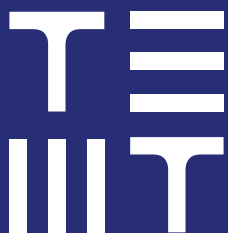


Residential Development
at Leopardstown Road
Civil Planning Report

10.02.2025

24094-X-XXX-RP-TNT-CE-0004



TENT ENGINEERING

Site Address:

Residential Development at
Leopardstown Road,
Sandyford,
Dublin 18

Client:

Winterbrook Homes Ltd.



TENT ENGINEERING

Revision and Review

This report has been prepared for the sole benefit, use and information of the client. The liability of Tent Engineering with respect to the information contained in this report will not extend to any third party.

PURPOSE

- P1 Information
- P2 Coordination
- P3 Planning
- P4 Building Control
- P5 Pre-tender
- P6 Tender
- P7 Construction

ACCEPTANCE (BY OTHERS)

- S Issued
- A Accepted
- B Accepted subject to comments
- C Rejected
- D Acceptance not required

Accepted by _____

REVISION(S)

Rev.	Description	Date
00	1st Issue	13.10.2024
01	2nd Issue	10.02.2025

AUTHOR(S)

Name

Conor Edwards
Civil Engineer



REVIEWER(S)

Name

Edward Heukers
Co-Founder, Director
Structural Engineer



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1 Introduction

1.1 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

1.2 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Tent Engineering shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations and designs at no additional cost to Tent Engineering Ltd.

1.2 This report refers to the Foul and Surface water drainage and fresh Water provisions associated with the proposed residential development at Leopardstown Road, Sandyford, Dublin 18. The development will be served by the proposed site infrastructure as shown on the enclosed drawings.

1.3 The residential development is located at Leopardstown Road, Sandyford, Dublin 18. The immediate surrounding area is noted for being well-developed, consisting of various commercial and industrial buildings, along with associated infrastructure. This built-up environment includes roads, parking areas, and existing utilities, providing a robust setting for the proposed development.

1.4 The subject red line boundary encompasses an greenfield site. Demolition works are not required.

1.5 Our proposed site is approximately 8781m², and is moderately flat, with no noteworthy proposed differences in level.

1.5 No adverse existing infrastructure has been identified on or below our site. A conclusive survey is to confirm cable and pipe positions below and over our site post-planning. No diversions are expected at this stage.

1.6 This report is to be read as supplement to the proposed development prepared under Section 179A of the Planning and Development Act for the residential development at Leopardstown Road including but not limited to Flood Risk Assessment *24094-X-XXX-RP-TNT-CE-0002*.

1.7 A Confirmation of Feasibility by Uisce Eireann is applied for and when granted will be shared as appendix to the current report.

Fig 1.1 - Proposed site location



2 Foul Water Drainage

2.1 The foul water drainage system proposed for the site has been designed in accordance with the Irish Water 'Code of Practice for Wastewater Infrastructure'.

2.2 A design peak flow equal to 6 times the calculated discharge volume is applied and 10% for unit consumption volume is added.

2.3 Sewers drain via gravity, unless noted otherwise. Foul sewers and lateral drains should be designed to run at no more than 75% of pipe full conditions.

2.4 An existing foul water network has been identified, connected to the current site, after interrogation of GIS service maps.

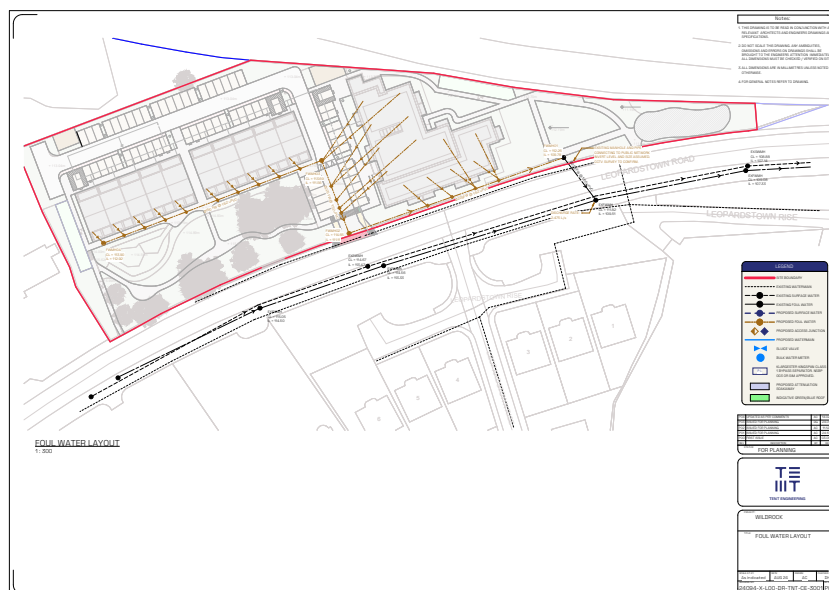
2.5 Our site is bounded by Leopardstown Road in the south, south-east direction. Existing services adjacent to our site offer a tie-in point for our sewer. An existing public sewer of $\varnothing 225\text{mm}$ concrete flows in westerly direction. GIS maps offer sufficient detail at this stage.

Prior to works commencing the contractor is to survey and confirm position, inverts and feasibility to connect to the existing branch. GIS maps offer sufficient detail at this stage.

2.6 The design water consumption for foul flow calculation purposes is taken to be as outlined in the table below, following from the Irish Water 'Waste Water Code of Practice' and specialist confirmations as appropriate.

A standard residential unit demands a foul capacity of circa 150 L/person per day.

Figure 2.1 - Foul Water Layout



Description	Daily Discharge
Block 01: No. 20 Units	8000L
Block 02: No. 60 Units	24000L
Total	32000L

2.7 The information of 2.2 and 2.6 results in a peak average daily waste waster discharge determination as outlined below.

(a) $32000 \times 1.1 \times 6.0 / 86400 = 2.475\text{L/s}$.
The above determination results in a typical $\varnothing 225\text{mm}$ diameter foul water network requirement.

