BARRETT **MAHONY**
CONSULTING ENGINEERS
CIVIL & STRUCTURAL

comhairle chontae na mí
meath county council

Fair Green
Oldcastle
Co. Meath

DRAINAGE STRATEGY REPORT

Part 8 Planning Application
July 2023

DOCUMENT CONTROL

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APPENDICES

1. INTRODUCTION

1.1 SCOPE OF THIS REPORT

Barrett Mahony Consulting Engineers Ltd. have been appointed by Meath County Council to prepare civil infrastructure design proposals for a new public play park development at Fair Green, Oldcastle, Co. Meath.

This report has been prepared to describe the proposed civil engineering infrastructure for the development and how it connects to the public infrastructure serving the area. Surface water drainage & wastewater drainage engineering aspects are addressed.

This report should be read in conjunction with the following civil engineering drawings submitted with the planning application:

Drg. No.	Drawing Title
23197-BMD-00-ZZ-DR-C-1000	Proposed Drainage Plan Layout
23197-BMD-00-ZZ-DR-C-1200	Typical Construction Details

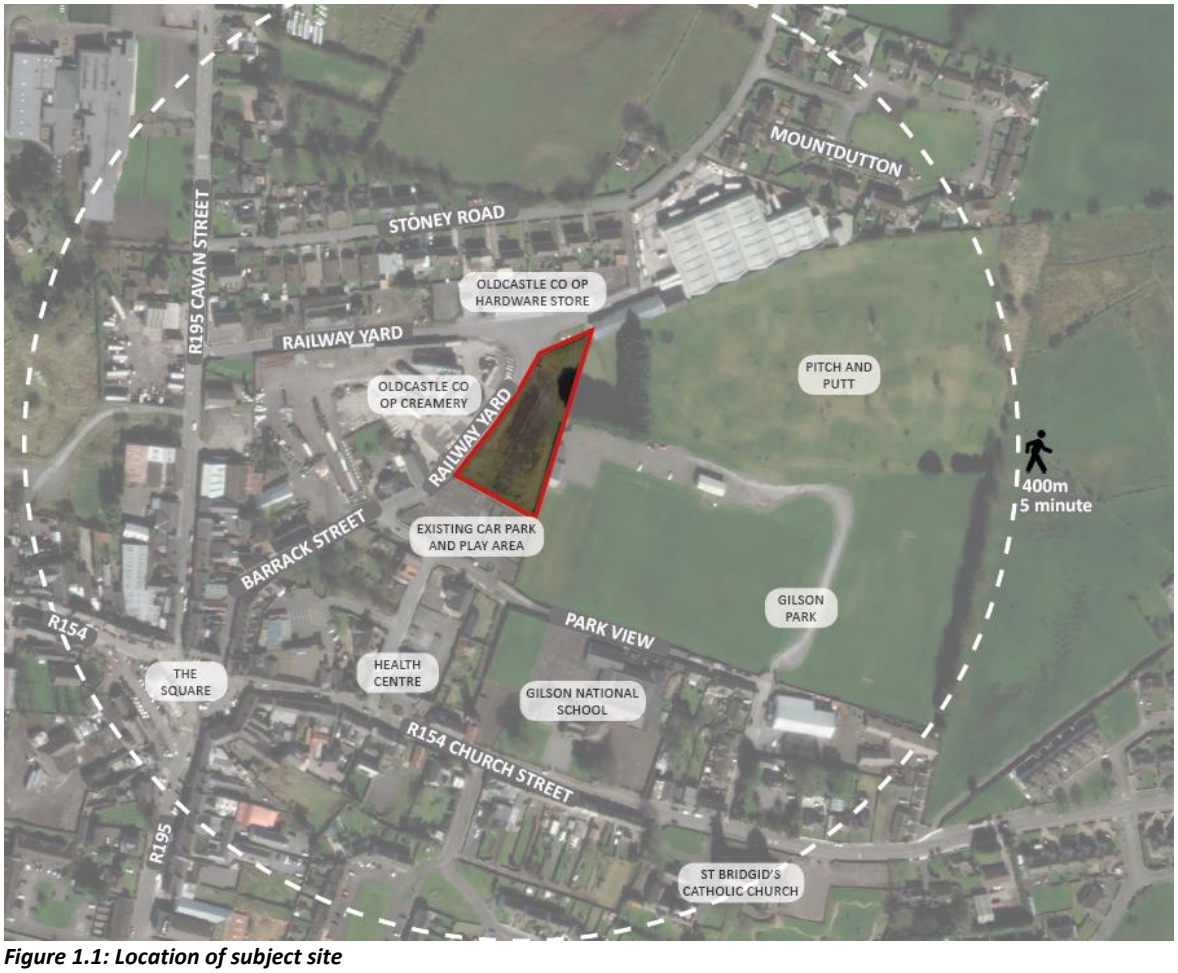


Figure 1.1: Location of subject site

1.2 GENERAL DESCRIPTION

The site is located within an established suburban area, adjacent to the Railway Yard in Oldcastle, opposite the Co-Op and to the west of the GAA/Soccer/Pitch and Putt grounds. The site red line boundary encompasses approximately 6,009m² and is outlined in red on Figure 1.1.

A topographical survey of the site indicates a change in grade of approximately 1.7m, sloping from the highest point (approx. +106.8m AOD) at the northeast corner of the site towards the south of the site (approx. +105.1m AOD).

The site is covered partially in a tarmac surface with a channel drain passing down through the middle of the site. To the southeastern corner of the site, there is an existing playground which will be demolished as part of the proposed works.

2. SURFACE WATER DRAINAGE SYSTEM

2.1 EXISTING SURFACE WATER INFRASTRUCTURE

The subject site currently has a concrete surface water drainage channel passing through the centre of the site in a north-south direction, and this appears to connect to an existing foul drainage manhole within the site.

2.2 EXISTING SITE DATA

Rainfall data gleaned from Met Eireann records (refer to Appendix I) indicate the following rainfall parameters are applicable to the site in question:

- M5-60 = 17.7
- M5-2D = 65.1
- Ratio "r" = 0.272

