



Engineering Assessment Report

Proposed Large-Scale Residential Development (LRD) at Old Slane Road, Mell/Tullyallen, Drogheda, Co. Louth

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This document has been prepared and checked in accordance with
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- A. Uisce Éireann Confirmation of Feasibility Letter
- B. Greenfield Run-off Rate and Attenuation Calculations for Proposed Site
- C. Quality Audit

1. Introduction

1.1 Context

This Engineering Assessment Report has been prepared by Waterman Moylan as part of the documentation in support of a planning application for a proposed residential development located off the Slane Road, east of Drogheda, in Mell/Tullyallen, Drogheda, Co. Louth. This application is for Phase 3 of a 3-Phase development. Phase 1 is completed and occupied (reference no. ABP-311678-21), and Phase 2 is under construction under planning reference no. 24/60266.

This report assesses wastewater and surface water drainage, water supply infrastructure, and the road and transportation network in the vicinity of the site, and details the criteria used to design the proposed wastewater and surface water drainage, water supply, and transport networks to serve the development.

1.2 Site Location and Description

The subject site is located in Mell/Tullyallen, Drogheda, Co. Louth. The site location is indicated on Figure 1 below:



Figure 1 | Site Location (Source: Google Maps)

Topographic survey data indicates that the site falls generally from north-west to south-east, with a high point of approximately 21.48m OD Malin at the north-west corner of the site and a low point of approximately 17.37m OD Malin at the south-east of the site. There is a stream flowing in a southerly direction approximately 126m from the eastern boundary of the site, draining land to the north and crossing under

the R168 Road. The stream crosses the Slane Road at Dry Bridge, discharging into the Boyne River approximately 650m south of the site.

In the Louth County Development Plan 2021-2027, the subject site is zoned “A2 New Residential”, as shown in the extract below:

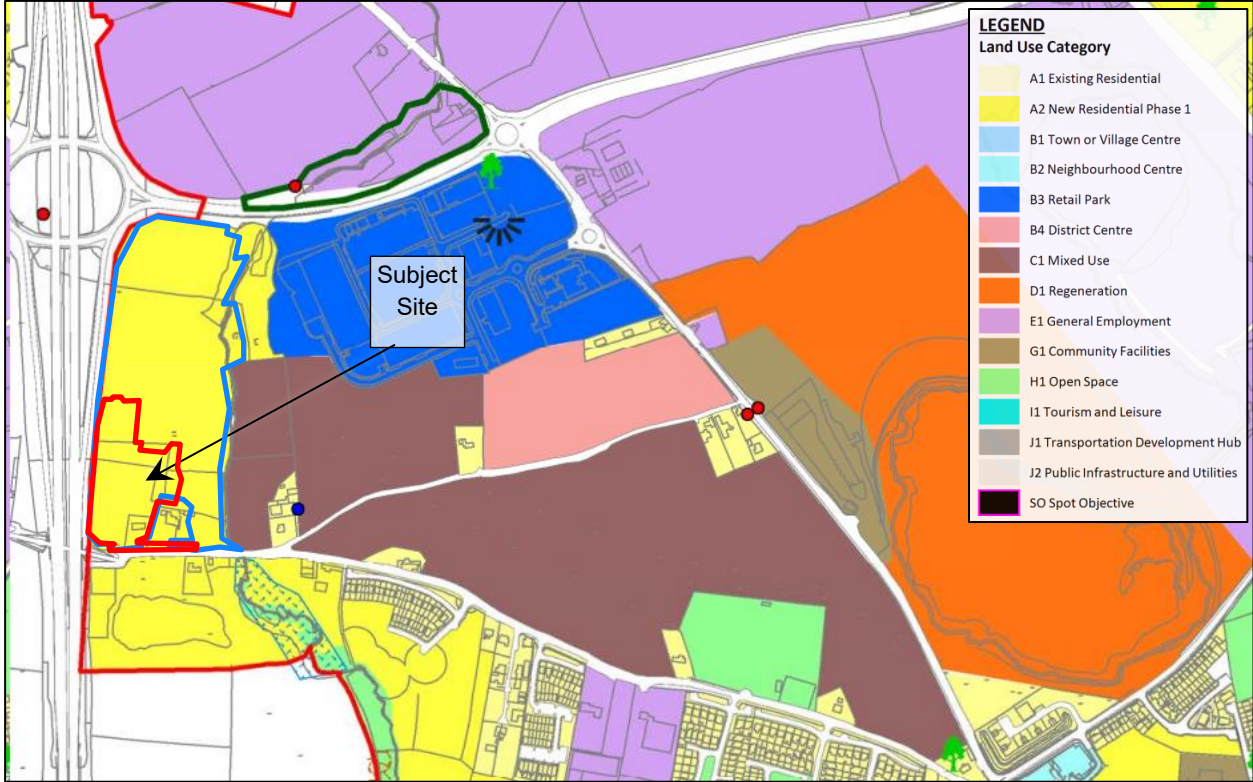


Figure 2 | Louth Development Plan Zoning Map

1.3 Proposed Development

Lagan Homes Tullyallen Ltd intend to make a planning application for planning permission to modify a permitted Strategic Housing Development (SHD) ABP-311678-21 (as amended by P.A.Ref. 2360368 and P.A.Ref. 2460266) known as Gort Mell by way of a planning application for a large scale residential development (LRD) permission at Old Slane Road and R168, Mell/Tullyallen, Drogheda, Co.Louth.

The proposed development will consist of alterations to the permitted SHD known as Gort Mell including change of house types, relocation of permitted ESB substation, relocation of public open space, alterations to drainage network design and levels and the construction of 47no. additional dwellings (5no. 1-bed, 16no. 2-bed, 23no. 3-bed and 3no. 4-bed) with a new vehicular entrance onto Old Slane Road together with all associated site development works, public lighting, public open space, car parking, roads and footpaths. Works proposed on Old Slane Road include the provision of a roundabout for future bus turning and a bus stop. The proposed modifications to the permitted SHD will increase the number of units from 237no. as permitted (21no. 1-bed, 49no. 2-bed, 142no. 3-bed and 25no. 4-bed) to 284no. in total (26no. 1-bed, 65no. 2-bed, 165no. 3-bed, 28no. 4-bed).

It is proposed to redirect surface water and foul water from 28 no. units within the permitted Phase 2, to drain through Phase 3 – this route better aligns with the existing topography, reducing the required depth of drainage.

The schedule of accommodation is set out in the Table below:

Description	1-Bed Houses	2-Bed Duplexes	2-Bed Houses	3-Bed Houses	4-Bed Houses	Total No. of Residential Units
Proposed Development	5	5	11	23	3	47
Total	5	5	11	23	3	47

Table 1 | Schedule of Accommodation

The site will accommodate car parking spaces, bicycle parking spaces, storage, services and plant areas, and landscaping. The proposed application includes all site landscaping works, substations, boundary treatments, lighting, servicing, signage, and associated and ancillary works, including site development works and services above and below ground. The application site also includes part of the Old Slane Road to facilitate a roundabout on the west-end of Old Slane Road for future bus turning and terminus, as requested by Louth County Council (LCC) during the Stage 1 Pre-planning meeting and the construction of a 225mm storm water sewer and 225mm foul water sewer which will connect to existing manholes to the east built under Phase 1.

The application site also incorporates feedback from the Stage 2 pre-planning meeting, and a response to the engineering items in Louth County Council's Stage 2 Opinion Report accompanies this submission under separate cover.

2. Foul Water Network

2.1 Existing Foul Water Network

Uisce Éireann records for the surrounding area have been consulted as part of this assessment, and are extracted below:

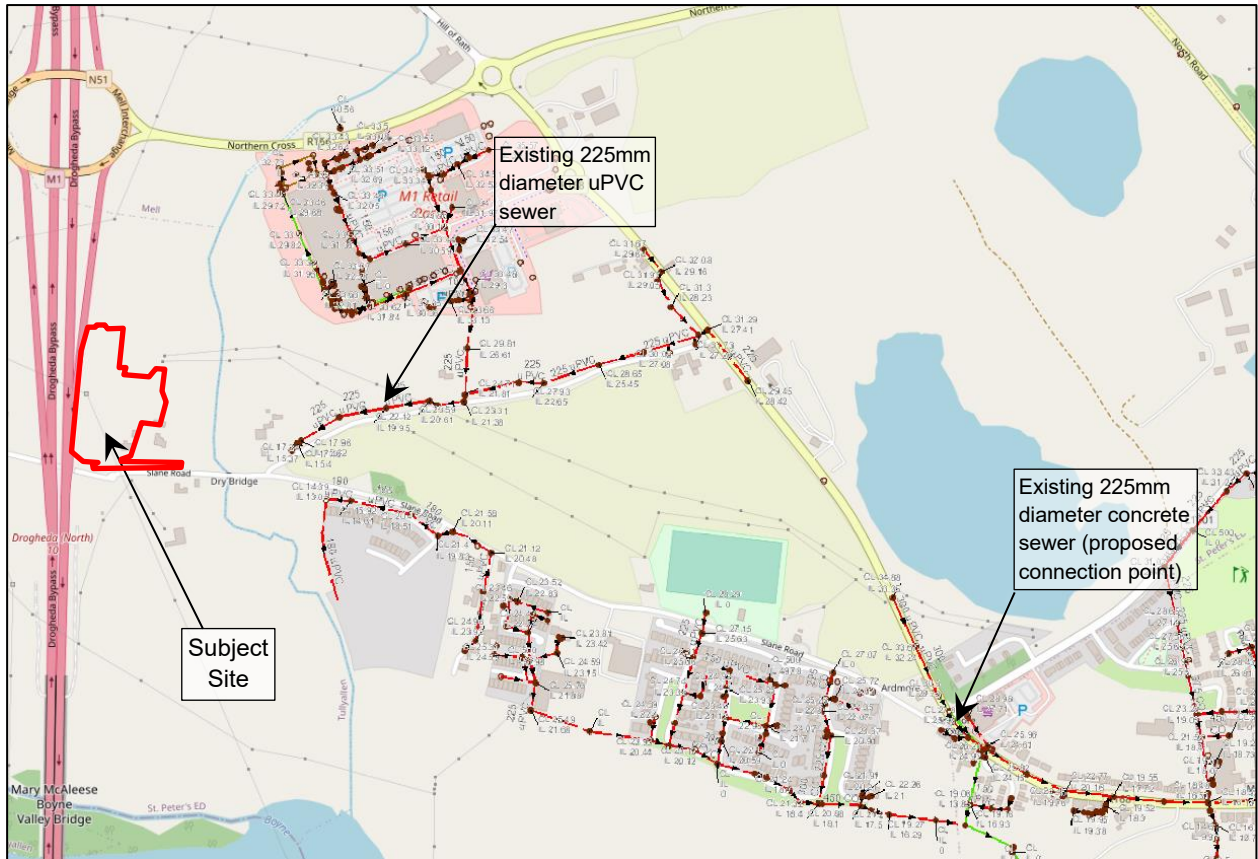


Figure 3 | Extract of Uisce Éireann's Wastewater Drainage Records

There is an existing 225mm diameter concrete sewer located approximately 800m east of the subject site. There are other foul water sewers serving developments to the south of the Old Slane Road and serving the M1 Retail Park. However, Uisce Éireann have confirmed that there is insufficient capacity in these networks to cater to the subject development.

2.2 New and Permitted Foul Water Network

Under Phase 1 of the development, a new pumping station and 24-hour storage tank was constructed at the low point of the site at the south-east of the Applicant's lands. From here, wastewater is pumped to the existing 225mm diameter concrete sewer. The invert level of the rising main leaving the pumping station is 8.4m OD Malin, and the invert level of the standoff manhole where the rising main terminates is 25.72m OD Malin.

The pumping station was designed and constructed to accommodate development of the entire site, including the subject Phase 3. Including the 47 no. dwellings proposed under the subject application, the total number of dwellings draining to the pumping station will be 284. The new pumping station includes a 24-hour storage tank with sufficient storage for this subject Phase 3.

2.3 Proposed Foul Water Network

It is proposed to drain wastewater from the site by gravity, through a series of 150mm and 225mm diameter drains, to the existing pumping station at the south-east of the site. As this is the low point of the site, this proposal allows for the drainage to discharge by gravity without resulting in excessive invert depths. Refer to the accompanying Drainage Layout drawing no. OSR-WMC-ZZ-GF-DR-C-4200.

It is proposed to drain foul water from 28 no. houses from the permitted adjacent Phase 2 development through the subject Phase 3 site. This ensures that the drainage from these units follows the existing topography of the site, and avoids excessively deep manholes. The drainage network for Phase 3 has been designed to accommodate flows from these units, and the existing pumping station was designed to accommodate the entirety of the development for all three phases.

Uisce Éireann will ultimately decide on the feasibility of the existing wastewater infrastructure to cater for the proposed development. In this regard, a Pre-Connection Enquiry was submitted to Uisce Éireann, and a Confirmation of Feasibility letter was received, dated 3 July 2025 (reference no. CDS25002896). The letter notes that connection to the wastewater network is feasible without the need for upgrades. A copy of the Confirmation of Feasibility letter is included in Appendix A.

2.4 Foul Water Drainage Calculations

The calculated foul water flows at the subject development are set out in the Table below. Domestic wastewater loads have been calculated based on 2.7 persons per unit with a per capita wastewater flow of 150 litres per head per day along with a 10% unit-consumption allowance, in line with Section 3.6 of the Uisce Éireann Code of Practice for Wastewater Infrastructure. Note that the Uisce Éireann Code of Practice assumes 2.7 residents per unit regardless of the unit type. A peak flow multiplier of 6 has been used, as per Section 2.2.5 of Appendix B of the Code of Practice.

Description	Total Population	Load per Capita	Daily Load	Total DWF	Peak Flow
	No. People	l/day	l/day	l/s	l/s
Proposed Development (47 Units)	126.9	150	20,938.5	0.242	1.452
Total	126.9	150	20,938.5	0.242	1.452

Table 2 | Calculation of Total Foul Water Flow from the Development

The total dry weather flow from the development is 0.242l/s, with a peak flow of 1.452l/s.

2.5 Foul Water Drainage – General

Foul water sewers will be constructed strictly in accordance with Uisce Éireann requirements. No private drainage will be located within public areas.

Drains will be laid to comply with the requirements of the latest Building Regulations, and in accordance with the recommendations contained in the Technical Guidance Document H.

3. Surface Water Network

3.1 Existing Surface Water Network

The subject site is primarily a greenfield, with the construction site compound for Phases 1 and 2 located at the east of the Phase 3 lands. Topographic survey data indicates that the site falls generally from north-west to south-east, with a high point of approximately 21.48m OD Malin at the north-west corner of the site and a low point of approximately 17.37m OD Malin at the south-east of the site. The lands continue to fall towards the south-east beyond the redline and within the Phase 1 development.

There is a stream flowing in a southerly direction along the eastern boundary of the lands, to the east of Phases 1 and 2, draining the subject site and land to the north. The stream crosses under the R168 Road, crosses the Old Slane Road at Dry Bridge, before discharging into the Boyne River approximately 147m east of the site.

3.2 New and Permitted Surface Water Network

The permitted surface water network serving Phases 1 and 2 drains the site via a series of sewers, as part of two separate catchments. Each of the catchments is attenuated separately in attenuation tanks, both located in the open space at the east of the site. The permitted layout includes an outfall to the existing stream at the south-east of the site via a new headwall, with the discharge rate restricted by flow control devices to the greenfield equivalent runoff rate. Each catchment includes a Class 1 Petrol Interceptor at the outfall to protect the quality of the receiving waters.

The surface water sewer network for Phase 1 is completed. The drainage for Phase 2 is currently under construction, with the eastern portions of the site largely complete, including the attenuation.

3.3 Proposed Surface Water Network and SuDS Strategy

It is proposed to drain surface water through the site via a series of sewers, ultimately discharging to the existing stream via a new sewer constructed along Old Slane Road under the Phase 1 works to facilitate the subject development.

There are 2no. proposed catchments within Phase 3, with the first catchment covering the northern part of this subject site. It is proposed to drain surface water from 28 no. houses from the permitted adjacent Phase 2 development through the subject Phase 3 site. This ensures that the drainage from these units follows the existing topography of the site, and avoids excessively deep manholes. The drainage network for Phase 3 has been designed to accommodate flows from these units, and they are included within the northern attenuation catchment. This northern catchment will be attenuated in a detention basin in the north-western open space within the subject Phase 3 site. The southern catchment shall be attenuated in a detention basin in the south-eastern open space.

Following this, surface water will discharge to the existing stream via the outfall constructed along Old Slane Road as part of the Phase 1 works.

The discharge rate will be restricted to the greenfield equivalent runoff rate, as calculated in Section 3.4 below, by a Hydrobrake or similar approved flow control device. Excess flows over and above the greenfield runoff will be attenuated in the above ground detention basins. The attenuation has been designed to accommodate runoff volumes up to the 1-in-100-year storm, accounting for a 20% increase due to climate change.

3.4 Greenfield runoff rates

The Local Authority and National guidelines require post-development run-off rates to be limited to greenfield run-off rates for the site. The greenfield run-off rates for the site have been calculated in

accordance with the Institute of Hydrology report No 124 “Flood Estimation for Small Catchments”, using the UK SUDS Website for the catchment. Table 3, below, illustrates the Greenfield run-off for the catchment. Refer to Appendix B for the Greenfield runoff rate calculations.

Catchment	Total Catchment Area	Greenfield Runoff
Catchment 1: Northern Catchment (including 28 units from Phase 2)	1.159 Ha	2.47 l/s
Catchment 2: Southern Catchment	0.7514 Ha	1.6 l/s
Total	1.857 Ha	4.07 l/s

Table 3 | Greenfield runoff rates for the proposed site

3.5 Proposed SuDS Strategy

The proposed development is designed to incorporate best drainage practice. Section 3.6, below, sets out the methodology used in determining the existing greenfield runoff rates and calculating attenuation storage requirements for the site. The relevant calculations are included in full in Appendix B.

It is proposed to incorporate a Storm Water Management Plan through the use of various SuDS techniques to treat and minimise surface water runoff from the site. The methodology involved in developing a Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GSDSDS) and in the SuDS Manual (Ciria C753). Based on three key elements – Water Quantity, Water Quality and Amenity – the targets of the SuDS train concept have been implemented in the design, providing SuDS devices for Source Control, Site Control and Regional Control.

3.5.1 Source Control

Permeable Paving:

It is proposed to introduce permeable paving at private paved garden areas throughout the development. Downpipes from the houses will drain to filter drains beneath the permeable paving to facilitate maximum infiltration of surface water from roof areas. The goal of permeable paving is to control stormwater at the source to reduce runoff. In addition to reducing surface runoff, permeable paving has the dual benefit of improving water quality by trapping suspended solids and filtering pollutants in the substrata layers.

Filter Drains:

It is proposed to install filter drains, consisting of perforated pipes surrounded in filter stone, around the perimeter of the building and beneath the permeable paving parking spaces. The filter drains will provide infiltration, optimise the retention time and provide quality improvement to the storm water runoff, in particular the first flush from hardstanding areas. The proposed perforated pipes connect to the proposed surface water sewer network.

3.5.2 Site Control

Bioretention:

It is proposed to introduce some tree planting through the site, including roadside tree pits. Surface water runoff from the roads will drain to the tree pits before discharging to the below-ground surface water network.

Roads will have the most pollutants and it is appropriate to provide an at-source treatment SuDS technique to address this. The proposed tree pits will provide infiltration, optimise the retention time, and provide quality improvement to the storm water runoff, in particular the first flush from the roads. The tree pits will

include an underlying 225mm diameter perforated pipe surrounded in stone, which discharges to the main surface water network.

Trees can help control storm water runoff because their leaves, stems, and roots slow rain from reaching the ground and capture and store rainfall to be released later. Trees help to attenuate flows, trap silts and pollutants, promote infiltration and prevent erosion. Incorporating tree planting offers multiple benefits, including attractive planting features, improved air quality and increased biodiversity whilst helping to ensure adaptation to climate change.

3.5.3 Regional Control

Detention Basins Attenuation and Flow Control:

The attenuation storage required for the 1-in-100-year storm will be provided in above ground dry detention basins located in the open spaces at the western and south-eastern parts of the site. Flows will be controlled by a Hydrobrake or similar approved flow control device, limited to the greenfield equivalent runoff rate (as outlined in Section 3.4 above), with excess flows being attenuated in the basins before outfalling by gravity to the tributary stream to the east of the site.

3.5.4 Treatment Train Summary

The SuDS treatment train at the site includes open green spaces and permeable paving to slow and intercept rainwater. Tree pits will further slow and reduce the runoff rate, while providing treatment of runoff, particularly from the roads. The use of these SuDS measures will encourage infiltration of surface water into the ground, with rainwater from roads will be directed towards tree pits. During large storm events, there is a high-level overflow from these tree pits into an adjacent gully, which discharges to the below-ground sewer network.

After these SuDS devices, rainwater will make its way into the below ground sewer network, which includes perforated filter drains where appropriate beneath permeable paving. The runoff is restricted to the greenfield equivalent rate, and excess storm water above this rate is directed to the proposed above ground attenuation. As noted above, all other SuDS features described are upstream and will serve to slow and treat surface water runoff before it reaches the outfall to the existing stream.

3.6 Interception or Treatment Storage and Attenuation Storage

As noted above, the methodology involved in developing the Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS) and in the SuDS Manual (Ciria C753). Appendix E of the Greater Dublin Strategic Drainage Study (GDSDS) sets out criteria for determining the provision of interception or treatment storage, attenuation storage and long-term storage at a development site. These calculations are included in full in Appendix B and are summarised below:

3.6.1 Criterion 1: River Water Quality Protection

The Greater Dublin Strategic Drainage Study (GDSDS) states that approximately 30% to 40% of rainfall events are sufficiently small that there is no measurable runoff from greenfield areas into the receiving waters. These events are generally considered as the first 5mm of rainfall. Assuming 80% runoff from paved surfaces and 0% from pervious surfaces for the first 5mm of rainfall yields the following:

Catchment 1	Paved surfaces connected to drainage system	$11,592.37m^2 \times 0.6596 \times 1 =$ $7,646.33m^2$	<i>11,592m² site area</i> <i>66% of the site is paved</i> <i>100% of the paved area</i>
	Volume of Interception Storage	$7,646.33m^2 \times 5mm \times 0.8 =$ 30.59m³	<i>Paved area directly drained</i> <i>5mm rainfall depth</i> <i>80% paved runoff factor</i>
Catchment 2	Paved surfaces connected to drainage system	$7,495.42m^2 \times 0.5381 \times 1 =$ $4,033.29m^2$	<i>7,495m² site area</i> <i>54% of the site is paved</i> <i>100% of the paved area</i>
	Volume of Interception Storage	$4,033.29m^2 \times 5mm \times 0.8 =$ 16.13m³	<i>Paved area directly drained</i> <i>5mm rainfall depth</i> <i>80% paved runoff factor</i>

Table 4 | Interception Calculation

Table 24.6 of the SuDS Manual (Ciria 753) states that permeable paving can intercept rainfall from an impermeable contributing area up to 2 times the permeable pavement area.

There is approximately 1,566.2m² of permeable paving proposed, with a contributing area of 3030.2m² draining to permeable paving. The impermeable areas draining to permeable paving comprise less than 2 times the area of permeable paving, thus meeting the requirements set out in Table 24.6.

The remainder of the site drains to softscape, including grassed/planted areas and tree pits, with more than 38% of the drained area softscape. As per Table 24.6, bioretention components can be assumed to comply with interception requirements where the impermeable surface area is less than 5 times the vegetated surface area receiving the runoff.

3.6.2 Criterion 2: River Regime Protection

Attenuation storage is provided to limit the discharge rate from the site into the public network. The total impermeable area of the catchment including roads, car-parking and roofs, is approximately 1.13 Ha, and the peak outflow will be limited to 4.1l/s in the 1 in 100-year event. In order to calculate the positively drained areas to reach the surface water network and ultimately the detention basins, the following runoff coefficients have been applied:

- Roofs CV: 100%
- Permeable Paving Parking Spaces, CV: 90%
- Roads, Footpaths, CV: 90%
- Back Garden, CV: 30%

There are 2no. proposed catchments, with the first catchment covering the northern part of this subject inclusive of the 28no. houses from the permitted Phase 2 development and the road section that these houses fall onto, in addition to the houses in the northern half of this subject Phase 3 site. This first catchment will be attenuated in the first detention basin in the western part of this subject Phase 3 site, with the second catchment being attenuated in the detention basin in the south-eastern open space near the site entrance.

Based on these calculations, the 1-in-100-year 24-hour winter storm is the critical storm for Catchment 1, with a required attenuation storage volume of 506.9m³. This volume is sufficient for the 1-in-100-year storm, accounting for a 20% increase due to climate change. Consequently, the 1-in-100 year 36-hour summer storm is the critical storm for Catchment 2, with a required attenuation storage volume of 209.3m³. This volume is sufficient for the 1-in-100-year storm, accounting for a 20% increase due to climate change.

The dry detention basin for Catchment 1 provides a volume of 563m³, with a depth of 1 metre. The required attenuation storage for Catchment 2 is provided in a 1-metre-deep dry detention basin with 300mm of underlying filter stone, with a combined volume of 255.7m³. This exceeds the 100-year volume. The drainage catchments are indicated in Figure 4 below. Refer to Appendix B for attenuation volume storage calculations.

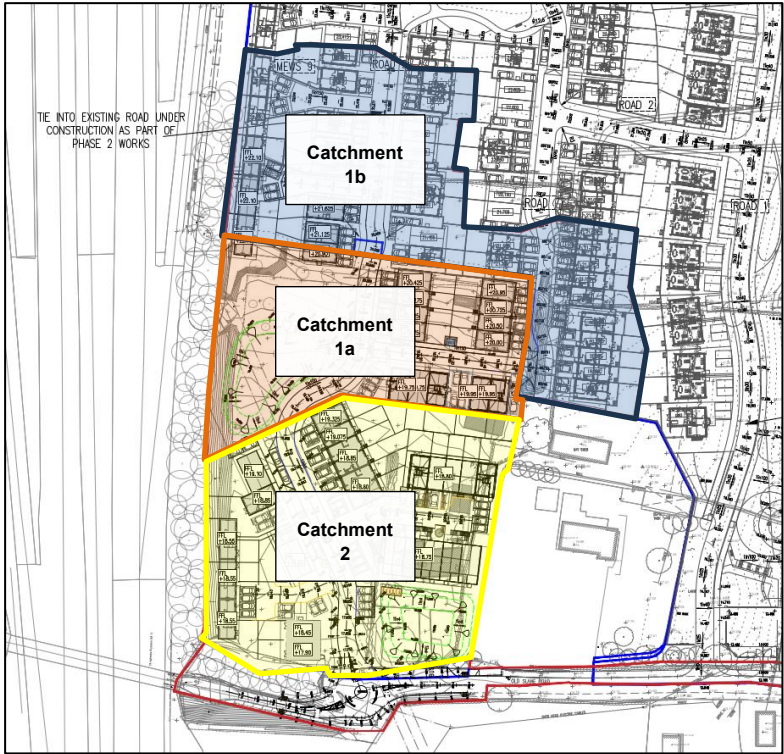


Figure 4 | Surface Water Drainage Catchments

As noted above, surface water runoff from the catchment will be restricted via a Hydro-brake or similar approved flow control device, limited to the calculated greenfield equivalent runoff rate, before discharging to the public network.