2.8 The typical foul water gradient to be used is 1:35 U.N.O. Pipe material is uPVC U.N.O.

2.9 The site and Leopardstown Road have a mild slope, not to the detriment of pipe gradients, self-cleaning velocities, and invert levels. A gravity system is feasible.

2.10 The proposed layout for the foul infrastructure serves the site as shown below in figure 2.1.

2.11 Prior to construction and installation of connections, a survey is to confirm position and invert levels of the relevant networks and manholes, percolation test, and further post-planning approvals as applicable.

2.12 Foul water designs follow Irish Water approved typical details and specifications.

3 Water Supply

3.1 The water supply system proposed for the site has been designed in accordance with the Irish Water 'Code of Practice for Water Infrastructure'.

3.2 A design peak flow equal to 5 times the calculated demand volume is applied and 25% for dry weather flow volume is added.

3.3 An existing water main network has been identified, to the north of the current site, after interrogation of GIS service maps.

3.3 Just off Leopardstown Road, there is an fire hydrant connect to the existing watermain. Two fire hydrants will be installed on-site to ensure adequate coverage in the event of an emergency.

3.4 The design water demand for fresh water supply calculation purposes is taken to be as outlined in the table below, following from the Irish Water 'Water Code of Practice' and specialist confirmations.

A standard residential unit demands a foul capacity of circa 150 L/person per day.

Description	Daily Demand
Block 01: No. 20 Units	8000L
Block 02: No. 60 Units	24000L
Total	32000L

3.5 The information of 3.2 and 3.4 results in a peak average daily water demand determination as outlined below:

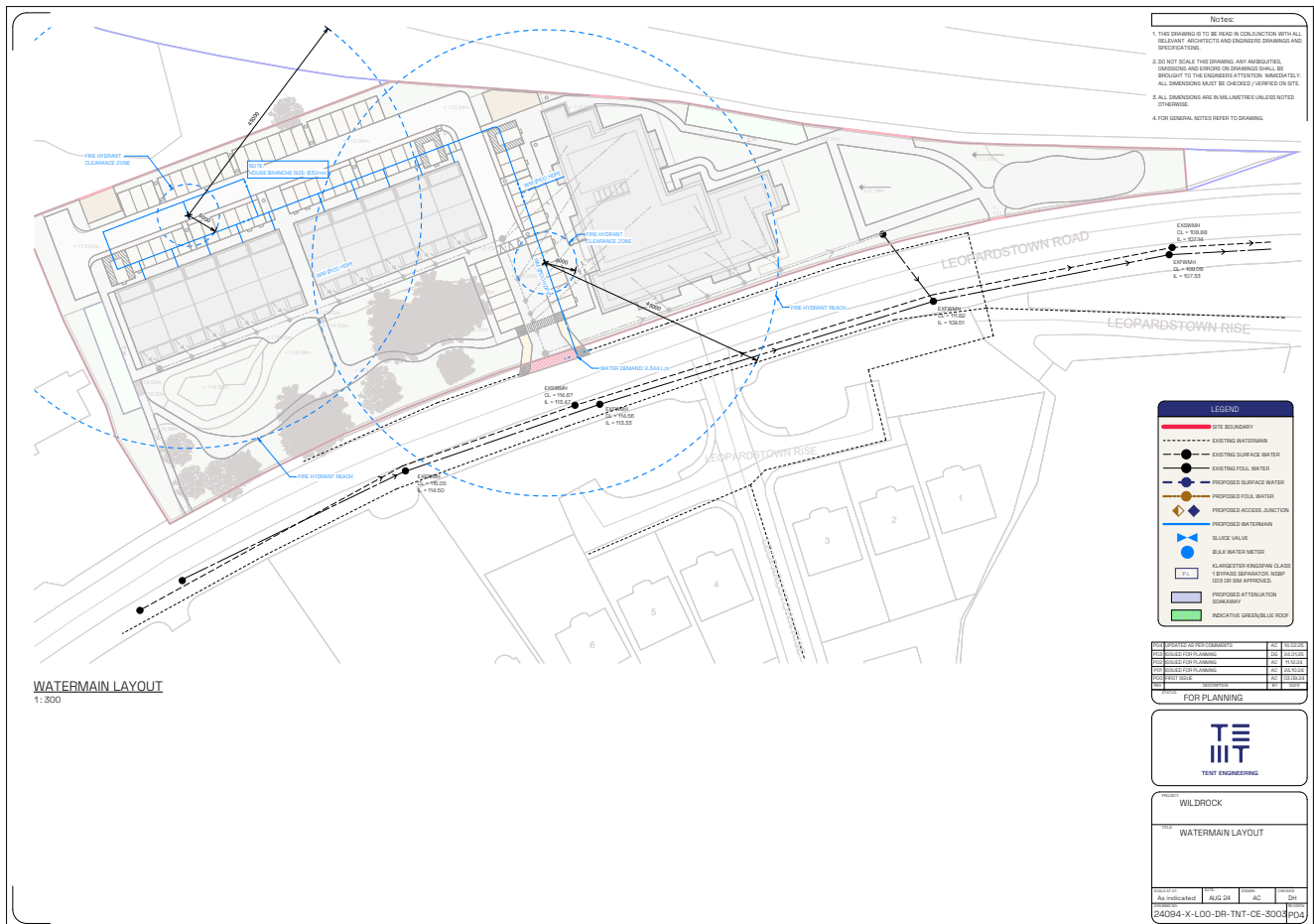
(a) $32000 \times 1.25 \times 5.0 / 86400 = 2.315\text{L/s}$.
The above determination results in a typical 100mm nominal diameter fresh water network requirement.

3.6 The water pipe size is $\varnothing 100\text{mm}$ U.N.O. and the pipe material is HDPE (PE - 80 rating) U.N.O.

3.7 The proposed layout for the fresh water infrastructure serves the site as shown on the enclosed drawings.

3.8 All on-site water details are to be Irish Water approved typical details and specifications.

Figure 3.1 - Watermain Layout



4 Surface Water Drainage

4.1 All proposed drainage is designed and detailed in accordance with the GSDSDS Regional Drainage Policies Technical Document - Volume 2, BRE Digest 365 - Soakaway Design Manual and The SUDS Manual - Ciria C753.

