Appendix 11.7

Soakaway Testing

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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Ground Investigations Ireland

Cowley Lands, Kilternan

Durkan Group

Ground Investigation Report

February 2025

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DOCUMENT CONTROL SHEET

Project Title	Cowley Lands, Kilternan
Engineer	Roger Mullarkey & Associates
Client	Durkan Group
Project No	14374-12-24
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	J Cashen	B Sexton	B Sexton	Dublin	12 February 2025

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

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CONTENTS

APPENDICES

1.0 Preamble

On the instructions of Roger Mullarkey & Associates, on behalf of Durkan Group, a site investigation was carried out by Ground Investigations Ireland Ltd. (GII) in January 2025 at the site of the proposed development in Kilternan, Dublin 18.

2.0 Overview

2.1. Background

It is proposed to construct a new development with associated services, access roads and car parking at the proposed site. At the time of the site investigation the site consisted of four fields which were transected by the ongoing construction of the new Glenamuck District Distributor Road (GDDR) in Dublin 18.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 4 No. Trial Pits to a maximum depth of 1.60m BGL
- Carry out 4 No. Soakaway tests to determine a soil infiltration value to BRE Digest 365
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing were undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015+A1:2020.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a

Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Surveying

The exploratory hole locations have been recorded using a KQGeo M8 GNSS System which records the coordinates and elevation of the locations to Irish Transverse Mercator (ITM) as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to in-situ and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered was consistent across the site and generally comprised;

- Topsoil
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.30m BGL.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the topsoil and were described typically as *brown / greyish brown / brown mottled grey / grey sandy gravelly CLAY with low cobble and boulder content*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had low (<5%), medium (5%-20%) or high (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred. It should be noted that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Soakaway Design

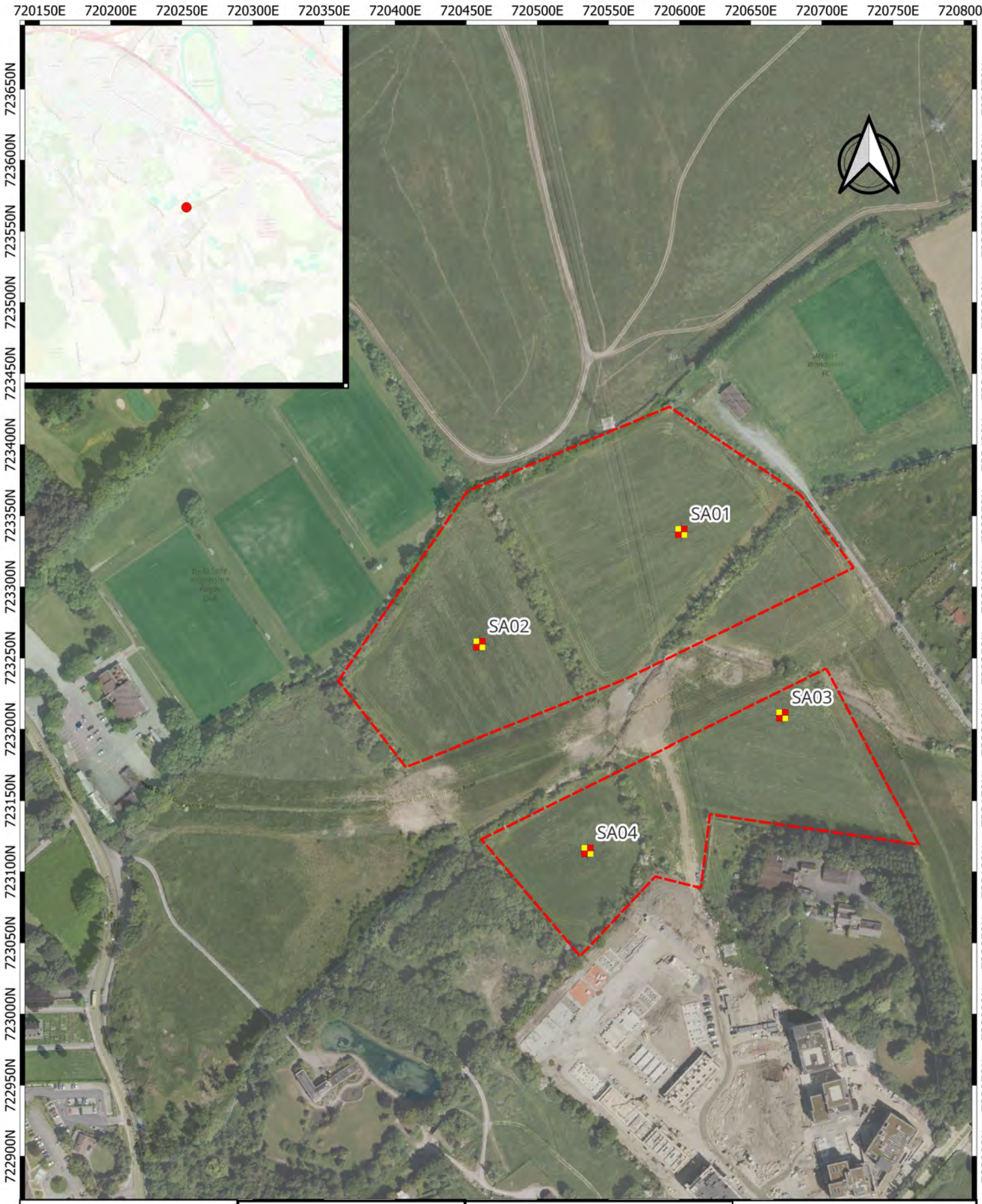
At the locations of all soakaway tests, the water level dropped too slowly to allow calculation of ‘f’ the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

5.3. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry. Excavations in the soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits. The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Figures



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Engineer:

ROGER MULLARKEY & ASSOCIATES

0 20 40 60 80 m

Project Title:
Cowley Lands, Kilternan

Drawing Title:
Figure 1 Proposed SI

GII Project Reference:
14374-12-24

Drawn By:
JC

Date:
12/02/2025

- Site Location
- Indicative Site Boundary
- Trial Pit - Soakaway

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Cowley Lands Glenamuck Road			**Trial Pit Number** SA01
Machine : JCB 3CX Excavator **Method :** Trial Pit	**Dimensions** 1.90m x 0.50m x 1.50m L x W x D	**Ground Level (mOD)**	**Client** Roger Mullarkey	**Job Number** 14374-12-24
	Location 720601 E 723338 N	**Dates** 22/01/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
					(0.40) 0.60	Soft light greyish brown slightly sandy silty CLAY		
0.50	B				(0.40) 1.00	Soft grey sandy gravelly CLAY with low subrounded cobble content (Damp)		
			Water strike(1) at 1.00m.		(0.50) 1.50	Firm dark grey slightly sandy gravelly CLAY with medium subangular to subrounded cobble content		▽1
1.50	B					Complete at 1.50m		

Plan

Remarks

Groundwater encountered. Seepage at 1.00m BGL
Trial Pit Stable
Tril Pit complete at 1.50m BGL
Soakaway test carried out in accordance with BRE Digest 365

Scale (approx)	Logged By	Figure No.
1:25	JG	14374-12-24.SA01

Ground Investigations Ireland Ltd
www.gii.ie

Site Cowley Lands Glenamuck Road			**Trial Pit Number** SA02
Machine : JCB 3CX Excavator **Method :** Trial Pit	**Dimensions** 1.60m x 0.50m x 1.50m L x W x D	**Ground Level (mOD)**	**Client** Roger Mullarkey	**Job Number** 14374-12-24
	Location 720459 E 723259 N	**Dates** 22/01/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL		
					(0.50)	Firm brown slightly sandy slightly gravelly CLAY with low subrounded cobble content		
0.50	B				0.70			
					(0.80)	Firm brown mottled grey slightly sandy slightly gravelly CLAY		
1.50	B				1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trial Pit Stable
Tril Pit complete at 1.50m BGL
Soakaway test carried out in accordance with BRE Digest 365

Scale (approx)	Logged By	Figure No.
1:25	JG	14374-12-24.SA02

Ground Investigations Ireland Ltd
www.gii.ie

Site Cowley Lands Glenamuck Road			**Trial Pit Number** SA03
Machine : JCB 3CX Excavator **Method :** Trial Pit	**Dimensions** 1.80m x 0.50m x 1.50m L x W x D	**Ground Level (mOD)**	**Client** Roger Mullarkey	**Job Number** 14374-12-24
	Location 720672 E 723209 N	**Dates** 22/01/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30			
					(0.40)	Soft light brown slightly sandy slightly gravelly CLAY		
					0.70			
0.50	B		Water strike(1) at 1.10m.		(0.80)	Soft to firm greyish brown sandy slightly gravelly CLAY		▽1
1.50	B				1.50	Complete at 1.50m		

Plan

Remarks

Groundwater encountered, seepage at 1.10m BGL
Trial Pit unstable; spalling at 0.70m BGL
Tril Pit complete at 1.50m BGL
Soakaway test carried out in accordance with BRE Digest 365

Scale (approx)	Logged By	Figure No.
1:25	JG	14374-12-24.SA03

Ground Investigations Ireland Ltd
www.gii.ie

Site Cowley Lands Glenamuck Road			**Trial Pit Number** SA04
Machine : JCB 3CX Excavator **Method :** Trial Pit	**Dimensions** 1.80m x 0.50m x 1.50m L x W x D	**Ground Level (mOD)**	**Client** Roger Mullarkey	**Job Number** 14374-12-24
	Location 720535 E 723114 N	**Dates** 22/01/2025	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
					0.30	Soft light brown slightly sandy slightly gravelly CLAY		
0.50	B				(0.40)			
					0.70	Soft greyish brown sandy slightly gravelly CLAY		
					(0.80)			
1.50	B		Water strike(1) at 1.50m.		1.50	Complete at 1.50m		▽1

Plan

Remarks

Groundwater encountered, seepage at 1.50m BGL
Trial Pit unstable; spalling at 0.70m BGL
Tril Pit complete at 1.50m BGL
Soakaway test carried out in accordance with BRE Digest 365

Scale (approx)	Logged By	Figure No.
1:25	JG	14374-12-24.SA03

Cowley Lands Kilternan – Trial Pit Photographs

SA01

SA01

Cowley Lands Kilternan – Trial Pit Photographs

SA01

Cowley Lands Kilternan – Trial Pit Photographs

SA02

SA02

Cowley Lands Kilternan – Trial Pit Photographs

SA02

SA02

Cowley Lands Kilternan – Trial Pit Photographs

SA03

SA03

Cowley Lands Kilternan – Trial Pit Photographs

SA03

SA03

Cowley Lands Kilternan – Trial Pit Photographs

SA04

SA04

Cowley Lands Kilternan – Trial Pit Photographs

SA04

SA04

APPENDIX 3 – Soakaway Testing Records

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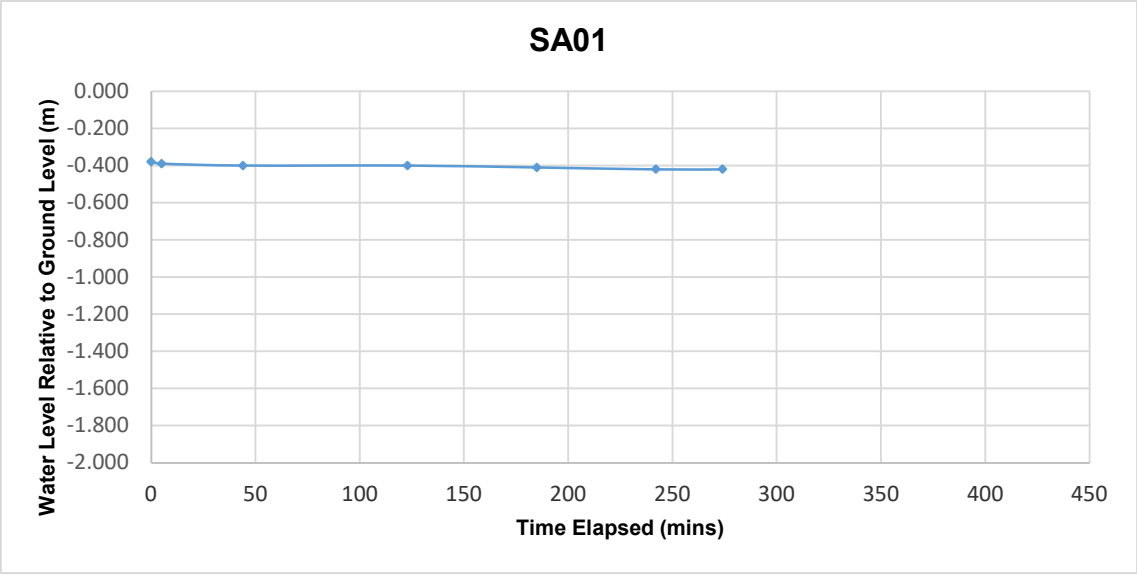
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.9m x 0.50m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
22/01/2025	0	-0.380
22/01/2025	5	-0.390
22/01/2025	44	-0.400
22/01/2025	123	-0.400
22/01/2025	185	-0.410
22/01/2025	242	-0.420
22/01/2025	274	-0.420

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.38	1.500	1.120	0.66	1.22



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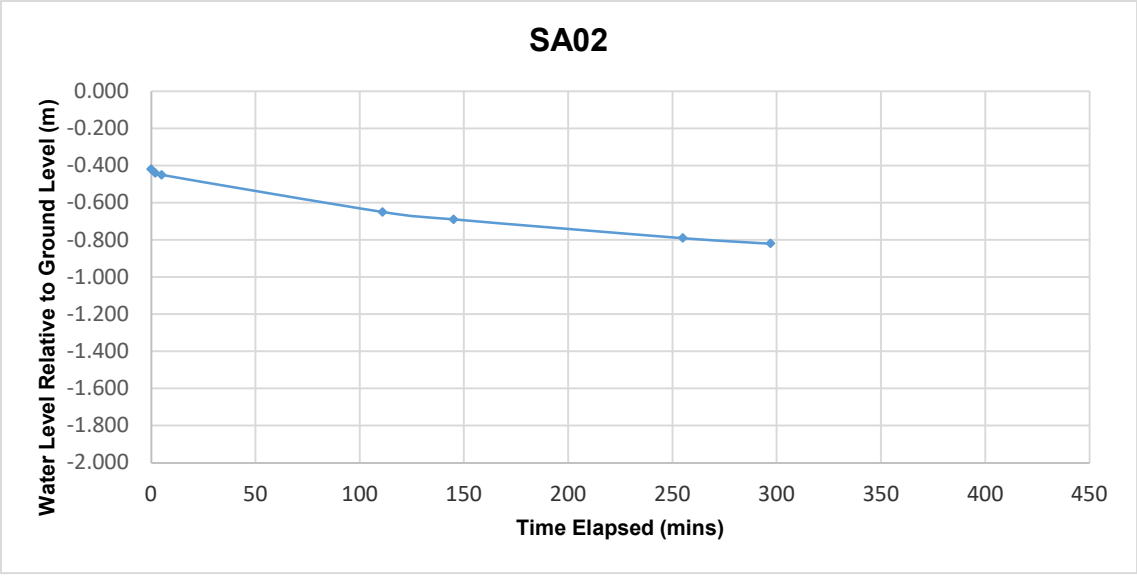
SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.6m x 0.50m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
22/01/2025	0	-0.420
22/01/2025	2	-0.440
22/01/2025	5	-0.450
22/01/2025	111	-0.650
22/01/2025	145	-0.690
22/01/2025	255	-0.790
22/01/2025	297	-0.820

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.42	1.500	1.080	0.69	1.23



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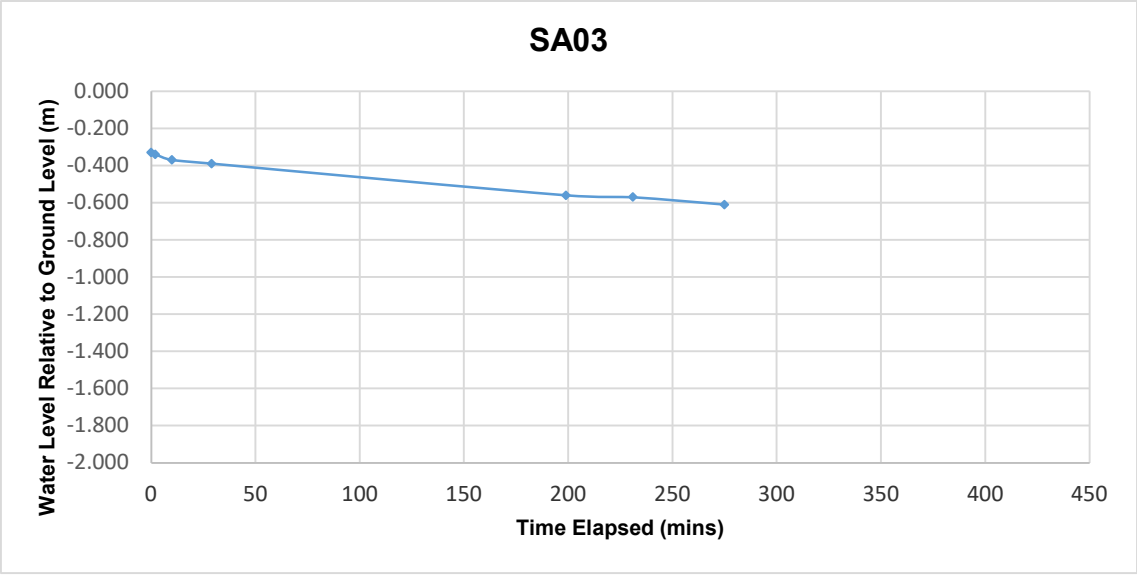
SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.8m x 0.50m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
22/01/2025	0	-0.330
22/01/2025	2	-0.340
22/01/2025	10	-0.370
22/01/2025	29	-0.390
22/01/2025	199	-0.560
22/01/2025	231	-0.570
22/01/2025	275	-0.610

