



Engineering Assessment Report

Proposed Development at New Road, Donabate, Co. Dublin

April 2024

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Comments

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1. Introduction

1.1 Background of Report

This engineering assessment report has been prepared by Waterman Moylan as part of the design documentation for a proposed development of lands adjacent to and north of New Road, Donabate, Co. Dublin.

The development is proposed at this site of 4.72 hectares at New Road, Donabate, Co. Dublin. The site is generally bound by: a site which is currently being developed to the north; Lanestown View residential development to the east; New Road and existing residential dwellings fronting same to the south; and Saint Patrick's Park residential development to the west. The site includes: part of New Road for road junction, cycle track, footpath and water service connection works; and part of the site to the north for water service connection works.

The proposed development will principally comprise the construction of 175 No. residential dwellings (123 No. houses and 52 No. apartments) and a single-storey crèche of 365 sqm (with outdoor play area and external stores). The 123 No. houses, which are part-1-/part-2-storey and 2-storey in height, include 30 No. 2-bed units, 82 No. 3-bed units and 11 No. 4-bed units. The 52 No. apartments include 26 No. 1-bed units, 20 No. 2-bed units and 6 No. 3-bed units and are contained in a single block ranging in height from 1 No. to 4 No. storeys.

The development will also include the following: 2 No. new multi-modal entrances/exits at New Road; 2 No. multi-modal connections to existing and under construction residential developments to the east and north respectively; cycle track and footpath along New Road; 139 No. car parking spaces; 4 No. set down bays; 6 No. motorcycle parking spaces; cycle parking; hard and soft landscaping, including public open space, communal amenity space and private amenity spaces (which include gardens, balconies and terraces facing all directions); boundary treatments; 1 No. sub-station; bin stores; lighting; PV panels atop houses; green roofs, PV panels, lift overruns and plant atop the apartment block; green roofs and PV panels atop the crèche building; and all associated works above and below ground.

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

1.2 Site Location and Description

The site is located at New Road, Donabate, Co. Dublin which forms its southern boundary, and is c. 140m west of the R126. It is bound to the west by the St. Patricks Park residential development, to the north by the Ballymastone residential development which is currently under construction and separated by a ditch system, and to the east by the new Lanestown View residential development.

The site is approx. 4.72ha in area and is currently greenfield in nature.

Topographically, the site is relatively flat, and has a high point of 9.11m OD at the site boundary on the back of footpath on the north side of New Road approx. 24m west of the existing site entrance. The site typically slopes down to the north where a ditch is located and generally falls to the east. Part of this ditch has been filled in by the adjacent Ballymastone development to the north.

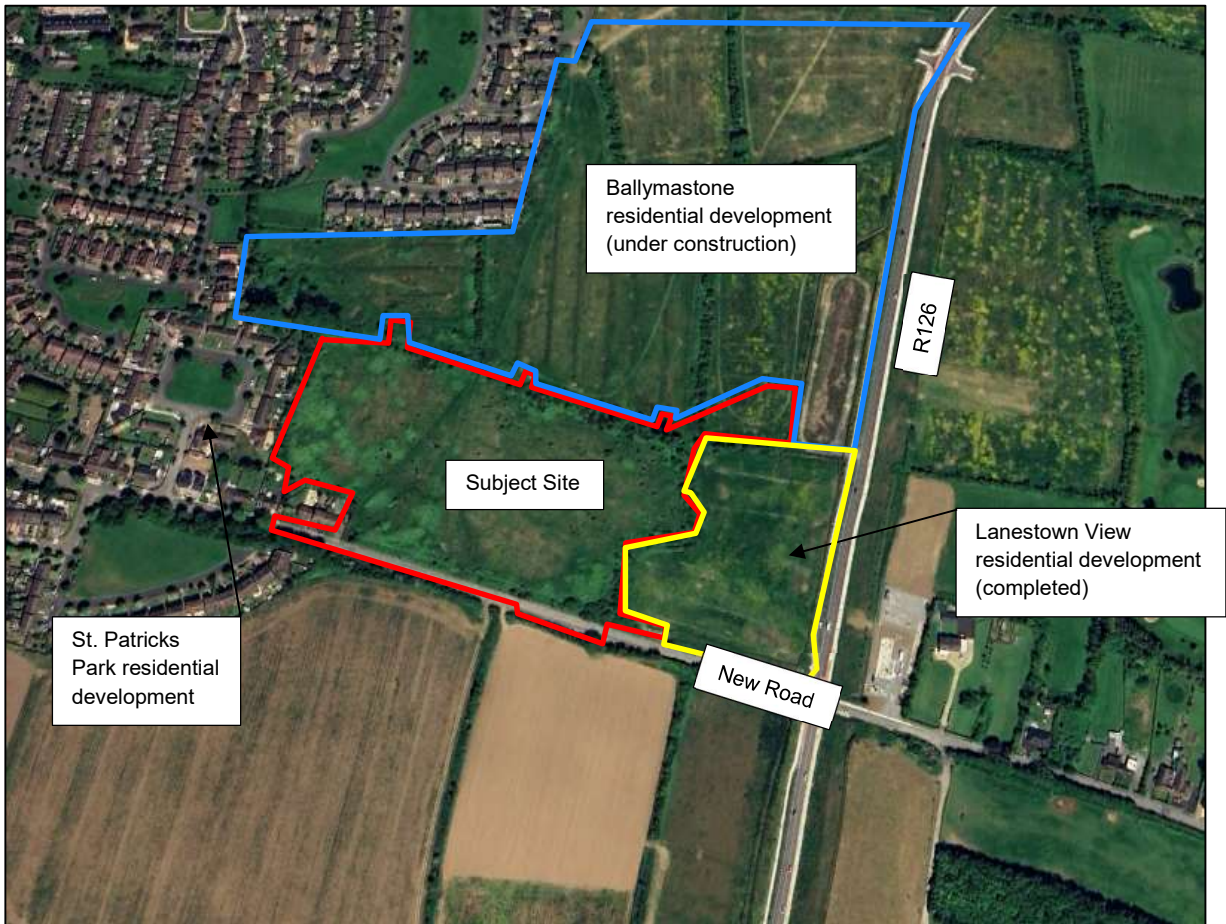


Figure 1 | Site Location Map

1.3 Proposed Development

The proposed development will consist of a total of 175 No. residential units, comprising 123 No. Houses & 52 No. Apartments units. A 4-room crèche with ancillary rooms is also proposed as per the schedule of accommodation below:

Description	1-Bed	2-Bed	3-Bed	4-Bed	Total
Houses	-	30	82	11	123
Apartments	26	20	6	-	52
Creche	-	-	-	-	1
Total	26	50	88	11	176

Table 1 | Schedule of Accommodation

The development includes all associated site works, boundary treatments, drainage, and service connections.

2. Foul Water Network

2.1 Existing Foul Water Network

The site is currently greenfield in nature. The adjacent Ballymastone residential development to the north is currently under construction. It is intended that foul flows from the subject development will drain by gravity and outfall to the new foul water pumping station constructed at the junction of New Road and Donabate distributor Road.

A Pre-Connection Enquiry was submitted to Irish Water and received a reference number of CDS23009194. The Confirmation of Feasibility Letter dated 12 February 2024, is included as Appendix A, and advises that the development is feasible without infrastructure upgrades to the foul water network.

2.2 Proposed Foul Water Network

It is proposed to serve the subject site with a series of 150mm and 225mm diameter networks, which will outfall to the adjacent Ballymastone development to the north, which is currently under construction and under the ownership of Fingal County Council. County Council have confirmed that the proposed Ballymastone outfall sewer will be constructed and in use well in advance of this subject development.

The proposed internal foul drainage network has been designed and sized in accordance with the Irish Water code of Practice for Wastewater Infrastructure and Standard Details. Please refer to Drawing numbers: 23-129-P200 which shows the proposed foul drainage layout to serve the subject site, and the foul water network in the adjacent residential estate to the north, currently under construction.

2.3 Foul Water Drainage Calculations

The calculated foul water flows at the subject development are set out in *Table 2*, 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 Irish Water Code of Practice for Wastewater Infrastructure. A peak flow multiplier of 6 has been used, as per Section 2.2.5 of Appendix B of the Code of Practice.