4.2 All surface water from the proposed site area is actively drained and appropriately discharged, ultimately into a separate sewer of the existing network.

4.3 The proposed Surface Water Drainage System proposed for the site has been designed using the following parameters:

- (a) Rain intensity and return periods specific to our site, obtained from Met Eireann.
- (b) Impermeability factor of 1.0 (100%)
- (c) Permeability run-off factor of 0.3 (30%)
- (d) Climate change factor 1.20 (+20%)
- (e) Urban creep factor 1.10 (+10%)
- (f) 1 in 100 year return period for attenuation storage volume requirements
- (g) 10 year return period for CIRIA SuDS soak away requirements
- (h) 5mm interception rainfall depth.
- (i) Site storm water discharge is limited to the higher value of 2L/s/ha or QBAR, but a minimum flow based on a flow control device with an orifice size of 50mm is allowed for

4.4 The following areas have been considered for the proposed development:

Description	Size
Total site	8782m ²
Roofs and hardstanding area (impermeable)	3178m ²
Landscape area (open space)	3286m ²
Permeable surface	2318m ²

4.5 The proposed site is moderately flat. A gravity system is feasible. No surcharging of the site network occurs during rare storm events.

4.6 The proposed layout for the storm water drainage system serves the site as shown on the enclosed drawings.

4.7 Sustainable Urban Drainage Systems (SUDS)

The following Sustainable Urban Drainage Systems have been incorporated:

- (a) Green roof (interception storage)
- (b) Blue roof (attenuation storage)
- (c) Permeable surface (reduced run-off)
- (d) Aco-Drains (surface water drainage)
- (e) Tree Pits (attenuation storage)
- (f) Attenuation Soakaway Tank (infiltration & attenuation)
- (g) Petrol Interceptor (environmental)

Green Blue roofs have been incorporated following the 'Green & Blue Roof Guide 2021'.

(a) A lightweight green roof cover, as part of a blue roof is proposed for flat roof areas. >70% of the flat roof area between the eaves (intensive) is required, following the local council development plan. This contributes to the interception storage during storm events and reduces the flow and discharge rates from the impermeable roof surface and blue roof storage requirements.

(b) >70% of the flat roof area provides blue roof short-term soak-away storage volume. A minimum 40mm of attenuation depth is to be provided to achieve 15.9m³ of storage volume. Surface water discharge is to be limited from the roof with a flow control to 0.16L/s and 0.10L/s at the outflows. The Blue Roof do not connect directly into the soakaway but will be connected to the surface network after the hydrobrake. This is done to ensure controlled discharge rates that prevent overloading the soakaway system. Blue roof flow rates are limited based on natural flow rates (QBAR) for the relevant catchment area, with an overflow system that avoids increased accumulation past the provided attenuation volume.

(c) The development will feature permeable surfaces across all footpaths, the road surrounding the office, and the waste transfer area. By implementing permeable surfaces, the site is expected to achieve a reduction in stormwater runoff by nearly 50% compared to conventional hard surfaces (0.5 runoff factor). Permeable surfaces will mitigate the risk of flooding but also promote groundwater recharge.

(d) The site is equipped with Aco-drains placed at site and building entrances. These drains are designed to mitigate potential water accumulation, thereby minimizing the risk of water pooling.

(e) Tree pits have been integrated into the surface water management infrastructure on our site. These tree pits are designed to capture and filter stormwater runoff, allowing for infiltration and reducing the burden on conventional drainage systems. A total of 14 tree pits are proposed for the residential development, each providing 1.01m³ of storage, resulting in a combined storage capacity of 14.14m³.

(f) An open grate soakaway system with a minimum free volume of 203m³ is provided. The dimensions of the soakaway are 18.4m x 12m x 0.96m. The soakaway requirements are designed with climate change increases following CIRIA C753. Site specific soil infiltration rates and the ground water table level are to be determined during post-planning works, prior to finalisation of the strategy and proposed systems. Surface water discharge from site is limited to 2.1L/s.

(g) A petrol interceptor is to reduce the potential (low) risk of any pollutants being discharged into the public surface water network. The interceptor filters debris, chemicals, rubbers, oils, fuels, and other potentially environmentally harmful fragments, prior to discharging into the soak away tank.

5 Flood Risk Summary

5.1 Refer to report 24094-X-XXX-RP-TNT-CE-0002 for the detailed Flood Risk Assessment.

5.2 The initial flood risk assessment is undertaken by taking cognisance of the guidance given in the Office of Public Works (OPW) and the Department of Environment, Heritage and Local Government (DEHLG) document titled ‘The planning system and flood risk management’ (2009).

5.3 Flood data has been interrogated via online available flood maps. Relevant Flood Maps are currently available and are not noted to be under review by the governing authority.

5.4 The proposed development lies within an area classified as Flood Zone C “lowest risk of flooding from rivers and sea”. This initial flood risk assessment is undertaken by taking cognisance of the guidance given in the Office of Public Works (OPW) and the Department of Environment, Heritage and Local Government (DEHLG) document titled ‘The planning system and flood risk management’ (2009).

5.5 The project is conservatively considered a ‘less vulnerable development’.

5.6 A review of all potential sources of flooding at the subject site concludes the following:

Flood Source	Risk of Flood after development
On-site drainage system	Low Designed with adequate capacity and allowing for climate change.
Local Authority drainage system	Low Assuming local council and public infrastructure authority continue to maintain and service their networks
Sea and Rivers	Low
Groundwater	Low

5.7 The OPW provides records for predictive and historic flood maps. These land maps have been consulted and interrogated regarding documented flood events in the vicinity of the subject site.

5.8 The nearest recorded flood is event was fluvial, was located circa 700m to the west of our site and is of no direct risk to our development. No nearby fluvial flood risks have been identified.