Ground investigations will be undertaken prior to construction. However, an infiltration rate of 1 x 10^{-5}m/s has been assumed for the purposes of soakaway sizing using guidance contained in the CIRIA SuDS Manual. It is expected that infiltration rates will be greater than the above figures, however, and site-specific soakaway testing will be carried out prior to commencement to establish a more accurate estimation of the available infiltration rate.

2.3 PROPOSED SURFACE WATER DRAINAGE SYSTEM

The surface water drainage strategy for the proposed park development will follow the principles of Sustainable Drainage Systems (SuDS). The high-level strategy for the development will involve collecting run-off from impermeable and partially permeable surface finishes using surface water linear drainage channels and buried pipework, leading to a large central soakaway system beneath the lawn/grassed public open space.

It is noted that all surface water run-off arising from the proposed development, will be disposed of within the confines of the site, infiltrating naturally to ground, with no proposed discharge to any other existing surface water drainage networks in the area. Thus, the proposed surface water drainage strategy provides a wholly sustainable & self-sufficient means of surface water management by discharging surface water back to ground at source, and therefore replicating the pre-development conditions.

The ballcourts and pump track areas will be finish in a painted impermeable asphalt finish and will drain towards linear drainage channels at the boundaries of the asphalt surfacing. Feature paving has been provided at locations throughout and will be constructed using a full infiltration permeable paving buildup (System C buildup). Playground areas will be surfaced in porous wet-pour safety surfacing. The main pedestrian paths will be finished in compacted gravel, and to mitigate the risk of loose material washing into the drainage network, it is proposed to install silt sump units at each outlet from the linear drainage channels. Additionally, a 0.5m sump has been provided at each of the 2no. inlet manholes to the soakaway system.

In summary the site area within the redline boundary is 6,009m². The measured catchment area potentially draining to the central soakaway (i.e. area within the boundary walls) has been conservatively estimated at 4,910m². When run-off coefficients are applied to the various surface finishes, the effective area draining to the soakaway is estimated as 2395.5m².

