.6 – Site Layout

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APPENDIX A. Q_{BAR} Calculation and Rainfall Data

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.470
Area (ha)	1.000	Urban	0.000
SAAR (mm)	799	Region Number	Ireland East

Results l/s

QBAR Rural	5.6
QBAR Urban	5.6
Q2 years	5.4
Q1 year	4.8
Q30 years	9.2
Q100 years	10.7

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 294126, Northing: 239157,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.4,	3.4,	4.0,	4.9,	5.4,	5.9,	7.4,	9.2,	10.3,	12.0,	13.4,	14.6,	16.4,	17.8,	18.9,	N/A ,
10 mins	3.3,	4.8,	5.6,	6.8,	7.6,	8.2,	10.3,	12.8,	14.4,	16.7,	18.7,	20.3,	22.8,	24.8,	26.4,	N/A ,
15 mins	3.9,	5.6,	6.5,	8.0,	8.9,	9.7,	12.2,	15.0,	16.9,	19.6,	22.0,	23.9,	26.9,	29.1,	31.0,	N/A ,
30 mins	5.1,	7.3,	8.5,	10.2,	11.4,	12.3,	15.4,	18.8,	21.1,	24.3,	27.2,	29.4,	32.9,	35.6,	37.8,	N/A ,
1 hours	6.8,	9.5,	10.9,	13.1,	14.6,	15.7,	19.4,	23.6,	26.3,	30.2,	33.6,	36.2,	40.3,	43.4,	46.1,	N/A ,
2 hours	9.0,	12.3,	14.1,	16.8,	18.6,	20.0,	24.5,	29.5,	32.8,	37.4,	41.4,	44.6,	49.3,	53.0,	56.1,	N/A ,
3 hours	10.5,	14.4,	16.4,	19.5,	21.5,	23.0,	28.1,	33.7,	37.3,	42.4,	46.9,	50.3,	55.6,	59.6,	63.0,	N/A ,
4 hours	11.8,	16.1,	18.3,	21.6,	23.8,	25.5,	30.9,	37.0,	40.9,	46.4,	51.1,	54.8,	60.5,	64.8,	68.3,	N/A ,
6 hours	13.9,	18.7,	21.3,	25.0,	27.5,	29.4,	35.4,	42.2,	46.5,	52.6,	57.9,	61.9,	68.1,	72.8,	76.7,	N/A ,
9 hours	16.3,	21.9,	24.7,	28.9,	31.7,	33.8,	40.6,	48.1,	52.9,	59.6,	65.4,	69.9,	76.7,	81.9,	86.1,	N/A ,
12 hours	18.3,	24.4,	27.5,	32.1,	35.1,	37.4,	44.8,	52.8,	58.0,	65.2,	71.4,	76.2,	83.4,	88.9,	93.5,	N/A ,
18 hours	21.6,	28.4,	32.0,	37.1,	40.5,	43.1,	51.3,	60.3,	66.0,	73.9,	80.8,	86.0,	93.9,	100.0,	104.9,	N/A ,
24 hours	24.2,	31.7,	35.6,	41.2,	44.9,	47.7,	56.6,	66.2,	72.4,	80.8,	88.2,	93.8,	102.2,	108.6,	113.9,	131.9,
2 days	30.0,	38.5,	42.7,	48.8,	52.8,	55.8,	65.2,	75.3,	81.7,	90.3,	97.8,	103.4,	111.9,	118.3,	123.5,	141.2,
3 days	35.0,	44.2,	48.8,	55.3,	59.5,	62.7,	72.6,	83.2,	89.8,	98.8,	106.5,	112.2,	120.9,	127.4,	132.7,	150.5,
4 days	39.4,	49.2,	54.1,	61.0,	65.5,	68.9,	79.3,	90.3,	97.2,	106.4,	114.3,	120.3,	129.1,	135.8,	141.2,	159.3,
6 days	47.2,	58.3,	63.7,	71.3,	76.1,	79.8,	91.1,	102.9,	110.2,	120.0,	128.4,	134.6,	143.9,	150.8,	156.4,	175.2,
8 days	54.3,	66.4,	72.2,	80.4,	85.7,	89.6,	101.6,	114.1,	121.8,	132.2,	140.9,	147.4,	157.1,	164.3,	170.1,	189.5,
10 days	61.0,	73.9,	80.2,	88.9,	94.4,	98.6,	111.3,	124.4,	132.5,	143.3,	152.4,	159.1,	169.2,	176.6,	182.6,	202.6,
12 days	67.3,	81.0,	87.6,	96.8,	102.7,	107.0,	120.3,	134.1,	142.5,	153.7,	163.1,	170.1,	180.5,	188.2,	194.4,	214.9,
16 days	79.1,	94.3,	101.6,	111.7,	118.1,	122.8,	137.2,	152.0,	161.0,	173.0,	183.0,	190.4,	201.4,	209.5,	216.0,	237.6,
20 days	90.3,	106.8,	114.7,	125.6,	132.4,	137.5,	152.9,	168.5,	178.1,	190.8,	201.3,	209.1,	220.6,	229.1,	235.9,	258.4,
25 days	103.6,	121.6,	130.2,	141.9,	149.3,	154.7,	171.2,	187.9,	198.1,	211.5,	222.7,	230.9,	243.0,	251.9,	259.1,	282.6,

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

APPENDIX B. Surface Water Design Criteria and Simulation Results

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)	5	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	10.000
M5-60 (mm)	15.800	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.284	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	20	Min Slope for Optimisation (1:X)	170
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Inverts