5.9 The site does not require additional flood prevention measures.

5.10 A flood justification test is not needed.

5.11 A stage 2 flood risk assessment is not needed.

6 Appendix A - Rainfall Data

Met Eimann
Nature Period Rainfall Depths for sliding Durations
Irish Crick Station: 319821, Northway: 225882,

DURATION	Interval		Years											
	6months	1year	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,	
5 min	2.4	3.5	4.1	5.0	5.5	5.1	7.7	9.5	10.7	12.4	14.0	15.2	16.0	
10 min	3.4	4.9	5.7	6.9	7.8	8.5	10.7	13.2	14.9	17.3	19.5	21.2	22.3	
15 min	4.0	5.7	6.7	8.2	9.2	10.0	12.6	15.6	17.6	20.4	23.0	24.9	26.3	
30 min	5.2	7.5	8.7	10.5	11.9	12.7	15.9	19.6	22.0	25.4	28.5	30.0	32.4	
1 hour	6.9	9.7	11.3	13.5	15.1	15.3	20.2	24.6	27.5	31.5	35.3	38.1	40.0	
2 hours	9.2	12.7	14.6	17.4	19.3	20.0	25.6	30.9	34.5	39.4	43.0	47.1	49.4	
3 hours	10.0	14.8	17.0	20.2	22.4	24.0	29.4	35.4	39.3	44.8	49.6	53.4	55.9	
4 hours	12.1	16.5	18.9	22.4	24.8	25.6	32.4	38.9	43.2	49.1	54.3	58.3	61.0	
6 hours	14.2	19.4	22.0	26.0	28.7	30.7	37.2	44.5	49.2	55.8	61.6	66.0	68.9	
9 hours	15.0	22.5	25.7	30.2	33.1	35.4	42.0	50.9	55.2	63.4	69.0	74.7	78.0	
12 hours	18.0	25.3	28.6	33.5	36.7	39.2	47.2	56.0	61.6	69.5	76.3	81.6	85.1	
18 hours	22.2	29.5	33.3	38.0	42.5	45.3	54.2	64.0	70.3	79.0	85.6	92.4	96.2	
24 hours	24.9	32.9	37.1	43.1	47.1	50.1	59.0	70.4	77.2	86.5	94.7	100.9	105.0	
2 days	30.9	40.0	44.6	51.2	55.5	58.0	69.1	82.2	89.2	99.9	108.1	114.4	118.5	
3 days	36.1	46.0	50.9	58.1	62.7	65.2	77.1	91.8	99.1	109.1	117.7	122.2	126.4	
4 days	40.7	51.3	56.6	64.2	69.1	72.0	84.3	99.5	107.2	117.5	125.4	130.1	134.5	
6 days	48.9	60.9	66.8	75.2	80.5	84.6	97.1	113.3	121.5	132.5	139.0	146.1	150.7	
8 days	55.5	69.5	76.0	85.1	90.9	95.3	108.7	127.7	137.4	149.1	156.0	164.1	168.3	
10 days	53.5	77.7	84.6	94.3	100.5	105.1	119.3	139.1	149.3	162.5	170.5	179.7	184.3	
12 days	70.2	85.3	92.7	102.9	109.5	114.4	129.3	149.9	161.5	176.2	185.0	195.1	200.3	
16 days	82.0	99.7	107.9	119.2	126.4	131.7	148.0	169.8	182.5	198.5	208.5	219.1	224.7	
20 days	94.0	113.3	122.1	134.4	142.1	147.9	165.4	188.4	194.5	219.1	231.3	238.4	246.3	
25 days	109.2	129.4	139.1	152.4	160.8	167.1	186.0	215.3	217.1	232.6	246.7	255.3	261.6	

NOTES:

These values are derived from a Depth Duration Frequency (DDF) Model update 2023

For details refer to:

'Metcos C., and Coconas, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eimann',

Available for download at:

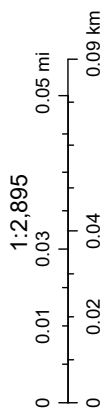
<http://hdl.handle.net/2262/102417>

7 Appendix B - Infrastructure Layouts

Wildrock - Surface Water Layout



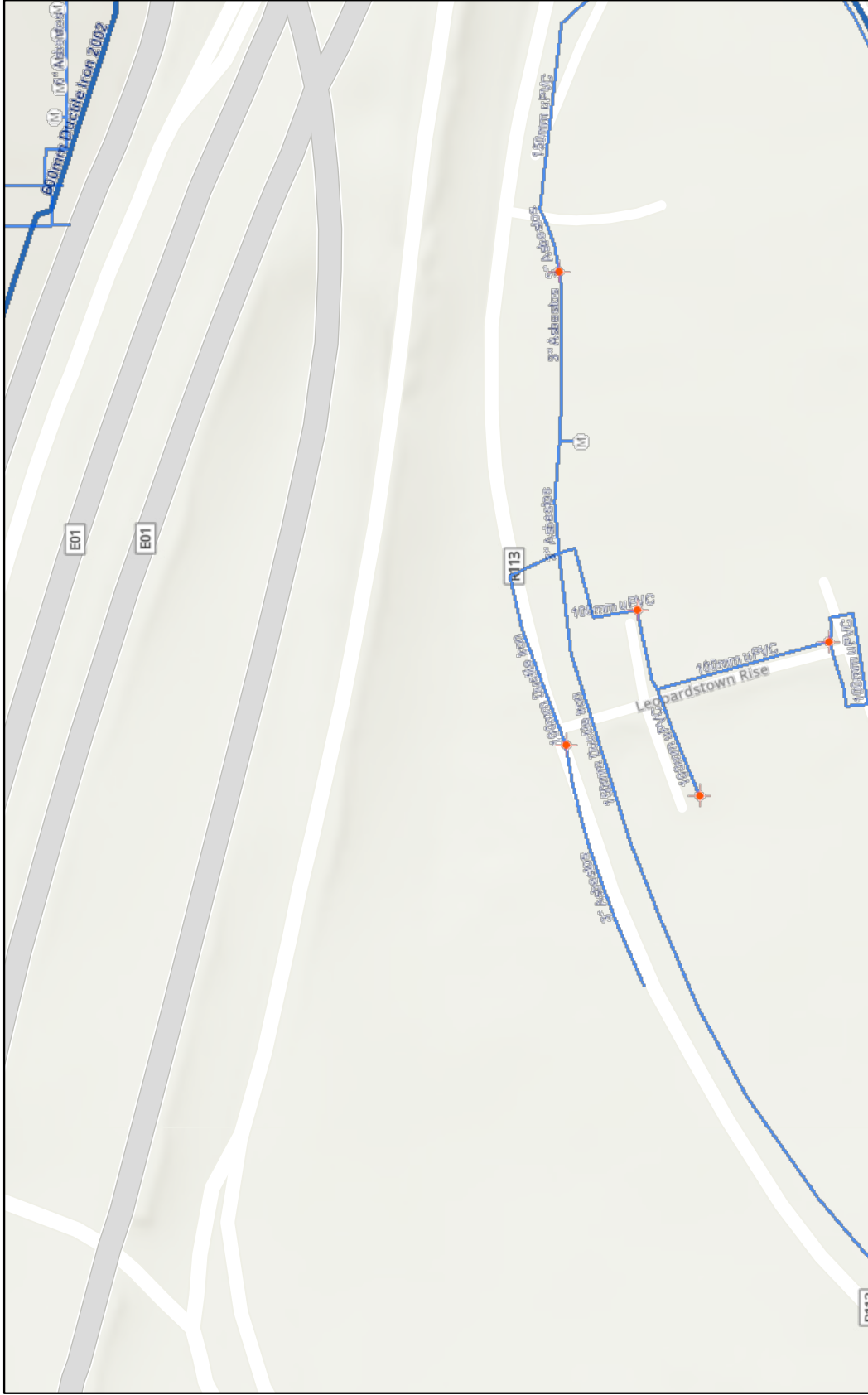
23/08/2024



Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METINASA, USGS, Sources: Esri,

Note: The information provided on the included maps as to the position of Uisce Eireann 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 Eireann.

Wildrock - Watermain Layout

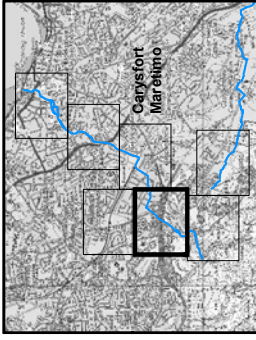


23/08/2024

1:2,895
 0 0.01 0.02 0.03 0.04 0.05 mi
 0 0.02 0.04 0.09 km
 Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METINASA, USGS, Sources: Esri,

Note: The information provided on the included maps as to the position of Uisce Eireann 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 Eireann.

8 Appendix C - Flood Data



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Well
- Defended Area
- Standard of Protection of Road Drainage (Walls / Embankments)
- Node Point
- Node ID
- Node Label

FINAL

REV: NOTE: DATE:

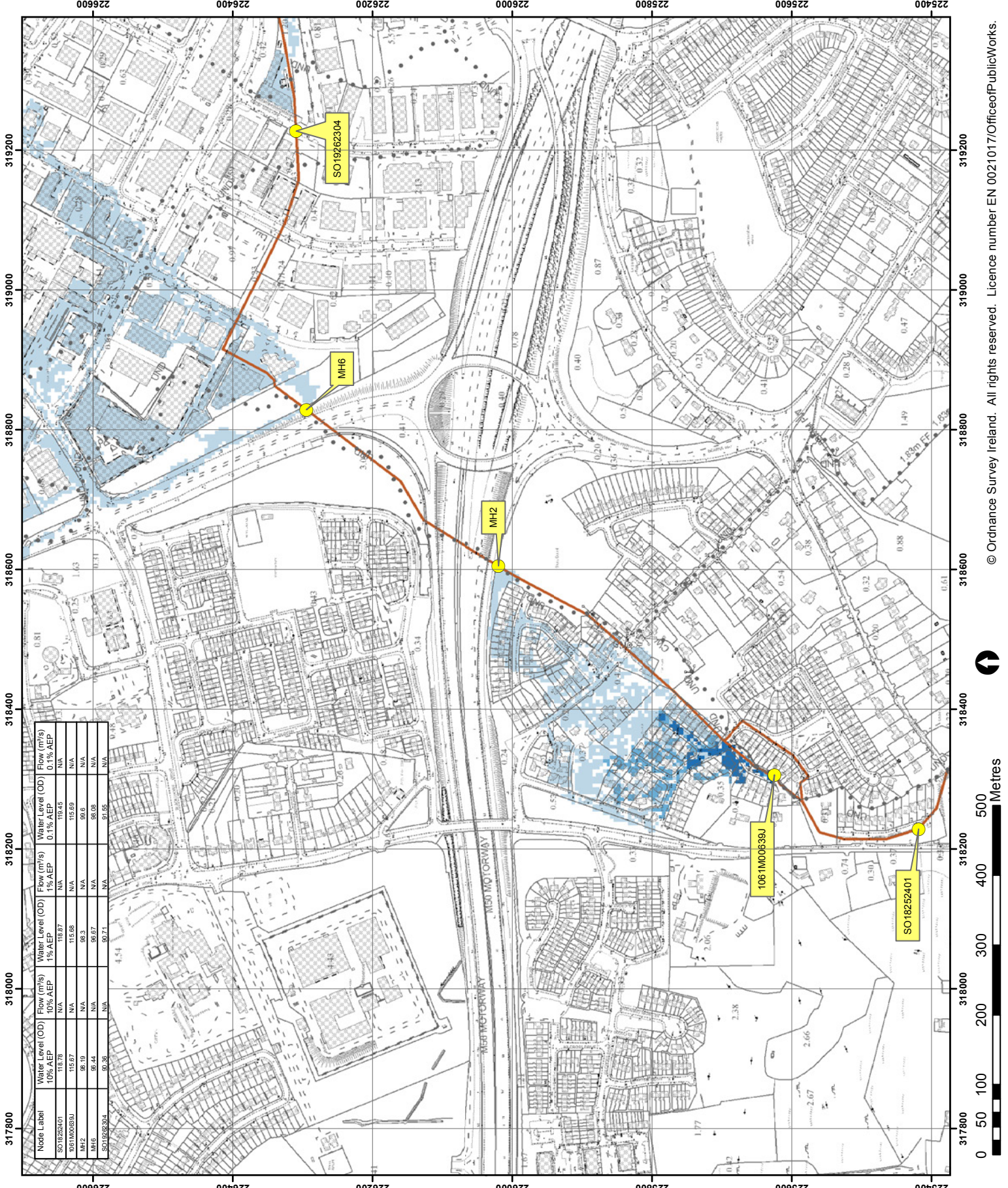


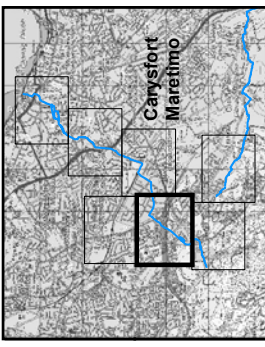
OPW
The Office of Public Works
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B112 6RZ
E: rps@opw.gov.ie