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.33	1.500	1.170	0.6225	1.2075



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Co. Dublin,
D22 YD52

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Web: www.gii.ie

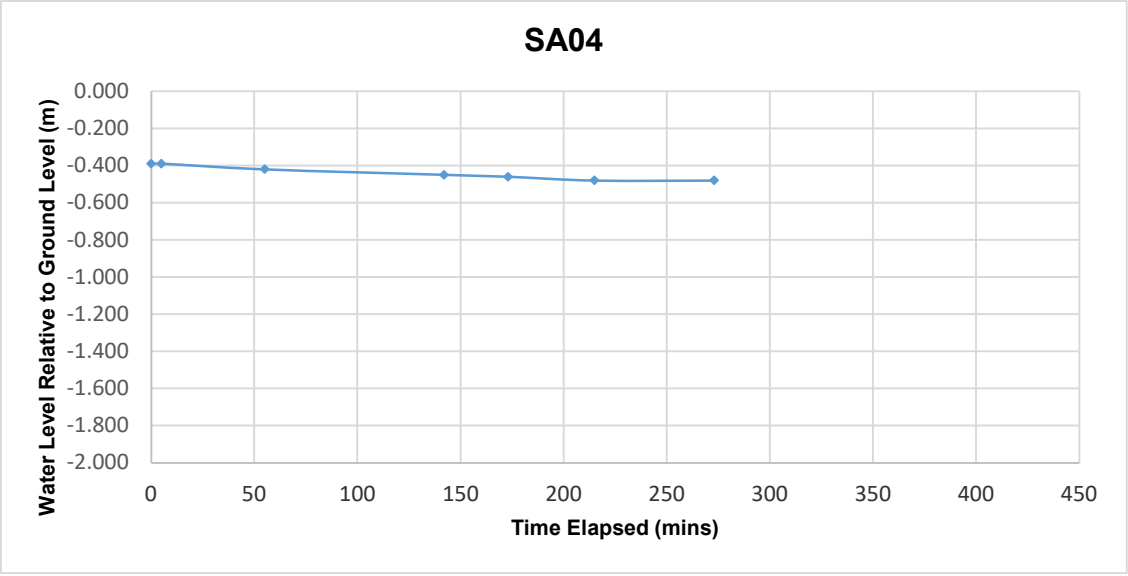
SA04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.6m x 0.50m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
22/01/2025	0	-0.390
22/01/2025	5	-0.390
22/01/2025	55	-0.420
22/01/2025	142	-0.450
22/01/2025	173	-0.460
22/01/2025	215	-0.480
22/01/2025	273	-0.480

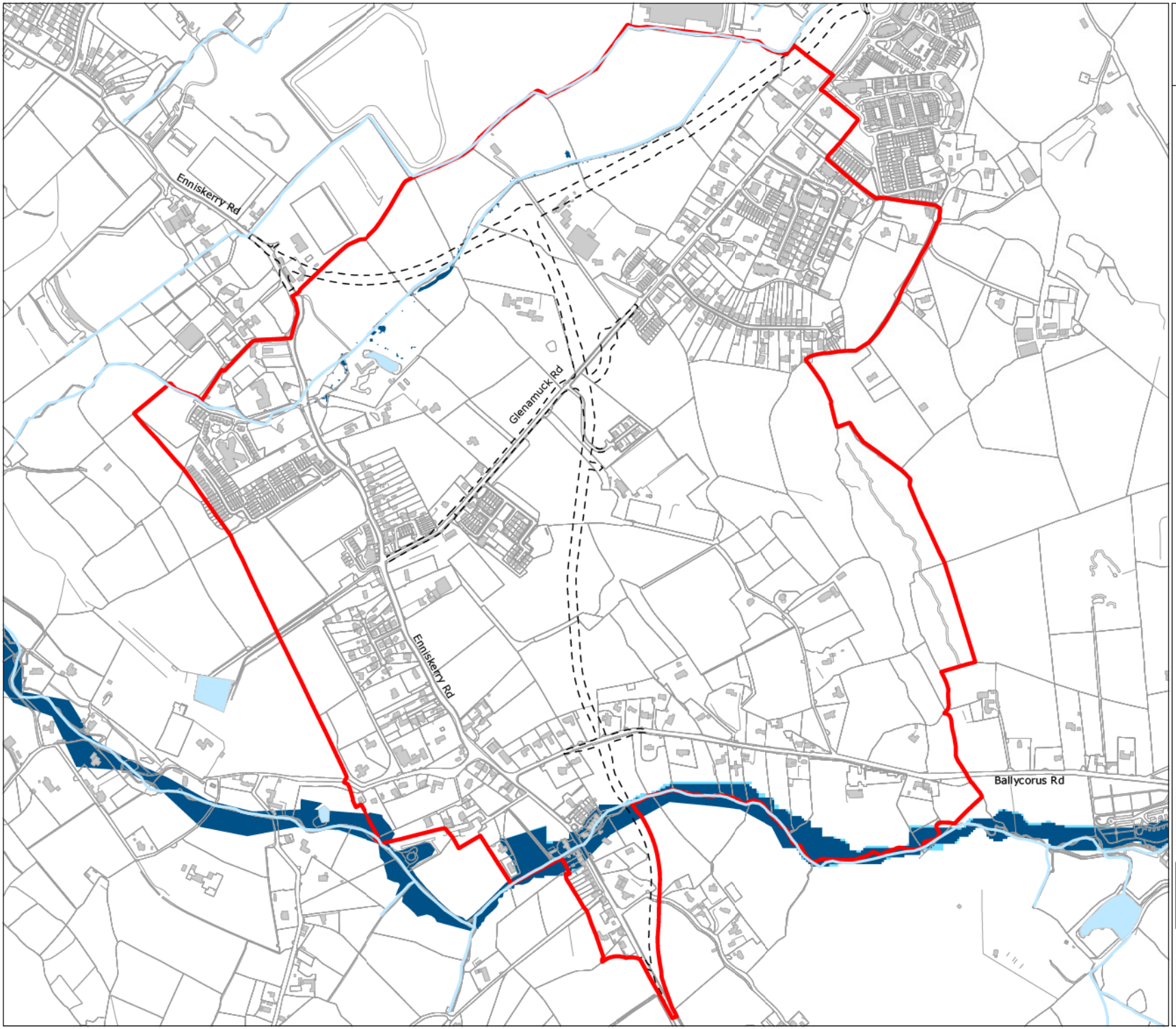
***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.39	1.500	1.110	0.6675	1.2225



Appendix 11.8

Kilternan Glenamuck LAP (Draft) MapNo.PL25010



Kiltiernan-Glenamuck Local Area Plan - Draft

Draft LAP Boundary

Glenamuck District Roads Scheme

Flood Zone A

Flood Zone B

Rivers (Existing)

Lakes and Ponds (Exisitng)

0 100 200 400 Meters

Planning and Economic Development

A. Blighe
Director of Services

dlr Comhairle Contae County Council

Water features and extract of flood zones from CDP 2022-2028

Senior Planner: L. McGauran	**Chief Technician:** M. Hennessy
Prepared By: Z. Horan	**Drawn By:** O. Feighery

Date:	**Scale:**	**Drawing No:**
February 2025	1:8,000	PL-25-010

Appendix 11.9

DLRCC CDP - Flood Map No.9

Mapping Notes:

1. The lines of the Road Proposals shown are diagrammatic only and may be subject to change.
2. Wave Overtopping layer is relevant to the following maps only: Map No's. 2, 3, 4, 7, 10 & 14 unless noted otherwise.
3. These flood maps contain Land Use Zonings & Flooding information only. Please refer to the Land Use Zoning maps for more detailed land use objectives.

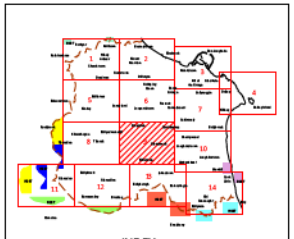
Flood Zone Map

COMHAIRLE CHONTAE DHÚN LAOGHAIRE-RÁTH AN DÚIN

DÚN LAOGHAIRE-RATHDOWN COUNTY COUNCIL

COUNTY DEVELOPMENT PLAN 2022-2028

Adopted March 2022



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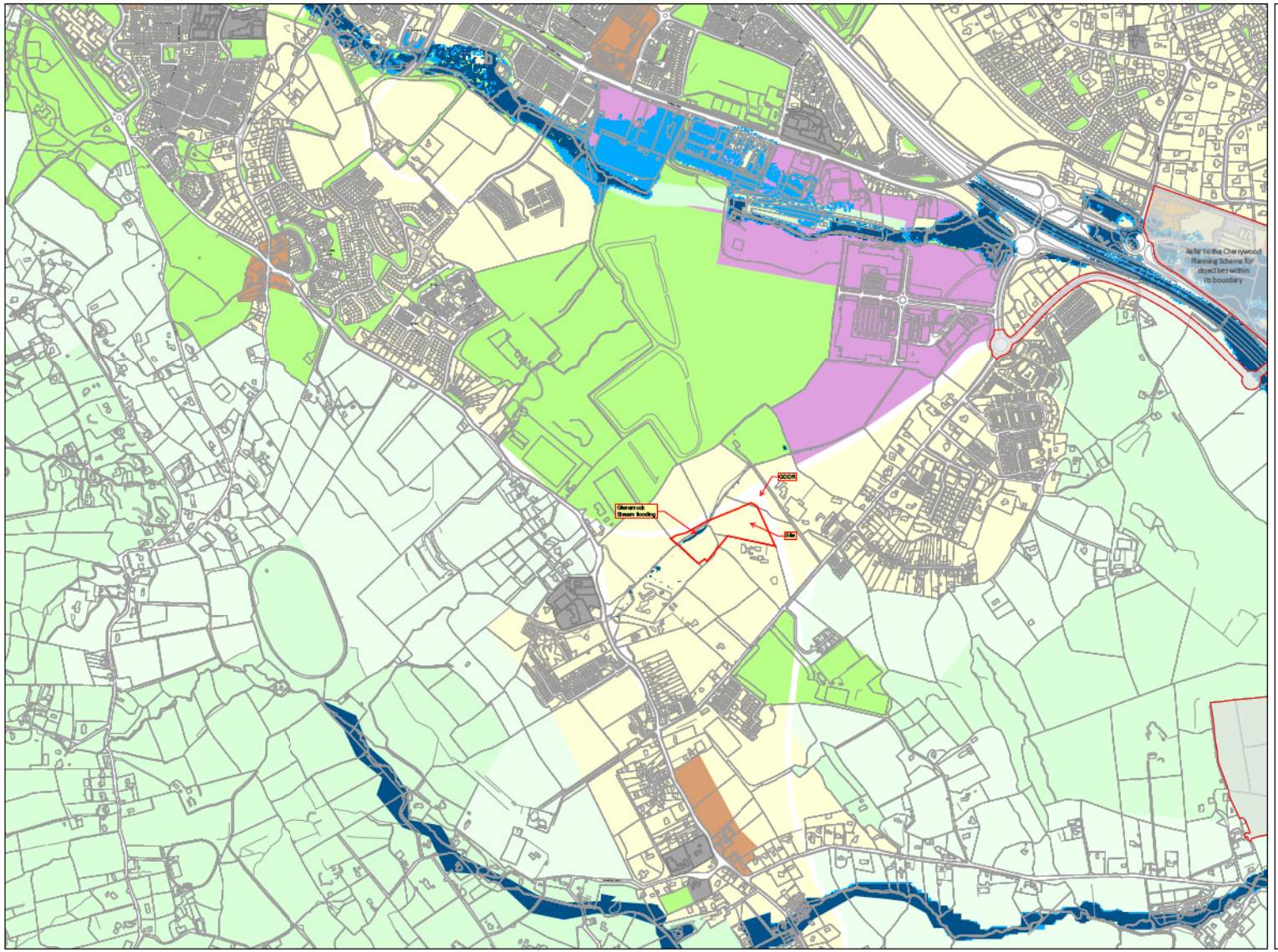


Land Use Zonings

Objective A	To provide residential development and improve residential amenity while protecting the existing residential amenities.
Objective A1	To provide for new residential communities and Sustainable Neighbourhood Infrastructure in accordance with approved local area plans.
Objective A2	To provide for the creation of sustainable residential neighbourhoods and preserve and protect residential amenity.
Objective B	To protect and improve rural amenity and to provide for the development of agriculture.
Objective DC	To protect, provide for and/or improve mixed-use district centre facilities.
Objective E	To provide for economic development and employment.
Objective F	To preserve and provide for open space with ancillary active recreational amenities.
Objective G	To protect and improve high amenity areas.
Objective GB	To protect and enhance the open nature of lands between urban areas.
Objective LW	To improve and provide for low density warehousing/light industrial warehousing uses
Objective MC	To consolidate and complete the development of the mixed use inner core to enhance and reinforce urban style development.
Objective MOC	To provide for a mix of uses which complements the inner core, but with less retail and residential and more emphasis on employment and services.
Objective MTC	To protect, provide for and or improve major town centre facilities.
Objective NC	To protect, provide for and or improve mixed use neighbourhood centre facilities.
Objective OE	To provide for office and enterprise development.
Objective TLI	To facilitate, support and enhance the development of third level education institutions.
Objective W	To provide for waterfront development and harbour related uses.
Objective SNI	To protect, improve and encourage the provision of sustainable neighbourhood infrastructure

