
PROPOSED HOUSING DEVELOPMENT AT BALLYOGAN COURT

DRAINAGE AND WATER SUPPLY

Jan 2019

**PROPOSED HOUSING DEVELOPMENT
AT
BALLYOGAN COURT**

DRAINAGE AND WATER SUPPLY REPORT

**Nicholas O'Dwyer Ltd.,
Consulting Engineers,
Nutgrove Office Park,
Nutgrove Avenue,
Dublin 14.**

Jan 2019

Project No: 30405					
Revision	Reason for Revision	Prepared by	Reviewed by	Approved by	Issue Date
-	First Issue	G Young	G. Young	K. McGauran	01/2018
A	Revised with surface water	G Young	G. Young	K. McGauran	04/2018
B	Revised layout	G Young	G. Young	K. McGauran	12/2018
C	Additional information added	G Young	G. Young	K. McGauran	01/2019
D					

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1. INTRODUCTION

This report is to provide information on the design of the services for a new development of 121 housing units on a greenfield site in Ballyogan Dublin.

This report deals with the following aspects of the development:

- Surface Water Drainage
 - Foul Water Drainage
 - Water Demand

This report is to be read in conjunction with the following drawings:

30405 PP	03 Rev C	FOUL & SW DRAINAGE LAYOUT
30405 PP	04 Rev C	DRAINAGE LONGITUDINAL SECTIONS SHEET 1
30405 PP	05 Rev C	DRAINAGE LONGITUDINAL SECTIONS SHEET 2.
30405 PP	06 Rev B	WATERMAIN LAYOUT
30405 PP	08 Rev C	TYPICAL STREET SERVICES LAYOUT AND DETAILS.
30405 PP	12 -	STORM MANHOLE DETAILS
30405 PP	13 -	STANDARD STORM DRAINAGE DETAILS
30405 PP	14 -	WATERMAIN STANDARD DETAILS
30405 PP	15 -	FOUL MANHOLE DETAILS
30405 PP	16 -	FOUL DRAINAGE STANDARD DETAILS
30405 PP	17 Rev A	TYPICAL ATTENUATION DETAILS

2. EXISTING SITE SERVICES

a. Existing Surface Water Drainage Network



The existing green field site currently has no specific drainage system and it appears the surface water percolates into the ground.

There is a 525mm surface water pipe which crosses at the NW corner of the site and passes under the adjoining motorway.

This surface water pipe is a main for the existing developments adjoining the proposed site.

There is also another surface water discharge pipe serving the existing development to the SW boundary of the site.



b. Existing Foul Drainage Network

There are a number of existing foul water discharge pipes around the perimeter of the site which serve the adjoining residential developments. The main foul water main is located to the NW of the site which travels through the site and under the existing motorway. There is also another foul pipe to the SW of the site in the adjoining residential development.

c. Water Supply

A public water main is available along the public road and as outlined in our communications with Irish Water there will be some upgrading required to facilitate the proposed development.