Map: Canystort Marehno Fluvial Flood Extents

Map Type: EXTENT
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT

Drawn By: C.C. Date: 27 October 2017
Checked By: A.S. Date: 27 October 2017
Approved By: S.P. Date: 27 October 2017
Drawing No.:
E09CAR_EXFCD_F2_04
Map Series: Page 4 of 7
Drawing Scale: 1:5,000 @ A3

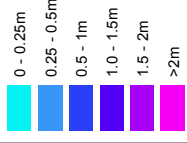




IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Fluvial AEP Flood Depth



Modelled River Centreline
AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendment to Label.	09/12/16



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Map:	
Canyfort Maretime Fluvial Flood Depths	
Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By:	C.McG.
Checked By:	A.S.
Approved By:	G.G.
Drawing No.:	E09SCAR_DPFCD001_F2_04
Map Series:	Page 4 of 7
Drawing Scale:	1:5,000 @A3



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9 Appendix D - Attenuation Requirement

Calculated by:	Arnaud Chaumont
Site name:	Wildrock total site
Site location:	Dublin

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.27006° N
Longitude:	6.21717° W
Reference:	395272315
Date:	Feb 05 2025 10:07

Site characteristics

Total site area (ha):	0.8781
Significant public open space (ha):	0.3286
Area positively drained (ha):	0.5495
Impermeable area (ha):	0.3178
Percentage of drained area that is impermeable (%):	58
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	100
Net site area for storage volume design (ha):	0.55
Net impermeable area for storage volume design (ha):	0.35
Pervious area contribution to runoff (%):	50

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	66
Rainfall 100 yrs 12 hrs:	--	81.6
FEH / FSR conversion factor:	1	1.12
SAAR (mm):	997	997
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.72	1.72
Growth curve factor 30 year:	2.13	2.13

Design criteria



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Arnaud Chaumont
Site name:	Wildrock excl. green-blue roof
Site location:	Dublin

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.27006° N
Longitude:	6.21717° W
Reference:	3268419690
Date:	Feb 05 2025 15:02

Site characteristics

Total site area (ha):	0.8115
Significant public open space (ha):	0.3286
Area positively drained (ha):	0.4829
Impermeable area (ha):	0.2512
Percentage of drained area that is impermeable (%):	52
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	100
Net site area for storage volume design (ha):	0.48
Net impermeable area for storage volume design (ha):	0.29
Pervious area contribution to runoff (%):	50

Methodology

esti	IH124
Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	66
Rainfall 100 yrs 12 hrs:	--	81.6
FEH / FSR conversion factor:	1	1.12
SAAR (mm):	997	997
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.72	1.72
Growth curve factor 30 year:	2.13	2.13

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.2
Urban creep allowance factor:	1.1
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Growth curve factor 100 years:	2.61	2.61
Q _{BAR} for total site area (l/s):	2.24	2.24
Q _{BAR} for net site area (l/s):	1.33	1.33

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m ³):	170	199
Long term storage 1/100 years (m ³):	0	0
Total storage 1/100 years (m ³):	170	199

This report was produced using the storage estimation tool developed by HRWallingford and available at [www.uksuds.com](http://uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Conor Edwards
Site name:	Wildrock - Roof B1
Site location:	Leopardstown Road, Sandyford

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.27022° N
Longitude:	6.21637° W
Reference:	3353531959
Date:	Feb 03 2025 17:01

Site characteristics

Total site area (ha):	0.0359
Significant public open space (ha):	0
Area positively drained (ha):	0.0359
Impermeable area (ha):	0.0359
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	100
Net site area for storage volume design (ha):	0.04
Net impermeable area for storage volume design (ha):	0.04
Pervious area contribution to runoff (%):	45.1

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	66
Rainfall 100 yrs 12 hrs:	--	81.6
FEH / FSR conversion factor:	1	1.12
SAAR (mm):	997	997
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.72	1.72
Growth curve factor 30 year:	2.13	2.13

Design criteria

Climate change allowance factor:	1.2
Urban creep allowance factor:	1.1
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Growth curve factor 100 years:	2.61	2.61
Q _{BAR} for total site area (l/s):	0.1	0.1
Q _{BAR} for net site area (l/s):	0.1	0.1

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m ³):	2	2
Long term storage 1/100 years (m ³):	0	0
Total storage 1/100 years (m ³):	2	2

This report was produced using the storage estimation tool developed by HRWallingford and available at [www.uksuds.com](http://uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Conor Edwards
Site name:	Wildrock - Roof B1
Site location:	Leopardstown Road, Sandyford

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.27016° N
Longitude:	6.21634° W
Reference:	205188718
Date:	Feb 03 2025 13:09

Site characteristics

Total site area (ha):	0.058
Significant public open space (ha):	0
Area positively drained (ha):	0.058
Impermeable area (ha):	0.058
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	100
Net site area for storage volume design (ha):	0.06
Net impermeable area for storage volume design (ha):	0.06
Pervious area contribution to runoff (%):	31.2

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	66
Rainfall 100 yrs 12 hrs:	--	81.6
FEH / FSR conversion factor:	1	1.12
SAAR (mm):	997	997
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	12	12
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.72	1.72
Growth curve factor 30 year:	2.13	2.13

Design criteria

Climate change allowance factor:

1.2

Urban creep allowance factor:

1.1

Volume control approach

Flow control to max of 2 l/s/ha or Qbar

Interception rainfall depth (mm):

5

Minimum flow rate (l/s):

2

Growth curve factor 100 years:

2.61

2.61

Q_{BAR} for total site area (l/s):