It is calculated that the creche will generate flow for 57 persons (10 staff and 47 children), with a wastewater volume of 90 litres per head per day, as per Appendix C 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
123 Houses	333	150	54,945	0.636	3.816
52 Apartments	141	150	23,265	0.269	1.614
1 Creche	57	90	5,130	0.059	0.354
Total	531	Varies	83,340	0.964	5.784

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

The total dry weather flow from the development has been calculated as: 0.964 l/s, with a peak flow of 5.784 l/s.

2.4 Foul Water Drainage – General

Foul water sewers will be constructed strictly in accordance with Irish Water 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

Surface water from the site currently discharges to the north and west of the subject site to ditches.

A site inspection was undertaken on 12 February 2024, to assess the condition of the ditch networks.

The ditch to the north of the subject site is internalised to the redline boundary of the adjacent Balmastone development to the north which is currently under construction under Reg Ref: LRD0008/S3. As part of the construction of this site, the ditch has been partially infilled in locations, and been replaced with a land drain.

The ditch to the west of the subject site is fully internalised to the redline boundary of the subject development. It originates internally at the southwest corner of the site and flows northwards to connect to the northern boundary ditch. As part of the construction work of the adjacent development to the north, the connection from the western boundary ditch to the north has been cut off, and this western boundary ditch is now a static ditch with no outfall to the east where it previously flowed.

There is a ditch to the northeast of the site which is the natural outfall ditch for the subject site. This ditch connects to the ditch that flows eastwards along the northern boundary of the adjacent Lanestown View development before being culverted under the new Donabate Distributor Road via twin 450mm diameter culverts. From there it flows eastwards through a series of ditches before discharging to the Donabate Golf course ditch system and ultimately the Irish Sea.

It is noted that the existing ditches to the north of the site are field drainage ditches. The proposed development will restrict surface water runoff from the proposed development to the equivalent of the existing greenfield runoff. In this regard, there will be no increase in runoff from the site to the existing drainage ditches. It is therefore considered reasonable that the ditches are adequate to receive the runoff from the proposed development as this will be the same as the existing situation.

3.2 SuDS

Sustainable Drainage System (SuDS) are a collection of water management practices that aim to align modern drainage systems with natural water processes.

By using SuDS techniques, water is either infiltrated or conveyed more slowly to the drainage system and ultimately more slowly to water courses via permeable paving, swales, & detention basins.

Fingal County Council's document titled Green/Blue Infrastructure for Development advises that: *"These facilities are designed to prevent pollution of streams and rivers and to slow down runoff from sites, therefore helping to prevent downstream flooding and improve water quality. This closely mimics natural catchment behaviour where rainfall either infiltrates through the soil or runs off slowly over the ground surface to the nearest watercourse. This is known as the "treatment train" approach. SuDS devices should be placed at source, site, and regional levels. SuDS can also provide amenity benefits to local communities and benefits for biodiversity simultaneously"*.

In the following sections of the surface water chapter, it will be outlined in detail how SuDS devices have been utilised and incorporated to the overall plan for the proposed development, and how their inclusion will mitigate the risk of localised and downstream flooding. Where possible we have introduced nature-based solutions to treat and slow down the surface water runoff from the site.

The Fingal County Council SuDS selection checklist is included as Appendix B.

3.3 Proposed Surface Water Network and Attenuation Strategy

The western boundary ditch has been identified as a townland boundary. This western boundary ditch has been surveyed by the project ecologists and arborist, who have found no items of significance that would require its preservation. Whilst there are no features to be preserved, we can respect the line of the boundary in this part of the site. Following on from consultation with the Local Authority’s heritage department, it has been decided that this ditch can be infilled with a land drain and surrounding filter stone.

At a meeting held on 21st February 2024 with the Local Authority’s surface water drainage department to discuss revisions to the previously discussed strategy, it was agreed that the western boundary ditch is to be infilled. A land drain at the head of the ditch was agreed to be constructed which is to connect to the proposed surface water drainage network at its nearest point on Road 2. The remainder of the western static boundary ditch to be infilled and is to be located in the private domain as part of the rear gardens of proposed units. It was further agreed that a filter drain system will need to be incorporated to the design as part of a collector system serving these units.

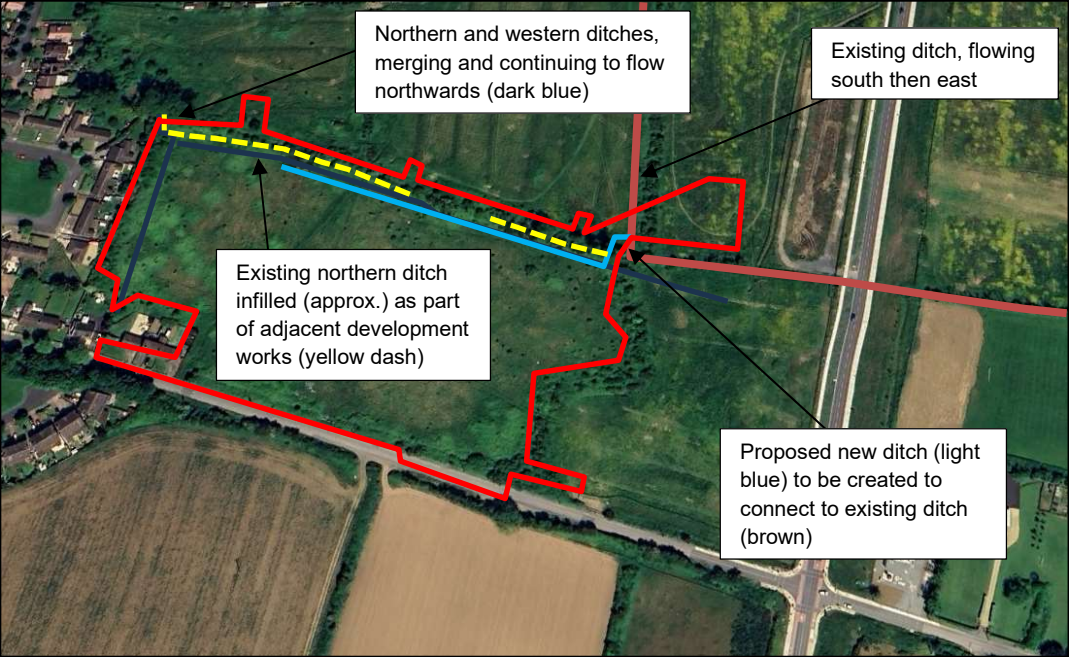


Figure 2 | Existing & proposed ditch networks and condition survey notes

There is an existing surface water drainage network located in New Road. Catchment 1 of the subject site, refer to Figure 3 below, is comprised of half of New Road carriageway sloping towards the subject site, the proposed cycle lane, the footpath and proposed units fronting onto New Road. A drainage network is to be provided in New Road to serve this catchment, which will enter the subject site at the eastern proposed site access point, with flows to be attenuated in the open space in an underground tank or system as the area and levels do not allow for above ground attenuation in this open space. It is proposed that this catchment will discharge at green field runoff rates to the existing surface water sewer in New Road. In March 2024, FCC confirmed that a survey of the sewer established that it was indeed a surface water sewer.

Due to the works to the ditch to the north of the subject site, it is proposed that a new ditch will be created to serve the outfalls internal to the subject development as per Figure 2 above. This figure indicates the existing ditches and an approximation of the impact to their original routes, and the proposed ditch and outfall connection location. Please note that in Figure 2 the redline boundary indicated, is not the project redline boundary for the purpose of the planning submission, but instead highlights the extent of the existing greenfield site that drains to the ditches discussed.

It is proposed to construct a SW drainage network that will service and attenuate the development internally, identified in Figure 3 as Catchments 2 & 3, before discharging at the current greenfield rates to the local natural ditch systems, and the existing surface water drainage network in New Road in the case of Catchment 1. The surface water drainage layout and attenuation strategy can be reviewed on drawing number: 23-129-P200.

The location and extent of SuDS devices and the nature-based solutions proposed for the development can be viewed on drawings: 23-129-P210 & P215 and is described below in Sections 3.3.1 to 3.3.4.

For storm water management purposes, it is proposed to divide the site into three separate sub-catchments, as shown in Figure 3 below.