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
SB1.000	24.053	0.466	51.6	0.121	5.00	0.0	0.600	o	150	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)
SB1.000	50.00	5.29	53.508	0.121	0.0	0.0	3.3	1.40	24.8	19.7

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
SB1.001	39.872	0.235	170.0	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB1.002	25.646	0.151	170.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB2.000	25.922	0.377	68.8	0.048	5.00	0.0	0.600	o	150	Pipe/Conduit	
SB2.001	27.486	0.478	57.5	0.048	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB1.003	13.169	0.259	50.8	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB1.004	18.395	0.078	235.8	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
SB3.000	23.734	0.653	36.3	0.046	5.00	0.0	0.600	o	150	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)
SB1.001	50.00	5.95	53.042	0.157	0.0	0.0	4.3	1.00	39.8	25.5
SB1.002	50.00	6.38	52.807	0.162	0.0	0.0	4.4	1.00	39.8	26.4
SB2.000	50.00	5.36	53.587	0.048	0.0	0.0	1.3	1.21	21.5	7.8
SB2.001	50.00	5.70	53.210	0.096	0.0	0.0	2.6	1.33	23.5	15.6
SB1.003	50.00	6.50	52.657	0.267	0.0	0.0	7.2	1.84	73.1	43.4
SB1.004	50.00	6.80	52.397	0.274	0.0	0.0	7.4	1.02	72.1	44.5
SB3.000	50.00	5.24	53.487	0.046	0.0	0.0	1.2	1.67	29.6	7.5

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
SB3.001	24.970	0.365	68.4	0.046	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB1.005	25.657	0.735	34.9	0.019	0.00	0.0	0.600	o	300	Pipe/Conduit	
SB4.000	24.577	0.564	43.6	0.046	5.00	0.0	0.600	o	150	Pipe/Conduit	
SB4.001	24.691	0.847	29.2	0.046	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB1.006	13.126	0.257	51.1	0.011	0.00	0.0	0.600	o	300	Pipe/Conduit	
SB1.007	19.382	0.079	245.0	0.011	0.00	0.0	0.600	o	375	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)
SB3.001	50.00	5.58	52.834	0.092	0.0	0.0	2.5	1.22	21.5	14.9
SB1.005	50.00	6.96	52.319	0.385	0.0	0.0	10.4	2.67	188.7	62.5
SB4.000	50.00	5.27	53.145	0.046	0.0	0.0	1.2	1.53	27.0	7.5
SB4.001	50.00	5.49	52.581	0.092	0.0	0.0	2.5	1.87	33.1	14.9
SB1.006	50.00	7.06	51.584	0.488	0.0	0.0	13.2	2.21	155.9	79.3
SB1.007	50.00	7.34	51.327	0.499	0.0	0.0	13.5	1.15	127.4	81.1

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
SB5.000	21.663	0.790	27.4	0.046	5.00	0.0	0.600	o	150	Pipe/Conduit	
SB5.001	22.017	0.790	27.9	0.046	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB1.008	34.047	0.908	37.5	0.007	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB6.000	70.000	2.139	32.7	0.168	5.00	0.0	0.600	o	225	Pipe/Conduit	
SB1.009	16.685	0.201	83.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB7.000	67.004	1.922	34.9	0.095	5.00	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)
SB5.000	50.00	5.19	53.042	0.046	0.0	0.0	1.2	1.93	34.1	7.5
SB5.001	50.00	5.38	52.252	0.092	0.0	0.0	2.5	1.91	33.8	14.9
SB1.008	50.00	7.53	51.248	0.597	0.0	0.0	16.2	2.97	327.7	97.1
SB6.000	50.00	5.51	52.629	0.168	0.0	0.0	4.5	2.29	91.3	27.3
SB1.009	50.00	7.67	50.340	0.765	0.0	0.0	20.7	1.99	219.8	124.4
SB7.000	50.00	5.50	52.211	0.095	0.0	0.0	2.6	2.22	88.4	15.4

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
SB1.010	13.805	0.069	200.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB1.011	25.404	0.259	98.0	0.055	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB8.000	60.000	0.353	170.0	0.070	5.00	0.0	0.600	o	225	Pipe/Conduit	
SB8.001	84.563	0.497	170.0	0.080	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB8.002	88.000	0.359	245.0	0.221	0.00	0.0	0.600	o	300	Pipe/Conduit	
SB8.003	37.833	0.643	58.8	0.049	0.00	0.0	0.600	o	300	Pipe/Conduit	
SB9.000	24.262	0.336	72.2	0.041	5.00	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)
SB1.010	50.00	7.85	50.139	0.860	0.0	0.0	23.3	1.28	141.1	139.8
SB1.011	49.45	8.08	50.070	0.915	0.0	0.0	24.5	1.83	202.2	147.1
SB8.000	50.00	6.00	54.017	0.070	0.0	0.0	1.9	1.00	39.8	11.4
SB8.001	50.00	7.41	53.664	0.150	0.0	0.0	4.1	1.00	39.8	24.4
SB8.002	47.38	8.88	53.167	0.371	0.0	0.0	9.5	1.00	70.7	57.1
SB8.003	46.64	9.18	52.807	0.420	0.0	0.0	10.6	2.05	145.2	63.7
SB9.000	50.00	5.26	52.195	0.041	0.0	0.0	1.1	1.54	61.3	6.7

