PUNCH
consulting engineers

Link Road to Clonlara Road, Baldonnell Business Park, Dublin 22.

Engineering Planning Report

212126-PUNCH-XX-XX-RP-C-001

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Document Control

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C01	Planning issue	1/6/2022	JP Murray	M Richardson	M Richardson

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1 Introduction

This report was prepared to accompany a planning application for the proposed Link Road to Clonlara Road, Baldonnell Business Park, Dublin 22. This report deals specifically with the surface water drainage, foul water drainage, watermain design and roads design for the planning application. This report has been prepared with reference to the "Greater Dublin Regional Code of Practice for Drainage Works", "Greater Dublin Strategic Drainage Study" and the "Irish Water Code of Practice for Wastewater Infrastructure".

The subject site has an area of approximately 0.083 Ha and the proposed road is circa 54m long. The proposed site is located on agricultural lands. It is bounded by existing and under construction logistics/warehouse developments to the north and east, and agricultural/ongoing construction works to the west and south. The River Camac flows parallel to the proposed road. The topography of the site is relatively flat.

Access to the development will be via the existing private road (Clonlara Road) within the Baldonnell Business Park.

The site location is shown in Figure 1-1 below.

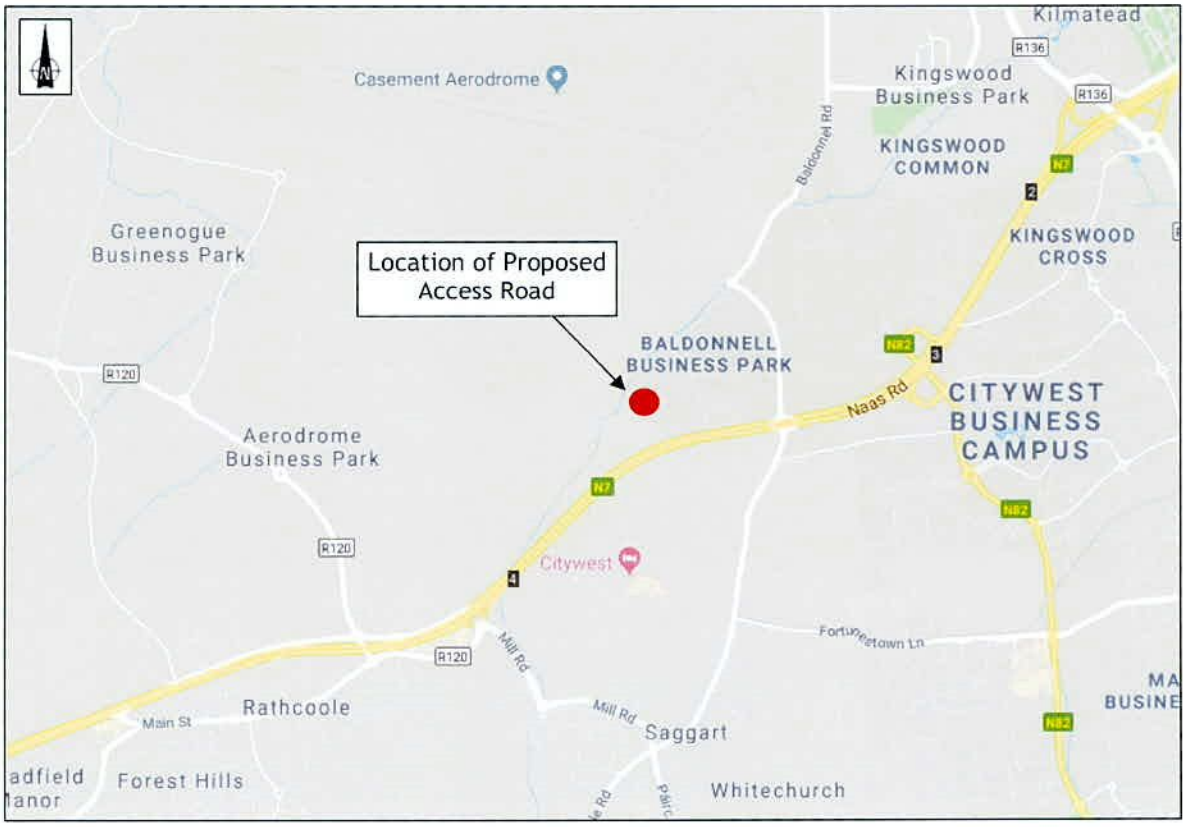

Figure 1-1: Site Location of the Proposed Development (© Google maps)

1.1 Proposed Development

The proposed development consists of the construction of a single carriage circa 54m long 2-way access road and footpath, along with foul and surface water sewer networks which will serve future developments located to the southwest of the ongoing development.