0.16

0.16

Q_{BAR} for net site area (l/s):

0.16

0.16

Site discharge rates

1 in 1 year (l/s):

Default

2

Edited

2

1 in 30 years (l/s):

2

2

1 in 100 year (l/s):

2

2

Estimated storage volumes

Attenuation storage 1/100 years (m³):

Default

10

Edited

12

Long term storage 1/100 years (m³):

0

0


Total storage 1/100 years (m³):

10

12

This report was produced using the storage estimation tool developed by HRWallingford and available at [www.uksuds.com](http://uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

10 Appendix E - Soak Away Requirement

		Project			Job no.	
		Calcs for			Start page no./Revision 1	
Calcs by 1	Calcs date 10/02/2025	Checked by	Checked date	Approved by	Approved date	

SOAKAWAY DESIGN

In accordance with CIRIA C753 SUDS

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area Other
 Impermeable area drained to the system $A = 3178.0 \text{ m}^2$
 Return period Period = 100 yr
 Ratio 60 min to 2 day rainfall of 5 yr return period $r = 0.277$
 5-year return period rainfall of 60 minutes duration $M5_{60\text{min}} = 16.3 \text{ mm}$
 Increase of rainfall intensity due to global warming $p_{\text{climate}} = 20 \%$

Soakaway / infiltration trench details

Soakaway type Rectangular
 Width of pit $w = 18400 \text{ mm}$
 Length of pit $l = 12000 \text{ mm}$
 Percentage free volume $V_{\text{free}} = 96 \%$
 Soil infiltration rate $f = 7.60 \times 10^{-6} \text{ m/s}$
 Base area $A_b = w \times l = 220800000 \text{ mm}^2$
 Perimeter $P = 2 \times (w + l) = 60800 \text{ mm}$
 Coefficient b $b = P \times f / (A_b \times V_{\text{free}}) = 0.01 \text{ hr}^{-1}$

Table equations (Eq. 25.4)

Rainfall intensity $i = M100 / D$
 Coefficient a $a = A_b / P - (A \times i / (P \times f))$
 Minimum depth required $H = a \times (e^{(-bD)} - 1)$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.33;	6.5;	1.89;	12.3;	147.66;	-278474;	182
10	0.48;	9.4;	1.96;	18.5;	110.81;	-208066;	272
15	0.58;	11.4;	1.97;	22.5;	89.88;	-168086;	329
30	0.76;	14.9;	1.98;	29.5;	59.04;	-109167;	428
60	1.00;	19.6;	1.93;	37.8;	37.84;	-68654;	537
120	1.27;	24.7;	1.89;	46.8;	23.41;	-41098;	640
240	1.62;	31.8;	1.84;	58.3;	14.58;	-24217;	748
360	1.86;	36.3;	1.80;	65.4;	10.89;	-17176;	790
600	2.21;	43.3;	1.75;	75.9;	7.59;	-10864;	820
1440	3.04;	59.4;	1.68;	100.0;	4.17;	-4329;	743

Minimum depth of soakaway

$H_{\text{max}} = 820 \text{ mm}$

Time to empty soakaway to half vol. - Eq.24.6(2)

$t_{50} = V_{\text{free}} \times A_b / (f \times P) \times \ln((H_{\text{max}} + A_b / P) / (H_{\text{max}} / 2 + A_b / P)) = 12\text{hr } 18\text{min } 43\text{s}$

PASS - Soakaway discharge time less than or equal to 24 hours

11 Appendix F - Drainage Calculation

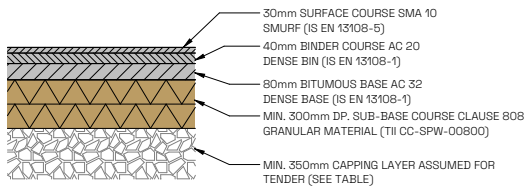
Residential					
Water Demand					
	Units	People	L/person	L	
Block 01	20	2.67	150	8010	
Block 02	60	2.67	150	24030	
1.25	Dry weather volume		Total	40050	L daily demand
5.0	Peak factor		Peak	200250	L peak demand
				2.318	L/s

Residential					
Foul Water Demand					
	Units	People	L/person	L	
Block 01	20	2.67	150	8010	
Block 02	60	2.67	150	24030	
1.1	Dry weather volume		Total	35244	L daily demand
6.0	Peak factor		Peak	211464	L peak demand
				2.448	L/s

12 Appendix G - Build Up Details

Title: TYPICAL ROAD BUILD-UP
 Dwg No: TYP-C-101
 Scale@A3: 1:20

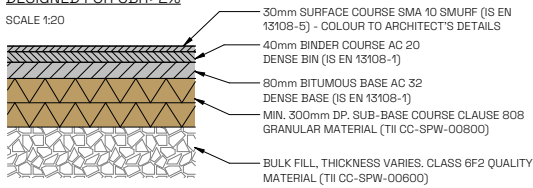
Notes:



ROAD CONSTRUCTION

DESIGNED FOR CBR > 2%

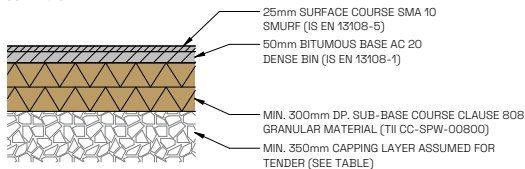
SCALE 1:20



COLOURED ASPHALT

DESIGNED FOR AREAS OF CONSTRUCTED FILL

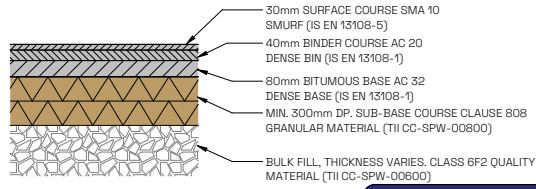
SCALE 1:20



PARKING CONSTRUCTION/DRIVEWAY

DESIGNED FOR CBR > 2%

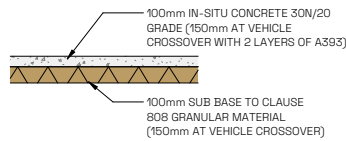
SCALE 1:20



ROAD CONSTRUCTION

DESIGNED FOR AREAS OF CONSTRUCTED FILL

SCALE 1:20



FOOTPATH CONSTRUCTION

SCALE 1:20

ROAD CONSTRUCTION CBR VALUES		
CBR	CAPPING	SUB-BASE
<2%	450mm THICK CAPPING LAYER TYPE 6F2 MATERIAL*	150mm THICK TYPE 1 GRANULAR MATERIAL TO DOT 803
2%-5%	300mm THICK CAPPING LAYER TYPE 6F2 MATERIAL*	150mm THICK TYPE 1 GRANULAR MATERIAL TO DOT 803
5-15%	NOT REQUIRED	300mm THICK TYPE 1 GRANULAR MATERIAL TO DOT 803
15%<	NOT REQUIRED	250mm THICK TYPE 1 GRANULAR MATERIAL TO DOT 803

