

Glenageary Gate LRD

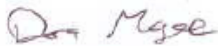
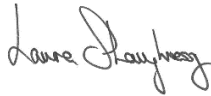
LRD Stage 3 Planning Application to Dun Laoghaire-
Rathdown County Council
Infrastructure Report

Red Rock Glenageary Ltd.

Project number: 60690914
60690914-ACM-00-00-RE-CE-10-0002

September 2023

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	10.01.2023	LRD Stage 2 Pre-Planning	MO'D	Marc O'Dowd	Principal Engineer
1	27.03.2023	Issue for Stormwater Audit	MO'D	Marc O'Dowd	Principal Engineer
2	25.03.2023	LRD Planning Application	MO'D	Marc O'Dowd	Principal Engineer
3	29.09.2023	Revised Planning Application	MO'D	Marc O'Dowd	Principal Engineer

Distribution List

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Table of Contents

1.	Introduction	5
1.1	Proposed Development	5
1.2	LRD Opinion	6
2.	Site Investigation.....	12
3.	Surface Water Drainage.....	13
3.1	Existing Surface Water Drainage.....	13
3.2	Utility survey information.....	14
3.3	Proposed Surface Water Drainage	14
3.3.1	DLRCC Engagement.....	14
3.3.2	Surface Water Network Calculations	14
3.3.3	SuDS (Sustainable urban Drainage Systems).....	15
3.3.3.1	Blue & Green Roof	15
3.3.3.2	Permeable Paving	17
3.4	Compliance with Greater Dublin Strategic Drainage Study	18
3.4.1	Interception & Treatment Volume Provision.....	21
3.4.2	Interception & Treatment Conclusion.....	22
3.5	Surcharge Analysis & Flood Exceedance Route	22
4.	Wastewater Drainage.....	23
5.	Water Supply Layout.....	24
	Appendix A – Site Investigation Extracts	25
	Appendix B – Groundwater Standpipe Readings	26
	Appendix C – Utility Records from Dun Laoghaire Rathdown	27
	Appendix D – Utility Survey.....	28
	Appendix E – Lid/As Built Drawing	29
	Appendix F – Met Éireann Rainfall Data	30
	Appendix G – Qbar Calculation.....	31
	Appendix H – Blue Roof Specification, Details & Calcs	32
	Appendix I – Surface Water Network Calculations	33
	Appendix J – Stormtech Attenuation Tank Details	34
	Appendix K – SuDS Manual Drainage Inspection Checklist	35
	Appendix L – Surcharge Analysis.....	36
	Appendix M – Irish Water Confirmation of Feasibility	37
	Appendix N – Wastewater Network Calculations	38

Figures

Figure 1.1:	Site Location	6
Figure 1.2:	Sketch demonstrating Watermain Clash and Suggested SW Connection	9
Figure 3.1:	Extract from DLRCC Records - Refer to Appendix C for records.....	13
Figure 3.2:	Slit Trenches undertaken to confirm location of sewer	13
Figure 3.3:	Green/Blue Roof Layers (Extract from Ciria C753 SuDS Manual).....	17
Figure 3.4:	Permeable Paving System - Partial Infiltration (Extract from Ciria C753 SuDS Manual)	18

Tables

Table 3.1:	Storm Network Design Criteria	14
Table 3.2:	PIMP (percentage impermeable area) factors	15
Table 3.3:	Blue Roof Summary.....	15
Table 3.4:	Extensive Green Roof Provision.....	16
Table 3.5:	GDSDS Table 6.3	19
Table 3.6:	Overall Site - Interception & Treatment Volume.....	21
Table 4.1:	Wastewater Discharge.....	23
Table 5.1:	Water Demand associated with the proposed development.....	24

1. Introduction

1.1 Proposed Development

Red Rock Glenageary Ltd., intend to apply to Dún Laoghaire Rathdown County Council for a Large-Scale Residential Development on a site of 0.74 ha at Junction of Sallynoggin Road and Glenageary Avenue, and Glenageary Roundabout, Glenageary, Co. Dublin.

The proposed development will consist of a new neighbourhood centre to include apartments, commercial and retail units, public plaza, childcare facility and all associated residential amenity spaces.

The proposed development includes:

- a) Construction of 138 no. residential apartment units (37 no. 1-bedroom units, 68 no. 2-bedroom (4 person units), 6 no. 2-bedroom (3 person units) and 27 no. 3-bedroom units) in 2 no. interlinked blocks at third to fifth floor level (ranging in height from four to seven storeys over basement level) consisting of:
 - i. Block A (5-6 storeys) comprising 41 no. apartments (8 no. 1-bedroom units, 17 no. 2-bedroom (4 person) units, 2 no. 2-bedroom (3 person) units and 14 no. 3-bedroom units).
 - ii. Block B (4-7 storeys) containing 97 no. apartments (29 no. 1-bedroom units, 51 no. 2-bedroom (4 person) units, 4 no. 2-bedroom (3 person) units and 13 no. 3-bedroom units).

Each residential unit has associated private open space in the form of a balcony/terrace.

- b) Residential amenity areas of approx. 342 sqm are proposed in the form of resident support services, concierge services, co-working space, social/activity spaces and gym at the ground floor level of Blocks A and B.
- c) Open Space (approx. 2,806.6 sqm) is proposed in the form of (a) public open space (c. 1,848.4 sqm) in the form of a public plaza accommodating outdoor seating, planting, pedestrian footpaths and cyclist links and (b) residential/communal open space (approx. 958.2 sqm) including c. 750.6 sqm at surface level (incl. playground), roof terrace at fifth floor level of link between Blocks A and Block B (c. 151 sqm) and roof terrace (c. 56.6 sqm) at fifth floor level of Block B. 1.8 m opaque screens are proposed around both roof gardens.
- d) Commercial and retail uses at ground floor level of Blocks A and B (c. 996 sqm) to include (a) 2 no. restaurants (c. 267 sqm and 295 sqm) in Block A, (b) a retail – clothing unit (c. 142 sqm), (c) retail - florist unit (c. 66 sqm), (d) retail - pharmacy unit (c. 126 sqm) and (e) hairdresser unit (c. 100 sqm) all in Block B.
- e) Childcare facility (c. 263 sqm) with dedicated open space and children's play area (c. 39.5 sqm) at ground floor level of Block B.
- f) Basement areas (total approx. 3,411 sqm) are proposed on one level and include car and bicycle parking areas, waste management and plant areas. An ESB substation (approx. 31.7 sqm) is proposed at surface level at the top of the basement ramp accessed off Glenageary Avenue. Commercial bin stores (c. 47.9 sqm) are proposed to be located at ground floor level of both Blocks A and B.
- g) A total of 80 no. car parking spaces at basement level are proposed to include 3 no. accessible parking spaces, 2 no. GoCar spaces and 17 no. EV charging spaces. 5 no. motorcycle parking spaces are also proposed at basement level.
- h) A set down area/loading bay is proposed at surface level at Sallynoggin Road and 2 no. set down areas/loading bays including 1 no. accessible car parking space are proposed at surface level at Glenageary Avenue.
- i) A total of 310 no. bicycle parking spaces to include 254 no. bicycle parking spaces at basement level including 10 no. cargo bicycle spaces and 56 no. bicycle parking spaces including 16 no. cargo bicycle spaces at surface level.
- j) The development shall be served via a new vehicular access point to the basement level from Glenageary Avenue. New pedestrian and cyclist access points will be provided onto Sallynoggin Road and Glenageary Avenue from the site.

- k) Removal of existing cycle path and footpath and dropped kerb pedestrian crossing at Glenageary Avenue to be reinstated by soft landscaping and replaced by a new shared cyclist and pedestrian raised table crossing point located on Glenageary Avenue linking to the existing signalised crossing on the R118. Existing 1.2 m pedestrian crossing on Glenageary Avenue to be widened to 2 m.
- l) Emergency services/servicing access is proposed from Sallynoggin Road and Glenageary Avenue.
- m) All associated site and infrastructural works include provision for water services; foul and surface water drainage and connections; attenuation proposal; permeable paving; all landscaping works; green roofs; roof plant room and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.

Brock McClure Planning & Development Consultants submitted a Section 247 planning pack to DLRCC and attended the subsequent S247 meeting on MS Teams with DLRCC. Pre-planning documents were issued to DLRCC and an S32 pre-planning meeting was held on the 21st September.



Figure 1.1: Site Location

1.2 LRD Opinion

AECOM has prepared a response to the DLRCC Opinion in relation to the proposed Large Scale Residential Development (LRD) application at the junction of Sallynoggin Road Lower and Glenageary Avenue, Sallynoggin/Glenageary Co. Dublin (DLRCC Reference PAC-LRD2-/004/23). This response should be read in conjunction with the remainder of AECOM's Infrastructure Report which has been updated to include the feedback from Dun Laoghaire Rathdown County Council (DLRCC).

DLRCC Comment 1:

1. As standard, the applicant is requested to ensure that all surface water design proposals are in accordance with the requirements of Appendix 7: Sustainable Drainage System Measures of the County Development Plan 2022-2028.

AECOM Response:

In accordance with the current DLRCC Development Plan Appendix 7, a stormwater audit has been undertaken on the proposed stormwater design to verify compliance with Appendix 7, including the requirements outlined within the Green Roof policy document.

A designer's response has been prepared for the issues raised in this audit and the responses have been accepted by the DLRCC approved auditing team, Punch Consulting Engineers.

Please refer to the Stormwater Audit submitted along with this application.

DLRCC Comment 2:

2. As standard, the applicant is requested to ensure that the proposed surface water design is in accordance with County Development Plan 2022-2028 Section 10.2.2.6 Policy Objective EI4: Sustainable Drainage Systems, such that the proposal meets the requirements of the Greater Dublin Strategic Drainage Study (GSDSDS) policies in relation to Sustainable Drainage Systems (SuDS). The design must incorporate SuDS measures appropriate to the scale of the proposed development such as green roofs, bioretention areas, permeable paving, rainwater harvesting, swales, etc. that minimise flows to the public drainage system and maximises local infiltration potential.

AECOM Response:

A minimum of 70% Green Roof has been proposed over the cumulative proposed roof area. A mix of soft landscaping, tree pits and permeable pavements have been proposed at ground floor level. The remaining impervious areas, which are small in comparison, will be directed to the closest at source SuDS measures and soft landscaping, where possible.

These measures, which are in accordance with the GSDSDS and Ciria SuDS Manual, will maximise the interception provided within the proposed development and will reduce the runoff from the proposed development in accordance with the SuDS treatment train approach.

DLRCC Comment 3:

3. The applicant has indicated storage volumes of 160m³ in an attenuation tank and further storage in the blue roof, equating to 133.59m³. AECOM's drawing "Proposed SuDS Layout" (520) does not clearly show the volume of storage provided in the blue podium area in the centre of the site, nor is it set out in the report. The podium roof area shows a storage volume of XXm³. As set out in the Appendix G of the Infrastructure Report, the storage volume should be in the region of 385m³. The applicant is requested to clearly set out the total storage volume provided on site both on the drawings and in the report. It is not clear from the surface water network calculations provided within this submission that the roofs have been adequately analysed. Full details of the analysis carried out, with appropriate

representation of the blue roof, the various flow restrictions, details of overflows and locations of down pipes should be provided.

AECOM Response:

Please refer to revised Infrastructure Report (Section 3.3 of this report) and respective drainage drawings.

The overall cumulative attenuation storage provided within the site is 334 m³. This includes 174 m³ of cumulative storage over 7 no. blue roofs and 160 m³ storage provided within 1 No. ground floor level attenuation tank. Refer

to Table 3.3 in this Infrastructure report for a full breakdown of the proposed blue roof areas and the respective outfall rates, and Appendix H for Blue Roof Calculations and required buildups.

It is currently expected that each Blue Roof will have 1 No. outfall each, which will all be routed to internal downpipes. The locations of these internal downpipes will be located at detailed design stage, in conjunction with the detailed architectural, structural and mechanical designs for the building.

DLRCC Comment 4:

4. The discharge rate for the site shall be limited to QBAR (calculated using site specific data) or 2l/s/ha, whichever is greater, subject to the orifice size of the flow control device not being less than 50mm in diameter. The applicant is requested to ensure that appropriate SAAR and SOIL values are chosen and should note that QBAR should be calculated for the net area contributing to surface water drainage network not the gross area of the site (i.e. red line boundary). Any landscaped areas that will not contribute to the surface water system should be excluded from discharge and attenuation volume calculations. The Surface Water Analysis appears to show a total area of 0.328ha compared to the 0.63ha used in the QBAR calculation. The applicant is requested to comment on the discrepancy and ensure consistency throughout.

AECOM Response:

The proposed QBar outfall rate for the development has been based on the site area, and not the proposed works area, which includes lands outside the development, on public lands.

The SAAR and SOIL values that have been used have been listed in Table 3.1 below.

The surface water analysis (MicroDrainage) calculations have been based only on the ground floor level contributing area, and the roof areas not subject to Blue Roof restrictions. The cumulative outflow from the Blue Roof areas has been added as a base flow to the MicroDrainage model, as outlined within Section 3.3.2 below.

DLRCC Comment 5:

5. The applicant has proposed to connect into the surface water system in the Lidl property. Due to capacity issues downstream on the combined network, the applicant is requested to take a public surface water sewer out of the site and connect into the surface water sewer to the south of the Lidl site. This is to allow for proper planning and sustainable development. The applicant has indicated a potential clash does not permit this move, however no evidence is shown to support this. The applicant is requested to provide the external sewer or provide appropriate details as to why this can not be done. In addition, the sewer located within the site should also be removed and diverted as appropriate. The applicant should liaise with Drainage Planning on this issue prior to a full application being lodged.

AECOM Response:

As indicated previously, there is an existing 315 mm dia. Watermain located within the nearside road lane on Sallynoggin Road, which would result in a clash with a proposed surface water outfall pipe from the development to the suggested surface water line in the road.

At the outfall location, (refer to the sketch in Figure 1.2) the watermain is at a level of 41.73 mOD (bottom of main) - 42.05 mOD (top of main), refer to Appendix D for the Utility Survey. A new public surface water pipe in the road would be between an invert level of 41.55 mOD and 42.3 mOD (based on a 1:170 gradient and a backdrop manhole upstream or downstream respectively).

An outfall pipe from the proposed development would not be possible as a 225 mm pipe connecting at an invert level of 41.55 mOD would have a soffit of 41.78 mOD, which would be a direct clash with the existing watermain. An outfall piping crossing over the top of the existing watermain, would result in a network too shallow within the proposed development, especially when considering the required ground level attenuation.

It would also not be possible to cross below the existing watermain with the proposed surface water outfall as this would result in non-compliant self-cleansing velocities in a sewer in Sallynoggin Road.

The current proposals avoid any clash with the existing 315 mm dia. Watermain, refer to drawing 60690914-ACM-00-00-DR-CE-10-0540.

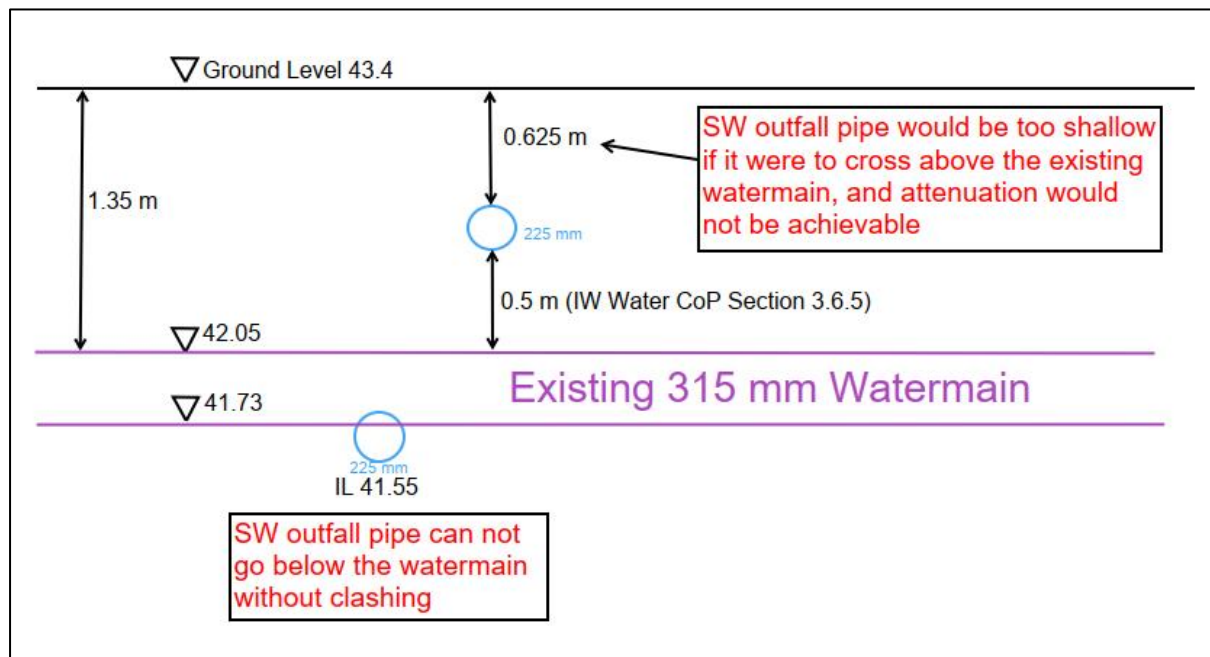


Figure 1.2: Sketch demonstrating Watermain Clash and Suggested SW Connection

DLRCC Comment 6:

6. As standard, the applicant is requested to ensure that a penstock is provided in the flow control device chamber and that the flow control device provided does not have a bypass door. The applicant shall also ensure a silt trap is being provided in the flow control device chamber.

AECOM Response:

Please refer to revised drainage drawings, which include a standard detail drawing for the proposed flow control manhole and includes a penstock and sump as suggested.

DLRCC Comment 7:

7. As standard, the applicant is requested to ensure that any changes to parking and hardstanding areas shall be constructed in accordance with the recommendations of the Greater Dublin Strategic Drainage Study for sustainable urban drainage systems (SuDS) i.e. permeable surfacing, and in accordance with Section 12.4.8.3 Driveways/Hardstanding Areas of the County Development Plan 2022-2028. Appropriate measures shall be included to prevent runoff from driveways entering onto the public realm as required. Where unbound material is proposed for driveway, parking or hardstanding areas, it shall be contained in such a way to ensure that it does not transfer on to the public road or footpath on road safety grounds.

AECOM Response:

The current proposals have prioritised the use of Permeable Paving on all internal hardstanding areas. There are remaining impervious areas proposed, which are small in comparison, and these will be designed to overflow to adjacent SuDS devices and soft landscaping at source.

The proposed public roadside car parking spaces and public footpaths will be hardstanding in accordance with DLRCC requirements.

DLRCC Comment 8:

8. The applicant has proposed to use their own run-off rates for areas contributing to the proposed surface water drainage network. The applicant has correctly used a CV value of 1. The applicant is requested to use a run-off rate for the landscaped areas which is reflective of the Soil Type for the site.

AECOM Response:

A runoff rate of 0.47 has been used for soft landscaping within the proposed site. This matches the runoff coefficient for SOIL Type 4 which has been considered suitable for the proposed development, in accordance with GSDS Vol. 2 Table 6.7.

DLRCC Comment 9:

9. As standard, the applicant is requested to ensure that the proposed development meets the requirements of Appendix 7.2: Green Roof Policy of the County Development Plan 2022-2028, such that all developments with a total roof area greater than 300 square metres include a green roof (note that the percentage coverage required depends on the type of green roof proposed). The applicant is requested to demonstrate by calculation and by representation on a drawing that the proposed green roof extents are in accordance with the Council's Green Roof policy.

The applicant is also requested provide details of maintenance access to the green roofs and should note that, in the absence of a stairwell type access to the roof, provision should be made for alternative maintenance and access arrangements such as external mobile access that will be centrally managed. A detailed cross section of the proposed build-up of the green roof should be provided, including dimensions. The applicant should demonstrate that the green roof is designed in accordance with BS EN 12056-3:2000 and The SUDS Manual (CIRIA C753).

AECOM Response:

A minimum of 70% of Green Roof has been proposed over the cumulative proposed roof area. Refer to Table 3.4 below and the relevant Architectural drawings for the proposed development.

To confirm, all Green Roof areas will be directly accessible from the main building.

Refer to the specification & calculated roof build-ups in Appendix H for build-up details of the proposed Green Roof and Blue Roof.

DLRCC Comment 10:

10. As standard, the applicant is requested to submit supporting standard details, including cross-sections and long-sections, and commentary that demonstrates that all proposed SuDS measures have been designed in accordance with the recommendations of CIRIA C753 (The SuDS manual).

AECOM Response:

Please refer to the details included in Appendix H, the proposed drainage drawings and architectural drawings for the proposed Green Roof, GreenBlue Roof and Blue Roof build-ups.

DLRCC Comment 11:

11. As standard, the applicant is requested to submit long-sections of the surface water drainage system, clearly labelling cover levels, invert levels, pipe gradients and pipe diameters.

AECOM Response:

Please refer to Appendix I and Appendix N for long sections of the proposed surface water and foul water drainage networks respectively.

DLRCC Comment 12:

12. The applicant has provided a drawing showing the interception proposals for the site, with the exception of Roof 1. Prior to lodging for planning, the applicant is requested to further detail the interception proposals for Roof 1 to ensure compliance with GDSDS requirements. It is also unclear of the drainage arrangements at the southern end of the site. The applicant should note that over-provision in one location does not compensate for under provision elsewhere.

AECOM Response:

Please refer to revised drainage drawings. A Green Roof has now been proposed on Roof 1 which is expected to provide interception storage for this area.

The south side of the site, at ground floor level, will contain a mix of soft landscaping and smaller impermeable surfaces. Where possible, pervious surfacing options will be used for the hardstanding areas and where this is not possible, falls will be provided for these areas to drain to adjacent soft landscaping areas that will provide interception storage.

DLRCC Comment 13:

13. As standard, the applicant is requested to include in the final submission, the fully dimensioned plans and sections of the attenuation storage system. All relevant inlet and outlet levels, dimensioned clearances between other utilities, and actual depths of cover to the tank shall be provided. The applicant shall include confirmation from the chosen manufacturer of the storage system that the specific model chosen, with the depth of cover being provided, has the required load bearing capacity to support the loading that may imposed upon it.

AECOM Response:

Please refer to Appendix J which includes the details of the proposed attenuation tank, including inlet and outlet pipework as well as the base level of the tank and top water level.

DLRCC Comment 14:

15. As standard, the applicant is requested to confirm that a utilities clash check has been carried out ensuring all utilities' vertical and horizontal separation distances can be provided throughout the scheme. The applicant should demonstrate this with cross-sections at critical locations such as junctions, site thresholds and connection points to public utilities. Minimum separation distances shall be in accordance with applicable Codes of Practice.

AECOM Response:

Please refer to long sections (Appendix I and Appendix N) and revised drainage drawings for the proposed utilities crossings.

DLRCC Comment 15:

16. As standard, the applicant is requested to ensure that a Stage 1 Stormwater Audit is carried out for the development. In accordance with the Stormwater Audit policy, the audit shall be forwarded to DLRCC prior to lodging the planning application. All recommendations shall be complied with, unless agreed in writing otherwise with DLRCC.

AECOM Response:

A Stage 1 Stormwater Audit has been carried out on the proposed drainage design and this has been submitted with the planning application pack.

A designer's response has been provided and agreed with the DLRCC approved auditors, Punch Consulting Engineers.

DLRCC Comment 16:**Site Specific Flood Risk Assessment**

1. As standard, the applicant is requested to ensure that the proposed development and the Site-Specific Flood Risk Assessment (SSFRA) is carried out in accordance with the requirements of Appendix 15 (Strategic Flood Risk Assessment) of the 2022 -2028 County Development Plan.

AECOM Response:

Please refer to the site-specific Flood Risk Assessment that has been submitted as part of this application.

2. Site Investigation

Site Investigation Ltd (SIL) were appointed to undertake site investigation on the subject site. The site investigation was completed in November 2020. Please refer to Appendix A for extracts from the site investigation (report no. 5787).