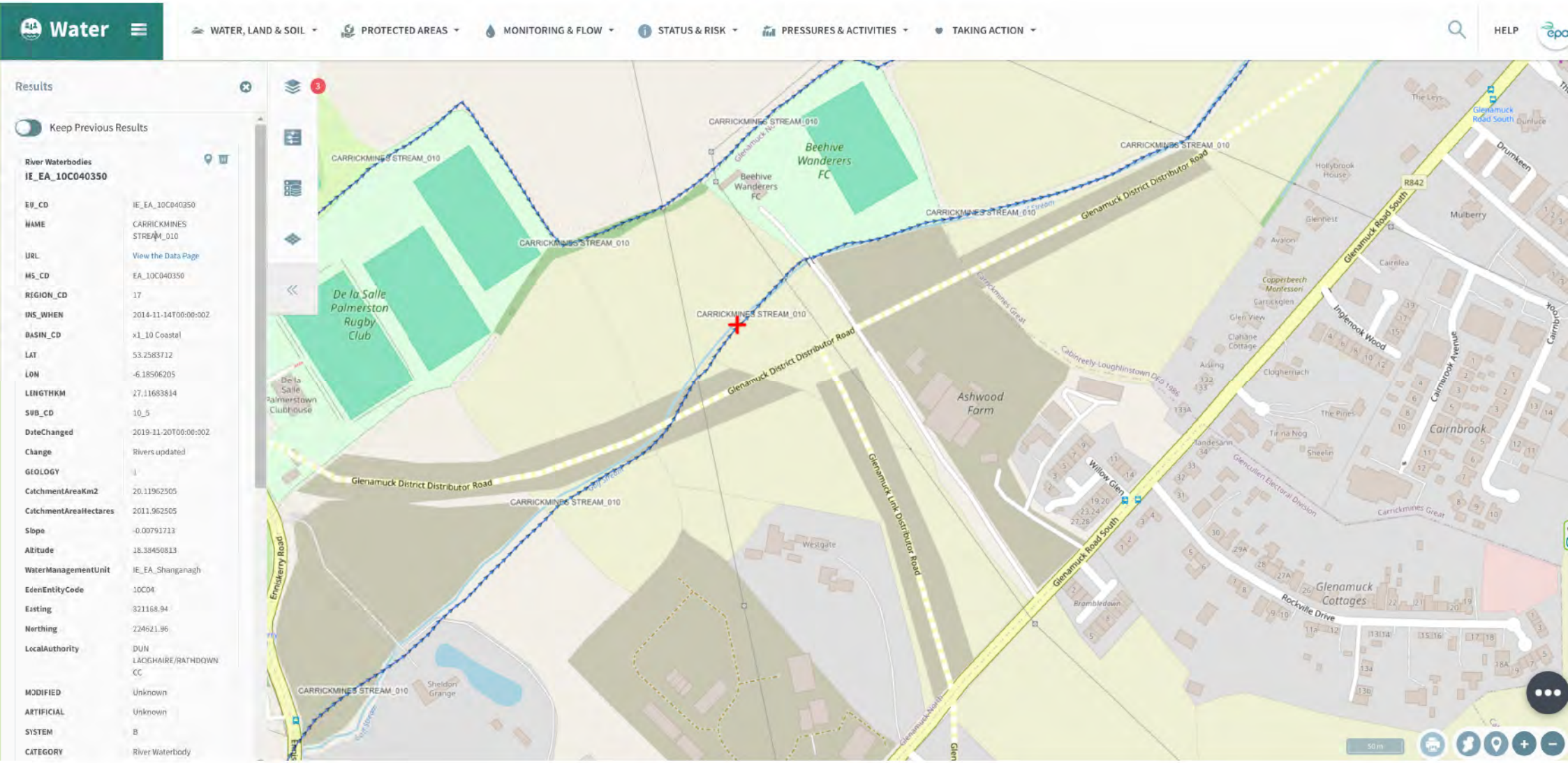
Areas of Flood Risk Concern

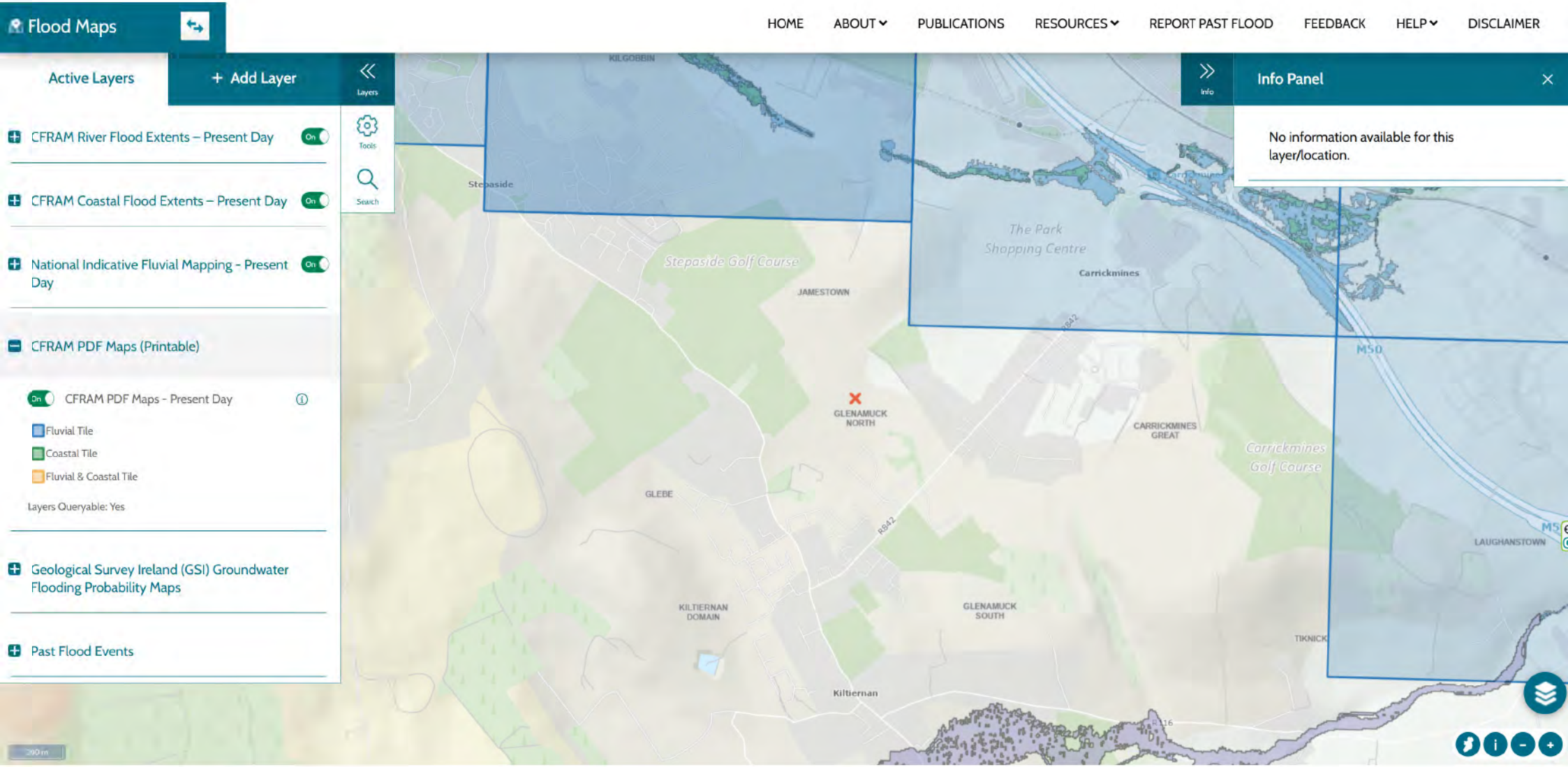
- Fluvial - Surface Water
- Fluvial - Surface Water
- Fluvial - Foul
- Flood Zone A
- Flood Zone B
- Wave Overtopping
- County Boundary
- Boundary of Adopted Cherrywood Planning Scheme

Director of Planning: M Hanchy
Senior Planner: L McGauran

Appendix 11.10

OPW Summary Report


Water
WATER, LAND & SOIL
PROTECTED AREAS
MONITORING & FLOW
STATUS & RISK
PRESSURES & ACTIVITIES
TAKING ACTION
HELP
Results
Keep Previous Results
River Waterbodies
IE_EA_10C040350
EU_CD IE_EA_10C040350
NAME CARRICKMINES STREAM_010
URL View the Data Page
MS_CD EA_10C040350
REGION_CD 17
INS_WHEN 2014-11-14T00:00:00Z
BASIN_CD x1_10 Coastal
LAT 53.2583712
LON -6.18506205
LENGTHKM 27.11683814
SUB_CD 10_5
DateChanged 2019-11-20T00:00:00Z
Change Rivers updated
GEOLOGY
CatchmentAreaKm2 20.11962505
CatchmentAreaHectares 2011.962505
Slope -0.00791713
Altitude 18.38450813
WaterManagementUnit IE_EA_Shanganagh
EdenEntityCode 10C04
Easting 321168.94
Northing 224621.96
LocalAuthority DUN LAOGHAIRE/RATHDOWN CC
MODIFIED Unknown
ARTIFICIAL Unknown
SYSTEM B
CATEGORY River Waterbody
CARRICKMINES STREAM_010
Beehive Wanderers FC
De la Salle Palmerston Rugby Club
De la Salle Palmerstown Clubhouse
Glenamuck District Distributor Road
Glenamuck Link Distributor Road
Glenamuck Road South
Ashwood Farm
Westgate
Sheldon Grange
Ennisker Road
Willow Glen
Rockville Drive
Glenamuck Cottages
Inglenook Wood
Carrinook Avenue
Carrickmines Great
Cabinteely-Loughlinstown DEA 1986
Glencullen Electoral Division
Cairnbrook
Mulberry
Drumkeen
R842
50 m


Flood Maps
HOME
ABOUT
PUBLICATIONS
RESOURCES
REPORT PAST FLOOD
FEEDBACK
HELP
DISCLAIMER
Active Layers
+ Add Layer
Layers
Tools
Search
CFRAM River Flood Extents – Present Day
On
CFRAM Coastal Flood Extents – Present Day
On
National Indicative Fluvial Mapping - Present Day
On
CFRAM PDF Maps (Printable)
On
CFRAM PDF Maps - Present Day
Fluvial Tile
Coastal Tile
Fluvial & Coastal Tile
Layers Queryable: Yes
Geological Survey Ireland (GSI) Groundwater Flooding Probability Maps
Past Flood Events
Info
Info Panel
No information available for this layer/location.
KILGOBBIN
Stepaside
Stepaside Golf Course
The Park Shopping Centre
Carrickmines
JAMESTOWN
R842
M50
GLENAMUCK NORTH
CARRICKMINES GREAT
Carrickmines Golf Course
GLEBE
M5
LAUGHANSTOWN
KILTIERNAN DOMAIN
GLENAMUCK SOUTH
TIKNICK
Kiltiernan

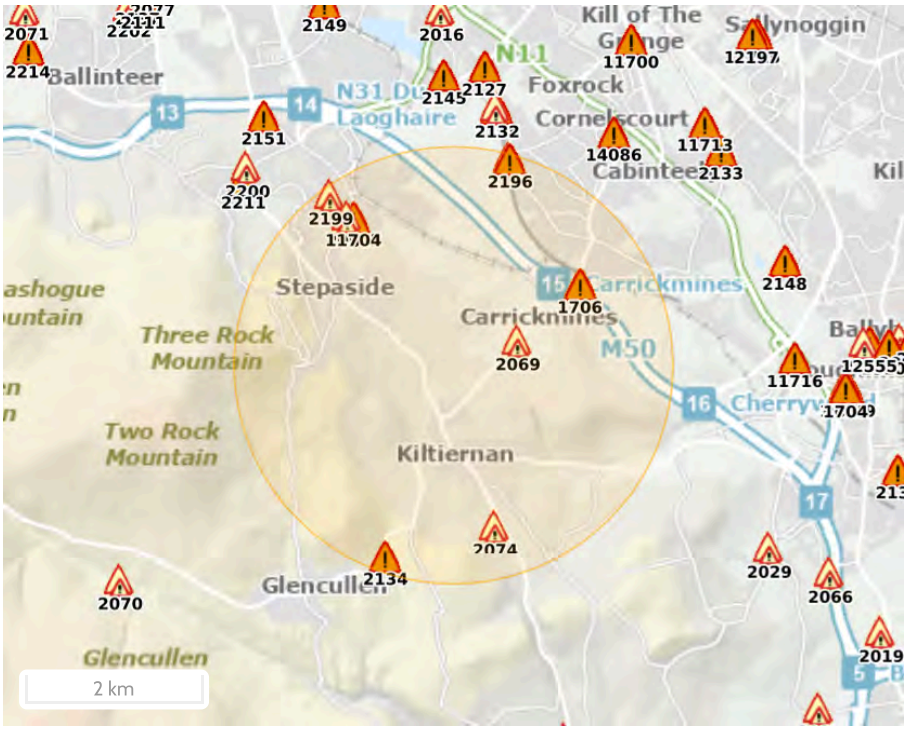

The Park
Shopping Centre
paside Golf Course
Carrickmines
JAMESTOWN
R842
GLEN MUCK
NORTH
CARRICK
GRE
SITE
R842
ILTIERNAN
DOMAIN
GLENAMUCK
SOUTH

Past Flood Event Local Area Summary Report

Report Produced: **8/3/2025 16:28**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

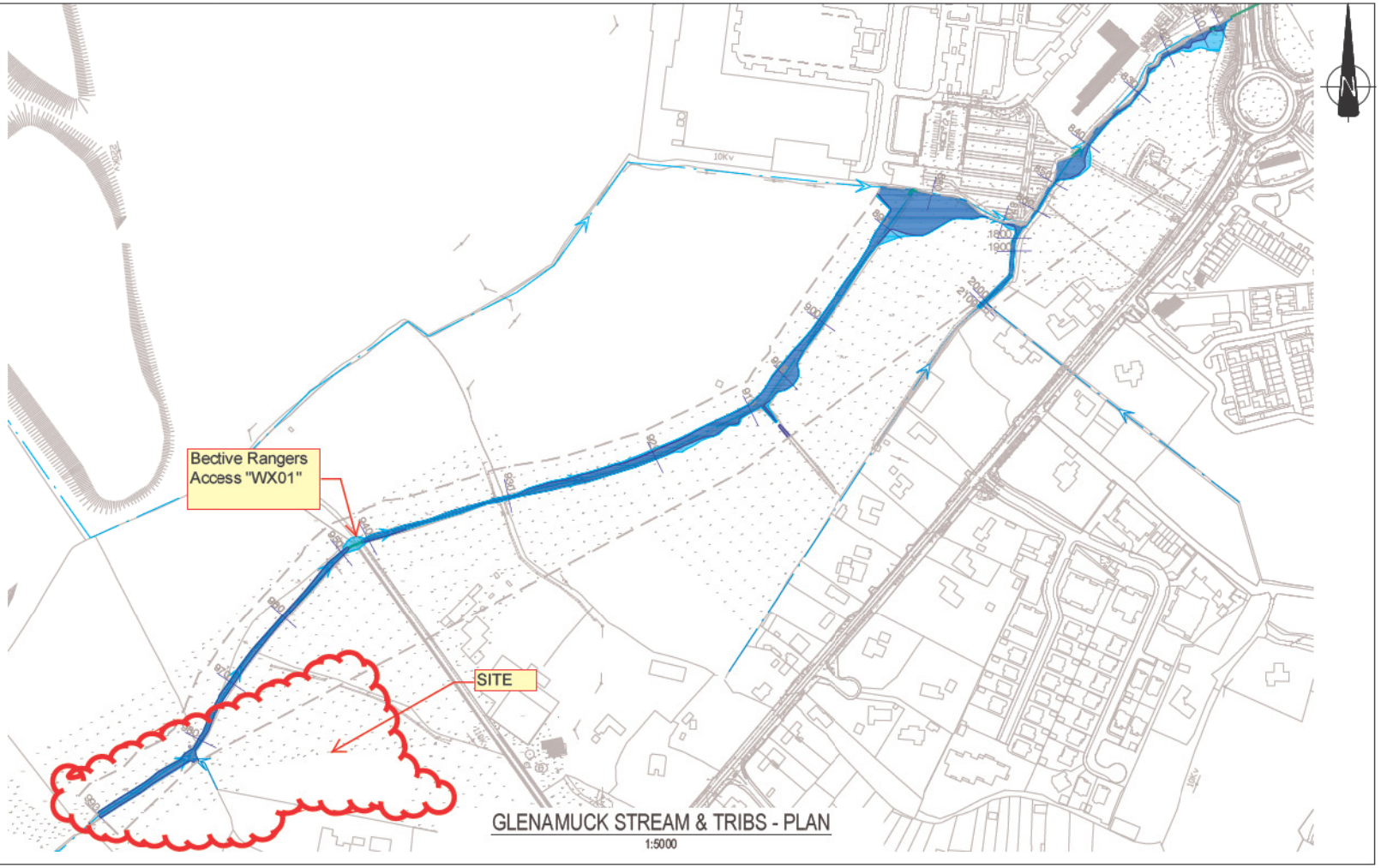
14 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Clonskeagh Road, Dublin 6 on 24th Oct 2011 (ID-11704)	23/10/2011	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Flooding at Kilgobbin Road, Stepaside, Co. Dublin on 24th Oct 2011 (ID-11712)	23/10/2011	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Brighton Cottages Foxrock Recurring (ID-2196)	n/a	Exact Point
	Additional Information: Reports (7) Press Archive (0)		
4.	Shanganagh Carrickmines Nov 1982 (ID-1706)	06/11/1982	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
5.	Shanganagh Carrickmines May 1993 (ID-1707)	25/05/1993	Approximate Point
	Additional Information: Reports (7) Press Archive (0)		
6.	Shanganagh Carrickmines Dec 1997 (ID-1708)	18/12/1997	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Brighton Terrace Jan 1980 (ID-2152)	01/01/1980	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
8.	Brighton Cottages Dec 1978 (ID-2154)	26/12/1978	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
9.	Kilternan Glencullen Road Nov 1982 (ID-2134)	05/11/1982	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
10.	Enniskerry Road Recurring (ID-2074)	n/a	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
11.	Kilgobbin Road Recurring (ID-2068)	n/a	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
12.	Glenamuck Stream Glenamuck Road Recurring (ID-2069)	n/a	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
13.	Carrickmines River Sandyford Hall Recurring (ID-2199)	n/a	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
14.	Shanganagh Carrickmines Nov 2002 (ID-1703)	26/11/2002	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

Appendix 11.11

GDRS EIAR Hydrological Maps 14-2 & 14-2



GLENAMUCK STREAM & TRIBS - PLAN
1:5000

LOUGHLINSTOWN RIVER - PLAN
1:5000

Legend

- WATERCOURSE (EPA MAPPED)
- WATERCOURSE (LOCAL DRAINAGE)
- EXTENT OF FLOOD MAPPING
- Q100 FLOOD EXTENTS
- Q1000 FLOOD EXTENTS
- XX CROSS SECTION LOCATION
- EXISTING CULVERT
- PROPOSED CULVERT

Notes

1. DRAWINGS ARE PRELIMINARY DESIGNS FOR PLANNING ONLY AND ARE SUBJECT TO DETAILED DESIGN
2. ALL WATERCOURSE CROSSING WORKS SUBJECT TO OPW SECTION 50 APPROVAL AND APPROVAL BY INLAND FISHERIES IRELAND