The proposed soakaway will accommodate the 1% AEP (annual exceedance probability) rainfall event with an allowance for 20% climate change and a Factor of Safety of 1.5, using an assumed infiltration rate of 1 x 10^{-5}m/s. Site-specific soakaway testing will be carried out prior to commencement to establish a more accurate estimation of the available infiltration rate. The proposed soakaway will be a proprietary cellular storage crate soakaway system with a storage volume capacity of 234.08m^3. The soakaway will measure 22m long by 7m wide by 1.6m deep with a voids ratio of approximately 95%.

A summary of the drained areas contributing to the drainage network has been prepared, and is provided in Appendix I, along with design calculation output for the proposed soakaway.

Please also refer to drawing C-1000 which shows the proposed drainage plan layout for the development.

2.4 Compliance with the Principles of Sustainable Drainage Systems

The proposed development is designed fully in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of urbanization by replicating the run-off characteristics of the greenfield site. The criteria provide a consistent approach to addressing the increase in both rate and volume of run-off, as well as ensuring the environment is protected from any pollution from roads and buildings. These drainage design criteria are as follows:

- Criterion 1 – River Water Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Flood Risk Assessment
- Criterion 4 – River Flood Protection

The requirements of SuDS are typically addressed by provision of the following:

- Interception storage
- Treatment storage (not required if interception storage is provided)
- Attenuation storage
- Long term storage (not required if growth factors are not applied to QBAR when designing attenuation storage)

In the case of the subject site all surface water discharge will be via infiltration at the central soakaway which also has capacity built-in to provide the required attenuation storage during storm events up to the 1% AEP event. As such, by removing the need to discharge surface water off-site, full interception storage is provided and there will be no requirement for treatment storage or long-term storage. Appendix I also provides a breakdown of the measured areas contributing to each network, along with run-off coefficients assumed.

2.4.1 Criterion 1 GDSDS – River Water Quality Protection

Run-off from natural greenfield areas contributes very little pollution and sediment to rivers and for most rainfall events direct run-off from greenfield sites to rivers does not take place as rainfall percolates into the ground. By contrast, urban run-off, when drained by pipe systems, results in run-off from virtually every rainfall event with higher levels of pollution, particularly in the first

phase of run-off, with little rainfall percolating to the ground. To prevent this happening, Criterion 1 requires that interception storage and/or treatment storage is provided, thereby replicating the run-off characteristics of the pre-development greenfield site.

2.4.1.1 Interception Storage

Interception storage where provided, should ensure that, at a minimum, the first 5mm of rainfall is intercepted on site and does not find its way to the receiving water. In the case of the subject site all surface water discharge will be via infiltration at the central soakaway, thus by default meets the 5mm requirement.

2.4.1.2 Treatment Storage

In accordance with the GDSDS, interception storage & treatment storage are interchangeable. Since full interception storage has been provided, treatment storage is not required.

2.4.2 Criterion 3 GDSDS – Site Flooding

The GDSDS requires that no flooding should occur on site for storms up to and including the 1 in 30-year event. The pipe network and the attenuation storage volumes should, therefore, be adequate for such storms to ensure that no site flooding occurs although partial surcharging of the system is allowed so long as it does not threaten to flood.

For the 1 in 100 year + 20% CC event, the pipe network can fully surcharge and cause site flooding, but the top water level due to any such flooding must be at least 500mm below any vulnerable internal floor levels, and the flood waters should be contained within the site. In addition, the top water level in any attenuation device during the 100-year storm must be at least 500mm below any vulnerable internal floor levels.

Appendix I gives soakaway design calculation output which shows the soakaway system does not flood for the 1 in 100 year + 20% CC event.

The peak volume in the soakaway system for the 1 in 100 year + 20% CC event is 230.32m3 (refer to Appendix I) which equates to a depth of 1.57m in the soakaway structure, and thus a top water level of +103.87m which is greater than 500mm below any existing floor levels adjacent to the site.

GDSDS Criterion 3 is therefore complied with.