3.6.3 Criterion 3: Levels of Service

There are four criteria for levels of service. These are:

- Criterion 3.1:** No external flooding except where specifically planned (30-year high intensity rainfall event).
- Criterion 3.2:** No internal flooding (100-year high intensity rainfall event).
- Criterion 3.3:** No internal flooding (100-year river event and critical duration for site storage).
- Criterion 3.4:** No flood routing off site except where specifically planned (100-year high intensity rainfall event).

Both internal and external flooding have been assessed in the Flood Risk Assessment report which accompanies this Engineering Assessment Report. The Flood Risk Assessment has been carried out in accordance with the *DEHLG/OPW Guidelines on the Planning Process and Flood Risk Management* published in November 2009.

The assessment identifies the risk of both internal and external flooding at the site from various sources and sets out mitigation measures against the potential risks of flooding. The sources of possible flooding

assessed in the report include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical errors.

As a result of the flood risk management and mitigation measures proposed, the residual risk of internal or external flooding for the 30-year and 100-year flood events is low, and accordingly all four of the above criteria have been met. Please refer to the accompanying Flood Risk Assessment report for the full analysis of the flood risk at the subject site.

3.6.4 Criterion 4: River Flood Protection

The long-term storage volume is a comparison of pre- and post-development runoff volumes. The objective is to limit the runoff discharged after development to the same as that which occurred prior to development.

Of the three methods described in the GSDS for establishing River Flood Protection by comparison of the pre- and post-development runoff volumes, (Criteria 4.1, 4.2 and 4.3 respectively), Criteria 4.3 is selected for use as the most practical criteria at this stage in the design.

The Criteria 4.3 approach is for all runoff to be limited to either Q_{BAR} or to 2 l/s/Ha, whichever is the greater. The proposed drainage system includes a flow control device to ensure that the discharge rate is limited to the greenfield equivalent and ample attenuation is provided for the 1-in-100-year storm, accounting for a 20% increase due to climate change.

3.7 Surface Water – General

Surface water sewers will be laid strictly in accordance with Louth County Council requirements for taking in charge and will generally consist of PVC (to IS 123) or concrete socket and spigot pipes (to IS 6).

All private outfall manholes will be built in accordance with the Greater Dublin Regional Code of Practice for Drainage Works. No private drainage will be located within public areas.

Drains will be laid in accordance with the requirements of the Building Regulations, Technical Guidance Document H.

3.8 Flood Risk Assessment

A site-specific Flood Risk Assessment has been carried out for the proposed development and accompanies this submission under separate cover.

4. Water Supply Network

4.1 Existing Water Supply Network

Uisce Éireann records for the surrounding area have been consulted as part of this assessment, and are extracted below:

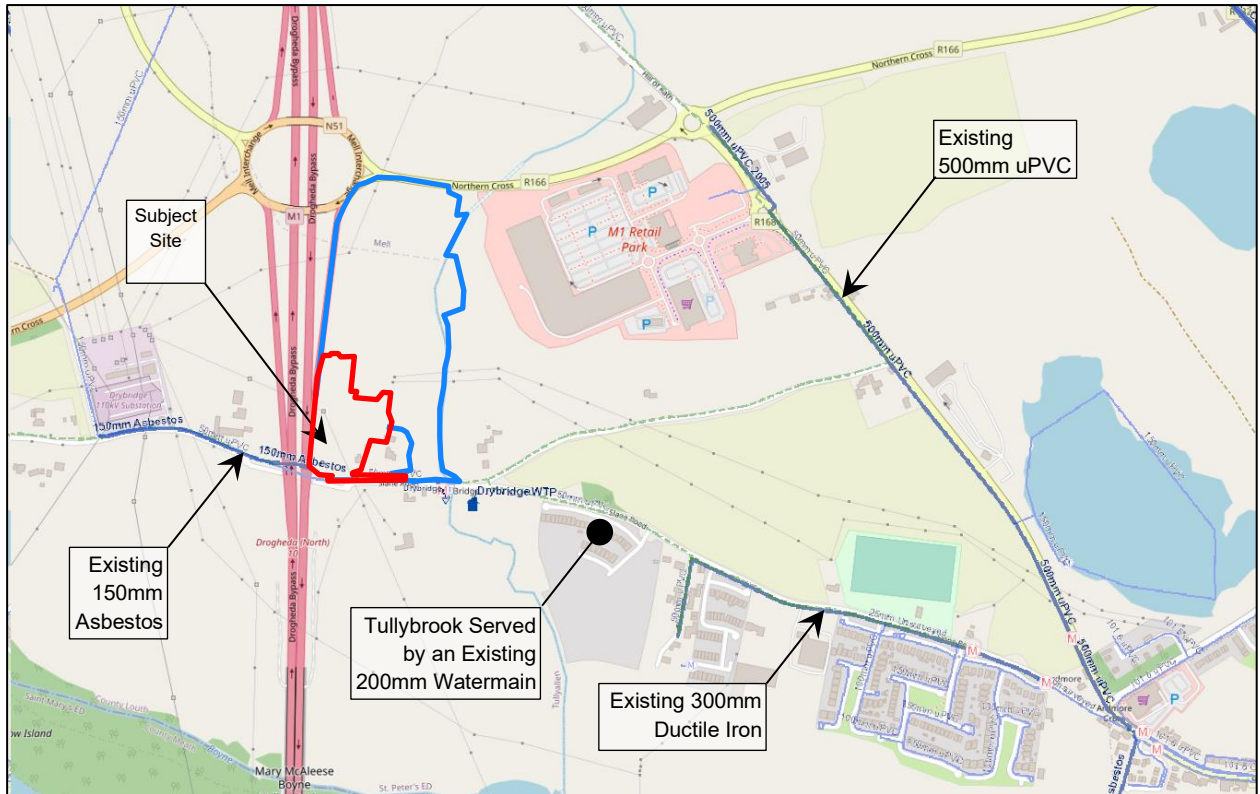


Figure 5 | Extract of Uisce Éireann's Water Supply Service Records

There is an existing 150mm diameter watermain in Slane Road to the south of the site. The existing Tullybrook development, to the south-east of the subject site, is served by a 200mm watermain (note that this watermain is not yet included in the extracted service record map above). This 200mm watermain connects to the existing 300mm ductile iron main to the east along Slane Road. There is an existing 500mm uPVC watermain in the R168 (Trinity Street).

Supply to the region has recently been upgraded, with new mains being laid as part of the Port Access Northern Cross Route (PANCR) Project. The PANCR Project has recently been completed and commissioned.

4.2 New and Permitted Water Supply Network

The permitted development includes a new watermain network around the site serving the permitted units, fed by a new 200mm watermain along Old Slane Road, completed under Phase 1, connecting to the existing 500mm uPVC watermain in the R168 (Trinity Street).

4.3 Proposed Water Supply Network

It is proposed to supply water to the site via the watermain constructed as part of the Phase 1 works. A new looped network will be constructed through the site, as shown on the accompanying Watermain Layout Drawing No. OSR-WMC-ZZ-GF-DR-C-4300.

Uisce Éireann will ultimately decide on the feasibility of the existing water supply infrastructure to cater for the proposed development. In this regard, a Pre-Connection Enquiry was submitted to Uisce Éireann, and a Confirmation of Feasibility letter was received, dated 3 July 2025 (reference no. CDS25002896). The letter notes that water connection is feasible subject to upgrades required to increase the capacity of the Uisce Éireann network. These works include the installation and commissioning of a Pressure Release Valve (PRV) along Marley’s Lane, 50 metres of new 450mm ID watermain and a Flow Control Valve along Rathmullan Road. A copy of the Confirmation of Feasibility letter is included in Appendix A.

4.4 Water Supply Calculations

The calculated water demand at the subject development is set out in the below table. The average domestic demand has been established based on an average occupancy ratio of 2.7 persons per dwelling with a daily domestic per capita consumption of 150 litres per head per day and with a 10% allowance factor. Note that the Uisce Éireann Code of Practice assumes 2.7 residents per unit regardless of the unit type.

The average day/peak week demand has been taken as 1.25 times the average daily domestic demand, while the peak demand has been taken as 5 times the average day/peak week demand, as per Section 3.7.2 of the Uisce Éireann Code of Practice for Water Infrastructure.

Description	Total Population	Water Demand	Average Demand	Average Peak Demand	Peak Demand
	<i>No. People</i>	<i>l/day</i>	<i>l/s</i>	<i>l/s</i>	<i>l/s</i>
Proposed Development (47 Units)	126.9	20,938.5	0.242	0.303	1.515
Total	126.9	20,938.5	0.242	0.303	1.515

Table 5 | Calculation of Water Demand for the Development

The average demand for the development is 0.242l/s, with a peak demand of 1.515l/s.

4.5 Water Supply – General

All watermains will be laid strictly in accordance with Uisce Éireann requirements and standard details.

Valves, hydrants, scour and sluice valves and bulk water meters will be provided in accordance with the requirements of Uisce Éireann.

5. Traffic and Transportation Assessment

5.1 Threshold for Transport Assessment

Section 2.1 of the *Traffic and Transport Assessment Guidelines (May 2014)* requires submission of a Transport Assessment where a proposed development meets one or more of the following criteria:

- 1- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.
- 2- Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists, or the location is sensitive.
- 3- Residential development in excess of 200 dwellings.
- 4- Retail and leisure development in excess of 1,000m².
- 5- Office, education, and hospital development in excess of 2,500 m².
- 6- Industrial development in excess of 5,000 m².
- 7- Distribution and warehousing in excess of 10,000 m².

Considering the number of proposed units is 47, a full Traffic and Transport Assessment is not required.

5.2 Land use

In the Louth County Development Plan 2021-2027, the subject site is zoned “A2 New Residential”, as shown in the extract below:

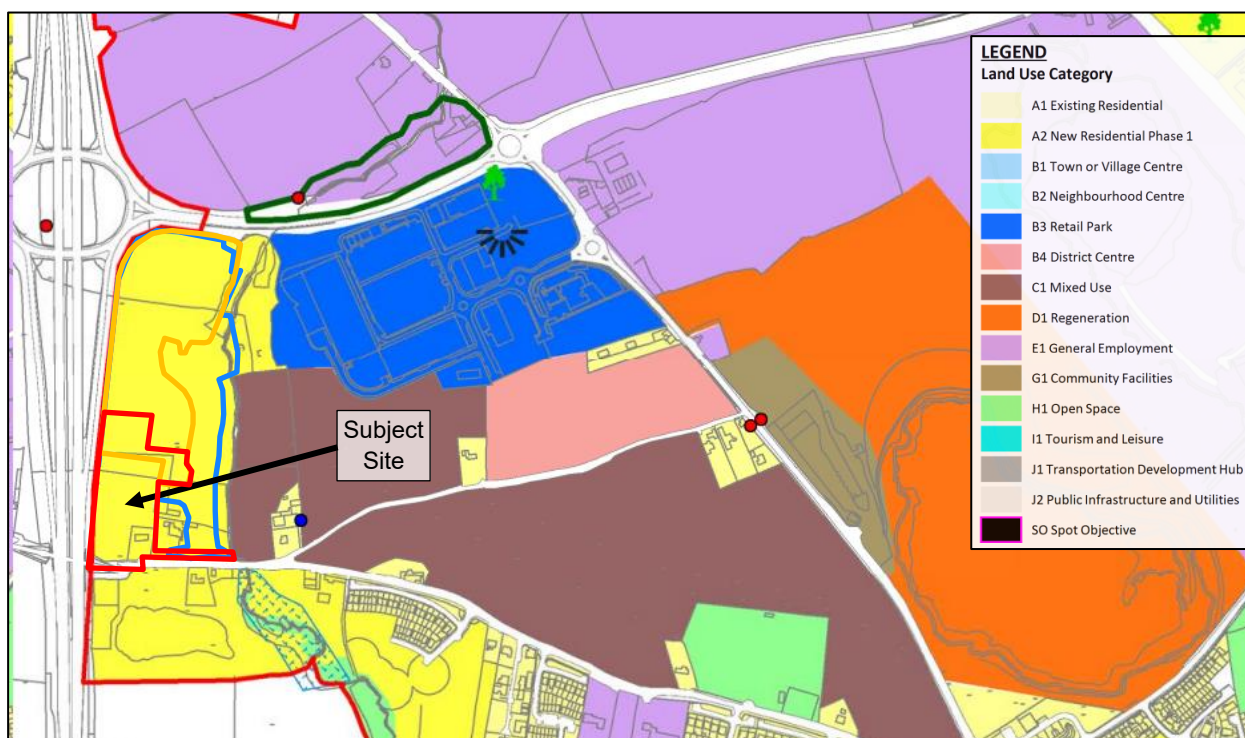


Figure 6 | Louth County Development Plan Zoning Map (Source: Louth County Development Plan 2021-2027)

5.3 Site Location and Description

The subject site is located in Mell/Tullyallen, Drogheda, Co. Louth. The site location is indicated on the figure below:

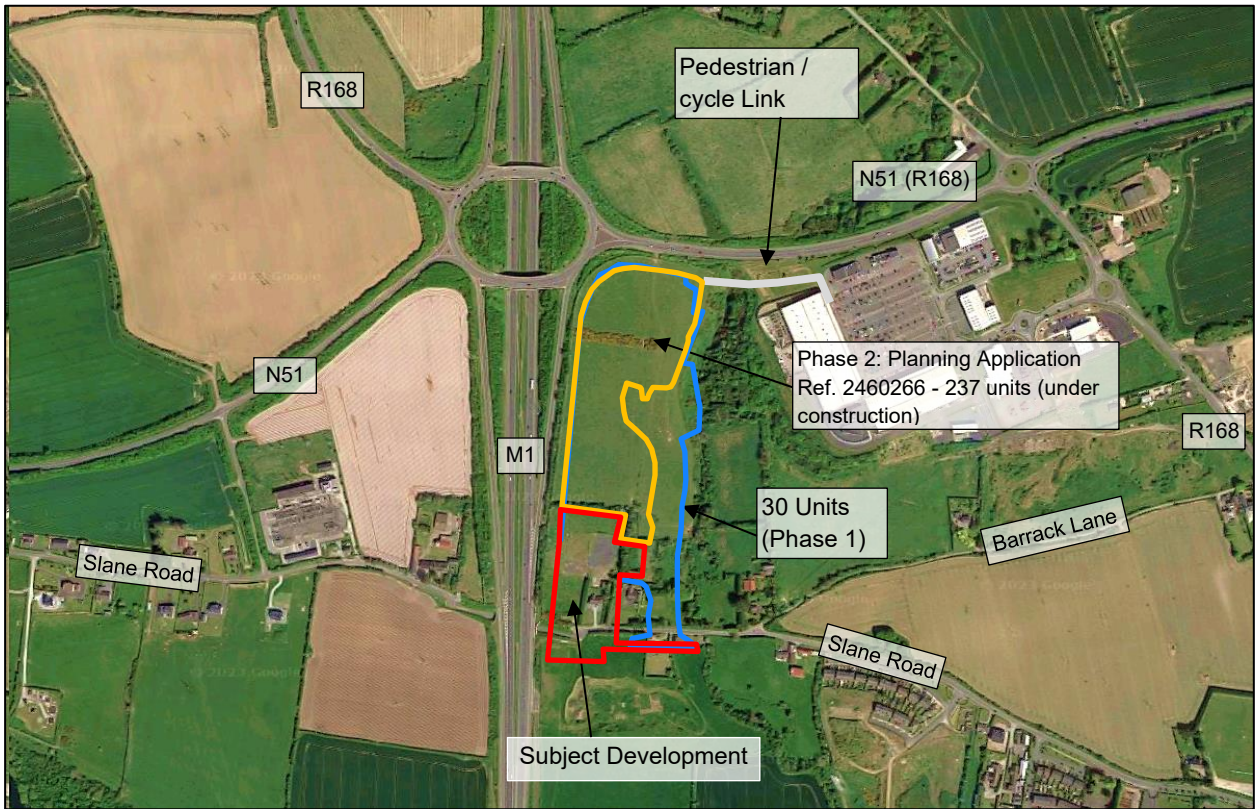


Figure 7 | Site Location (Source: Google Maps)

The application site is bounded to the north, south and west by greenfields. To the north is an approved Phase 2 development under Planning Application Ref. 2460266, which is under construction. It will comprise 237 units. An existing dwelling bounds the site to the east. The M1 is located to the west of the subject site.

There is a stream flowing in a southerly direction along the eastern side of the site, draining land to the north and crossing under the R168 Road. The stream crosses the Slane Road at Dry Bridge, discharging into the Boyne River approximately 650m south of the site.

Vehicular access will be via the Old Slane Road to the south of the subject development

5.4 Existing Roads and Junctions

5.4.1 Roads

The subject site is located adjacent to a comprehensive road network consisting of national roads, regional roads, and local roads.

The subject development will be accessed from Slane Road.

Slane Road runs directly into Drogheda town centre, it is a single carriageway local road with no facilities for pedestrians or cyclists on either side of the road until the Tullybrook development, approximately 400m east of the subject development. From there a footpath runs along the southern boundary of the road.

The **M1** Motorway runs adjacent the western boundary of the proposed development site. The M1 runs from Dublin to Belfast serving towns including Dundalk, Balbriggan, and Skerries.

The **N51** runs from Delvin, County Westmeath, through Athboy, Navan and Slane, before crossing the M1 Motorway to the north-west of the site and terminating near Drogheda at a roundabout on the R132.

The **R168** runs to the east of the site between the N51 and Drogheda Town Centre. From Drogheda Town Centre, the **R152** Regional Road runs south, by Duleek, before joining the national road N2 towards to Ashbourne. The **R108** Regional Road also runs south from Drogheda Town Centre, leading directly through Ballymun before intersecting with the M50 in Dublin.

The **R132** Regional Road runs north from Drogheda, continuing through Dunleer and Castlebellingham to Dundalk, where it joins the N52. The R132 is the former N1 route (now by-passed by the M1 motorway).

As the Slane Road continues east, it intersects Trinity Street (R168), which leads directly into the Drogheda Town Centre.

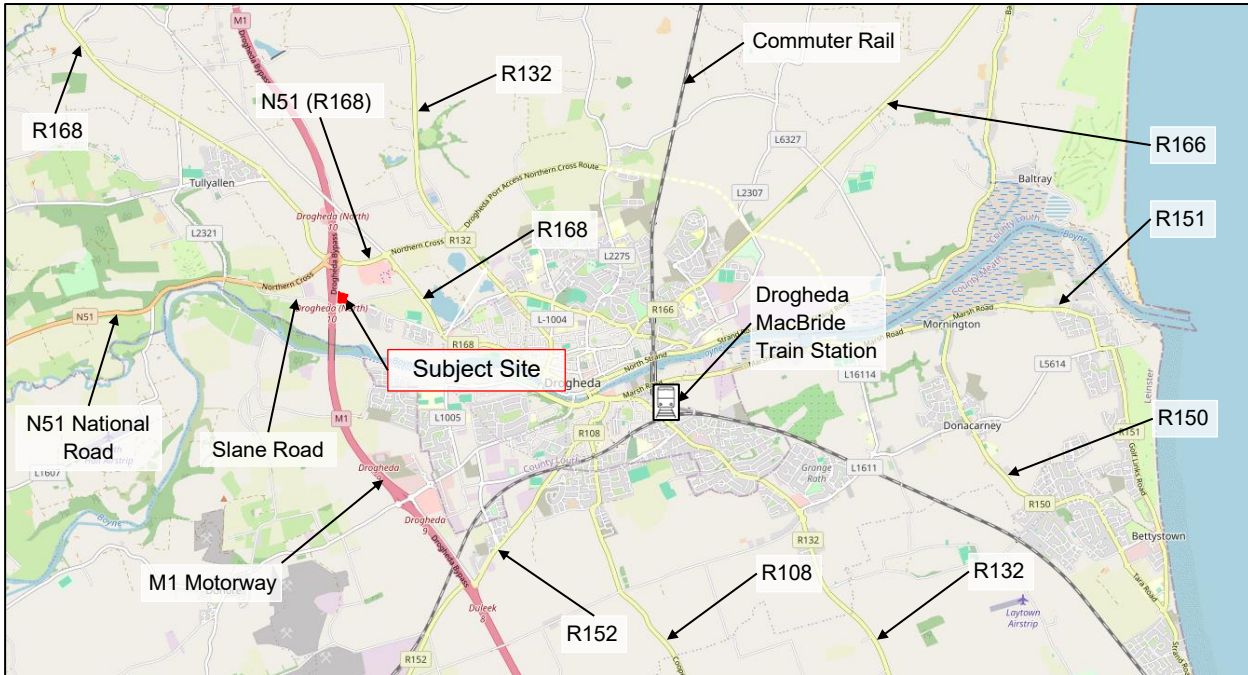


Figure 8 | Existing Road Network (Source: Open Street Map)

5.5 Multi-modal access to the site

5.5.1 Existing Pedestrian Facilities and Walking Accessibility

The existing pedestrian facilities in the surrounding area comprise of an inter-connected network of footways linking the various neighbourhoods to each other, to the existing schools and to the surrounding public network.

The Figure below indicates the typical walkable catchments from the subject site for 10-minute, 20-minute, and 40-minute walking times. Areas of Drogheda Town Centre are accessible within 15-minute and 30-minute walks, with most of the Town Centre falling within a 40-minute walking catchment.

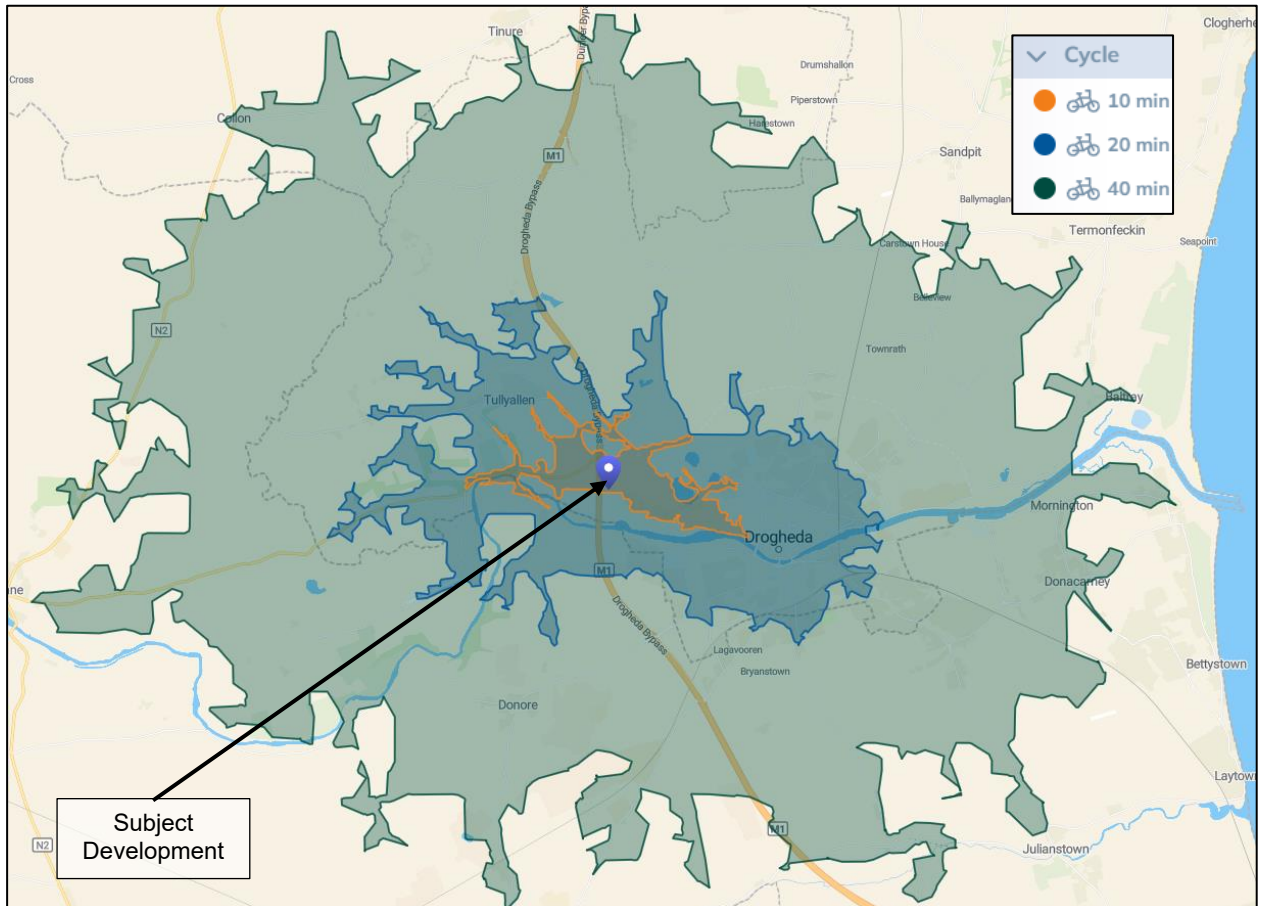


Figure 10 | Site Accessibility – Isochrone map indicating cycling accessibility (Source: Smappen)

Much of Drogheda Town Centre is accessible from the site within a 20-minute cycle, with the entirety of the Town Centre falling within the 20-minute catchment.

5.5.3 Existing Bus Network

There are several existing public transport facilities available in vicinity of the proposed development site ranging from bus services to rail services. The **Figure 11** illustrates these in the local context and a summary of the frequency of these routes is shown in **Table 6**.

- Bus Stop 135941: Is the closest to the subject development, situated at the entrance to M1 Retail Park is a c. 1.4km or 20-minute walk (see **Figure 11**). Once the pedestrian / cycle link is completed, the distance between the subject development and the bus stop through the future committed development Planning Application Ref. 2460266 will be reduced to c.1.1km or 13-minute walk, as can be seen in figure below. This bus stop is served by Bus Eireann Routes 173 and 190, and by Local Link Route 188.
- Bus Stop 109411: Located at St. Joseph's Terrace is a 1,4km or 21-minute walk. This bus stop is served by Bus Eireann Route 173.
- Bus Stop 139151: The bus stop is located on North Road in the northern direction, and it is a 2.4km walk or a 33-minute walk. It is served by Bus Eireann Route 100, 100x D4 and D5, Matthews Bus Route 901, 901d and 904, and Streamline Coaches route UM03.

- Bus Stop 100601: is located on North Road in the southern direction and is a 2.4km or 33-minute walk away. It is served by Bus Eireann Route 100, 100x D4 and D5, Matthews Bus Route 901, 901d and 904, and Streamline Coaches route UM03.
- The Drogheda Bus Station and its surroundings are located at Donore Rd. and George's St. It is a 3.3 km or a 45-minute walk, or a 12-minute cycle away. This bus stop is served by various Bus Eireann routes, including 100, 100x, 101, 10x, 105, 168, 182, 182a, 190, D1, D2, D4, and D5, as well as Local Link LMF routes 163 and 188.