Client

dlr Comhairle Contae County Council

Project

Glenamuck District Roads Scheme

Key Plan

Drawing Title

EXISTING FLOOD EXTENTS

Scale at A3

AS SHOWN

Discipline

HYDROLOGY

Drawing Status

PLANNING

Drawing No

APPENDIX 14-1 FIGURE 1

Issue

-

Prepared By

DBFL Consulting Engineers
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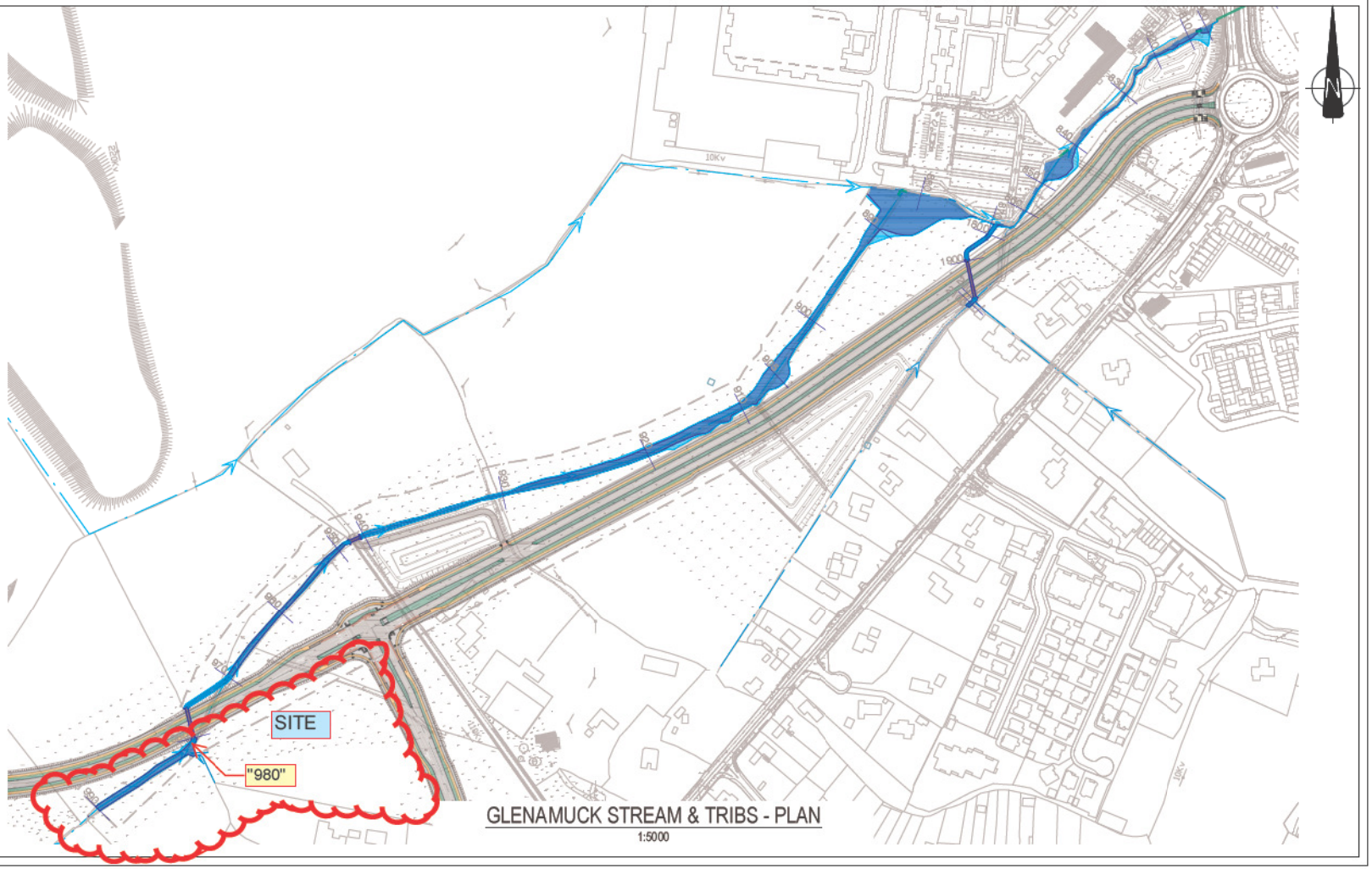
WATERFORD OFFICE Unit 2, The Chandlery, 1-2 O' Connell Street, Waterford, Ireland. PHONE +353 51 309 500
EMAIL info@dbfl.ie SITE www.dbfl.ie



GLENAMUCK STREAM & TRIBS - PLAN
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Key Plan

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Scale at A3

AS SHOWN

Discipline

HYDROLOGY

Drawing Status

PLANNING

Drawing No

APPENDIX 14-1 FIGURE 2

Issue

-

Prepared By

DBFL

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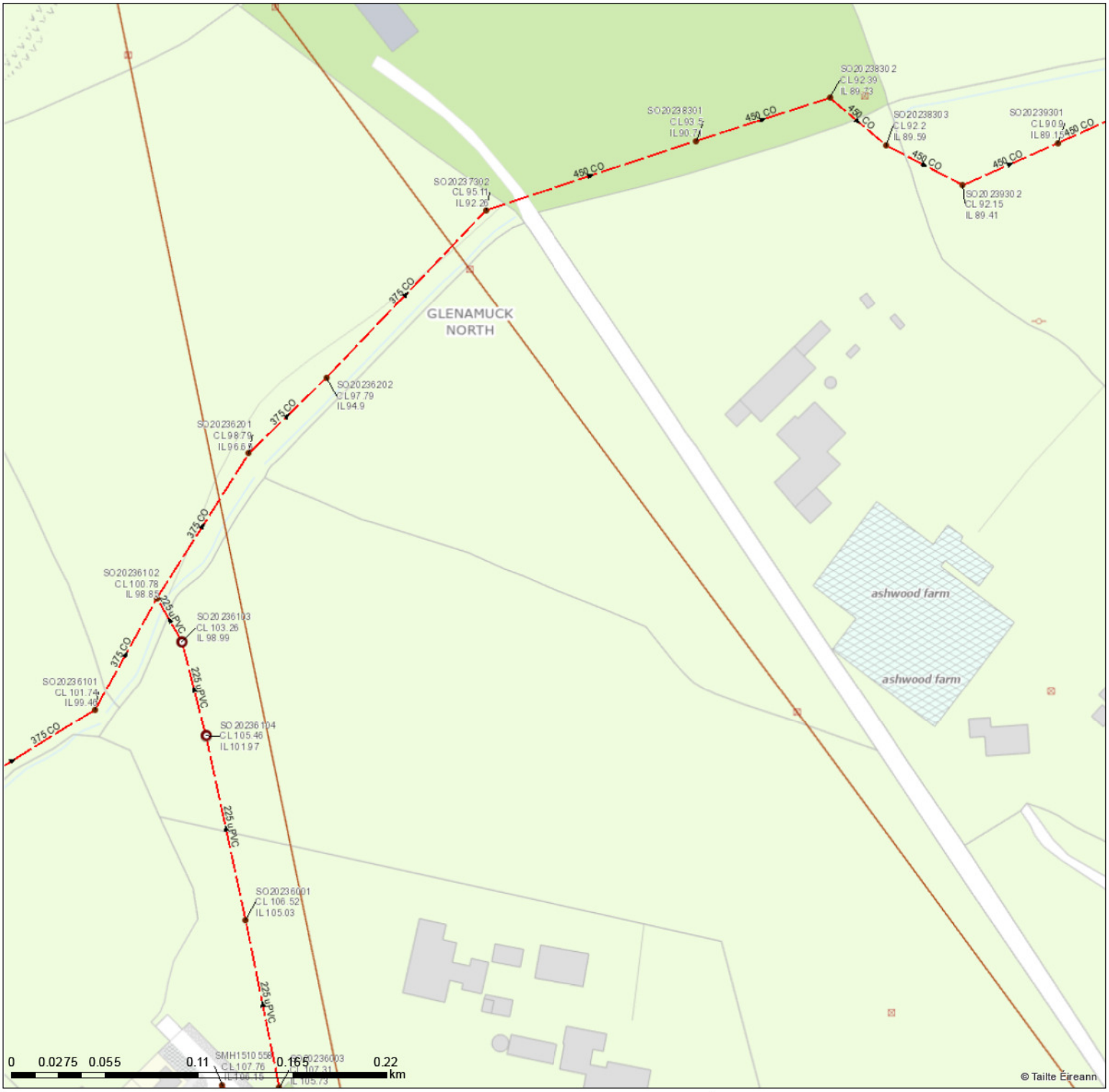
WATERFORD OFFICE Unit 2, The Chandlery, 1-2 O' Connell Street, Waterford, Ireland. PHONE +353 51 309 500

DBFL Consulting Engineers EMAIL info@dbfl.ie SITE www.dbfl.ie

Appendix 11.12

Uisce Éireann Records Maps

Glenamuck Foul Drainage



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
- 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 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
- 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
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- 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

1. Tá toirmeasc ar aon chuid den líníocht seo a aithtairgeadh nó a sheoladh ar aghaidh in aon slí, nó aon chuid den líníocht a stóráil ar aon chóras aisghabhála d'aon sórt gan cead i scríbhinn ó shealbhóir an chóipchirt de chuid Uisce Éireann seachas mar a aontófar an doiciméad a úsáid i ndáil leis an tionscadal dá n-eisíodh an doiciméad chuige ar dtús.

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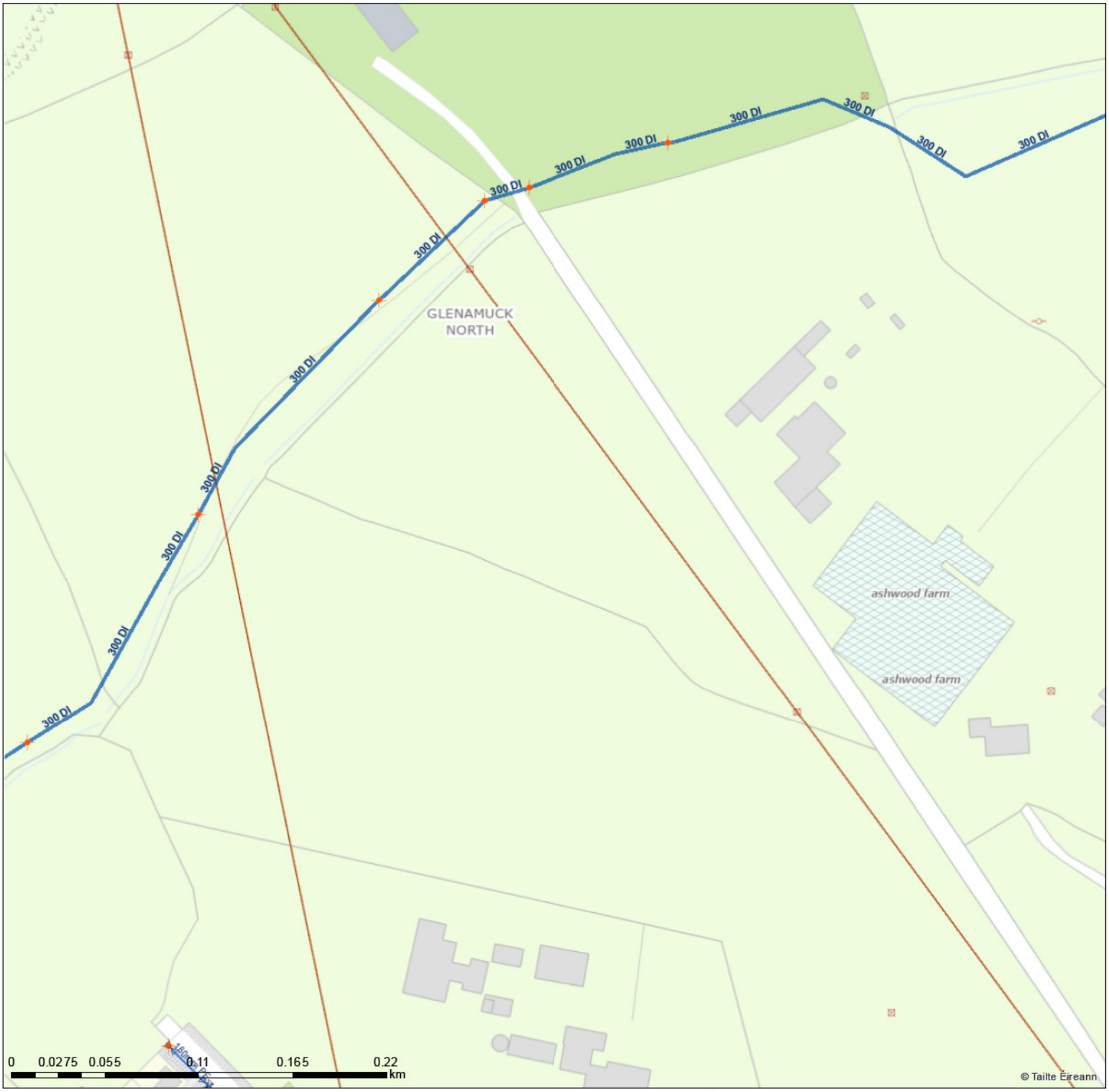
Uisce Éireann Irish Water

Print Date: 07/03/2025

Printed by:Uisce Éireann

Glenamuck Watermains



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- Bifurcation
- Hatchbox
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- Hydrobrake
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- Overflow
- Soakaway
- Standard Outlet
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Uisce Éireann Irish Water

Print Date: 07/03/2025

Printed by:Uisce Éireann

Appendix 11.13

Met Éireann Rainfall Data

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 320661, Northing: 223188,

	Interval		Years									
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	2.4,	3.4,	4.0,	4.9,	5.5,	6.0,	7.6,	9.4,	10.6,	12.3,	13.8,	15.0,	15.8,
10 mins	3.3,	4.8,	5.6,	6.8,	7.7,	8.3,	10.5,	13.0,	14.7,	17.1,	19.2,	20.9,	22.0,
15 mins	3.9,	5.6,	6.6,	8.0,	9.0,	9.8,	12.4,	15.3,	17.3,	20.1,	22.6,	24.6,	25.9,
30 mins	5.2,	7.4,	8.6,	10.4,	11.6,	12.5,	15.7,	19.3,	21.7,	25.0,	28.1,	30.4,	32.0,
1 hours	6.8,	9.6,	11.1,	13.3,	14.9,	16.0,	19.9,	24.3,	27.1,	31.2,	34.8,	37.6,	39.5,
2 hours	9.0,	12.5,	14.4,	17.2,	19.0,	20.5,	25.2,	30.5,	34.0,	38.9,	43.2,	46.5,	48.7,
3 hours	10.6,	14.6,	16.8,	19.9,	22.0,	23.7,	29.0,	34.9,	38.8,	44.2,	48.9,	52.6,	55.1,
4 hours	11.9,	16.3,	18.7,	22.1,	24.4,	26.2,	32.0,	38.4,	42.6,	48.4,	53.5,	57.5,	60.1,
6 hours	14.0,	19.1,	21.7,	25.6,	28.2,	30.2,	36.7,	43.9,	48.5,	55.0,	60.7,	65.1,	68.0,
9 hours	16.5,	22.3,	25.3,	29.7,	32.7,	34.9,	42.2,	50.2,	55.4,	62.5,	68.8,	73.7,	76.9,
12 hours	18.5,	24.9,	28.2,	33.0,	36.2,	38.7,	46.5,	55.2,	60.8,	68.5,	75.3,	80.4,	83.9,
18 hours	21.8,	29.1,	32.8,	38.3,	41.9,	44.6,	53.5,	63.1,	69.3,	77.9,	85.4,	91.1,	94.9,
24 hours	24.5,	32.4,	36.5,	42.5,	46.4,	49.4,	59.0,	69.4,	76.1,	85.3,	93.3,	99.5,	103.5,
2 days	30.5,	39.4,	44.0,	50.5,	54.7,	58.0,	68.1,	79.1,	86.0,	95.5,	103.7,	109.9,	114.0,
3 days	35.6,	45.3,	50.3,	57.3,	61.8,	65.3,	76.1,	87.6,	94.8,	104.7,	113.2,	119.5,	123.8,
4 days	40.1,	50.7,	55.9,	63.4,	68.2,	71.8,	83.2,	95.2,	102.8,	113.0,	121.8,	128.4,	132.7,
6 days	48.3,	60.2,	66.0,	74.3,	79.6,	83.6,	95.9,	108.9,	117.1,	128.0,	137.3,	144.3,	148.8,
8 days	55.8,	68.8,	75.2,	84.1,	89.8,	94.1,	107.4,	121.2,	129.9,	141.4,	151.2,	158.5,	163.3,
10 days	62.8,	76.8,	83.6,	93.2,	99.3,	103.9,	118.0,	132.6,	141.7,	153.8,	164.0,	171.7,	176.7,
12 days	69.4,	84.4,	91.7,	101.9,	108.3,	113.1,	127.9,	143.3,	152.8,	165.4,	176.1,	184.0,	189.2,
16 days	82.0,	98.8,	106.8,	118.0,	125.1,	130.4,	146.5,	163.2,	173.4,	187.0,	198.5,	207.0,	212.5,
20 days	94.0,	112.3,	121.0,	133.2,	140.8,	146.6,	163.9,	181.7,	192.6,	207.1,	219.2,	228.2,	234.1,
25 days	108.3,	128.4,	137.9,	151.2,	159.5,	165.7,	184.4,	203.5,	215.2,	230.6,	243.5,	253.0,	259.3,

NOTES:
These values are derived from a Depth Duration Frequency (DDF) Model update 2023
For details refer to:
'Mateus C., and Coonan, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eireann',
Available for download at:
http://hdl.handle.net/2262/102417

Glenamuck North -Site A Dec 2025
320661E,223188N
M5/60 = 16.0mm
r=0.276
SAAR = 994

Appendix 11.14

Uisce Éireann Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

Phillip Assaf

Durkan Glenamuck Developments Ltd.
1st Floor Maple House
Lower Kilmacud Road
Stillorgan
Dublin
A94E3F2

1 December 2025

Our Ref: CDS25008771 Pre-Connection Enquiry
Site A Glenamuck North, Glenamuck Road, Kilternan, Dublin

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 150 unit(s) at Site A Glenamuck North, Glenamuck Road, Kilternan, 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 Uisce Éireann

- Proposed connection is to the newly diverted water main as part of Kilternan/Glenamuck DLR GDRS Roads Project. The infrastructure must be of adequate capacity and integrity, connected to the Uisce Éireann network and in operation prior the connection.
- As per Uisce Éireann GIS records (please see Section B of this letter), Uisce Éireann assets are present on the site. The Developer must demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the assets during and after the works. For design submissions and queries related to diversion/build near or over, please contact UÉ Diversion Team via email address diversions@water.ie

- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

- Proposed connection is to the newly diverted wastewater sewer as part of Kilternan/Glenamuck DLR GDRS Roads Project. The infrastructure must be of adequate capacity and integrity, connected to the Uisce Éireann network and in operation prior the connection.
- As per Uisce Éireann GIS records (please see Section B of this letter), Uisce Éireann assets are present on the site. The Developer must demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the assets during and after the works. For design submissions and queries related to diversion/build near or over, please contact UÉ Diversion Team via email address diversions@water.ie

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

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

Where can you find more information?