2 no. soakaway tests were carried out at two Trial Pits (TP05 and TP06). Zero infiltration was recorded at these locations. The full SIL report no. 5787 is attached in Appendix A of this report. The proposed location for a soakaway test shown in this survey map was abandoned following encountering an obstruction. Tests were subsequently carried out at TP05 and TP06.

The site investigation found "consistent results with firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content."

Groundwater ingresses were not recorded in the boreholes or trial pits during the fieldworks period. Groundwater standpipe readings from March and May 2021 range from 1.6 – 2.9 mbgl (meters below ground level), indicating a high water table is present at the site. Refer to Appendix B for the groundwater readings.

Drainage elements such as manholes and oil separators will be further assessed at detail design stage to identify any potential risk of uplift and any required mitigation measured.

3. Surface Water Drainage

3.1 Existing Surface Water Drainage

Refer to Appendix C for the existing utilities mapping, provided by Dun Laoghaire-Rathdown County Council (DLRCC). Records were requested and received from DLRCC in 2020 and 2021, and there was a discrepancy found in the records regarding the alignment of a surface water pipe which was shown on one set of records to be traversing the site but not in the other set of records. AECOM and DLRCC discussed this difference and trenches were undertaken by Red Rock Developments on the 20th October 2021 in the presence of a DLRCC drainage representative and an AECOM engineer to ascertain the exact location and route of the public surface water pipe within the subject site.

Figure 3.1 shows the records provided which are the more accurate representation of what was found on site, Figure 3.2 shows the slit trenches undertaken on the 20th October 2021 and the public sewer found.

These slit trenches confirmed the location of the 300 mm diameter concrete pipe which enters an existing manhole within the site (which is at the 90 degree junction rather than the location further south), which had been covered over and was approx. 300 mm below ground level. The line then heads north and connects into the existing 225 mm combined sewer at the manhole at the junction of Parnell Street and Sallynogin Road.

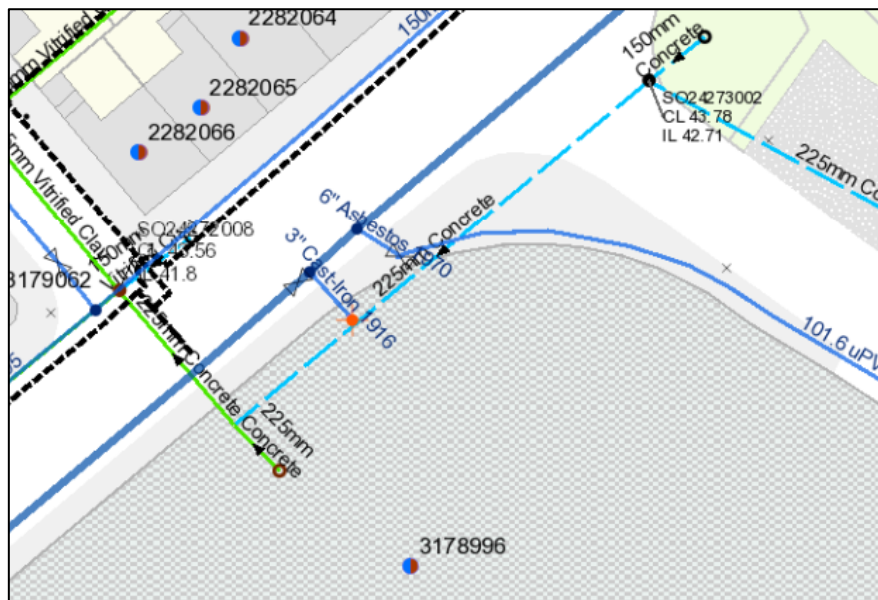


Figure 3.1: Extract from DLRCC Records - Refer to Appendix C for records



Figure 3.2: Slit Trenches undertaken to confirm location of sewer

AECOM Drawing '60690914-ACM-00-00-DR-CE-10-0501- Proposed Drainage Layout' indicates the location of this pipe relative to the works proposed on the subject site and the associated 6m wayleave. Given the fact that no works are proposed in the vicinity of the existing pipe, AECOM propose to protect the pipe during construction and maintain the 6m wayleave as indicated on the drawing. No changes are proposing to the existing line or level of this pipe.

3.2 Utility survey information

A Utility survey was carried out by the client in September 2020, refer to Appendix D for the Utility survey. AECOM have also obtained an As-Built drawing, provided by Lidl GmbH supermarket, carried out in the adjacent site, refer to Appendix E for this drawing. This drawing incorrectly shows a surface water sewer in Sallynoggin Road outside Lidl's building, refer to the Utility Survey for the correct location.

This sewer is located within Lidl's ownership lands, and not shown on public records. The surface water sewer runs towards the west and then turns approximately 90° and connects to the Sallynoggin Road public surface water sewer.

3.3 Proposed Surface Water Drainage

3.3.1 DLRCC Engagement

Currently it is proposed to discharge the surface water to the existing 3rd party surface water sewer which the adjoining site (Lidl Supermarket) is discharging to, which falls south-west parallel to Sallynoggin Road. This pipe is within the ownership of the adjacent landowner (Lidl GmbH supermarket) and a Letter of Consent has been provided to allow a connection from the proposed development.

AECOM engaged with DLRCC during a previous application for this site regarding the alignment of the existing surface water sewer adjacent to Sallynoggin Road, as mentioned in Section 3.1. Slit trenches were undertaken to confirm the location of the pipe, which was confirmed to be within the site boundary.

3.3.2 Surface Water Network Calculations

The site investigation report has since been received and the soil class has been amended accordingly. *“Consistent results with firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content”* were obtained during site investigation. AECOM have therefore assumed a Soil Class 4 in accordance with TII publication DN-DNG-03064 and the GDSDS Regional Policies – Volume 2, New Development (Appendix D – The Old and New UK PR Equations), which describe soil class 4 as “clayey or loamy soils” and “clayey, poorly drained soil”, respectively.

The site ownership area is 0.61 ha (excluding public footpaths, based on the current design), and based on a soil type 4 and a SAAR of 785 mm (Met Éireann), the corresponding Qbar is 3.37 l/s. The allowable discharge rate in the drainage model is rounded down to 3.3 l/s. Refer to Appendix G for the Qbar calculation.

Met Éireann rainfall data (refer to Appendix F) has been used in the drainage model.

The design criteria for the stormwater network are summarised below in Table 3.1. The PIMP (percentage impermeable area) factors used in the drainage model are summarised in Table 3.2.

Table 3.1: Storm Network Design Criteria

M5-60*	15.8 mm
Ratio R*	0.276
Pipe Design Return Period	5 years
Attenuation Return Period	100 years + 20% climate change allowance

* Based on Met Éireann rainfall data

Table 3.2: PIMP (percentage impermeable area) factors

Surface Type	PIMP (%)
Impermeable	100
Permeable Paving	100
Green Roof	92
Landscaping	47

It is proposed to attenuate a portion of the site's stormwater at roof level and on the podium slab above basement, restricting the outflow to 1.15 l/s, entered as 7 separate base flows into the drainage model. The model incorporates these base flows in place of impermeable areas being attenuated by the blue roof area attenuation. Some upper roofs are proposed to drain to the podium to be attenuated.

Refer to Appendix H for blue roof specification, calculations and details. Refer to Appendix I for surface water network calculations.

Table 3.3: Blue Roof Summary

Roof:	Net Blue Roof Area (m ²)	Catchment Area (m ²)	Storage Required (m ³)	Storage Provided (m ³)	Storage Depth (mm)	Half Drain Time (mins)	Outflow Rate (l/s)
Roof 3	206.0	294.6	19.5	23.2	125.0	1408.0	0.14
Roof 4	106.0	151.0	9.3	11.9	125.0	1357.0	0.08
Roof 5	277.0	396.4	25.2	31.2	125.0	1266.0	0.20
Roof 7	247.0	352.4	23.1	27.8	125.0	1369.0	0.17
Roof 9	230.0	328.6	20.5	25.9	125.0	1412.0	0.17
Roof 12	121.0	173.3	10.8	16.6	125.0	1405.0	0.09
Podium	770.0	595.6	58.9	37.9	85.0	1427.0	0.30
Total	1957.0	2291.9	167.2	174.4	-	-	1.15

*Excludes areas where blue roof build-up isn't provided (vents etc) and is 70% of roof area available

1.15 l/s is the proposed cumulative outflow rate from the 7 no. outfalls on the blue roof system, which outfall to the below ground drainage network, which includes a Stormtech attenuation tank which provides 140 m³ of attenuation, to attenuate the remainder of the site. Refer to Appendix J for details of the Stormtech attenuation tank.

The proposed location for the tank, is the only feasible location based on the current development proposals. It is expected that a large portion of roof runoff can be routed to the upstream end of the proposed attenuation tank, but it is noted that all of the roof and podium will also be provided with Blue Roof attenuation and released at restricted rates.

Refer to AECOM Drawing '60690914-ACM-00-00-DR-CE-10-0501- Proposed Drainage Layout' for the proposed surface water network.

Surface water runoff from some roofs is proposed to cascade to other roofs via internal risers or drain to the slung drainage network below the ground floor slab (soffit of basement ceiling) before discharging to the surface water network within the site.

3.3.3 SuDS (Sustainable urban Drainage Systems)

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS) in accordance with the guidelines of the GDSDS and the SuDS Manual CIRIA C753. The aim of the proposed drainage system is to replicate the natural characteristics of rainfall runoff, minimising the environmental impact from rainfall events by reducing the runoff leaving the site for small rainfall events. Site investigation found infiltration is not present on the site.

3.3.3.1 Blue & Green Roof

A Blue Roof is used to attenuate surface runoff from roofs and slowly release the water into the drainage system below. The roof will retain this rainwater during storm events, allowing evaporation and transpiration from the plants

during dry weather, thus decreasing the impact of the development on the receiving environment and reducing the peak flows generated. Blue roofs are proposed on podium and roof level, with permeable paving and vegetated surfaces, thus allowing for interception & treatment.

A green roof buildup above the attenuation layer can provide treatment and interception via evapotranspiration, in addition to the attenuation provided. The performance of green roofs in the summer is significant in preventing runoff from normal rainfall events due to high levels of evapotranspiration. Green roofs do not provide the same storage in winter as they tend to be saturated for a greater portion of time.

Extensive green roofs will be accessed via internal ladders to allow maintenance to be carried out. Roof edge protection is provided in the form of a parapet.

At least 70% of the total roof area is proposed as green roof/planting. Table 3.4 below shows the green roof provision, parapets are excluded from the below figures. Similarly, the podium (above the basement car park) is not considered as roof, given its at ground level and is a key pedestrian route, therefore must be largely hardscaped. The podium is considered as blue roof, utilising permeable pavement to allow the runoff drain to the drainage layer.

Refer to drawing no 60690914-ACM-00-00-DR-CE-10-0520 for the storage provided at roof level in the blue roofs, and the outflow rate from each blue roof.

Table 3.4: Extensive Green Roof Provision

Roof:	Roof Area (sqm)	Green Roof Area (sqm)	Blue Roof
Roof 1	438.4	237.8	N
Roof 2	46.0	32.0	N
Roof 3	294.6	268.6	Y
Roof 4	151.0	105.0	Y
Roof 5	396.4	366.8	Y
Roof 6	37.7	28.9	N
Roof 7	468.3	231.0	Y
Roof 8	Not Used		
Roof 9	377.3	352.9	Y
Roof 10	56.6	33.5	N
Roof 11	173.3	128.4	Y
Roof 12	24.0	17.7	Y
Total	2463.6	1802.6	
Extensive Green Roof Provision:		73%	

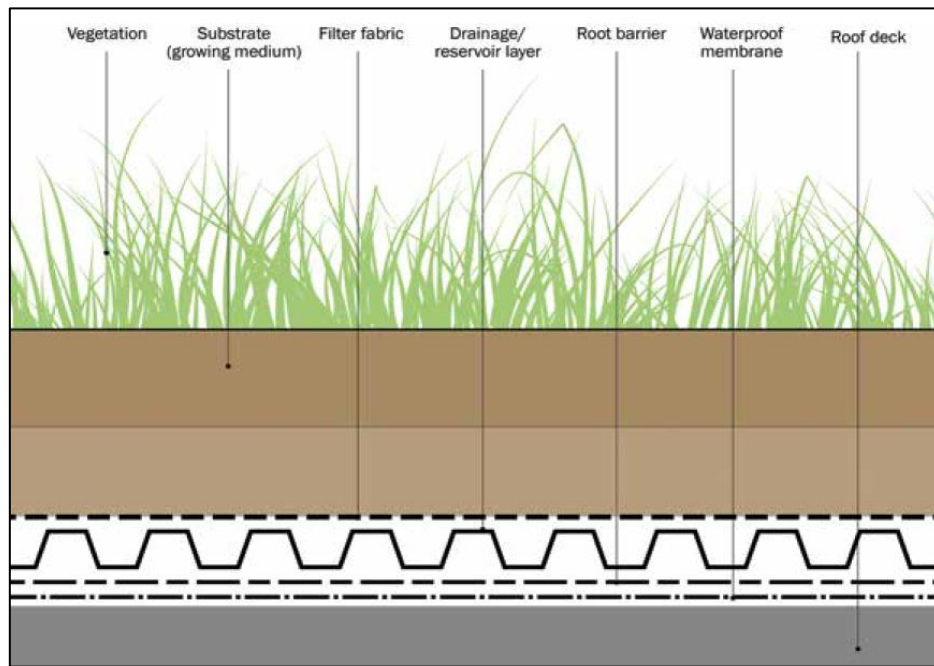


Figure 3.3 Green/Blue Roof Layers (Extract from Ciria C753 SuDS Manual)

3.3.3.2 Permeable Paving

Permeable paving is proposed at roof level, podium level and on ground level footpaths, where possible, within the site ownership. Permeable paving will prevent runoff leaving the site and entering the public network, given gradients are shallow enough. The maximum gradient where permeable paving is laid proposed is approx. 1:30 locally, the majority is 1:40 or less steep.

Porous surfacing (paving block or open graded material) which can treat rainwater, at source, and allow infiltration through to an underlying porous subbase where water can be stored within the voids of the subbase before being slowly released to the drainage collection system through natural flow via the porous medium.

A tanked permeable paving system includes an impermeable membrane at its base and includes an outlet to the surface water system. These systems will allow some form of storage for small rainfall events and can result in water evaporation and adsorption in small quantities, therefore there will be less run-off from these areas in small rainfall events thus mimicking the natural response for this catchment. As well as reducing the amount of run-off from the surface, permeable paving will slow down the rate of runoff from the pavement in extreme rainfall events contributing to attenuation of flows.

In addition, permeable paving will increase the quality of water which is intercepted by the system through filtration, biodegradation, pollutant adsorption and settlement and retention of solids, also the reduction in peak flows to the outfall will enhance settlement and biodegradation of pollutants.

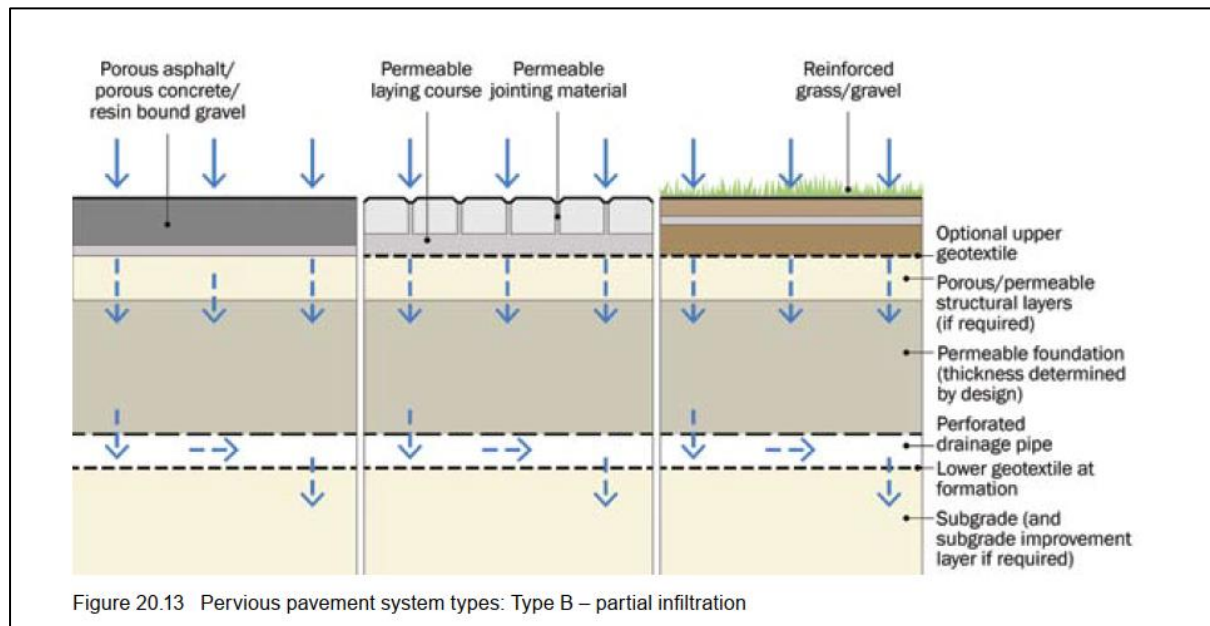


Figure 3.4: Permeable Paving System - Partial Infiltration (Extract from Ciria C753 SuDS Manual)

3.4 Compliance with Greater Dublin Strategic Drainage Study

Site investigation has concluded that there is no measurable infiltration on the site. Therefore, in areas where interception (no runoff from the site for rainfall depths of 5mm – GDSDS) requirements are not achievable, treatment of runoff is satisfied in accordance with the GDSDS. The criteria for surface water is summarised in Section 6.3.4 and Table 6.3 of the GDSDS.

Table 3.5: GSDS Table 6.3

Criteria	Sub-criterion	Return Period (Years)	Design Objective	Design Proposals
Criterion 1 River Water Quality Protection	1.1	<1	Interception storage of at least 5mm, and preferably 10mm, of rainfall where runoff to the receiving water can be prevented.	SuDS measures such as green/blue roof, permeable paving and soft landscaping have been proposed, where possible, to allow interception storage, through evapotranspiration. This criterion is satisfied, for the site as a whole. Refer to Section 3.4.1 for further detail.
	1.2	<1	Where initial runoff from at least 5mm of rainfall cannot be intercepted, treatment of runoff (treatment volume) is required. Retention pond (if used) to have minimum pool volume equivalent to 15mm rainfall.	Treatment volume will be provided through the proposed green roofs, permeable paving and soft landscaping, at or close to the source. See treatment storage calculations in Section 3.4.1.
Criterion 2 River Regime Protection	2.1	1	Discharge rate equal to 1 year greenfield site peak runoff rate or 2 l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume.	Runoff from the site will be restricted to a maximum of 3.3 l/s. This is based on a contributing area of 0.61 ha and a soil class of 4 (as site investigation revealed clay). However, the 1 year peak runoff event will be further restricted due to the Hydrobrake's head/discharge relationship. It is noted that while the outflow will be set to the Qbar Rate, the outflow is also a function of head. The maximum flow rate is achieved only at the maximum head of water in the attenuation tank (and momentarily just before the vortex starts to form), while for less head of water in the tank (as in the case of the 1 year return period event) the discharge rate is a function of the head-discharge relationship of the Hydro-Brake (flow control) device. This ensures that an appropriate/reasonable discharge flow rate is achieved for each return period event. Refer to Appendix I for surface water network calculations.
	2.2	100	Discharge rate equal to 1 in 100 year greenfield site peak runoff rate. Site critical duration storm to be used to assess attenuation storage volume.	The overall discharge rate proposed for the site is 3.3 l/s, which is achieved for the 100 Year Return Period Events.
Criterion 3 Level of Service (flooding) for the site	3.1	30	No flooding on site except where specifically planned flooding is approved. Summer design storm of 15 or 30 minutes are normally critical.	It is proposed that the Critical Duration Storm 100 Year Return Period event is fully contained within the attenuation tanks. No flooding occurs on site for any event up to the 100 Year event + 20% climate change.

Criteria	Sub-criterion	Return Period (Years)	Design Objective	Design Proposals
	3.2	100	No internal property flooding. Planned flood routing and temporary flood storage accommodated on site for short high intensity storms. Site critical duration events.	It is proposed that the Critical Duration Storm 100 Year Return Period event is fully contained within the attenuation tanks. No flooding occurs on site for any event up to the 100 Year event + 20% climate change. Site levels have been proposed to ensure that in the highly unlikely event that ponding occurs, it will be situated away from the building access points.
	3.3	100	No internal property flooding. Floor levels at least 500 mm above maximum river level and adjacent on-site storage retention.	No flooding occurs on site for any event up to the 100 Year event + 20% climate change. 360 mm freeboard is achieved to the top of the attenuation tank.
	3.4	100	No flooding of adjacent urban areas. Overland flooding managed within the development.	No flooding occurs on site for any event up to the 100 Year event + 20% climate change. Refer to AECOM drawing no. 60690914-ACM-00-00-DR-CE-10-0550 for the overland flood routing.
Criterion 4 River Flood Protection (Criterion 4.1, or 4.2 or 4.3 to be applied)	4.1	100	"Long-term" floodwater accommodated on site for development runoff volume which is in excess of the greenfield runoff volume. Temporary flood storage drained by infiltration on a designated flooding area brought into operation by extreme events only. 100 year, 6 hour duration storm to be used for assessment of the additional volume of runoff.	This sub-criterion is not applied. Only one of the three sub-criteria is required to be applied.
	4.2	100	Infiltration storage provided equal in volume to "long term" storage. Usually designed to operate for all events. 100year, 6 hour duration storm to be used for assessment of the additional volume of runoff.	This sub-criterion is not applied. Only one of the three sub-criteria is required to be applied.

Criteria	Sub-criterion	Return Period (Years)	Design Objective	Design Proposals
	4.3	100	Maximum discharge rate of Qbar or 2 l/s/ha, whichever is the greater, for all attenuation storage where separate "long term" storage cannot be provided.	A simulation for the surface water network was undertaken to ensure that all runoff from the site will be limited to 3.3 l/s. The attenuation tank and the blue roofs proposed, provide sufficient capacity within the site to ensure that no flooding occurs on site for the critical duration storm of the 1 in 100 year event plus 20% climate change allowance.

3.4.1 Interception & Treatment Volume Provision

The provided interception and treatment volume proposed for the overall site is shown below in Table 3.6. The provided interception and treatment volume associated with the SuDS measures proposed are shown below in Table 3.6.

Table 3.6: Overall Site - Interception & Treatment Volume

Overall Site - Interception & Treatment Provision				
Impermeable Area (m ²)	Interception		Treatment	
	Required (m ³) *	Provided (m ³)	Required (m ³) **	Provided (m ³)
5500	22.0	23.5	66.0	176.1

* Based on the first 5mm of rainfall, over 80% of the impermeable area.

** Based on the first 15mm of rainfall, over 80% of the impermeable area.

The proposed SuDS measures offer the following interception & treatment volumes:

Proposed Interception & Treatment							
SuDS Type (m ²)	SuDS Area (m ²)	Contributing Area (m ²)	Depth: Substrate/ Sub-base/ Bedding Layer/ Extended Detention (mm)	Porosity (%)	Interception (mm/m ²)	Interception Provided (m ³)	Treatment Provided (m ³)
Extensive Green Roof *	1803	1803	80	20%	5	9.0	28.8
Roof Permeable Paving **	600	600	50	30%	5	3.0	9.0
Permeable Paving †	1112	1112	200	30%	5	5.6	66.7
Soft Landscaping	1192	1192	200	30%	5	6.0	71.5
Total Provision:						23.5	176.1

* 5 mm of interception on extensive green roof is achieved 80% of the summer months, as per The CIRIA SuDS Manual (C753), Section 12.4.2. Treatment volume is calculated based on assumed porosity and substrate depth.