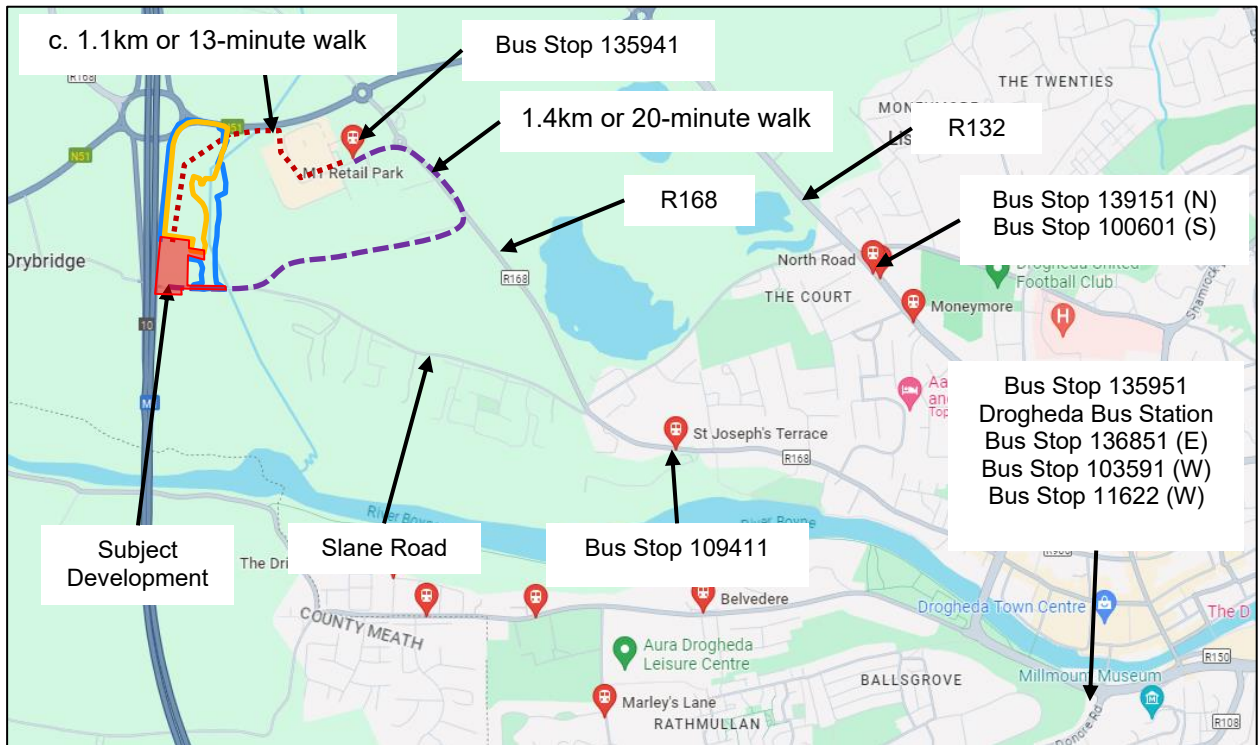


Figure 11 | Location of Closest Bus Stops (Source: Transport for Ireland)

The summary of bus frequencies is as shown in the table below.

Route No.	Route Name	Frequency
Bus Stop 135941		
173	Drogheda West St - Dominick St.	8 service every hour between 12:00 and 19:00.
190	Drogheda - Navan - Trim	Every Hour between 5:40 and 23:40
188	Drogheda, Hospital - Kildalkey Road, Athboy Church Car Park	Every Hour between 5:40 and 23:40
Bus Stop 109411		
173	Drogheda West St - Dominick St.	11 service every hour between 9:00 and 19:00
Bus Stop 139151		
100	Drogheda - Dundalk - Newry	2 services 6:48 and 7:48

100X	Wilton Tce - Airport - Dundalk	7 services every hour between 18:00 and 01:00
D4	Southgate SC - Ballymakenny	Every 20-30 Minutes between 06:00 and 20:00, and every hour between 20:00 and 23:00
D5	Colpe Road - Termonabbey	Every 20-30 Minutes between 06:20 and 19:30, and every hour between 20:00 and 23:00
901	Dublin - Dundalk	Every hour between 7:20 and 0:20, with 3 additional services at 8:45, 16:50 and 17:50
901d	The Helix - Marshes Shopping Centre	1 service at 17:55
904	Belfield, Campus - Marshes Shopping Centre	2 services at 17:15 and 18:20
UM03	University Campus - Hill Street Dundalk	2 services at 16:45 and 18:45
Bus Stop 100601		
100	Newry - Dundalk - Drogheda	2 services 6:40 and 7:40
100X	Dundalk - Airport - Wilton Tce	4 services at 18:04, 19:04, 20:04 and 21:02.
D4	Ballymakenny - Southgate SC	Every 20-30 Minutes between 06:40 and 19:50, and every hour between 20:10 and 00:00
D5	Termonabbey - Colpe Road	Every 20-30 Minutes between 06:20 and 20:00, and every hour between 20:40 and 22:40
901	Dundalk - Dublin	Every hour between 6:00 and 22:00, with 5 additional services at 6:55, 7:55, 8:55, 8:45, and 21:55
901d	Marshes Shopping Centre - The Helix	1 service at 7:40
904	Marshes Shopping Centre - Belfield, Campus	3 services at 6:25, 6:55 and 7:25
UM03	University Campus - Hill Street Dundalk	2 services at 7:25 and 10:25
Bus Stop 135941		
188	Drogheda, Hospital - Kildalkey Road, Athboy Church Car Park	8 services 6:30, 8:00, 11:00, 13:00, 15L00, 19:00 and 21:00
100	Drogheda - Dundalk - Newry	Every hour between 06:45 and 18:00
100X	Wilton Tce - Airport - Dundalk	Every hour between 06:40 and 0:55
100X	Dundalk - Airport - Wilton Tce	Every hour between 6:00 and 22:10
101	Drogheda - Dublin - Airport	Every 20-30 Minutes between 05:20 and 23:00 and every hour between 23:00 and 5:00.

101X	Termon Abbey - Drogheda - Wilton Tce	5 services 5:54, 6:22, 6:42, 6:57 and 7:12
101X	Wilton Tce - Drogheda - Termon Abbey	4 services 17:44, 18:24, 18:54 and 19:14
105	Drogheda - Ashbourne - Blanchardstown	Every hour between 5:30 and 20:30
168	Annagassan - Dundalk	10 services between 7:00 and 23:30
182	Drogheda - Collon - Ardee - Monaghan	Every two hours between 8:10 and 20:10
182a	Drogheda - Hospital - Ardee	Every two hours between 7:10 and 17:10
190	Drogheda - Navan - Trim	Every hour between 5:30 and 23:30
D1	Drogheda - Laytown	Every 30 minutes between 5:30 and 0:00
D2	Drogheda - Laytown via coast Road	Every 30 minutes between 5:30 and 23:30
Bus Stop 136851		
163	Donore - Drogheda	5 services 8:43, 10:50, 12:50, 16:10 and 17:29
Bus Stop 11622		
163	Drogheda - Donore	5 services 9:07, 11:27, 13:27, 16:37 and 17:52
D4	Ballymakenny - Southgate SC	Every 20-30 minutes between 6:10 and 23:14
D5	Termonabbey - Colpe Road	Every 30 minutes between 6:30 and 22:40
Bus Stop 11622		
168	Kildalkey Road, Athboy Church Car Park - Drogheda, Hospital	8 services 7:35, 9:00, 12:00, 14:00, 16:00, 18:00, 20:00 and 22:00
D4	Southgate SC - Ballymakenny	Every 20-30 minutes between 6:10 and 23:14
D5	Colpe Road - Termonabbey	Every 30 minutes between 6:30 and 22:40

Table 6 | Bus Routes – Frequency Table (source: Transport for Ireland)

In the previous table, for bus stop 135941 (**Drogheda Bus Station**), only buses that start at or pass through this bus station have been considered. Buses terminating at the bus station have not been included.

As can be seen from the table above, the town of Drogheda is well served by a bus system which links it to the surrounding area, including the coast, Northern Ireland, Dublin City, and Ireland's international airport. Some examples of possible routes are given below:

Dublin Airports:

- Route 101: 70 minutes.
- Route 100x: 30 minutes.

Dublin City:

- Route 101: 120-minute.

- Route 100x: 75 minutes.

Navan:

- Route 188: 40-50 minutes.
- Route 190: 40-50 minutes.

Dundalk:

- Route 100x: 35 minutes.
- Route 100: 45 minutes.
- Route 168: 110 minutes.

Lawtown:

- Route D2: 16 minutes.
- Route D1: 20 minutes.

5.5.4 Existing Rail Network

The nearest rail station to the subject site is the Drogheda MacBride Train Station. The location of the train station is shown in **Figure 12**.

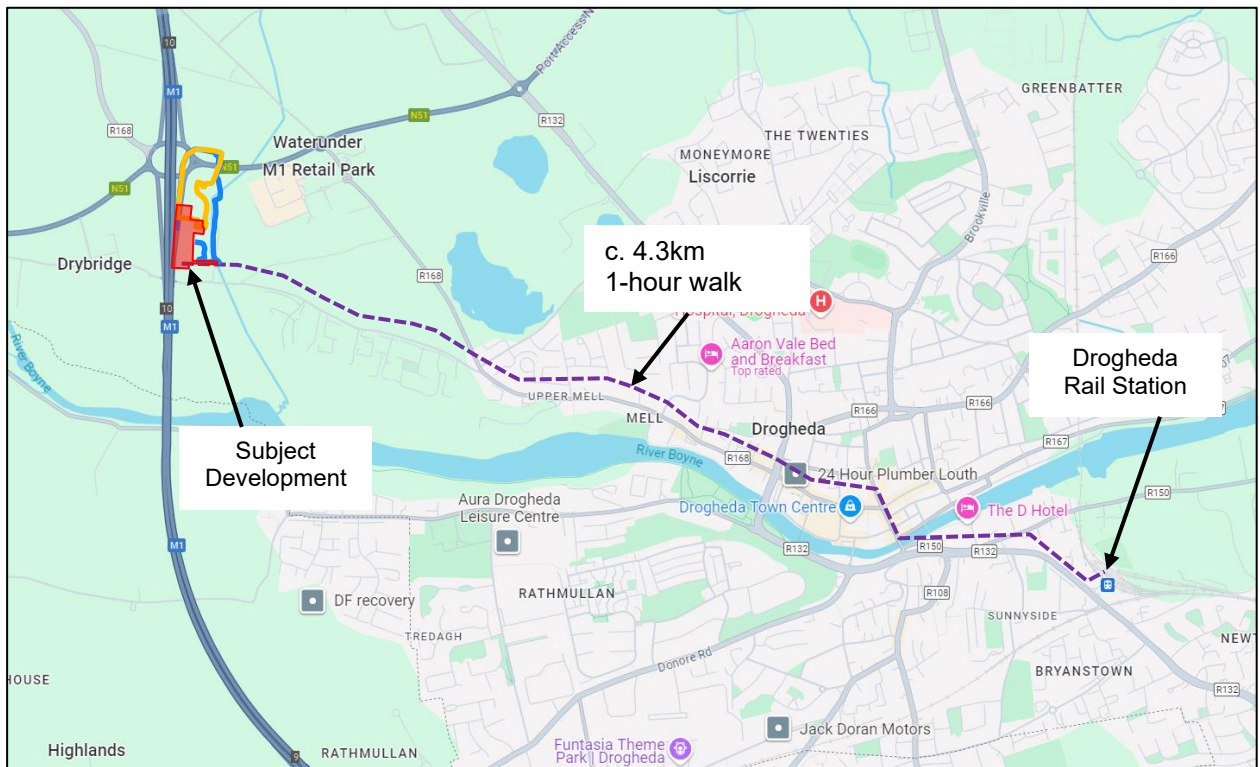


Figure 12 | Location of Drogheda MacBride Train Station (Source: google maps)

Drogheda MacBride Train Station is located approximately 4.3km to the southwest of the site. This distance can be reached in c.1-hour walking or c. 16-minute cycling.

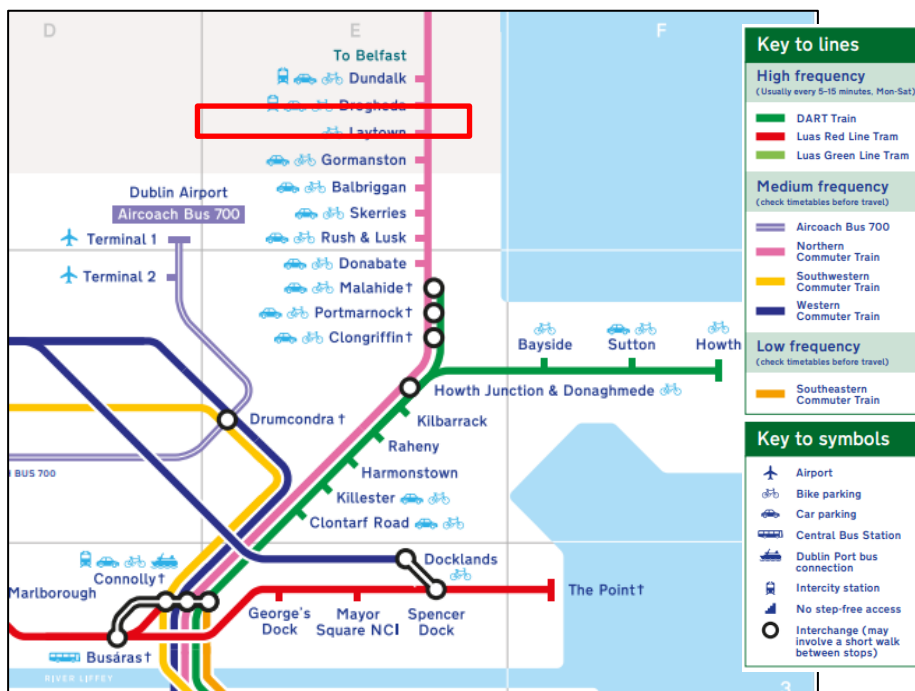


Figure 13 | Location of Drogheda MacBride Train Station (Source: google maps)

The trains from this station facilitate services that allow for good connection to other onward destinations both north and south. Services generally operate with 30-minute frequencies during the peak hour morning and evening commuter periods.

The train routes serving Drogheda Train Station are outlined below:

- Belfast – Dublin Connolly
- Dublin Connolly - Belfast
- Drogheda/Dundalk – Dublin Commuter (S)
- Dublin - Drogheda/Dundalk Commuter (N)
- Rosslare Europort – Gorey – Dublin Connolly (NW)

The table below indicates the main routes to and from Drogheda Train Station.

Route	Frequency
Belfast - Dublin Connolly	8 services 7:21, 8:22, 12:07, 14:07, 15:40, 17:41, 19:41 and 21:41
Dublin Connolly - Belfast	8 services 8:12, 10:06, 11:55, 13:56, 15:55, 18:21, 19:34 and 21:29
Drogheda/Dundalk – Dublin Commuter (S)	Every 30 minutes between 8:50 and 22:05
Dublin - Drogheda/Dundalk Commuter (N)	Every 30 minutes between 5:50 and 00:50
Rosslare Europort – Gorey – Dublin Connolly (NW)	2 services 5:03 and 9:52

Table 7 | Trains through Drogheda Train Station (Source: Transport for Ireland and Irish Rail)

From Drogheda station there are good connections to both Dublin to the south and Belfast to the north.

The travel time from Drogheda Railway Station to Connolly Railway Station (Dublin) is approximately 30 minutes on the intercity Belfast-Connolly service and approximately 1 hour on the commuter service.

The travel time from Drogheda Railway Station to Belfast Lanyon Place is approximately 70 minutes on the intercity Connolly – Belfast.

5.5.5 GoCar Facilities

There is a GoCar station in the vicinity of the proposed development located in M1 Retail Park is a 1.4km or 20-minute walk as shown in figure below. Once the pedestrian / cycle link is completed, the distance between the subject development and the GoCar station will be reduced to c. 1.1km or 13-minute walk, as can be seen in figure below.

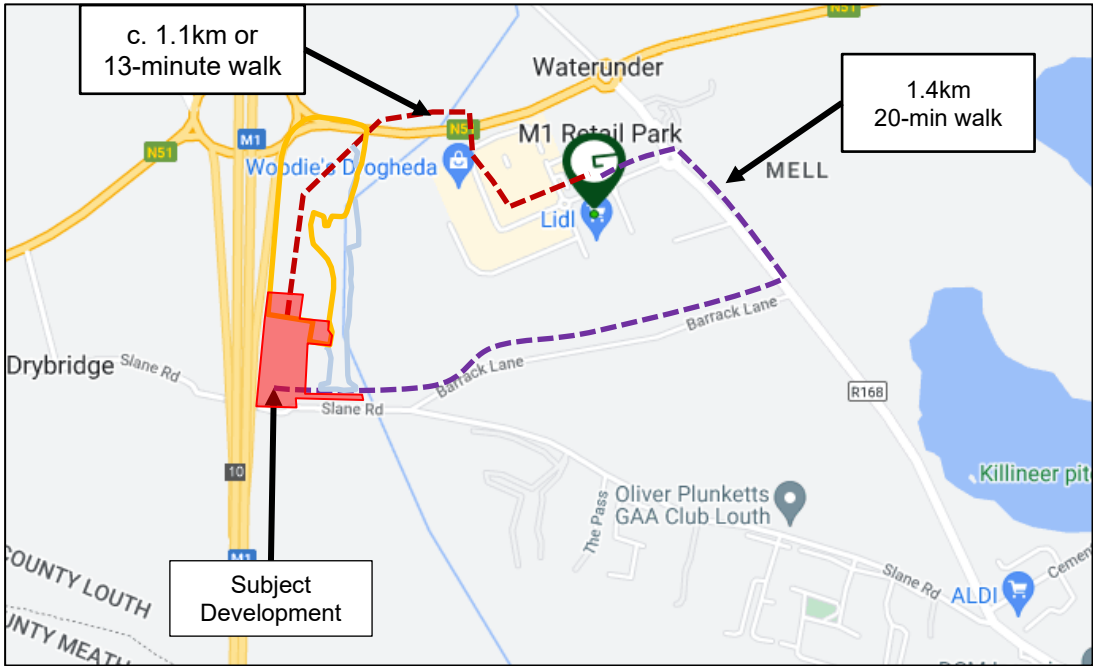


Figure 14 | Location of Nearest GoCar station (Source: google maps)

5.6 Proximity to Amenities

The town of Drogheda has several facilities (see Figure 15) which are within walking distance and others which are further afield but may take longer or can be reached by bicycle.

The closest is the M1 Retail Park, which is a shopping centre with a variety of facilities such as an electronics store, a grocery store, and others. Located at the entrance to M1 Retail Park is the Bus Stop 135941 which is served by Bus Eireann Route 173 and 190, and by Local Link Route 188.

Figure 15 shows the different amenities in the area around the subject development.

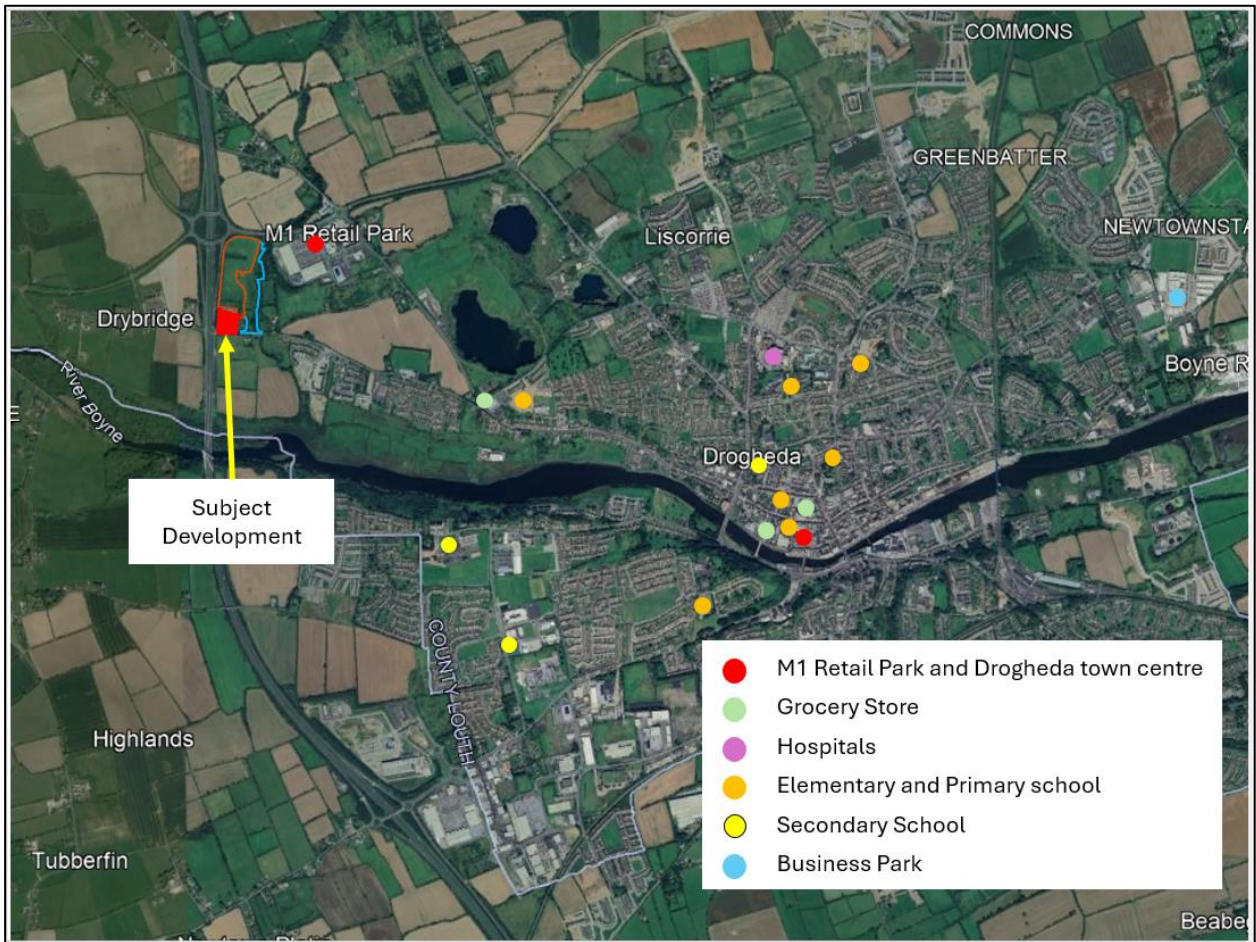


Figure 15 | Amenities (Source: google maps)

5.7 Proximity to Employment Areas

5.7.1 Dublin Airport

The site is approximately 40 km from the Dublin Airport, with an average travel time of 30-minutes by vehicle.

In terms of public transport, there are two options to get to Dublin airports: Route 100X every hour and Route 101 every 20-30 minutes. The former takes 30 minutes and the latter 70 minutes to reach Dublin Airport.

5.7.2 M1 Retail Park

The development is located close to the M1 Retail Park area which provides a range of employment opportunities. The adjacent development to the north-west of the site is a shopping centre with a variety of facilities including an electronics store, food store and others.

5.7.3 Business Parks

To the east of Drogheda there is a business park with several businesses or employment opportunities (see **Figure 15** above). The site is located 5.7km from the subject development site and it takes 14 minutes by car or 20 minutes by cycle to reach this area. Walking is another option, and it takes 140 minutes to reach the business park from the subject development.

In terms of public transport, the route 173 can be used from the M1 Retail Park and takes approximately 30 minutes to arrive.

5.7.4 City Centre & Shopping District

Approximately 3km to the east of the development is the centre of Drogheda, which includes a number of small and medium-sized businesses such as discount stores, banks, food outlets, clothing stores, grocery stores and shopping mall centres.

The shopping mall centre is located approximately 3.1km to the east of the development, and it takes approximately 40 minutes by walking or 10 minutes by bicycle to reach this area. The M1 Retail Park is situated approximately 3.1km to the east of the development, and the route 190 can be used to reach it from there. This route takes approximately 20 minutes to complete.

5.8 Transportation Improvements

5.8.1 Pedestrian Network Upgrades

A new footpath has been constructed along Slane Road part of the Phase 1 30-units recently constructed. The new footpath extends west along Slane Road from Phase 1 as far as the M1 underpass (approximately 110m), and to the east approximately 220m connecting to the existing footpath in front of the Tullybrook development.

A pedestrian-cycle link is proposed as part of the permitted development under SHD ABP-311678-21. It will run to the east of the development along the N51 (R168) to the M1 Retail Park. This section was walked by representatives from the design team, along with Aaron Lynch and Patrick Rodgers from Louth County Council on 25th September 2023. During that site visit, the extent of footpaths that could be provided was agreed upon. This section of land has been left to facilitate the future provision of pedestrian and cycle infrastructure along the N51 (R168) towards the Port Access Northern Cross Route. This is in accordance with the Louth County Council's Stage 2 Opinion Report, in which the Transportation Division requested that the Applicant provide a sterile section of land on the boundary adjacent to the public road to facilitate the subsequent provision of pedestrian and cycle infrastructure. The report also indicates that the sterile section of land should allow for the provision of a DMURS-compliant footpath and cycleway to the widths set out in Section 2.6 and Table 2.2 of 'The Cycle Design Manual'. In accordance with the DMURS guidelines, a minimum footpath width of 1.8 metres is required. The Cycle Design Manual stipulates a cycle path width of 2 metres and a buffer zone of 0.5 metres, resulting in a total width of 4.3 metres.

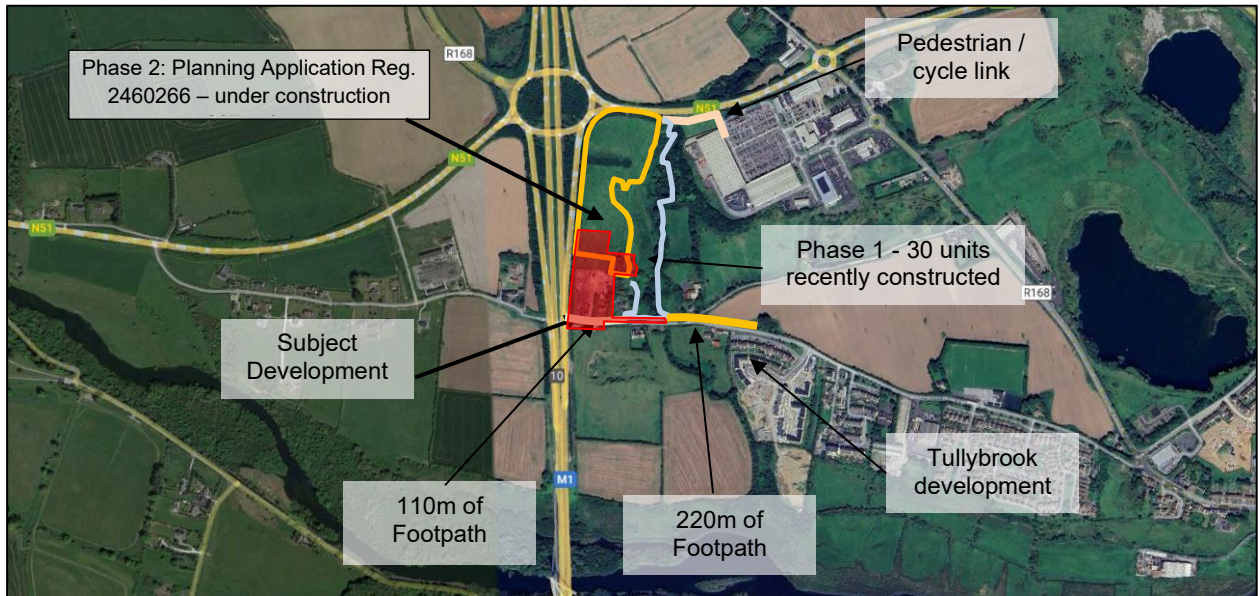


Figure 16 | Pedestrian Network Upgrades (Source: Google Maps)

5.8.2 Infrastructure, Cycle and Pedestrian

The Louth County Development Plan 2021-2027 outlines the objectives for road traffic and management. In the vicinity of the subject development, the Louth County Development Plan 2021-2027 has identified the following interventions as necessary:

- Old Slane Road: Widening to facilitate footpaths.
- Drogheda Cycleways: Implementation of elements of the Drogheda Cycle Strategy
- Leonards Cross (Junction 2) Road realignment.