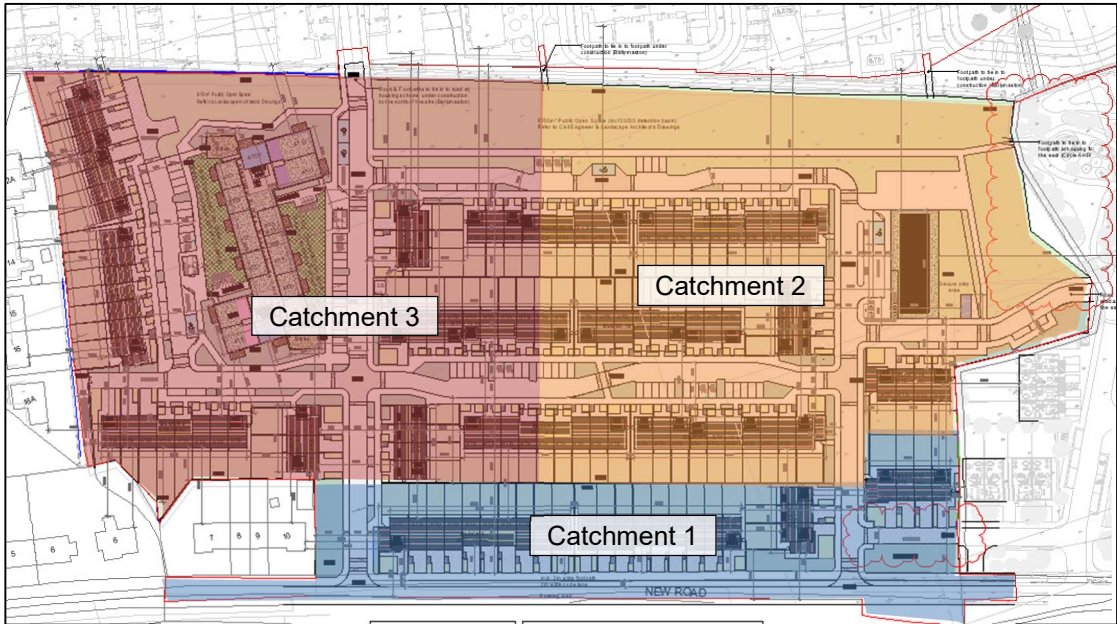


Figure 3 | Sketch of Site Catchments

Storm water from each catchment will be attenuated and discharged at a controlled rate, limited to the greenfield equivalent runoff or 2 l/s/ha (whichever is greater), to ultimately outfall to the existing ditch system forming the northern boundary of the site. Stormwater from catchment 1 however, will outfall to the existing surface water network located in New Road. The proposed development will be designed to incorporate best drainage practice. Section 3.4, below, sets out the methodology used in determining the existing greenfield runoff rates and calculating attenuation storage requirements for the site.

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 (GDSDS) and in the SuDS Manual. Based on three key elements – Water Quantity, Water Quality and Amenity (including biodiversity) – the targets of the SuDS train concept have been implemented in the design, providing SuDS devices for each of the following:

- Source Control
- Site Control
- Regional Control

3.3.1 Source Control

Permeable Paving:

It is proposed to introduce permeable paving at all private driveways and parking courts throughout the development. Downpipes from the front of the houses and apartments will drain to filter drains beneath the permeable paving to facilitate maximum infiltration of surface water from driveways and 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 gravel, to the rear gardens of residential units and adjacent footpaths in open spaces. The filter drains will provide infiltration, optimise the retention time, and provide quality improvement to the storm water runoff, in particular for the first flush from the roof area which will accumulate small particulate matter after extended dry periods.

Green / Sedum Roof:

Section 3.6.7 of the Fingal County Council document Green/Blue Infrastructure for Development instructs that a green roof must be provided for a minimum of 60% of the total roof area, where it exceeds 300m² for specific development types, which in this case is applicable to the apartment block. It is proposed to introduce sedum roofing as a source control device on an Apartment Block. The sedum roofing is proposed to cover a minimum of 60% of the total apartment roof area, totalling a cumulative green roof area of 986m². The sedum roofing typically consists of 75mm substrate with a sedum blanket.

The substrate and the plant layers in a green roof absorb large amounts of rainwater and release it back into the atmosphere by transpiration and evaporation. They also filter water as it passes through the layers, so the run-off, when it is produced, has fewer pollutants. Rainfall not retained by green roofs is detained, effectively increasing the time to peak, and slowing peak flows.

A sedum roof can reduce annual percentage runoff by between 40% and 80% through this retention and evapotranspiration, with the impact dependent on a range of factors including the depth of substrate, the saturation of substrate at the onset of a rain event, the angle of the roof, the range of vegetation growing, intensity of rainfall and the time of year.

A paper entitled *Green Roofs Over Dublin: A Green Roof Policy Guidance Paper for Dublin* was published in August 2008 with guidelines for Dublin City Council to develop planning directives for the incorporation of green roofs in new development. The table below is taken from this document and shows the percentage of total rainfall retention over a 14-month period for different green roof treatments.

Slope	Media Depth	Light Rain <2mm	Medium Rain 2mm-6mm	Heavy Rain >6mm	Overall
2.0%	25mm	95.1%	82.9%	64.7%	69.8%
2.0%	40mm	97.1%	85.5%	65.1%	70.1%
6.5%	40mm	94.9%	83.1%	59.5%	65.9%
6.5%	60mm	95.8%	84.6%	62.0%	68.1%

Table 3 | Percentage of Total Rainfall Retention Over a 14-Month Period (Aug 2002-Oct 2003)

The proposed sedum roofing shall be on flat roofs with a media depth of 75mm, exceeding the depths shown above. Thus, the percentage of total rainfall retention can be expected to exceed the tabulated figures.

3.3.2 Site Control

Roadside Bio-retention Tree Pits:

It is proposed to provide roadside trees throughout the development. 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.

Swales:

Swales are grassed channels proposed to run parallel and adjacent to selected roads throughout the site. Rainfall from the road surface will be directed to gaps in the road kerbing and will flow to the swales. The swales will be linked back to the drainage network to prevent flooding in extreme weather events, where the volume of rainfall exceeds the infiltration capacity of the swales.

Grassed swales enhance surface water runoff quality as they slow down water flow, allowing suspended particles to filter and settle out of suspension. C. 255 linear metres of swales are proposed as part of the development.

3.3.3 Regional Control

Detention Basin / Attenuation Tank:

Detention basins are engineered depressions in the ground which provide space to attenuate rainfall. The detention basins will typically remain dry but will act as a storage pond during extreme rainfall events. These will be utilised to serve catchments 2, & 3. These detention basins have been designed to incorporate an underlying stone mattress, so that during lesser rainfall events, attenuated water volumes will not flood to the surface level of the basin allowing for the basin to remain usable. An additional benefit of this stone mattress is that in the case of heavier rainfall events where the volume of attenuated rainfall does exceed the bottom of basin level, that as the attenuated water level recedes, the stone mattress provides additional porosity to the soil structure below the surface level allowing the topsoil to drain more efficiently and return the grassed surface to a useable condition more quickly.

It is intended that the surface water to be attenuated from Catchments 2 & 3 will flow through the proposed ditch to a hydrobrake. This hydrobrake will release water at the greenfield runoff rates with volumes in excess of this being attenuated. It is proposed that a landscaped shelf will be provided on the southern side of the proposed ditch and will be slightly elevated above the invert level of the ditch. The plateau formed by the shelf will be included by a sloped embankment. The confines of this embankments, and the top of bank formed by the opposite side of the ditch will provide sufficient attenuation volume to serve the required attenuation volume of Catchments 2 & 3 combined.

For Catchment 1, it is proposed to utilise an underground system due to the levels and area of the adjacent open space and outfall surface water sewer on New Road.

Flow Control:

A flow control device (Hydrobrake or similar approved) is proposed at each sub-catchment attenuation feature, which will limit exiting flows to the greenfield equivalent runoff rate.

Please refer to Appendix C for attenuation and flow control calculations for each catchment.

Petrol interceptor:

Class 1 petrol interceptors will be provided before the surface water outfalls to the local water courses / surface water sewer.

A SuDS checklist is included as Appendix B, as per FCC requirements.

3.4 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 (GSDSDS) and in the SuDS Manual. Appendix E of the Greater Dublin Strategic Drainage Study (GSDSDS) sets out criteria for determining the provision of interception or treatment storage, attenuation storage and long-term storage at a development site.