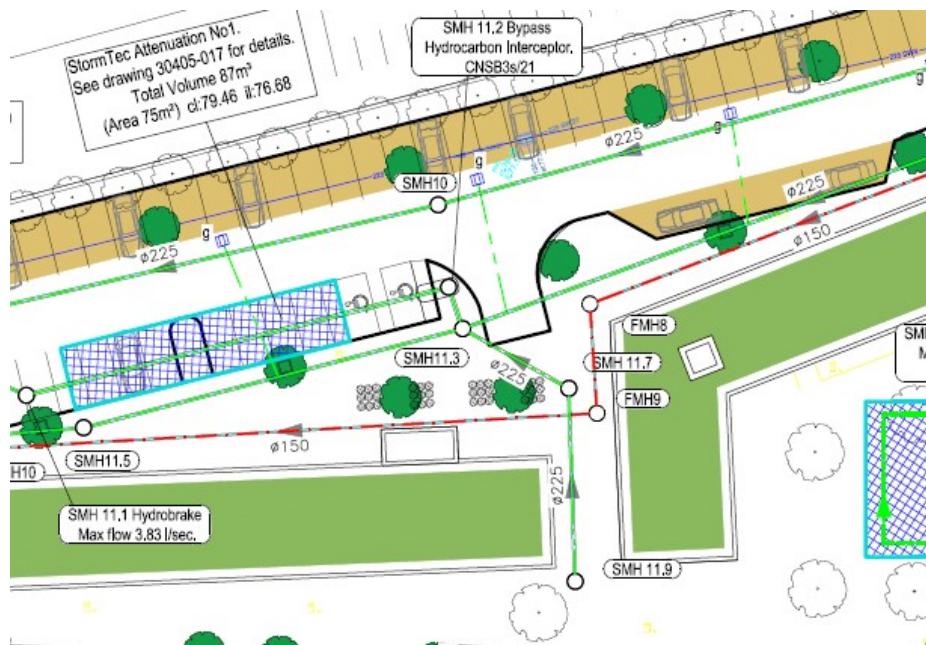
2. SITE ASSESSMENT OF FLOOD RISK

The site has been reviewed in accordance with the Dun Laoghaire Rathdown County Development Plan 2016 -2022 and Appendix 13 Strategic Flood Risk Assessment to assess the location of the site and the potential of flooding occurring.

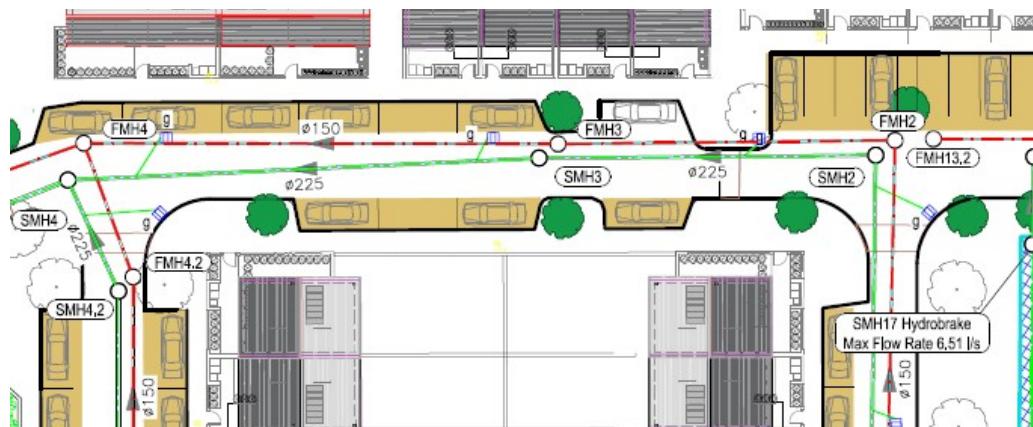
The site is not located in a flood risk area and therefore is in Zone C which is low risk probability of flooding.



In accordance with Appendix 13 of Dun Laoghaire Rathdown Development Plan an assessment has been carried out to determine the potential of local flooding in the site. There are three locations where potential surface water could pond if there was a deficiency in the drainage network due to blockages. At the apartment blocks near attenuation No 1 the potential flooding would occur at Manhole SMH11.3 which would result in surface water on the road area. This would not impact the adjoining apartments as the ground level of these units are over 300mm above the finished road level. The ponding would occur over the car parking and road surface only as the kerbing would contain the water.



Another area where there could be potential surface water ponding is ion the area of Manholes SMH03 and SMH02 which are the lowest cover level manholes in the development. The impact would be flooding of the access road and parking over the extent of the road and then discharge to the green landscape area. The housing units either side of the road are over 300mm above the road finished levels providing adequate protection form flooding of the units.



The final potential area for ponding due to partial blockage of the surface water system is the area outside the attenuation area No 3 at manhole SMH 15 and SMH16 being the lowest covers to this drainage system. The potential of any surface water flooding will be to discharge from the road surface to the green landscape area. It is proposed to reduce the extent of the kerbs around this landscape area to allow such discharge if the issue does occur.



3. SURFACE WATER DISCHARGE

a. Proposed Network

It is proposed to utilise the existing surface water discharge locations for the new proposed scheme. By the limitation of the discharge from the site to the 2l/h per sec a

This layout is largely in line with the amended Masterplan but with some minor modifications.

b. Surface Water Storage

In accordance with the GDSDS runoff from the development would be limited to an appropriate greenfield runoff rate and attenuation storage would be provided within the site to cater for storms with return periods of up to and including 100 years. Outfall manholes located at strategic positions along the drainage network will contain flow restrictions which will be employed to limit the overall site runoff.

c. Sustainable Drainage Proposals

Surface water drainage within the site will be designed incorporating Sustainable Urban Drainage Systems (SUDS). All surface water will be attenuated to greenfield runoff levels. Attenuation storage will be provided on site to cater for the 1 in 100-year rainfall event.

In accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and the Greater Dublin Regional Code of Practice for Drainage Works it is proposed to include a number of SUDS including the following:

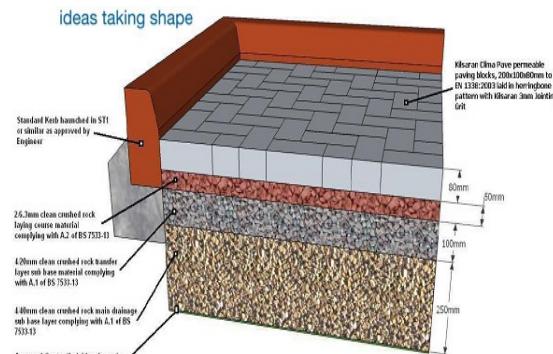
Green Roof

To reduce the impact of surface water runoff within the development it is proposed to use sedum/ moss type green roof to the Apartments buildings. This is an intensive green roof with minimal growing medium depth. The roof area will have up to 90% of the surface with a sedum green roof.



Porous paving

The car parking areas to the development are designed with porous paving which will also utilise planar infiltration drainage through the stone sub-base below to an infiltration drain. Stone with a void ratio of 35% to 40% will be utilised for the capping layer/ sub base below the surfacing utilising the benefit of planar infiltration to the infiltration trench along with some local storage for attenuation.



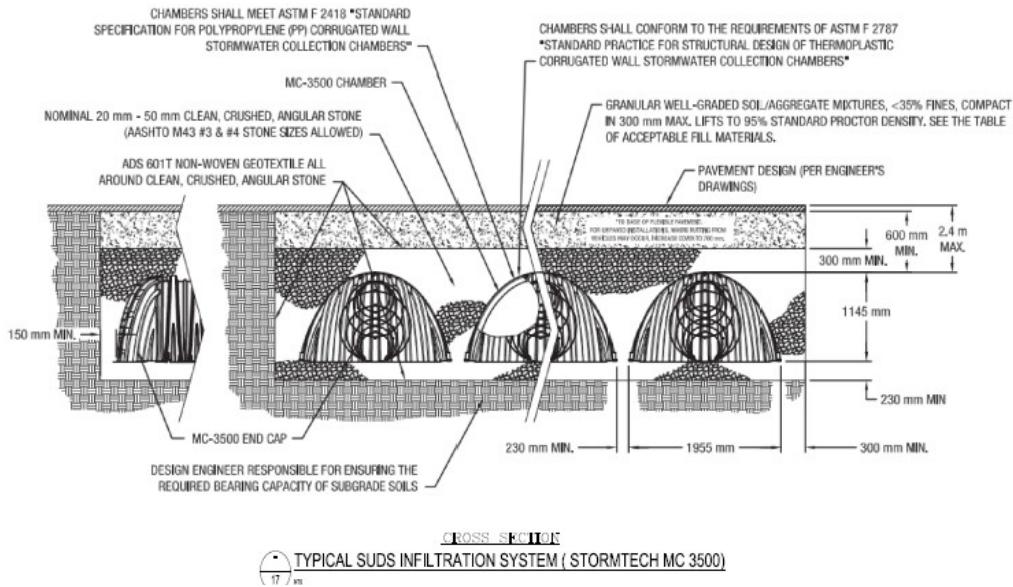
Tree Bases, Filter drains and Planting areas.

Where the trees and plants are located along parking areas there will be a system of filters and gully connections to the tree pit storage system which will incorporate surplus water retention.

Filter drains will be located in the landscaped area and will be designed in accordance with current guidelines and regulations including the CIRIA C753.

Underground storage

Storage by use of Stormtech or similar system is proposed under the landscape areas which provides a maintenance free system of retention of surface water. Flow of the water through filter pipes enable the excess discharge to flow out within the tone filter bed.



4. FOUL WATER DISCHARGE

a. Proposed Network

Due to the natural fall and topography of the area most of the foul water discharge will be in a separate pipe system falling by gravity to the existing 375mm pipe which crossed under the motorway. There are existing manholes on the site to enable connection into this sewer. There will also be a requirement due the proposed profile of the development to provide a foul discharge pipe into the adjoining development.