The restricted nature of the existing Slane Road corridor prevents the provision of segregated cycle facilities or a shared path. Traffic surveys have shown that the 85% speed on Slane Road, adjacent to the development site, is in the order of 75km/h.

Slane Road is a two-way single-carriageway local road that has been upgraded in recent years to include a pedestrian facility on one side, enhancing safety for both pedestrians and cyclists. The proposed development includes the provision of a footpath along Slane Road, extending between the access road to the site and the access road serving the eastern developments. This proposal aligns with the objectives set out in the Louth County Development Plan.

In addition, the Louth County Development Plan 2021–2027 proposes a realignment of Slane Road and improvements to the Leonard’s Cross junction. Upgrading this junction to a compliant priority-controlled staggered junction or a signalised crossroads would require land that is in private ownership and outside the control of the applicant.

5.8.3 DART

Drogheda Rail Station is located approximately 4.3km metres east of the proposed development site (see **Figure 12**) and is part of the northern route of the future DART Expansion Programme which see the DART extended to locations along the east coast of Ireland such as Donabate, Rush and Lusk, Skerries, Balbriggan and finally on to Drogheda (see **Figure 17**).

The DART+ Programme aims to modernise and provide an electrified, more frequent, and reliable rail service, enhancing capacity on the rail corridor across Dublin City and Greater Dublin. DART+ offers several benefits, including:

- Increase peak passenger capacity and increase train frequency between Dublin City Centre and Drogheda MacBride Station - inclusive of the Howth Branch - facilitating frequent and reliable transport to the surrounding communities.
- Facilitate the development and future growth of existing and new communities that will greatly benefit from the connectivity that the DART+ Coastal North project will deliver.
- Build a sustainable and connected city region, supporting the transition to a low carbon and climate resilient society.
- Facilitate people to make sustainable travel choices by encouraging a move away from private cars to a reliable, efficient and safer public transport network.
- Improve multi-modal transport connectivity through the development of the wider DART+ Programme.

The DART train currently stops at Malahide station. It is expected that the new service will be in operation at Drogheda Railway Station within the next few years. According to the website, the latest updates are:

- Larnród Éireann has completed the second phase of the non-statutory public consultation on the 'Preferred Option' for the DART+ Coastal North project.
- The feedback and submissions received during this consultation will be thoroughly reviewed and assessed.
- Based on this feedback, a public consultation report will be prepared to support the development of the Railway Order (RO) application to be submitted to An Bord Pleanála.
- The intention is to lodge the Railway Order in summer 2024.

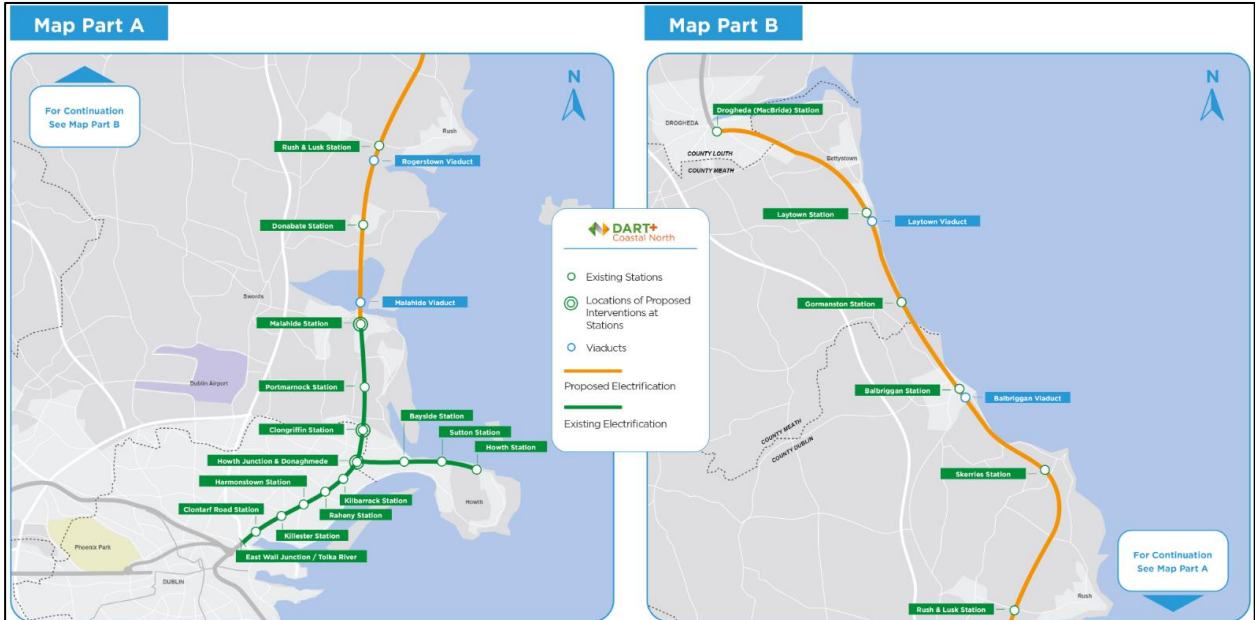


Figure 17 | Dart Expansion Programme (source DART+).

5.9 Proposed Development

Phase 1 (30 Units, constructed and occupied)

A previous proposal by the applicant to develop the subject site received a decision to grant permission from An Bord Pleanála in February 2022 (reference no. ABP-311678-21 as amended by P. A. Ref. 2360368). Although that permission is for 237 no. units, only the first 30 no. units are constructed under that planning grant.

As part of the Phase 1 30-unit works, the entrance road from Slane Road and the footpath upgrade works along Slane Road is being carried out.

Phase 2 (Planning Application Ref. 2460266 – Under Construction)

The Phase 2 comprises a total of 207 no. residential units to be developed on 4.8Ha site. The development incorporates a Creche and is developed to the north and west of the indicated Phase 1.

Phase 3 (Subject Development Application)

The site is bounded to the west by the M1 motorway, to the north by the N51 (R168), to the south by Slane Road and to the east by the phase 2 Gort Mell Development and a single dwelling fronting onto Old Slane Road. The development with total of c.1.3 Ha net site area will consist of the construction of 47 No. residential units comprising 5 No. 1-bed houses, 5 No. 2-bed duplexes, 11 No. 2-bed houses, 23 No. 3-bed houses and 3 No. 4-bed houses).

The schedule of accommodation is shown in **Table 8** below.

Description	1-Bed Houses	2-Bed Duplexes	2-Bed Houses	3-Bed Houses	4-Bed Houses	Total No. of Residential Units
Proposed Development	5	5	11	23	3	47
Total	5	5	11	23	3	47

Table 8 | Schedule of Accommodation

In addition, as part of the proposed planning application, a new junction is included at the intersection of the Subject Site Access Road and Old Slane Road. The new roundabout will have a radius of 8 meters to accommodate Buses up to 10.60 meters in length with three axles.

The proposed roundabout is consistent with Item 3.(d) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025. Comments received during the LRD meeting, as well as those outlined in the LRD Opinion, have been duly considered and incorporated into the final design of the development.

5.9.1 Pedestrian Infrastructure

The proposed development has been designed with a network of interconnecting footpaths providing permeability throughout the site to the surrounding area. All footpaths within the proposed development have been designed as 2.0m wide. This is in accordance with Section 4.3.1 of the DMURS which suggests that a minimum 1.8m footpath should be provided.

The proposed development includes footpaths on the southern access and at the northern access which provides a primary connection to the committed development under Planning Application Ref. 2460266. The proposed development also includes a shared road on the eastern part of the site which will provide secondary access into the committed development as well.

The proposed pedestrian infrastructure is consistent with Item 3.(b).(i) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025. Comments received during the LRD meeting, as well as those outlined in the LRD Opinion, have been duly considered and incorporated into the final design of the development.

The main pedestrian and cycle path is shown in the figure below.



Figure 18 | Proposed pedestrian and cycle path

5.9.2 Internal Layout and Vehicular Access Points

The internal roads have been designed to comply with DMURS as required by the County Development Plan. The internal roads generally vary between 4.8m and 6m in width. All footpaths are 2.0m wide and connect the internal spaces.

All internal roads within the proposed development are designed for a speed limit of 30km/h. The speed limit on the shared road will be 20km/h. All junctions within the development itself will be priority junctions with raised tables where appropriate. The low design speeds and traffic calming measures will ensure the safe operation of these junctions and a safe/secure environment for pedestrians and cyclists.

The proposed speed reduction measures are in line with Item 3.(g) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025.

The design and layout of the proposal has been prepared to fully comply with the current relevant design standards and specifications applicable to this form of development.

Sufficient parallel and perpendicular parking spaces have been reserved in accordance with local guidelines.

The following figure shows the layout of the development with the access points and connections with adjacent approved development.

The proposed Internal Layout is consistent with Items 3.(f) and 3.(h) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025.



Figure 19 | Proposed Site Access Points and Internal Road Layout

The primary access to the subject development is from Slane Road, situated on the southern side of the site. As previously mentioned, the proposed planning application includes an upgraded junction at the intersection of the Subject Site Access Road and Old Slane Road. The new roundabout will have a radius

of 8 metres to accommodate buses up to 10.60 metres in length with three axles, as illustrated in the figure below.

The proposed roundabout is consistent with Item 3.(d) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025.

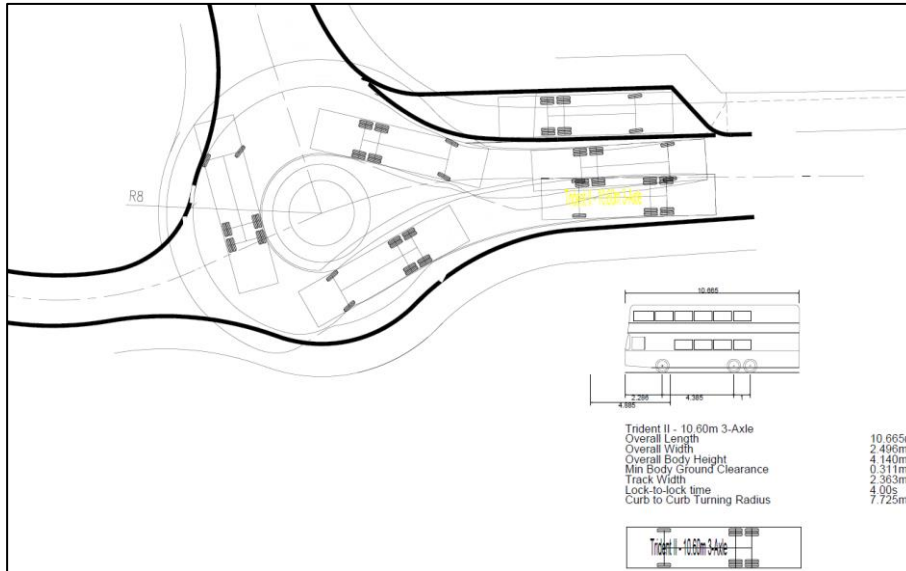


Figure 20 | Proposed Site Access Roundabout

The internal road network runs northwards to the primary connection into the committed development under Planning Application Ref. No. 2460266. A shared road to the east of the subject development provides a secondary connection into the committed development under Planning Application Ref. No. 2460266.

5.9.3 Quality Audit

A Quality Audit has been carried out by RoadPlan which is provided in Appendix C of this report. These recommendations have been incorporated into the design.

5.9.4 DMURS

Waterman Moylan Consulting Engineers considers that the proposed development is consistent with the principles and guidance outlined in the Design Manual for Urban Roads and Streets (DMURS). Outlined below are some of the specific design features that have been incorporated within the proposed scheme with the objective of delivering a design that is in full compliance with DMURS.

In order of importance, DMURS prioritises pedestrians, cyclists, public transport and private cars. The proposed development has been designed with pedestrians and cyclists taking precedence over other modes of transport. In this regard, footpaths are provided throughout the development, with the required pedestrian and cyclist linkages onto the facilities in the close proximity of the site.

DMURS recommends using active edges to enliven the street and create a more engaging environment. This is achieved through frequent entrances and openings that overlook the street and generate pedestrian activity. The roads in the development have regular junctions and driveways in accordance with this recommendation.

On-street parking is proposed at several locations. On-street parking separates pedestrians from the vehicle roadway and, as per DMURS Section 4.4.9, can calm traffic by increasing driver caution, contribute to pedestrian comfort by providing a buffer between the vehicular carriageway and footpath and provide good levels of passive security.

Streets have been designed in accordance with the alignment and curvature recommendations set out in DMURS Section 4.4.6. The road layout is generally orthogonal. Section 3.3.1 of DMURS notes that street networks that are generally orthogonal in nature are the most effective in terms of permeability (and legibility). Regular junctions along with raised pedestrian tables/crossings at main pedestrian desire lines will encourage reduced driving speeds.

The proposed 'home zones' are designed to prioritise the needs of pedestrians, cyclists, children and residents, and to reduce the speed and dominance of cars. The home zones consist of a shared roadway. Entrance treatment to home zones is in the form of a ramp, which helps to indicate that a driver is entering a home zone and intends to use a different road surface colour in the local zones.

Suitable sightlines will be provided throughout the development, ensuring that localised planting does not obscure visibility as cars make turning manoeuvres, improving the pedestrian safety at crossing points.

Public areas fronting and within the proposed development will be designed by a multidisciplinary design team to accommodate pedestrians and cyclists in accordance with the appropriate principles and guidelines set out in DMURS. In particular, the vehicular access and public footways within the remit of the development will incorporate the relevant DMURS requirements and guidelines as set out above.

5.10 Parking Strategy

To determine the appropriate amount of car and cycle parking for the proposed development, reference will be made to the following guidelines/policies:

- Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)
- Louth County Development Plan 2021-2027

5.10.1 Car Parking

Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)

The Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities set national planning policy and guidance in relation to the planning and development of urban and rural settlements, with a focus on sustainable residential development and the creation of compact settlements.

The chapter 5.3.4 Car Parking – Quantum, Form and Location. In this chapter considerate three areas:

- (i) In city centres and urban neighbourhoods of the five cities, defined in Chapter 3 of that document (Table 3.1 and Table 3.2) car-parking provision should be minimised, substantially reduced, or wholly eliminated. The maximum rate of car parking provision for residential development at these locations, where such provision is justified to the satisfaction of the planning authority, shall be 1 no. space per dwelling.
- (ii) In accessible locations, defined in Chapter 3 of that document (Table 3.8) car- parking provision should be substantially reduced. The maximum rate of car parking provision for residential development, where such provision is justified to the satisfaction of the planning authority, shall be 1.5 no. spaces per dwelling.
- (iii) In intermediate and peripheral locations, defined in Chapter 3 of that document (Table 3.8) the maximum rate of car parking provision for residential development, where such provision is justified to the satisfaction of the planning authority, shall be 2 no. spaces per dwelling.

The table 3.1 of Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities define:

City – Centre: The city centres of Dublin and Cork, comprising the city core and immediately surrounding neighbourhoods, are the most central and accessible urban locations nationally with the greatest intensity of land uses, including higher order employment, recreation, cultural, education, commercial and retail uses. It is a policy and objective of these Guidelines that residential densities in the range 100 dph to 300 dph (net) shall generally be applied in the centres of Dublin and Cork.

City - Urban Neighbourhoods: The city urban neighbourhoods category includes: (i) the compact medium density residential neighbourhoods around the city centre that have evolved overtime to include a greater range of land uses, (ii) strategic and sustainable development locations, (iii) town centres designated in a statutory development plan, and (iv) lands around existing or planned high-capacity public transport nodes or interchanges (defined in Table 3.8) – all within the city and suburbs area. These are highly accessible urban locations with good access to employment, education and institutional uses and public transport. It is a policy and objective of these Guidelines that residential densities in the range 50 dph to 250 dph (net) shall generally be applied in urban neighbourhoods of Dublin and Cork.

City - Suburban/Urban Extension: Suburban areas are the lower density car-orientated residential suburbs constructed at the edge of cities in the latter half of the 20th and early 21st century, while urban

extension refers to the greenfield lands at the edge of the existing built-up footprint that are zoned for residential or mixed-use (including residential) development. It is a policy and objective of these Guidelines that residential densities in the range 40 dph to 80 dph (net) shall generally be applied at suburban and urban extension locations in Dublin and Cork, and that densities of up to 150 dph (net) shall be open for consideration at 'accessible' suburban / urban extension locations (as defined in Table 3.8).

The table 3.8 of Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities indicate:

High-Capacity Public Transport Node or Interchange: Lands within 1,000 metres (1km) walking distance of an existing or planned high-capacity urban public transport node or interchange, namely an interchange or node that includes DART, high frequency Commuter Rail, light rail or MetroLink services; or locations within 500 metres walking distance of an existing or planned BusConnects 'Core Bus Corridor' 12 stop.

Accessible Location: Lands within 500 metres (i.e. up to 5–6-minute walk) of existing or planned high frequency (i.e. 10-minute peak hour frequency) urban bus services.

Intermediate Location: Lands within 500-1,000 metres (i.e. 10–12-minute walk) of existing or planned high frequency (i.e. 10-minute peak hour frequency) urban bus services; and Lands within 500 metres (i.e. 6-minute walk) of a reasonably frequent (minimum 15-minute peak hour frequency) urban bus service.

Peripheral: Lands that do not meet the proximity or accessibility criteria detailed above. This includes all lands in Small and Medium Sized Towns and in Rural Towns and Villages.

From the above description and considering the information in **Chapter 5** of this EAR, the current development is in the Peripheral Area. - The closest bus stop to the subject development, situated at the entrance to M1 Retail Park is a c. 1.4km or 20-minute walk. Once the pedestrian / cycle link is completed, the distance between the subject development and the bus stop through the future committed development Planning Application Ref. 2460266 will be reduced to c.1.1km or 13-minute walk mention in Chapter 5. This bus stop is served by Bus Eireann Routes 173 and 190, and by Local Link Route 188 which have a frequency of one hour.

Therefore, it is considered that 2 parking spaces per dwelling would be the maximum appropriate for the subject development.

The following table summarises the maximum number of car parking spaces required by this standard.

Land Use	Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities	
	Parking space Standard	Car Parking spaces required (Maximum) Resident / Visitor
47 Houses	2	94

Table 9 | Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities – Maximum Car Parking Spaces

Louth County Development Plan 2021-2027 (incl. variation 1 and 2)

The Louth County Development Plan 2021-2027, chapter 13, divided the Car Parking Requirements in three areas:

- Area 1 - Applies to land within 1km of Drogheda Train Station. High-Capacity Public Transport Node or Interchange: Lands Located within Town and Settlement Centres: Lands within 1,000 metres (1km) walking distance of an existing or planned high-capacity urban public transport node or interchange,

namely an interchange or node that includes DART, high frequency Commuter Rail. Highest densities should be applied at the node or interchange and decrease with distance

- Area 2 - Applies to Regional Growth Centres - Drogheda and Dundalk. Accessible Locations Town centre of Regional Growth Centres and /or lands within 500 metres (i.e. up to 5–6-minute walk) of existing or planned high frequency (i.e. 10-minute peak hour frequency) urban bus services.
- Area 3 - Applies to Self-Sustaining Growth Towns, Self-Sustaining Towns, Small Towns and Villages, and Rural Nodes.
 - Intermediate and Peripheral Locations Intermediate Location: Lands within 500-1,000 metres (i.e. 10–12-minute walk) of existing or planned high frequency (i.e. 10-minute peak hour frequency) urban bus services; and Lands within 500 metres (i.e. 6-minute walk) of a reasonably frequent (minimum 15-minute peak hour frequency) urban bus service.
 - Peripheral Location: Lands that do not meet the proximity or accessibility criteria detailed above. This includes all lands in Self-Sustaining Growth Towns, Self-Sustaining Towns, Small Towns and Villages, and Rural Nodes.

As indicated in **Chapter 5** of this EAR, the current development is in Area 3. According to Table 13.11 of this Development Plan, the residential dwelling requires 2 parking spaces per dwelling.

The table below summarises the number of car parking spaces required.

Land Use	No. units	Louth County Development Plan 2021-2027	
		Parking space Maximum	Car Parking spaces required (Maximum) Resident / Visitor
1-bed	5	2	10
2-bed	16	2	32
3-bed	23	2	46
4-bed	3	2	6
Total	47		94

Table 10 | Louth County Development Plan 2021-2027 – Maximum Car Parking Spaces

Car Parking Proposed

A comparison of the standards presented above, the *Louth County Development Plan 2021-2027*, and the *Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)* reveals a similar number of car parking spaces.

It is also important to note that the standards presented above do not consider the type of unit. This can be observed in that the aforementioned standards considered 2 no. car parking spaces for all units, including 1-bed and 2-bed units, which could result in a high number of car parking spaces.

Consequently, for the purpose of subject development, it is proposed that an average of one car parking space be allocated for the 1-bed and 2-bed units. With regard to the remaining 3-bed and 4-bed units, 2 No. car parking spaces are proposed for each unit. In addition, it is proposed 1 No. car parking spaces for visitors per 3 No. simplex and duplex units.

The table below present the breakdown of the proposed car parking spaces.

Land Use	No. units	Car Parking Spaces Proposed			
		Parking Ratio		Car Parking spaces	
		Residents	Visitors	Residents	Visitors

1-bed simplex	5	1	1 / 3 units	5	4
2-bed duplex	5	1		5	
2-bed houses	11	1	0	11	0
3-bed houses	23	2	0	46	0
4-bed houses	3	2	0	6	0
Total	47			73	4
			1.65		77

Table 11 | Car Parking Spaces - Proposed

Therefore, for the Subject Development is proposed a total of 77 No. car spaces are proposed, including 73 No. for residents and 4 No. for visitors. The proposed development includes 20 No car parking spaces which equal to 20% of the overall car parking spaces. The proposed EV car parking spaces is consistent with Item 3.(i) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025.

5.10.2 Cycle Parking

Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024)

The Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities set national planning policy and guidance in relation to the planning and development of urban and rural settlements, with a focus on sustainable residential development and the creation of compact settlements.

The chapter 5.3.5 Bicycle Parking and Storage indicate that in areas of high and medium accessibility, planning authorities must ensure that new residential developments have high quality cycle parking and cycle storage facilities for both residents and visitors. Access to secure storage of bicycles is a key concern for residents in more compact housing developments.

It is a specific planning policy requirement of these Guidelines that all new housing schemes (including mixed-use schemes that include housing) include safe and secure cycle storage facilities to meet the needs of residents and visitors. The following requirements for cycle parking and storage are recommended:

- (i) **Quantity** – in the case of residential units that do not have ground level open space or have smaller terraces, a general minimum standard of 1 cycle storage space per bedroom should be applied. Visitor cycle parking should also be provided. Any deviation from these standards shall be at the discretion of the planning authority and shall be justified with respect to factors such as location, quality of facilities proposed, flexibility for future enhancement/ enlargement, etc. It will be important to make provision for a mix of bicycle parking types including larger/heavier cargo and electric bikes and for individual lockers.
- (ii) **Design** – cycle storage facilities should be provided in a dedicated facility of permanent construction, within the building footprint or, where not feasible, within an adjacent or adjoining purpose-built structure of permanent construction. Cycle parking areas shall be designed so that cyclists feel safe. It is best practice that either secure cycle cage/compound or preferably locker facilities are provided.

For the bicycle parking proposal, the recommendations indicated above will be followed.

Louth County Development Plan 2021-2027

The Louth County Development Plan 2021-2027, Chapter 13 Section 16, states that secure cycle parking should be provided in new developments in accordance with the standards set out overleaf. This section defines long-term parking as parking for more than three hours.

Table 13.12 of this standard indicates that for apartments, flats, sheltered housing and housing a minimum of 1 cycle space per bedroom is required for long stay and 1 space per 2 units for visitor/short stay.

The table below summarises the number of cycle parking spaces required.

Land Use	No. units	Louth County Development Plan 2021-2027 (Minimum)				
		Cycle parking Standard		Cycle Parking		
		Long Stay	Short Stay	Long Stay	Short Stay	Total
1-bed	5	1	0.5	5	2	7
2-bed	16	2	0.5	32	8	40
3-bed	23	3	0.5	69	11	80
4-bed	3	4	0.5	12	2	14
Total	47			118	23	141

Table 12 | Louth County Development Plan 2021-2027- Minimum Cycle Parking Spaces

Cycle Parking Proposed

According to the different development plans seen above, for the present development, the *Louth County Development Plan 2021-2027 standards* is considered appropriate for the development.

The table below shows the breakdown the number of cycle parking spaces proposed:

Land Use	No. units	Cycle Parking Spaces Proposed				
		Cycle Parking Ratio		Cycle Parking Proposed		
		Long Stay	Short Stay	Long Stay	Short Stay	Total
1-bed	5	1	0.5	5	2	7
2-bed	16	2	0.5	32	8	40
3-bed	23	3	0.5	69	11	80
4-bed	3	4	0.5	12	2	14
Public cycle parking spaces				0	5	5
Total	47	2.51	0.5	118	28	146

Table 13 | Cycle Parking Spaces Proposed

A total of 146 No. cycle parking spaces is proposed as part of the subject development comprising of 118 No. cycle spaces for residents and 28 No. for visitor. Cycle parking spaces are proposed in the rear garden for end of terrace houses and in the front garden for mid terraced houses. In addition, the proposed public cycle parking spaces at the site entrance, allowing for LCC's bike share scheme operator to allocate same within the development, is in line with Item 3.(j) of the Planning Report on the Recommended Opinion for the LRD, dated 27 June 2025.

Appendices

A. Uisce Éireann Confirmation of Feasibility Letter

CONFIRMATION OF FEASIBILITY

Kevin Muhia

Block S, Eastpoint Business Park
Alfie Byrne Road
Dublin 3
Dublin
D03H3F4

3 July 2025

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

**Our Ref: CDS25002896 Pre-Connection Enquiry
Site at, Slane Road, Drogheda, Louth**

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 60 unit(s) at Site at, Slane Road, Drogheda, Louth, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection**
 - Feasible Subject to upgrades
 - In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Uisce Eireann network. A PRV (Marley's Lane) is to be installed & commissioned. The proposed connection could be completed as soon as possibly practicable after these works are completed. Timeline for this project to be confirmed.

In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Uisce Eireann network. Approximately 50m of new 450mm ID

Stiúróirí / Directors: Niall Gleeson (POF / CEO), Jerry Grant (Cathaoirleach / Chairperson), Gerard Britchfield, Liz Joyce, Michael Nolan, Patricia King, Eileen Maher, Cathy Mannion, Paul Reid, Michael Walsh.

Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin, Ireland D01NP86

Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Uisce Éireann is a designated activity company, limited by shares.

Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

- **Wastewater Connection**
 - watermain & a Flow Control Valve is to be laid (See Figure 2 below).
 - Feasible without infrastructure upgrade by Uisce Éireann
 - Customer to engage at Connection Application stage in relation to the sizing of the Existing Wastewater Pumping Station, to cater for additional units & to ensure the storage requirements are met for the additional flows.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

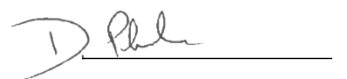
Where can you find more information?