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
SB9.001	37.376	0.220	170.0	0.104	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB8.004	39.874	0.123	325.0	0.031	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB10.000	31.788	0.318	100.0	0.097	5.00	0.0	0.600	o	150	Pipe/Conduit	
SB8.005	12.648	0.039	325.0	0.015	0.00	0.0	0.600	o	375	Pipe/Conduit	
SB1.012	15.620	0.026	590.0	0.000	0.00	0.0	0.600	o	600	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)
SB9.001	50.00	5.89	51.859	0.145	0.0	0.0	3.9	1.00	39.8	23.6
SB8.004	45.13	9.85	51.639	0.596	0.0	0.0	14.6	1.00	110.4	87.4
SB10.000	50.00	5.53	51.521	0.097	0.0	0.0	2.6	1.01	17.8	15.8
SB8.005	44.68	10.06	49.844	0.708	0.0	0.0	17.1	1.00	110.4	102.8
SB1.012	44.13	10.32	49.805	1.623	0.0	0.0	38.8	1.00	281.4	232.8

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
SB11.000	43.920	0.732	60.0	0.035	5.00	0.0	0.600	o	150	Pipe/Conduit	
SB11.001	21.365	0.214	100.0	0.026	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB11.002	11.708	0.117	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
SB12.000	27.057	0.159	170.0	0.069	5.00	0.0	0.600	o	225	Pipe/Conduit	
SB11.003	17.601	0.104	170.0	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB1.013	1.082	0.002	590.0	0.014	0.00	0.0	0.600	o	600	Pipe/Conduit	
SB1.014	1.977	0.003	590.0	0.000	0.00	0.0	0.600	o	600	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)
SB11.000	50.00	5.56	51.502	0.035	0.0	0.0	0.9	1.30	23.0	5.7
SB11.001	50.00	5.92	50.770	0.061	0.0	0.0	1.7	1.00	17.8	9.9
SB11.002	50.00	6.11	50.556	0.061	0.0	0.0	1.7	1.00	17.8	9.9
SB12.000	50.00	5.45	49.985	0.069	0.0	0.0	1.9	1.00	39.8	11.2
SB11.003	50.00	6.40	49.826	0.156	0.0	0.0	4.2	1.00	39.8	25.3
SB1.013	44.09	10.34	48.565	1.794	0.0	0.0	42.8	1.00	281.4	257.0
SB1.014	44.03	10.37	48.563	1.794	0.0	0.0	42.8	1.00	281.4	257.0

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
SB1.015	1.270	0.002	590.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
SB1.016	28.561	0.048	590.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
SB1.017	4.100	0.024	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
SB1.018	68.026	1.361	50.0	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)
SB1.015	43.98	10.39	48.560	1.794	0.0	0.0	42.8	1.00	281.4	257.0
SB1.016	43.03	10.87	48.558	1.794	0.0	0.0	42.8	1.00	281.4	257.0
SB1.017	50.00	5.07	48.509	0.000	10.1	0.0	1.7	1.00	39.8	10.1
SB1.018	50.00	5.68	48.485	0.000	10.1	0.0	2.0	1.85	73.7	12.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.121	0.121	0.121
1.001	-	-	100	0.036	0.036	0.036
1.002	As Zoned	Hardstanding	100	0.005	0.005	0.005
2.000	-	-	100	0.048	0.048	0.048
2.001	-	-	100	0.048	0.048	0.048
1.003	As Zoned	Hardstanding	100	0.011	0.011	0.009
1.004	As Zoned	Hardstanding	100	0.046	0.046	0.007
3.000	-	-	100	0.046	0.046	0.046
3.001	-	-	100	0.046	0.046	0.046
1.005	As Zoned	Default	100	0.010	0.010	0.010
		Hardstanding	100	0.009	0.009	0.019
4.000	-	-	100	0.046	0.046	0.046
4.001	-	-	100	0.046	0.046	0.046
1.006	As Zoned	Default	100	0.006	0.006	0.006
		Hardstanding	100	0.005	0.005	0.011
1.007	As Zoned	Default	100	0.006	0.006	0.006
		Hardstanding	100	0.005	0.005	0.011
5.000	-	-	100	0.046	0.046	0.046
5.001	-	-	100	0.046	0.046	0.046
1.008	As Zoned	Default	100	0.001	0.001	0.001
		Hardstanding	100	0.006	0.006	0.007
6.000	-	-	100	0.168	0.168	0.168
1.009	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.095	0.095	0.095
1.010	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.055	0.055	0.055
8.000	-	-	100	0.070	0.070	0.070

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
8.001	-	-	100	0.080	0.080	0.080
8.002	-	-	100	0.221	0.221	0.221
8.003	-	-	100	0.049	0.049	0.049
9.000	-	-	100	0.041	0.041	0.041
9.001	-	-	100	0.104	0.104	0.104
8.004	-	-	100	0.031	0.031	0.031
10.000	-	-	100	0.097	0.097	0.097
8.005	-	-	100	0.015	0.015	0.015
1.012	-	-	100	0.000	0.000	0.000
11.000	-	-	100	0.035	0.035	0.035
11.001	-	-	100	0.026	0.026	0.026
11.002	-	-	100	0.000	0.000	0.000
12.000	-	-	100	0.069	0.069	0.069
11.003	-	-	100	0.026	0.026	0.026
1.013	As Zoned	Default	100	0.004	0.004	0.004
		Road	100	0.001	0.001	0.004
		Pervious Paving	70	0.014	0.010	0.014
1.014	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
1.017	-	-	100	0.000	0.000	0.000
1.018	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.839	1.794	1.794