2.4.3 Criterion 2 & 4 GDSDS – River Regime & Flood Protection

Whatever the rainfall event, unchecked run-off from the developed site through traditional pipe networks will discharge into receiving waters at rates that are an order of magnitude greater than that prior to development. This can cause flash flow in the outfall river / stream that can cause scour and erosion.

Criterion 4 is intended to prevent flooding of the receiving system / watercourse by either limiting the volume of run-off to the predevelopment volume using “long term storage” (Option 1) or by limiting the rate of run-off for the 100-year storm to QBAR without applying growth factors using “extended attenuation storage” (Option 2).

As noted above, no surface water is proposed to be transferred to river networks, therefore there is no requirement for long-term storage to limit the impact on the receiving watercourse.

3. FLOOD RISK

3.1 INTRODUCTION

The flood risk assessment outlined below is carried out in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities". The OPW publication also outlines a Sequential Approach for determining whether a development is appropriate for a specified location in terms of flood risk. The categorization of the subject site in terms of the OPW's sequential approach is further outlined in section 3.2 below.

3.2 STAGE 1: FLOOD RISK IDENTIFICATION

Stage 1 identifies whether there are any flooding or surface water management issues related to the site, i.e., it identifies whether a flood risk assessment is required.

A desktop review of the available flood mapping available for the area on FloodMaps.ie indicates no flood risk close to the subject site, with the nearest area at risk of flooding based on the OPW National Indicative Flood Mapping flood extents, over 1km away, to the south of Oldcastle. Refer to Figure 3.1 below.

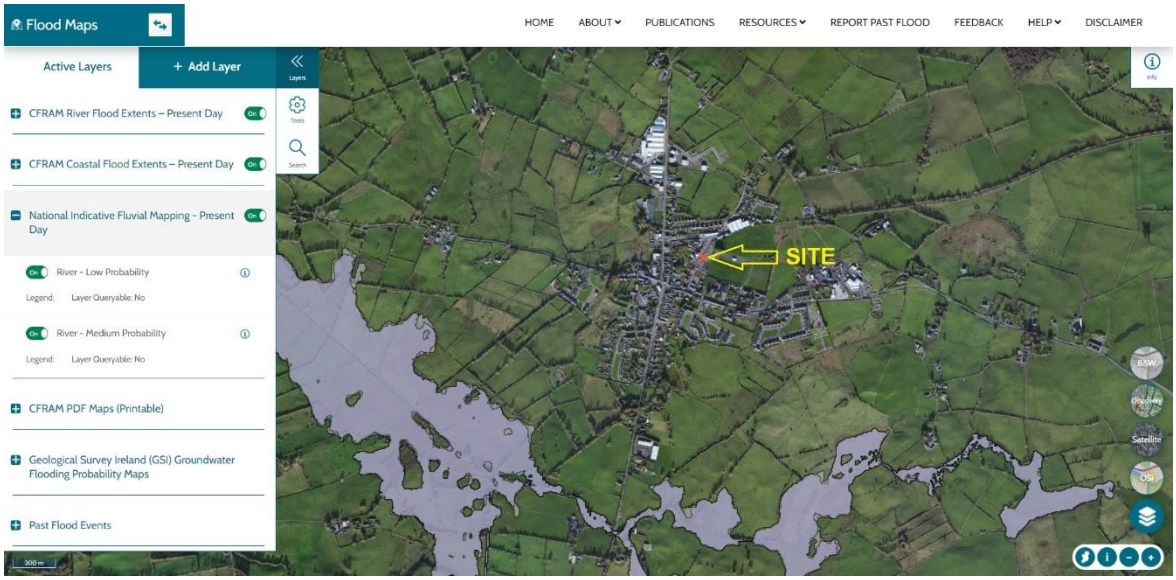


Figure 3.1: Extract from Floodmaps.ie showing National Indicative Flood Mapping

3.2.1 Flood Zones

The sequential approach defines the flood zones as detailed below:

- *Flood Zone A* – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- *Flood Zone B* – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- *Flood Zone C* – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

In this case the subject site is located in Flood Zone C.