3.4.1 Criterion 1: River Water Quality Protection

Criterion 1.1: Interception

The Greater Dublin Strategic Drainage Study (GSDSDS) 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:

Paved surfaces connected to drainage system	$43,695\text{m}^2 \times 0.44 \times 0.75 = 14,419.35\text{m}^2$	<i>43,695m² site area 44% of the site is paved 75% of the paved area</i>
Volume of Interception Storage	$14,420\text{m}^2 \times 5\text{mm} \times 0.8 = 58\text{m}^3$	<i>Paved area directly drained 5mm rainfall depth 80% paved runoff factor</i>

Table 4 | Interception Calculation

The required interception volume is 58m³. It is not proposed to provide the entire required interception volume. Criterion 1.2 will therefore be assessed to provide the required River Water Quality Protection in accordance with Criterion 1.

Criterion 1.2: Treatment Volume

For events larger than 5mm, and in situations where interception storage cannot be provided, surface water runoff treatment is provided utilising SuDS in accordance with the CIRIA design manual C521.

Assuming 80% runoff from paved surfaces and 0% from pervious surfaces for the first 15mm of rainfall:

Paved surfaces draining to river	$43,695\text{m}^2 \times 0.44 \times 0.75 = 14,419.35\text{m}^2$	<i>43,695m² site area 44% of the site is paved 75% of the paved area</i>
Volume of Treatment Storage	$14,420\text{m}^2 \times 15\text{mm} \times 0.8 = 173\text{m}^3$	<i>Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces</i>

Table 5 | Treatment Volume Calculation

The required treatment volume for the site is met through the introduction of various SuDS features (which have been described in Section 3.2, above).

Permeable paving is proposed in private driveways and accounts for a total cumulative area of C. 2,173m³. Assuming a subbase depth of 0.3m with 33% voids, this yields a treatment volume of 286m³. Filter drains, swales, and roadside trees around the site provide further treatment volume. These SuDS features provide ample treatment volume to meet the Criteria 1 requirements.

3.4.1 Criterion 2: River Regime Protection

Attenuation storage is provided to limit the discharge rate from the site into receiving waters. As per the GSDSDS, the required attenuation volume is calculated assuming 80% runoff from paved areas and has been calculated for the 1-year, 30-year and 100-year return periods, identifying the critical storm for each – refer to calculations included in Appendix C which have been based on the usage of Soil Type 4.

As noted above, the site has been divided into three sub-catchments which will be attenuated separately. Based on the calculations, included as Appendix C, the required attenuation storage volume for each sub-catchment is set out in *Table 6 below*.

Catchment	Area	Required Attenuation Volume	Allowable Discharge Rate
	m ²	m ³	l/s
Catchment 1	7,712	70.21	3.71
Catchment 2	19,380	288.78	9.33
Catchment 3	16,603	209.96	7.99
Total	43,695	568.95	21.03

Table 6 | Attenuation Volume for Each Sub-Catchment

The catchments will be attenuated in detention basins. The proposed detention basins will normally remain dry except in extreme weather events and will have a combined storm water storage capacity of 598m³ minimum.

Each attenuation area provides sufficient storage to accommodate the 1-in-100-year storm volume, accounting for a 20% increase due to climate change for their respective catchment.

Catchments 2 & 3 will discharge to the ditch and will both be served by the detention basin. The hydrobrake limiting the flow rate of Catchments 2 & 3 will be the sum of the allowable discharge rate for the catchments and thus will be 17.32 l/s.

3.4.2 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. Only three are discussed up to this point. Please refer to the accompanying Flood Risk Assessment report for the full analysis of the flood risk at the subject site.

3.4.3 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 flow control devices at the outfall for each catchment 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.

The extra runoff volume of the development runoff over greenfield runoff, Vol_{xs} , is calculated in Appendix C for each of the sub-catchments. Note that as stated in the GDSDS, this volume is not additional to the attenuation storage volume but is effectively an element of it.

3.5 Surface Water – General

Surface water sewers will generally consist of PVC (to IS 123) or concrete socket and spigot pipes (to IS 6) and laid strictly in accordance with Fingal County Council requirements for taking in charge. It is intended that all sewers within the public domain will be handed over to Fingal County Council for taking in charge.

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.

3.6 Flood Risk Assessment

A Flood Risk Assessment has been prepared by Waterman Moylan. This report is submitted under a separate cover.

4. Water Supply

4.1 Existing Water Supply

Irish Water records for the surrounding area have been obtained and are extracted to *Figure 4* below. There is an existing 6" Ø (150mm) uPVC watermain located along New Road fronting the subject site, named as the L2170 Balcarrick Road in the below extract.

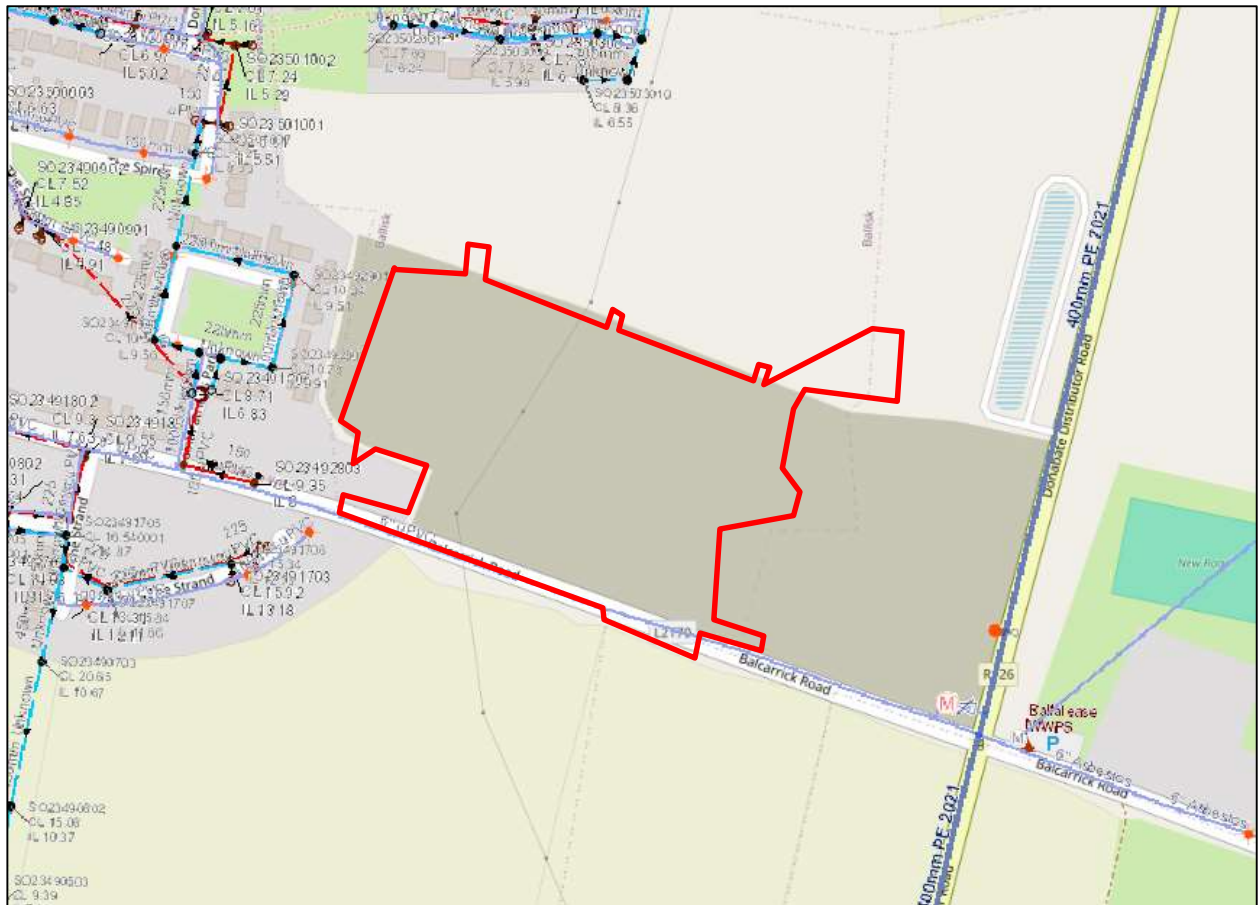


Figure 4 | Existing Watermain Network Map Extract

A Pre-Connection Enquiry was submitted to Irish Water and received a reference number of CDS23009194. The Confirmation of Feasibility Letter dated 12th February 2024, is included as Appendix A, and advises that the development is feasible without infrastructure upgrades to the water supply network.

4.2 Proposed Water Supply

The subject development is proposed to have 3 No. watermain connections (all 150mmØ). 2 No. proposed connections to the existing 6" uPVC watermain fronting the site on New Road, and a further 1 No. connection to the 100mmØ spur from the adjacent Ballymastone residential development to the north which is currently under construction.