** Based on 5 mm interception for the area of permeable paving, as per Table 24.6 of The CIRIA SuDS Manual (C753), provided sufficient maintenance is carried out. Refer to Appendix K for the SuDS maintenance inspection checklist. Treatment volume is calculated based on assumed porosity and bedding layer.

*** Interception via evapotranspiration: Box 24.3 of The CIRIA SuDS Manual (C753), states 3 mm/day is approximately the free surface evapotranspiration rate in mid-summer in the UK. The interception provided may be greater than this, if there is a large soil moisture deficit. Treatment volume is calculated based on assumed porosity and substrate depth.

† Based on 5 mm interception for the area of permeable paving, as per Table 24.6 of The CIRIA SuDS Manual (C753), provided sufficient maintenance is carried out. Refer to Appendix K for the SuDS maintenance inspection checklist. Treatment volume is calculated based on assumed porosity and sub-base depth.

Note:

Interception is most critical during summer months, as prolonged dry periods leave rivers most vulnerable to pollution, as flows are low and dilution is reduced.

Box 24.3 of The CIRIA SuDS Manual (C753) also states that water at depths greater than 250 mm is much less likely to be lost through evapotranspiration. The above assumptions where water may be below 250 mm are based on The

CIRIA SuDS Manual (C753) guidance; intensive green roofs case studies of Section 12.4.2 and permeable paving interception volume of 5 mm (for 80% of summer events and 50% of winter events) is based on Table 24.6

3.4.2 Interception & Treatment Conclusion

As noted above, based on Section 12.4.2 of the CIRIA SuDS Manual C753, during the summer months, 5 mm of interception is provided for extensive green roofs. Therefore, all extensive green roofs areas are meeting interception requirements for their respective plan areas.

The majority of hard landscaping on the roofs and podium is permeable paving, ensuring interception & treatment requirements for those areas are satisfied.

3.5 Surcharge Analysis & Flood Exceedance Route

The Flood Exceedance Route for the case of 50% blockage at the Hydrobrake was examined. In the event of a blockage during a major rainfall event, the Hydrobrake manhole will surcharge first, when the network has surpassed capacity, as it is the lowest proposed manhole on the site. The excess water would then flood at the lowest linear drains (those at the northwest of the site, which will be included at detailed design stage). Due to the proposed levels, any excess flood water as a result of a Hydrobrake blockage associated flooding will flow to Sallynoggin Road. Refer to the flow exceedance route shown on drawing no. 60690914-ACM-00-00-DR-CE-10-0550.

Similarly, any storm overflows from the blue roof will flood from the Hydrobrake manhole, as overflows are included in the blue roof outlets, to prevent floods at roof level.

Refer to the Surcharge Analysis in Appendix L for further detail.

4. Wastewater Drainage

A Pre-Connection Enquiry (PCE) was submitted to Irish Water (Reference No: CDS22006963) for the proposed development on 27th September 2022. Irish Water issued the Confirmation of Feasibility (CoF) initially on 3rd October and a refer to Appendix M. The CoF stated instructed that the wastewater connection point should be at the existing 300 mm sewer in Glenageary Avenue. However, an updated PCE (Reference No: CDS22008331) was submitted on 19th November 2022, to request an additional wastewater connection point to Sallynoggin Road, which wasn't granted in the initial CoF. This connection is requested to rationalise the proposed outfalls from the proposed blocks and ensure a gravity will be feasible for the full development. Confirmation of Feasibility (Reference No: CDS22008331) was issued on 13th February 2023. Refer to Appendix M for both CoF documents.

The associated wastewater discharge associated with the residential aspect of the development is as follows;

Table 4.1: Wastewater Discharge

Use	Proposed No. Residential Units	Associated Population*	Peaking Factor	Foul Discharge (l/d) **	Foul Discharge (l/s)	Peak Flow (l/s) ***
Residential	138	373	4.5	61,479	0.71	3.20

* based on a national average of 2.7 persons/house (Irish Water Code of Practice)

** based on foul loading 165 l/p/d, as per Irish Water requirements

*** based on peak factor of 6 as per Irish Water requirements (population between 0-750)

The design has been undertaken in accordance with Irish Water's Code of Practice for Wastewater Infrastructure. Refer to the proposed foul network as shown in AECOM Drawing '60690914-ACM-00-00-DR-CE-10-0501-Proposed Drainage Layout' and to Appendix M for the wastewater network calculations.

It is proposed to collect surface water runoff entering the basement via; vents, the basement access ramp and from the vehicles within the car park in a drainage network below the basement slab. This network will in turn discharge via a petrol interceptor to a pump chamber at the base of the access ramp from which it will be pumped through a 50 mm HDPE rising main to a standoff manhole and then by gravity to the foul sewer network within the site. Refer to drawing '60639703-ACM-00-00-DR-CE-10-0502-Proposed Basement Drainage Layout'.

5. Water Supply Layout

As discussed above in 4, an initial CoF (CDS22006963) was received on 3rd October 2022 and a revised CoF was obtained (CDS22008331 COF) on 13th February 2023, refer to Appendix M for both.

The CoF stated that the following;

“Connection point for the Development should be at the existing 250mm DI main in Sallynoggin Road. A bulk meter will be required to be installed at the connection line.”

The water demand associated with the proposed development is shown below;

Table 5.1: Water Demand associated with the proposed development

Use	Proposed No. Residential Units	Associated Population*	Average Water Demand (l/d) **	Average Water Demand (l/s) ***	Peak Demand (l/s) ****
Residential	138	373	55,890	0.81	4.04

* based on a national average of 2.7 persons/house (Irish Water Code of Practice)

**based on per-capita consumption of 150 l/p/d, as per Irish Water requirements

*** 1.25 times the average daily domestic demand, as per Irish Water requirements

**** 5 times the average day/peak week demand, for sizing of the pipe network, as per Irish Water requirements

A service connection with a bulk meter is proposed to serve the residential units from the 250 mm watermain in Sallynoggin Road, supplying a storage tank at basement level, which supplies the 2 no. blocks. Individual service connections are proposed for the ground floor commercial units, allowing them to be metered separately.

1 no. fire hydrant is proposed to ensure proposed dry risers are within 45 m of a fire hydrant, the Fire Engineer will confirm the proposed locations are adequate. Refer to AECOM drawing '60690914-ACM-00-00-DR-CE-10-2701-Proposed Watermain Layout' for further detail on the water supply proposal.

Appendix A – Site Investigation Extracts

SOAKAWAY TEST



Project Reference:	5787
Contract name:	Glenageary SHD
Location:	Sallynoggin Road, Glenageary, Co. Dublin
Test No:	SA01
Date:	19/11/2020

Ground Conditions

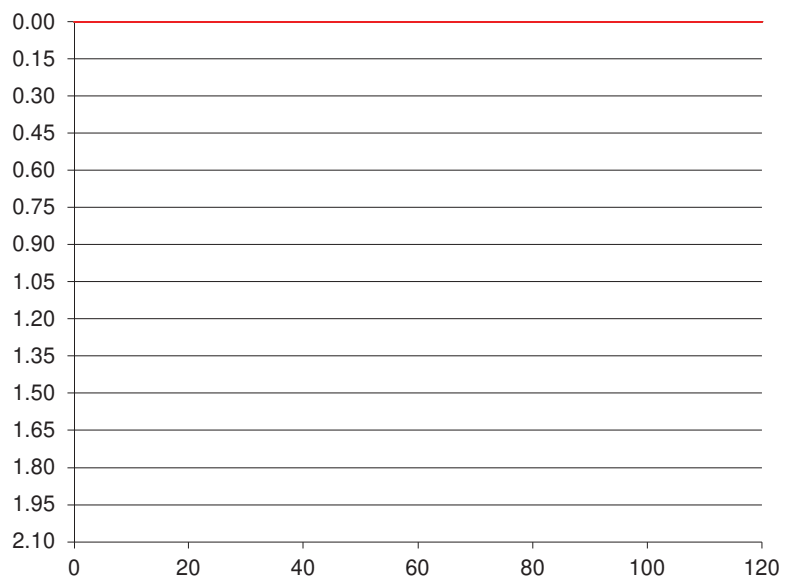
From	To	
0.00	0.60	MADE GROUND: brown slightly sandy slightly gravelly silty clay with some concrete block fragments.

Remarks:

Concrete obstruction encountered at 0.60mbgl - soakaway test relocated to TP06.

Elapsed Time (mins)	Fall of Water (m)
0	-
0.5	-
1	-
1.5	-
2	-
2.5	-
3	-
3.5	-
4	-
4.5	-
5	-
6	-
7	-
8	-
9	-
10	-
12	-
14	-
16	-
18	-
20	-
25	-
30	-
40	-
50	-
60	-
75	-
90	-
120	-

Pit Dimensions (m)		
Length (m)	2.00	m
Width (m)	0.50	m
Depth	0.60	m
Water		
Start Depth of Water	-	m
Depth of Water	-	m
75% Full	-	m
25% Full	-	m
75%-25%	-	m
Volume of water (75%-25%)	-	m3
Area of Drainage	-	m2
Area of Drainage (75%-25%)	-	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	N/A	min
Time 75% to 25% (sec)	N/A	sec



f = **Fail** or
m/min

Fail
m/s

SOAKAWAY TEST



Project Reference:	5787
Contract name:	Glenageary SHD
Location:	Sallynoggin Road, Glenageary, Co. Dublin
Test No:	TP05
Date:	19/11/2020

Ground Conditions

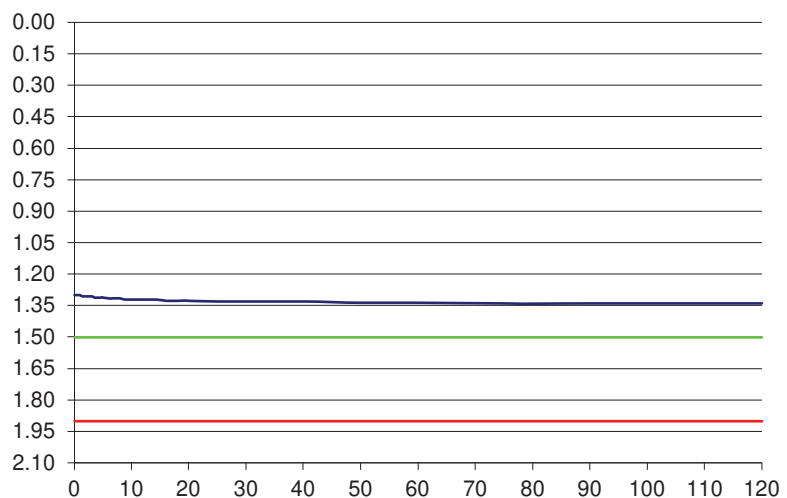
From	To	
0.00	1.20	MADE GROUND: brown slightly sandy slightly gravelly silty clay with some concrete kerb and block fragments.
1.20	1.30	MADE GROUND: tarmacadam.
1.30	1.60	MADE GROUND: brown slightly sandy slightly gravelly silty clay with some red brick fragments.
1.60	2.10	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.

Remarks:

-

Elapsed Time (mins)	Fall of Water (m)
0	1.30
0.5	1.30
1	1.30
1.5	1.31
2	1.31
2.5	1.31
3	1.31
3.5	1.31
4	1.31
4.5	1.31
5	1.31
6	1.32
7	1.32
8	1.32
9	1.32
10	1.32
12	1.32
14	1.32
16	1.33
18	1.33
20	1.33
25	1.33
30	1.33
40	1.33
50	1.34
60	1.34
75	1.34
90	1.34
120	1.34

Pit Dimensions (m)		
Length (m)	3.30	m
Width (m)	0.50	m
Depth	2.10	m
Water		
Start Depth of Water	1.30	m
Depth of Water	0.80	m
75% Full	1.50	m
25% Full	1.90	m
75%-25%	0.40	m
Volume of water (75%-25%)	0.66	m3
Area of Drainage	15.96	m2
Area of Drainage (75%-25%)	4.69	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	N/A	min
Time 75% to 25% (sec)	N/A	sec



f = Fail or
m/min

Fail
m/s

SOAKAWAY TEST



Project Reference:	5787
Contract name:	Glenageary SHD
Location:	Sallynoggin Road, Glenageary, Co. Dublin
Test No:	TP06
Date:	19/11/2020

Ground Conditions

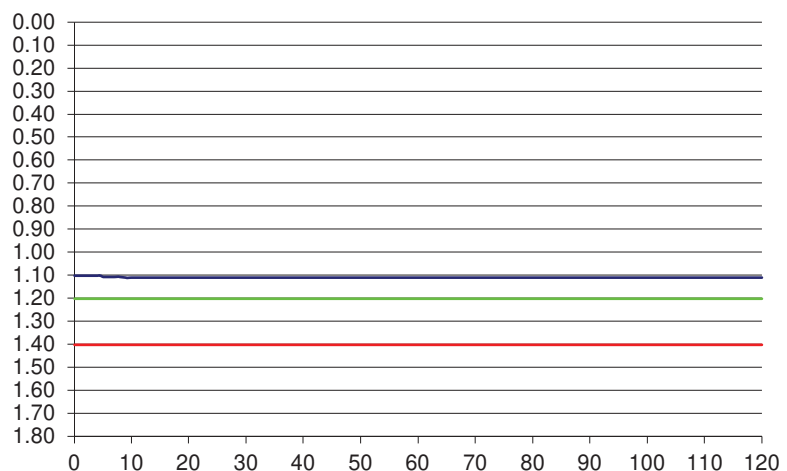
From	To	
0.00	0.60	MADE GROUND: brown slightly sandy slightly gravelly silty clay with some concrete block fragments.
0.60	0.75	MADE GROUND: concrete.
0.75	1.10	MADE GROUND: brown silty sandy gravel with some timber and insulation fragments.
1.10	1.80	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content.

Remarks:

Excavation area restricted due to shallow concrete obstructions.

Elapsed Time (mins)	Fall of Water (m)
0	1.10
0.5	1.10
1	1.10
1.5	1.10
2	1.10
2.5	1.10
3	1.10
3.5	1.10
4	1.10
4.5	1.10
5	1.11
6	1.11
7	1.11
8	1.11
9	1.11
10	1.11
12	1.11
14	1.11
16	1.11
18	1.11
20	1.11
25	1.11
30	1.11
40	1.11
50	1.11
60	1.11
75	1.11
90	1.11
120	1.11

Pit Dimensions (m)		
Length (m)	1.80	m
Width (m)	0.50	m
Depth	1.50	m
Water		
Start Depth of Water	1.10	m
Depth of Water	0.40	m
75% Full	1.20	m
25% Full	1.40	m
75%-25%	0.20	m
Volume of water (75%-25%)	0.18	m3
Area of Drainage	6.90	m2
Area of Drainage (75%-25%)	1.82	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	N/A	min
Time 75% to 25% (sec)	N/A	sec

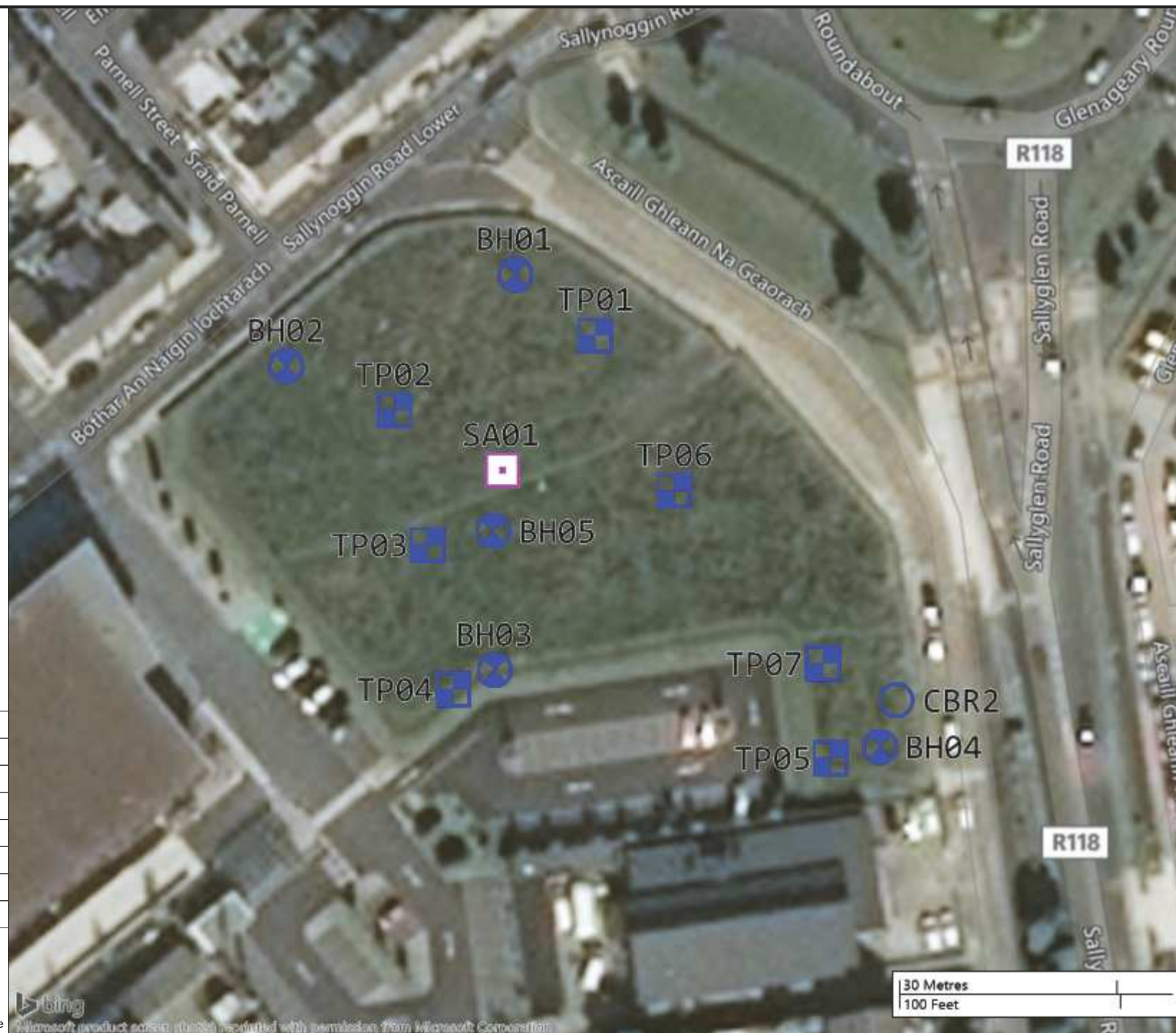


f = **Fail** or
m/min

Fail
m/s

Legend Key

- Locations By Type - CP+RC
- Locations By Type - ICBR
- Locations By Type - IP
- Locations By Type - TP



Contract No:	5787
Contract Name:	Glenageary SHD
Location:	Sallynoggin Road, Glenageary, Co. Dublin
Client:	Turkington Rock
Engineer:	AECOM
Title:	Site Plan
Scale:	1:750
Drawn By:	SL



Site Investigations Ltd
The Grange
12th Lock Road
Lucan
Co. Dublin
T: 01 6108768
e: info@siteinvestigations.ie



Microsoft product names and related with permission from Microsoft Corporation

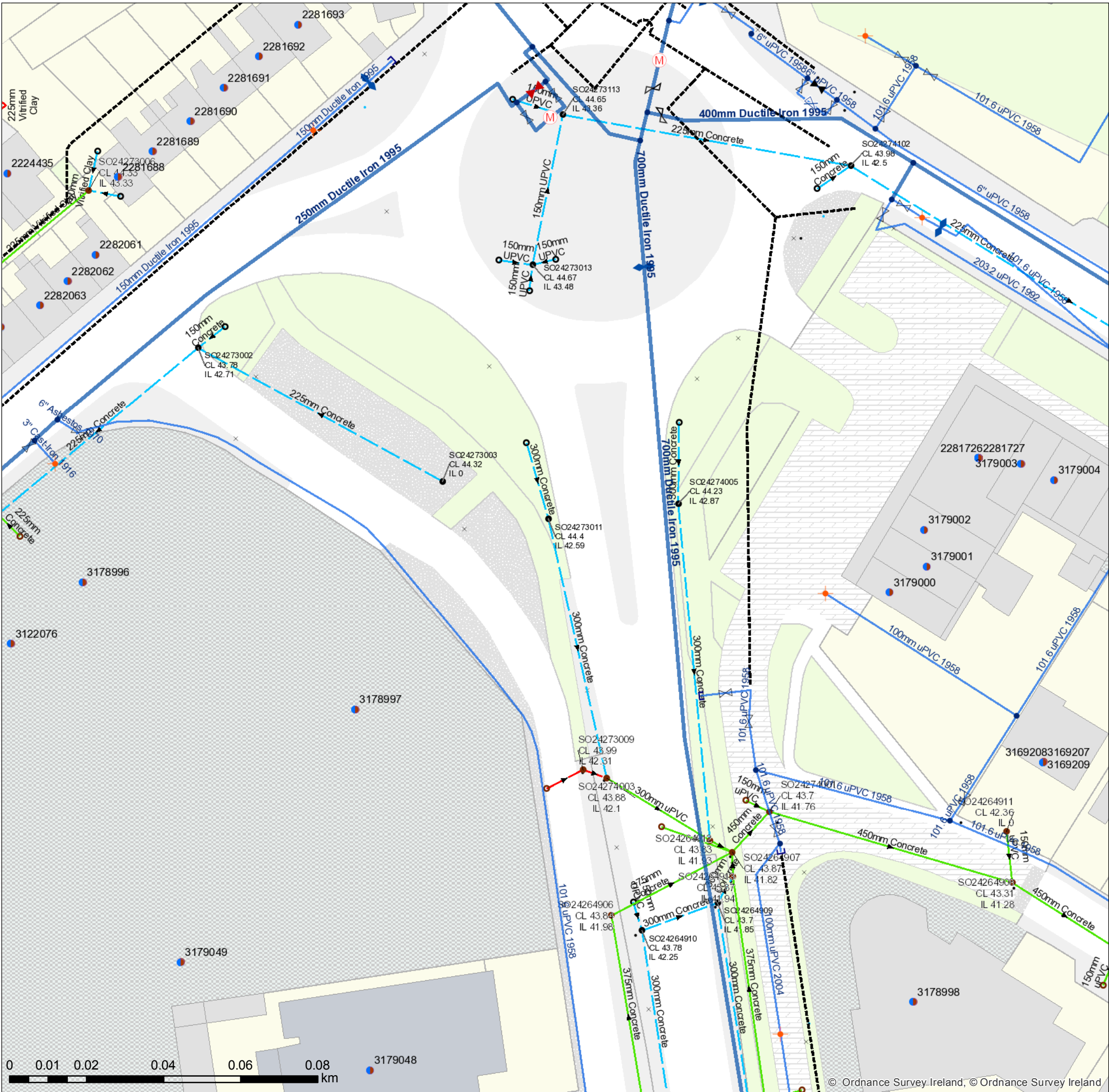
Appendix B – Groundwater Standpipe Readings

Groundwater Readings

Standpipe	Water Depth/mbgl	Water Depth/mOD
Reading 1 - 15/03/2021		
BH01	1.85	42.27
BH02	1.61	42.20
BH04	2.51	41.57
Reading 2 - 24/05/2021		
BH01	2.92	41.20
BH02	1.81	42.00
BH04	2.76	41.32

Appendix C – Utility Records from Dun Laoghaire Rathdown

Sallynoggin Road, Glenageary-1



Water Distribution Network

- Water Treatment Plant
- Water Pump Station
- Storage Cell/Tower
- Dosing Point
- Meter Station
- Abstraction Point
- Telemetry Kiosk

Reservoir

- Potable
- Raw Water

Water Distribution Mains

- Irish Water
- Private

Trunk Water Mains

- Irish Water
- Private

Water Lateral Lines

- Irish Water
- Non IW
- Water Casings
- Water Abandoned Lines
- Boundary Meter
- Bulk/Check Meter
- Group Scheme
- Source Meter
- Waste Meter
- Unknown Meter ; Other Meter
- Non-Return
- PRV
- PSV
- Sluice Line Valve Open/Closed
- Butterfly Line Valve Open/Closed
- Sluice Boundary Valve Open/Closed
- Butterfly Boundary Valve Open/Closed
- Scour Valves