3.2.1.1 Vulnerability Class

The sequential approach describes the vulnerability classes as follows:

- *Highly vulnerable development* – hospitals, schools, houses, student halls of residence etc.
- *Less vulnerable development* – retail, commercial, industrial, agriculture etc.

  and
- *Water compatible development* – docks, marinas, amenity open space etc.

The development is a public park development which is classed as 'a water compatible' development.

3.2.1.2 Development Classification

The matrix of vulnerability as per "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" is reproduced in Table 3.1 below:

Table 3.1: Matrix of Vulnerability

	Flood Zone A	**Flood Zone B**	**Flood Zone C**
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water compatible development	Appropriate	Appropriate	Appropriate

This development is therefore deemed appropriate. The site does not require a sequential justification test to be completed. No CFRAM maps are available for the location of the proposed development.

3.3 STAGE 2: INITIAL FLOOD RISK ASSESSMENT

The initial flood risk assessment should ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and potential conflicts between flood risk and development are addressed. It should assess the adequacy of existing information and any flood defences.

3.3.1 Examination of potential flooding sources that can affect the site

The possible sources of flood water are assessed in the table below using the "**Source – Pathway – Receptor Model"**.

Table 3.2: The possible sources of flood water

Source	**Pathway**	**Receptor**	**Likelihood**	**Consequence**	**Risk**
Tidal Note (Note 1)	Overtop Breach	People Property	Unlikely	High	Very Low
Fluvial Note	Overtop Breach	People Property	Unlikely	High	Very Low
Pluvial Surface water	Overflow / Blockage	People Property	Possible	Moderate	Moderate
Groundwater	Rising groundwater levels	People Property	Unlikely	Low	Low

3.3.2 Appraisal of the availability and adequacy of existing information and flood zone maps

As noted in section 3.2 of this report, a desktop review of the available flood mapping available for the area on FloodMaps.ie indicates no flood risk close to the subject site, with the nearest area at risk of flooding based on the OPW National Indicative Flood Mapping flood extents, over 1km away, to the south of Oldcastle. Refer to Figure 3.1 of this report. The screenshot Figure 3.1 shows that the site is located outside of the Flood Risk Areas (Fluvial, Coastal, Pluvial, Groundwater Flood Extents) based on the Floodmaps.ie resource.

3.3.3 Determination of what technical studies are appropriate

Following a review of the available information regarding flooding it is not considered necessary to carry out any further analysis of fluvial or tidal flooding.

4. FOUL DRAINAGE SYSTEM

4.1 EXISTING FOUL SEWER INFRASTRUCTURE

From a review of the available Irish Water mapping, it is noted there is existing foul sewer infrastructure within the site. An existing 225mm diameter sewer enters the site from the northwest, and connects with another 150mm diameter sewer at a manhole at the north of the site. An existing 225mm sewer then runs from this existing manhole through the site in a southerly direction parallel to the eastern boundary wall, to another manhole in the existing car park immediately south of the site. Refer to Appendix II for existing foul sewer records.

4.2 PROPOSED FOUL SEWER SYSTEM

The development itself does not necessitate a foul sewer connection.

However, upon reviewing the proposed site layout in the context of existing manhole and sewer pipe positions, it will be necessary to divert the existing foul sewer. The diversion is necessary to facilitate new tree-planting, and to ensure that manhole covers do not clash with proposed ballcourts & play surfaces as these manhole covers may pose a slip/trip hazard.

Please refer to drawing C-1000 which describes the proposed foul sewer diversion in more detail. Subject to further discussion with Irish Water, a Diversion Agreement will be entered into to divert the existing foul sewer infrastructure.

5. WATER INFRASTRUCTURE

5.1 EXISTING WATER SUPPLY INFRASTRUCTURE

The subject site currently has no watermains infrastructure within the current boundary walls. However, there is an existing watermains which runs adjacent to the site in the public footpath to the west. There are no water infrastructure upgrades or diversions proposed as part of the development. Refer to Appendix II for existing watermains records.