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)
SB1.018		48.000	47.125	47.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SB-MH42, DS/PN: SB1.017, Volume (m³): 13.0

Unit Reference	MD-SHE-0130-1010-2100-1010	Sump Available	Yes
Design Head (m)	2.100	Diameter (mm)	130
Design Flow (l/s)	10.1	Invert Level (m)	48.509
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.100	10.1	Kick-Flo®	1.160	7.6
Flush-Flo™	0.569	9.6	Mean Flow over Head Range	-	8.6

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)	Depth (m)	Flow (l/s)
0.100	4.7	0.600	9.6	1.600	8.9	2.600	11.2	5.000	15.2	7.500	18.5
0.200	8.1	0.800	9.4	1.800	9.4	3.000	11.9	5.500	15.9	8.000	19.1
0.300	9.0	1.000	8.8	2.000	9.9	3.500	12.9	6.000	16.6	8.500	19.6
0.400	9.4	1.200	7.8	2.200	10.3	4.000	13.7	6.500	17.3	9.000	20.2
0.500	9.6	1.400	8.3	2.400	10.7	4.500	14.5	7.000	17.9	9.500	20.7

Storage Structures for Storm

Cellular Storage Manhole: SB-MH42, DS/PN: SB1.017

Invert Level (m) 48.509 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	423.4	0.0	2.100	423.4	0.0	2.101	0.0	0.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 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) 15.800 Cv (Summer) 0.750
Region Scotland and Ireland Ratio R 0.284 Cv (Winter) 0.840

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

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flow / Cap.	Pipe Flow (l/s)	Status
SB1.000	SB-MH1	15 minute 100 year Winter I+20%	54.408	54.383	0.725	1.42	33.4	FLOOD RISK
SB1.001	SB-MH2	15 minute 100 year Winter I+20%	54.467	53.448	0.181	1.10	41.5	SURCHARGED

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flow / Cap.	Pipe Flow (l/s)	Status
SB1.002	SB-MH3	15 minute 100 year Winter I+20%	54.580	53.188	0.156	1.11	40.6	SURCHARGED
SB2.000	SB-MH4	15 minute 100 year Winter I+20%	54.613	53.935	0.198	0.72	14.8	SURCHARGED
SB2.001	SB-MH5	15 minute 100 year Winter I+20%	54.536	53.743	0.383	1.27	28.4	SURCHARGED
SB1.003	SB-MH6	15 minute 100 year Winter I+20%	54.428	53.003	0.122	1.08	68.0	SURCHARGED
SB1.004	SB-MH7	15 minute 100 year Winter I+20%	54.042	52.701	0.004	1.11	69.1	SURCHARGED
SB3.000	SB-MH8	15 minute 100 year Winter I+20%	54.537	53.636	-0.001	0.58	16.3	OK
SB3.001	SB-MH9	15 minute 100 year Winter I+20%	54.184	53.433	0.449	1.48	30.4	SURCHARGED
SB1.005	SB-MH10	15 minute 100 year Winter I+20%	53.819	52.524	-0.095	0.60	101.9	OK
SB4.000	SB-MH11	15 minute 100 year Winter I+20%	54.495	53.236	-0.059	0.66	17.1	OK
SB4.001	SB-MH12	15 minute 100 year Winter I+20%	53.931	52.894	0.163	0.99	31.1	SURCHARGED
SB1.006	SB-MH13	15 minute 100 year Winter I+20%	53.084	52.266	0.382	1.04	132.5	SURCHARGED
SB1.007	SB-MH14	15 minute 100 year Winter I+20%	52.527	52.018	0.316	1.27	135.4	SURCHARGED
SB5.000	SB-MH15	15 minute 100 year Winter I+20%	54.392	53.121	-0.071	0.53	17.2	OK
SB5.001	SB-MH16	15 minute 100 year Winter I+20%	53.706	52.510	0.108	1.03	33.0	SURCHARGED
SB1.008	SB-MH17	15 minute 100 year Winter I+20%	53.010	51.906	0.283	0.53	154.8	SURCHARGED
SB6.000	SB-MH18	15 minute 100 year Winter I+20%	54.054	52.771	-0.083	0.70	61.7	OK
SB1.009	SB-MH19	15 minute 100 year Winter I+20%	51.915	51.659	0.944	1.15	202.2	FLOOD RISK
SB7.000	SB-MH20	15 minute 100 year Winter I+20%	53.636	52.313	-0.123	0.41	34.9	OK
SB1.010	SB-MH21	15 minute 100 year Winter I+20%	51.714	51.391	0.878	2.15	230.1	SURCHARGED
SB1.011	SB-MH22	15 minute 100 year Winter I+20%	51.645	51.045	0.600	1.38	241.5	SURCHARGED
SB8.000	SB-MH23	15 minute 100 year Winter I+20%	55.442	54.603	0.361	0.56	21.6	SURCHARGED
SB8.001	SB-MH24	15 minute 100 year Winter I+20%	55.314	54.512	0.623	1.04	40.2	SURCHARGED
SB8.002	SB-MH25	15 minute 100 year Winter I+20%	55.095	53.973	0.507	1.44	98.1	SURCHARGED
SB8.003	SB-MH26	15 minute 100 year Winter I+20%	54.244	53.016	-0.092	0.82	109.6	OK
SB9.000	SB-MH27	15 minute 100 year Winter I+20%	53.620	52.557	0.137	0.25	14.0	SURCHARGED