Sewer Foul Combined Network

- Single Air Control Valve
- Double Air Control Valve
- Water Stop Valves
- Water Service Connections
- Water Distribution Chambers
- Water Network Junctions
- Pressure Monitoring Point
- Fire Hydrant
- Fire Hydrant/Washout

Water Fittings

- Cap
- Reducer
- Tap
- Other Fittings

Sewer Mains Irish Water

- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Mains Private

- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Lateral Lines

- Sewer Lateral Lines
- Sewer Casings

Sewer Manholes

- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type

- Outfall
- Overflow
- Soakaway
- Standard Outlet
- Other; Unknown

Cleanout Type

- Rodding Eye
- Flushing Structure
- Other; Unknown

Sewer Inlets

- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Fittings

- Vent/Col
- Other; Unknown

Storm Water Network

Surface Water Mains

- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Inlet Type

- Gully
- Standard
- Other; Unknown

Storm Manholes

- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- Storm Clean Outs
- Stormwater Chambers

Discharge Type

- Outfall
- Overflow
- Soakaway
- Other; Unknown

Gas Networks Ireland

- Transmission High Pressure Gasline
- Distribution Medium Pressure Gasline
- Distribution Low Pressure Gasline

ESB Networks

ESB HV Lines

- HV Underground
- HV Overhead
- HV Abandoned

ESB MVLV Lines

- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV Underground
- Abandoned

Non Service Categories

- Proposed
- Under Construction
- Out of Service
- Decommissioned

Water Non Service Assets

- Water Point Feature
- Water Pipe
- Water Structure

Waste Non Service Assets

- Waste Point Feature
- Sewer
- Waste Structure

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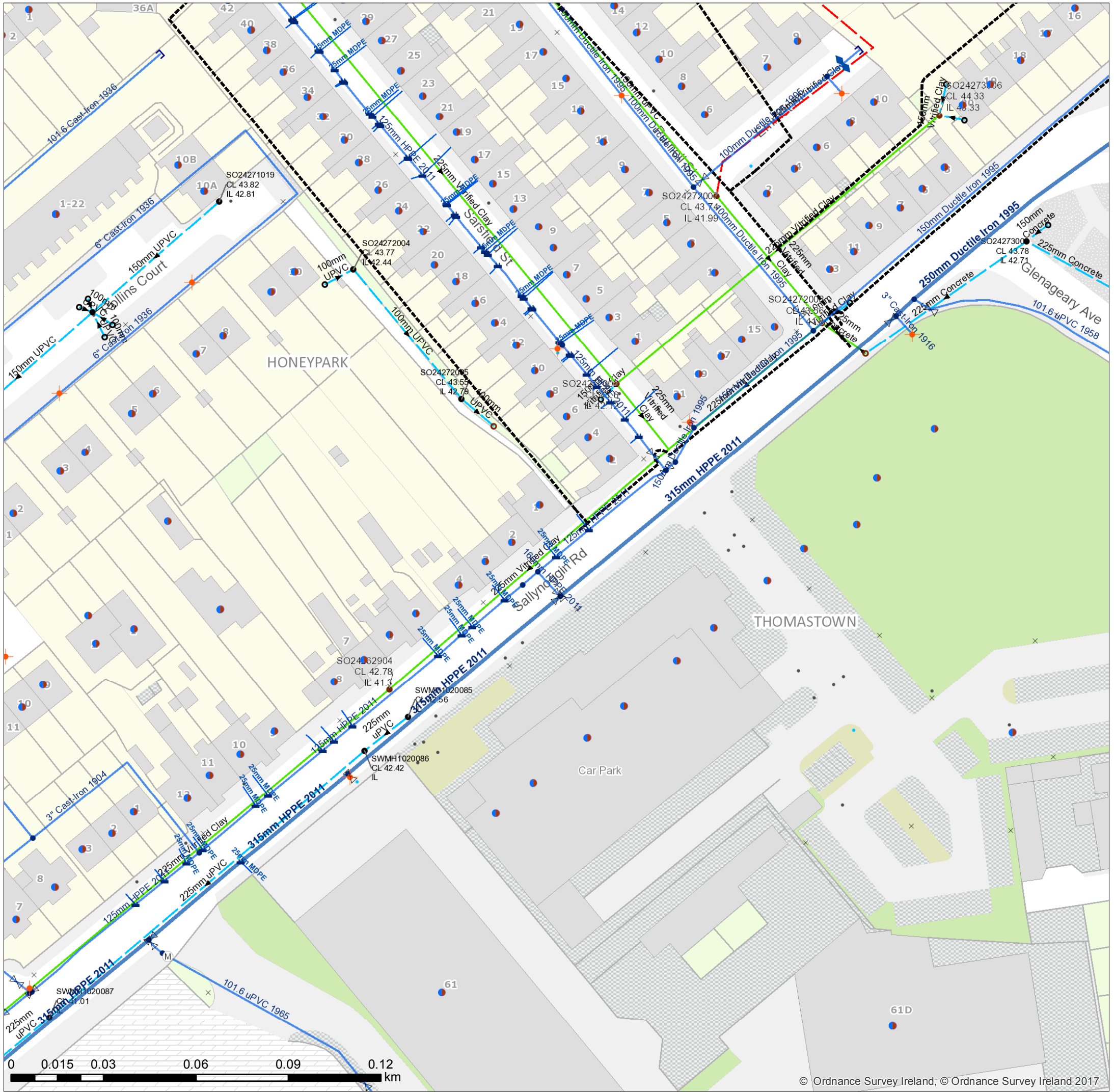
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Honey Park - Sallynoggin Road



Water Distribution Network Water Treatment Plant Water Pump Station Storage Cell/Tower Dosing Point Meter Station Abstraction Point Telemetry Kiosk	Single Air Control Valve Double Air Control Valve Water Stop Valves Water Service Connections Water Distribution Chambers Water Network Junctions Pressure Monitoring Point Fire Hydrant Fire Hydrant/Washout	Sewer Foul Combined Network Waste Water Treatment Plant Waste Water Pump station Sewer Mains Irish Water Gravity - Combined Gravity - Foul Gravity - Unknown Pumping - Combined Pumping - Foul Pumping - Unknown Syphon - Combined Syphon - Foul Overflow Sewer Mains Private Gravity - Combined Gravity - Foul Gravity - Unknown Pumping - Combined Pumping - Foul Pumping - Unknown Syphon - Combined Syphon - Foul Overflow Sewer Lateral Lines Sewer Casings Sewer Manholes Standard Backdrop Cascade Catchpit Bifurcation Hatchbox Lampole Hydrobrake Other; Unknown	Discharge Type Outfall Overflow Soakaway Standard Outlet Other; Unknown Cleanout Type Rodding Eye Flushing Structure Other; Unknown Sewer Inlets Catchpit Gully Standard Other; Unknown Sewer Fittings Vent/Col Other; Unknown	Storm Water Network Surface Water Mains Surface Gravity Mains Surface Gravity Mains Private Surface Water Pressurised Mains Surface Water Pressurised Mains Private Inlet Type Gully Standard Other; Unknown Storm Manholes Standard Backdrop Cascade Catchpit Bifurcation Hatchbox Lampole Hydrobrake Other; Unknown Storm Culverts Storm Clean Outs Stormwater Chambers Discharge Type Outfall Overflow Soakaway Other; Unknown	Gas Networks Ireland Transmission High Pressure Gasline Distribution Medium Pressure Gasline Distribution Low Pressure Gasline ESB Networks ESB HV Lines HV Underground HV Overhead HV Abandoned ESB MVLV Lines MV Overhead Three Phase MV Overhead Single Phase LV Overhead Three Phase LV Overhead Single Phase MVLV Underground Abandoned Non Service Categories Proposed Under Construction Out of Service Decommissioned Water Non Service Assets Water Point Feature Water Pipe Water Structure Waste Non Service Assets Waste Point Feature Sewer Waste Structure
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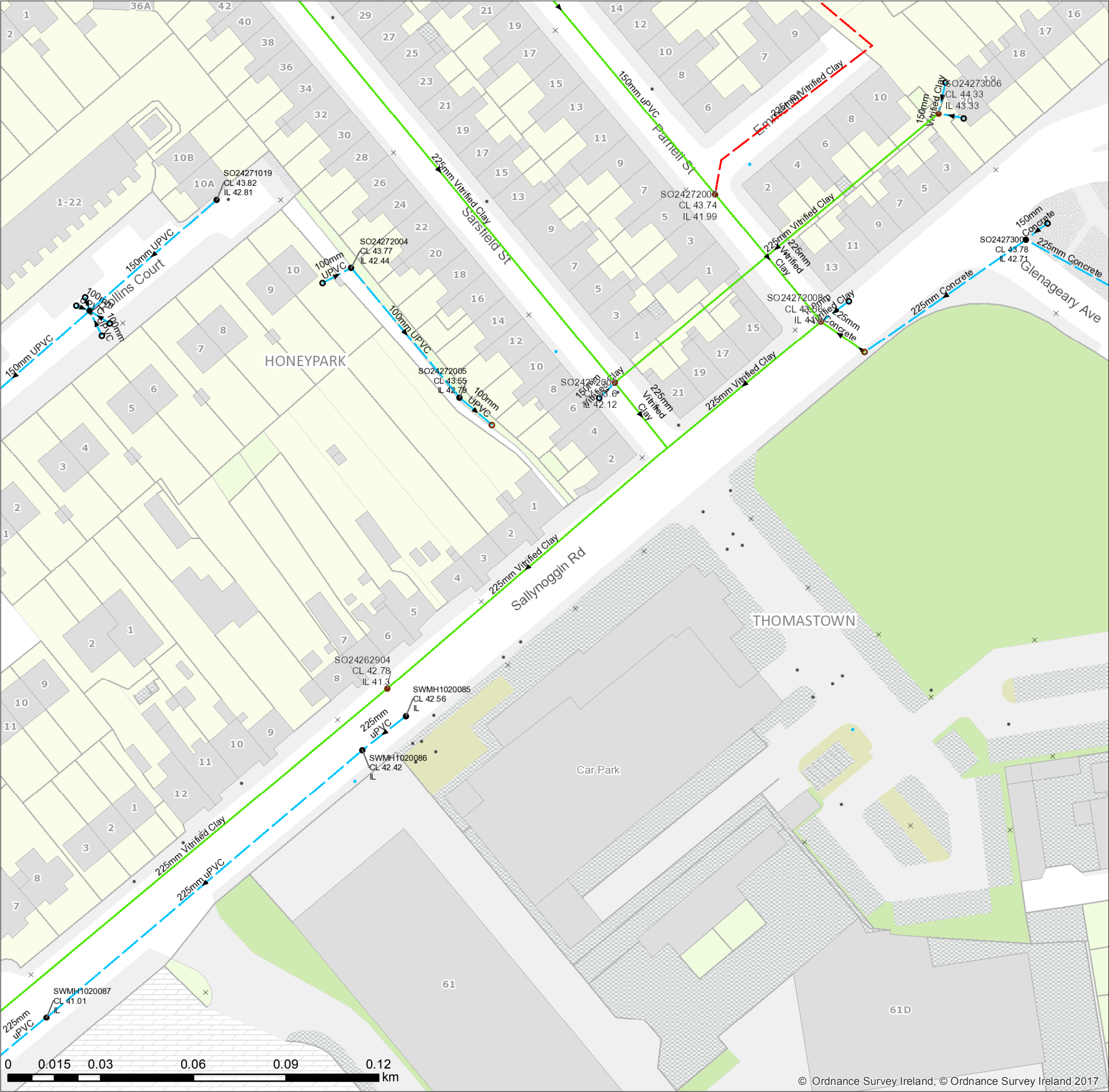
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Honey Park - Sallynoggin Road



Water Distribution Network - Water Treatment Plant - Water Pump Station - Storage Cell/Tower - Dosing Point - Meter Station - Abstraction Point - Telemetry Kiosk	- Single Air Control Valve - Double Air Control Valve - Water Stop Valves - Water Service Connections - Water Distribution Chambers - Water Network Junctions - Pressure Monitoring Point - Fire Hydrant - Fire Hydrant/Washout	Sewer Foul Combined Network - Waste Water Treatment Plant - Waste Water Pump station	Discharge Type - Outfall - Overflow - Soakaway - Standard Outlet - Other; Unknown	Storm Water Network - Surface Gravity Mains - Surface Gravity Mains Private - Surface Water Pressurised Mains - Surface Water Pressurised Mains Private	Gas Networks Ireland - Transmission High Pressure Gasline - Distribution Medium Pressure Gasline - Distribution Low Pressure Gasline
Reservoir - Potable - Raw Water	Water Fittings - Cap - Reducer - Tap - Other Fittings	Sewer Mains Irish Water - Gravity - Combined - Gravity - Foul - Gravity - Unknown - Pumping - Combined - Pumping - Foul - Pumping - Unknown - Syphon - Combined - Syphon - Foul - Overflow	Cleanout Type - Rodding Eye - Flushing Structure - Other; Unknown	Inlet Type - Gully - Standard - Other; Unknown	ESB Networks - ESB HV Lines - HV Underground - HV Overhead - HV Abandoned - ESB MVLV Lines - MV Overhead Three Phase - MV Overhead Single Phase - LV Overhead Three Phase - LV Overhead Single Phase - MVLV Underground - Abandoned
Water Distribution Mains - Irish Water - Private		Sewer Mains Private - Gravity - Combined - Gravity - Foul - Gravity - Unknown - Pumping - Combined - Pumping - Foul - Pumping - Unknown - Syphon - Combined - Syphon - Foul - Overflow	Sewer Inlets - Catchpit - Gully - Standard - Other; Unknown	Storm Manholes - Standard - Backdrop - Cascade - Catchpit - Bifurcation - Hatchbox - Lampole - Hydrobrake - Other; Unknown	Non Service Categories - Proposed - Under Construction - Out of Service - Decommissioned
Water Lateral Lines - Irish Water - Non IW		Sewer Lateral Lines Sewer Casings	Sewer Fittings - Standard - Backdrop - Cascade - Catchpit - Bifurcation - Hatchbox - Lampole - Hydrobrake - Other; Unknown	Discharge Type - Outfall - Overflow - Soakaway - Other; Unknown	Water Non Service Assets - Water Point Feature - Water Pipe - Water Structure
Water Casings Water Abandoned Lines					Waste Non Service Assets - Waste Point Feature - Waste - Waste Structure
Meters - Boundary Meter - Bulk/Check Meter - Group Scheme - Source Meter - Waste Meter - Unknown Meter; Other Meter					
Valves - Non-Return - PRV - PSV - Sluice Line Valve Open/Closed - Butterfly Line Valve Open/Closed - Sluice Boundary Valve Open/Closed - Butterfly Boundary Valve Open/Closed - Scour Valves					

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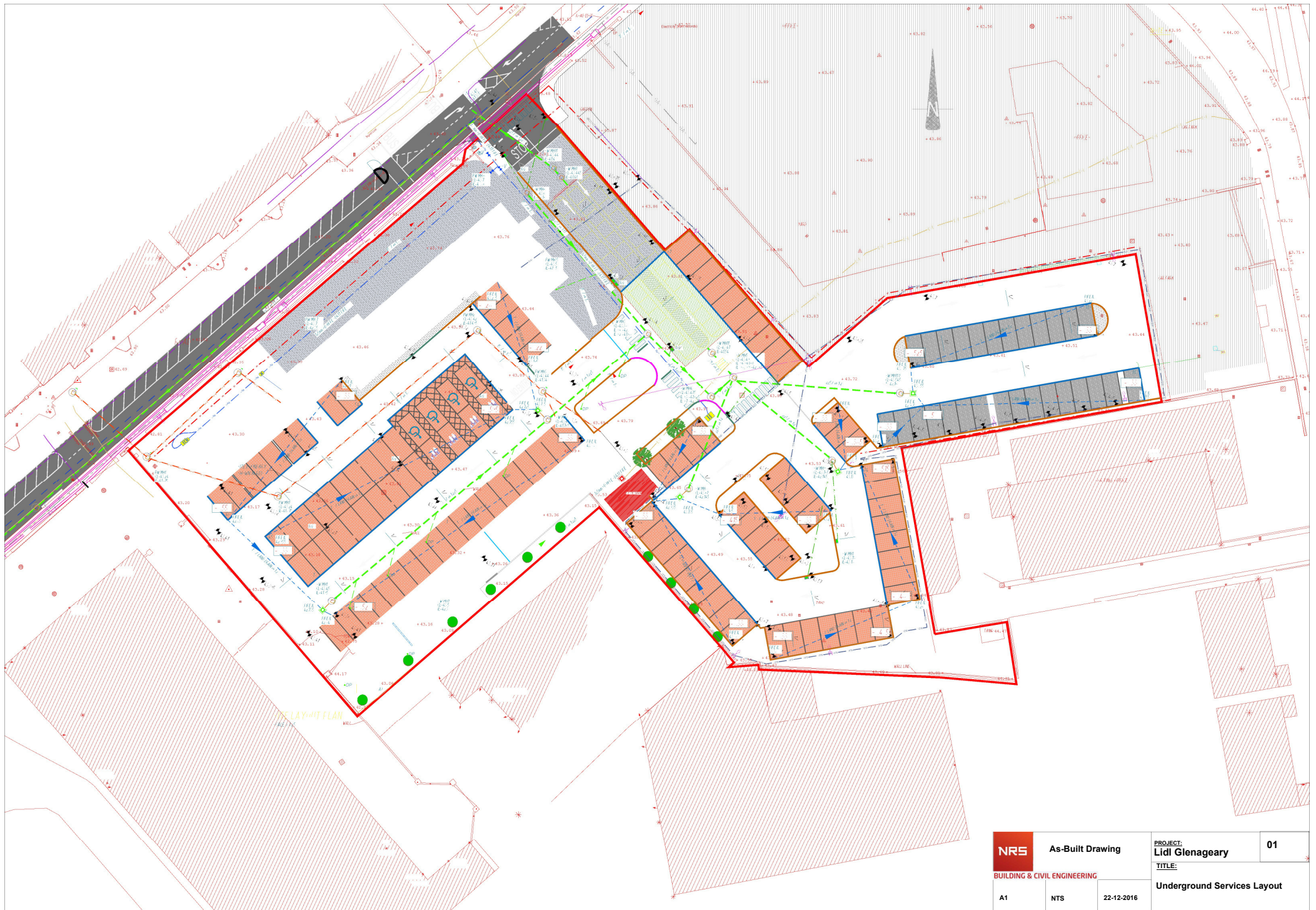


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Appendix D – Utility Survey

Appendix E – Lidl As Built Drawing



NRS BUILDING & CIVIL ENGINEERING	As-Built Drawing	PROJECT: Lidl Glenageary	01
		TITLE: Underground Services Layout	
A1	NTS	22-12-2016	

Appendix F – Met Éireann Rainfall Data

Met Éireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 324324, Northing: 227034,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.6,	4.1,	5.0,	5.5,	6.0,	7.4,	9.0,	10.1,	11.7,	13.0,	14.1,	15.7,	16.9,	18.0,	N/A ,
10 mins	3.5,	5.0,	5.7,	6.9,	7.7,	8.3,	10.3,	12.6,	14.1,	16.2,	18.1,	19.6,	21.9,	23.6,	25.1,	N/A ,
15 mins	4.1,	5.8,	6.8,	8.1,	9.1,	9.8,	12.1,	14.8,	16.6,	19.1,	21.3,	23.0,	25.7,	27.8,	29.5,	N/A ,
30 mins	5.5,	7.6,	8.7,	10.4,	11.6,	12.4,	15.3,	18.5,	20.7,	23.6,	26.3,	28.3,	31.4,	33.8,	35.8,	N/A ,
1 hours	7.2,	9.9,	11.3,	13.4,	14.8,	15.8,	19.3,	23.2,	25.7,	29.3,	32.4,	34.8,	38.4,	41.3,	43.6,	N/A ,
2 hours	9.5,	12.8,	14.6,	17.1,	18.8,	20.1,	24.4,	29.0,	32.0,	36.2,	39.9,	42.7,	47.0,	50.3,	53.0,	N/A ,
3 hours	11.1,	14.9,	16.9,	19.8,	21.7,	23.2,	27.9,	33.1,	36.4,	41.0,	45.1,	48.2,	52.9,	56.5,	59.4,	N/A ,
4 hours	12.5,	16.7,	18.8,	22.0,	24.0,	25.6,	30.7,	36.3,	39.9,	44.8,	49.2,	52.5,	57.5,	61.3,	64.5,	N/A ,
6 hours	14.7,	19.4,	21.9,	25.4,	27.7,	29.5,	35.2,	41.4,	45.4,	50.8,	55.6,	59.2,	64.7,	68.8,	72.3,	N/A ,
9 hours	17.3,	22.7,	25.4,	29.4,	32.0,	34.0,	40.3,	47.2,	51.6,	57.6,	62.8,	66.8,	72.7,	77.3,	81.0,	N/A ,
12 hours	19.4,	25.3,	28.3,	32.6,	35.4,	37.6,	44.4,	51.8,	56.5,	62.9,	68.5,	72.7,	79.1,	83.9,	87.9,	N/A ,
18 hours	22.8,	29.5,	32.8,	37.7,	40.9,	43.3,	50.9,	59.0,	64.2,	71.3,	77.4,	82.0,	89.0,	94.3,	98.6,	N/A ,
24 hours	25.6,	32.8,	36.5,	41.8,	45.2,	47.8,	56.0,	64.8,	70.3,	77.9,	84.4,	89.3,	96.7,	102.4,	106.9,	122.4,
2 days	32.4,	40.7,	44.8,	50.6,	54.4,	57.2,	66.0,	75.4,	81.2,	89.1,	95.8,	100.9,	108.4,	114.1,	118.7,	134.2,
3 days	38.0,	47.1,	51.5,	57.8,	61.8,	64.9,	74.2,	84.0,	90.1,	98.3,	105.3,	110.5,	118.3,	124.1,	128.8,	144.6,
4 days	42.9,	52.6,	57.4,	64.1,	68.3,	71.5,	81.3,	91.6,	97.9,	106.4,	113.6,	118.9,	126.9,	132.9,	137.7,	153.7,
6 days	51.6,	62.4,	67.7,	75.0,	79.6,	83.1,	93.7,	104.7,	111.4,	120.4,	128.0,	133.6,	142.0,	148.2,	153.2,	169.8,
8 days	59.3,	71.1,	76.8,	84.6,	89.6,	93.3,	104.6,	116.1,	123.2,	132.7,	140.6,	146.4,	155.1,	161.5,	166.7,	183.8,
10 days	66.5,	79.1,	85.1,	93.4,	98.7,	102.6,	114.4,	126.5,	133.9,	143.7,	152.0,	158.0,	167.0,	173.6,	178.9,	196.5,
12 days	73.2,	86.5,	92.9,	101.6,	107.1,	111.2,	123.6,	136.2,	143.9,	154.0,	162.5,	168.7,	177.9,	184.8,	190.2,	208.2,
16 days	85.7,	100.3,	107.2,	116.7,	122.7,	127.1,	140.4,	153.8,	162.0,	172.7,	181.7,	188.3,	197.9,	205.1,	210.8,	229.5,
20 days	97.3,	113.1,	120.5,	130.7,	137.0,	141.7,	155.7,	169.9,	178.5,	189.8,	199.1,	206.0,	216.1,	223.5,	229.4,	248.8,
25 days	111.1,	128.1,	136.1,	146.9,	153.7,	158.7,	173.6,	188.6,	197.6,	209.5,	219.3,	226.4,	236.9,	244.7,	250.8,	270.9,

NOTES:

N/A Data not available

These values are derived from a Depth Duration Frequency (DDF) Model

For details refer to:

'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Éireann, Dublin',

Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

M5-60 = 15.8 mm
Ratio R = 0.276
(Used in Drainage Model)

SAAR (from Met Éireann) = 785 mm
(Used in Qbar Estimation)

Appendix G – Qbar Calculation

Greenfield runoff rate estimation for sites

www.uksubs.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	1	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	920	785
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.13	2.13
Growth curve factor 100 years:	2.61	2.61
Growth curve factor 200 years:	2.86	2.86

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.14	3.37
1 in 1 year (l/s):	0.12	2.86
1 in 30 years (l/s):	0.3	7.17
1 in 100 year (l/s):	0.37	8.79
1 in 200 years (l/s):	0.4	9.63

Appendix H – Blue Roof Specification, Details & Calcs



**BETON EXTENSIVE GREEN ROOF WATERPROOFING
INVERTED SYSTEM WITH ATTENUATION (blue roof)
SPECIFICATION – Glenageary Avenue**
Spec no 14/02/23 rev a Glenageary Avenue

Components:

Beton MasterSeal 2103 (Coniroof 2103) – Certification ETA 04/0035

Beton ACO Roofbloxx Blue roof system – to drainage standards

Beton Zinco Green Roof build up – Certification ETA 13/0668

Note: This specification can only include materials which:

1. Bear a CE Marking in accordance with the provisions of the Construction Products Regulation.
2. Comply with an appropriate harmonised standard or European Technical Assessment in accordance with the provisions of the Construction Products Regulation.
3. Can be used without restriction in accordance with Irish Building Regulations.