- **Section A** - What is important to know?
- **Section B** - Details of Uisce Éireann's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit www.water.ie/connections, email newconnections@water.ie or contact 1800 278 278.

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

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

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

Section B – Details of Uisce Éireann’s Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email

datarequests@water.ie

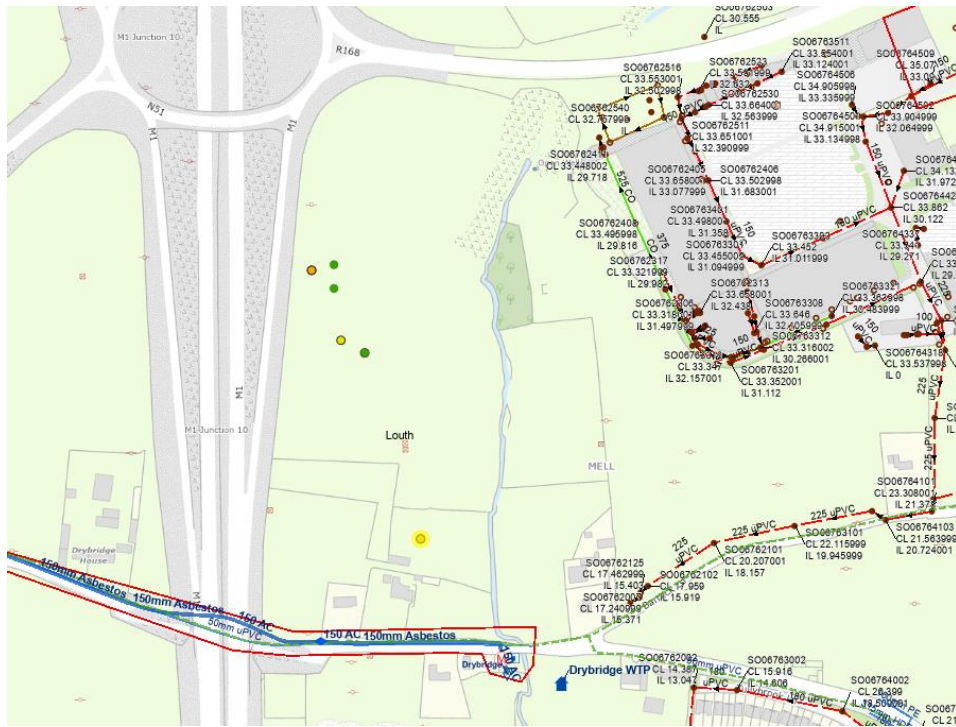


Figure 1 - Existing GIS Layout

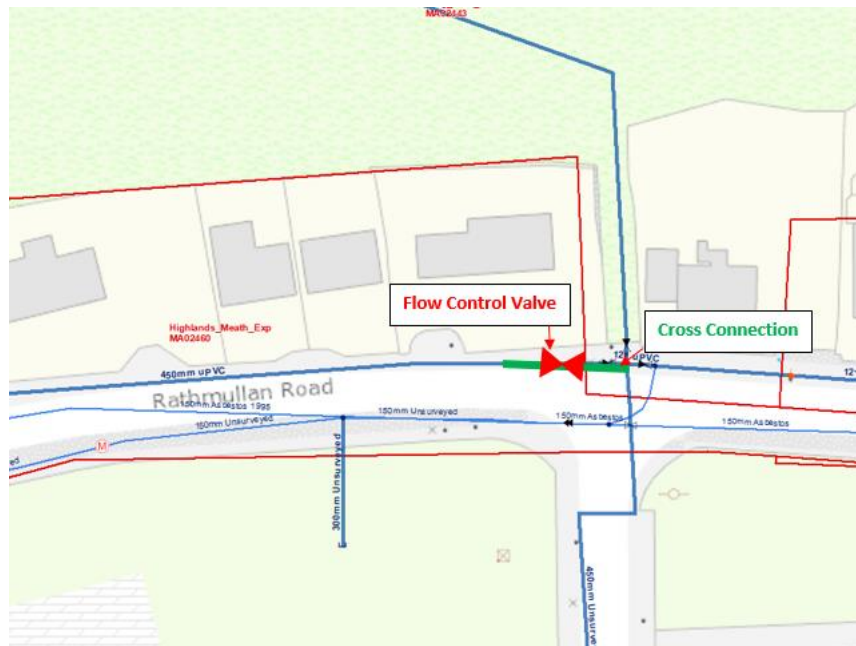


Figure 2 - Proposed Upgrades

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

Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann's underground network(s) 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.

B. Greenfield Run-off Rate and Attenuation Calculations for Proposed Site



Block S, EastPoint Business Park,
Alfie Byrne Road, Dublin D03 H3F4
t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie

Calculation By: KM
Approved by: MD

Project Data

Project Name	Old Slane Road LRD C1
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	31/03/2025

Description	%	Area
Total Site Area	-	11,592m ²
Paved Area	Total	66%
	Drained	100%
Soil Area	Total	34%
	Drained	0%

Soil Type:	Type 2
SPR Index (from FSR):	0.30
SAAR:	801mm
Rain Data:	Met Éireann
Climate Change Factor:	20%

Greenfield Runoff:

$$Q_{BARrural} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$$

Area = 0.01159km² ... Total site area in km²
 SAAR = 801mm ... Standard Average Annual Rainfall in mm
 SOIL = 0.30 ... The "SPR" index from FSR

Note: Where a site is <0.5km², the Q_{BARrural} formula should be applied for 0.5km² and the result factored based on the ratio of the actual site area and the applied area.

Q_{BARrural} = 0.002m³/s
 Q_{BARrural} = 2.474 l/s
 Q_{BARrural} = 2.134 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q _{BAR} (l/s)	2.10	5.19	6.43
Q _{BAR} (l/s/Ha)	1.81	4.48	5.55
Allowable Discharge	2.47	2.47	2.47

Rainfall Data:

Rain Data From: Met Éireann Archive
 Climate Change Factor: 20%

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.2	14.4	17.4	20.6	22.8	25.7	30.2
1	12.0	18.5	22.1	25.9	28.6	32.0	37.3
2	15.7	23.5	28.0	32.6	35.6	39.8	46.2
4	20.5	30.1	35.4	41.0	44.6	49.6	57.0
6	24.0	34.8	40.7	46.9	51.0	56.4	64.6
12	31.2	44.4	51.5	59.0	63.8	70.2	79.8
24	40.7	56.8	65.3	74.3	79.9	87.5	98.6
48	49.4	67.4	76.8	86.6	92.8	100.9	113.0



Block S, EastPoint Business Park,
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Calculation By: KM
Approved by: MD

Summary

Project Name	Old Slane Road LRD C1
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	31/03/2025

Summary of GDSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	30.59m ³
Treatment Volume	91.76m ³

Criterion 2: River Regime Protection

Critical Storm:	24-hour 1-in-100-year storm
Volume Required	540.52m ³

Criterion 4: River Flood Protection

Long Term Storage (no interception provided)	216.25m ³
Long Term Storage (Interception provided)	185.67m ³

Attenuation Volume Requirement for Various Storm Events:

1-in-1-Year Storm	131.71m ³
1-in-5-Year Storm	232.64m ³
1-in-10-Year Storm	286.78m ³
1-in-20-Year Storm	354.26m ³
1-in-30-Year Storm	397.38m ³
1-in-50-Year Storm	455.19m ³
1-in-100-Year Storm	540.52m ³
Maximum Volume Requirement	540.52m³



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Criterion 1 River Protection Volume

Project Name	Old Slane Road LRD C1
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	31/03/2025

1.1 Interception

Paved surfaces connected to drainage system	$11592.37m^2 \times 0.6596 \times 1 =$ 7,646.33m ²	11,592m ² site area 66% of the site is paved 100% of the paved area
Volume of Interception Storage	$7646.327252m^2 \times 5mm \times 0.8 =$ 30.59m³	Paved area directly drained 5mm rainfall depth 80% paved runoff factor

1.2 Treatment Volume

Paved surfaces draining to public drainage network	$11592.37m^2 \times 0.6596 \times 1 =$ 7,646.33m ²	11,592m ² site area 66% of the site is paved 100% of the paved area
Volume of Treatment Storage	$7646.327252m^2 \times 15mm \times 0.8 =$ 91.76m³	Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces



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Criterion 2 River Regime Protection

Project Name	Old Slane Road LRD C1
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	31/03/2025

Rainfall Data (Including 20% increase due to climate change)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.2	14.4	17.4	20.6	22.8	25.7	30.2
1	12.0	18.5	22.1	25.9	28.6	32.0	37.3
2	15.7	23.5	28.0	32.6	35.6	39.8	46.2
4	20.5	30.1	35.4	41.0	44.6	49.6	57.0
6	24.0	34.8	40.7	46.9	51.0	56.4	64.6
12	31.2	44.4	51.5	59.0	63.8	70.2	79.8
24	40.7	56.8	65.3	74.3	79.9	87.5	98.6
48	49.4	67.4	76.8	86.6	92.8	100.9	113.0

Inflow (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	70.7	110.1	133.0	157.8	174.3	196.4	231.2
1	91.8	141.3	168.8	198.2	218.4	245.0	285.4
2	120.2	179.8	213.8	249.6	272.5	304.6	353.3
4	156.9	230.3	270.7	313.8	341.3	379.0	435.8
6	183.5	266.1	311.1	358.8	390.0	431.3	493.6
12	238.6	339.5	393.6	451.4	488.1	536.8	610.2
24	311.1	434.0	499.2	568.0	611.1	668.9	754.2
48	378.0	515.7	587.2	662.5	709.3	771.7	864.3

Outflow (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
1	8.9	8.9	8.9	8.9	8.9	8.9	8.9
2	17.8	17.8	17.8	17.8	17.8	17.8	17.8
4	35.6	35.6	35.6	35.6	35.6	35.6	35.6
6	53.4	53.4	53.4	53.4	53.4	53.4	53.4
12	106.9	106.9	106.9	106.9	106.9	106.9	106.9
24	213.7	213.7	213.7	213.7	213.7	213.7	213.7
48	427.4	427.4	427.4	427.4	427.4	427.4	427.4

Storage Required (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	66.2	105.7	128.6	153.4	169.9	191.9	226.8
1	82.9	132.4	159.9	189.3	209.5	236.1	276.5
2	102.4	162.0	196.0	231.8	254.7	286.8	335.5
4	121.3	194.7	235.1	278.2	305.7	343.3	400.2
6	130.1	212.7	257.6	305.3	336.5	377.8	440.2
12	131.7	232.6	286.8	344.6	381.3	429.9	503.3
24	97.3	220.3	285.4	354.3	397.4	455.2	540.5
48	0.0	88.2	159.8	235.1	281.9	344.2	436.9



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Criterion 4 River Flood Protection

Project Name	Old Slane Road LRD C1
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	31/03/2025

$$Vol_{xs} = RD \times A \times 10 [(PIMP/100 \times \alpha 0.8) + (1 - (PIMP/100))(\beta \times Soil) - Soil]$$

Vol _{xs}		... Extra runoff volume of development over Greenfield runoff
RD	= 65 mm	... Rainfall depth of the 100-year, 6-hour event
A	= 1.159 Ha	... Area of site
PIMP	= 66%	... Impermeable area of total site
$\alpha 0.8$	= 100%	... Proportion of paved area drained to drainage network or river with 80% runoff
β	= 60%	... Proportion of pervious area drained to the network or river
Soil	= 0.30	... SPR index

$$Vol_{xs} = 216.25m^3$$



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Approved by: MD

Project Data

Project Name	Old Slane Road LRD C2
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	10/03/2025

Description	%	Area
Total Site Area	-	7,495m ²
Paved Area	Total	54%
	Drained	100%
Soil Area	Total	46%
	Drained	0%

Soil Type:	Type 2
SPR Index (from FSR):	0.30
SAAR:	801mm
Rain Data:	Met Éireann
Climate Change Factor:	20%

Greenfield Runoff:

$$Q_{BARrural} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$$

Area = 0.0075km² ... Total site area in km²
 SAAR = 801mm ... Standard Average Annual Rainfall in mm
 SOIL = 0.30 ... The "SPR" index from FSR

Note: Where a site is <0.5km², the Q_{BARrural} formula should be applied for 0.5km² and the result factored based on the ratio of the actual site area and the applied area.

Q_{BARrural} = 0.002m³/s
 Q_{BARrural} = 1.599 l/s ... Note: where greenfield runoff value is <2l/s, a value of 2l/s shall be taken
 Q_{BARrural} = 2.668 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q _{BAR} (l/s)	1.70	4.20	5.20
Q _{BAR} (l/s/Ha)	2.27	5.60	6.94
Allowable Discharge	2.00	2.00	2.00

Rainfall Data:

Rain Data From: Met Éireann Archive
 Climate Change Factor: 20%

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.2	14.4	17.4	20.6	22.8	25.7	30.2
1	12.0	18.5	22.1	25.9	28.6	32.0	37.3
2	15.7	23.5	28.0	32.6	35.6	39.8	46.2
4	20.5	30.1	35.4	41.0	44.6	49.6	57.0
6	24.0	34.8	40.7	46.9	51.0	56.4	64.6
12	31.2	44.4	51.5	59.0	63.8	70.2	79.8
24	40.7	56.8	65.3	74.3	79.9	87.5	98.6
48	49.4	67.4	76.8	86.6	92.8	100.9	113.0



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Summary

Project Name	Old Slane Road LRD C2
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	10/03/2025

Summary of GSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	16.13m ³
Treatment Volume	48.40m ³

Criterion 2: River Regime Protection

Critical Storm:	12-hour 1-in-100-year storm
Volume Required	235.46m ³

Criterion 4: River Flood Protection

Long Term Storage (no interception provided)	103.37m ³
Long Term Storage (Interception provided)	87.24m ³

Attenuation Volume Requirement for Various Storm Events:

1-in-1-Year Storm	53.96m ³
1-in-5-Year Storm	97.16m ³
1-in-10-Year Storm	121.23m ³
1-in-20-Year Storm	151.73m ³
1-in-30-Year Storm	171.08m ³
1-in-50-Year Storm	196.74m ³
1-in-100-Year Storm	235.46m ³
Maximum Volume Requirement	235.46m³



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Criterion 1 River Protection Volume

Project Name	Old Slane Road LRD C2
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	10/03/2025

1.1 Interception

Paved surfaces connected to drainage system	$7495.42m^2 \times 0.5381 \times 1 =$ $4,033.29m^2$	7,495m ² site area 54% of the site is paved 100% of the paved area
Volume of Interception Storage	$4033.285502m^2 \times 5mm \times 0.8 =$ 16.13m³	Paved area directly drained 5mm rainfall depth 80% paved runoff factor

1.2 Treatment Volume

Paved surfaces draining to public drainage network	$7495.42m^2 \times 0.5381 \times 1 =$ $4,033.29m^2$	7,495m ² site area 54% of the site is paved 100% of the paved area
Volume of Treatment Storage	$4033.285502m^2 \times 15mm \times 0.8 =$ 48.40m³	Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces



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Criterion 2 River Regime Protection

Project Name	Old Slane Road LRD C2
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	10/03/2025

Rainfall Data (Including 20% increase due to climate change)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.2	14.4	17.4	20.6	22.8	25.7	30.2
1	12.0	18.5	22.1	25.9	28.6	32.0	37.3
2	15.7	23.5	28.0	32.6	35.6	39.8	46.2
4	20.5	30.1	35.4	41.0	44.6	49.6	57.0
6	24.0	34.8	40.7	46.9	51.0	56.4	64.6
12	31.2	44.4	51.5	59.0	63.8	70.2	79.8
24	40.7	56.8	65.3	74.3	79.9	87.5	98.6
48	49.4	67.4	76.8	86.6	92.8	100.9	113.0

Inflow (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	37.3	58.1	70.2	83.2	92.0	103.6	122.0
1	48.4	74.5	89.1	104.5	115.2	129.2	150.5
2	63.4	94.9	112.8	131.6	143.7	160.7	186.3
4	82.8	121.5	142.8	165.5	180.0	199.9	229.9
6	96.8	140.4	164.1	189.2	205.7	227.5	260.4
12	125.8	179.1	207.6	238.1	257.5	283.1	321.9
24	164.1	228.9	263.3	299.6	322.3	352.8	397.8
48	199.4	272.0	309.8	349.4	374.1	407.0	455.9

Outflow (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1	7.2	7.2	7.2	7.2	7.2	7.2	7.2
2	14.4	14.4	14.4	14.4	14.4	14.4	14.4
4	28.8	28.8	28.8	28.8	28.8	28.8	28.8
6	43.2	43.2	43.2	43.2	43.2	43.2	43.2
12	86.4	86.4	86.4	86.4	86.4	86.4	86.4
24	172.8	172.8	172.8	172.8	172.8	172.8	172.8
48	345.6	345.6	345.6	345.6	345.6	345.6	345.6

Storage Required (m³)

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	33.7	54.5	66.6	79.6	88.4	100.0	118.4
1	41.2	67.3	81.9	97.3	108.0	122.0	143.3
2	49.0	80.5	98.4	117.2	129.3	146.3	171.9
4	54.0	92.7	114.0	136.7	151.2	171.1	201.1
6	53.6	97.2	120.9	146.0	162.5	184.3	217.2
12	39.4	92.7	121.2	151.7	171.1	196.7	235.5
24	0.0	56.1	90.5	126.8	149.5	180.0	225.0
48	0.0	0.0	0.0	3.8	28.5	61.4	110.3



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Criterion 4 River Flood Protection

Project Name	Old Slane Road LRD C2
Project Number	23-067
Client	Lagan Homes
Architect	JFOC Architects
Status	Planning
Date	10/03/2025

$$Vol_{xs} = RD \times A \times 10 [(PIMP/100 \times \alpha 0.8) + (1 - (PIMP/100))(\beta \times Soil) - Soil]$$

Vol _{xs}		... Extra runoff volume of development over Greenfield runoff
RD	= 65 mm	... Rainfall depth of the 100-year, 6-hour event
A	= 0.750 Ha	... Area of site
PIMP	= 54%	... Impermeable area of total site
$\alpha 0.8$	= 100%	... Proportion of paved area drained to drainage network or river with 80% runoff
β	= 60%	... Proportion of pervious area drained to the network or river
Soil	= 0.30	... SPR index

$$Vol_{xs} = 103.37m^3$$

Design Settings

Rainfall Methodology FSR Return Period (years) 5 Additional Flow (%) 0 FSR Region Scotland and Ireland M5-60 (mm) 15.400 Ratio-R 0.274 CV 1.000 Time of Entry (mins) 4.00	Maximum Time of Concentration (mins) 30.00 Maximum Rainfall (mm/hr) 50.0 Minimum Velocity (m/s) 1.00 Connection Type Level Soffits Minimum Backdrop Height (m) 0.200 Preferred Cover Depth (m) 1.200 Include Intermediate Ground <input checked="" type="checkbox"/> Enforce best practice design rules <input checked="" type="checkbox"/>
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Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.060	4.00	21.413	1200	705948.687	776212.032	1.840
2	0.031	4.00	20.575	1200	705946.516	776190.912	1.865
3	0.020	4.00	19.895	1200	705948.269	776174.137	1.860
4	0.031	4.00	19.745	1200	705941.953	776170.942	2.035
5	0.080	4.00	22.517	1200	705871.160	776255.085	2.107
6	0.085	4.00	22.214	1200	705895.845	776252.361	2.214
7	0.063	4.00	21.515	1200	705868.852	776228.297	1.990
8	0.053	4.00	21.331	1200	705893.113	776225.978	2.343
9	0.031	4.00	20.728	1200	705892.140	776208.797	2.245
10	0.052	4.00	20.357	1200	705889.181	776199.762	2.111
11	0.056	4.00	19.471	1350	705886.837	776177.576	2.077
13	0.049	4.00	19.300		705859.867	776169.146	2.764
15	0.037	4.00	19.150	1200	705868.847	776161.977	2.442
16	0.049	4.00	18.957	1200	705864.249	776149.544	2.521
17	0.071	4.00	18.602	1200	705911.621	776124.644	1.882
18	0.035	4.00	18.485	1200	705894.587	776125.980	2.050
19	0.059	4.00	18.289	1350	705877.442	776117.720	2.285
20	0.049	4.00	18.450	1200	705859.132	776100.429	2.223
21	0.029	4.00	18.184	1350	705882.861	776106.566	2.263
22	0.038	4.00	17.660		705905.251	776088.936	2.164
23	0.042	4.00	17.812	1350	705883.899	776088.313	2.422
24	0.023	4.00	17.397	1500	705884.379	776071.957	2.116
PP1	0.016	4.00	19.745		705952.146	776166.843	0.500
PP2	0.010	4.00	20.357		705883.953	776206.921	0.500
PP3	0.007	4.00	20.357		705898.545	776198.501	0.500
PP4	0.002	4.00	19.745		705937.646	776165.282	0.500
PP5	0.005	4.00	18.602		705926.597	776126.229	0.500
PP6	0.020	4.00	18.602		705911.659	776130.108	0.500
PP7	0.005		18.450		705853.642	776097.867	0.500
6.1		4.00	22.496	1200	705896.818	776260.765	2.056
15.1		4.00	19.323	1200	705883.607	776171.176	2.181
24.1			16.270	1200	705944.405	776071.438	1.430
PP8	0.010	4.00	18.289		705877.863	776135.682	0.700

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1	1	2	21.231	0.600	19.573	18.710	0.863	24.6	225	4.13	50.0
2	2	3	10.313	0.600	18.710	18.035	0.675	15.3	225	4.18	50.0
3	3	4	7.078	0.600	18.035	17.710	0.325	21.8	225	4.23	50.0
4	4	11	55.514	0.600	17.710	17.430	0.280	198.3	225	5.23	50.0
5	5	6	24.835	0.600	20.410	20.000	0.410	60.6	225	4.25	50.0
6	6	8	26.524	0.600	20.000	18.988	1.012	26.2	225	4.42	50.0
7	7	8	24.372	0.600	19.525	18.988	0.537	45.4	225	4.21	50.0
8	8	9	17.209	0.600	18.988	18.558	0.430	40.0	225	4.56	50.0
9	9	10	9.507	0.600	18.483	18.246	0.237	40.1	300	4.62	50.0
10	10	11	22.309	0.600	18.246	17.430	0.816	27.3	300	4.74	50.0
11	11	13	28.257	0.600	17.394	17.253	0.141	200.4	375	5.60	50.0
13	13	16	19.986	0.600	16.536	16.436	0.100	199.9	225	5.96	50.0
15	15	16	13.256	0.600	16.708	16.436	0.272	48.7	225	4.26	50.0
16	16	19	34.450	0.600	16.436	16.004	0.432	79.7	225	6.35	50.0
17	17	18	17.086	0.600	16.720	16.435	0.285	60.0	225	4.42	50.0
18	18	19	19.031	0.600	16.435	16.004	0.431	44.2	225	4.58	50.0
19	19	21	12.401	0.600	16.004	15.921	0.083	149.4	225	6.54	50.0
20	20	21	24.510	0.600	16.227	15.921	0.306	80.1	225	4.28	50.0
21	21	23	18.282	0.600	15.921	15.390	0.531	34.4	225	6.68	50.0
22	22	23	21.361	0.600	15.496	15.390	0.106	201.5	225	4.39	50.0
23	23	24	16.363	0.600	15.390	15.281	0.109	150.1	225	6.94	50.0
7.000	PP1	4	10.986	0.600	19.245	19.060	0.185	59.4	100	4.18	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1	2.648	105.3	10.9	1.615	1.640	0.060	0.0	49	1.729
2	3.364	133.8	16.5	1.640	1.635	0.092	0.0	53	2.308
3	2.816	112.0	20.2	1.635	1.810	0.112	0.0	65	2.152
4	0.925	36.8	29.1	1.810	1.816	0.161	0.0	152	1.023
5	1.683	66.9	14.4	1.882	1.989	0.080	0.0	71	1.349
6	2.565	102.0	29.8	1.989	2.118	0.165	0.0	83	2.234
7	1.946	77.4	11.4	1.765	2.118	0.063	0.0	58	1.407
8	2.074	82.5	50.9	2.118	1.945	0.281	0.0	128	2.178
9	2.489	176.0	56.4	1.945	1.811	0.312	0.0	116	2.223
10	3.018	213.3	68.8	1.811	1.741	0.381	0.0	117	2.701
11	1.276	140.9	108.0	1.702	1.672	0.598	0.0	247	1.401
13	0.921	36.6	116.9	2.539	2.296	0.647	0.0	225	0.938
15	1.878	74.7	6.7	2.217	2.296	0.037	0.0	45	1.172
16	1.465	58.3	132.4	2.296	2.060	0.733	0.0	225	1.492
17	1.692	67.3	17.2	1.657	1.825	0.095	0.0	78	1.425
18	1.974	78.5	23.6	1.825	2.060	0.130	0.0	84	1.727
19	1.067	42.4	168.5	2.060	2.038	0.933	0.0	225	1.087
20	1.462	58.1	8.9	1.998	2.038	0.049	0.0	59	1.065
21	2.237	88.9	182.6	2.038	2.197	1.010	0.0	225	2.278
22	0.917	36.5	6.8	1.939	2.197	0.038	0.0	65	0.704
23	1.065	42.3	196.9	2.197	1.891	1.090	0.0	225	1.084
7.000	1.001	7.9	2.9	0.400	0.585	0.016	0.0	42	0.923

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
5.000_1	PP2	10	8.865	0.600	19.857	19.708	0.149	59.5	100	4.15	50.0
4.000	PP3	10	9.449	0.600	19.857	19.698	0.159	59.4	100	4.16	50.0
8.000	PP4	4	7.112	0.600	19.245	19.125	0.120	59.3	100	4.12	50.0
10.000	PP5	17	15.060	0.600	18.102	17.848	0.254	59.3	100	4.25	50.0
11.000	PP6	17	5.464	0.600	18.102	18.010	0.092	59.4	100	4.09	50.0
5.000	6.1	6	8.460	0.600	20.440	20.000	0.440	19.2	225	4.05	50.0
9.000	15.1	15	17.392	0.600	17.142	16.708	0.434	40.1	225	4.14	50.0
1.010	24	24.1	60.028	0.600	15.281	14.840	0.441	136.1	225	7.83	47.9
12.000	PP8	19	17.967	0.600	17.589	17.439	0.150	119.8	100	4.43	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
5.000_1	1.000	7.9	1.8	0.400	0.549	0.010	0.0	32	0.809
4.000	1.001	7.9	1.3	0.400	0.559	0.007	0.0	27	0.730
8.000	1.002	7.9	0.4	0.400	0.520	0.002	0.0	14	0.499
10.000	1.002	7.9	0.9	0.400	0.654	0.005	0.0	23	0.667
11.000	1.001	7.9	3.6	0.400	0.492	0.020	0.0	47	0.977
5.000	2.997	119.2	0.0	1.831	1.989	0.000	0.0	0	0.000
9.000	2.072	82.4	0.0	1.956	2.217	0.000	0.0	0	0.000
1.010	1.119	44.5	192.6	1.891	1.205	1.113	0.0	225	1.139
12.000	0.701	5.5	1.8	0.600	0.750	0.010	0.0	39	0.628