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flow / Cap.	Pipe Flow (l/s)	Status
SB9.001	SB-MH28	15 minute 100 year Winter I+20%	52.984	52.528	0.444	1.20	45.0	SURCHARGED
SB8.004	SB-MH29	15 minute 100 year Winter I+20%	53.365	52.194	0.180	1.61	162.0	SURCHARGED
SB10.000	SB-MH30	15 minute 100 year Winter I+20%	52.871	52.372	0.701	1.78	30.4	SURCHARGED
SB8.005	SB-MH31	15 minute 100 year Winter I+20%	52.936	50.794	0.575	2.38	195.5	SURCHARGED
SB1.012	SB-MH32	720 minute 100 year Winter I+20%	52.828	50.576	0.171	0.44	63.7	SURCHARGED
SB11.000	SB-MH33	15 minute 100 year Winter I+20%	53.340	51.585	-0.067	0.58	12.8	OK
SB11.001	SB-MH34	15 minute 100 year Winter I+20%	52.120	51.088	0.168	1.21	20.3	SURCHARGED
SB11.002	SB-MH35	15 minute 100 year Winter I+20%	52.280	50.766	0.060	1.25	20.1	SURCHARGED
SB12.000	SB-MH36	720 minute 100 year Winter I+20%	51.110	50.577	0.367	0.07	2.7	SURCHARGED
SB11.003	SB-MH37	720 minute 100 year Winter I+20%	52.835	50.576	0.526	0.17	6.1	SURCHARGED
SB1.013	SB-MH38	720 minute 100 year Winter I+20%	52.831	50.575	1.410	0.29	70.1	SURCHARGED
SB1.014	SB-MH39	720 minute 100 year Winter I+20%	52.822	50.575	1.412	0.30	69.9	SURCHARGED
SB1.015	SB-MH40	720 minute 100 year Winter I+20%	52.806	50.574	1.415	0.29	69.6	SURCHARGED
SB1.016	SB-MH41	720 minute 100 year Winter I+20%	52.796	50.574	1.417	0.31	69.3	SURCHARGED
SB1.017	SB-MH42	720 minute 100 year Winter I+20%	51.540	50.572	1.838	0.36	9.9	SURCHARGED
SB1.018	SB-MH43	720 minute 100 year Winter I+20%	50.240	48.541	-0.170	0.14	9.9	OK

APPENDIX C. Wastewater Design Calculation and Network Details

O'Connor Sutton Cronin		Page 0
9 Prussia Street Dublin 7 Ireland	PRIMARY CARE CENTRE AND NURSING HOME	
Date 24/08/2022 15:57 File S665-OCSC-1B-MH-M3-C-0001.01.MDX	Designed by EH Checked by MK	
XP Solutions	Network 2020.1.3	

FOUL SEWERAGE DESIGN

Design Criteria for Foul Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Domestic (l/s/ha)	0.00	Maximum Backdrop Height (m)	1.500
Industrial Peak Flow Factor	0.00	Domestic Peak Flow Factor	6.00	Min Design Depth for Optimisation (m)	1.200
Calculation Method	BS 8301	Add Flow / Climate Change (%)	0	Min Vel for Auto Design only (m/s)	0.75
Frequency Factor	0.00	Minimum Backdrop Height (m)	0.200	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
WB1.000	45.652	0.761	60.0	0.000	11.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.001	57.443	0.427	134.5	0.000	10.0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
WB1.000	51.881	0.000	0.0	11.0	0.0	35	0.76	1.13	20.0	2.4
WB1.001	51.120	0.000	0.0	21.0	0.0	47	0.59	0.75	13.3	2.8

Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
WB2.000	20.181	0.336	60.0	0.000	7.0	0.0	1.500	o	150	Pipe/Conduit	
WB2.001	33.974	0.252	135.0	0.000	17.0	0.0	1.500	o	150	Pipe/Conduit	
WB2.002	24.019	0.188	127.8	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.002	46.886	0.347	135.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB3.000	43.158	0.719	60.0	0.000	48.0	0.0	1.500	o	150	Pipe/Conduit	
WB3.001	38.381	0.471	81.4	0.000	27.0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
WB2.000	51.469	0.000	0.0	7.0	0.0	34	0.74	1.13	20.0	2.2
WB2.001	51.133	0.000	0.0	24.0	0.0	47	0.60	0.75	13.3	2.9
WB2.002	50.881	0.000	0.0	24.0	0.0	47	0.61	0.77	13.7	2.9
WB1.002	50.693	0.000	0.0	45.0	0.0	51	0.62	0.75	13.3	3.3
WB3.000	51.536	0.000	0.0	48.0	0.0	42	0.84	1.13	20.0	3.3
WB3.001	50.817	0.000	0.0	75.0	0.0	47	0.77	0.97	17.2	3.7

Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
WB1.003	63.440	0.470	135.0	0.000	11.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.004	35.782	0.265	135.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.005	17.703	0.140	126.5	0.000	26.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.000	49.297	0.822	60.0	0.000	73.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.001	30.889	0.229	135.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB5.000	29.201	0.658	44.4	0.000	38.0	0.0	1.500	o	150	Pipe/Conduit	
WB5.001	23.965	0.715	33.5	0.000	39.0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
WB1.003	50.346	0.000	0.0	131.0	0.0	58	0.67	0.75	13.3	4.2
WB1.004	49.876	0.000	0.0	131.0	0.0	58	0.67	0.75	13.3	4.2
WB1.005	49.611	0.000	0.0	157.0	0.0	58	0.69	0.78	13.8	4.4
WB4.000	52.881	0.000	0.0	73.0	0.0	44	0.86	1.13	20.0	3.7
WB4.001	52.059	0.000	0.0	73.0	0.0	54	0.64	0.75	13.3	3.7
WB5.000	53.203	0.000	0.0	38.0	0.0	38	0.92	1.32	23.3	3.2
WB5.001	52.545	0.000	0.0	77.0	0.0	38	1.06	1.52	26.8	3.7

Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
WB4.002	25.646	0.190	135.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB6.000	26.968	0.899	30.0	0.000	40.0	0.0	1.500	o	150	Pipe/Conduit	
WB6.001	26.968	0.693	38.9	0.000	40.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.003	12.309	0.091	135.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.004	19.794	0.155	127.7	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB7.000	32.581	1.086	30.0	0.000	40.0	0.0	1.500	o	150	Pipe/Conduit	
WB7.001	24.303	0.810	30.0	0.000	40.0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
WB4.002	51.830	0.000	0.0	150.0	0.0	59	0.67	0.75	13.3	4.3
WB6.000	53.232	0.000	0.0	40.0	0.0	34	1.06	1.60	28.3	3.2
WB6.001	52.333	0.000	0.0	80.0	0.0	39	1.01	1.41	24.9	3.7
WB4.003	51.640	0.000	0.0	230.0	0.0	63	0.69	0.75	13.3	4.8
WB4.004	51.549	0.000	0.0	230.0	0.0	62	0.71	0.77	13.7	4.8
WB7.000	53.290	0.000	0.0	40.0	0.0	34	1.06	1.60	28.3	3.2
WB7.001	52.204	0.000	0.0	80.0	0.0	37	1.11	1.60	28.3	3.7

Network Design Table for Foul Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
WB4.005	25.646	0.427	60.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.006	68.237	1.137	60.0	0.000	45.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.007	13.182	0.180	73.2	0.000	45.0	0.0	1.500	o	150	Pipe/Conduit	
WB4.008	13.380	0.178	75.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.006	9.217	0.061	150.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	
WB1.007	10.000	0.067	150.0	0.000	0.0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Units	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
WB4.005	51.394	0.000	0.0	310.0	0.0	53	0.95	1.13	20.0	5.3
WB4.006	50.966	0.000	0.0	355.0	0.0	54	0.96	1.13	20.0	5.5
WB4.007	49.829	0.000	0.0	400.0	0.0	58	0.91	1.02	18.1	5.7
WB4.008	49.649	0.000	0.0	400.0	0.0	58	0.90	1.01	17.9	5.7
WB1.006	49.471	0.000	0.0	557.0	0.0	76	0.72	0.71	12.6	6.4
WB1.007	49.409	0.000	0.0	557.0	0.0	76	0.72	0.71	12.6	6.4

Free Flowing Outfall Details for Foul Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
WB1.007	WB	54.646	49.343	49.314	0	0