System Supplier

Beton Construction Services Ltd.

System Applicator

Beton Construction Services Ltd.

Suitability of concrete base

Before starting work make sure the concrete base is such to permit the overlaying with the specified system. The concrete surface must be free of dirt, debris, snots, materials and other such items and obstructions so as to allow the seamless installation of the system. The substrate must be to zero falls.

Preparation

Prior to the application of the system. The entire substrate must be cleaned using jet washing techniques and/or captive shot blasting and/or mechanical, rolling or hand held grinding equipment.

Coating System MasterSeal Roof 2103 (Coniroof 2103)

Substrate to be primed with one of the following as per data sheet. Mastertop P622, BC375N, MasterSeal P660, P684 and for overlapping and missed priming window reasons MasterSeal P691. While wet the primer coat is broadcasted with silica sand to provide a mechanical key. When cured remove all excess sand.

Membrane must be applied by specialised computer controlled spray plant. Membrane must be Masterseal M803.

Insulation

1. **Ravatherm XPS 300 SL** thickness to meet U value requirement.

Separation Membrane

1. **Ravatherm XPS MK WFRL** Breather Membrane

Beton Construction Services Ltd. - www.beton.ie

Cork office: Heron Court, Market Quay, Bandon, Co. Cork. - Tel 023 885 4231

Dublin Office: Unit B 14, Aerodrome Business Park, Rathcoole, Co Dublin. - Tel 01 401 6402

Spec no 14/02/23 rev a Glenageary Avenue

Attenuation - ACO Roofbloxx Blue roof system

1. 30mm drainage layer with filter.
2. ACO Roofbloxx 2 stacked (85mm) or 3 stacked (125mm) wrapped in Linear Low Density Polyethylene secondary membrane (LLDPE) and welded in place to form tank.
3. ACO Blue Roof Flow Restrictor one for each outlet.

ZinCo Green Roof System

1. Zinco Fixodrain XD20
2. Zinco substrate Sedum Carpet type 80mm
3. Sedum Carpet.

Ballast of Clean 20mm Pebbles (500mm width around all perimeters & as required)

Drainage – ZinCo Fixodrain XD20

Ballast of 20mm rounded washed pebbles

Separation Profiles

Zinco Gravel Retainers to be used to separate different finishes as required.

Beton Construction Services Ltd. - www.beton.ie

Cork office: Heron Court, Market Quay, Bandon, Co. Cork. - Tel 023 885 4231

Dublin Office: Unit B 14, Aerodrome Business Park, Rathcoole, Co Dublin. - Tel 01 401 6402

Spec no 14/02/23 rev a Glenageary Avenue



ACO. creating
the future of drainage

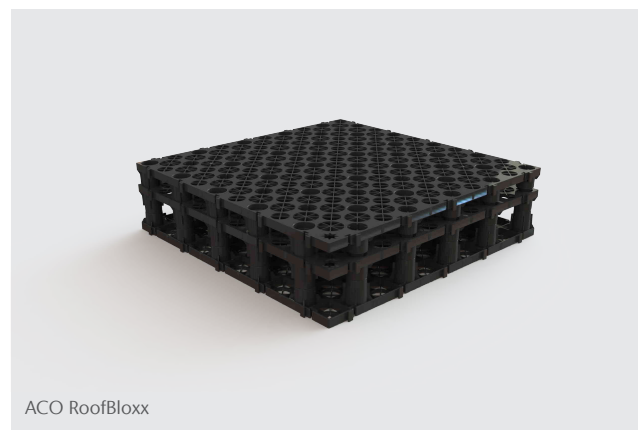
ACO RoofBloxx

The ACO RoofBloxx geocellular tank is a shallow, high-strength, height variable storage void, that can be used with the RoofBloxx Cell structural drainage sheet and blue roof flow restrictor to give a complete blue roof attenuation system.

This can be combined with ACO roof outlets, downpipes and surface water drainage systems to give a wider building drainage and SuDS solution. ACO RoofBloxx Tank is an interlocking geocellular drainage system ranging in depth 85mm – 165+mm. It has been designed for shallow, high-strength roof attenuation systems and is also ideal for intensive green roof designs. ACO RoofBloxx modularity and high-void structure makes it an ideal system to be incorporated into complex on-structure landscapes.

Benefits

- Design flexibility
- Easy installation
- Lightweight and high strength
- Efficient
- Sustainable and environmentally friendly

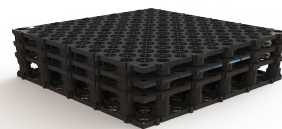
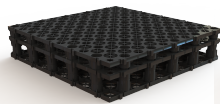
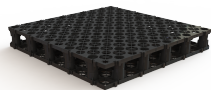


ACO RoofBloxx

Applications

- Blue, Blue green and Green roofs
- Podium decks
- Planter boxes
- Paved areas and roadways

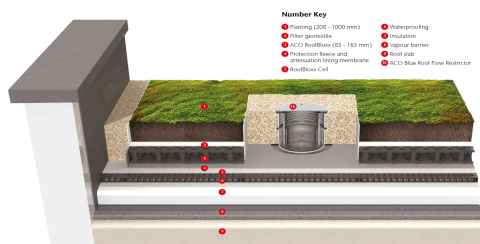
System Overview



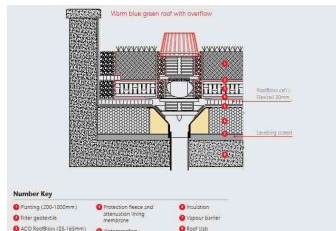
Model	RoofBloxx 85	RoofBloxx 125	RoofBloxx 165
Product Code	110001	110002	110003
Size (mm)	500 x 500 x 85	500 x 500 x 125	500 x 500 x 165
Material	Polypropylene	Polypropylene	Polypropylene
Colour	Black	Black	Black
Top surface void area	~53%	~53%	~53%
Porosity	~90%	~90%	~90%
Gross volume	~0.021m ³	~0.031m ³	~0.041m ³
Net water volume	~0.019m ³	~0.028m ³	~0.037m ³
Unit weight	~2.2kg	~3.3kg	~4.4kg
Compressive strength Max.	800kN/m ² Max.	800kN/m ² Max.	800kN/m ²
Discharge capacity			
- @ 0% gradient	6.4l/m/s	12.2l/m/s	16.9l/m/s
- @ 1% gradient	7.5l/m/s	13.4l/m/s	17.9l/m/s
- @ 2% gradient	8.5l/m/s	14.1l/m/s	18.8l/m/s
Biological/chemical resistance	Unaffected by moulds and algae, soil borne chemicals, bacteria and bitumen		

ACO RoofBloxx Installation

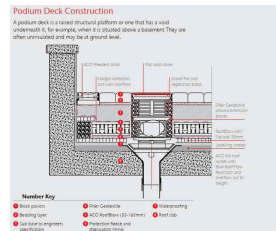
Warm Green Roof



Warm Blue Green Roof with overflow

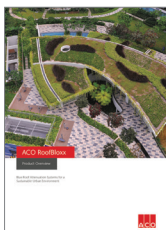


Podium Deck



Typical Specification Clause

The blue roof storage unit is ACO RoofBloxx by ACO Building Drainage measuring 500 x 500 x 85/125/165 mm (as appropriate) with an ultimate vertical compressive strength of not less than 800 kN/m² with a 90% void ratio. The ACO RoofBloxx system shall be laid on a 1mm PP welded geomembrane, ACOTex 300gsm Protection Fleece, ACO RoofBloxx Cell 30mm, and overlaid with ACOTex 125gsm geotextile. All laps should be a minimum of 300 mm.



To download a copy of the ACO RoofBloxx Product Overview brochure visit www.aco.co.uk/products/roofbloxx

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ACO. creating
the future of drainage



Project Title

Design Number

Glengearry Gate

Notes / Reference

Roof 3

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m ²	294.6
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	294.6
Net Roof Area (m ²)	206.0
Permitted Outflow (l/s)	0.140
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	
Required Net Storm Storage Volume (m ³)	19.47
Total Net Volume Required (m ³)	19.47
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R:		l/s
M5-60:		mm/h
DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	4.94
10 mins	141.12	6.84
15 mins	110.40	8.00
30 mins	67.92	9.75
1 hour	41.76	11.80
2 hours	25.62	14.09
4 hours	15.76	16.55
6 hours	11.84	17.91
10 hours	8.02	18.58
24 hours	4.46	19.47
48 hours	2.52	11.44

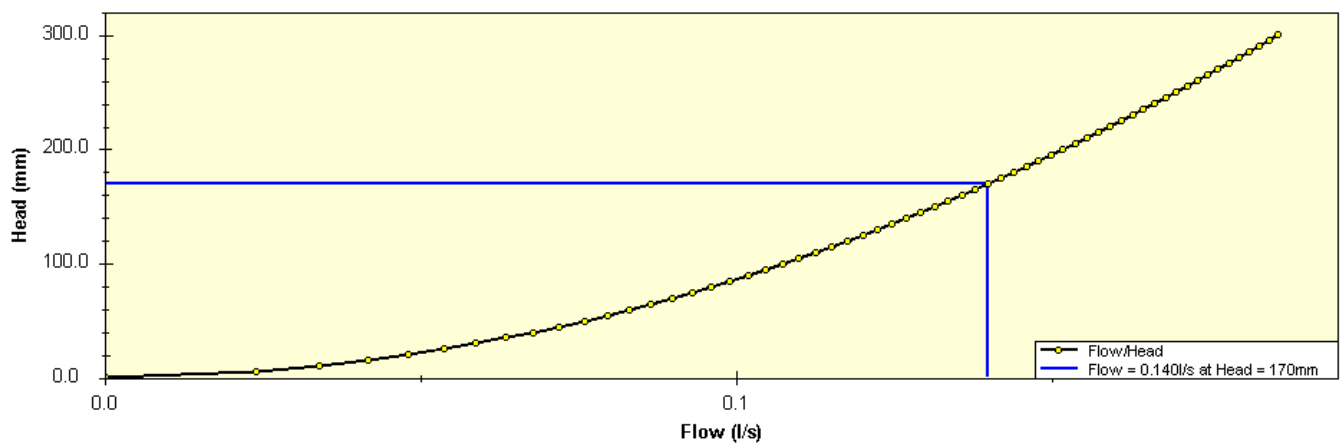
Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

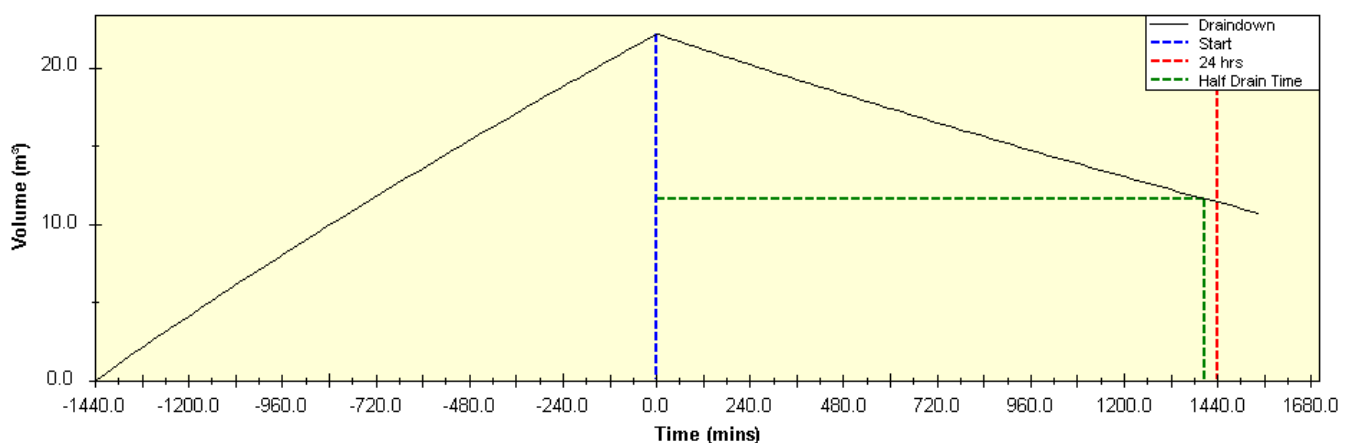
Half Draindown time: 1408 mins

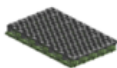
Level & Draindown Graphs

Flow / Head



Draindown



	Required (m ²)	Depth (mm)	Gross Volume (m ³)	Net Volume (m ³)	Layers Required	Product No.	Description	Qty	Unit
	206.0	125	25.75	23.18	1	110002	RoofBloxx Tank 125	824	pcs
	206.0	30	6.18	5.87	1	110008	RoofBloxx Cell 30	824	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	217					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	217					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Glengary Gate

Design Number

Notes / Reference

Roof 4

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m ²	151.0
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	151.0
Net Roof Area (m ²)	106.0
Permitted Outflow (l/s)	0.080
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	
Required Net Storm Storage Volume (m ³)	9.27
Total Net Volume Required (m ³)	9.27
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R:		l/s
M5-60:		mm/h
DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	2.53
10 mins	141.12	3.50
15 mins	110.40	4.10
30 mins	67.92	4.98
1 hour	41.76	6.02
2 hours	25.62	7.16
4 hours	15.76	8.36
6 hours	11.84	9.00
10 hours	8.02	9.22
24 hours	4.46	9.27
48 hours	2.52	4.44

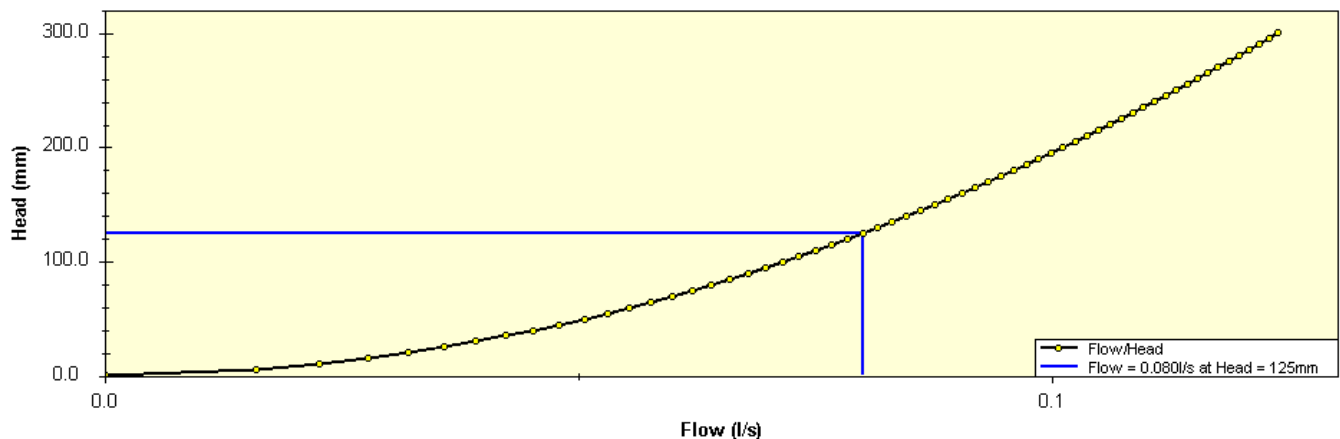
Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

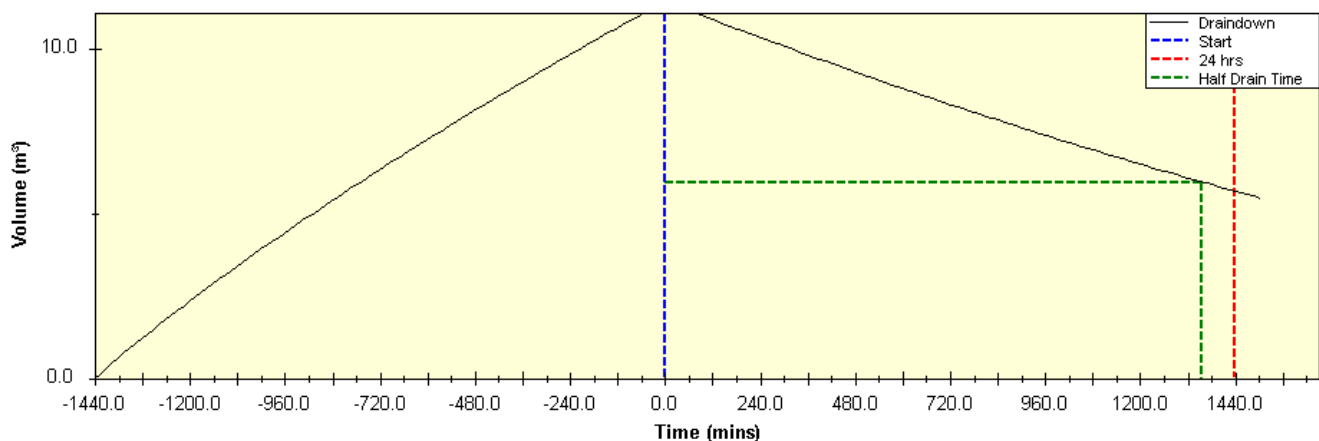
Half Draindown time: 1357 mins

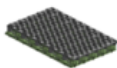
Level & Draindown Graphs

Flow / Head



Draindown



	Required (m ²)	Depth (mm)	Gross Volume (m ³)	Net Volume (m ³)	Layers Required	Product No.	Description	Qty	Unit
	106.0	125	13.25	11.93	1	110002	RoofBloxx Tank 125	424	pcs
	106.0	30	3.18	3.02	1	110008	RoofBloxx Cell 30	424	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	112					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	112					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Design Number

Glengary Gate

Notes / Reference

Roof 5

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m ²	396.4
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	396.4
Net Roof Area (m ²)	277.0
Permitted Outflow (l/s)	0.200
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	
Required Net Storm Storage Volume (m ³)	25.19
Total Net Volume Required (m ³)	25.19
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R:		l/s
M5-60:		mm/h
DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	6.65
10 mins	141.12	9.20
15 mins	110.40	10.76
30 mins	67.92	13.10
1 hour	41.76	15.83
2 hours	25.62	18.87
4 hours	15.76	22.10
6 hours	11.84	23.85
10 hours	8.02	24.58
24 hours	4.46	25.19
48 hours	2.52	13.39

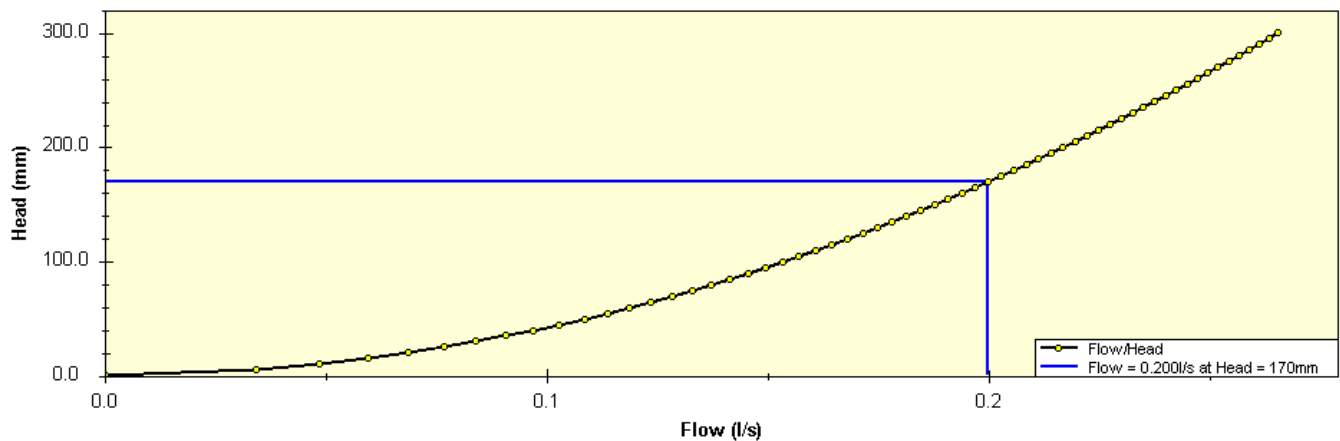
Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

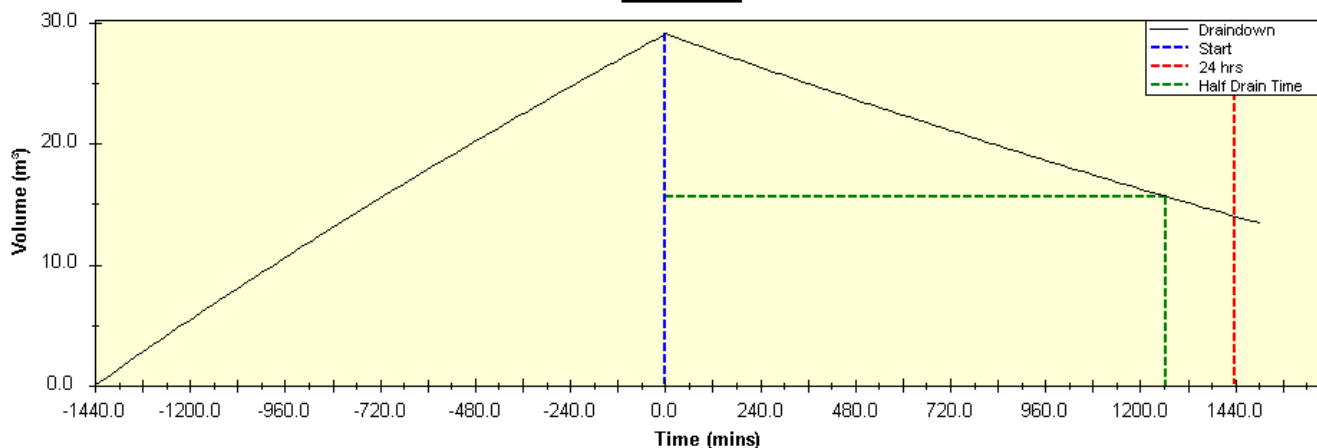
Half Draindown time: 1266 mins

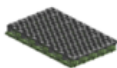
Level & Draindown Graphs

Flow / Head



Draindown



	Required (m ²)	Depth (mm)	Gross Volume (m ³)	Net Volume (m ³)	Layers Required	Product No.	Description	Qty	Unit
	277.0	125	34.63	31.16	1	110002	RoofBloxx Tank 125	1108	pcs
	277.0	30	8.31	7.89	1	110008	RoofBloxx Cell 30	1108	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	291					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	291					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Glengearry Gate

Design Number

Notes / Reference

Roof 7

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m²	352.4
Additional Contributing Areas (m²)	
Total Catchment Area (m²)	352.4
Net Roof Area (m²)	247.0
Permitted Outflow (l/s)	0.170
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	

Required Net Storm Storage Volume (m³)	23.07
Total Net Volume Required (m³)	23.07
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R: l/s