The proposed works are outlined in a series of engineering drawings prepared by PUNCH Consulting Engineers as well as landscape drawings produced by CSR Landscape Architects. This documentation is supplied as part of the planning documentation.

2 Stormwater Drainage Design

2.1 Existing Stormwater Drainage

2.1.1 Public Surface Water Sewerage

Record and survey drawings provided indicate no public surface water drainage adjacent to or within the development site. Please refer to Irish Water existing records in Appendix A.

The River Camac flows alongside to the proposed road on the northern side.

2.2 Proposed Stormwater Drainage

The proposed surface water drainage system has been designed using Causeway Flow software in accordance with the Department of Environment and Local Government's guidance document "Recommendations for Site Development Works for Housing Areas", with guidance taken from the "Greater Dublin Strategic Drainage Study" (GDSDS) and the South Dublin County Council Development Plan.

A new surface water sewer network shall be provided for the proposed road and path which will be entirely separated from any foul water sewer network. All surface water run-off from hardstanding areas are designed to be collected by a gravity pipe network and will discharge to the River Camac north of the road. Please refer to PUNCH drawings illustrating the proposed stormwater drainage arrangement. refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0100

Attenuation is proposed through the use of oversized pipes for the small scale network proposed.

The proposed network will discharge stormwater from the road and pathway into the River Camac via a headwall. A manhole will be located prior to the headwall with a hydraulic vortex flow controller (e.g. Hydrobrake) to limit outflow.

The proposed stormwater sewers have been designed using Causeway Flow software. Table 2-1 describes the stormwater drainage design parameters used and detailed calculations are enclosed in Appendix B.

Inland Fisheries Ireland have been consulted with regard to the design, and have provided positive feedback. Please refer correspondence in Appendix D.

Please refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0100 for drainage design.

Description	Value
Total Impervious Site area drained by new network	0.083 Ha (road and footpath)
Return period target	Pipe Design 1 in 5 year. Network Design 1 in 30 year + CC. Check 1 in 100 year + CC for flooding.
Climate Change	20%
M5-60	18.7
Ratio R	0.271
SOIL type	4 (clayey)
Soil value	0.45
SAAR	808mm
Flow reduction parameter	2 l/s
Qbar value per hectare	0.5 l/s
Controlled Outflow	2 l/s
Flow restriction method	Hydraulic vortex flow controller
Attenuation Storage Volume	Pipe storage volume
Infiltration Rate	N/A

Table 2-1: Stormwater Drainage Design Parameters

2.2.1 Causeway Flow Modelling - General

The proposed surface water drainage system has been designed using Causeway Flow software in accordance with the Department of Environment and Local Government's guidance document "Recommendations for Site Development Works for Housing Areas", with guidance taken from the "Greater Dublin Strategic Drainage Study" (GDSDS) and the South Dublin County Council Development Plan.

The model has analysed a range of storms at the 1% AEP (1 in 100-year return period storm), with a 20% additional rainfall to allow for climate change.

The network has been modelled with the associated vortex flow controller (e.g. Hydrobrake) outlet included. Attenuation is provided solely by the oversized pipes and manholes in the proposed network.

No separate attenuation tank is included. Causeway includes a design setting called "additional storage". This is included in the software to account for storage volume in the network provided by secondary drainage including access junctions, inspection chambers, service connections etc.

Depths of water in the network model (including pipework, manholes, the attenuation tanks and vortex flow controllers) have been assessed for surcharging and flood risk. The model is established such that a flood risk is identified in the model results if the water rises to within 300mm of the cover level. If the water level rises to a level below this, it is identified as a surcharge within the model results. It is important to note that this warning is given related to proposed ground level at the node (not adjacent floor level).

Please refer to detailed Causeway calculations (inputs and outputs) enclosed in Appendix B for details.