APPENDIX D. Irish Water Correspondence

Mark Killian

9 Prussia Street
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Dublin 7
D07KT57

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

20 October 2021

Re: CDS21003388 pre-connection enquiry - Subject to contract | Contract denied

Connection for Business Connection of 1 unit(s) at Phase 1C, Moygaddy, Meath

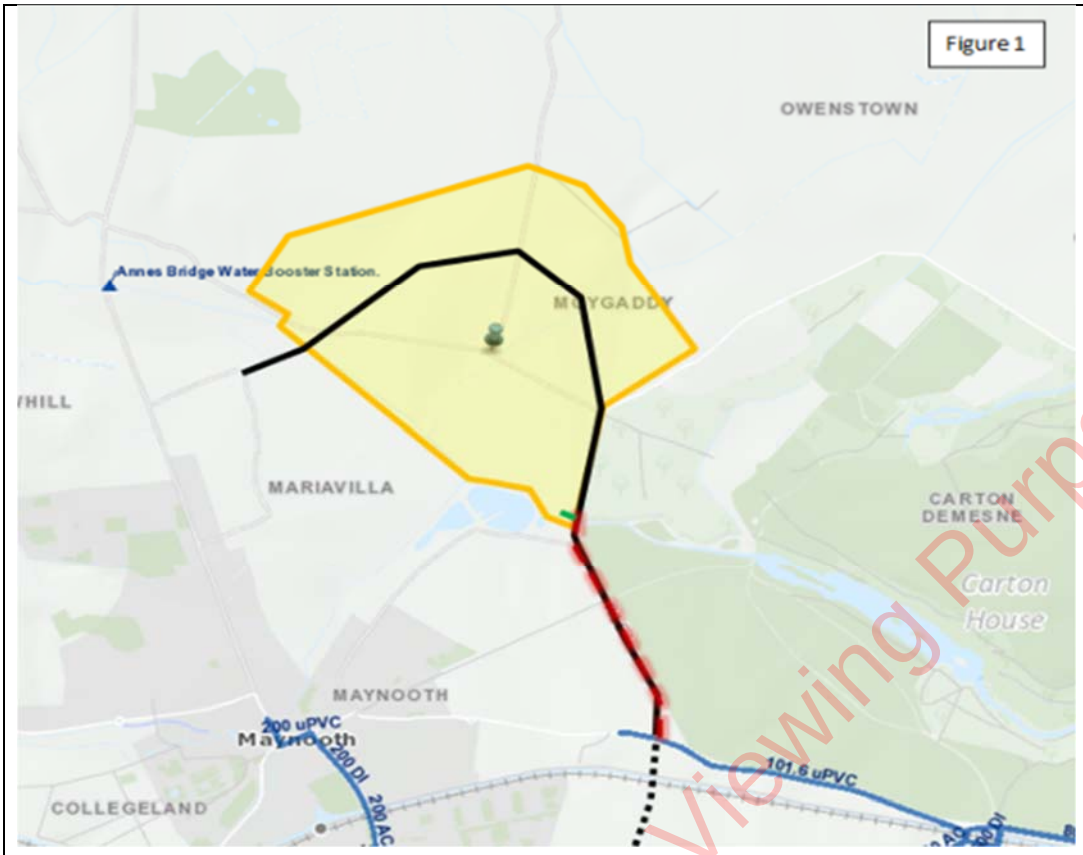
Dear Sir/Madam,

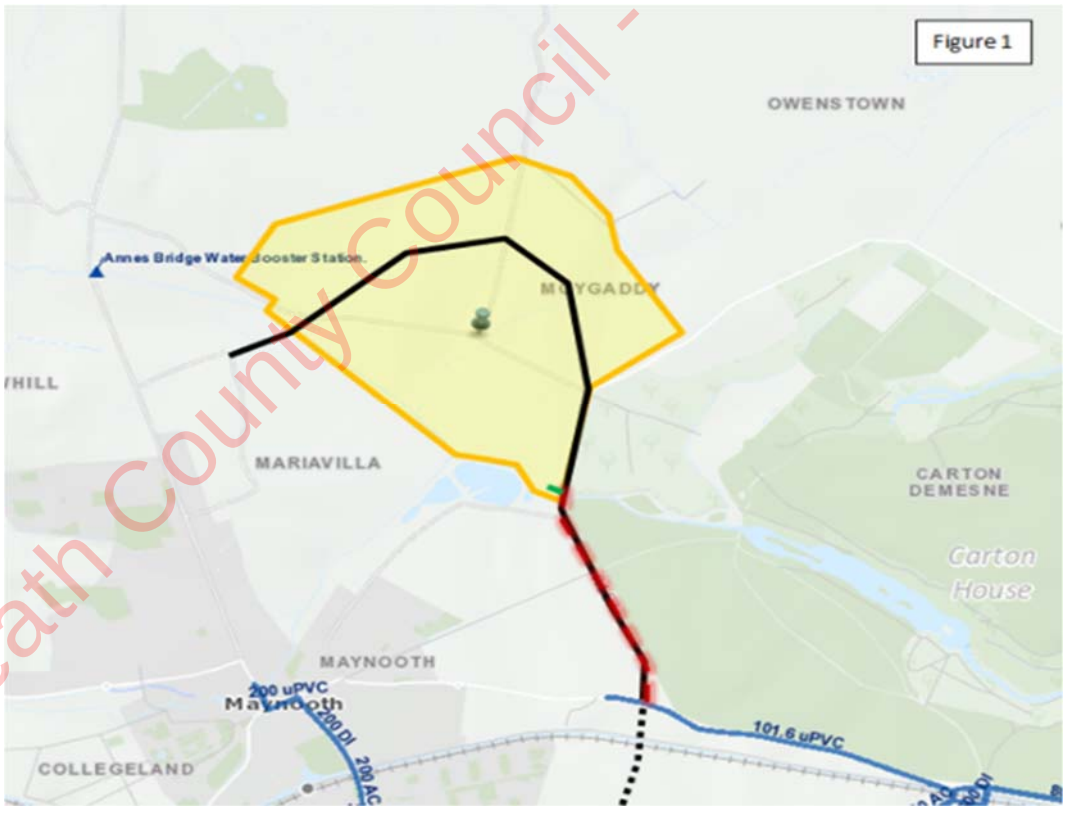
Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Phase 1C, Moygaddy, Meath (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