M5-60: mm/h

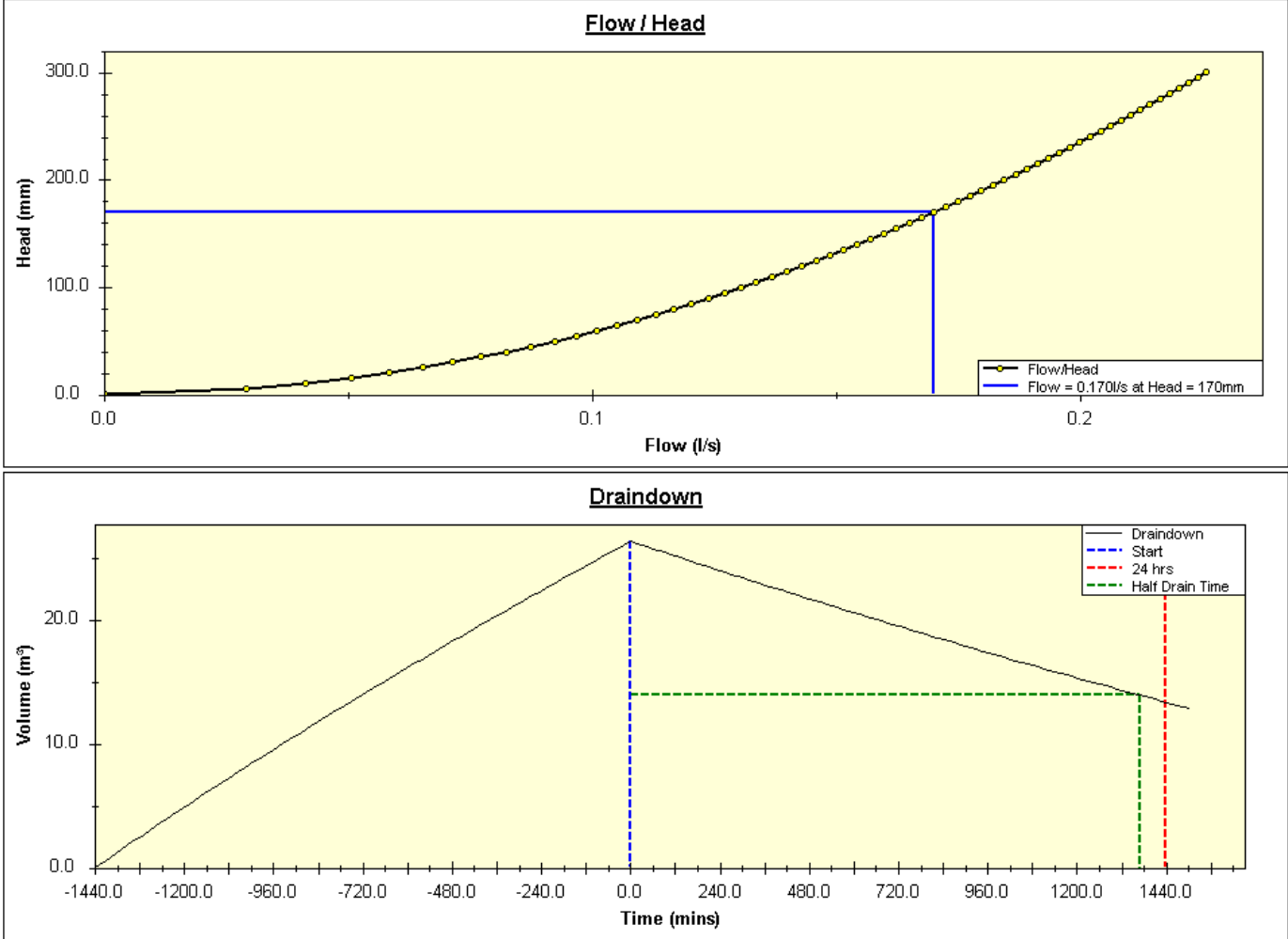
DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m³)
5 mins	203.04	5.91
10 mins	141.12	8.19
15 mins	110.40	9.57
30 mins	67.92	11.66
1 hour	41.76	14.10
2 hours	25.62	16.83
4 hours	15.76	19.76
6 hours	11.84	21.37
10 hours	8.02	22.13
24 hours	4.46	23.07
48 hours	2.52	13.25

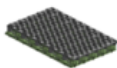
Structural Load Calculations

Item	kN/m²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

Half Draindown time: 1369 mins

Level & Draindown Graphs



	Required (m²)	Depth (mm)	Gross Volume (m³)	Net Volume (m³)	Layers Required	Product No.	Description	Qty	Unit
	247.0	125	30.88	27.79	1	110002	RoofBloxx Tank 125	988	pcs
	247.0	30	7.41	7.04	1	110008	RoofBloxx Cell 30	988	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	260					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	260					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Design Number

Glengary Gate

Notes / Reference

Roof 9

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m ²	328.6
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	328.6
Net Roof Area (m ²)	230.0
Permitted Outflow (l/s)	0.170
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	
Required Net Storm Storage Volume (m ³)	20.52
Total Net Volume Required (m ³)	20.52
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R: l/sM5-60: mm/h

DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	5.51
10 mins	141.12	7.63
15 mins	110.40	8.92
30 mins	67.92	10.85
1 hour	41.76	13.11
2 hours	25.62	15.61
4 hours	15.76	18.26
6 hours	11.84	19.68
10 hours	8.02	20.22
24 hours	4.46	20.52
48 hours	2.52	10.37

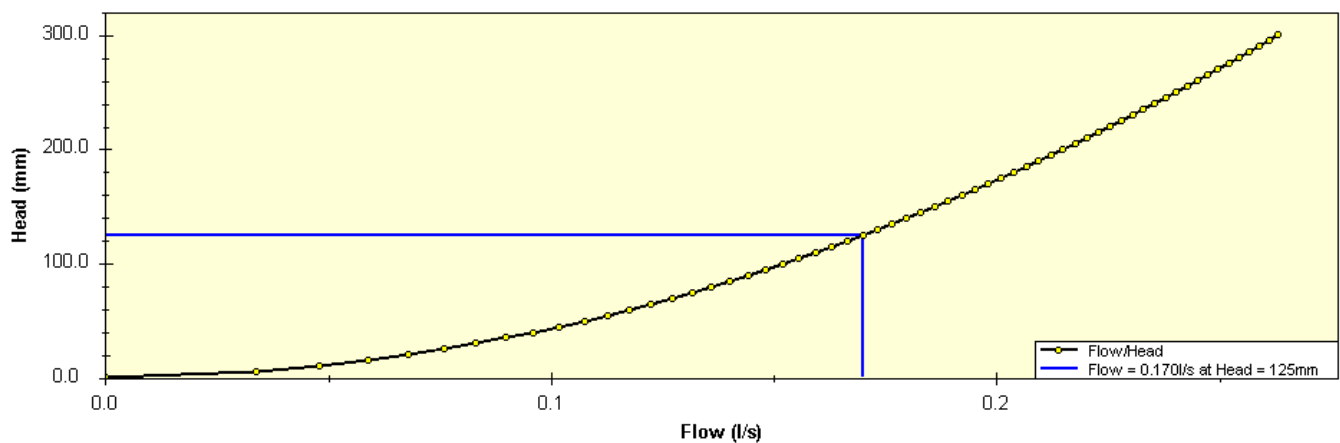
Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

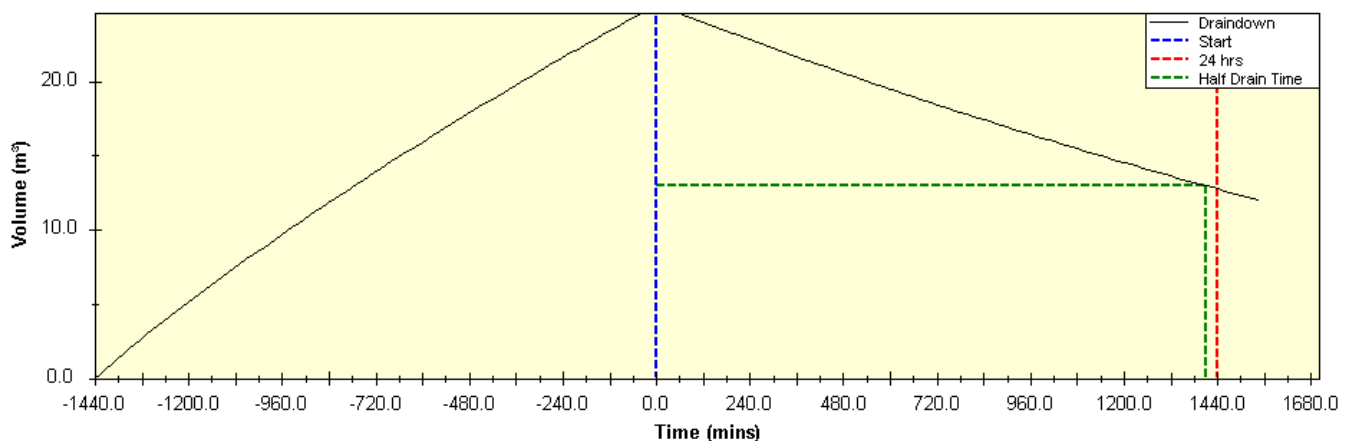
Half Draindown time: 1412 mins

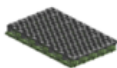
Level & Draindown Graphs

Flow / Head



Draindown



	Required (m ²)	Depth (mm)	Gross Volume (m ³)	Net Volume (m ³)	Layers Required	Product No.	Description	Qty	Unit
	230.0	125	28.75	25.88	1	110002	RoofBloxx Tank 125	920	pcs
	230.0	30	6.90	6.56	1	110008	RoofBloxx Cell 30	920	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	242					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	242					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Design Number

Glengary Gate

Notes / Reference

Roof 12

Design Storm Event	1:100
Climate Change %	20%
Location	Dublin
Roof Area m ²	173.3
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	173.3
Net Roof Area (m ²)	121.0
Permitted Outflow (l/s)	0.090
Blue or Blue/Green Roof	Blue / Green
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	
Required Net Storm Storage Volume (m ³)	10.79
Total Net Volume Required (m ³)	10.79
Void Ratio	0.90
Selected depth of storage tank (mm)	125

R: l/sM5-60: mm/h

DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	2.91
10 mins	141.12	4.02
15 mins	110.40	4.70
30 mins	67.92	5.72
1 hour	41.76	6.91
2 hours	25.62	8.23
4 hours	15.76	9.63
6 hours	11.84	10.37
10 hours	8.02	10.65
24 hours	4.46	10.79
48 hours	2.52	5.41

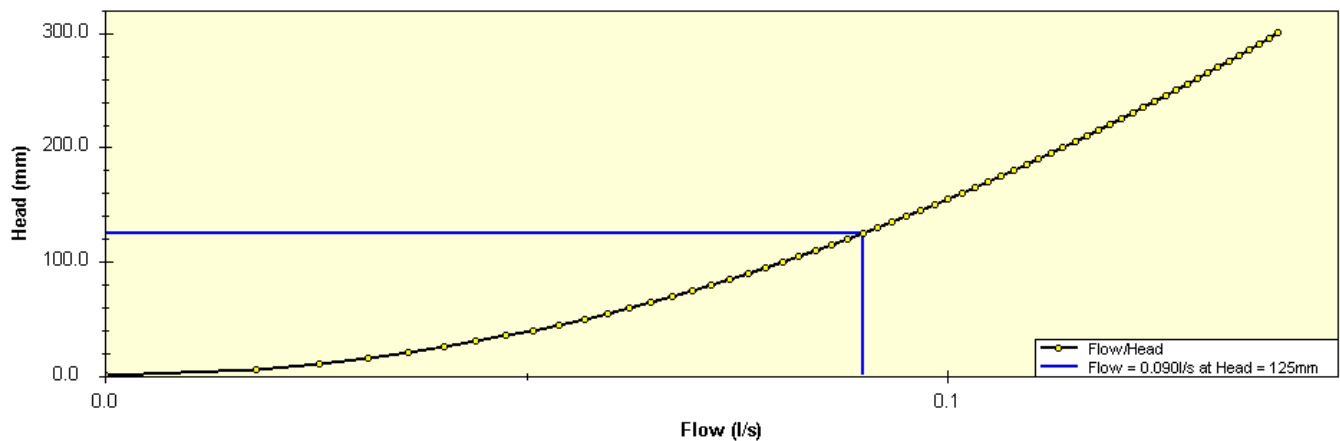
Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.154
Weight of Product (Tray)	0.000
Geotextile	0.004
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	1.103

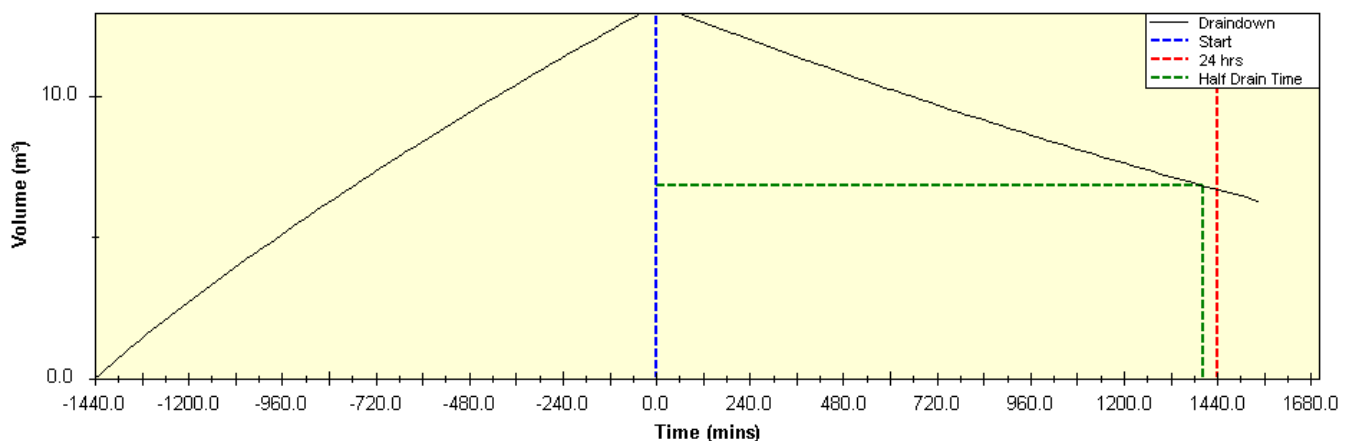
Half Draindown time: 1405 mins

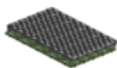
Level & Draindown Graphs

Flow / Head



Draindown



	Required (m ²)	Depth (mm)	Gross Volume (m ³)	Net Volume (m ³)	Layers Required	Product No.	Description	Qty	Unit
	121.0	125	15.13	13.61	1	110002	RoofBloxx Tank 125	484	pcs
	121.0	30	3.63	3.45	1	110008	RoofBloxx Cell 30	484	pcs
	0	0	0	0	0			0	pcs
	0					110011	Capillary Wicking Rope	0	Rolls
	128					27041	ACOTex Plus Protection Fleece (300gsm) 100 x 4.0m	1	Rolls
	128					27038	ACOTex Filter geotextile (125gsm) 100 x 4.0m	1	Rolls

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Project Title

Design Number

Glengearry Gate, Dublin

Notes / Reference

Podium

Design Storm Event	1:100
Climate Change	20 %
Runoff Coefficient	1.00
Location	Dublin
Roof Area m ²	595.6
Additional Contributing Areas (m ²)	
Total Catchment Area (m²)	595.6
Net Roof Area (m ²)	770.0
Permitted Outflow (l/s)	0.300
Blue or Blue/Green Roof	Unknown
If B/G, Green Roof Type	Extensive
a. Permanent reservoir above or in storage void	None
b. Required Reservoir Depth (mm)	

Required Net Storm Storage Volume (m ³)	37.89
Actual Depth (mm)	55
Porosity	90 %
Selected depth of storage tank (mm)	85
Provided Storage Volume (m ³)	58.91
Utilisation	64.3 %

Structural Load Calculations

Item	kN/m ²
Weight of Product (Tank / Cell)	0.116
Weight of Product (Tray)	0.000
Geotextile	0.005
Weight of Permanent Storage	0.000
Weight of Stormwater Storage	0.788

R: Project Status:M5-60: mm/h

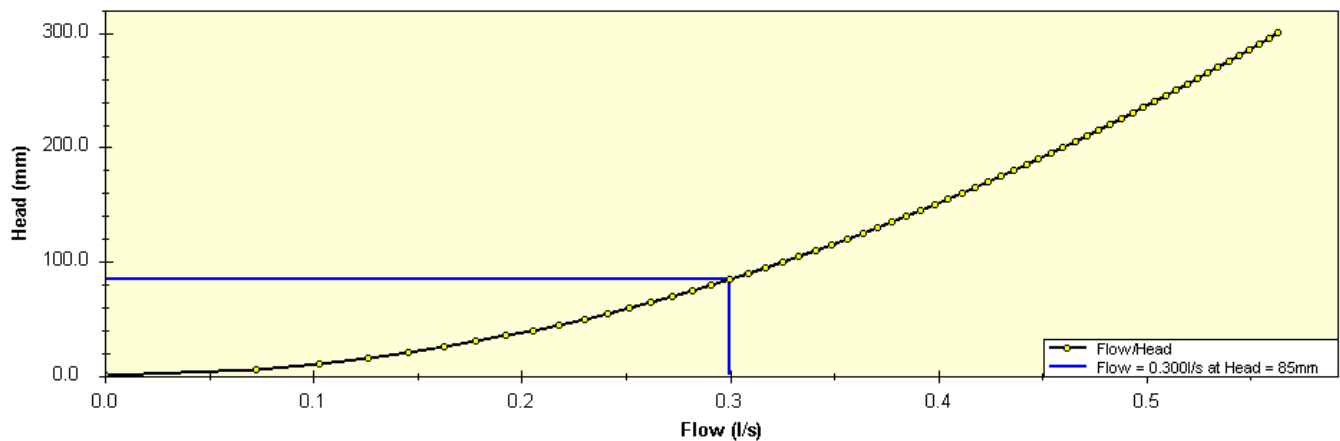
DURATION (mins)	INTENSITY (mm/h)	REQUIRED STORAGE VOLUME (m ³)
5 mins	203.04	9.99
10 mins	141.12	13.83
15 mins	110.40	16.17
30 mins	67.92	19.69
1 hour	41.76	23.79
2 hours	25.62	28.36
4 hours	15.76	33.22
6 hours	11.84	35.85
10 hours	8.02	36.94
24 hours	4.46	37.89
48 hours	2.52	20.20

Required aperture / outlet plate size: 22 mm

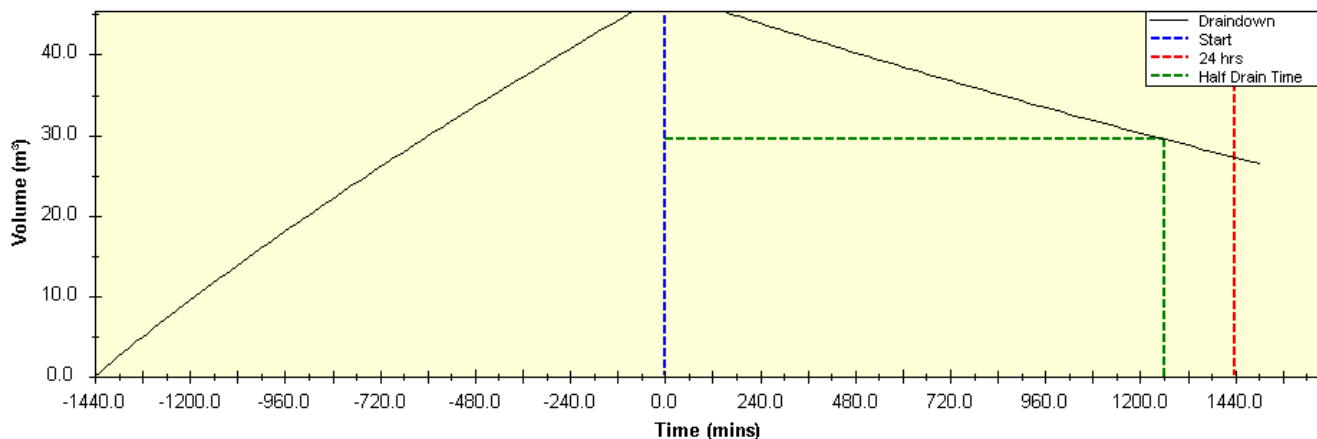
Half Empty Time: 1260 mins

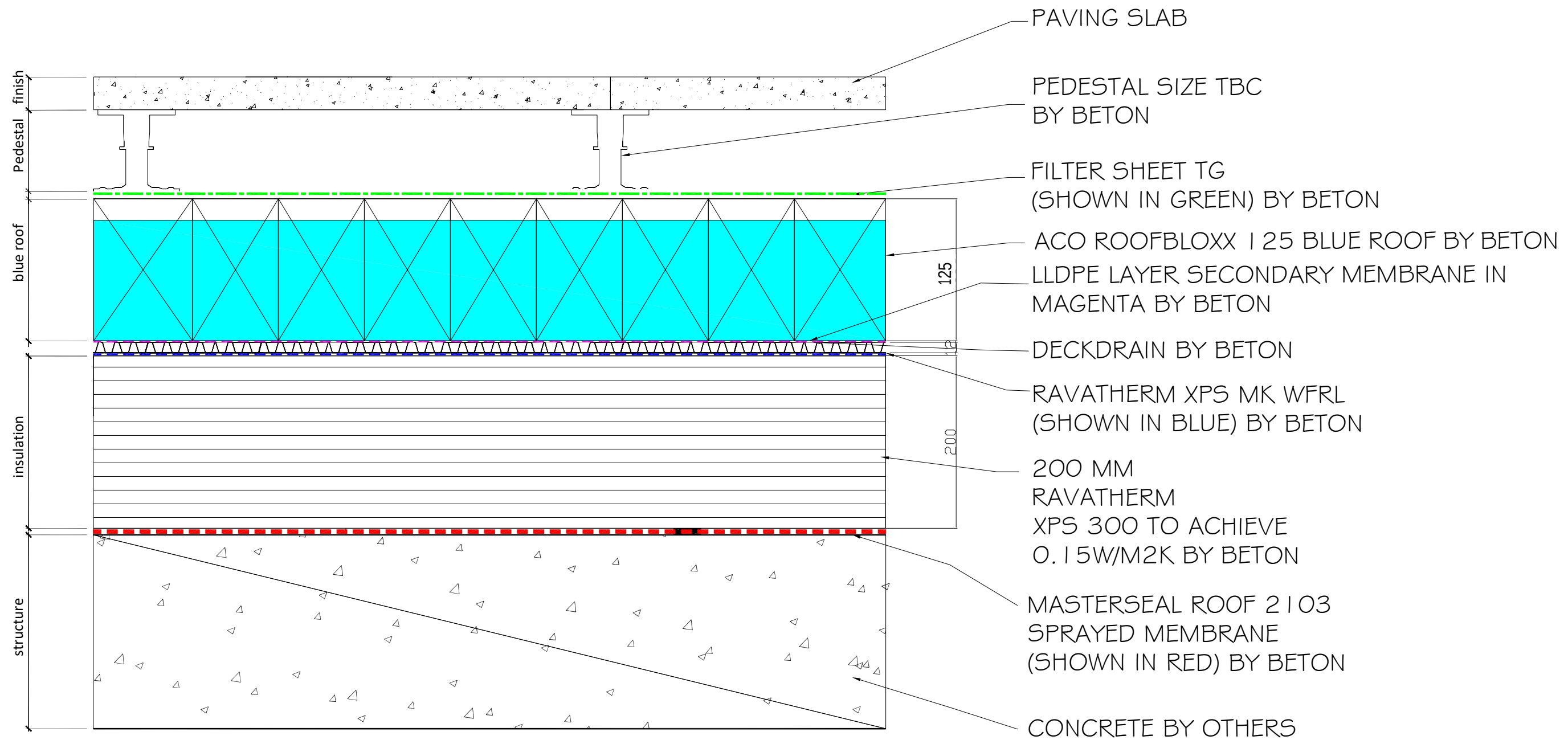
Level & Draindown Graphs

Flow / Head



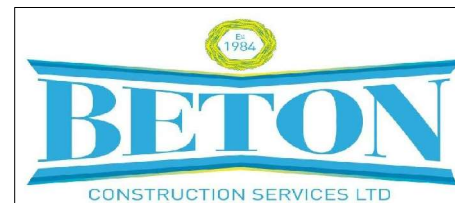
Draindown





Roof Type - Section Through Blue Roof with Pedestals & Paving Slab

SECTION THROUGH BLUE ROOF WITH PEDESTAL & PAVING DETAIL



Cork
Beton Construction Services Ltd
Heron Court, Market Quay,
Bandon,
Co.Cork
Phone: +353 23 88 542 31