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

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

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

Yours sincerely,

Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

What is important to know?	Why is this important?
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 Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
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?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *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 Uisce Éireann's network(s)?	• Requests for maps showing Uisce Éireann'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 ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** 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 Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie

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

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

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

Appendix 11.15

Foul and Water Demand Calculations

Foul/Wastewater Calculations

New Network - DOMESTIC Wastewater Flows - CATCHMENT A						
Usage	**Quantity**	**Occupancy (h)**	**Population (P)**	**Consumption (G) (l/h/day)**	**Loading (PxG)(l/day)**	
Residential	46 Units	2.7No./Unit	124	150	18,630	
				Total =	**18,630 l/day**	
				Flowrate per day (l/s)		**0.22l/s**
				Growth Rate	1	1
				Infiltration (I)	10%	0.02
				Dry Weather Flow	**PG + I**	**0.24 l/s**
				Peaking Factor (Pf_{Dom})	6	
				Design Foul Flow (l/s)	**Pf_{Dom} x PG**	**1.45 l/s**
				Misconnection Allowance (SW)	1.5%	0.01l/s
				Design Flow (l/s)		**1.45 l/s**

Based on Irish Water Code of Practice Wastewater Infrastructure

New Network - DOMESTIC Wastewater Flows - CATCHMENT B						
Usage	**Quantity**	**Occupancy (h)**	**Population (P)**	**Consumption (G) (l/h/day)**	**Loading (PxG)(l/day)**	
Residential	79 Units	2.7No./Unit	213	150	31,950	
				Total =	**31,950 l/day**	
				Flowrate per day (l/s)		**0.37l/s**
				Growth Rate	1	1
				Infiltration (I)	10%	0.04
				Dry Weather Flow	**PG + I**	**0.41 l/s**
				Peaking Factor (Pf_{Dom})	6	
				Design Foul Flow (l/s)	**Pf_{Dom} x PG**	**2.46 l/s**
				Misconnection Allowance (SW)	1.5%	0.01l/s
				Design Flow (l/s)		**2.47 l/s**

Based on Irish Water Code of Practice Wastewater Infrastructure

Water Demand Calculations

New Network - DOMESTIC Water Demand								
Usage	**Quantity**	**Occupancy**	**Population**	**Consumption (l//h/day)**	**Ave. Daily Domestic Demand (l/day)**	**Ave. Daily Domestic Demand (l/s)**	**Ave. Day/Peak Week (l/s)**	**Peak Hour Water Demand (l/s)**
Resi'	135 Units	2.7 No./Unit	365	150	54,750	0.63	0.79	**3.95 l/s**
Peak Hour Water Demand (Domestic)								**3.95 /s**

Based on Irish Water Code of Practice for Water Infrastructure

Appendix 11.16

Hydrobrake Calculations

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.850	9.400
Flush-Flo™	0.269	9.356
Kick-Flo®	0.592	7.934
Mean Flow		7.974

This Hydro-Brake® Optimum includes:

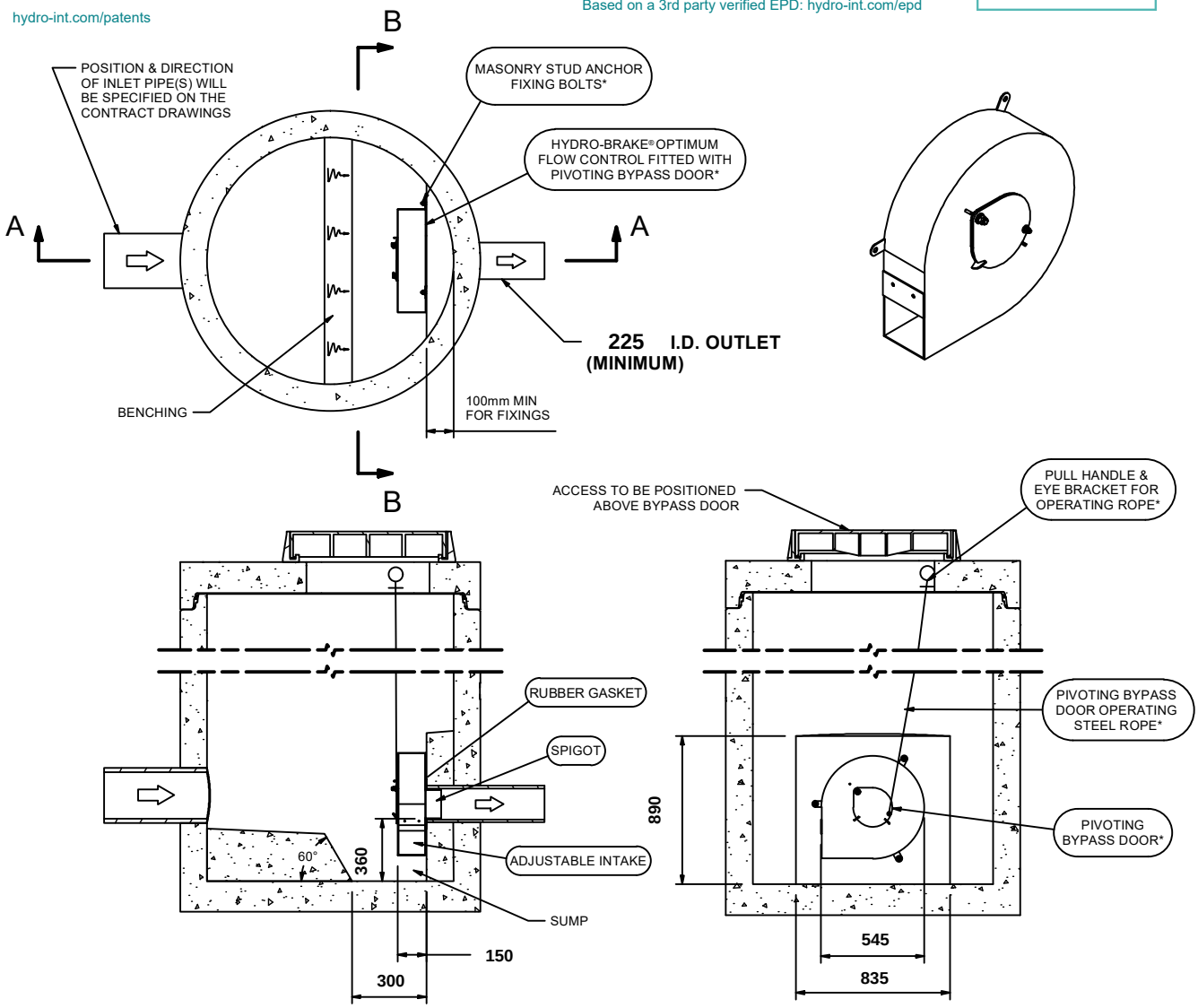
- •All in 3 mm Grade 304L stainless steel
- • Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- • Media blasted for corrosion resistance
- • Variable flow rate post installation via adjustable inlet (if necessary)
- • Indicative Weight: 20 kg
- • Product Carbon Footprint: 76.1 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT:

LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0144-9400-0850-9400 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International A CRH COMPANY

DATE	03/12/2025 19:11
SITE	Glenamuck Nth A - Tank 1
DESIGNER	Roger Mullarkey
REF	2411 / 25_21_1570

SHE-0144-9400-0850-9400

Hydro-Brake® Optimum

info@rmullarkey.ie

Technical Specification						
	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	0.850	9.400	0.850	8.040	0.850	10.612
Flush-Flo™	0.269	9.356	0.466	7.179	0.232	11.373
Kick-Flo®	0.592	7.934	0.593	6.787	0.592	8.968
Mean Flow		7.974		6.426		9.235

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

wrc approved™
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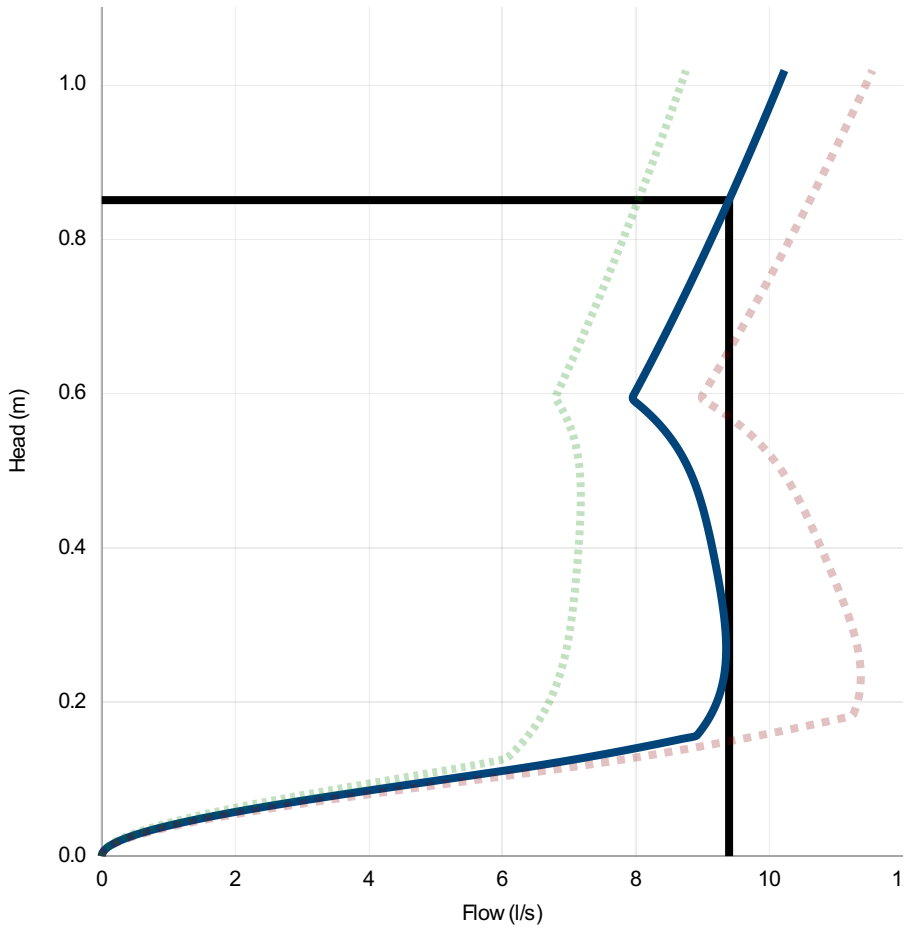
Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.029	0.568
0.059	2.090
0.088	4.228
0.117	6.526
0.147	8.395
0.176	9.079
0.205	9.241
0.234	9.326
0.264	9.355
0.293	9.344
0.322	9.307
0.352	9.253
0.381	9.191
0.410	9.121
0.440	9.041
0.469	8.943
0.498	8.814
0.528	8.634
0.557	8.381
0.586	8.029
0.616	8.081
0.645	8.258
0.674	8.431
0.703	8.601
0.733	8.767
0.762	8.929
0.791	9.089
0.821	9.245
0.850	9.398

DESIGN ADVICE

The head/flow characteristics of this SHE-0144-9400-0850-9400 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International
A CRH COMPANY

DATE	03/12/2025 19:11
Site	Glenamuck Nth A - Tank 1
DESIGNER	Roger Mullarkey
Ref	2411 / 25_21_1570

SHE-0144-9400-0850-9400

Hydro-Brake® Optimum

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.230	9.700
Flush-Flo™	0.365	9.700
Kick-Flo®	0.793	7.896
Mean Flow		8.414

This Hydro-Brake® Optimum includes:

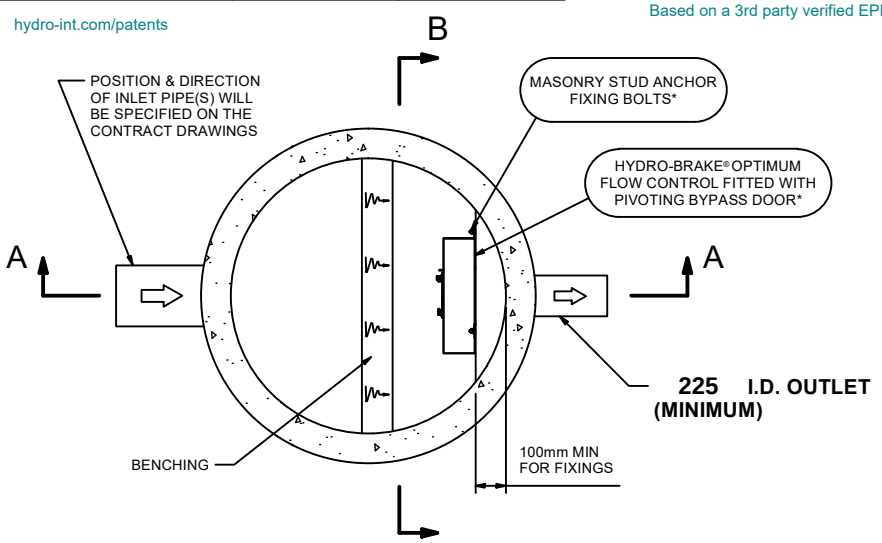
- •All in 3 mm Grade 304L stainless steel
- • Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- • Media blasted for corrosion resistance
- • Variable flow rate post installation via adjustable inlet (if necessary)
- • Indicative Weight: 25 kg
- • Product Carbon Footprint: 101.76 kgCO2e

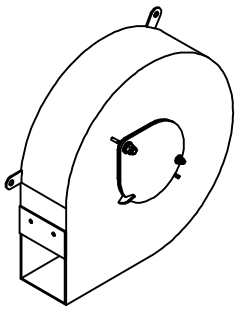
Based on a 3rd party verified EPD: hydro-int.com/epd

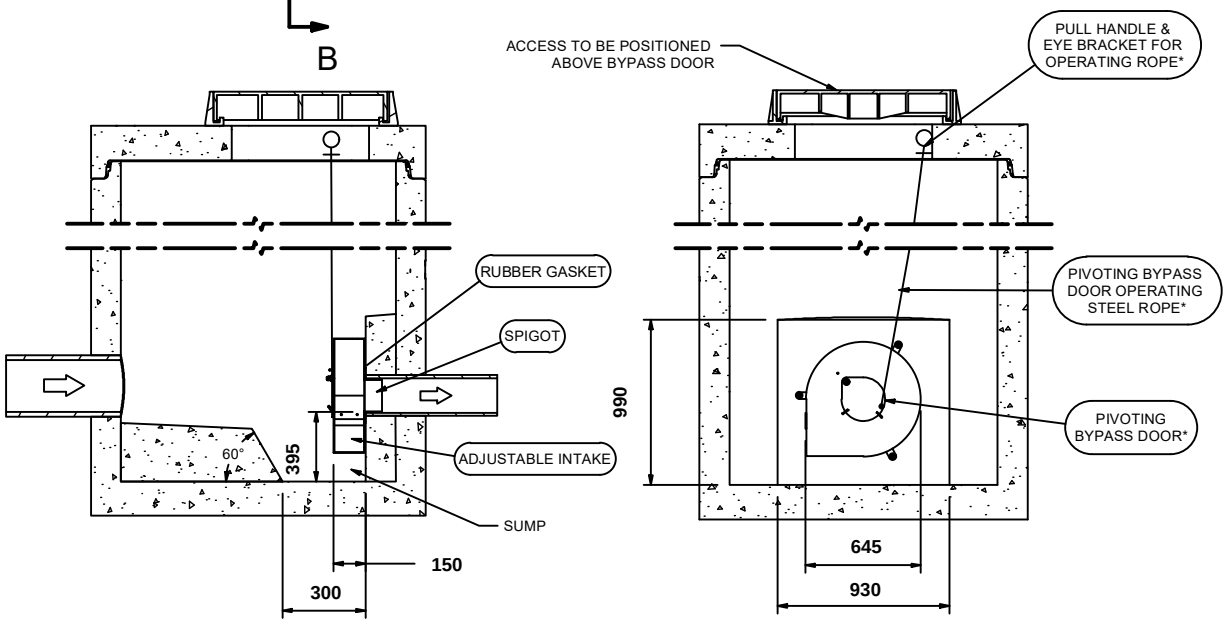
BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents







SECTION A-A

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IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
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THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0140-9700-1230-9700 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International A CRH COMPANY

DATE	03/12/2025 19:15
SITE	Glenamuck Nth A - Tank 2
DESIGNER	Roger Mullarkey
REF	2411