The site is proposed to be served by a network of watermains loops and branches, ranging from 50mm to 150mm in diameter. Sluice, air, and scour valves, hydrants, and water meters, including bulk water meters for the apartment blocks and commercial building (creche), have been incorporated to the design as required.

As noted in Section 2.1, a pre-connection enquiry was submitted to Uisce Eireann; the response letter from Uisce Eireann dated 12 February 2024 is included in Appendix A. In this letter, Uisce Eireann state that a new connection to the existing network is feasible without any local upgrade works.

The proposed internal watermain layout, and the existing networks in the adjacent estates can be seen on Drawing Number: 23-129-P300.

4.3 Water Supply Calculations

The calculated water demand at the subject development is set out in the *Table 7*. 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. 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 Irish Water Code of Practice for Water Infrastructure.

The consumption demand of the creche facility is based on the outflow figure of 90 litres per head per day as per Table 2.

Description	Total Population	Water Demand	Average Demand	Average Peak Demand	Peak Demand
	No. People	l/day	l/s	l/s	l/s
123 Houses	333	54,945	0.636	0.795	3.975
52 Apartments	141	23,265	0.269	0.336	1.680
Creche	57	5,130	0.059	0.074	0.370
Total	531	83,340	0.964	1.205	6.025

Table 7 | Calculation of Water Demand for the Development

The average demand for the development is 0.964 l/s, with a peak demand of 6.025 l/s.

4.4 Water Supply – General

All watermains will be laid strictly in accordance with Irish Water requirements for taking in charge.

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

5. Roads and Transport Network

This section provides an overview of the existing and proposed road and transportation network in the vicinity of the site.

5.1 Existing Road Layout

New Road (L2170 – also known as Balcarrick Road) forms the southern site boundary. It is a 2-lane carriageway running east-west, with Donabate beach c 1.8km to the east and the Donabate town Rail station C. 0.7km to the west. New Road has a typical width of 5.6m to 6.3m fronting the subject site, narrowing to the west as it approaches the existing residential developments on the outskirts of Donabate town. New Road has a posted speed limit of 50kph fronting the subject site. There is a pedestrian footpath, with a typical width of 2m, fronting the subject site on New Road. The footpath extends along the entirety on New Road on its northern side from Donabate Village to Donabate beach.

New Road's Junction with the R126 is located c. 0.25km to the east of the subject site. The R126 serves Portrane c. 2.2km to the northwest and is connected to the M1 at Junction 4 c. 4.25km to the southwest. The R126 is a 2-lane carriageway and has pedestrian footpaths, dedicated cycle lanes and shared pedestrian and cyclist paths on both sides of the carriageway, extending from its junction with New Road to the north for c. 1.5km and to the south for c. 2.2km

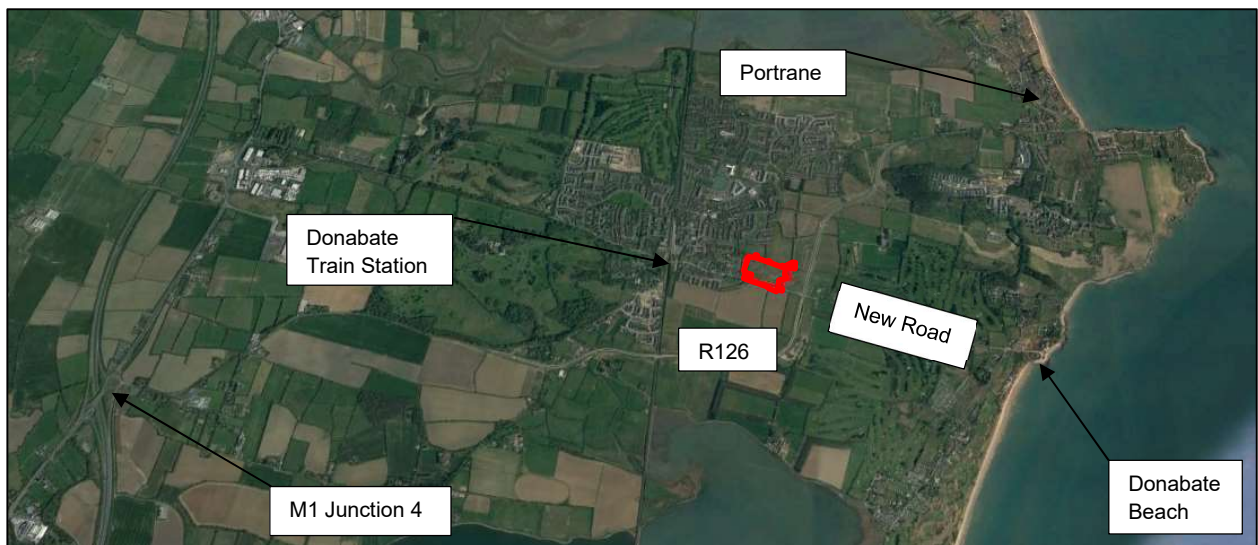


Figure 5 | Road Network and Public Transport Infrastructure

The site currently has 2 access points, there is an agricultural access located on the southwestern site boundary from New Road. A second access point has been created by hedgerow clearance centrally along the southern site boundary with New Road. The clearance took place between May 2017 and June 2018.

5.2 Public Transport Infrastructure

5.2.1 Rail

Donabate Rail Station is located c. 0.7km to the west of the subject site, approx. a 9-minute walk. This station is served by the Dublin-Dundalk & DART and Commuter services. This is further detailed in the accompanying Traffic and Transport Assessment report and Travel Plan.

5.2.2 Bus

There are a pair of bus stops located on Donabate Main Street, approx. 0.6km, or 7-minute walk from the subject site. The bus stops numbered: 3780 & 7691, serve routes 33B, 33D, 33E, & 33T, which runs between: Portrane-Swords, Portrane - St. Stephens Green (Dublin City), Lower Abbey St. (Dublin City) - Skerries, & Donabate-Skerries, respectively. Further details can be found in the accompanying Traffic and Transport Assessment and Travel Plan reports.

5.3 Proposed Road Layout

The site is proposed to be accessed from 2 No. new vehicular entrances from New Road with 6m radii. Vehicular connectivity is further proposed to the Ballymastone residential development, currently under construction, adjacent to the North of Road 3.

There is a proposed cycle lane and footpath fronting along the south of the south on New Road.

Internally the road layout is comprised of 2-lane local access roads with a carriageway width of 5m to 5.5m, and 5m radii bends. 2m pedestrian footpaths are provided on both sides of the development for the majority. Additional pedestrian routes through open green space have been provided along desire lines and for amenity.

There are 3 No. on Homezone areas on Northern Road 1, Western Road 2 and Eastern Road 7. The Homezones are composed of a ramp up to a shared vehicular pedestrian and cyclist area which is typically composed of a different material colour and texture to further advise motorists of the change in priority. These homezones are short lengths of road located at the end of cul-de-sacs which further reduce vehicular speeds at these locations to 20kph or less.

Horizontal and vertical deflections have been introduced to reduce vehicular speeds, and a swept path and sightlines analysis have been undertaken. Full DMURS details are included in the DMURS report submitted under a separate cover.

Additional pedestrian and cycle filtered permeability has been provided to the new developments to the east and north of the site and additional filtered permeability has been provided from each of the homezones / cul-de-sacs which do not allow through vehicular traffic.

The road layout is shown the following drawing numbers: P050 Road Surfacing Layout, Road Layout & Levels Drawings P100, Road Cross Sections Drawing P115 & Road Construction Details P190, are included as part of the planning application package.