Dublin
Beton Construction Services Ltd
Unit B14, Aerodrome Business Park
Rathcoole
D24 NW93.
Phone: +353 1 401 6402

TITLE:
SECTION THROUGH BLUE ROOF WITH PEDESTAL & PAVING DETAIL

Project : CARDIFF LANE

Scale: NTS

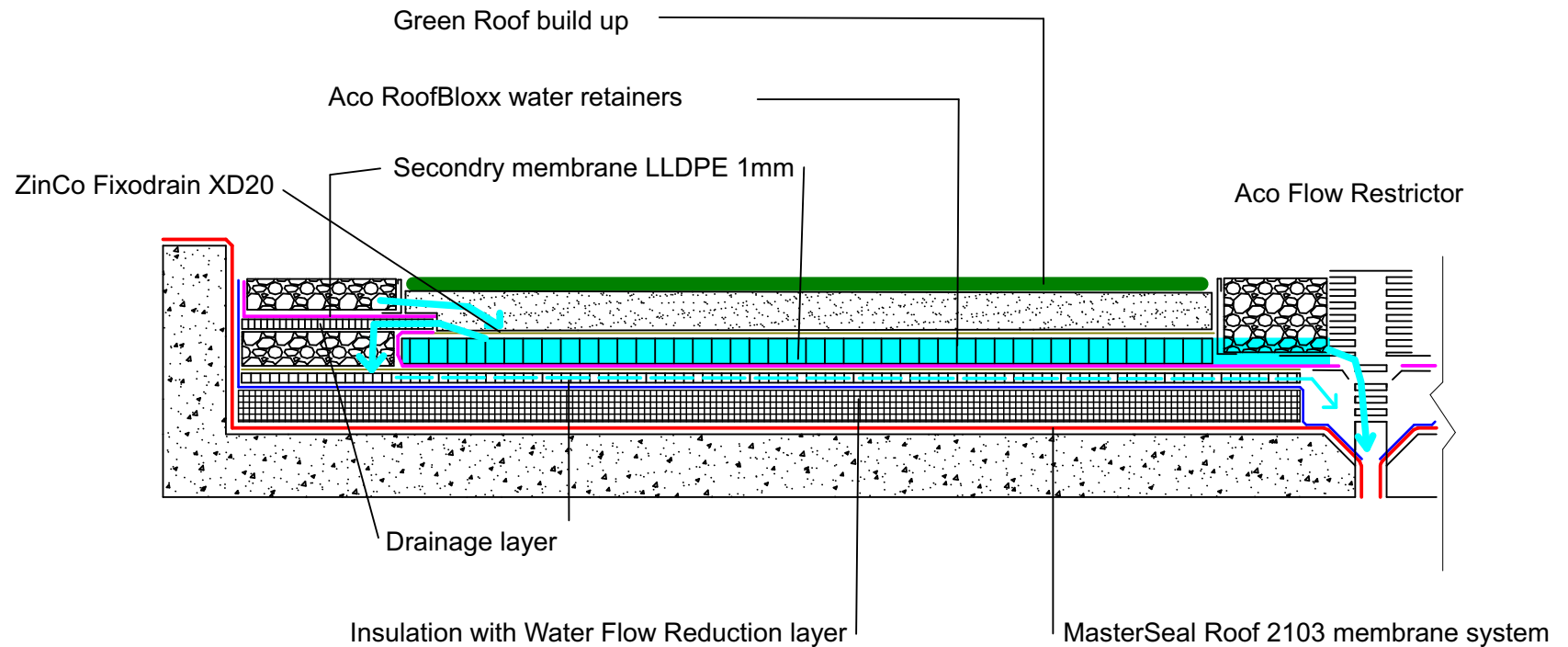
Drawn No: CL-BR-2023-05-1B

Drawn by: AM

Date: 30-03-2023

Note: This Drawing is for illustration purposed
only and not considered a working drawing.

Beton Inverted Green Roof Waterproofing system with Blue roof retention



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Website: www.beton.ie
email: info@beton.ie

Date: 22/03/22
Drawing no: Beton ACO CONICA BR rev b
Title: Beton Inverted Green Roof Waterproofing system
with Blue roof retention
Drawn by: DoC
Scale: Not to scale

This drawing is not a working drawing and is
for illustration purposes only.

Appendix I – Surface Water Network Calculations

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	15.800	Add Flow / Climate Change (%)	0
Ratio R	0.276	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.000
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.180	0.101	170.1	0.064	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	17.180	0.101	170.1	0.000	0.00	0.1	0.600	o	225	Pipe/Conduit	
S1.002	13.900	0.082	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	7.800	0.046	169.6	0.000	4.00	0.2	0.600	o	225	Pipe/Conduit	
S1.003	20.716	0.122	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	34.239	0.260	131.7	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	15.935	0.248	64.3	0.000	4.00	0.3	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.29	42.385	0.064	0.0	0.0	0.0	1.00	39.7	11.6
S1.001	50.00	4.57	42.284	0.064	0.1	0.0	0.0	1.00	39.7	11.7
S1.002	50.00	4.80	42.183	0.064	0.1	0.0	0.0	1.00	39.8	11.7
S2.000	50.00	4.13	42.300	0.000	0.2	0.0	0.0	1.00	39.8	0.2
S1.003	50.00	5.15	42.101	0.064	0.3	0.0	0.0	1.00	39.8	11.9
S1.004	50.00	5.65	41.979	0.090	0.3	0.0	0.0	1.14	45.2	16.5
S3.000	50.00	4.16	42.500	0.000	0.3	0.0	0.0	1.63	65.0	0.3

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	31.294	0.183	170.6	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	18.683	0.110	169.8	0.039	4.00	0.2	0.600	o	225	Pipe/Conduit	
S4.001	17.921	0.105	170.7	0.000	0.00	0.2	0.600	o	225	Pipe/Conduit	
S4.002	32.610	0.192	169.8	0.027	0.00	0.1	0.600	o	225	Pipe/Conduit	
S4.003	11.678	0.069	169.2	0.000	0.00	0.1	0.600	o	225	Pipe/Conduit	
S4.004	49.610	0.292	170.0	0.087	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	14.610	0.086	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.005	50.00	6.17	41.719	0.133	0.6	0.0	0.0	1.00	39.7	24.7
S4.000	50.00	4.31	42.318	0.039	0.2	0.0	0.0	1.00	39.8	7.2
S4.001	50.00	4.61	42.208	0.039	0.4	0.0	0.0	1.00	39.7	7.4
S4.002	50.00	5.15	42.103	0.066	0.5	0.0	0.0	1.00	39.8	12.4
S4.003	50.00	5.35	41.906	0.066	0.6	0.0	0.0	1.00	39.8	12.5
S4.004	50.00	6.18	41.837	0.153	0.6	0.0	0.0	1.00	39.8	28.1
S1.006	50.00	6.42	41.536	0.286	1.2	0.0	0.0	1.00	39.8«	52.8

AECOM		Page 3
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Green Roof	92	0.025	0.023	0.023
	Classification	Open Space	47	0.071	0.033	0.056
	Classification	Impermeable	100	0.008	0.008	0.064
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	Classification	Impermeable	100	0.013	0.013	0.013
	Classification	Open Space	47	0.003	0.001	0.014
	Classification	Green Roof	92	0.012	0.011	0.026
3.000	-	-	100	0.000	0.000	0.000
1.005	Classification	Impermeable	100	0.043	0.043	0.043
4.000	Classification	Permeable Paving	100	0.039	0.039	0.039
4.001	-	-	100	0.000	0.000	0.000
4.002	Classification	Permeable Paving	100	0.027	0.027	0.027
4.003	-	-	100	0.000	0.000	0.000
4.004	Classification	Permeable Paving	100	0.028	0.028	0.028
	Classification	Impermeable	100	0.058	0.058	0.087
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.328	0.286	0.286

AECOM		Page 4
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	225	0.990	1.091	Unclassified	1200	0	0.990	Unclassified
S1.001	S2	225	1.091	1.192	Unclassified	1200	0	1.091	Unclassified
S1.002	S3	225	1.192	1.274	Unclassified	1200	0	1.192	Unclassified
S2.000	S4	225	1.075	1.121	Unclassified	1200	0	1.075	Unclassified
S1.003	S5	225	1.274	1.396	Unclassified	1200	0	1.274	Unclassified
S1.004	S6	225	1.396	1.656	Unclassified	1200	0	1.396	Unclassified
S3.000	S7	225	0.875	1.123	Unclassified	1200	0	0.875	Unclassified
S1.005	S8	225	1.656	1.739	Unclassified	1200	0	1.656	Unclassified
S4.000	S9	225	1.157	1.267	Unclassified	1200	0	1.157	Unclassified
S4.001	S10	225	1.267	1.372	Unclassified	1200	0	1.267	Unclassified
S4.002	S11	225	1.372	1.564	Unclassified	1200	0	1.372	Unclassified
S4.003	S12	225	1.569	1.638	Unclassified	1200	0	1.569	Unclassified
S4.004	S13	225	1.638	1.730	Unclassified	1200	0	1.638	Unclassified
S1.006	S14	225	1.665	1.739	Unclassified	1200	0	1.739	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S1.006	S	43.340	41.450	41.450	0	0
--------	---	--------	--------	--------	---	---

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	5	Cv (Summer)	1.000
Region	Scotland and Ireland	Cv (Winter)	1.000
M5-60 (mm)	15.800	Storm Duration (mins)	30
Ratio R	0.276		

AECOM		Page 5
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.006, Volume (m³): 5.3

Unit Reference	MD-SHE-0077-3300-1700-3300
Design Head (m)	1.700
Design Flow (l/s)	3.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	41.536
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	3.3
Flush-Flo™	0.338	2.7
Kick-Flo®	0.687	2.2
Mean Flow over Head Range	-	2.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.6	5.000	5.4	9.000	7.2
0.600	2.5	2.200	3.7	5.500	5.7	9.500	7.4
0.800	2.3	2.400	3.9	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.2		

AECOM		Page 6																		
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire																			
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by M0'D																			
Innovyze	Network 2020.1																			
Storage Structures for Storm Cellular Storage Manhole: S14, DS/PN: S1.006 Invert Level (m) 42.100 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>150.0</td><td>0.0</td><td>1.101</td><td>0.0</td><td>0.0</td></tr><tr><td>1.100</td><td>150.0</td><td>0.0</td><td></td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	150.0	0.0	1.101	0.0	0.0	1.100	150.0	0.0			
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	150.0	0.0	1.101	0.0	0.0															
1.100	150.0	0.0																		
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AECOM

Page 7

Midpoint

Alencon Link

Basingstoke, RG21 7PP

Date 13/04/2023 19:29

File Glenageary Gate.MDX

Glenageary Gate LRD

Sallynoggin Road

Dun Laoghaire

Designed by DM

Checked by M0'D

Innovyze

Network 2020.1

Micro Drainage

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

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 1

Number of Online Controls 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FSR

Ratio R 0.276

Region Scotland and Ireland Cv (Summer) 1.000

M5-60 (mm)

15.800 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

DVD Status OFF

Analysis Timestep

Fine Inertia Status OFF

DTS Status

ON

Profile(s)

Summer and Winter

Duration(s) (mins)

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

Return Period(s) (years)

1, 30, 100

Climate Change (%)

20, 20, 20

PN

US/MH Name

Storm

Return Period

Climate Change

First (X) Surge

First (Y) Flood

First (Z) Overflow

Overflow Act.

Water Level (m)

S1.000

S1

720 Winter

100

+20%

30/120 Summer

43.082

S1.001

S2

720 Winter

100

+20%

30/15 Summer

43.081

S1.002

S3

720 Winter

100

+20%

30/15 Summer

43.080

S2.000

S4

720 Winter

100

+20%

30/60 Winter

43.079

S1.003

S5

720 Winter

100

+20%

1/180 Winter

43.079

S1.004

S6

720 Winter

100

+20%

1/30 Summer

43.077

S3.000

S7

720 Winter

100

+20%

30/240 Winter

43.076

S1.005

S8

720 Winter

100

+20%

1/15 Summer

43.075

S4.000

S9

720 Winter

100

+20%

30/15 Summer

43.083

S4.001

S10

720 Winter

100

+20%

30/15 Summer

43.082

S4.002

S11

720 Winter

100

+20%

1/180 Winter

43.080

S4.003

S12

720 Winter

100

+20%

1/15 Summer

43.078

S4.004

S13

720 Winter

100

+20%

1/15 Summer

43.076

S1.006

S14

720 Winter

100

+20%

1/15 Summer

43.071

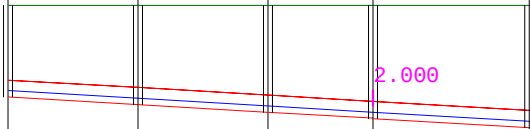
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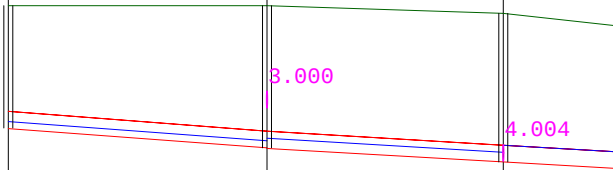
AECOM		Page 8
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

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

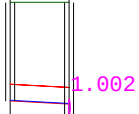
PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)						
S1.000	S1	0.472	0.000	0.08			2.9	SURCHARGED	
S1.001	S2	0.572	0.000	0.08			2.9	SURCHARGED	
S1.002	S3	0.672	0.000	0.08			2.8	SURCHARGED	
S2.000	S4	0.554	0.000	0.01			0.2	SURCHARGED	
S1.003	S5	0.753	0.000	0.08			2.8	SURCHARGED	
S1.004	S6	0.873	0.000	0.09			3.9	SURCHARGED	
S3.000	S7	0.351	0.000	0.01			0.3	SURCHARGED	
S1.005	S8	1.131	0.000	0.16			6.0	SURCHARGED	
S4.000	S9	0.540	0.000	0.05			1.9	SURCHARGED	
S4.001	S10	0.649	0.000	0.06			2.0	SURCHARGED	
S4.002	S11	0.752	0.000	0.09			3.3	SURCHARGED	
S4.003	S12	0.947	0.000	0.10			3.3	SURCHARGED	
S4.004	S13	1.014	0.000	0.19			7.3	SURCHARGED	
S1.006	S14	1.310	0.000	0.09		852	3.1	SURCHARGED	

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

MH Name		S1	S2	S3	S5	S6	
Hor Scale 1000							
Ver Scale 100							
Datum (m)40.000							
PN		S1.000	S1.001	S1.002	S1.003		
Dia (mm)		225	225	225	225		
Slope (1:X)		170.1	170.1	170.0	170.0		
Cover Level (m)		43.600	43.600	43.600	43.600	43.600	
Invert Level (m)		42.385	42.284 42.284	42.183 42.183	42.101 42.101	41.979	
Length (m)		17.180	17.180	13.900	20.716		

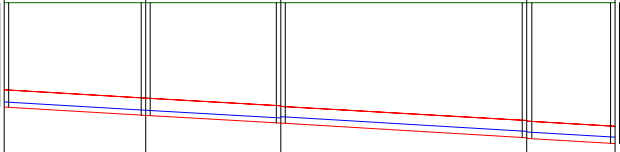
MH Name		S6	S8	S14	S	
Hor Scale 1000						
Ver Scale 100						
Datum (m)40.000						
PN		S1.004	S1.005	S1.006		
Dia (mm)		225	225	225		
Slope (1:X)		131.7	170.6	170.0		
Cover Level (m)		43.600	43.600	43.500	43.340	
Invert Level (m)		41.979	41.719 41.719	41.536 41.536	41.450	
Length (m)		34.239	31.294	14.610		

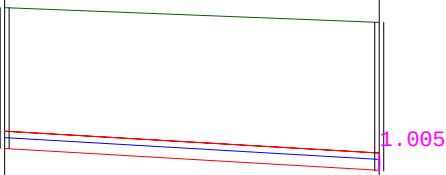
AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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MH Name			S5
Hor Scale 1000			
Ver Scale 100			
Datum (m)41.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)		43.600	43.600
Invert Level (m)		42.300 42.254	
Length (m)			

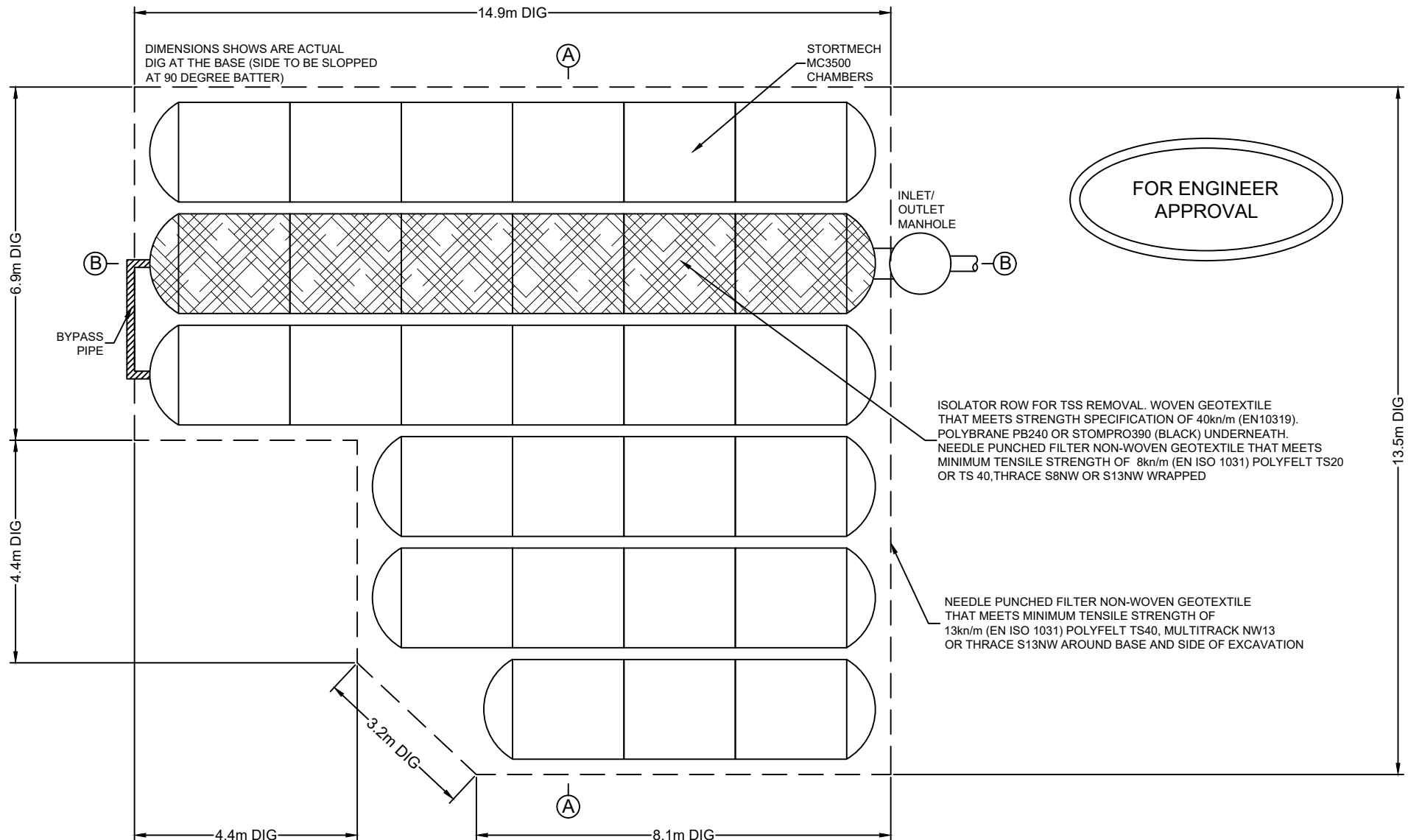
MH Name		S7	S8
Hor Scale 1000			
Ver Scale 100			
Datum (m)40.000			
PN		S3.000	
Dia (mm)		225	
Slope (1:X)		64.3	
Cover Level (m)		43.600	43.600
Invert Level (m)		42.500 42.252	
Length (m)		15.935	

AECOM		Page 3
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:29 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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MH Name	S9	S10	S11	S13
Hor Scale 1000				
Ver Scale 100				
Datum (m)40.000				
PN	S4.000	S4.001	S4.002	
Dia (mm)	225	225	225	
Slope (1:X)	169.8	170.7	169.8	
Cover Level (m)	43.700	43.700	43.700	43.700
Invert Level (m)	42.318	42.208	42.103	41.911
Length (m)	18.683	17.921	32.610	

MH Name	S13	S14
Hor Scale 1000		
Ver Scale 100		
Datum (m)40.000		
PN	S4.004	
Dia (mm)	225	
Slope (1:X)	170.0	
Cover Level (m)	43.700	43.500
Invert Level (m)	41.837	41.545
Length (m)	49.610	

Appendix J – Stormtech Attenuation Tank Details



SITE: GLENAGEARY GATE
160m3

JN230146
DRAWING NO.

1
PAGE NO.

15/02/23
DATE.

TITLE:
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StormTech Resolute Group

FOR ENGINEER
APPROVAL

GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES
COMPACT IN 150mm LIFTS TO 95% PROCTOR DENSITY
SEE TABLE OF ACCEPTABLE FILL MATERIALS IN
STORMTECH DESIGN MANUAL

LAYER OF NEEDLE PUNCHED NON-WOVEN GEOTEXTILE
BETWEEN COVER STONE AND LAYER ABOVE
THAT MEETS MINIMUM TENSILE STRENGTH OF 13kn/m (EN ISO 1031).
POLYFELT TS40, MULTITRACK NW13 OR THRACE S13NW

20-50mm CRUSHED, ANGULAR STONE

FINISHED
SURFACE

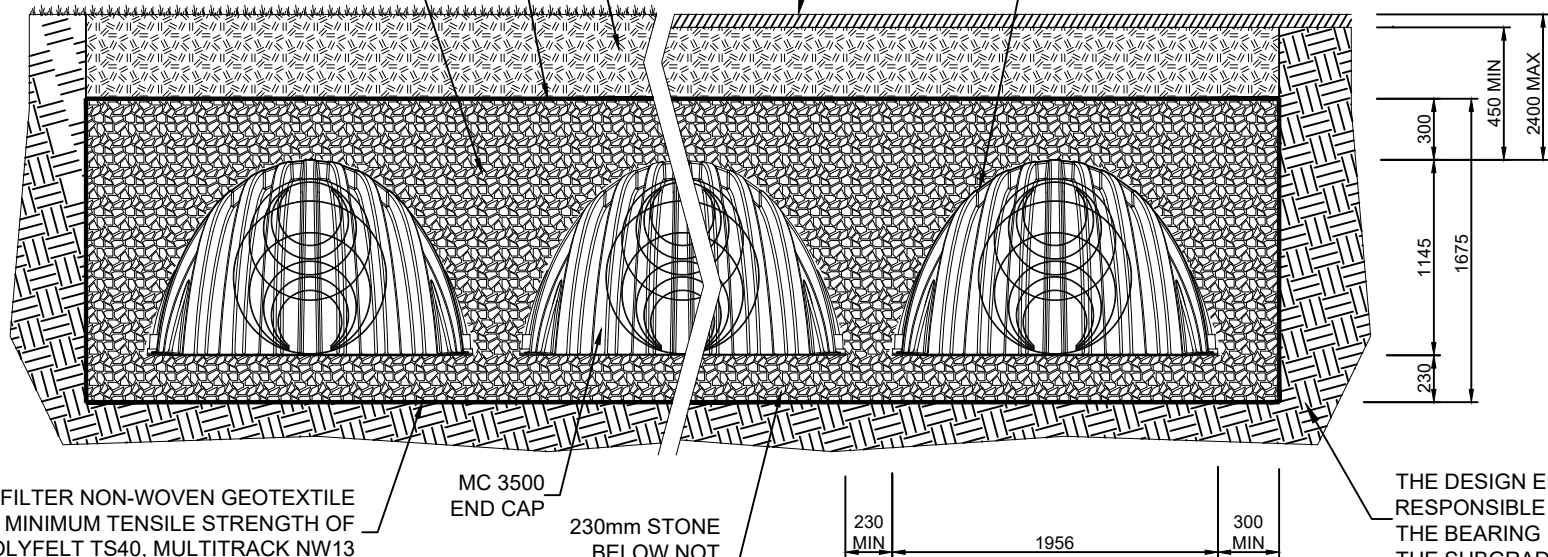
MC-3500 CHAMBERS SHALL MEET THE REQUIREMENTS
OF ASTM F2418-05, "STANDARD SPECIFICATION
FOR POLYPROPYLENE (PP) CORRUGATED WALL
STORMWATER COLLECTION CHAMBERS.