Total foul water discharge is based on the following maximum population

Type of Unit	Max Pop per unit	No of Units	Total PE
2 bed Houses	4	59	236
3 bed Houses	6	8	48
1 bed apartments	2	40	80
2 bed apartments	4	12	48
Total		119	412

Having a rate of 250l/pop/day over a 24-hour period the proposed maximum peak discharge from the site at 6 DWF will be **7.2 l/sec** and 1.2 l/sec averaged over a 24-hour period.

For layout and details of the proposed Foul Water drainage please refer to the drawings.

b. Consultations with Irish Water

A pre-connection application has been made to Irish Water in relation to the development for both foul and surface water. Attached in the Appendix B is the acceptable response from Irish Water. Note the application was for 121 units as opposed to the revised 119 units which has no impact on the application.

5. WATER SUPPLY

The proposed development of 119 units will be fed from the existing 300mm watermains which is located within the proposed site. This main currently passes under the motorway and feeds the main area of Ballyogan

The water demand for the development is based on the following:

	No. of Units	Required flow M3/hr (400x 250l/p/d)	Peak Usage (L/s) 3 x Ave	Avg Usage (L/s)
Total	119	4.3 m3/hr	3.6 l/sec	1.2 l/sec

The proposed watermain, connections and hydrants will all be installed in accordance with the Irish Water specification for developments.

The ring main will be a minimum of 150mm diameter as the development is over 50 number of units. Spurs and connections from the ring main will be 100mm diameter.

APPENDIX A

SURFACE WATER DRAINAGE DESIGN

Ballyogan Attenuation Design**Catchment #1****1 in 100 Year Storm Event****A. Site Area and Permeability**

Description	Plan Area (m ²)	Impermeability Factor Units	Equivalent Impermeable Area (m ²)
Permeable paving	480	0.50	240
General Hardstand	2074	0.95	1970
Roofs (Green)	951	0.95	903
Landscaping	2267	0.05	113
Total (m²)	5772	-	3227
Total (ha)	0.58	-	0.32

Total Area of catchment = 5772 m²
= 0.58 ha
Equivalent Impermeable Site Area : = 3227 m²
= 0.32 ha

B. Permissible Site Run-off

$$\text{QBAR} = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

AREA	=	500000 m ²
^{3.} SAAR	=	1006
SOIL (Type S3)	=	0.37
QBAR	=	0.2196 m ³ /s
	=	219.56 l/sec

Area of site = 5772.00

Allowable discharge = 2.53 l/sec

Ballyogan Attenuation Design
Catchment #1

C. Attenuation Size Calculation

Allowable discharge from Site = 2.53 l/sec

Return Period : **100 years**

Impermeable area of attenuation catchment = 3227 m²

Extreme Rainfall Event					Runoff	Runoff	Attenuation
Duration	Duration	Depth ^{4.}	+ 10% ^{5.}	Rate	Total	Excess	Volume
minutes	hrs	mm	mm	mm/hr	l/s	l/s	m3
5	0.08	10.90	16.50	198.00	177.49	174.96	52.49
10	0.17	15.20	23.00	138.00	123.71	121.17	72.70
15	0.25	17.80	27.00	108.00	96.81	94.28	84.85
30	0.50	23.40	33.40	66.80	59.88	57.35	103.22
60	1.00	30.70	41.30	41.30	37.02	34.49	124.15
120	2	40.30	51.10	25.55	22.90	20.37	146.66
180	3	47.30	57.80	19.27	17.27	14.74	159.15
240	4	52.90	63.20	15.80	14.16	11.63	167.46
360	6	62.10	71.50	11.92	10.68	8.15	175.99
540	9	72.80	81.00	9.00	8.07	5.53	179.28
720	12	81.50	88.40	7.37	6.60	4.07	175.78
1080	18	95.50	100.10	5.56	4.99	2.45	158.79
1440	24	106.90	109.30	4.55	4.08	1.55	133.74
2880	48	121.30	123.00	2.56	2.30	-0.24	0.00
4320	72	134.40	134.50	1.87	1.67	-0.86	0.00

Required Attenuation Volume for extreme 100 year Storm Event :

179 m³

References:

1. CIRIA C697 The SUDS Manual, Section 3.2
Greater Dublin Regional Code of Practice V6.0, Section 16.3
2. Institute of Hydrology Report No. 124, Section 7.2, Eqn 7.1. CIRIA C697
The SUDS Manual, Table 4.2 states that the Institute of Hydrology Report No. 124 is to be used to determine QBAR.
3. MET Eireann Annual Average Rainfall Grid
4. MET Eireann Online Data - Rainfall Return Period Table
5. An allowance of 10% has been included for climate change as per Table 6.2 of GDSDS Vol. 2

Ballyogan Attenuation Design**Catchment #2****1 in 100 Year Storm Event****A. Site Area and Permeability**

Description	Plan Area (m ²)	Impermeability Factor Units	Equivalent Impermeable Area (m ²)
Permeable paving	603	0.50	302
General Hardstand	3696	0.95	3511
Roofs (Green)	567	0.95	539
Roofs	1813	0.95	1722
Landscaping	3291	0.05	165
Total (m²)	9970	-	6238
Total (ha)	1.00	-	0.62

Total Area of catchment = 9970 m²

= 1.00 ha

Equivalent Impermeable Site Area : = 6238 m²

= 0.62 ha

B. Permissible Site Run-off

$$^1. \text{ QBAR} = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

AREA = 500000 m²

^3. SAAR = 1006

SOIL (Type S3) = 0.37

QBAR = 0.2196 m³/s

= 219.56 l/sec

Area of site = 9970.00

Allowable discharge = 4.38 l/sec

**Ballyogan Attenuation Design
Catchment #2**

C. Attenuation Size Calculation

Allowable discharge from Site = 4.38 l/sec

Return Period : **100 years**

Impermeable area of attenuation catchment = 6238 m²

Extreme Rainfall Event					Runoff Total	Runoff Excess	Attenuation Volume
Duration	Duration	Depth ^{4.}	+ 10% ^{5.}	Rate			
minutes	hrs	mm	mm	mm/hr	l/s	l/s	m3
5	0.08	10.90	16.50	198.00	343.10	338.73	101.62
10	0.17	15.20	23.00	138.00	239.13	234.75	140.85
15	0.25	17.80	27.00	108.00	187.15	182.77	164.49
30	0.50	23.40	33.40	66.80	115.75	111.38	200.48
60	1.00	30.70	41.30	41.30	71.57	67.19	241.88
120	2	40.30	51.10	25.55	44.27	39.90	287.25
180	3	47.30	57.80	19.27	33.39	29.01	313.29
240	4	52.90	63.20	15.80	27.38	23.00	331.22
360	6	62.10	71.50	11.92	20.65	16.27	351.47
540	9	72.80	81.00	9.00	15.60	11.22	363.45
720	12	81.50	88.40	7.37	12.77	8.39	362.33
1080	18	95.50	100.10	5.56	9.64	5.26	340.76
1440	24	106.90	109.30	4.55	7.89	3.51	303.59
2880	48	121.30	123.00	2.56	4.44	0.06	10.80
4320	72	134.40	134.50	1.87	3.24	-1.14	0.00

Required Attenuation Volume for extreme 100 year Storm Event :

363 m³

References:

1. CIRIA C697 The SUDS Manual, Section 3.2
Greater Dublin Regional Code of Practice V6.0, Section 16.3
2. Institute of Hydrology Report No. 124, Section 7.2, Eqn 7.1. CIRIA C697
The SUDS Manual, Table 4.2 states that the Institute of Hydrology Report
No. 124 is to be used to determine QBAR.
3. MET Eireann Annual Average Rainfall Grid
4. MET Eireann Online Data - Rainfall Return Period Table
5. An allowance of 10% has been included for climate change as per Table
6.2 of GSDS Vol. 2

Ballyogan Attenuation Design
Catchment #3
1 in 100 Year Storm Event

A. Site Area and Permeability

Description	Plan Area (m ²)	Impermeability Factor Units	Equivalent Impermeable Area (m ²)
Permeable paving	843	0.50	422
General Hardstand	2490	0.95	2366
Roofs	2215	0.95	2104
Landscaping	4055	0.05	203
Total (m²)	9603	-	5094
Total (ha)	0.96	-	0.51

$$\begin{aligned} \text{Total Area of catchment} &= 9603 \text{ m}^2 \\ &= 0.96 \text{ ha} \\ \text{Equivalent Impermeable Site Area :} &= 5094 \text{ m}^2 \\ &= 0.51 \text{ ha} \end{aligned}$$