2.2.2 Causeway Flow - Area Contribution

Causeway flow does not allow for different surfaces to contribute to the drainage network at different runoff rates. Thus the road and pathway are combined as one single contributing impervious area. The area is approximately 0.083 ha.

Only the proposed new road area is to be drained by the proposed surface water network. Existing road areas being modified slightly with road marking do not contribute to the proposed new surface water drainage network, and are serviced separately by existing networks.

Please refer to PUNCH drawing 212126-PUN-XX-XX-DR-C-0150 for extent of new proposed impervious asphalt and footpath areas along the new road extension.

2.2.3 Rainfall Data

A value for the SAAR for the site has been obtained from the Met Éireann website. The SAAR value used was 808mm.

The following rainfall parameters have been utilised in the Causeway Flow model: M5-60 of 18.7mm and a Ratio (R) of 0.271. These figures have been taken from Met Éireann Rainfall Data, refer to Appendix B for rainfall data sheet.

2.2.4 Geotechnical & Soils

The GSI quaternary map was reviewed and an extract from this map is shown in Figure 6. This indicates the area to be 'Till derived from limestones.'

Based on the above, a soil value of 4 (soil index = 0.45) was used for the design which characteristics the soil as 'Clayey, poorly drained'.

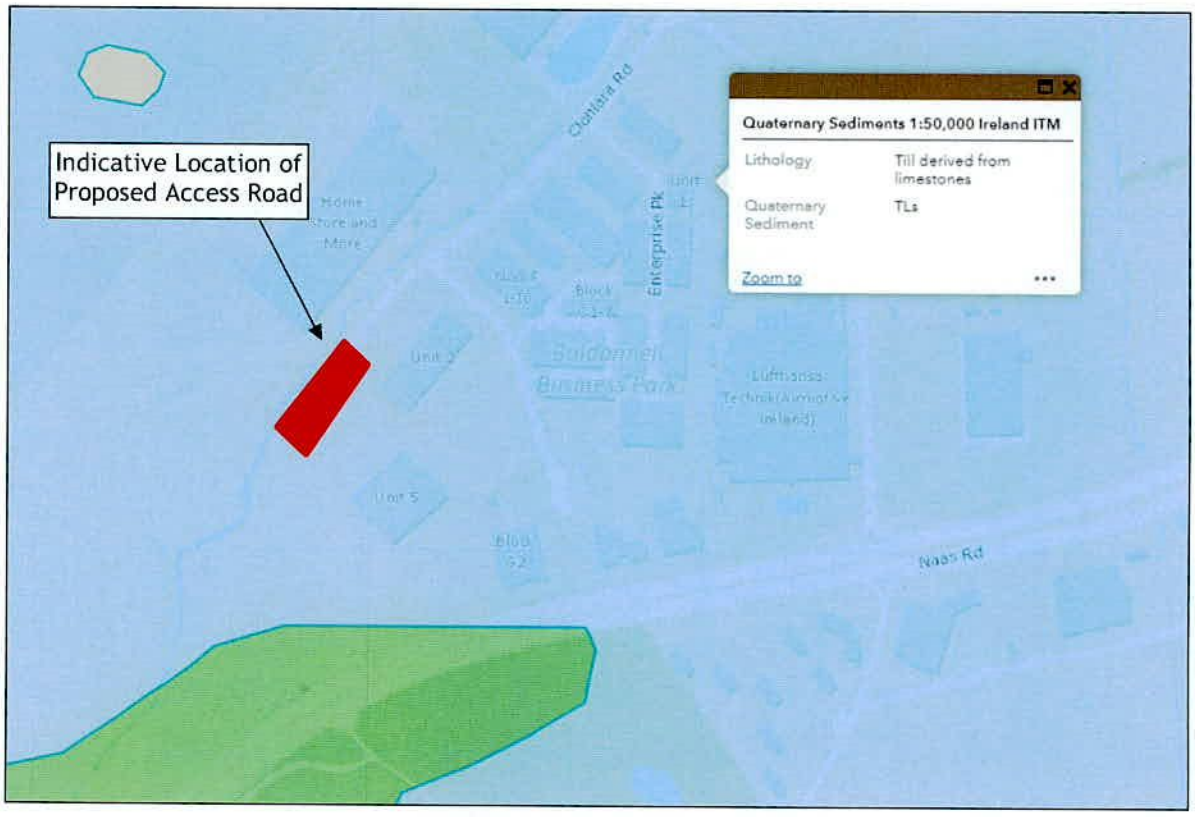

Figure 2-1: Extract from GSI Quaternary Map

2.2.5 Qbar Calculation

The following values have been used to calculate Qbar:

- SAAR = 808 mm (refer to section 2.2.3)
- SOIL = 0.45 (refer to section 2.2.4)
- Area of Site = 0.083 ha (refer to section 2.2.2)

To establish Qbar for a site less than 50 ha, Qbar for 50 ha is calculated, and then proportionately reduced to the actual site area.