NEEDLE PUNCHED FILTER NON-WOVEN GEOTEXTILE
THAT MEETS MINIMUM TENSILE STRENGTH OF
13kn/m (EN ISO 1031) POLYFELT TS40, MULTITRACK NW13
OR THRACE S13NW AROUND BASE AND SIDE OF EXCAVATION

MC 3500
END CAP

230mm STONE
BELOW NOT
PART OF
STORAGE

THE DESIGN ENGINEER IS
RESPONSIBLE FOR ASSESSING
THE BEARING RESISTANCE OF
THE SUBGRADE SOILS*



* REFER TO STORMTECH DESIGN MANUAL

SITE: GLENAGEARY GATE
160m3

JN230146
DRAWING NO.

2
PAGE NO.

15/02/23
DATE.

TITLE: CROSS SECTION A-A CHAMBER

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SCALE

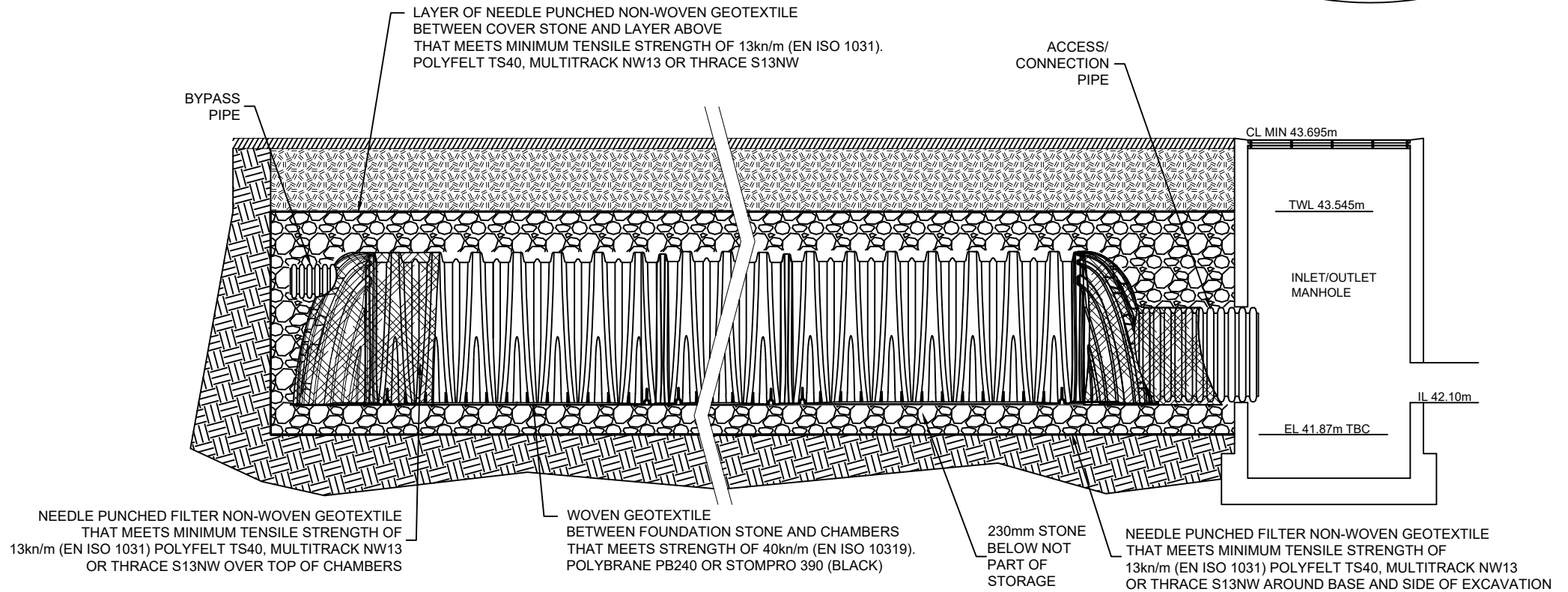
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SITE: GLENAGEARY GATE
160m3

JN230146
DRAWING NO.

3
PAGE NO.

15/02/23
DATE.

TITLE: CROSS SECTION B-B ISOLATOR ROW DETAIL

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Appendix K – SuDS Manual Drainage Inspection Checklist

Table B.25 SuDS maintenance inspection checklist

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference(s)	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (eg biodiversity, wildlife and visual aspects)	

Inspection date

	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date Completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (eg rutting, spreading of blocks or signs of ponding water)?								

Silt/sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (eg underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
System blockages and litter build-up								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Vegetation								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (Check against approved planting regime.)								
Does any part of the system require weeding, pruning or mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species becoming established? If yes, state action required								
Infrastructure								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (eg wheel ruts?)								

Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
Other observations								
Information appended (eg photos)								
Suitability of current maintenance regime								
Continue as current Increase maintenance Decrease maintenance								
Next inspection								
Proposed date for next inspection								

Appendix L – Surcharge Analysis

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	15.800	Add Flow / Climate Change (%)	0
Ratio R	0.276	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.000
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.180	0.101	170.1	0.064	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	17.180	0.101	170.1	0.000	0.00	0.1	0.600	o	225	Pipe/Conduit	
S1.002	13.900	0.082	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	7.800	0.046	169.6	0.000	4.00	0.2	0.600	o	225	Pipe/Conduit	
S1.003	20.716	0.122	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	34.239	0.260	131.7	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	15.935	0.248	64.3	0.000	4.00	0.3	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.29	42.385	0.064	0.0	0.0	0.0	1.00	39.7	11.6
S1.001	50.00	4.57	42.284	0.064	0.1	0.0	0.0	1.00	39.7	11.7
S1.002	50.00	4.80	42.183	0.064	0.1	0.0	0.0	1.00	39.8	11.7
S2.000	50.00	4.13	42.300	0.000	0.2	0.0	0.0	1.00	39.8	0.2
S1.003	50.00	5.15	42.101	0.064	0.3	0.0	0.0	1.00	39.8	11.9
S1.004	50.00	5.65	41.979	0.090	0.3	0.0	0.0	1.14	45.2	16.5
S3.000	50.00	4.16	42.500	0.000	0.3	0.0	0.0	1.63	65.0	0.3

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	31.294	0.183	170.6	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	18.683	0.110	169.8	0.039	4.00	0.2	0.600	o	225	Pipe/Conduit	
S4.001	17.921	0.105	170.7	0.000	0.00	0.2	0.600	o	225	Pipe/Conduit	
S4.002	32.610	0.192	169.8	0.027	0.00	0.1	0.600	o	225	Pipe/Conduit	
S4.003	11.678	0.069	169.2	0.000	0.00	0.1	0.600	o	225	Pipe/Conduit	
S4.004	49.610	0.292	170.0	0.087	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	14.610	0.086	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.005	50.00	6.17	41.719	0.133	0.6	0.0	0.0	1.00	39.7	24.7
S4.000	50.00	4.31	42.318	0.039	0.2	0.0	0.0	1.00	39.8	7.2
S4.001	50.00	4.61	42.208	0.039	0.4	0.0	0.0	1.00	39.7	7.4
S4.002	50.00	5.15	42.103	0.066	0.5	0.0	0.0	1.00	39.8	12.4
S4.003	50.00	5.35	41.906	0.066	0.6	0.0	0.0	1.00	39.8	12.5
S4.004	50.00	6.18	41.837	0.153	0.6	0.0	0.0	1.00	39.8	28.1
S1.006	50.00	6.42	41.536	0.286	1.2	0.0	0.0	1.00	39.8«	52.8

AECOM		Page 3
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Green Roof	92	0.025	0.023	0.023
	Classification	Open Space	47	0.071	0.033	0.056
	Classification	Impermeable	100	0.008	0.008	0.064
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	Classification	Impermeable	100	0.013	0.013	0.013
	Classification	Open Space	47	0.003	0.001	0.014
	Classification	Green Roof	92	0.012	0.011	0.026
3.000	-	-	100	0.000	0.000	0.000
1.005	Classification	Impermeable	100	0.043	0.043	0.043
4.000	Classification	Permeable Paving	100	0.039	0.039	0.039
4.001	-	-	100	0.000	0.000	0.000
4.002	Classification	Permeable Paving	100	0.027	0.027	0.027
4.003	-	-	100	0.000	0.000	0.000
4.004	Classification	Permeable Paving	100	0.028	0.028	0.028
	Classification	Impermeable	100	0.058	0.058	0.087
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.328	0.286	0.286

AECOM		Page 4
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	225	0.990	1.091	Unclassified	1200	0	0.990	Unclassified
S1.001	S2	225	1.091	1.192	Unclassified	1200	0	1.091	Unclassified
S1.002	S3	225	1.192	1.274	Unclassified	1200	0	1.192	Unclassified
S2.000	S4	225	1.075	1.121	Unclassified	1200	0	1.075	Unclassified
S1.003	S5	225	1.274	1.396	Unclassified	1200	0	1.274	Unclassified
S1.004	S6	225	1.396	1.656	Unclassified	1200	0	1.396	Unclassified
S3.000	S7	225	0.875	1.123	Unclassified	1200	0	0.875	Unclassified
S1.005	S8	225	1.656	1.739	Unclassified	1200	0	1.656	Unclassified
S4.000	S9	225	1.157	1.267	Unclassified	1200	0	1.157	Unclassified
S4.001	S10	225	1.267	1.372	Unclassified	1200	0	1.267	Unclassified
S4.002	S11	225	1.372	1.564	Unclassified	1200	0	1.372	Unclassified
S4.003	S12	225	1.569	1.638	Unclassified	1200	0	1.569	Unclassified
S4.004	S13	225	1.638	1.730	Unclassified	1200	0	1.638	Unclassified
S1.006	S14	225	1.665	1.739	Unclassified	1200	0	1.739	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S1.006	S	43.340	41.450	41.450	0	0
--------	---	--------	--------	--------	---	---

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	5	Cv (Summer)	1.000
Region	Scotland and Ireland	Cv (Winter)	1.000
M5-60 (mm)	15.800	Storm Duration (mins)	30
Ratio R	0.276		

AECOM		Page 5
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.006, Volume (m³): 5.3

Unit Reference	MD-SHE-0053-1600-1700-1600
Design Head (m)	1.700
Design Flow (l/s)	1.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	53
Invert Level (m)	41.536
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	1.6
Flush-Flo™	0.228	1.1
Kick-Flo®	0.468	0.9
Mean Flow over Head Range	-	1.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.4	3.000	2.1	7.000	3.1
0.200	1.1	1.400	1.5	3.500	2.2	7.500	3.2
0.300	1.1	1.600	1.6	4.000	2.4	8.000	3.3
0.400	1.0	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.4
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.5
0.800	1.1	2.400	1.9	6.000	2.8		
1.000	1.3	2.600	1.9	6.500	3.0		

AECOM		Page 6																		
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire																			
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by M0'D																			
Innovyze	Network 2020.1																			
Storage Structures for Storm Cellular Storage Manhole: S14, DS/PN: S1.006 Invert Level (m) 42.100 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>150.0</td><td>0.0</td><td>1.101</td><td>0.0</td><td>0.0</td></tr><tr><td>1.100</td><td>150.0</td><td>0.0</td><td></td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	150.0	0.0	1.101	0.0	0.0	1.100	150.0	0.0			
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	150.0	0.0	1.101	0.0	0.0															
1.100	150.0	0.0																		
©1982-2020 Innovyze																				

AECOM		Page 7
Midpoint	Glenageary Gate LRD	
Alencon Link	Sallynoggin Road	
Basingstoke, RG21 7PP	Dun Laoghaire	
Date 13/04/2023 19:33	Designed by DM	
File Glenageary Gate.MDX	Checked by MO'D	
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.276
Region	Scotland and Ireland	Cv (Summer)	1.000
M5-60 (mm)	15.800	Cv (Winter)	1.000

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

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

US/MH				Return Period	Climate Change	First (X)		First (Y)		First (Z)		Overflow Act.
PN	Name	Storm	Surcharge			Flood	Overflow					
S1.000	S1	10080	Summer	100	+20%	1/720	Summer	30/5760	Summer			
S1.001	S2	10080	Summer	100	+20%	1/480	Summer	30/2880	Winter			
S1.002	S3	10080	Summer	100	+20%	1/240	Summer	30/2160	Summer			
S2.000	S4	10080	Summer	100	+20%	1/480	Summer	30/2880	Summer			
S1.003	S5	10080	Summer	100	+20%	1/120	Summer	30/2160	Summer			
S1.004	S6	10080	Summer	100	+20%	1/30	Summer	30/2160	Summer			
S3.000	S7	10080	Summer	100	+20%	1/1440	Summer	30/4320	Summer			
S1.005	S8	10080	Summer	100	+20%	1/15	Summer	30/2160	Winter			
S4.000	S9	7200	Summer	100	+20%	1/480	Summer					
S4.001	S10	10080	Summer	100	+20%	1/240	Summer	30/10080	Summer			
S4.002	S11	10080	Summer	100	+20%	1/120	Summer	30/10080	Summer			
S4.003	S12	10080	Summer	100	+20%	1/15	Summer	30/10080	Summer			
S4.004	S13	10080	Summer	100	+20%	1/15	Summer	30/10080	Summer			
S1.006	S14	10080	Summer	100	+20%	1/15	Summer	30/960	Summer			

AECOM		Page 8
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 13/04/2023 19:33 File Glenageary Gate.MDX	Designed by DM Checked by MO'D	
Innovyze	Network 2020.1	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	43.608	0.998	8.164	0.02			0.7	FLOOD
S1.001	S2	43.608	1.099	8.166	0.03			1.0	FLOOD
S1.002	S3	43.608	1.200	7.755	0.04			1.4	FLOOD
S2.000	S4	43.608	1.083	7.619	0.02			0.6	FLOOD
S1.003	S5	43.607	1.281	7.402	0.06			2.3	FLOOD
S1.004	S6	43.607	1.402	6.652	0.06			2.4	FLOOD
S3.000	S7	43.606	0.881	6.373	0.02			1.0	FLOOD
S1.005	S8	43.606	1.662	5.818	0.08			3.1	FLOOD
S4.000	S9	43.613	1.070	0.000	0.02			0.8	FLOOD RISK
S4.001	S10	43.612	1.179	0.000	0.02			0.8	FLOOD RISK
S4.002	S11	43.611	1.283	0.000	0.03			1.2	FLOOD RISK
S4.003	S12	43.609	1.478	0.000	0.04			1.3	FLOOD RISK
S4.004	S13	43.608	1.546	0.000	0.06			2.3	FLOOD RISK
S1.006	S14	43.604	1.843	104.128	0.05		9864	1.7	FLOOD

PN	US/MH Name	Level Exceeded
S1.000	S1	16
S1.001	S2	16
S1.002	S3	15
S2.000	S4	14
S1.003	S5	15
S1.004	S6	14
S3.000	S7	14
S1.005	S8	14
S4.000	S9	
S4.001	S10	
S4.002	S11	
S4.003	S12	
S4.004	S13	
S1.006	S14	42

Appendix M – Irish Water Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Dara Magee

AECOM
4th Floor, Adelphi Plaza
George's Street Upper
Dun Laoghaire
Dublin
A96T927

Uisce Éireann
Bosca OP448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

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

www.water.ie

3 October 2022

**Our Ref: CDS22006963 Pre-Connection Enquiry
Glenageary Gate, Sallynoggin Road, Dublin**

Dear Applicant/Agent,

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

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 166 unit(s) at Glenageary Gate, Sallynoggin Road, 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
 - Connection point for the Development should be at the existing 250mm DI main in Sallynoggin Road. A bulk meter will be required to be installed at the connection line.
- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water
 - Connection point should be at the existing 300mm ID sewer in Glenageary Avenue.
 - Separate storm water connection services must be provided for the Development. The storm water from the site must be discharged only into the existing storm water network in Sallynoggin Road that does not discharge to an Irish Water combined/foul sewer. The connection arrangement should be agreed with the Local Authority Drainage Division.

- Proposed basement car park should be designed such that surface water from the Site and/or surrounding areas cannot flow down to the car park. Wastewater from the car park (contaminated water generated from run off from cars/tyres) must be pumped to ground level to discharge by gravity to the Irish Water Network via a petrol interceptor.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water 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 Irish Water.

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/

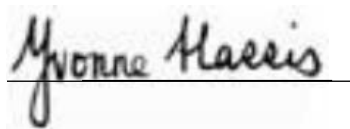
Where can you find more information?

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

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

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

Yours sincerely,



Yvonne Harris
Head of Customer Operations

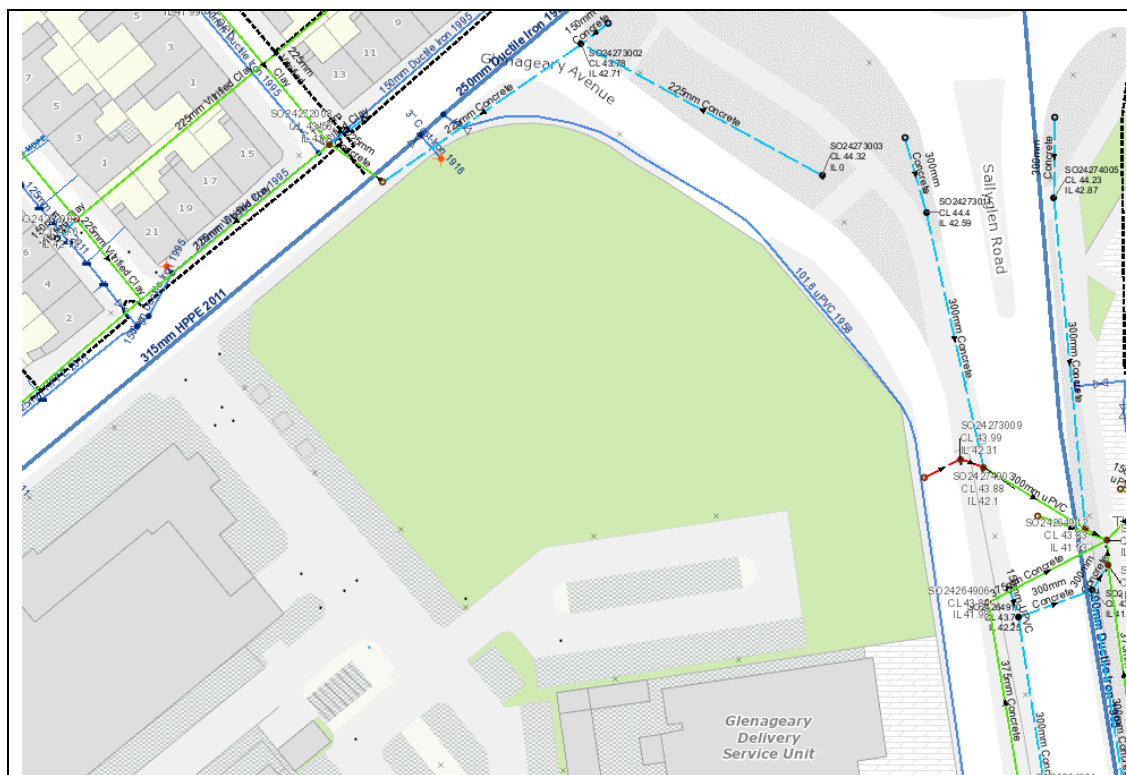
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• 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 Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *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
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • What to do? - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Irish Water Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
Trade Effluent Licensing	• 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/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water’s Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water 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 Irish Water’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 Irish Water.

Whilst every care has been taken in respect of the information on Irish Water’s network(s), Irish Water 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 Irish Water’s underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water’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.

CONFIRMATION OF FEASIBILITY

Dara Magee

AECOM
Adelphi Plaza
George's Street Upper
Dun Laoghaire
Dublin
A96T927

Uisce Éireann
Bosca OP448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

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

www.water.ie

13 February 2023

**Our Ref: CDS22008331 Pre-Connection Enquiry
Glenageary Gate, Sallynoggin Road, Dublin**

Dear Applicant/Agent,

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

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 170 unit(s) at Glenageary Gate, Sallynoggin Road, 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

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water 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 Irish Water.

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

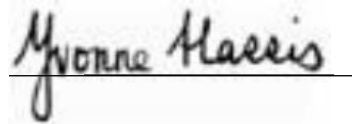
Where can you find more information?

- **Section A** - What is important to know?

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

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

Yours sincerely,

A handwritten signature in black ink, reading "Yvonne Harris", is written over a horizontal line.

Yvonne Harris
Head of Customer Operations

Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• 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 Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *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
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • What to do? - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Irish Water Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
Trade Effluent Licensing	• 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/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Appendix N – Wastewater Network Calculations

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 15/12/2022 12:38 File Glenageary Gate.MDX	Designed by DM Checked by	
Innovyze	Network 2020.1	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	165.00	Maximum Backdrop Height (m)	1.500
Persons per House	2.70	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	20.353	0.102	200.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F2.000	2.398	0.012	200.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F2.001	13.249	0.066	200.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	42.400	0.000	0.0	0	0.0	0	0.00	0.47	3.7	0.0
F2.000	42.257	0.000	0.0	0	0.0	0	0.00	0.47	3.7	0.0
F2.001	42.245	0.000	0.0	0	0.0	0	0.00	0.47	3.7	0.0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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F1.000	F	43.510	42.298	42.290	0	0
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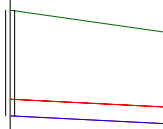
Free Flowing Outfall Details for Foul - Main

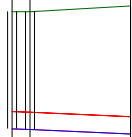
Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

F2.001	F	43.880	42.179	42.175	0	0
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AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 15/12/2022 12:38 File Glenageary Gate.MDX	Designed by DM Checked by	
Innovyze Network 2020.1		
<u>Simulation Criteria for Foul - Main</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 5 Cv (Summer) 0.750 Region Scotland and Ireland Cv (Winter) 0.840 M5-60 (mm) 15.800 Storm Duration (mins) 30 Ratio R 0.276		
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AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Glenageary Gate LRD Sallynoggin Road Dun Laoghaire	
Date 15/12/2022 15:48	Designed by DM	
File Glenageary Gate.MDX	Checked by	
Innovyze	Network 2020.1	

MH Name		F1	F
Hor Scale 1000			
Ver Scale 100			
Datum (m)41.000			
PN		F1.000	
Dia (mm)		225	
Slope (1:X)		200.0	
Cover Level (m)		43.800	43.510
Invert Level (m)		42.400	42.298
Length (m)		20.353	

MH Name		F3	F
Hor Scale 1000			
Ver Scale 100			
Datum (m)41.000			
PN		F2.001	
Dia (mm)		225	
Slope (1:X)		200.0	
Cover Level (m)		43.800	43.880
Invert Level (m)		42.245	42.179
Length (m)		13.249	