B. Permissible Site Run-off

$$1. \quad Q_{BAR} = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

$$\begin{aligned} \text{AREA} &= 500000 \text{ m}^2 \\ \text{SAAR} &= 1006 \\ \text{SOIL (Type S3)} &= 0.37 \\ \text{Q}_{BAR} &= 0.2196 \text{ m}^3/\text{s} \\ &= 219.56 \text{ l/sec} \end{aligned}$$

$$\text{Area of site} = 9603.00$$

$$\text{Allowable discharge} = 4.22 \text{ l/sec}$$

**Ballyogan Attenuation Design
Catchment #3**

C. Attenuation Size Calculation

Allowable discharge from Site = 4.22 l/sec

Return Period : 100 years

Impermeable area of attenuation catchment = 5094 m²

Extreme Rainfall Event					Runoff Total	Runoff Excess	Attenuation Volume
Duration	Duration	Depth ^{4.}	+ 10% ^{5.}	Rate			
minutes	hrs	mm	mm	mm/hr	l/s	l/s	m ³
5	0.08	10.90	16.50	198.00	280.17	275.95	82.79
10	0.17	15.20	23.00	138.00	195.27	191.05	114.63
15	0.25	17.80	27.00	108.00	152.82	148.60	133.74
30	0.50	23.40	33.40	66.80	94.52	90.31	162.55
60	1.00	30.70	41.30	41.30	58.44	54.22	195.20
120	2	40.30	51.10	25.55	36.15	31.94	229.94
180	3	47.30	57.80	19.27	27.26	23.05	248.89
240	4	52.90	63.20	15.80	22.36	18.14	261.22
360	6	62.10	71.50	11.92	16.86	12.65	273.14
540	9	72.80	81.00	9.00	12.74	8.52	275.99
720	12	81.50	88.40	7.37	10.42	6.21	268.14
1080	18	95.50	100.10	5.56	7.87	3.65	236.66
1440	24	106.90	109.30	4.55	6.44	2.23	192.44
2880	48	121.30	123.00	2.56	3.63	-0.59	0.00
4320	72	134.40	134.50	1.87	2.64	-1.57	0.00

Required Attenuation Volume for extreme 100 year Storm Event :

276 m³

References:

1. CIRIA C697 The SUDS Manual, Section 3.2
Greater Dublin Regional Code of Practice V6.0, Section 16.3
2. Institute of Hydrology Report No. 124, Section 7.2, Eqn 7.1. CIRIA C697
The SUDS Manual, Table 4.2 states that the Institute of Hydrology Report
No. 124 is to be used to determine QBAR.
3. MET Eireann Annual Average Rainfall Grid
4. MET Eireann Online Data - Rainfall Return Period Table
5. An allowance of 10% has been included for climate change as per Table
6.2 of GDSDS Vol. 2

APPENDIX B

Irish Water Pre Connection Confirmation

Dun Laoghaire-Rathdown County Council c/o Ken McGauran
Nicholas O Dwyer Ltd.
Unit E4, Nutgrove Office Park
Nutgrove Avenue
Dublin 14



Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

17 September 2018

Dear Sir/Madam,

Irish Water
PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

Re: Customer Reference No 7893018061 pre-connection enquiry - Subject to contract | Contract denied
121 Unit Residential Development

Irish Water has reviewed your pre-connection enquiry in relation to
water and wastewater connections at Ballyogan Court, Ballyogan, Co. Dublin
Based upon the details you have provided with your pre-connection enquiry and on the capacity currently available as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network can be facilitated.

Water Supply- Connection shall be to the 300mm diameter water main to ensure security of supply.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Utility Regulation.

If you have any further questions, please contact us on 1850 278 278 or +353 1 707 2828, 8.00am-4.30pm, Mon-Fri or email newconnections@water.ie. For further information, visit www.water.ie/connections

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

Stiúrthóirí / Directors: Mike Quinn (Chairman), Jerry Grant, Cathal Marley, Brendan Murphy, Michael G. O'Sullivan
Ofic Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86
Is culdeachta ghniorúchaithe atá faoi theoiríonn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363