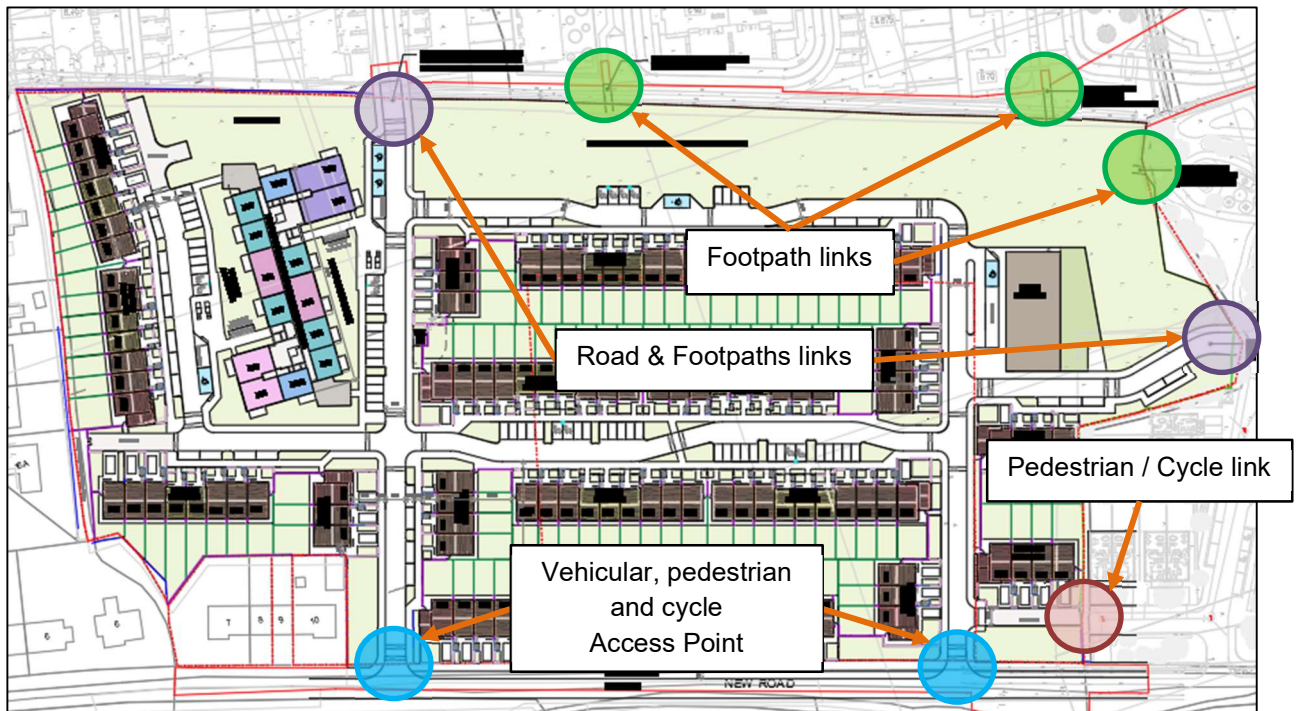


Figure 6 | Proposed Site Access Points and Internal Road Layout

5.4 Parking Assessment

The proposed development has been made provision for adequate and secure parking spaces in accordance with the Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities (2024), the Sustainable Urban Housing: Design Standards for New Apartments (July 2023), and the Fingal Development Plan 2023 – 2029 Standards.

As a results of the assessment, 139 No. car park spaces, 4 No. parking bays, 6 No. motorcycle parking spaces 611 No. bicycle parking spaces are proposed.

This is further detailed in the accompanying Traffic and Transport Assessment report and Travel Plan.

5.5 Quality Audit

A Quality Audit has been carried out by Bruton Consulting Engineers. For further information on the Quality Audit, refer to the DMURS Statement of Design Consistency which accompanies this submission under separate cover.

APPENDICES

A. Confirmation of Feasibility Letter – CDS23009194

CONFIRMATION OF FEASIBILITY

Robert Walpole

Block S, EastPoint Business Park
Alfie Byrne Road, East Wall
Dublin 3
Dublin
D03H3F4

12 February 2024

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: CDS23009194 Pre-Connection Enquiry
New Road, Donabate, Dublin, Dublin

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 184 unit(s) at New Road, Donabate, Dublin, Dublin, (the **Development**).

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

- **Water Connection** - Feasible without infrastructure upgrade by Irish Water
-
- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water
- The applicant is advised to engage with the Local Water Services Department if level/position surveys are required during the detailed design of the development.

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.

Stiúthóirí / Directors: Tony Keohane (Cathaoirleach / Chairman), Niall Gleeson (POF / CEO), Christopher Banks, Fred Barry, Gerard Britchfield, Liz Joyce, Patricia King, Eileen Maher, Cathy Mannion, 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 design activity company, limited by shares. Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

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/

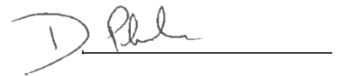
Where can you find more information?

- **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



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. FCC SuDS Selection Checklist

SUDS/Green Infrastructure selection checklist –To be submitted in planning submission - Rev 2

Suds Measures	Measures to be used on this site	Rationale for selecting/not selecting measure	Checklist submitted? See no. 8 below
Source Control			
Swales	✓	Proposed at select locations adjacent to roads.	
Tree Pits	✓	Proposed along road sides and in between parking bays.	
Rainwater Butts			
Rainwater harvesting			
Soakaways	X	Large-scale soakaways are not suitable for use on site due to poor infiltration levels.	
Infiltration trenches			
Permeable pavement (Grasscrete, Block paving, Porous Asphalt etc.)	✓	All private driveways are to be permeable paving with underlying filter drains. Downpipes from the front of the houses will also drain to the filter drain under the permeable paving to facilitate maximum infiltration of surface water from driveways and roof areas.	
Green Roofs	✓	A green roof will be provided for the Apartment Block (Blocks A & B).	
Filter strips			
Bio-retention systems/Raingardens	✓	Proposed to be provided in the private domain of residential units.	
Blue Roofs	N/A		
Filter Drain	✓	Filter drains are to be incorporated around the perimeter of each block to allow for infiltration of surface water.	
Site Control			
Detention Basins	✓	Grassed detention basins with an underlying stone mattress are proposed for use on Catchments 2, & 3 to attenuate surface runoff. Water will be attenuated via the utilisation of a hydrobrake system.	
Retention basins			
Regional Control			
Ponds			
Wetlands			
Other			
Petrol/Oil interceptor	✓	A Class 1 petrol interceptor will be provided before the surface water outfall.	
Attenuation tank – only as a last resort where other measures are not feasible	✓	An attenuation tank is proposed to serve the Apartment blocks. It will be located in the private domain and remain under private management. An tank is proposed to attenuate the widened section of New Road and units fronting it.	

Oversized pipes– only as a last resort where other measures are not feasible	χ	None proposed	
--	---	---------------	--

Note:

1. Fingal has a preference for above ground Green Infrastructure rather than tanks or oversized pipes . Above ground flows through swales, basins etc are encouraged.
2. Demonstrate SUDS system will have sufficient Pollutant removal efficiency in accordance with Ciria Suds Manual C753
3. Basins sides should be no steeper than 1:4 and no deeper than 1.2m in the 1%AEP
4. Culverting shall be avoided where possible
5. De-culverting is encouraged.
6. Please submit evidence of infiltration rates
7. To account for climate change in the design of the drainage system rainfall intensities should be factored up by 20%
8. The Applicant must provide Suds checklists in accordance with the Appendix B of the Ciria Suds manual C753

Appendix	Name
B3	Full planning
B4	Scheme design
B5	Health and safety
B6	Infiltration assessment
B7	Proprietary treatment
B9	filter strip
B11	filter drain
B13	swale
B15	bioretention
B16	pervious pavement
B17	attenuation tank
B19	basin
B21	pond wetland

C. GSDSD Attenuation Calculations



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Project Data

Calculation By: LSL		Catchment	Catchment 1
Approved by:		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
		Date	08/03/2024

Description		%	Area
Total Site Area		-	7,712m ²
Paved Area	Total	34%	2,601m ²
	Drained	90%	2,341m ²
Soil Area	Total	66%	5,111m ²
	Drained	0%	0m ²

Soil Type:	Type 4
SPR Index (from FSR):	0.47
SAAR:	698mm
Rain Data:	Dublin Airport
Climate Change Factor:	20%

Greenfield Runoff:

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

- Area = 0.00771km² ... Total site area in km²
- SAAR = 698mm ... Standard Average Annual Rainfall in mm
- SOIL = 0.47 ... 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} = 0.004m³/s
- Q_{BARrural} = 3.711 l/s
- Q_{BARrural} = 4.812 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q _{BAR} (l/s)	3.15	7.79	9.65
Q _{BAR} (l/s/Ha)	4.09	10.10	12.51
Allowable Discharge	3.71	3.71	3.71

Rainfall Data:

Rain Data From: Dublin Airport
Climate Change Factor: 20%

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.0	14.4	17.9	22.0	24.2	28.8	33.6
1	12.0	18.6	22.9	27.6	30.4	36.0	42.0
2	15.7	23.8	28.8	34.8	37.6	43.2	50.4
4	21.2	31.2	37.2	43.2	46.4	52.8	61.2
6	25.6	37.2	43.2	50.4	54.4	62.4	70.8
12	32.4	46.8	48.0	63.6	68.0	76.8	86.4