NOTE:

* GEOTEXTILE TO BE Laid UNDER SUB-GRADE CONSULT ENGINEER

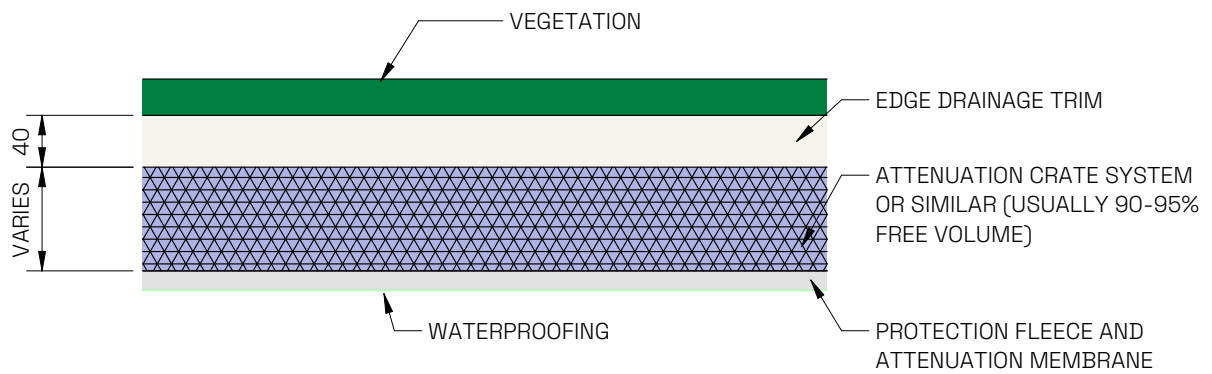
** SUB-BASE THICKNESS MAY BE REDUCED TO 200mm IF SUB-GRADE PROVEN TO BE NON-FROST SUSCEPTIBLE

Title: GREEN/BLUE ROOF BUILD-UP

Notes:

Dwg No: TYP-C-106

Scale@A4: 1:5



13 Appendix H - Confirmation of Feasibility



CONFIRMATION OF FEASIBILITY

Edward Heukers
Tent Engineering
32 Francis Street
Dublin 8
D08 NN96

7 February 2025

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

**Our Ref: CDS24006803 Pre-Connection Enquiry
Wildrock, Leopardstown Road, Sandyford, 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 80 unit(s) at Wildrock, Leopardstown Road, Sandyford, 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
- **Wastewater Connection** - Feasible Subject to upgrades
- In order to accommodate the proposed connection, diversion and upgrades to a storage tank on Burton Hall Road are required. The Uisce Éireann Project is at a detail design stage and estimated completion date is in Q4/2025 (subject to change).

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

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

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

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

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

UE / LH / OP448 / 0323

Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

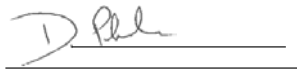
Where can you find more information?

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

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

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

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

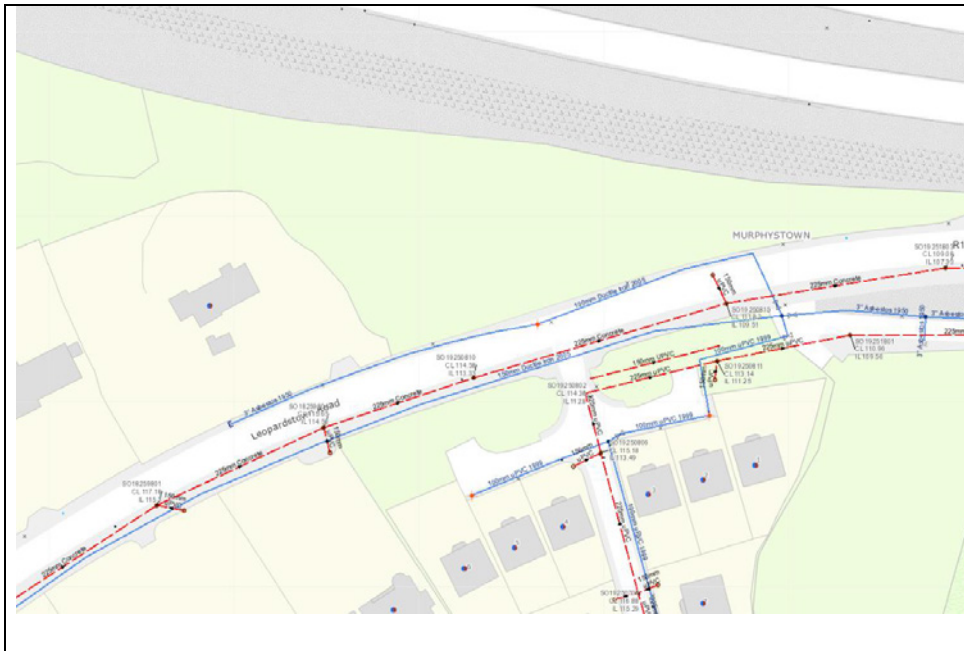
Section A - What is important to know?

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

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

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

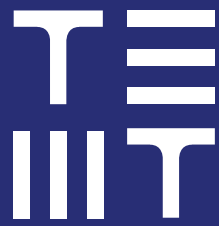
The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie



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

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

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



TENT ENGINEERING