SHE-0140-9700-1230-9700

Hydro-Brake® Optimum

info@rmullarkey.ie

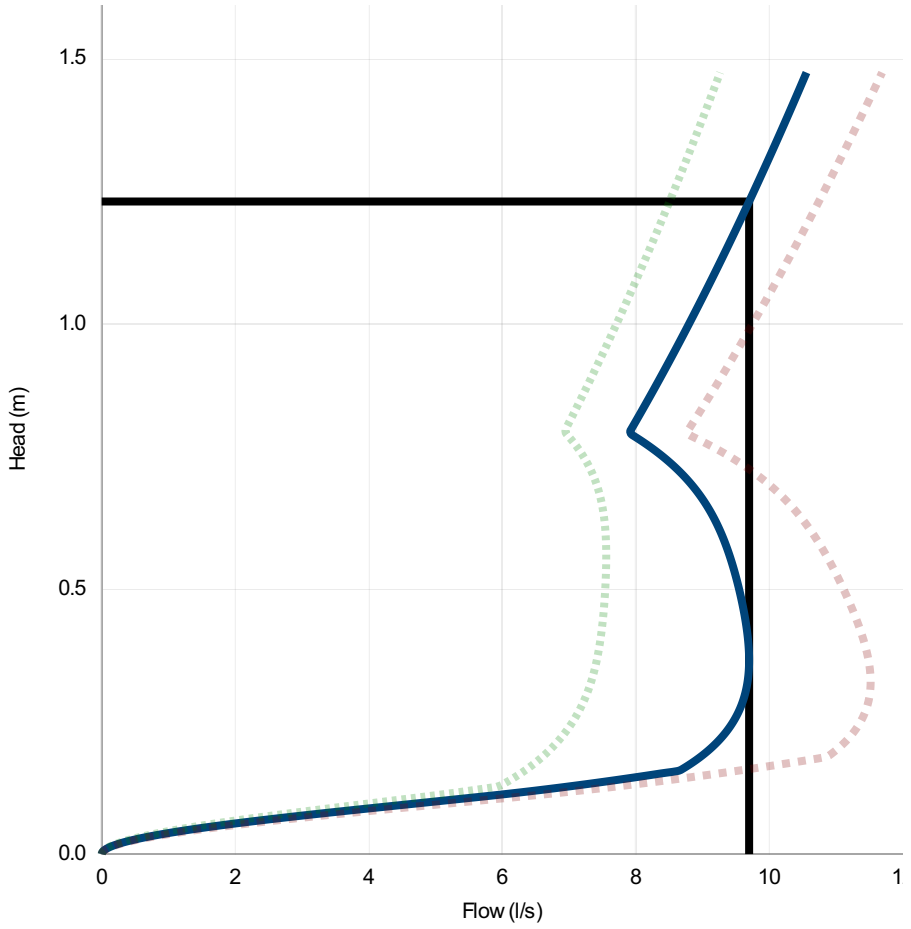
Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	**Head (m)**	**Flow (l/s)**	**Head (m)**	**Flow (l/s)**	**Head (m)**	**Flow (l/s)**
Primary Design	1.230	9.700	1.230	8.508	1.230	10.745
Flush-Flo™	0.365	9.700	0.562	7.559	0.324	11.520
Kick-Flo®	0.793	7.896	0.795	6.926	0.792	8.749
Mean Flow		8.414		6.933		9.595

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

wrc approved™
PT/503/0422
Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.042	1.131
0.085	3.903
0.127	6.982
0.170	8.817
0.212	9.230
0.254	9.485
0.297	9.628
0.339	9.691
0.382	9.697
0.424	9.665
0.467	9.607
0.509	9.531
0.551	9.436
0.594	9.317
0.636	9.161
0.679	8.949
0.721	8.658
0.763	8.261
0.806	7.957
0.848	8.150
0.891	8.338
0.933	8.521
0.976	8.700
1.018	8.876
1.060	9.047
1.103	9.215
1.145	9.380
1.188	9.541
1.230	9.700

DESIGN ADVICE

The head/flow characteristics of this SHE-0140-9700-1230-9700 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International
A CRH COMPANY

DATE	03/12/2025 19:15
Site	Glenamuck Nth A - Tank 2
DESIGNER	Roger Mullarkey
Ref	2411

SHE-0140-9700-1230-9700

Hydro-Brake® Optimum

Appendix 11.17

SWA Report - to be submitted with Stage3

PUNCH
consulting engineers

Residential Development at "Southern Site" Glenamuck North, Kilternan, Dublin 18

Stage 1 Stormwater Audit

254214-PUNCH-XX-XX-RP-C-0001

December 2025

Document Control

Document Number: **254214-PUNCH-XX-XX-RP-C-0001**

Status	Rev	Description	Date	Prepared	Checked	Approved
S3	P01	DRAFT Issue	02/12/2024	E.McMillan	D. Trkulja	N Cronin
S3	P02	Final Issue	05/12/2024	E.McMillan	D. Trkulja	N Cronin

Report by: _____ Date: 5th December 2025

Emma McMillan

Design Engineer, EIT, BSCE

PUNCH Consulting Engineers

Checked by: _____ Date: 5th December 2025

Drazen Trkulja

Project Engineer, BEng (Hons) MIEI

PUNCH Consulting Engineers

Checked by: _____ Date: 5th December 2025

Niamh Cronin

Director, BE PGradDip CEng FIEI

PUNCH Consulting Engineers

Table of Contents

1 Introduction

1.1 Purpose of Report

This report presents a Stage 1 Stormwater Audit carried out for a proposed LRD (Site A) including 132 no. residential units G3 and associated infrastructure at Glenamuck North, Kilternan, Co. Dublin.

Roger Mullarkey & Associates were appointed to provide Engineering Services, which includes design of the surface water network and associated sustainable drainage systems (SuDS) proposed.

PUNCH Consulting Engineers have been appointed by Durkan Glenamuck Developments Ltd to carry out an independent Stage 1 Stormwater Audit in line with Dún Laoghaire Rathdown County Council requirements.

1.2 Site Details

The site is located at Glenamuck North, Kilternan, Dublin 18, within lands zoned under Zoning Objective A in the Dún Laoghaire-Rathdown County Development Plan 2022–2028. The planning application area comprises approximately 3.3 hectares, with a total drained surface water area of 2.62 hectares. The lands are currently greenfield and situated north of Glenamuck Road South, adjoining the under-construction Glenamuck District Distributor Road (GDDR) and Glenamuck Link Distributor Road (GLDR).

The proposed development consists of a Large Residential Development (LRD) comprising 135 residential units together with associated internal roads, landscaped open spaces, and supporting infrastructure. The drainage design incorporates a fully separate foul and surface water system, with connections facilitated by spur infrastructure provided under the GDRS project. The surface water network is divided into two main catchments (1.34 ha and 1.28 ha) discharging via controlled outfalls. A comprehensive Sustainable Drainage Systems (SuDS) strategy has been adopted, including bio-retention areas, roadside swales, tree pits, permeable paving, filter drains, rainwater butts, and intensive green roofs, supported by attenuation storage in two below-ground voided arch systems providing a combined capacity of 1,024 m^3. The development also includes green roof systems achieving over 70% coverage on all flat roof areas, hard and soft landscaping, and all ancillary works including attenuation, lighting, and boundary treatments.

1.3 Report Details

The audit was carried out by Emma McMillan, checked by Drazen Trkulja, and approved by Niamh Cronin between the dates of December 1st and December 5th 2025.

The Stage 1 Audit has been carried out in accordance with the Dún Laoghaire-Rathdown County Council (DLRCC) procedures outlined in the Dun Laoghaire Rathdown Development Plan 2022-2028, Appendix 7 "Stormwater Management Policy - Including Stormwater Audit Procedure". The auditor has examined only those issues within the design relating to surface water drainage and Sustainable Drainage Systems (SuDS) implications of the scheme and has therefore not examined or verified the compliance of the design to any other criteria. Design responsibility for the stormwater drainage and SuDS remains solely with the Design Engineer.

Appendix A contains the copies of current drawings and documents examined by the auditor. Appendix B contains the Stage 1 Surface Water Audit Feedback form.

All findings outlined in Section 2 of this report are considered by the auditor to require action to improve the stormwater credentials of the scheme.

1.4 Drawings & Documents Reviewed

Initial documents received 19-11-2025:

1. Stage 2 Opinion Response
2. ~~RMA 2411 Glenamuck North LRD Site A DRAINAGE INFRASTRUCTURE Report~~
3. ~~RMA 2411 SSFRA Glenamuck North Site A LRD Stage 3~~
4. ~~RMA 2411-100 Road and Block Levels GA LRD Stage 3~~
5. ~~RMA 2411-101 SW Drainage GA LRD Stage 3~~
6. ~~RMA 2411-102 Foul Drainage GA LRD Stage 3~~
7. ~~RMA 2411-103 Watermain GA LRD Stage 3~~
8. ~~RMA 2411-104 Exceedance Flow Route LRD Stage 3~~
9. ~~RMA 2411-105 SuDS Details Stage 3~~
10. ~~RMA 2411-106 Catchment LRD Stage 3~~
11. ~~RMA 2411-107 Hydrant Circles LRD Stage 3~~
12. ~~RMA 2411-108 Attenuation Storage LRD Stage 3~~
13. ~~RMA 2411-109 SW Longitudinal Sections Sheet 1 Stage 3~~
14. ~~RMA 2411-110 SW Longitudinal Sections Sheet 2 Stage 3~~
15. ~~RMA 2411-115 Manhole Details Stage 3~~
16. ~~RMA 2411-116 Road Details - Sheet 1 Stage 3~~
17. ~~RMA 2411-117 Road Details - Sheet 2 Stage 3~~

Updated documents received 4-12-2025:

1. ~~RMA 2411 Glenamuck North LRD Site A DRAINAGE INFRASTRUCTURE Report~~
2. RMA 2411 SSFRA Glenamuck North Site A LRD Stage 3
3. RMA 2411-100 Road and Block Levels GA LRD Stage 3
4. RMA 2411-101 SW Drainage GA LRD Stage 3
5. RMA 2411-102 Foul Drainage GA LRD Stage 3
6. RMA 2411-103 Watermain GA LRD Stage 3
7. RMA 2411-104 Exceedance Flow Route LRD Stage 3
8. RMA 2411-105 SuDS Details Stage 3
9. RMA 2411-106 Catchment LRD Stage 3
10. RMA 2411-107 Hydrant Circles LRD Stage 3
11. RMA 2411-108 Attenuation Storage LRD Stage 3
12. RMA 2411-109 SW Longitudinal Sections Sheet 1 Stage 3
13. RMA 2411-110 SW Longitudinal Sections Sheet 2 Stage 3
14. RMA 2411-111 SW Longitudinal Sections Sheet 3 Stage 3
15. RMA 2411-112 Foul Longitudinal Sections Sheet 1 Stage 3
16. RMA 2411-113 Foul Longitudinal Sections Sheet 2 Stage 3
17. RMA 2411-115 Manhole Details Stage 3
18. RMA 2411-116 Road Details - Sheet 1 Stage 3
19. RMA 2411-117 Road Details - Sheet 2 Stage 3
20. Surface Cover Type Area Table

Updated documents received 5-12-2025:

1. RMA 2411 Glenamuck North LRD Site A DRAINAGE INFRASTRUCTURE Report

Note: Strikethrough text indicates documents that were superseded during the audit. These superseded documents are not included in the final audit report.

2 Stage 1 Audit Findings

2.1 General Requirements as per DLRCC County Development Plan 2022-2028

Table 2-1 below outlines the result of a review of the scheme designer's proposals against the general requirements outlined in the DLRCC County Development Plan 2022-2028, Appendix 7, section 7.1.1.

Table 2-1 General Requirements for all developments greater than a single house

	Requirements as per DLRCC 2022-2028 Development Plan	Addressed by Scheme Designer?
2.1.1	**Climate Change** All developments must apply a minimum factor of 1.2 to their drainage design and attenuation volumes to accommodate climate change.	Y
2.1.2	**Urban Creep** All developments must apply a factor of 1.1 to their drainage design and attenuation volumes to accommodate urban creep.	Highlighted as part of this audit
2.1.3	**Blockage Analysis** Scheme Designers must submit details of the proposed surface water drainage system in the event of blockage or partial blockage of the system, commenting on any surcharging or flood risk that may be identified, particularly in relation to freeboard used in the simulation analysis. The proposal must include a drawing confirming that safe overland flow routes do not negatively impact properties both within and without the site. The overland flow route plan should identify drop kerbs or ramps required for channelling the flow and address low point areas in the site and detail how properties, both within the development and on adjacent lands, will be protected in the event of excessive overland flows.	Highlighted as part of this audit
2.1.4	**Utility Clash Check** The Scheme Designer must undertake a utilities clash check to ensure all utilities' vertical and horizontal separation distances can be provided throughout the scheme. The Scheme Designer should demonstrate this with cross-sections at critical locations such as junctions, site thresholds and connection points to public utilities. Minimum separation distances must be in accordance with applicable Codes of Practice.	Highlighted as part of this audit
2.1.5	**Private Drains** Where an applicant's land is crossed by a private drain, the applicant is responsible for acquiring any rights or permissions necessary to connect to, or to increase the discharge into, or to build over, or divert, or to ensure the adequate capacity is not exceeded, or otherwise alter any private drains not in their exclusive ownership or control, and for ensuring their adequacy.	Highlighted as part of this audit
2.1.6	**Pumping of Surface Water**	N/A

2.1.7	**Sustainable Drainage Systems (SuDS):** The proposal must demonstrate that they meet the requirements of the Greater Dublin Strategic Drainage Study (GDSDS) 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. The Scheme Designer should provide cross-sections and long-sections, and commentary that demonstrates all proposed SuDS measures have been designed in accordance with the relevant industry standards and the recommendations of The SuDS Manual (CIRIA C753)	Highlighted as part of this audit
2.1.8	**Infiltration:** The Scheme Designer should submit Site Investigation Report and results, including infiltration tests, and a plan showing the trial pits/soakaway test locations across the site. The report should address instances where groundwater, if any, was encountered during testing and its impact.	Y
2.1.9	**Hardstanding/Parking Areas:** All proposed parking and hardstanding areas should maximise local infiltration before discharge to the surface water drainage system, via a specifically designed permeable paving/porous asphalt system, in accordance with the requirements of Section 12.4.8 of the County Development Plan 2022-2028.	Highlighted as part of this audit
2.1.10	**Basement:** If basement carparking is provided, then all incidental run-off from the basement should be shown to drain to the foul system and not the surface water system	N/A
2.1.11	**Run-off Factors:** Where Scheme Designers propose to use reduced run-off factors (or reduced impermeable contributing areas) for areas of their site that drain to SuDS measures these factors must be agreed with Municipal Services, preferable during the pre-planning process. It should be noted that standard surface water simulation software uses default Cv values of 0.84 for Winter and 0.75 for Summer. If the Scheme Designer proposes to use their own reduced run-off rates, then the default Cv values should be amended to a value of 1.0. Maintaining the default Cv values in conjunction with the Scheme Designers proposed rates reduces the run-off in simulations of rainfall events, giving inaccurate simulation results which may lead to under sizing of the drainage system and attenuation storage required.	Highlighted as part of this audit
2.1.12	**Hydrological Parameters** Scheme Designers must use site specific or local data in their Qbar, attenuation volume and surface water system design such as: • SAAR • Soil Type • Rainfall Return Period Table (available from MET Eireann) • Rainfall intensity • Other hydrological parameters	Highlighted as part of this audit
2.1.13	**Discharge Rate:** Surface Water discharge from a development must be restricted to 2 l/s/ha or the calculated Qbar, whichever is greater. The Qbar should be calculated using the net area drained and not the gross area of the site (i.e. red line boundary).	Highlighted as part of this audit

	This discharge rate should be marked on the drainage drawing on the manhole in which the flow restricting device if located. The manhole in which the flow restricting device is located should not have a bypass pipe and, a penstock and silt trap should be provided. Flow restricting devices with an orifice of less than 50mm in diameter should be avoided. Where this is not possible then the Scheme Designer must submit a robust maintenance regime to ensure blockages are avoided, to the satisfaction of dlr. Scheme Designers are recommended to use the HR Wallingford UK SuDS Greenfield runoff rate estimation tool to estimate Qbar for their site: https://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation	
2.1.14	**Attenuation:** If an attenuation system is proposed it should, where possible, not be located under the internal roads but in/under open space or parking areas. Attenuation systems must be inline. The preference is for attenuation systems that allow for infiltration and/or treatment within the site. The Scheme Designer should note that certain landscaping items, such as trees, may not be compatible with attenuation systems. The Scheme Designer must provide 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 system should be provided. Details of the proposed inlet and outlet manholes and arrangements to facilitate draw down and maintenance should also be provided. Scheme Designers are recommended to use the HR Wallingford UK SuDS Surface water storage volume estimation tool to estimate the attenuation storage required for their site: https://www.uksuds.com/drainage-calculation-tools/surface-water-storage.	Y
2.1.15	**Green Roof:** The proposal must meet the requirements of Appendix 7.2: Green Roof Policy of the County Development Plan 2022-2028.	Highlighted as part of this audit
2.1.16	**Interception and Treatment:** The Scheme Designer must demonstrate that required interception and/or treatment of surface water run-off is achieved in accordance with GDSDS policy. To be in compliance with GDSDS Volume 2 Section 6.3.3 Table 6.3 Criterion 1, interception of the first 5-10mm is required. If interception of first 5-10mm can't be achieved, then treatment of first 15mm is required.	Highlighted as part of this audit
2.1.17	**Maintenance:** Scheme Designers must submit a post-construction maintenance specification and schedule for the drainage system, including SuDS measures and attenuation system to DLRCC for approval. This maintenance specification and schedule must be included in the Safety File.	Highlighted as part of this audit
2.1.18	**New Connections:** Prior to submission of the planning application, the Scheme Designer must obtain the sewer network records from DLRCC and assess if a new connection to the public sewer is technically feasible.	Highlighted as part of this audit

2.2 DLRCC 2022 Development Plan – Stormwater Audit Procedure Table

Table 2-2 Stormwater Audit Procedure Table - Completed by Scheme Designer

Surface Cover Type	Area (m^2)
Wetland or open water (semi-natural; not chlorinated) maintained or established on site.	
Semi-natural vegetation (e.g. hedgerows, trees, woodland, species-rich grassland) maintained or established on site.	2,579
Reuse of existing soils and seed source to develop vegetation cover	
Standard trees planted in connected tree pits with a minimum soil volume equivalent to at least two thirds of the projected canopy area of the mature tree.	3,321
Standard trees planted in pits with soil volumes less than two thirds of the projected canopy area of the mature tree.	9 No.
Intensive green roof or vegetation over structure. Substrate minimum settled depth of 150mm.	1,007
Non intensive Brown Roof (Biodiversity Roof). Substrate minimum settled depth of 150mm. Design will be site specific and developed by a suitably qualified ecologist.	
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket)	
Extensive green roof of sedum mat or other lightweight systems	
Green wall -modular system or climbers rooted in soil.	
Rain gardens and other vegetated sustainable drainage elements.	712
Flower-rich perennial planting.	3,943
Hedges (line of mature shrubs one or two shrubs wide).	662
Hedgerows or double hedgerow of native species (may have an associated ditch and bank)	
Groundcover planting.	56
Amenity grassland entire area or sections managed for lesser mowing frequencies for pollinators (e.g. six week meadow)	2,859
Amenity grassland (species-poor, regularly mown lawn).	4,171
Water features (chlorinated) or unplanted detention basins.	
Permeable paving.	2,505
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone)	18,890
Blue roof	

2.3 Urban Creep

Problem: Report states that a 10% factor for urban creep has applied in the MicroDrainage analysis; however, this is not clearly reflected in the subsequent calculations within Appendix 11.1. Urban creep of 10% is required for attenuation volume calculations as per Section 7.1.1 of the DLRCC Development Plan 2022–2028. The report states an increase in the drained paved area to the rear of all houses by more than 17% of the roof/path area draining to the back of each house to accommodate the overall 10%.