Refer below for Qbar calculation:

Qbar for 50Ha:

$$Qbar\ (50Ha) = 0.00108xAREA^{0.89}SAAR^{1.17}SOIL^{2.17}$$

$$Qbar\ (50Ha) = 0.00108x0.50^{0.89}808^{1.17}0.45^{2.17} = 259.81l/s$$

Qbar per Hectare:

Proportionate Qbar for 10,000m²:

$$Qbar\ (site) = \frac{Qbar(50Ha)xSite\ area}{50{,}000}$$

$$Qbar\ (site) = \frac{259.81x10{,}000}{500{,}000} = 5.20\ l/s$$

This results in a Qbar value of 5.20 l/s/Ha

Qbar for Impervious Catchment

Proportionate Qbar for 830m^2:

$$Qbar\ (site) = \frac{Qbar(50Ha)xSite\ area}{500{,}000}$$

$$Qbar\ (site) = \frac{259.81x830}{500{,}000} = l/s$$

This results in a Qbar value of 0.5 l/s

This excessively low Qbar would result in increased risk of blockage at the flow control. As a result, it is proposed to limit the surface water discharge to 2l/s only.

2.2.6 Attenuation and Flow Control

It is proposed to attenuate all surface water runoff from impervious areas (i.e.. road and pathway) using the storage capacity within oversized pipes and manholes. The outlet flow will be controlled by a vortex flow controller. Allowance has been made for flood levels at the discharge outlet as advised by the flood risk consultant, RPS. The location of discharge corresponds closely to RPS flood model BAL_23 level of 97.453, and this level has been taken at the headwall discharge.

The storage has been sized to attenuate the 1:100-year return period storm event, plus 20% climate change. The storage has been modelled as part of a stormwater drainage network system in Causeway Flow with its discharge limited by a vortex flow controller. As the site covers a very small area, Qbar is very small. The vortex flow controller would require a very small opening in order to limit the discharge rate to the value of Qbar. This is likely to cause issues of blockages occurring.

It is proposed to limit the discharge to the existing river to 2.0l/s.

Please refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0100 for drainage design. Please refer documentation provided by RPS for all flood assessments.

2.3 SUDs Proposals

In summary, the proposed SuDS systems for the site comprise:

- External on grade soft landscape areas
- Landscaped swale alongside road

SUDS measures proposed as part of this development have been designed taking guidance from CIRIA Publications C644 - "Building Greener" and Ciria C697 - "The SUDS Manual". Reference is also made to the recently released South Dublin County Council 'Sustainable Drainage explanatory design and Evaluation Guide, 2022.'

Please see PUNCH drawing 212126-PUN-XX-XX-DR-C-0150 for the SUDS plan.

2.3.1 Proposed Landscaping

A significant area of the site will have landscaping. This will be a mix of proposed and existing landscape areas with some large existing trees retained.

Landscaping adjacent to the river will indirectly take surface water by evapotranspiration. Please refer to landscape documentation for details.

2.3.2 Swale Landscape Areas

The majority of the development is to discharge to a proposed swale area adjacent to the proposed new road. At low flow situations, the majority of runoff will remain within the soil along the bottom of the swale and will be treated. Surface water treatment in this situation is provided primarily by evapotranspiration.

The swales are proposed to be grassed.

Any high flow surface water would build up and discharge to proposed gullies within the swales.

Surface water is discharged to the swale using a beany kerb combined kerb and drainage system (or equivalent) with swale discharge headwall outlets connecting to the swale.

Please see PUNCH drawing 212126-PUN-XX-XX-DR-C-0150 for the SUDS plan. Please refer to landscape documentation for detail so f proposed planting.