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1	21.231	24.6	225	Circular	21.413	19.573	1.615	20.575	18.710	1.640
2	10.313	15.3	225	Circular	20.575	18.710	1.640	19.895	18.035	1.635
3	7.078	21.8	225	Circular	19.895	18.035	1.635	19.745	17.710	1.810
4	55.514	198.3	225	Circular	19.745	17.710	1.810	19.471	17.430	1.816
5	24.835	60.6	225	Circular	22.517	20.410	1.882	22.214	20.000	1.989
6	26.524	26.2	225	Circular	22.214	20.000	1.989	21.331	18.988	2.118
7	24.372	45.4	225	Circular	21.515	19.525	1.765	21.331	18.988	2.118
8	17.209	40.0	225	Circular	21.331	18.988	2.118	20.728	18.558	1.945
9	9.507	40.1	300	Circular	20.728	18.483	1.945	20.357	18.246	1.811

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
2	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
3	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
4	4	1200	Manhole	Adoptable	11	1350	Manhole	Adoptable
5	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
6	6	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
7	7	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
8	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
9	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
10	22.309	27.3	300	Circular	20.357	18.246	1.811	19.471	17.430	1.741
11	28.257	200.4	375	Circular	19.471	17.394	1.702	19.300	17.253	1.672
13	19.986	199.9	225	Circular	19.300	16.536	2.539	18.957	16.436	2.296
15	13.256	48.7	225	Circular	19.150	16.708	2.217	18.957	16.436	2.296
16	34.450	79.7	225	Circular	18.957	16.436	2.296	18.289	16.004	2.060
17	17.086	60.0	225	Circular	18.602	16.720	1.657	18.485	16.435	1.825
18	19.031	44.2	225	Circular	18.485	16.435	1.825	18.289	16.004	2.060
19	12.401	149.4	225	Circular	18.289	16.004	2.060	18.184	15.921	2.038
20	24.510	80.1	225	Circular	18.450	16.227	1.998	18.184	15.921	2.038
21	18.282	34.4	225	Circular	18.184	15.921	2.038	17.812	15.390	2.197
22	21.361	201.5	225	Circular	17.660	15.496	1.939	17.812	15.390	2.197
23	16.363	150.1	225	Circular	17.812	15.390	2.197	17.397	15.281	1.891
7.000	10.986	59.4	100	Circular	19.745	19.245	0.400	19.745	19.060	0.585
5.000_1	8.865	59.5	100	Circular	20.357	19.857	0.400	20.357	19.708	0.549
4.000	9.449	59.4	100	Circular	20.357	19.857	0.400	20.357	19.698	0.559
8.000	7.112	59.3	100	Circular	19.745	19.245	0.400	19.745	19.125	0.520
10.000	15.060	59.3	100	Circular	18.602	18.102	0.400	18.602	17.848	0.654
11.000	5.464	59.4	100	Circular	18.602	18.102	0.400	18.602	18.010	0.492
5.000	8.460	19.2	225	Circular	22.496	20.440	1.831	22.214	20.000	1.989
9.000	17.392	40.1	225	Circular	19.323	17.142	1.956	19.150	16.708	2.217
1.010	60.028	136.1	225	Circular	17.397	15.281	1.891	16.270	14.840	1.205




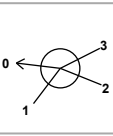

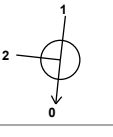

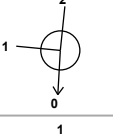

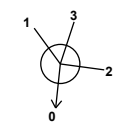
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
10	10	1200	Manhole	Adoptable	11	1350	Manhole	Adoptable
11	11	1350	Manhole	Adoptable	13		Junction	
13	13		Junction		16	1200	Manhole	Adoptable
15	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
16	16	1200	Manhole	Adoptable	19	1350	Manhole	Adoptable
17	17	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
18	18	1200	Manhole	Adoptable	19	1350	Manhole	Adoptable
19	19	1350	Manhole	Adoptable	21	1350	Manhole	Adoptable
20	20	1200	Manhole	Adoptable	21	1350	Manhole	Adoptable
21	21	1350	Manhole	Adoptable	23	1350	Manhole	Adoptable
22	22		Junction		23	1350	Manhole	Adoptable
23	23	1350	Manhole	Adoptable	24	1500	Manhole	Adoptable
7.000	PP1		Junction		4	1200	Manhole	Adoptable
5.000_1	PP2		Junction		10	1200	Manhole	Adoptable
4.000	PP3		Junction		10	1200	Manhole	Adoptable
8.000	PP4		Junction		4	1200	Manhole	Adoptable
10.000	PP5		Junction		17	1200	Manhole	Adoptable
11.000	PP6		Junction		17	1200	Manhole	Adoptable
5.000	6.1	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
9.000	15.1	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
1.010	24	1500	Manhole	Adoptable	24.1	1200	Manhole	Adoptable

Pipeline Schedule

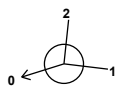
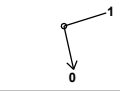
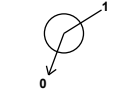
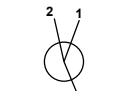
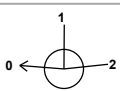
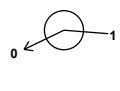
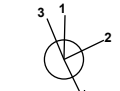
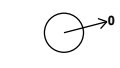
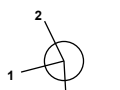
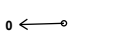
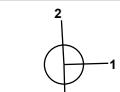
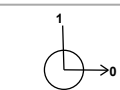

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
12.000	17.967	119.8	100	Circular	18.289	17.589	0.600	18.289	17.439	0.750

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
12.000	PP8		Junction		19	1350	Manhole	Adoptable











Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	705948.687	776212.032	21.413	1.840	1200				
2	705946.516	776190.912	20.575	1.865	1200		1	19.573	225
3	705948.269	776174.137	19.895	1.860	1200		1	18.710	225
4	705941.953	776170.942	19.745	2.035	1200		2	18.710	225
5	705871.160	776255.085	22.517	2.107	1200		0	18.035	225
6	705895.845	776252.361	22.214	2.214	1200		1	18.035	225
7	705868.852	776228.297	21.515	1.990	1200		0	8.000	100
8	705893.113	776225.978	21.331	2.343	1200		2	7.000	100
9	705892.140	776208.797	20.728	2.245	1200		3	17.710	225
10	705889.181	776199.762	20.357	2.111	1200		0	17.710	225
							5	20.410	225
							1	20.000	225
							2	20.000	225
							0	20.000	225
							0	19.525	225
							1	18.988	225
							2	18.988	225
							0	18.988	225
							1	18.558	225
							0	18.483	300
							1	5.000_1	100
							2	4.000	100
							3	18.246	300
							0	18.246	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
11	705886.837	776177.576	19.471	2.077	1350		1 4 2 10	17.430 17.430	225 300
13	705859.867	776169.146	19.300	2.764			0 11 1 11	17.394 17.253	375 375
15	705868.847	776161.977	19.150	2.442	1200		0 15 1 9.000	16.708 16.708	225 225
16	705864.249	776149.544	18.957	2.521	1200		1 15 2 13 0 16	16.436 16.436 16.436	225 225 225
17	705911.621	776124.644	18.602	1.882	1200		1 11.000 2 10.000 0 17	18.010 17.848 16.720	100 100 225
18	705894.587	776125.980	18.485	2.050	1200		1 17 0 18	16.435 16.435	225 225
19	705877.442	776117.720	18.289	2.285	1350		1 12.000 2 18 3 16 0 19	17.439 16.004 16.004 16.004	100 225 225 225
20	705859.132	776100.429	18.450	2.223	1200		0 20	16.227	225
21	705882.861	776106.566	18.184	2.263	1350		1 20 2 19 0 21	15.921 15.921 15.921	225 225 225
22	705905.251	776088.936	17.660	2.164			0 22	15.496	225
23	705883.899	776088.313	17.812	2.422	1350		1 22 2 21 0 23	15.390 15.390 15.390	225 225 225
24	705884.379	776071.957	17.397	2.116	1500		1 23 0 1.010	15.281 15.281	225 225
PP1	705952.146	776166.843	19.745	0.500			0 7.000	19.245	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
PP2	705883.953	776206.921	20.357	0.500			0	5.000_1	19.857	100
PP3	705898.545	776198.501	20.357	0.500			0	4.000	19.857	100
PP4	705937.646	776165.282	19.745	0.500			0	8.000	19.245	100
PP5	705926.597	776126.229	18.602	0.500			0	10.000	18.102	100
PP6	705911.659	776130.108	18.602	0.500			0	11.000	18.102	100
PP7	705853.642	776097.867	18.450	0.500						
6.1	705896.818	776260.765	22.496	2.056	1200		0	5.000	20.440	225
15.1	705883.607	776171.176	19.323	2.181	1200		0	9.000	17.142	225
24.1	705944.405	776071.438	16.270	1.430	1200		1	1.010	14.840	225
PP8	705877.863	776135.682	18.289	0.700			0	12.000	17.589	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	15.400	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.274	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
5	0	0	0
30	0	0	0
100	20	0	0

Node 16 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	16.436	Product Number	CTL-SHE-0060-2500-2564-2500
Design Depth (m)	2.564	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.5	Min Node Diameter (mm)	1200

Node 23 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	15.390	Product Number	CTL-SHE-0082-4100-2110-4100
Design Depth (m)	2.110	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	4.1	Min Node Diameter (mm)	1200

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	374.2	0.0	1.000	752.3	0.0	1.001	0.0	0.0

Node 22 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	15.496
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	336.2	0.0	0.300	336.2	0.0	0.301	0.0	0.0

Node 22 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	16.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	153.3	0.0	1.000	397.7	0.0	1.001	0.0	0.0

Node PP1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.245
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	155.9	0.0	0.350	155.9	0.0	0.351	0.0	0.0

Node PP2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.857
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	96.5	0.0	0.350	96.5	0.0	0.351	0.0	0.0

Node PP3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.857
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	70.7	0.0	0.350	70.7	0.0	0.351	0.0	0.0

Node PP4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.245
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	24.0	0.0	0.350	24.0	0.0	0.351	0.0	0.0

Node PP5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.102
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	48.1	0.0	0.350	48.1	0.0	0.351	0.0	0.0

Node PP6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.102
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	36.0	0.0	0.350	36.0	0.0	0.351	0.0	0.0

Node PP7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	17.950
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	48.0	0.0	0.350	48.0	0.0	0.351	0.0	0.0

Node PP8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	17.589
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	96.0	0.0	0.350	96.0	0.0	0.351	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	19.617	0.044	9.0	0.0794	0.0000	OK
15 minute summer	2	10	18.759	0.049	13.7	0.0721	0.0000	OK
1440 minute summer	3	1020	18.251	0.216	1.7	0.2905	0.0000	OK
1440 minute summer	4	1020	18.251	0.541	2.3	0.7774	0.0000	SURCHARGED
15 minute summer	5	10	20.474	0.064	11.9	0.1211	0.0000	OK
15 minute summer	6	10	20.075	0.075	24.6	0.1425	0.0000	OK
15 minute summer	7	10	19.578	0.053	9.4	0.0931	0.0000	OK
15 minute summer	8	10	19.110	0.122	41.9	0.1939	0.0000	OK
15 minute summer	9	10	18.601	0.118	46.3	0.1662	0.0000	OK
15 minute summer	10	10	18.348	0.102	54.2	0.1657	0.0000	OK
1440 minute summer	11	1020	18.251	0.857	9.1	1.6883	0.0000	SURCHARGED
1440 minute summer	13	1020	18.251	1.715	9.7	106.4080	0.0000	SURCHARGED
1440 minute summer	15	1020	18.250	1.542	0.7	2.2131	0.0000	SURCHARGED
1440 minute summer	16	1020	18.250	1.814	2.5	2.7595	0.0000	SURCHARGED
15 minute summer	17	10	16.788	0.068	12.7	0.1276	0.0000	OK
1440 minute summer	18	990	16.607	0.172	2.0	0.2530	0.0000	OK
1440 minute summer	19	990	16.607	0.603	5.1	1.1748	0.0000	SURCHARGED
1440 minute summer	20	990	16.606	0.379	0.7	0.5963	0.0000	SURCHARGED
1440 minute summer	21	990	16.606	0.685	6.2	1.1555	0.0000	SURCHARGED
1440 minute summer	22	990	16.606	1.110	4.1	48.3170	0.0000	SURCHARGED
1440 minute summer	23	990	16.606	1.216	6.7	2.1589	0.0000	SURCHARGED
15 minute summer	24	10	15.339	0.058	6.5	0.1151	0.0000	OK
60 minute summer	PP1	38	19.266	0.021	1.7	0.9829	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	1	1	2	9.0	1.511	0.085	0.1265	
15 minute summer	2	2	3	13.7	1.883	0.102	0.2046	
1440 minute summer	3	3	4	1.6	0.408	0.015	0.2794	
1440 minute summer	4	4	11	2.3	0.362	0.062	2.2079	
15 minute summer	5	5	6	11.9	1.144	0.178	0.2589	
15 minute summer	6	6	8	24.6	1.478	0.241	0.4455	
15 minute summer	7	7	8	9.4	0.678	0.121	0.3547	
15 minute summer	8	8	9	41.7	1.991	0.506	0.3603	
15 minute summer	9	9	10	46.2	1.970	0.263	0.2232	
15 minute summer	10	10	11	54.1	1.767	0.254	1.0216	
1440 minute summer	11	11	13	9.0	0.465	0.064	3.1167	
1440 minute summer	13	13	16	2.2	0.114	0.059	0.7949	
1440 minute summer	15	15	16	-0.6	0.017	-0.008	0.5272	
1440 minute summer	16	16	19	2.1	0.494	0.036	1.2436	
15 minute summer	17	17	18	12.6	1.199	0.188	0.1800	
1440 minute summer	18	18	19	2.0	0.422	0.025	0.6880	
1440 minute summer	19	19	21	5.1	0.832	0.119	0.4932	
1440 minute summer	20	20	21	0.7	0.238	0.012	0.9748	
1440 minute summer	21	21	23	6.1	0.229	0.069	0.7271	
1440 minute summer	22	22	23	-3.5	-0.088	-0.096	0.8495	
1440 minute summer	23	23	24	3.1	0.626	0.074	0.0843	
15 minute summer	24	1.010	24.1	6.4	0.798	0.144	0.4810	44.4
60 minute summer	PP1	7.000	4	0.7	0.624	0.092	0.0128	

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	PP2	37	19.875	0.018	1.0	0.5330	0.0000	OK
60 minute summer	PP3	37	19.873	0.016	0.7	0.3404	0.0000	OK
30 minute summer	PP4	20	19.256	0.011	0.3	0.0771	0.0000	OK
60 minute summer	PP5	35	18.117	0.015	0.5	0.2141	0.0000	OK
15 minute summer	PP6	11	18.141	0.039	3.0	0.4504	0.0000	OK
15 minute summer	PP7	1	17.950	0.000	0.7	0.0000	0.0000	OK
15 minute summer	6.1	1	20.440	0.000	0.0	0.0000	0.0000	OK
1440 minute summer	15.1	1020	18.250	1.108	0.4	1.2534	0.0000	SURCHARGED
15 minute summer	24.1	10	14.897	0.057	6.4	0.0000	0.0000	OK
60 minute summer	PP8	38	17.609	0.020	1.0	0.5773	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
60 minute summer	PP2	5.000_1	10	0.6	0.575	0.070	0.0085	
60 minute summer	PP3	4.000	10	0.4	0.531	0.053	0.0075	
30 minute summer	PP4	8.000	4	0.2	0.412	0.023	0.0031	
60 minute summer	PP5	10.000	17	0.4	0.508	0.046	0.0106	
15 minute summer	PP6	11.000	17	2.4	0.859	0.300	0.0150	
15 minute summer	6.1	5.000	6	0.0	0.000	0.000	0.0488	
1440 minute summer	15.1	9.000	15	-0.4	-0.013	-0.004	0.6917	
60 minute summer	PP8	12.000	19	0.5	0.430	0.085	0.0197	

Results for 5 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	19.628	0.055	13.7	0.0988	0.0000	OK
15 minute summer	2	9	18.770	0.060	20.8	0.0877	0.0000	OK
15 minute summer	3	10	18.424	0.389	37.0	0.5244	0.0000	SURCHARGED
960 minute winter	4	900	18.399	0.689	2.9	0.9912	0.0000	SURCHARGED
15 minute summer	5	10	20.491	0.081	18.1	0.1520	0.0000	OK
15 minute summer	6	10	20.094	0.094	37.4	0.1784	0.0000	OK
15 minute summer	7	10	19.590	0.065	14.3	0.1151	0.0000	OK
15 minute summer	8	10	19.153	0.165	63.7	0.2615	0.0000	OK
15 minute summer	9	10	18.635	0.152	70.4	0.2141	0.0000	OK
15 minute summer	10	10	18.399	0.153	82.8	0.2485	0.0000	OK
960 minute winter	11	900	18.399	1.005	11.0	1.9812	0.0000	SURCHARGED
960 minute winter	13	900	18.399	1.863	11.8	180.3371	0.0000	SURCHARGED
960 minute winter	15	900	18.399	1.691	0.7	2.4264	0.0000	SURCHARGED
960 minute winter	16	915	18.399	1.963	2.4	2.9856	0.0000	SURCHARGED
15 minute summer	17	10	16.807	0.087	19.7	0.1630	0.0000	OK
1440 minute winter	18	1080	16.763	0.328	1.9	0.4836	0.0000	SURCHARGED
1440 minute winter	19	1080	16.763	0.759	4.6	1.4799	0.0000	SURCHARGED
1440 minute winter	20	1080	16.763	0.536	0.7	0.8423	0.0000	SURCHARGED
1440 minute winter	21	1080	16.763	0.842	5.6	1.4193	0.0000	SURCHARGED
1440 minute winter	22	1080	16.762	1.266	3.6	79.3826	0.0000	SURCHARGED
1440 minute winter	23	1080	16.762	1.372	6.2	2.4367	0.0000	SURCHARGED
15 minute summer	24	10	15.347	0.066	8.3	0.1308	0.0000	OK
60 minute summer	PP1	38	19.273	0.028	2.5	1.3098	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	1	1	2	13.7	1.715	0.130	0.1696	
15 minute summer	2	2	3	20.8	1.922	0.156	0.2486	
15 minute summer	3	3	4	23.4	1.256	0.209	0.2815	
960 minute winter	4	4	11	2.9	0.348	0.079	2.2079	
15 minute summer	5	5	6	18.1	1.276	0.270	0.3526	
15 minute summer	6	6	8	37.4	1.607	0.367	0.6214	
15 minute summer	7	7	8	14.3	0.736	0.185	0.4963	
15 minute summer	8	8	9	63.4	2.161	0.769	0.5043	
15 minute summer	9	9	10	70.3	2.036	0.400	0.3429	
15 minute summer	10	10	11	81.9	1.720	0.384	1.1894	
960 minute winter	11	11	13	10.9	0.465	0.077	3.1167	
960 minute winter	13	13	16	2.1	0.164	0.057	0.7949	
960 minute winter	15	15	16	0.6	0.051	0.009	0.5272	
960 minute winter	16	16	19	2.2	0.492	0.037	1.3701	
15 minute summer	17	17	18	19.6	1.345	0.292	0.2492	
1440 minute winter	18	18	19	1.8	0.390	0.023	0.7569	
1440 minute winter	19	19	21	4.6	0.797	0.107	0.4932	
1440 minute winter	20	20	21	0.7	0.229	0.012	0.9748	
1440 minute winter	21	21	23	5.6	0.202	0.063	0.7271	
1440 minute winter	22	22	23	-3.1	-0.077	-0.084	0.8495	
1440 minute winter	23	23	24	3.3	0.635	0.078	0.0862	
15 minute summer	24	1.010	24.1	8.2	0.857	0.184	0.5748	48.1
60 minute summer	PP1	7.000	4	1.3	0.734	0.163	0.0192	

Results for 5 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	PP2	36	19.881	0.024	1.6	0.7070	0.0000	OK
30 minute summer	PP3	20	19.878	0.021	1.4	0.4508	0.0000	OK
30 minute summer	PP4	19	19.258	0.013	0.4	0.0966	0.0000	OK
30 minute summer	PP5	20	18.121	0.019	1.0	0.2818	0.0000	OK
15 minute summer	PP6	11	18.153	0.051	4.5	0.5870	0.0000	OK
15 minute summer	PP7	1	17.950	0.000	1.1	0.0000	0.0000	OK
15 minute summer	6.1	1	20.440	0.000	0.0	0.0000	0.0000	OK
960 minute winter	15.1	900	18.399	1.257	0.3	1.4215	0.0000	SURCHARGED
15 minute summer	24.1	10	14.905	0.065	8.2	0.0000	0.0000	OK
60 minute summer	PP8	37	17.616	0.027	1.6	0.7737	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
60 minute summer	PP2	5.000_1	10	1.0	0.677	0.124	0.0127	
30 minute summer	PP3	4.000	10	0.7	0.627	0.094	0.0112	
30 minute summer	PP4	8.000	4	0.3	0.476	0.037	0.0043	
30 minute summer	PP5	10.000	17	0.6	0.600	0.080	0.0158	
15 minute summer	PP6	11.000	17	3.7	0.966	0.476	0.0212	
15 minute summer	6.1	5.000	6	0.0	0.000	0.000	0.0662	
960 minute winter	15.1	9.000	15	-0.3	-0.013	-0.004	0.6917	
60 minute summer	PP8	12.000	19	0.8	0.509	0.153	0.0298	

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	9	19.640	0.067	20.0	0.1200	0.0000	OK
15 minute summer	2	11	18.801	0.091	30.4	0.1335	0.0000	OK
15 minute summer	3	11	18.778	0.743	36.1	1.0002	0.0000	SURCHARGED
15 minute summer	4	11	18.734	1.024	43.7	1.4720	0.0000	SURCHARGED
15 minute summer	5	10	20.510	0.100	26.4	0.1888	0.0000	OK
15 minute summer	6	10	20.117	0.117	54.7	0.2217	0.0000	OK
15 minute summer	7	10	19.604	0.079	20.9	0.1403	0.0000	OK
15 minute summer	8	10	19.380	0.392	93.1	0.6215	0.0000	SURCHARGED
15 minute summer	9	11	18.714	0.231	95.8	0.3248	0.0000	OK
15 minute summer	10	11	18.624	0.378	112.9	0.6135	0.0000	SURCHARGED
1440 minute winter	11	1380	18.608	1.214	11.2	2.3928	0.0000	SURCHARGED
1440 minute winter	13	1380	18.608	2.072	12.0	298.2938	0.0000	SURCHARGED
1440 minute winter	15	1380	18.608	1.900	0.7	2.7260	0.0000	SURCHARGED
1440 minute winter	16	1380	18.608	2.172	2.2	3.3031	0.0000	SURCHARGED
1440 minute winter	17	1110	16.959	0.239	1.9	0.4502	0.0000	SURCHARGED
1440 minute winter	18	1110	16.959	0.524	2.6	0.7726	0.0000	SURCHARGED
1440 minute winter	19	1110	16.959	0.955	5.8	1.8622	0.0000	SURCHARGED
1440 minute winter	20	1110	16.959	0.732	1.6	1.1505	0.0000	SURCHARGED
1440 minute winter	21	1110	16.959	1.038	7.2	1.7499	0.0000	SURCHARGED
1440 minute winter	22	1110	16.958	1.462	5.4	126.7236	0.0000	SURCHARGED
1440 minute winter	23	1110	16.958	1.568	8.0	2.7847	0.0000	SURCHARGED
15 minute summer	24	10	15.356	0.075	10.7	0.1489	0.0000	OK
60 minute summer	PP1	37	19.281	0.036	3.7	1.7249	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	1	1	2	20.1	1.889	0.191	0.2510	
15 minute summer	2	2	3	29.4	2.098	0.220	0.2827	
15 minute summer	3	3	4	32.2	1.220	0.288	0.2815	
15 minute summer	4	4	11	42.1	1.059	1.145	2.2079	
15 minute summer	5	5	6	26.4	1.397	0.394	0.4693	
15 minute summer	6	6	8	54.6	1.684	0.535	0.8027	
15 minute summer	7	7	8	20.9	0.784	0.270	0.6371	
15 minute summer	8	8	9	86.8	2.182	1.052	0.6841	
15 minute summer	9	9	10	95.4	2.011	0.542	0.6117	
15 minute summer	10	10	11	111.8	1.730	0.524	1.5710	
1440 minute winter	11	11	13	11.1	0.463	0.079	3.1167	
1440 minute winter	13	13	16	2.1	0.138	0.056	0.7949	
1440 minute winter	15	15	16	0.6	0.016	0.009	0.5272	
1440 minute winter	16	16	19	2.1	0.504	0.036	1.3701	
1440 minute winter	17	17	18	1.9	0.647	0.028	0.6795	
1440 minute winter	18	18	19	2.5	0.399	0.032	0.7569	
1440 minute winter	19	19	21	5.8	0.816	0.136	0.4932	
1440 minute winter	20	20	21	-0.9	0.230	-0.015	0.9748	
1440 minute winter	21	21	23	7.2	0.216	0.081	0.7271	
1440 minute winter	22	22	23	-4.7	-0.119	-0.129	0.8495	
1440 minute winter	23	23	24	3.5	0.648	0.083	0.0904	
15 minute summer	24	1.010	24.1	10.5	0.917	0.236	0.6873	45.3
60 minute summer	PP1	7.000	4	2.2	0.848	0.275	0.0280	