Recommendation: The designer to confirm that the 17% expansion of back gardens equates to minimum 10% of all impervious surfaces as per DLRCC Development Plan.

2.4 Blockage Analysis

Problem: The proposal does not currently confirm that overland flow routes currently shown will not negatively impact properties both within and outside the site.

Recommendation: The designer should confirm that the overland flow routes do not negatively impact properties within and outside the proposed development.

2.5 Utility Clash Checks

Problem: The report states that a utility clash test has been undertaken and refers to the following drawings for further details: RMA 2411-109, RMA 2411-110, RMA 2411-111, RMA 2411-112, and RMA 2411-116. However, the SWA team has not received drawings RMA 2411-111 and RMA 2411-112 for review.

The typical sections show ideal separation between the watermain and other utilities, as well as between surface water and foul systems. Drawings RMA 2411-109 and RMA 2411-110 illustrate the typical stormwater section, but these do not confirm a comprehensive utility clash check among all proposed and existing utilities on the site.

Additionally, drawing RMA 2411-101 (SW Drainage GA LRD Stage 3) shows some stormwater pipes in close proximity to each other, and the required separation distance should be confirmed.

Recommendation: Scheme designer to forward all relevant cross and long sectional drawings for review, and confirm a utility clash check has been carried out and adequate separation distances are achieved between the surface water network and SuDS features, and all other utilities, all in accordance with relevant Uisce Éireann Code of Practice and Council requirements.

2.6 Hydrogeological Parameters Item No. 1

Problem: The soil on site, currently classified as Class 3 for calculation purposes, may fall under Class 4 based on FSI Teagasc Soil Data. Additionally, the Winter Rain Acceptance Potential (WRAP) Map suggests the soil could be Class 5, while the Flood Studies Report could be interpreted as Type 4, and the site investigation encountered firm to stiff sandy gravelly clay with very limited secondary granular material. All soakaway tests indicated to have drained too slowly to allow calculation of an infiltration rate and were reported as unsuitable for soakaways. Above findings appear to be consistent with Soil Class 4.

Recommendation: The scheme designer to provide justification for the use of Class 3 in preference to the mapped and observed Soil Class 4.

2.7 Hydrogeological Parameters Item No. 2

Problem: The submitted calculations adopt an M5-60 value of 17.7 mm and an r value of 0.272. An independent check using the latest Met Éireann rainfall data (based on DDF Model update 2023) for the site-specific coordinates returned M5-60 = 16.0 mm and r = 0.276.

Recommendation: The scheme designer to review the rainfall parameters against the current Met Éireann data for the exact site coordinates, update the M5-60 and r values if required, and revise all affected runoff calculations and references in the Engineering Infrastructure Report and Stormwater Impact Assessment accordingly.

2.8 Green Roofs

Problem: It is unclear what type of green roof is proposed, as there are inconsistencies within the body of the engineering infrastructure and stormwater impact assessment document, appendix 11.19, and the drawings. If the proposed Green roof has over 70% coverage and is classified as extensive, the run off coefficient of 83% would be require modification.

The following required item for compliance with Section 4.0 of DLR's Green Roof Policy 2022 have not been submitted for review:

1. Further details on access for maintenance – which buildings would have access via. Stairs and which would require a cherry picker etc.

Recommendation: Scheme designer to clarify and show exact type, extent of green roof area and overall roof area being proposed to ensure the green roof coverage meets the requirements of Appendix 7.2: Green Roof Policy of the County Development Plan 2022-2028. Additionally:

i) Consider providing the necessary information to satisfy the requirements of DLR's Green Roof Policy 2022, as outlined above.
ii) Designer to revise the reports and drawings for consistency on green roof type, including interception calculations, run-off coefficients, among other.

2.9 Interception

Problem: The interception calculations present total provided volumes that substantially exceed the site requirement, derived by summing the individual contributions from various SuDS components. It is not clear whether the contributory impermeable areas assigned to each component (particularly green roofs, swales, bioretention areas, filter drains and permeable pavements) comply with the maximum permissible ratios set out in Table 24.6 of CIRIA C753 (SuDS Manual). Green roofs, for example, can only provide interception for the roof area they cover. For swales, bioretention areas and filter drains, Table

24.6 of CIRIA C753 limits the contributory impermeable area that can be treated for interception to a maximum of 5 times the SuDS feature area (or 1 times the area for permeable pavements).

Recommendation: Please provide clarification, demonstrating that the proposed interception provision complies with the contributory-area limits in Table 24.6 of CIRIA C753. Revised calculations should be submitted if necessary.

2.10 Maintenance Schedule

Problem: Scheme Designers must submit a post-construction maintenance specification and schedule for the drainage system, including SuDS measures and attenuation system to DLRCC for approval. This maintenance specification and schedule must be included in the Safety File.

Recommendation: Scheme designer to consider including a maintenance schedule for the drainage system, including SuDS measures, for review.

2.11 Water Table

Problem: The designer should ensure the formation level of the permeable paving is 1000mm above the highest ground water level. It is stated that the groundwater strikes were noted on the exploratory hole logs, but the samples did not remain open for sufficiently long periods of time to establish the regime and groundwater is expected to vary

Recommendation: Consider further site investigation to ensure the ground water level is not less than 1000mm below the formation level of the permeable carpark build-up.

2.12 CBR Values – Permeable Paving

Problem: Californian bearing ration (CBR) varies inversely with moisture content (as the latter increases the CBR value decreases). The equilibrium CBR value is the long-term value that occurs once the pavement is constructed, and the moisture content of the subgrade soil comes in to equilibrium with the suction forces within the subgrade air spaces. Carrying out CBR tests will allow for appropriate permeable paving design including capping material if and where required. This capping is typically quite impermeable when compacted.

Recommendation: Consider undertaking CBR tests on site to allow for appropriate permeable paving design. These CBR tests are to be carried out in accordance with BS 1377-4:1990.

2.13 Taking in Charge

Problem: It is not clear which SuDS measures are proposed to be private and which SuDS devices are proposed to be taken in charge by Dún Laoghaire Rathdown County Council.

Recommendation: Please confirm whether all proposed SuDS within the redline boundary will remain private or specify which SuDS devices are proposed to be adopted by Dún Laoghaire-Rathdown County Council. A Taking in Charge Drawing is referenced within the report but was not included in the documents provided for the SWA.

2.14 Land Drain and Storm Water Layout

Problem: On drawing RMA 2411-101 SW Drainage GA LRD Stage 3 it shows the New Land Drain and the storm water pipe running in parallel to each other around SMh07 and LDMh05, with the land drain discharging into the Glenamuck Stream

Recommendation: Scheme designer to confirm that the diversion and direct discharge of the land drain to the Glenamuck Stream has been agreed with DLRCC Water Services Department as currently shown on drawing RMA 2411-101.

2.15 Gradients and ground modelling

Problem: As per Chapter 29.2, Section E of The SuDS Manual, successfully integrating SuDS measures including swales, infiltration trenches and infiltration blankets require areas of ground modelling to ensure proposed SuDS measures are located in appropriate areas to ensure adequate drainage of the site.

Recommendation: It is recommended that the integration of each SuDS component be considered, and its contouring adjusted to allow the levels to flow towards to SuDS measure, in a naturalistic manner that is visually attractive, and accords with the local surrounding landscape. Ensuring that contouring of swales does not conflict with proposed or existing utilities

2.16 Drainage Layout

Problem: On drawing RMA 2411-101 SW Drainage GA LRD Stage 3 pipe run between SMh 15 and SMh16 appears to be connecting to proposed surface water manhole "SMh 16" at an acute angle.

Recommendation: Scheme designer to consider all pipe connections to be at a minimum of 90 degrees or greater.

2.17 Bypass Interceptors

Problem: Petrol Interceptor has not been included in the design of the stormwater drainage system.

Recommendation: Designer to provide a justification for not including petrol interceptors prior to discharge to the watercourse.

2.18 Minimum Velocity

Problem: Table 6.4 of the GDSDS requires a minimum velocity (pipe full) of 1.0m/s. It is unclear from the information provided if this minimum velocity is achieved.

Recommendation: Designer to confirm if minimum velocity is achieved.

2.19 Storm Water Connection

Problem: It is not evident if there are existing SW pipelines that could be utilised as connection points for the both of the outfalls, rather than discharging to the stream.

Recommendation: The designer to confirm discussions were had with DLRCC Water Services department regards connection options.

STORMWATER AUDIT FEEDBACK FORM

PUNCH Consulting Engineers

Scheme Title: **Residential Development at "Southern Site", Glenamuck North, Kilternan, Dublin 18**

Audit Stage: 1 **Audit Completed:** 05/12/2025 **Project Ref:** 254214

Paragraph No. in Audit Report	Issue Accepted (Yes/No)	Recommended Measure Accepted (Yes/No)	Alternative Measures (described) [or reason problem not accepted]	Alternative Measures Accepted by Auditors (Yes/No)
2.3	Y	Y	An additional 10% storage volume has been facilitated in the 2No.attenuation storage areas.	
2.4	Y	N	The overland flow routes are indicated on dwg.No.2411/104 along with dropped kerb locations and typical detail. It is noted that blockage analysis carried out does not indicate above ground flooding. All flood routing follows the road gradients contained within the kerbing and flows to the low points indicated on the site.	Y
2.5	Y	Y	Updated and additional longitudinal sections have been provided on Dwg.'s 2411/109, 110, 111, 112 & 113. Separation distances between the main S/W & Foul drainage pipes have been achieved and are >c.1.25m. Clash checks have been carried out and the designer is satisfied the current proposals meet the required standards and are sufficient to enable the development proceed to planning stage. In advance of construction, at compliance stage and connection application stage to Uisce Éireann, further reviews will take place and any adjustments necessary will be facilitated.	
2.6	Y	Y	The choice of SOIL Type has been reviewed and determined by the designer that Type 4 is a more apprropriate choice for this site based on the WRAP Map (Class 5), the FSR (Type 4) and the SI results and the Qbar and design calculations have been adjusted accordingly.	
2.7	Y	Y	The Met Eireann data has been updated to the latest available and now shows the M5-60 = 16mm and r = 0.276. Design calculations have been adjusted accordingly.	

Paragraph No. in Audit Report	Issue Accepted (Yes/No)	Recommended Measure Accepted (Yes/No)	Alternative Measures (described) [or reason problem not accepted]	Alternative Measures Accepted by Auditors (Yes/No)
2.8	Y	Y	The green roof are specified as Intensive. The runoff coefficient is clarified as 0.83 and the report/calculations adjusted accordingly. Paragraphs 7.1.9-7.1.11 of the main report address the DLRCC policy and access requirements identified as GR1-GR5 in the CDP Appendix 7.2.	
2.9	Y	Y	Limited contributary areas cannot always be achieved in higher density residential projects but are substantially achieved in this application. Interception of a typical road to swale, house roof to permeable paving and house roof to filter drain pictorial narrative has been added to drawing No.2411/106. Where there are proportional area limitations exceeded, on a catchment wide basis, in the designers opinion there is more than sufficient interception provided at the downstream lowest elements of the drainage network below the 2No.storage systems.	
2.10	Y	Y	A considered maintenance schedule of elements is included in paragraph 7.1.14 of the main report. Subject to a successful planning decision and at compliance stage in advance of construction, a frequency of maintenance will be agreed with the Local Authority.	
2.11	Y	Y	Further ground investigation works will be carried out in advance of construction.	
2.12	Y	Y	Subject to a successful planning outcome, additional SI work will be undertaken including CBR testing in advance of construction commencing on the site.	
2.13	Y	Y	Taking-in-charge of all SuDS elements in the public areas or areas draining public roads are to be offered for TIC to DLRCC as part of a planning compliance process as is normal.	
2.14	Y	Y	The land drain diversion has been proposed, discussed and agreed in principle with DLRCC Water Services Department and is subject to their review as part of the planning application process.	

Paragraph No. in Audit Report	Issue Accepted (Yes/No)	Recommended Measure Accepted (Yes/No)	Alternative Measures (described) [or reason problem not accepted]	Alternative Measures Accepted by Auditors (Yes/No)
2.15	Y	Y	Ground profiling into the SuDS has been considered and the landscape architect has included these elements into their design included with the overall planning submission. All roads drain to SuDS features on the site and the cambers are shaped thus to achieve flow towards these elements. The cambers are indicated on Dwg.No.'s 2411/100. Dropped kerbs allow flow to pass into these SuDS elements.	
2.16	Y	Y	SMh15 has been adjusted to achieve a pipe connections angle >90 degrees. Dwg.2411/101 has been amended accordingly.	
2.17	Y	Y	It is considered that due to the extensive implementation of SuDS measures on the site and more than sufficient downstream interception provided PI's have not been included in the application. If DLRCC require PI's, they can condition same as part of the planning process.	
2.18	Y	Y	225mm & 300mm S/W Pipe gradients are between 1/24 and 1/120. 375mm S/W pipe gradients are 1/150. These gradients satisfy the minimum velocity requirements when flowing full in accordance with published tables for hydraulic design of pipes.	
2.19	Y	N	The proposed S/W outfall points have been extensively discussed and agreed in principle with the DLRCC Roads Project Office (GDRS scheme) and the Water Services Department as part of the pre-planning process.	Y

Signed: *Design Team Project Manager* **Date:** 05/12/25

Please complete and return to the auditor

Auditor Signed Off: ..... *Auditor* **Date:** 05/12/2025

Appendix 11.18

Surface Cover Type

All Stormwater Audits must include the following table completed by the scheme designers.

Surface Cover Type	Area (m^2)
Wetland or open water (semi-natural; not chlorinated) maintained or established on site.	
Semi-natural vegetation (e.g. hedgerows, trees, woodland, species-rich grassland) maintained or established on site.	2579
Reuse of existing soils and seed source to develop vegetation cover	0
Standard trees planted in connected tree pits with a minimum soil volume equivalent to at least two thirds of the projected canopy area of the mature tree.	3321

Surface Cover Type	Area (m^2)
Standard trees planted in pits with soil volumes less than two thirds of the projected canopy area of the mature tree.	9No.
Intensive green roof or vegetation over structure. Substrate minimum settled depth of 150mm.	1007
Non intensive Brown Roof (Biodiversity Roof). Substrate minimum settled depth of 150mm. Design will be site specific and developed by a suitably qualified ecologist.	0
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket)	0
Extensive green roof of sedum mat or other lightweight systems	0
Green wall –modular system or climbers rooted in soil.	0
Rain gardens and other vegetated sustainable drainage elements.	712
Flower-rich perennial planting.	3943
Hedges (line of mature shrubs one or two shrubs wide).	662
Hedgerows or double hedgerow of native species (may have an associated ditch and bank)	0
Groundcover planting.	56
Amenity grassland entire area or sections managed for lesser mowing frequencies for pollinators e.g. six week meadow)	2859
Amenity grassland (species-poor, regularly mown lawn).	4171
Water features (chlorinated) or unplanted detention basins.	0
Permeable paving.	2505
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone).	18,890

Appendix 11.19

Green Roofs

Bauder Green Roof Solutions

Systems for new build construction and existing buildings

For all green roofs, an integrated approach is crucial for the design and specification of both the waterproofing and landscaping components to achieve the best results.

Creating a green roof requires key decisions about access and what the roof is to be used for before the design can begin. We will work with you from the earliest design stage to ensure that your green roof project comes to fruition beautifully.

Intensive green roofs

Garden planting schemes require greater depths of substrate and the overall weight of the solution dictates the construction of the supporting structure and the green roof components required to sustain the vegetation.
See pages 6-7.

Marischal Square
New Aberdeen

Biodiverse green roofs

The aim is to replicate, as far as is practical, the ecological requirements for the local area. The habitats are designed to support a variety of native plants, birds, animals, and invertebrates. The careful design and construction of these habitats is key to conforming to the local Biodiversity Action Plan (BAP) or the site's Urban Greening Factor (UGF) commitment. See pages 8-9.

Richard Knightly House

~~Extensive green roofs~~

Extensive green roofs are constructed using shallow depths of growing mediums and access limited to only allow for maintenance.