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Calculation By:	LSL
Approved by:	Mark Duignan

Summary

Catchment	Catchment 1
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Summary of GSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	7.80m³
Treatment Volume	23.41m³

Criterion 2: River Regime Protection

1-in-1-Year Storm	12.72m ³
1-in-30-Year Storm	33.51m ³
1-in-100-Year Storm	23.98m ³
Reduction of Long-Term Storage	21.99m ³
Volume Required	92.20m³

... Includes head-loss correction

Criterion 4: River Flood Protection


Long Term Storage (no interception provided)	-21.99m³
Long Term Storage (Interception provided)	-29.79m³

Total Attenuation Volume Requirement:

1-in-100 Year Storm

1-in-1-Year Storm	12.72m ³
1-in-30-Year Storm	33.51m ³
1-in-100-Year Storm	23.98m ³
Total	70.21m³

The maximum attenuation volume required is 70.21m³

 Waterman Moylan Engineering Consultants		Criterion 1	
		River Protection Volume	
Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4 t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie		Catchment	Catchment 1
		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
Calculation By:	LSL	Date	08/03/2024
Approved by:			

1.1 Interception

Paved surfaces connected to drainage system	$7712m^2 \times 0.3372665975 \times 0.75 =$ $1,950.75m^2$	$7,712m^2$ site area 34% of the site is paved 75% of the paved area
Volume of Interception Storage	$1950.74999994m^2 \times 5mm \times 0.8 =$ $7.80m^3$	Paved area directly drained 5mm rainfall depth 80% paved runoff factor

1.2 Treatment Volume

Paved surfaces draining to river	$7712m^2 \times 0.3372665975 \times 0.75 =$ $1,950.75m^2$	$7,712m^2$ site area 34% of the site is paved 75% of the paved area
Volume of Treatment Storage	$1950.74999994m^2 \times 15mm \times 0.8 =$ $23.41m^3$	Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces



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Criterion 2
River Regime Protection

Catchment	Catchment 1
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Calculation By:	LSL
Approved by:	

1-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	50.00	9.36	0.00	9.36	16.9	3.71	6.7	5.65	10.2
1	33.33	6.24	0.00	6.24	22.5	3.71	13.4	2.53	9.1
2	21.83	4.09	0.00	4.09	29.4	3.71	26.7	0.38	2.7
4	14.75	2.76	0.00	2.76	39.8	2.76	39.8	0.00	0.0
6	11.83	2.22	0.00	2.22	47.9	2.22	47.9	0.00	0.0
12	7.50	1.40	0.00	1.40	60.7	1.40	60.7	0.00	0.0

30-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	134.67	25.22	0.00	25.22	45.4	3.71	4.9	21.51	28.5
1	84.43	15.81	0.00	15.81	56.9	3.71	10.2	12.10	33.4
2	52.22	9.78	0.00	9.78	70.4	3.71	20.5	6.07	33.5
4	32.23	6.03	0.00	6.03	86.9	3.71	37.2	2.32	23.3
6	25.18	4.72	0.00	4.72	101.9	3.71	42.6	1.01	11.5
12	15.74	2.95	0.00	2.95	127.4	2.95	0.0	0.00	0.0

100-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	186.67	34.96	0.00	34.96	62.9	3.71	1.5	31.25	12.6
1	116.67	21.85	0.00	21.85	78.7	3.71	4.4	18.14	21.6
2	70.00	13.11	0.00	13.11	94.4	3.71	9.5	9.40	24.0
4	42.50	7.96	0.00	7.96	114.6	3.71	15.3	4.25	17.5
6	32.78	6.14	0.00	6.14	132.6	3.71	13.4	2.43	8.7
12	20.00	3.75	0.00	3.75	161.8	3.71	-4,519.5	0.03	-42.2



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Project Data

Calculation By: LSL		Catchment	Catchment 2
Approved by:		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
		Date	08/03/2024

Description		%	Area
Total Site Area		-	19,380m ²
Paved Area	Total	48%	9,334m ²
	Drained	90%	8,401m ²
Soil Area	Total	52%	10,046m ²
	Drained	0%	0m ²

Soil Type:	Type 4
SPR Index (from FSR):	0.47
SAAR:	698mm
Rain Data:	Dublin Airport
Climate Change Factor:	20%

Greenfield Runoff:

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

- Area = 0.01938km² ... Total site area in km²
- SAAR = 698mm ... Standard Average Annual Rainfall in mm
- SOIL = 0.47 ... 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} = 0.009m³/s
- Q_{BARrural} = 9.325 l/s
- Q_{BARrural} = 4.812 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q _{BAR} (l/s)	7.93	19.58	24.25
Q _{BAR} (l/s/Ha)	4.09	10.10	12.51
Allowable Discharge	9.33	9.33	9.33

Rainfall Data:

Rain Data From: Dublin Airport
Climate Change Factor: 20%

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.0	14.4	17.9	22.0	24.2	28.8	33.6
1	12.0	18.6	22.9	27.6	30.4	36.0	42.0
2	15.7	23.8	28.8	34.8	37.6	43.2	50.4
4	21.2	31.2	37.2	43.2	46.4	52.8	61.2
6	25.6	37.2	43.2	50.4	54.4	62.4	70.8
12	32.4	46.8	54.0	63.6	68.0	76.8	86.4



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Calculation By:	LSL
Approved by:	Mark Duignan

Summary

Catchment	Catchment 2
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Summary of GSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	28.00m³
Treatment Volume	84.01m³

Criterion 2: River Regime Protection

1-in-1-Year Storm	58.84m ³
1-in-30-Year Storm	138.45m ³
1-in-100-Year Storm	91.49m ³
Reduction of Long-Term Storage	-31.50m ³
Volume Required	257.29m³

... Includes head-loss correction

Criterion 4: River Flood Protection


Long Term Storage (no interception provided)	31.50m³
Long Term Storage (Interception provided)	3.49m³

Total Attenuation Volume Requirement:

1-in-100 Year Storm

1-in-1-Year Storm	58.84m ³
1-in-30-Year Storm	138.45m ³
1-in-100-Year Storm	91.49m ³
Total	288.78m³

The maximum attenuation volume required is 288.78m³

 Waterman Moylan Engineering Consultants		Criterion 1	
		River Protection Volume	
Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4 t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie		Catchment	Catchment 2
		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
Calculation By:	LSL	Date	08/03/2024
Approved by:			

1.1 Interception

Paved surfaces connected to drainage system	$19380m^2 \times 0.481630547 \times 0.75 =$ 7,000.50m ²	19,380m ² site area 48% of the site is paved 75% of the paved area
Volume of Interception Storage	$7000.500000645m^2 \times 5mm \times 0.8 =$ 28.00m ³	Paved area directly drained 5mm rainfall depth 80% paved runoff factor

1.2 Treatment Volume

Paved surfaces draining to river	$19380m^2 \times 0.481630547 \times 0.75 =$ 7,000.50m ²	19,380m ² site area 48% of the site is paved 75% of the paved area
Volume of Treatment Storage	$7000.500000645m^2 \times 15mm \times 0.8 =$ 84.01m ³	Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces



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Criterion 2
River Regime Protection

Catchment	Catchment 2
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Calculation By:	LSL
Approved by:	

1-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	50.00	33.60	0.00	33.60	60.5	9.33	16.8	24.28	43.7
1	33.33	22.40	0.00	22.40	80.6	9.33	33.6	13.08	47.1
2	21.83	14.67	0.00	14.67	105.6	9.33	67.1	5.35	38.5
4	14.75	9.91	0.00	9.91	142.7	9.33	134.3	0.59	8.5
6	11.83	7.95	0.00	7.95	171.8	7.95	171.8	0.00	0.0
12	7.50	5.04	0.00	5.04	217.7	5.04	217.7	0.00	0.0

30-Year Return Period


(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	134.67	90.50	0.00	90.50	162.9	9.33	11.4	81.18	99.0
1	84.43	56.74	0.00	56.74	204.3	9.33	24.3	47.42	123.6
2	52.22	35.09	0.00	35.09	252.7	9.33	50.1	25.77	138.4
4	32.23	21.66	0.00	21.66	311.9	9.33	98.7	12.33	130.5
6	25.18	16.92	0.00	16.92	365.6	9.33	143.7	7.60	117.1
12	15.74	10.58	0.00	10.58	457.0	9.33	52.8	1.25	7.1