2.3.3 SUDS Pillars

The design will implement the four Sustainable urban Drainage pillars as summarised below

Water Quantity

Surface water quantity is attenuated by the provision of oversized drainage pipes.

Water Quality

Short term duration storms are treated within the grassed swale by evapotranspiration, improving water **quality**

Amenity

The proposed landscaping including trees will provide an amenity to the development. Please refer to landscape documentation for planting details.

Biodiversity

The proposed landscape design will provide a biodiversity benefit. The various natural plants that will grow in the swalw will also provide for biodiversity. Please refer to landscape documentation for planting details.

3 Foul Water Drainage Design

3.1 Existing Foul Water Drainage

Based on available Irish Water and site survey records, the following public foul water drainage exists:

- A 675mm diameter foul sewer on the opposite side of the River Camac to the north, continuing north eastward .
- A 225mm diameter connection towards the proposed site as indicated on a Roghan O'Donovan (ROD) records.

Please refer to Appendix A for Irish Water Record Drawings and Roghan O'Donovan record drawings illustrating the existing foul water drainage arrangement. An extract from the Irish Water drawing is shown in Figure 3-1. An extract from the site records by Roghan O'Donovan is shown in .

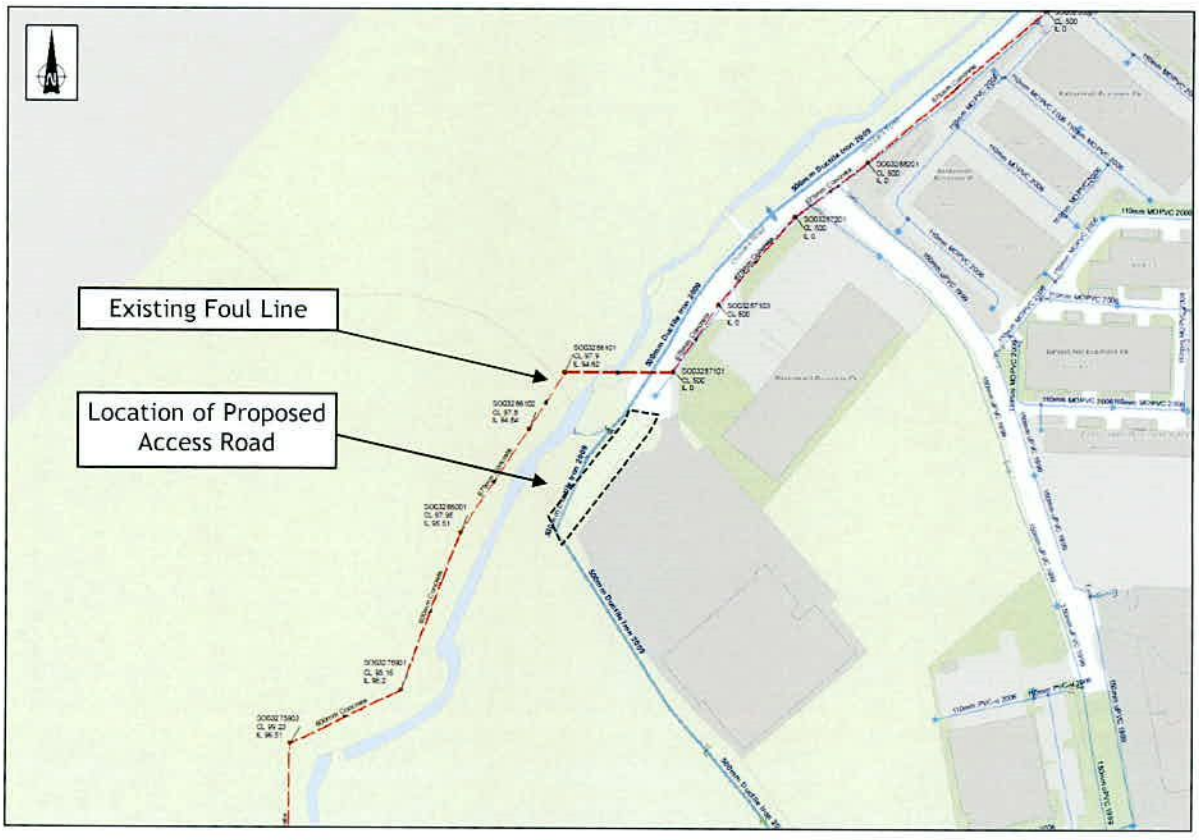

Figure 3-1: Existing foul drainage surrounding the site (Extract from Irish Water records)