A substrate-based green roof will often incorporate a mixed vegetation scheme of low maintenance plants chosen to suit the project and location.

Our BauderGREEN Sedum System is installed with the BauderGREEN XF 301 sedum blanket direct on to our root resistant waterproofing.
See pages 10-13.

Brookfield Primary School

Enhancing the Roof

Bringing net zero and climate change into focus through further rooftop facilities

Generating renewable energy through adding a PV array and attenuating stormwater with a rooftop SuDS to reduce localised flooding.

Using the roof to generate energy

A flat roof is the ideal place for a solar photovoltaic (PV) installation to generate site-sourced electricity. Our BauderSOLAR G LIGHT is an integrated biosolar solution for mounting photovoltaic renewable energy on a green roof or blue roof where the substrate and vegetation provide the ballasted installation mechanism to secure the array.

A biosolar PV system allows for the entire roof to qualify as a green roof, and if a biodiversity finish is specified this can further enhance the BREEAM credit rating for the roof element. See pages 14-15.

Clapham Park
Lambeth, London

Attenuating rainfall to reduce run-off

A blue roof offers a sustainable drainage method designed to attenuate and slow the discharge of stormwater from a flat roof for up to a 48 hour period via a restrictive flow outlet. Ideal for urban areas where options for ground-based attenuation systems are limited or where construction is being carried out within flood sensitive areas. See pages 16-17.

Permeable paving on pedestals finish

Bauder Intensive Green Roofs

Outdoor spaces for people to enjoy soft vegetated recreational areas and hard landscaped access zones

Replicating a traditional landscape at roof level with lightweight components and substrates for a shallower build up than conventional landscaping.

Creating an intensive green roof on a building provides additional facilities and maximises the potential of the building.

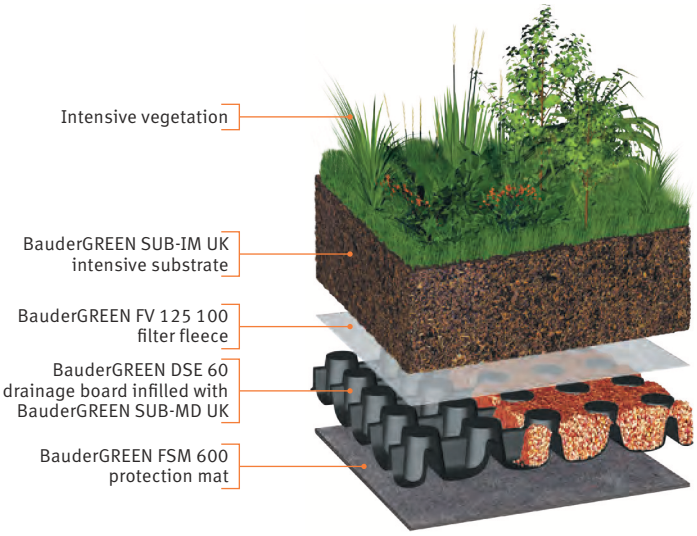
The desired planting finish will dictate the assembly of the green roof components and the construction of the supporting structure.

Depths of substrate will vary to accommodate trees, shrubs, herbaceous planting, and turfed areas with bedding options for hard landscaping. Maintenance of the roof is required throughout the year to upkeep the landscape and allow the vegetation to flourish.

Plus points

- Assists in maximising the building's potential and overall value of the property.
- Provides valuable recreational space.
- Bauder technical support service gives integrated approach for design and specification of waterproofing and landscaping components.
- Comprehensive range of guarantee packages to fulfil cover requirements for the project (dependent on system/product selection). For more information contact our technical dept for a sample guarantee outlining cover level, terms and conditions.

Marischal Square
Aberdeen, Scotland



Bauder Intensive Green Roofs

Holyrood Student Accommodation
Edinburgh

BUILDING BOARD	
Roof Size:	4,000m²
Roofing Systems:	Bauder Hot Melt System and intensive green roof
Client:	University of Edinburgh
Main Contractor:	Balfour Beatty
Specifier:	Oberlanders Architects & JM Architects
Approved Contractor:	Procladd

All England Lawn Tennis Club Museum
Wimbledon

Bauder Biodiverse Green Roofs

Creating a habitat to encourage a wider spread of birds, insects, and plant species

Substrate based non publicly accessed green roofs meeting the requirement for biodiversity at roof level and primarily specified for ecological benefits.

Biodiverse green roofs are generally designed with British native vegetation and additional elements, such as log piles and dew ponds, to create the desired habitat. The different plants are normally established through plugs, seeds, or wildflower blanket on a range of substrate depths, typically 80-150+mm.

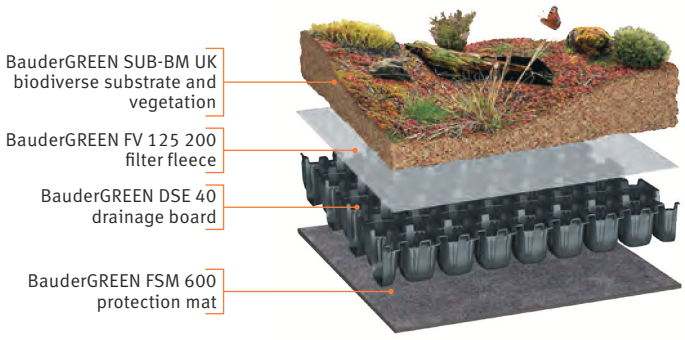
Biodiverse green roofs can also be created on a pitch of up to 25 degrees. This configuration requires the BauderGREEN WSP reservoir board to enhance water retention for the plants, hold the substrate in place, and be sufficiently rigid to manage the imposed shear load.

Plus points

- British native vegetation options comprising seed mixes, plug plants, and wildflower blanket.
- Specification embraces all elements of waterproofing, the green roof components and planting scheme.
- Meet Biodiversity Action Plans, Urban Greening Factor, or planning requirements for the location.
- Contributes to BREEAM assessment ratings.
- Single source for design of Bauder waterproofing and green roof with clear accountability.
- Comprehensive range of guarantee packages to fulfil cover requirements for the project (dependent on system/product selection). For more information contact our technical dept for a sample guarantee outlining cover level, terms and conditions.

Biodiverse roof plans

An ecological report will normally define the requirements for the biodiverse finish and our technical team will provide detailed layouts of the roof showing mounding of substrate and location of planting ensuring the loading of the roof is compatible with the structure.



Bauder Biodiverse Green Roofs

Our vegetation options

BauderGREEN WB wildflower blanket for instant coverage at installation

BauderGREEN WB native species wildflower blanket

The UK grown vegetation blanket contains a broad mix of 38 British wildflowers, herbs, and grasses that are included on most BAP lists. The vegetation is grown in lightweight substrate on a coir carrier that is 100% biodegradable. The natural fibres of the coir carrier promote the rapid rooting of the blanket into the BauderGREEN SUB-BM UK biodiverse substrate.

The blanket meets GRO recommendations and the vegetation is specifically selected to flourish in the challenging conditions found at roof top level.

BauderGREEN Plug Plants immediately after planting

BauderGREEN Plug Plants native species wildflowers

The use of small seedling plants allows the specifier to select the individual species to be planted by hand, their position on the roof, and density of planting. The more plugs per square metre, the faster the vegetation will establish to cover the roof entirely.

We supply a large variety of British provenance plug plants to suit the specification and desired finish.

BauderGREEN Flora seed mix established over two years

BauderGREEN Flora Seed Mixes

Our range uses with different blends of seed with British and Scottish provenance to suit different roof environments for costal, urban, and chalk grassland. They balance the requirement to have grasses and low ground cover, to prevent erosion, with wildflowers to offer a nectar source to many insects visiting the green roof.

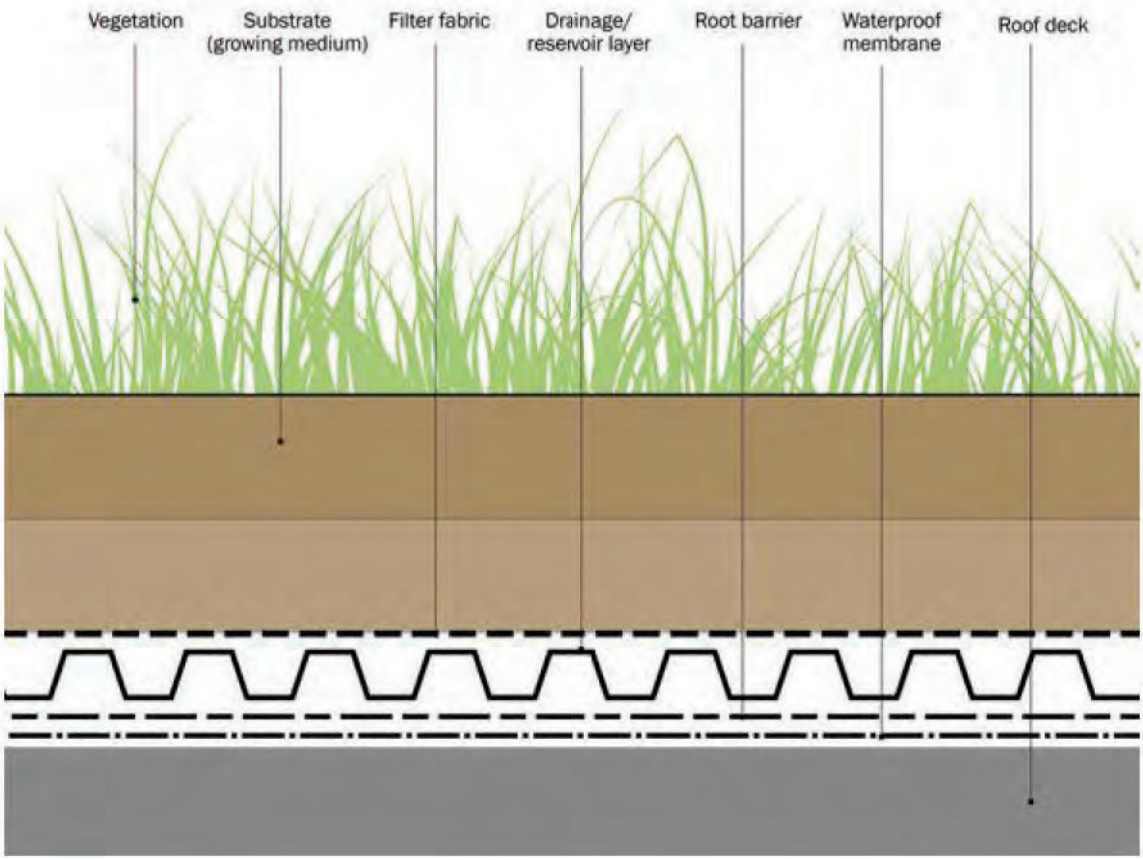


Figure 12.1 Section showing typical extensive green roof components

As mentioned earlier, there are two main types of green roof:

Extensive green roofs – These systems cover the entire roof area with hardy, slow growing, drought tolerant, low maintenance plants (eg mosses, succulents, herbs, grasses) often enhanced with wildflowers. Planting often establishes more slowly, but the long-term biodiversity can be of high value. They are only accessed for maintenance and can be flat or sloping. Extensive green roofs typically comprise a 20–150 mm thick growing medium and can be further divided into "single-layer" systems (which consist of a single medium designed to be free-draining and support plant growth), and "multi-layer" systems that include both a growing medium layer and a separate underlying drainage layer. They are lightweight and low cost to maintain, and can be used in a wide variety of locations with minimal intervention. They are often suitable for retrofit on existing structures due to their light weight. Biodiverse extensive green roofs are often planted with a mix of species supported by a range of soil depths.

Intensive green roofs (or roof gardens) – These are designed to sustain more complex landscaped environments that can provide high amenity or biodiversity benefits. They are planted with a range of plants including grasses, shrubs and/or trees, either as ground cover or within planters, and may also include water features and storage of rainwater for irrigation (ie blue roof elements). They are usually easily accessible, as they normally require a fairly high level of regular maintenance, and in some cases they are made accessible to the public. Intensive roofs have a deeper substrate, with >150 mm growing medium, and therefore impose greater loads on the roof structure.

Green roofs with substrate depths of 100–200 mm tend to be semi-intensive roofs, and can include characteristics of both extensive and intensive roofs, with plants that include shrubs and woody plants. Irrigation and maintenance requirements of this type of roof will be dependent upon the plant species chosen for the roof. There are also various combinations of green roof that combine both types in a single roof system.

A comparison of the main differences between extensive and intensive green roof systems is given in **Table 12.1**.

Appendix 11.20

Stage 2 Opinion Response

	LRD Notice of Response Ref PAC/LRD2/004/25	
No	**DLR Water Services Department – Drainage Planning Opinion – Appendix C Internal Reports**	**Response**
1	*The applicant is requested to contact drainage planning to discuss the issues of the features on site and discuss and agree how the features will be dealt with in an appropriate manner, in accordance with the requirements of our development plan policies as well as best practice. The "drain" should be assessed by a suitably qualified person to determine if the feature is a relevant waterbody. It is not acceptable to divert the flow into an attenuation system that has not been designed to cater for this flow.*	The drain in question was assessed and determined to be a continuation of a land drain constructed below the recently completed Glenamuck Manor housing scheme. It was noted to be a 225mm diameter plastic pipe and drains part of a private property upstream called "*Shaldon Grange*". Discussions were held with the Water Services Department regarding this element and it was determined that to avoid any conflict with the proposed attenuation system, the existing drain would be diverted into a new 300mm diameter pipe that remains independent of the proposed attenuated system and this pipe will pass through the development to a new outfall into the Glenamuck Stream. Refer to Dwg.2411/101 for further detail.
2	*The applicant has provided two different SAAR values in the application. Consistency in the data for calculations is required.*	A SAAR of 994mm has been determined as accurate based on the latest available data from Met Éireann and is noted twice in the main report as such.
3	*It should be noted that the Microdrainage has default Cv values of 0.84 for Winter and 0.75 for Summer. These should be amended to a value of 1.0, particularly where the applicants are proposing reduced PIMP (%) values. Maintaining the default Cv values reduces the run-off in simulations of rainfall events, giving an inaccurate simulation results which may lead to under sizing of the drainage system and attenuation storage. The applicant is requested to resubmit their MicroDrainage calculations using the 1.0, and site specific or local data, such as SAAR, Soil Type, rainfall Return Period Table (available form Met Éireann)0 rainfall intensity and other hydrological parameters. The applicant must clearly state and justify all inputs used in Microdrainage and agree these with Drainage Planning prior to submission of the final application.*	The Cv values have been set to 1.0 for both summer and winter events in the calculations provided. The Met Éireann data has also been provided which include the SAAR=994, M5/60=16.0mm and r=0.276.
4	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.	Compliance with Appendix 7 of the CDP is demonstrated in detail in the *Report*

5	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 (GDSDS) 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.	A full SuDS treatment train approach has been implemented in the design and is detailed in Chapter 7 of the *Report*.
6	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.	Noted but no changes are proposed to the application parking/hardstanding areas.
7	The applicant has indicated, in the Taking in Charge drawing, that the lands where the attenuation tank for catchment 2 is located is not to be taken in charge. The applicant should specify whether the proposed area will be taken in charge or privately managed and provide the details of the management company that will maintain the proposed surface water drainage network as required. A wayleave should be provided if the area is not to be taken in charge.	This area is to remain as privately managed and subject to a successful planning decision; the details of the management company are to be agreed at planning compliance stage as will a wayleave.
8	*The applicant shall ensure that trees shall not be planted in the area over the attenuation tank. Trees shall be placed at a minimum distance of 2m from the edge of attenuation tanks. Tree protection barriers may be required, depending on the tree species and the expected extent of root spread, to be advised by the landscape architect.*	Noted
9	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.	The application has maintained the required separation distances and a clash check has been carried out. Refer to Dwg.No.'s 2411/109 to 112 and 116 for further detail.
10	As standard, and as noted within the application, 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.	A Stormwater Audit has been completed and the results submitted to DLRCC prior to lodgement of the Stage 3 submission. Refer to the Appendix 11.17 of the Report.

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.*	Long-sections have been provided in the Stage 3 submission, Refer to Dwg.No.'s 2411/109 to 112.
12	*As standard, the applicant is requested to provide a penstock in the flow control device chamber and ensure that the flow control device provided does not have a bypass door. The applicant shall also clarify whether a silt trap is being provided in the flow control device chamber and if not to make provision for same.*	Penstock and removal of the bypass operation is noted and details of same are shown on Dwg.2411/108.
13	*As standard, the applicant is requested to provide 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.*	Details of same are shown on Dwg.2411/108. Correspondence from the attenuation storage manufacturer has been included in the Appendix of this report
14	*As standard, the applicant is requested to show the options being proposed for interception and treatment with contributing areas on a drawing together with an accompanying text and tabular submission showing the calculations, to demonstrate that the entire site is in compliance with GDSDS requirements. The applicant should note that over-provision in one location does not compensate for under provision elsewhere.*	Refer to Dwg.2411/106 for catchment measurements and interception tablature (also included in Section 6.19 and Appendix 11.2 of this report)
	Flood Risk Assessment	
	Based on the information contained in the Site Specific Flood Risk Assessment (SSFRA) submitted by the applicant, the conclusions therein are accepted. However, as previously noted in this report, the assessment did not account for certain drains in the models and attenuation calculations. This oversight needs to be addressed to ensure comprehensive and accurate flood risk analysis.	The noted drains do not connect with the proposed attenuated system and are therefore do not require adjustment to the drainage model.