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute summer	PP2	20	19.888	0.031	3.0	0.9231	0.0000	OK
30 minute summer	PP3	20	19.885	0.028	2.1	0.5921	0.0000	OK
30 minute summer	PP4	19	19.262	0.017	0.6	0.1247	0.0000	OK
30 minute summer	PP5	19	18.127	0.025	1.5	0.3603	0.0000	OK
15 minute summer	PP6	11	18.168	0.066	6.6	0.7643	0.0000	OK
15 minute summer	PP7	1	17.950	0.000	1.7	0.0000	0.0000	OK
15 minute summer	6.1	1	20.440	0.000	0.0	0.0000	0.0000	OK
1440 minute winter	15.1	1380	18.608	1.466	0.2	1.6577	0.0000	SURCHARGED
15 minute summer	24.1	10	14.914	0.074	10.5	0.0000	0.0000	OK
60 minute summer	PP8	37	17.624	0.035	2.3	1.0038	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute summer	PP2	5.000_1	10	1.6	0.783	0.207	0.0185	
30 minute summer	PP3	4.000	10	1.3	0.731	0.161	0.0164	
30 minute summer	PP4	8.000	4	0.5	0.555	0.062	0.0063	
30 minute summer	PP5	10.000	17	1.0	0.690	0.130	0.0224	
15 minute summer	PP6	11.000	17	5.6	1.058	0.714	0.0290	
15 minute summer	6.1	5.000	6	0.0	0.000	0.000	0.0878	
1440 minute winter	15.1	9.000	15	-0.2	-0.004	-0.002	0.6917	
60 minute summer	PP8	12.000	19	1.4	0.585	0.253	0.0428	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	19.656	0.083	31.0	0.1487	0.0000	OK
15 minute summer	2	11	19.454	0.744	47.0	1.0905	0.0000	SURCHARGED
15 minute summer	3	11	19.379	1.344	45.9	1.8103	0.0000	SURCHARGED
15 minute summer	4	11	19.294	1.584	59.4	2.2777	0.0000	SURCHARGED
15 minute summer	5	11	20.750	0.340	41.0	0.6415	0.0000	SURCHARGED
15 minute summer	6	11	20.642	0.642	83.7	1.2204	0.0000	SURCHARGED
15 minute summer	7	11	20.276	0.751	32.5	1.3271	0.0000	SURCHARGED
15 minute summer	8	11	20.204	1.216	113.1	1.9278	0.0000	SURCHARGED
15 minute summer	9	11	19.254	0.771	120.1	1.0830	0.0000	SURCHARGED
30 minute summer	10	19	19.069	0.823	142.1	1.3338	0.0000	SURCHARGED
2160 minute winter	11	2100	18.947	1.553	12.4	3.0605	0.0000	SURCHARGED
2160 minute winter	13	2100	18.947	2.411	13.4	524.7532	0.0000	SURCHARGED
2160 minute winter	15	2100	18.946	2.238	0.8	3.2121	0.0000	FLOOD RISK
2160 minute winter	16	2100	18.946	2.510	2.2	3.8184	0.0000	FLOOD RISK
30 minute summer	17	20	17.947	1.227	42.4	2.3076	0.0000	SURCHARGED
30 minute summer	18	20	17.882	1.447	52.3	2.1313	0.0000	SURCHARGED
30 minute summer	19	20	17.754	1.750	67.7	3.4115	0.0000	SURCHARGED
30 minute summer	20	20	17.615	1.387	23.4	2.1811	0.0000	SURCHARGED
30 minute summer	21	20	17.596	1.675	78.4	2.8235	0.0000	SURCHARGED
2160 minute summer	22	1620	17.255	1.759	9.2	216.4125	0.0000	SURCHARGED
2160 minute summer	23	1620	17.255	1.865	11.6	3.3123	0.0000	SURCHARGED
15 minute summer	24	10	15.370	0.089	14.6	0.1763	0.0000	OK
30 minute summer	PP1	20	19.298	0.053	7.6	2.4936	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	1	1	2	31.0	1.952	0.294	0.5637	
15 minute summer	2	2	3	36.2	2.093	0.271	0.4102	
15 minute summer	3	3	4	43.5	1.296	0.389	0.2815	
15 minute summer	4	4	11	56.3	1.415	1.530	2.2079	
15 minute summer	5	5	6	39.9	1.447	0.596	0.9877	
15 minute summer	6	6	8	70.9	1.784	0.695	1.0549	
15 minute summer	7	7	8	25.7	0.797	0.332	0.9693	
15 minute summer	8	8	9	107.0	2.692	1.298	0.6844	
15 minute summer	9	9	10	119.6	2.033	0.680	0.6695	
30 minute summer	10	10	11	140.2	1.991	0.657	1.5710	
2160 minute winter	11	11	13	12.4	0.463	0.088	3.1167	
2160 minute winter	13	13	16	2.1	0.078	0.057	0.7949	
2160 minute winter	15	15	16	0.7	0.019	0.010	0.5272	
2160 minute winter	16	16	19	2.1	0.513	0.036	1.3701	
30 minute summer	17	17	18	36.6	1.465	0.543	0.6795	
30 minute summer	18	18	19	40.0	1.121	0.509	0.7569	
30 minute summer	19	19	21	51.6	1.297	1.215	0.4932	
30 minute summer	20	20	21	17.0	0.633	0.293	0.9748	
30 minute summer	21	21	23	70.8	1.779	0.796	0.7271	
2160 minute summer	22	22	23	-8.0	-0.200	-0.218	0.8495	
2160 minute summer	23	23	24	3.8	0.661	0.090	0.0961	
15 minute summer	24	1.010	24.1	14.3	0.998	0.323	0.8629	51.6
30 minute summer	PP1	7.000	4	4.2	0.986	0.533	0.0659	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 97.43%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute summer	PP2	20	19.900	0.043	4.8	1.2734	0.0000	OK
30 minute summer	PP3	19	19.894	0.037	3.3	0.8033	0.0000	OK
30 minute summer	PP4	20	19.282	0.036	2.4	0.2657	0.0000	OK
30 minute summer	PP5	19	18.135	0.033	2.4	0.4794	0.0000	OK
15 minute summer	PP6	11	18.200	0.098	10.2	1.1333	0.0000	OK
15 minute summer	PP7	1	17.950	0.000	2.6	0.0000	0.0000	OK
15 minute summer	6.1	11	20.644	0.204	6.4	0.2302	0.0000	OK
2160 minute winter	15.1	2100	18.946	1.804	0.1	2.0408	0.0000	SURCHARGED
15 minute summer	24.1	10	14.927	0.087	14.3	0.0000	0.0000	OK
60 minute summer	PP8	38	17.674	0.085	6.8	2.4837	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute summer	PP2	5.000_1	10	2.9	0.917	0.375	0.0284	
30 minute summer	PP3	4.000	10	2.3	0.857	0.287	0.0249	
30 minute summer	PP4	8.000	4	2.3	0.729	0.288	0.0370	
30 minute summer	PP5	10.000	17	1.8	0.807	0.227	0.0750	
15 minute summer	PP6	11.000	17	8.0	1.098	1.011	0.0414	
15 minute summer	6.1	5.000	6	-6.4	-0.260	-0.054	0.3281	
2160 minute winter	15.1	9.000	15	-0.1	-0.002	-0.001	0.6917	
60 minute summer	PP8	12.000	19	5.2	0.790	0.951	0.1342	

C. Quality Audit

25152-01-001

PROPOSED HOUSING DEVELOPMENT
AT SLANE ROAD, DROGHEDA, CO. LOUTH

Stage 1 Quality Audit

(Incorporating a DMURS Street Design Audit, and Audits
of Accessibility, Cycling, Walking and Road Safety)

for

WATERMAN MOYLAN

AUGUST 2025

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DOCUMENT CONTROL SHEET

Project Title	Proposed Housing Development at Slane Road, Drogheda, Co. Louth
Project No.	25152-01
Client	Waterman Moylan
Document Title	Stage 1 Quality Audit
Document No.	25152-01-001

Status	Author(s)	Reviewed By	Approved By	Issue Date
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1. INTRODUCTION

- 1.1 Roadplan Consulting has been commissioned by Waterman Moylan to carry out a Quality Audit of a proposed development at Slane Road, Drogheda, Co. Louth.
- 1.2 The proposed development comprises the construction of Phase 3 of a residential development. The development will also include dedicated car parking spaces, bike parking and bin stores.
- 1.3 The development is situated west of the town centre of Drogheda on the Slane Road.
- 1.4 Figure 1 below is a layout drawing of the development. The Slane Road has a speed limit of 50 km/h in the area of the proposed development.



Figure 1.1– Site Location Map and Site Layout for the development

2. QUALITY AUDIT

- 2.1 Quality Audit is a defined process, independent of, but involving, the design team that, through planning, design, construction and management stages of a project provides a check that high quality places are delivered and maintained by all relevant parties, for the benefit of all end users. Quality Audit is a process, applied to urban roads, traffic management or development schemes, which systematically reviews projects using a series of discrete but linked evaluations and ensures that the broad objectives of place, functionality, maintenance and safety are achieved.
- 2.2 Quality Audit was introduced in the publication Design Manual for Urban Roads and Streets following concerns that in the design of new streets provisions made for motor vehicles frequently led to a poorly designed public realm. In an urban area there is a high level of competing demand from different classes of road users. A well-balanced street will have minimal visual clutter and obstacles; it will use durable materials and most importantly, will encourage a degree of negotiation between road users as they make their way through it.
- 2.3 Quality Audit involves various assessments of the impacts of a street scheme in terms of road safety, visual quality and the use of streets by the community. Access for disabled people, pedestrians, cyclists and drivers of motor vehicles is considered.
- 2.4 In the context of a Quality Audit, road safety assessment is considered to be an appropriate method of examining road safety issues as it incorporates both the hazard identification techniques used in road safety audit and formal risk assessment techniques. This allows the opportunity at an early stage for road safety issues to be considered in a more dynamic way within the design process, and to ensure that safety issues are considered as part of the design rather than after design work is completed.
- 2.5 The Quality Audit Team reports findings with suggestions for future action. It should be noted that, in a Quality Audit, it is not the intention that suggestions would be binding on the design team; they are offered for detailed consideration in the design process.
- 2.6 DMURS states that Quality Audits should consist of the following parts:
- DMURS Street Design Audit
 - Individual Design Audits
 - Quality Audit Report

In the case of this report the individual design audits comprise an RSA, an Accessibility audit, a Walking audit and a Cycle audit.

3. METHODOLOGY

3.1 The Audit Team was as follows:

- George Frisby BEngSc CEng Chartered Engineer MIEI
- Glenn Hingerty BEngSc ME CEng MIEI MCIHT

3.2 Road safety, non-motorised users, visual quality, access for disabled and functionality were considered in the Quality Audit. This exercise focused on issues such as:

- the design rationale as it related to vehicle, cycle and pedestrian movements;
- pedestrian desire lines both to and through the site;
- access requirements for all modes of transport;
- access requirements for disabled people and other vulnerable users;
- any road safety concerns associated with the scheme;
- how the scheme is experienced by those entering it and moving around within the street, including how this affects road user behavior; and
- any other issues considered relevant to each constituent element of the Quality Audit process.

3.3 The site visit for this quality audit was carried out on 12th August 2025.

The documents provided for the audit were:

Drawing Number	Rev	Drawing Title
OSR-WMC-ZZ-GF-DR-C-4100	-	Phase 3 Road General Arrangement
OSR-WMC-ZZ-GF-DR-C-4105	01	Phase 3 Proposed Roundabout

Copies of these audited drawings are contained in Appendix A.

Details of drainage or road lighting are not provided. It is assumed that adequate layouts will be provided for each.

There is an existing roadside ditch along the west side of the L1532 road. It may be severed by the proposed developments. It is assumed that provision will be made to maintain proper roadside drainage.

In accordance with DMURS Advice Note No. 4 May 2019 (contained on <https://www.dmurs.ie/supplementary-material>) a Quality Audit should always contain a DMURS Street Design Audit and Other Design Audits (as required). Section 4 of this report contains the Street Design Audit and Section 5 contains the Other Design Audits (Road Safety, Walking, Cycling, Accessibility). The Street Design Audit is in the format provided as a template on the DMURS website.

4. STREET DESIGN AUDIT

CONNECTIVITY			
Key Issues	Key DMURS Reference	Audit Suggestion	Design Team Response
Strategic routes/major desire lines been identified and are clearly incorporated into the design.	3.1 – Integrated Street Network 3.2.1 – Movement Function 3.3.1 – Street layouts 3.3.4 - Wayfinding	No Comment	Noted.
Multiple points of access are provided to the site/place, in particular for sustainable modes.	3.3.1 – Street Layouts 3.3.3 – Retrofitting ¹	No Comment	Noted.
Accessibility throughout the site is maximised for pedestrians and cyclists, ensuring route choice.	3.3.1 – Street Layouts 3.3.2 – Block Sizes 3.4.1 – Vehicle Permeability	No Comment	Noted.
Through movements by private vehicles on local streets are discouraged by an appropriate level of traffic calming measures.	3.2.1 – Movement Function 3.2.2 – Place Context 3.4.1 – Vehicle Permeability	No Comment	Noted.

¹ When connecting with existing communities a detailed analysis and extensive community consultation should be carried out to identify the optimal location for connections (refer also to the NTA Permeability in Existing Urban Areas: Best Practice Guide).

SELF-REGULATING STREET ENVIRONMENT			
Key Issues	Key DMURS Reference	Audit Suggestion	Design Team Response
A suitable range of design speeds have been applied with regard to context and function.	3.2.1 – Movement Function 3.2.2 – Place Context 4.1.1 – A Balanced Approach to Speed ²	Traffic Calming Measures would be beneficial. These could be integrated with raised crossings or raised tables.	Noted.
The street environment will facilitate the creation of a traffic calmed environment via the use of 'softer' or passive measures.	4.2.1 – Building Height and Street Width 4.2.2 – Street Trees 4.2.3 – Active Street Edges 4.2.4 – Signage and Line Marking 4.2.7 – Planting 4.4.2 – Carriageway Surfaces 4.4.9 – On-Street Parking Advice Note 1 – Transitions and Gateways	4.2.1 – It is unclear what the proposed building heights will be.	Noted. All the proposed units (37no. houses and 10no. duplexes) are 2-storey.
A suitable range of design standards/ measures have been applied that are consistent with the applied design speeds.	4.4.1 – Carriageway Widths 4.4.4 – Forward Visibility 4.4.5 – Visibility Splays 4.4.6 – Alignment and curvature 4.4.7 – Horizontal and Vertical Deflections Advice Note 1 – Transitions and Gateways	4.4.5 – It is unclear what Visibility Splays will be present and if they are adequate.	Noted. Visibility Splays have now been incorporated and are adequate.

² Refer also to the National Speed Limit Guidelines

PEDESTRIAN AND CYCLING ENVIRONMENT			
Key Issues	Key DMURS Reference	Audit Suggestion	Design Team Response
The built environment contributes to the creation of a safe and comfortable pedestrian environment.	4.2.1 – Building Height and Street Width 4.2.3 – Active Street Edges 4.2.5 – Street Furniture 4.4.9 – On-Street parking	4.2.1 – It is unclear what the proposed building heights will be.	Noted. All the proposed units (37no. houses and 10no. duplexes) are 2-storey.
Footpaths are continuous and wide enough to cater for the anticipated number of pedestrian movements.	3.2.1 – Movement Function 3.2.2 – Place Context 4.2.5 – Street Furniture 4.3.1 - Footways, Verges and Strips 4.3.2 - Pedestrian Crossings	4.3.2 - Pedestrian Crossings should be raised to create continuous footways.	Noted.
Cycling facilities will cater for cyclists of all ages and abilities.	3.2.1 – Movement Function 3.2.2 – Place Context 4.3.5 - Cycle facilities	3.2.1 – It is unclear how the development will tie into any proposed cycle schemes. Adequate connectivity should be included. 4.3.5 – It is unclear what Cycle storage facilities are provided, especially for residential units with no rear access. All units should have access to appropriate cycle storage including for cargo cycles.	Noted. Adequate storage facilities have been provided across the development, including for residential units with no rear access.
The particular needs of visually and mobility impaired users have been identified and incorporated in the design.	4.2.5 - Street Furniture 4.3.1 - Footways, Verges and Strips 4.3.2 - Pedestrian Crossings 4.3.4 - Pedestrianised and Shared Surfaces	4.3.2 – It is unclear what colour of tactile paving is proposed for pedestrian crossings. Appropriate colours should be used.	Noted. Appropriate colours for tactile paving have been incorporated across the site.

VISUAL QUALITY			
Key Issues	Key DMURS Reference	Audit Suggestion	Design Team Response
The landscape plan responds to the street hierarchy and the value of the place.	3.2.1 – Movement Function 3.2.2 – Place Context 4.2.2 – Street Trees 4.2.7 – Planting Advice Note 1 – Transitions and Gateways	No Comment	Noted.
Street furniture is orderly placed.	3.2.1 – Movement Function 3.2.2 – Place Context 4.2.5 - Street Furniture 4.3.1 - Footways, Verges and Strips	No comment	Noted.
The use of signage and line marking has been minimised.	3.2.1 – Movement Function. 3.2.2 – Place Context. 4.2.4 - Signage and Line Marking.	No comment	Noted.
Materials and finishes used throughout the scheme have been selected from a limited palette and respond to the value of the place?	3.2.1 – Movement Function 3.2.2 – Place Context 4.2.6 – Materials and Finishes 4.2.8 – Historic Contexts 4.3.2 – Pedestrian Crossings 4.4.2 – Carriageway Surfaces Advice Note 2 – Materials and Specifications	No comment	Noted.

ADDITIONAL COMMENTS

5. ROAD SAFETY

5.1 Issue

In the absence of Swept Path Analyses, it is unclear if all required manoeuvres by vehicles of varying sizes are achievable throughout the development. Where not possible, this may increase the risk of vehicle collisions or vehicles mounting kerbs and colliding with pedestrians.

Suggestion

Carry out Swept Path Analyses in the development. Make infrastructural adjustments as required.

5.2 Issue

In the absence of Swept Path Analyses, it is unclear if the proposed roundabout at the development entrance can adequately cater for turning of large vehicles such as buses and turning HGVs (due to the upstream height restriction). Inadequate space to manoeuvre may increase the risk of vehicle collisions or vehicles mounting kerbs and colliding with pedestrians.

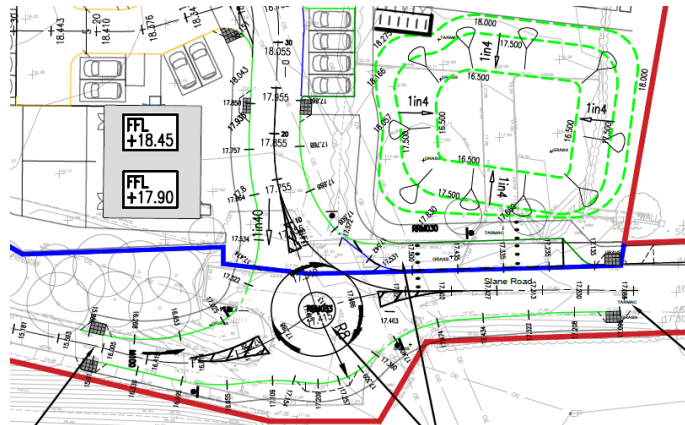


Figure 5.1– Proposed Roundabout

Suggestion

Carry out Swept Path Analyses on the roundabout. Make infrastructural adjustments as required.

5.3 Issue

In the absence of Swept Path Analyses, it is unclear if the proposed lane width at the exit on the eastern arm of the roundabout is sufficiently wide to cater for vehicles passing a bus stopped within the bus stop. A lack of appropriate lane width at this location may contribute to a side swipe collision at this location.

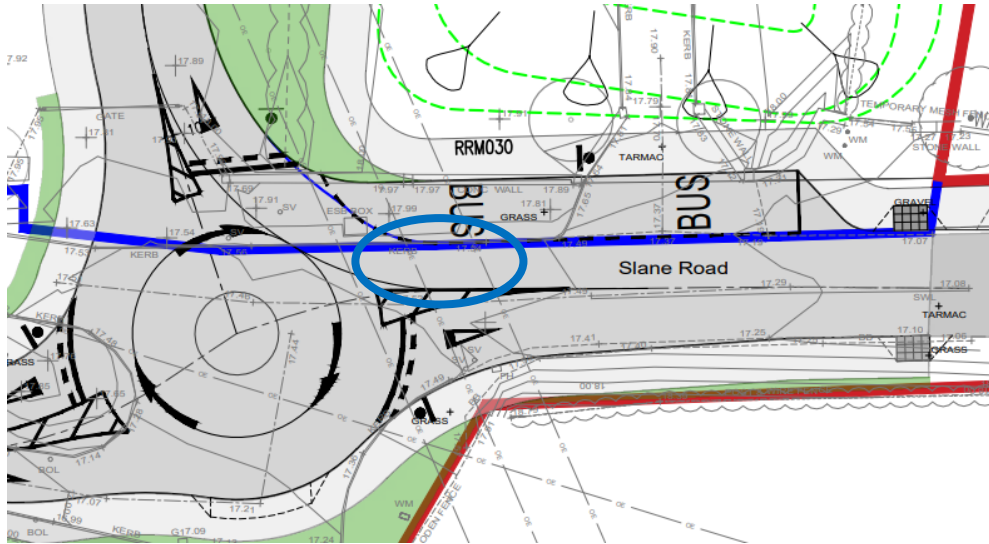


Figure 5.2– Lane Width

Suggestion

Carry out Swept Path Analyses and modify the layout as necessary to remove the risk of a side swipe collision at this location.

5.4 **Issue**

It is unclear what bus stop detail is proposed. Where standard kerbing is included, this may increase the risk of buses mounting kerbs and injuring passengers/pedestrians.

Suggestion

Include Kassel kerbs at the bus stop.

5.5 **Issue**

In the absence of sightline detail, it is unclear if there are adequate sightlines available at each priority junction within the proposed development. Compromised sightlines may result in vehicular collisions.

Suggestion

Ensure adequate sightlines at each junction within the proposed development.

5.6 **Issue**

Buses parked in the proposed bus stop immediately upstream of the existing access to the residential dwelling may compromise visibility for motorists exiting the existing residential access. Restricted visibility may contribute to a turning collision at this location.

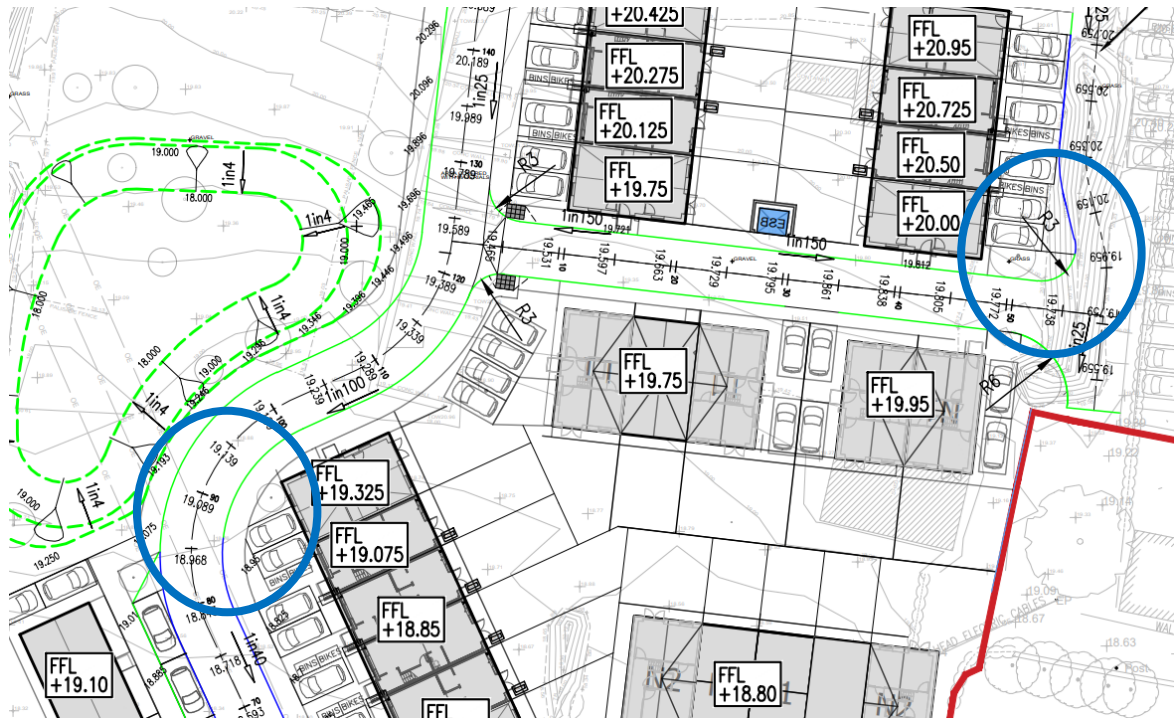


Figure 5.4 – Low Radii Bends

Suggestion

Ensure that two opposing vehicles can pass one another on all low radius bends and ensure that adequate stopping sight distance is available at all locations.

5.9 **Issue**

The horizontal alignment of the internal access road appears to change direction suddenly near the northern end of the scheme. The provision of horizontal alignment with back-to-back low curve radii may contribute to loss of control collision or side swipe collisions at this location.

6.2 Issue

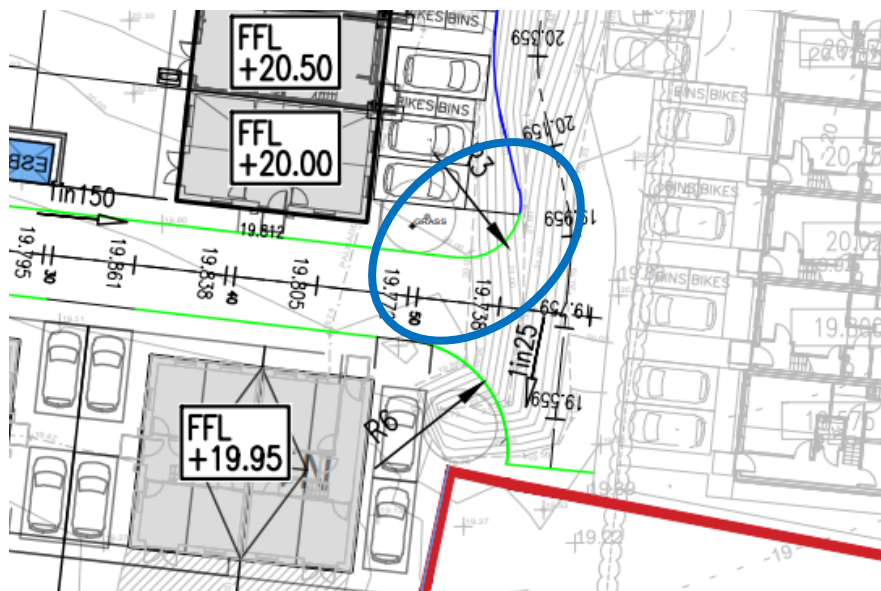
It appears that wide shared pedestrian / vehicle surfaces are proposed within the development. However, motorists entering the proposed shared surface may not expect pedestrians on the carriageway which may contribute to a pedestrian collision along the shared surface

Suggestion

Provide appropriate signage at the commencement of the shared surface warning motorists of the presence of pedestrians on the shared surface within the proposed development.

6.3 Issue

Shared surfaces are proposed within the development where pedestrians will be interacting with vehicular traffic. It is unclear if adequate stopping sight distance for motorists to a pedestrian will be provided in all areas of the shared surface. A lack of appropriate stopping sight distance may contribute to a pedestrian collision in these areas.



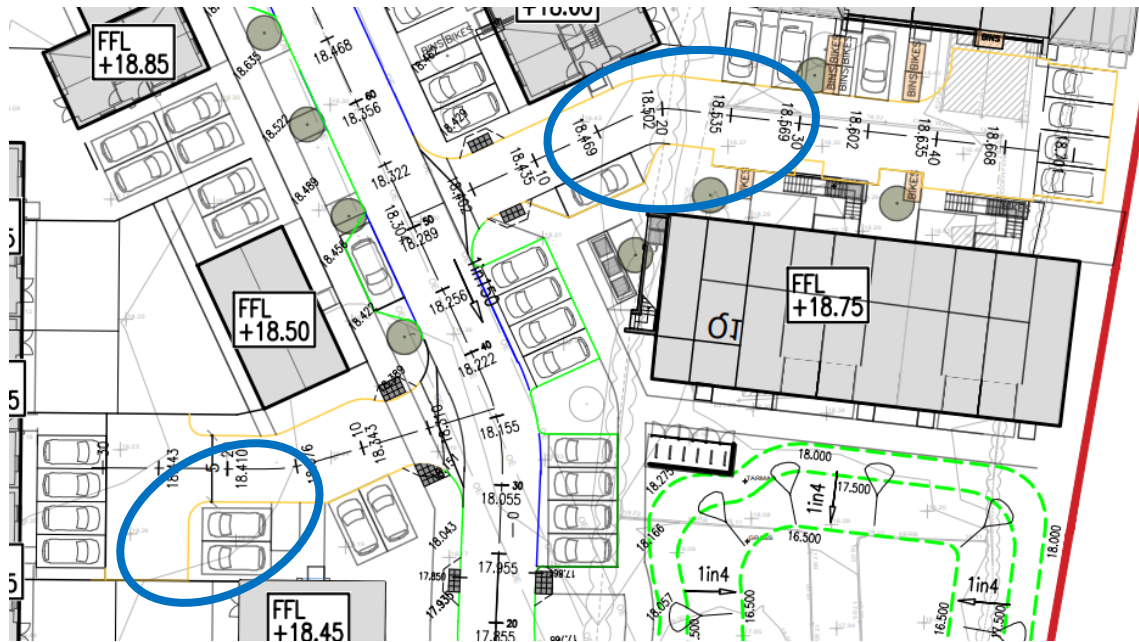


Figure 6.2– Visibility of pedestrians using shared surface

Suggestion

Ensure adequate footway dimensions for the required level of service.