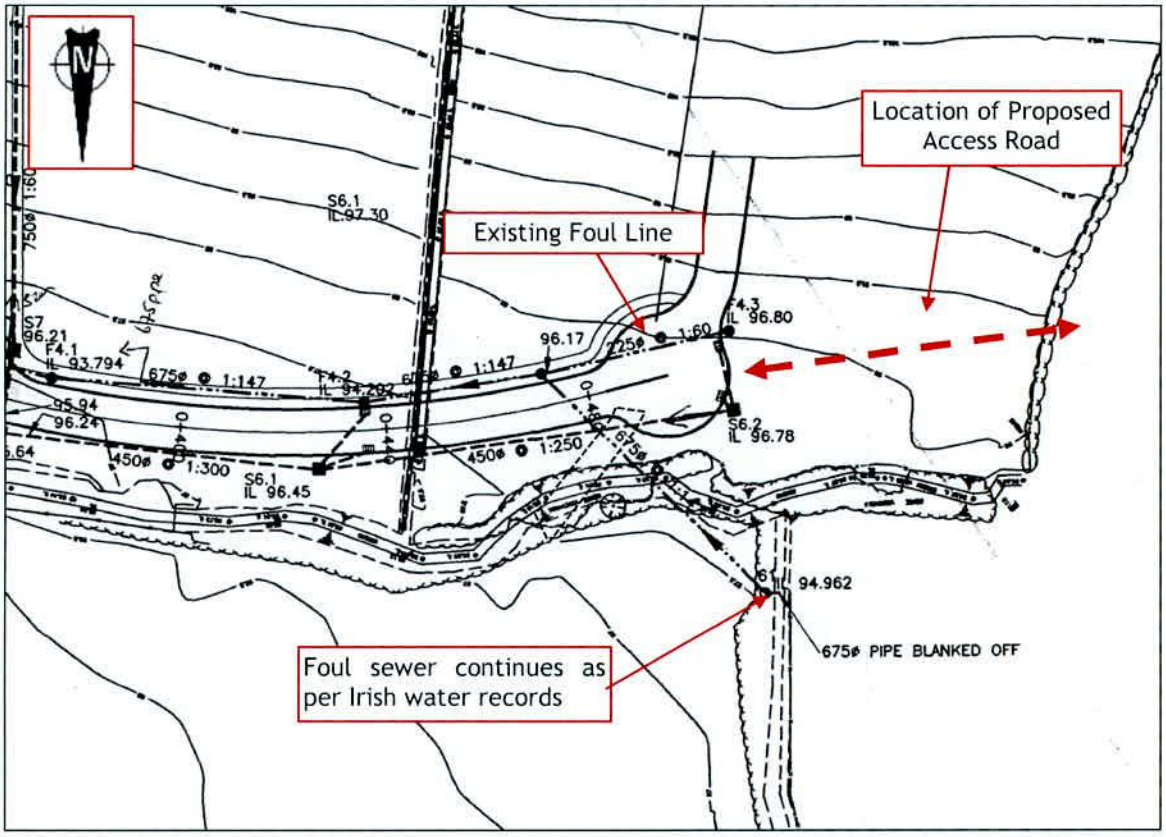

Figure 3-2: Existing foul drainage surrounding the site (Extract from ROD Site Survey)

3.2 Proposed Foul Water Drainage

Foul water drainage design is provided for the portion of the site for which a planning application is to be applied for, as outlined in the introduction above.

It is proposed to provide a new 150mm diameter gravity drainage sewer to facilitate future development. The new foul sewer will not be connected to the existing network. The design will permit a future connection to development at the upstream end and future connection to discharge at the downstream end. The downstream end will be directly adjacent to the existing manhole at the upstream end of the existing 225mm diameter foul sewer. The design will facilitate a soffit to soffit connection.

Foul water drainage has been designed with reference to the following documentation:

- *"Recommendations for Site Development Works for Housing Areas"* published by DOE
- *"Code of Practice for Wastewater Infrastructure"* published by *Irish Water - particularly Appendix D - Wastewater Flow Rates for Design*
- *"Greater Dublin Regional Code of Practice for Drainage Works"*
- *"Design Recommendations for Multi-storey and Underground Car Parks"* published by the Institution of Structural Engineers.