100-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff <i>= Rainfall Rate x Area x Soil Type</i>				Discharge		Storage	
		Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	186.67	125.45	0.00	125.45	225.8	9.33	1.9	116.12	23.5
1	116.67	78.41	0.00	78.41	282.3	9.33	8.5	69.08	63.2
2	70.00	47.04	0.00	47.04	338.7	9.33	21.3	37.72	86.0
4	42.50	28.56	0.00	28.56	411.3	9.33	44.3	19.24	91.5
6	32.78	22.03	0.00	22.03	475.8	9.33	65.2	12.70	88.9
12	20.00	13.44	0.00	13.44	580.6	9.33	-17.5	4.12	-7.7

 Waterman Moylan Engineering Consultants		Criterion 4	
		River Flood Protection	
Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4 t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie		Catchment	Catchment 2
		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
Calculation By:	LSL	Date	08/03/2024
Approved by:			

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

Vol_{XS} ... Extra runoff volume of development over Greenfield runoff

RD = 71 mm ... Rainfall depth of the 100 year, 6 hour event mm

A = 1.938 Ha ... Area of site

PIMP = 48% ... Impermeable area of total site

$\alpha_{0.8}$ = 90% ... 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 = 0.47 ... SPR index

$$Vol_{XS} = 31.50m^3$$



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Project Data

Calculation By: LSL		Catchment	Catchment 3
Approved by:		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
		Date	08/03/2024

Description		%	Area
Total Site Area		-	16,603m ²
Paved Area	Total	43%	7,144m ²
	Drained	90%	6,430m ²
Soil Area	Total	57%	9,459m ²
	Drained	0%	0m ²

Soil Type:	Type 4
SPR Index (from FSR):	0.47
SAAR:	698mm
Rain Data:	Dublin Airport
Climate Change Factor:	20%

Greenfield Runoff:

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

- Area = 0.0166km² ... Total site area in km²
- SAAR = 698mm ... Standard Average Annual Rainfall in mm
- SOIL = 0.47 ... 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} = 0.008m³/s
- Q_{BARrural} = 7.989 l/s
- Q_{BARrural} = 4.812 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q _{BAR} (l/s)	6.79	16.78	20.77
Q _{BAR} (l/s/Ha)	4.09	10.10	12.51
Allowable Discharge	7.99	7.99	7.99

Rainfall Data:

Rain Data From: Dublin Airport
Climate Change Factor: 20%

Duration (Hours)	Return Period (Years)						
	1	5	10	20	30	50	100
0.5	9.0	14.4	17.9	22.0	24.2	28.8	33.6
1	12.0	18.6	22.9	27.6	30.4	36.0	42.0
2	15.7	23.8	28.8	34.8	37.6	43.2	50.4
4	21.2	31.2	37.2	43.2	46.4	52.8	61.2
6	25.6	37.2	43.2	50.4	54.4	62.4	70.8
12	32.4	46.8	54.0	63.6	68.0	76.8	86.4



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Calculation By:	LSL
Approved by:	Mark Duignan

Summary

Catchment	Catchment 3
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Summary of GSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	21.43m³
Treatment Volume	64.30m³

Criterion 2: River Regime Protection

1-in-1-Year Storm	41.21m ³
1-in-30-Year Storm	102.90m ³
1-in-100-Year Storm	65.86m ³
Reduction of Long-Term Storage	-0.55m ³
Volume Required	209.42m³

... Includes head-loss correction

Criterion 4: River Flood Protection


Long Term Storage (no interception provided)	0.55m³
Long Term Storage (Interception provided)	-20.89m³

Total Attenuation Volume Requirement:

1-in-100 Year Storm

1-in-1-Year Storm	41.21m ³
1-in-30-Year Storm	102.90m ³
1-in-100-Year Storm	65.86m ³
Total	209.96m³

The maximum attenuation volume required is 209.96m³

 Waterman Moylan Engineering Consultants		Criterion 1	
		River Protection Volume	
Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4 t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie		Catchment	Catchment 3
		Project Name	New Road, Donabate
		Project Number	23-129
		Client	Fingal County Council
		Architect	FCC
		Status	Design
Calculation By:	LSL	Date	08/03/2024
Approved by:			

1.1 Interception		
Paved surfaces connected to drainage system	$16603m^2 \times 0.4302636657 \times 0.75$ = 5,358.00m ²	16,603m ² site area 43% of the site is paved 75% of the paved area
Volume of Interception Storage	$5358.00000035332m^2 \times 5mm \times 0.8$ = 21.43m ³	Paved area directly drained 5mm rainfall depth 80% paved runoff factor
1.2 Treatment Volume		
Paved surfaces draining to river	$16603m^2 \times 0.4302636657 \times 0.75$ = 5,358.00m ²	16,603m ² site area 43% of the site is paved 75% of the paved area
Volume of Treatment Storage	$5358.00000035332m^2 \times 15mm \times 0.8$ = 64.30m ³	Paved area directly drained 15mm rainfall depth 80% runoff from paved surfaces



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Criterion 2
River Regime Protection

Catchment	Catchment 3
Project Name	New Road, Donabate
Project Number	23-129
Client	Fingal County Council
Architect	FCC
Status	Design
Date	08/03/2024

Calculation By:	LSL
Approved by:	

1-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff				Discharge		Storage	
		= Rainfall Rate x Area x Soil Type				Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
		l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	50.00	25.72	0.00	25.72	46.3	7.99	14.4	17.73	31.9
1	33.33	17.15	0.00	17.15	61.7	7.99	28.8	9.16	33.0
2	21.83	11.23	0.00	11.23	80.9	7.99	57.5	3.24	23.3
4	14.75	7.59	0.00	7.59	109.3	7.59	109.3	0.00	0.0
6	11.83	6.09	0.00	6.09	131.5	6.09	131.5	0.00	0.0
12	7.50	3.86	0.00	3.86	166.7	3.86	166.7	0.00	0.0

30-Year Return Period


(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff				Discharge		Storage	
		= Rainfall Rate x Area x Soil Type				Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
		l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	134.67	69.27	0.00	69.27	124.7	7.99	10.1	61.28	77.3
1	84.43	43.43	0.00	43.43	156.3	7.99	21.3	35.44	94.6
2	52.22	26.86	0.00	26.86	193.4	7.99	43.6	18.87	102.9
4	32.23	16.58	0.00	16.58	238.7	7.99	84.4	8.59	90.7
6	25.18	12.95	0.00	12.95	279.8	7.99	119.5	4.96	74.3
12	15.74	8.10	0.00	8.10	349.8	7.99	-2,090.7	0.11	-28.3

100-Year Return Period

(Climate Change Factor = 20%)

Duration	Rainfall Rate	Runoff				Discharge		Storage	
		= Rainfall Rate x Area x Soil Type				Rate	Volume	Rate	Volume
Hours	(l/s/Ha)	Paved	Green	Total	Volume	Rate	Volume	Rate	Volume
		l/s	l/s	l/s	m ³	l/s	m ³	l/s	m ³
0.5	186.67	96.02	0.00	96.02	172.8	7.99	2.0	88.03	22.6
1	116.67	60.01	0.00	60.01	216.0	7.99	7.9	52.02	51.4
2	70.00	36.01	0.00	36.01	259.2	7.99	18.8	28.02	65.9
4	42.50	21.86	0.00	21.86	314.8	7.99	36.8	13.87	63.9
6	32.78	16.86	0.00	16.86	364.2	7.99	50.2	8.87	55.8
12	20.00	10.29	0.00	10.29	444.4	7.99	-127.1	2.30	-36.6

 Waterman Moylan Engineering Consultants Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4 t 01 664 8900 f 01 661 3618 e info@waterman-moylan.ie	Criterion 4		
	River Flood Protection		
	Catchment	Catchment 3	
	Project Name	New Road, Donabate	
	Project Number	23-129	
	Client	Fingal County Council	
Architect	FCC		
Calculation By:	LSL	Status	Design
Approved by:		Date	08/03/2024

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

Vol_{XS}		... Extra runoff volume of development over Greenfield runoff
RD	= 71 mm	... Rainfall depth of the 100 year, 6 hour event mm
A	= 1.660 Ha	... Area of site
PIMP	= 43%	... Impermeable area of total site
$\alpha_{0.8}$	= 90%	... 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	= 0.47	... SPR index

$$Vol_{XS} = 0.55m^3$$

UK and Ireland Office Locations