6.4 **Issue**

Road signs are indicated to be located within the footpath at a number of locations. Road signs located within footpaths may restricted the effective footpath width. A lack of appropriate footpath width may force mobility impaired pedestrians onto the road, where they would be at an increased risk of being struck by a passing vehicle.

Suggestion

All street furniture should be located such that they do not obstruct the footpaths.

6.5 **Issue**

It is unclear what the anticipated pedestrian demand is for proposed infrastructure and if the proposed dimensions will be adequate for pedestrian activity.

Suggestion

Ensure adequate footway dimensions for the required level of service.

7. CYCLING

7.1 **Issue**

It is unclear what cycle storage is proposed, especially for all residential units with no rear access. Lack of secure storage may compromise uptake of cycling as a mode.

Suggestion

Ensure adequate cycle storage for all residential units. Ensure adequate provision of cargo cycle storage.

7.2 **Issue**

It is unclear what drainage measures are proposed for roadways in the development. Certain drainage gullies may pose challenges for cyclists.

Suggestion

Drainage gullies and arrangements should be sympathetic to cyclists' needs.

8. ACCESSIBILITY

8.1 Issue

It is unclear what colour tactile paving is proposed. Incorrect use of tactile paving colour may cause confusion or disorientation for white cane users.

Suggestion

Ensure appropriate use of tactile paving colours.

8.2 Issue

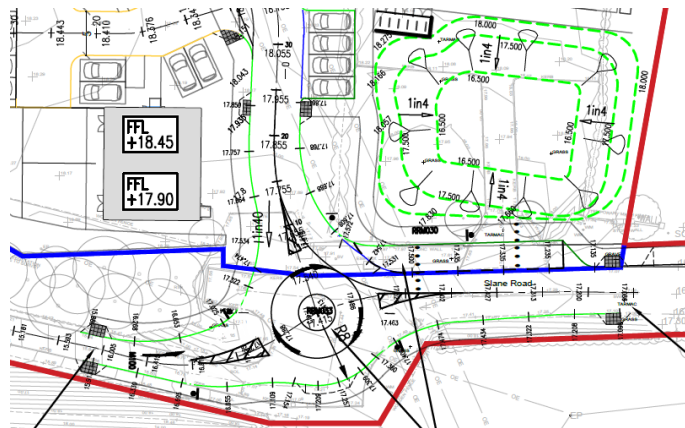
It is unclear if appropriate kerb upstands are provided at all pedestrian crossing locations. Inappropriate kerb heights may contribute to tripping hazards at pedestrian crossing locations.

Suggestion

Ensure that kerb upstands at all pedestrian crossing locations are 6mm or less.

8.3 Issue

In the absence of Swept Path Analyses, it is unclear if the proposed roundabout at the development entrance can adequately cater for buses entering the bus stop. It is unclear if the bus can pull in parallel to the bus stop. This may compromise access for pedestrians with mobility impairments.



9. QUALITY AUDIT FEEDBACK FORM

Scheme: Proposed Housing Development at Slane Road, Drogheda, Co. Louth

Document Number: 25152-01-001

Date Audit Completed: 15th August 2025

Paragraph No. in Quality Audit Report	To Be Completed By Designer			To Be Completed by Audit Team
	Issue Accepted (yes/no)	Suggested Measure Accepted (yes/no)	Describe alternative measure(s). Give reasons for not accepting suggested measure. Only complete if suggested measure is not accepted.	Alternative measures or reasons accepted by auditors (yes/no)
5.1	Yes	Yes	Swept Path Analyses have been undertaken to ensure all required manoeuvres by vehicles of varying sizes are achievable throughout the development.	-----
5.2	Yes	Yes	While there is currently no bus route along this portion of the Old Slane Road, the possible future introduction of a bus route would greatly benefit the proposed scheme, and as such the proposed roundabout has been designed to facilitate this. Swept path analysis has been carried out using a 10.6m long 3-axle bus, confirming that the proposed Inscribed Circle Diameter of 16m is sufficient to allow this bus to perform a 180° manoeuvre without reversing.	-----
5.3	Yes	Yes	Swept Path Analyses of the roundabout have been undertaken which confirm that the lane widths are sufficiently wide to cater for vehicles passing a bus stopped within the bus stop.	-----
5.4	Yes	Yes	Kassel kerbs have now been included at the bus stop.	-----
5.5	Yes	Yes	Adequate sightlines haven now been incorporated within the proposed development.	-----
5.6	Yes	Yes	Adequate sightlines have been provided for motorists exiting the existing residential access.	-----
5.7	Yes	No	The proposed courtyards along the western section of the site are designed for residential parking/access only, and will only be used by cars. Refuse collection is from the adjacent local through road. A swept path analysis has been carried out to confirm that there is sufficient space for turning movements of a large family car within the courtyards along the western section of the site without the need to reverse onto the residential roadway. Note that this strategy for the proposed Phase 3 courtyards matches the strategy for those that are	Yes

			permitted and under construction in Phase 2 immediately north of the proposed development under planning reference 2460266.	
5.8	Yes	Yes	At all low radius bends, two opposing vehicles can pass one another, and adequate stopping sight distance is available at all locations.	-----
5.9	Yes	Yes	The horizontal alignment of the internal access roads is in line with the minimum curve radii in accordance with Table 4.3 of the DMURS.	-----
6.1	Yes	Yes	Adequate visibility splays have been incorporated for pedestrian crossings.	-----
6.2	Yes	Yes	Appropriate signage at the commencement of the shared surface warning motorists of the presence of pedestrians on the shared surfaces has now been provided.	-----
6.3	Yes	Yes	Adequate footpath dimensions have been provided across the proposed development in accordance with DMURS.	-----
6.4	Yes	Yes	All street furniture is located in areas that do not obstruct footpaths.	-----
6.5	Yes	Yes	Adequate footpath dimensions have been provided across the proposed development in accordance with DMURS.	-----
7.1	Yes	Yes	Ample cycle storage has been provided for all residential units.	-----
7.2	Yes	Yes	Drainage gullies and arrangements have been designed to accommodate cyclists' needs.	-----
8.1	Yes	Yes	Appropriate tactile paving colours have been incorporated across the site.	-----
8.2	Yes	Yes	Kerb upstands at all pedestrian crossing locations are 6mm or less.	-----
8.3	Yes	Yes	Swept Path Analysis has been undertaken on the roundabout to ensure that buses entering the bus stop can pull in parallel to the bus stop	-----

Safety Audit
Signed off  Design Team Leader

Print Name MARK DUGGAN

Date 22/8/25

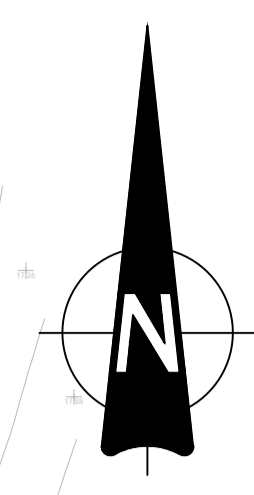
Safety Audit
Signed off  Audit Team Leader

Print Name George Frisby

Date 22/8/2025

Please complete and return to: Roadplan Consulting,
7, Ormonde Road
Kilkenny
E-mail: info@roadplan.ie

APPENDIX A – DRAWINGS



This drawing should not be scaled. Dimensions to be verified on site.
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LEGEND

	PROPOSED 125mm KERB
	PROPOSED 50mm KERB
	PROPOSED 25mm KERB
	PROPOSED FLUSH KERB
	PROPOSED BACK OF FOOTPATH
	CENTER LINE WITH CHAINAGE
	FINISHED ROAD LEVELS
	ROAD GRADIENT
	PROPOSED GULLY

Rev	Date	Description	By	CHK

Project: PROPOSED RESIDENTIAL DEVELOPMENT AT OLD SLANE ROAD, DROGHEDA CO. LOUTH

Title: PHASE 3 ROAD GENERAL ARRANGEMENT

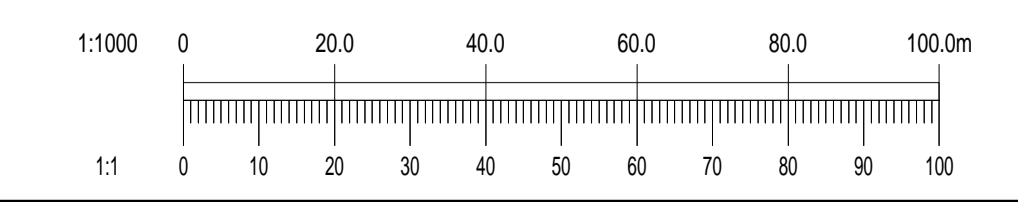
Client: LAGAN HOMES TULLYALLEN LTD.

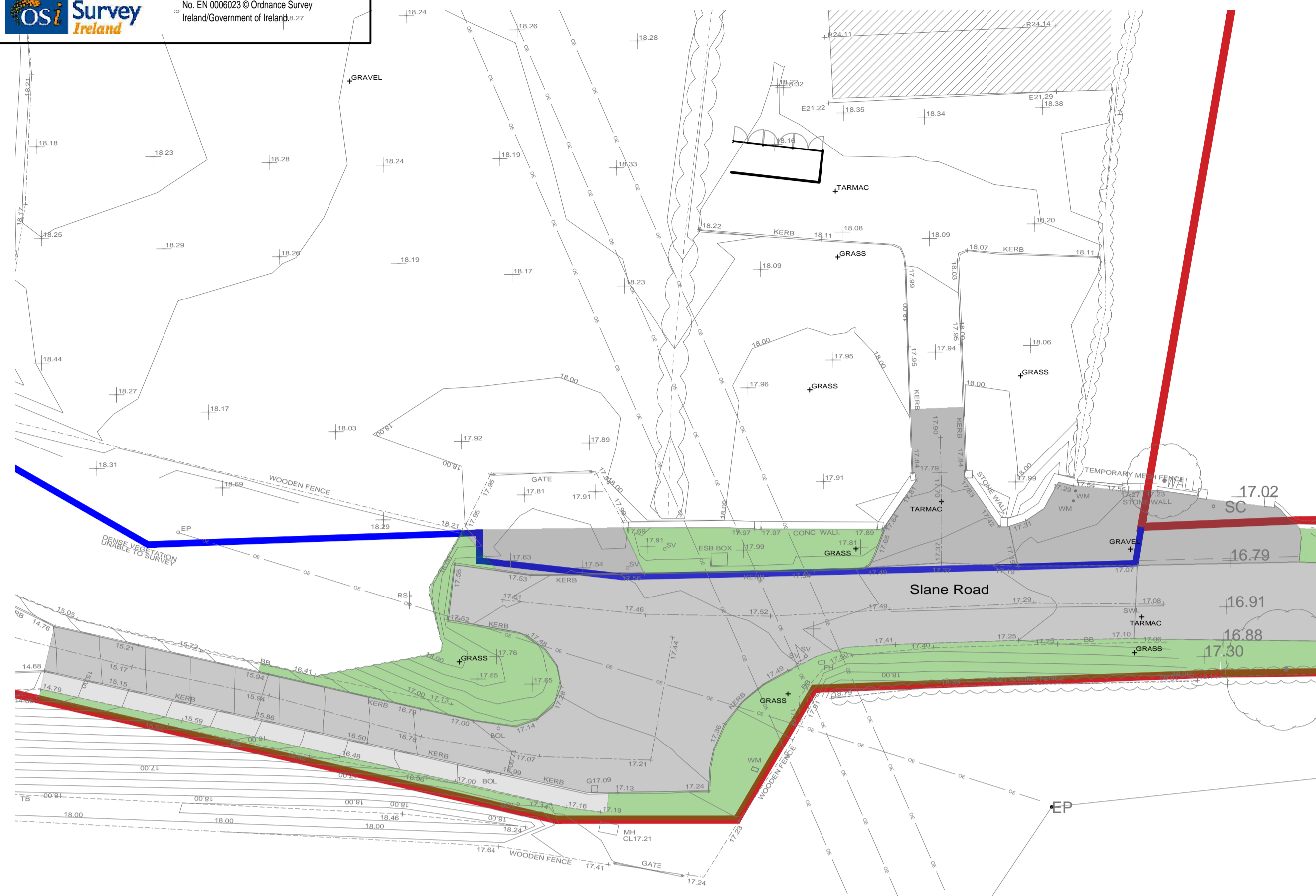


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 Email: info@waterman-moylan.ie www.waterman-moylan.ie

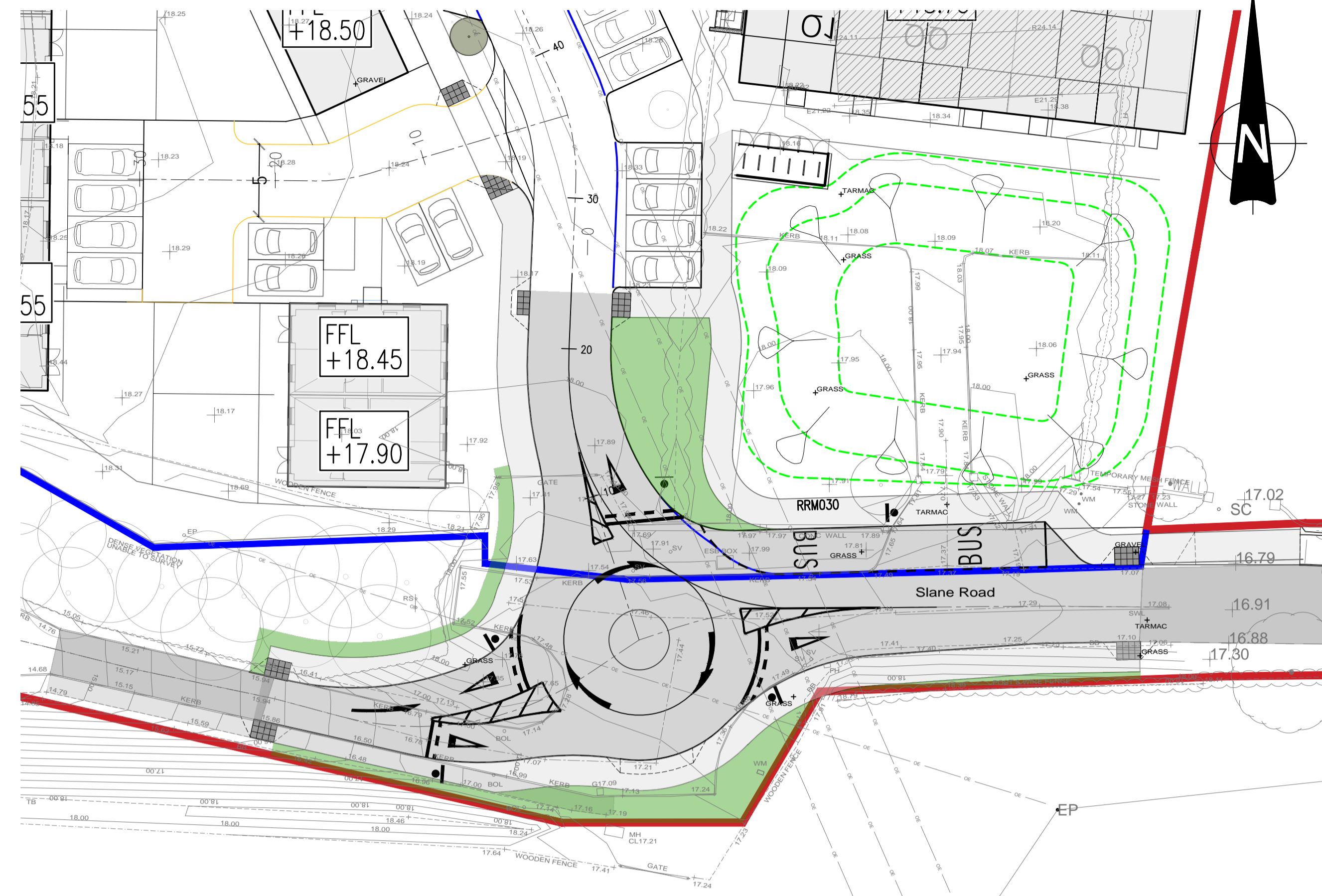
PLANNING

Designed By	NS	Approved	MD	Waterman Ref	23-067		
Drawn By	NS	Date	MAY 2025	Scales @ A1	1:500		
Project	Originator	Volume	Level	Type	Role	Number	Revision
OSR-WMC-ZZ-GF-DR-C-	4100	-	-	-	-	-	-



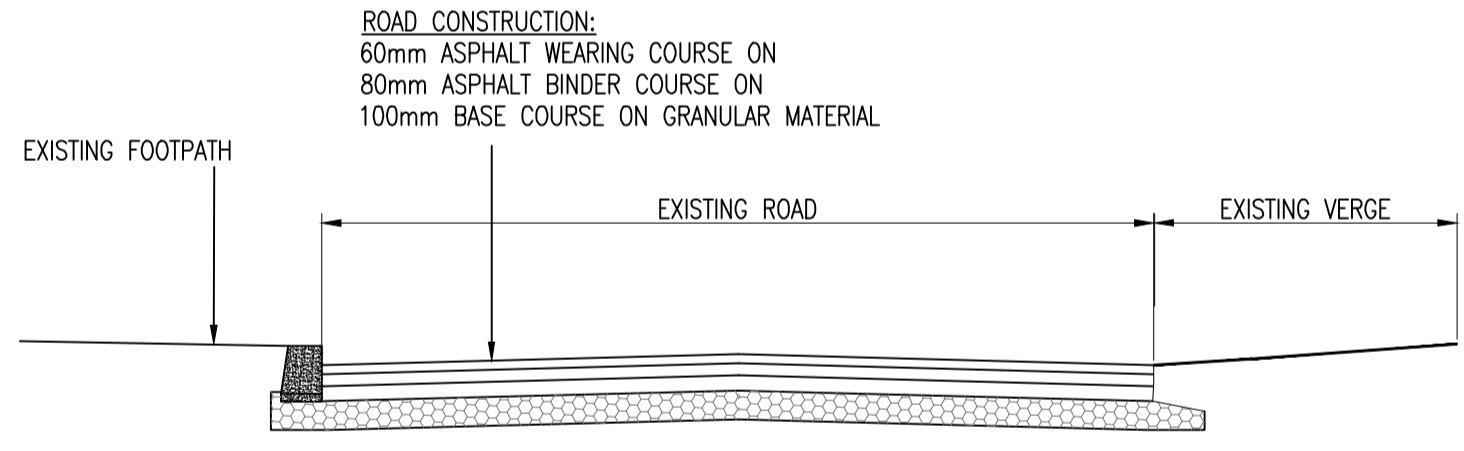


EXISTING PLAN
SCALE 1:250



PROPOSED PLAN
SCALE 1:250

TIE INTO EXISTING LEVEL

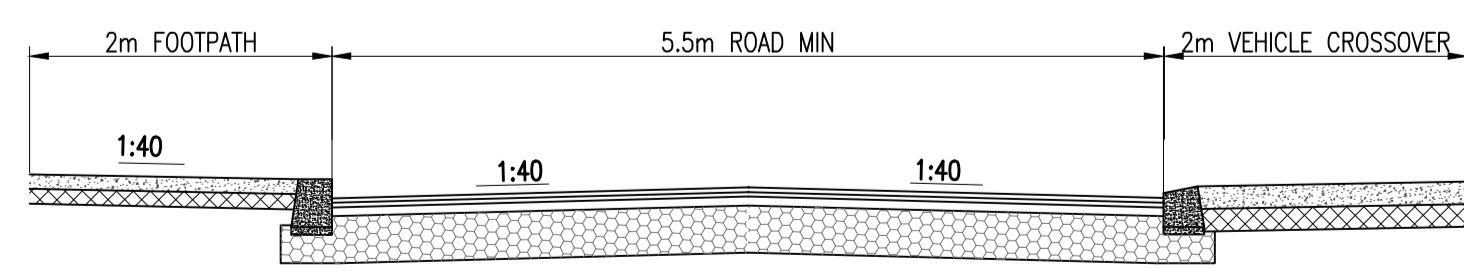


TYPICAL EXISTING SECTION - SLANE ROAD
SCALE 1:50

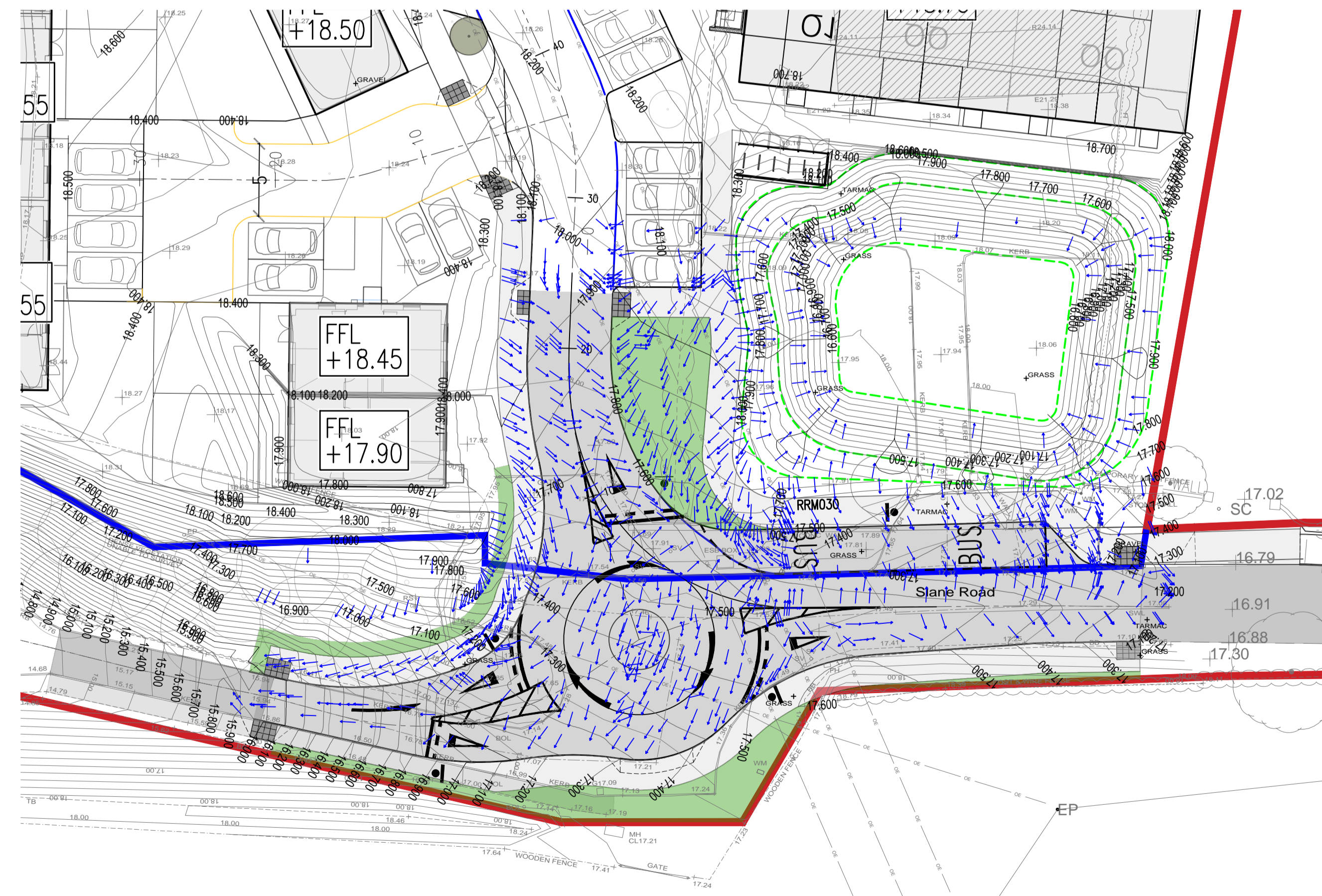
PROPOSED FOOTPATH CONSTRUCTION:
100mm CONCRETE 30N/20 ON 100mm CLAUSE 808 SUBBASE (COMPACTED)
NOTE: TO BE INCREASED TO 150mm CONCRETE ON 150mm CLAUSE 808 AT VEHICLE CROSSOVERS

ROAD CONSTRUCTION:
60mm CLOSED GRADED ASPHALT CONCRETE SURFACE COURSE TO CLAUSE 912 ON 80mm ASPHALT BINDER COURSE (AC 20 DENSE BINDER TO IS 13108-1) WITH 20mm NOMINAL AGGREGATE ON 100mm ASPHALT CONCRETE BASE COURSE TO CLAUSE 906 ON MINIMUM OF 300mm - CLAUSE 808 GRANULAR MATERIAL NOTE: THE DEPTH OF THIS SUB-BASE IS DEPENDENT UPON THE CBR OF THE FORMATION. SEE TABLE 1. PROVIDE GEOGRID TG3030S MATERIAL BELOW FORMATION LEVEL TO BE CLASS 6F2 SUPPLIED AND LAID IN ACCORDANCE WITH SERIES 600 IN THE NRA SPECIFICATION FOR ROAD WORKS.

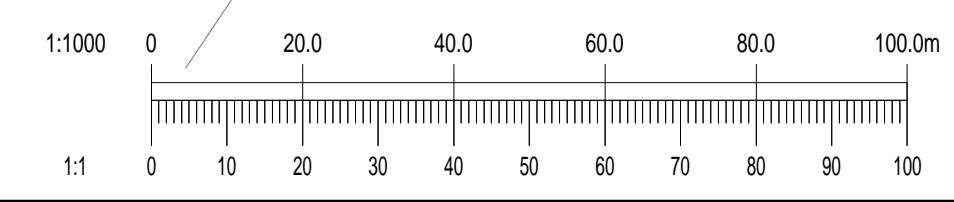
PROPOSED VEHICLE CROSSOVER CONSTRUCTION:
150mm CONCRETE 30N/20 ON 150mm CLAUSE 808 SUBBASE (COMPACTED)



TYPICAL PROPOSED SECTION - SLANE ROAD
SCALE 1:50



PROPOSED PLAN AND LEVELS
SCALE 1:250



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Rev	Date	Description	By	CHK
01	16/06/25	ROUNDABOUT LEVELS ADJUSTED TO REDUCE OVERLAND FLOW TO W/ UNDERPASS. CONTOURS AND FLOW ARROWS SHOWN	NS	SDN

PROPOSED RESIDENTIAL DEVELOPMENT AT OLD SLANE ROAD, DROGHEDA CO. LOUTH

PHASE 3 PROPOSED ROUNDABOUT

LAGAN HOMES TULLYALLEN LTD.



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Email: info@waterman-moylan.ie www.waterman-moylan.ie

PLANNING			
Designed By	NS	Approved	MD
Drawn By	NS	Date	MAY 2025
Project	Originator	Volume	Level
OSR-WMC-ZZ-GF-DR-C- 4105			
Revision	01		

UK and Ireland Office Locations