The exact arrangement of foul drainage constructed may not match exactly the arrangement proposed at planning, however the principles will be implemented.

The following wastewater characteristics have been taken:

- 150mm diameter
- 1:100 gradient

A pre connection application has been made to Irish Water for the proposed development. Please refer to Appendix D for the confirmation of feasibility.

Please refer to PUNCH drawing 212126-PUN-XX-XX-DR-C-0100 illustrating the proposed foul water drainage arrangement.

4 Watermain Design

4.1 Existing Watermain

4.1.1 Existing Public Water Infrastructure

The following existing Irish Water public watermain exists adjacent to the development:

- A 500 mm diameter DI watermain, which cuts centrally through the site
- An existing 200mm watermain directly to the north east

Please refer to Appendix A for Irish Water Record Drawings as well as Roghan O Donavan records illustrating the existing watermain arrangement in the area. An extract is shown in above.

4.1.2 Existing On site, Private Water Infrastructure

There is no existing on-site private water infrastructure.

4.2 Proposed Watermain

4.2.1 General

Water demands are developed on the basis of foul water demands. Design has been developed with reference to the following documentation:

- *"Recommendations for Site Development Works for Housing Areas"* published by DOE
- *"Code of Practice for Wastewater Infrastructure"* published by *Irish Water - particularly Appendix D - Wastewater Flow Rates for Design*
- *"Code of Practice for Water Infrastructure"* published by *Irish Water - particularly Appendix D - Wastewater Flow Rates for Design*

A pre connection application has been made to Irish Water for the proposed development. Please refer to Appendix D for the confirmation of feasibility.

4.2.2 Proposed Water Supply Network

A 200mm watermain is proposed to enable a future water supply connection to future development south of the new access road. It is not proposed to connect the proposed development to the existing 200mm diameter watermain located at the roundabout on Clonlara Road. Once a future development is understood, the connection would be applied for.

Please refer to PUNCH drawing 212126-PUN-XX-XX-DR-C-0100 illustrating the proposed watermain.

5 Roads and Access

5.1 Proposed Roads & Access

5.1.1 General

The proposed access road consists of a single carriage 2-way access road, and footpath on one side. There are dropped kerbs for pedestrians at the northern (roundabout) side. The road terminates at the red line boundary. Any existing kerbs and footpaths will be removed prior to construction.

The proposed roads layout was designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) and the Recommendations for Site Development Works.

5.1.2 Sightlines and Autotrack Demonstrations

Sight lines at all/main junctions were designed in accordance with DMURS based on existing speed limits on the main road.

Autotrack assessments were carried out on the proposed road network and demonstrate that a fire tender can safely negotiate the proposed road network and turning heads.

5.1.3 Road Safety Audit

A Road Safety Audit has been undertaken for the road design, and comments provided have been incorporated into the design. Refer to Road Safety Audit provided by Bruton and Associates.

The comments identified as well as how each have been addressed are summarised below:

Item reference section in Audit	Summary Description	Means of Resolving
3.1	Gully ponding at crossing points	Gullies provided upstream of pedestrian crossings
3.2	Opposing tactile paving alignment	Opposing tactile paving aligned to each other
3.3	Yield signs omitted	Yield signs added
3.4	Inadequate space for truck at Caulfield Access to allow vehicles to pass	Increased space provided for truck to wait and allow vehicles to pass

Table 5-1: Road Safety Audit responses

5.1.4 Interim design

The proposed road is a dead end to service a future development site. To address the interim situation where the land is not developed, delineator bollards are proposed along the road edge.

Please refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0403

5.1.5 Drawing References

Please refer to PUNCH drawing 212126-PUN-XX-XX-DR-C-0400, 212126-PUN-XX-XX-DR-C-0401. 212126-PUN-XX-XX-DR-C-0402 for a detail layout of the proposed road arrangement.

Please refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0600, 212126-PUN-XX-XX-DR-C-0601 for autotrack drawings.

Please refer PUNCH drawing 212126-PUN-XX-XX-DR-C-0624 and 212126-PUN-XX-XX-DR-C-0625 for sightline drawings

Appendix A Existing Record Drawings