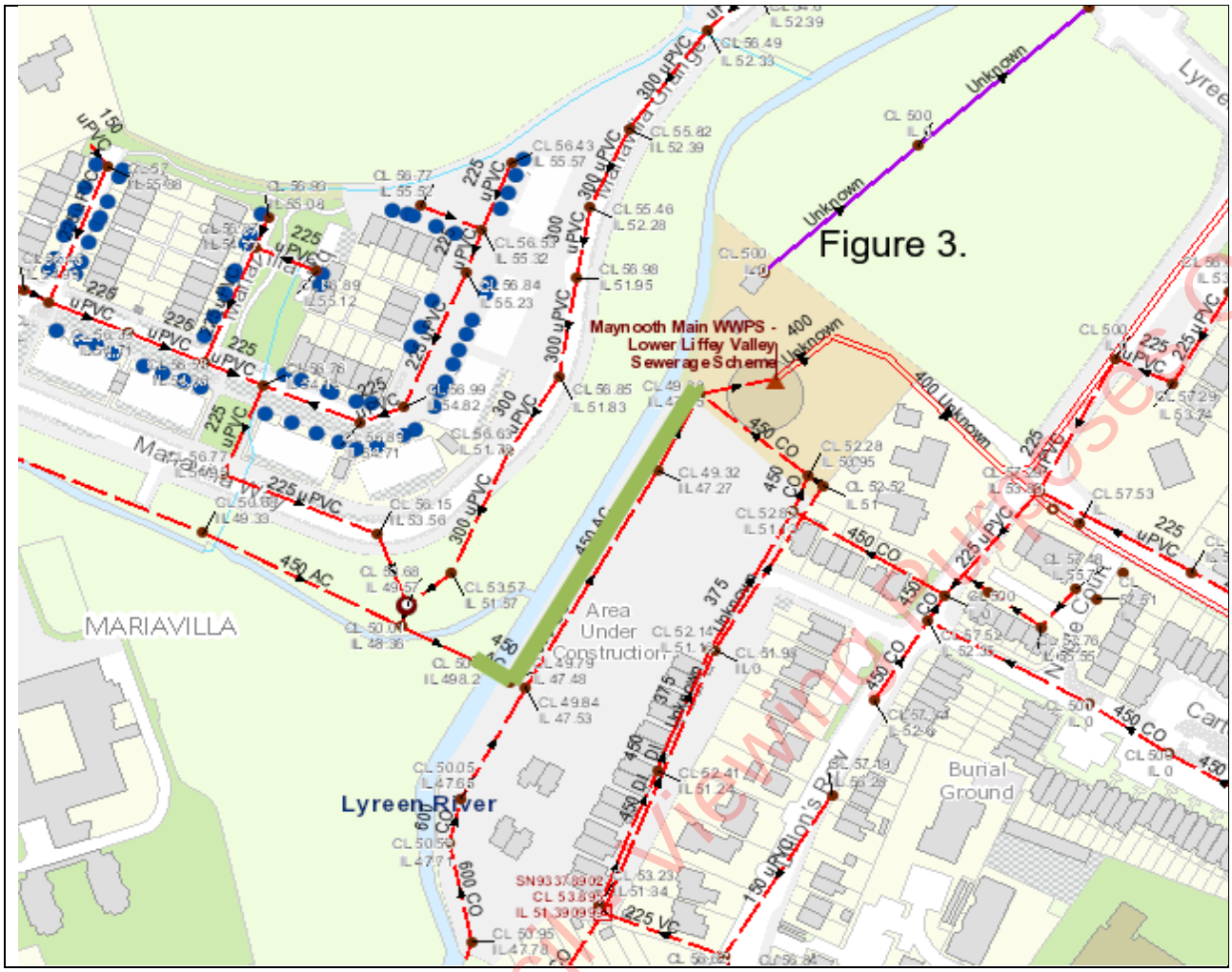
SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	There are water network capacity constraints in this catchment.
Wastewater Connection	There are wastewater network capacity constraints in this catchment.
SITE SPECIFIC COMMENTS	
Water Connection	In order to accommodate the proposed connection at this development, upgrade works are required to increase the capacity of the Irish Water network. Irish Water does not currently have any plans to carry out the works required to provide the necessary upgrade and capacity. Should you wish to have such upgrade works progressed, Irish Water will require you to provide a contribution of a relevant portion of the costs for the required upgrades, please contact Irish Water to discuss this further. 1. Connection main – Approx. 50m of new 250mm ID main to be laid to connect the site development (see yellow section below) to the new 300mm ID upgrade main. Connection main shown below (See green line in figure 1). 2. Trunk/Distribution main 1 – Approx. 950m of 300mm ID main to be laid to link connection main and new 350mm ID main (see red

	dashed line in figure 1). To service the lands a total of 3500m of 300mm ID main (seen as black line in figure 1) which links in with Mariavilla. 3. Trunk/Distribution main 2 – Approx. 1400m of new 350mm ID main to be laid to link new 300mm ID TM 1 and the existing 400mm AC main together. 4. Onsite storage required for commercial units, 24-hour storage at ADPW demand, storage units must also be able to be refilled from empty within 12-hour period IW currently have a project 'Maynooth East Ring Road' which is currently at design stage and on our current investment plan consisting of approx. 1400m of 350mm ID main (shown below (black dashed line in figure 2) and will be carried out in conjunction with Kildare County Councils 'Maynooth Eastern Ring Road' project.
Wastewater Connection	In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Maynooth Wastewater Pump Station and Rising Main. Irish Water currently has a project on our current investment plan which will provide the necessary upgrade and capacity. This upgrade project is currently scheduled to be completed by Q4 2025 (this may be subject to change, as planning has yet to be granted in both Kildare and Meath and the appropriate consents for the project). The addition discharge would cause a back up of flows in the existing gravity network entering the pump station. Upgrade works would be required to increase the capacity of the wastewater network (upgrade of approx. 175m of network directly upstream of the Pump Station). Irish Water are currently reviewing these works which are not currently on the Capital Investment Plan. Please contact Irish Water to discuss this further. Where a connection is proposed in advance of the delivery of strategic solutions in this area, Irish water are willing to review Storm Sewer Separation proposals (from the combined network) in the Maynooth area, in order to provide additional wastewater capacity. This would require co-operation and agreement from Kildare County Council, as the storm drainage authority. Further measures are currently being investigated by Irish Water in this area via the Capital Maintenance Programme, including: - identifying and repairing areas of infiltration - control of pumping stations in the catchment - increasing local storage in the area
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

The map included below outlines the current Irish Water infrastructure adjacent to your site:







Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

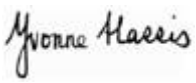
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.

4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Paul Lowry from the design team on 018230377 or email paullowr@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



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