APPENDIX I

Site Coordinates & Met Eireann Data

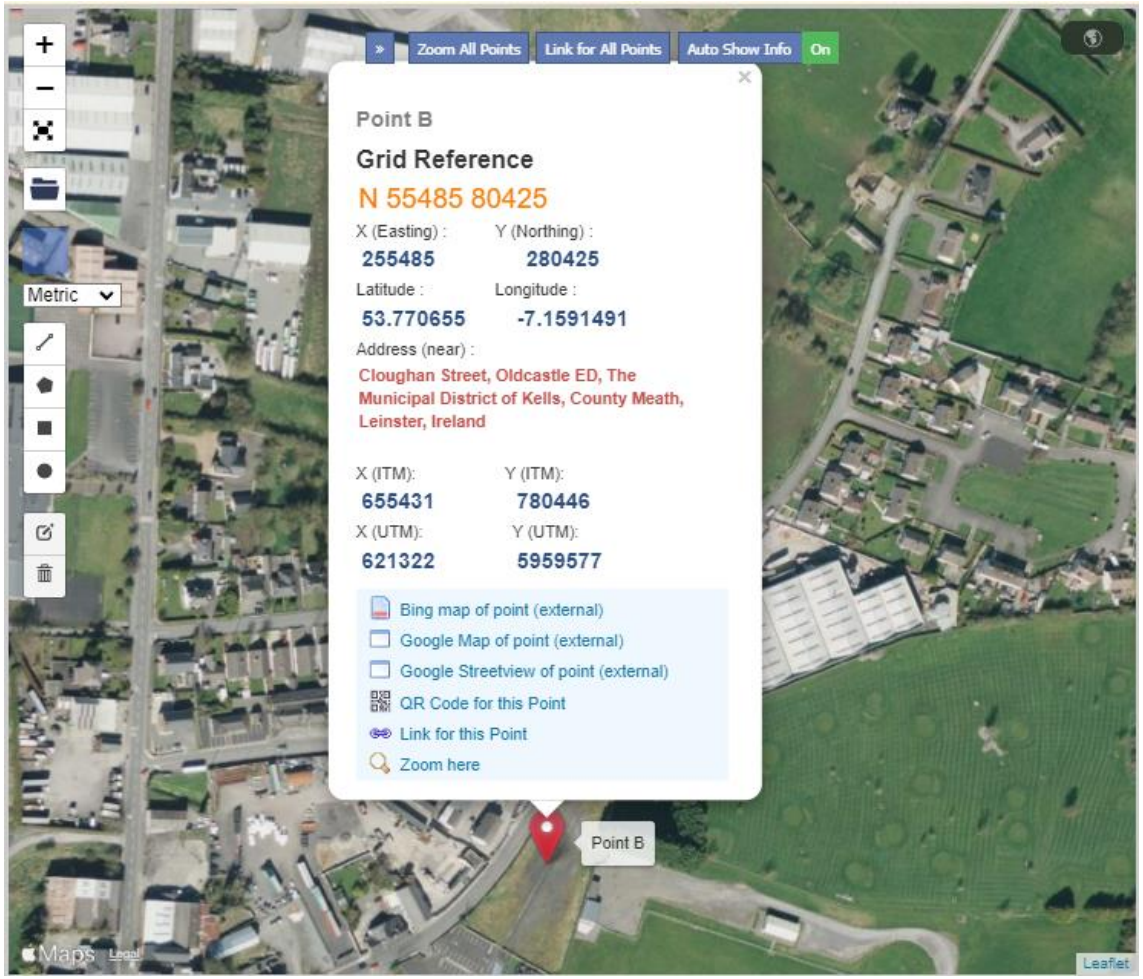
Drained Area Summary

Soakaway Design Calculations

Site Coordinates (ING):

E: 255485, N: 280425

Source: https://irish.gridreferencefinder.com/



Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 255485, Northing: 280425,

Fair Green, Oldcastle, Co. Meath

	Interval		Years									
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	2.9,	4.0,	4.6,	5.5,	6.1,	6.6,	8.1,	9.8,	11.0,	12.5,	13.9,	15.0,	15.7,
10 mins	4.0,	5.6,	6.4,	7.7,	8.5,	9.2,	11.3,	13.7,	15.3,	17.5,	19.4,	20.9,	21.9,
15 mins	4.7,	6.6,	7.6,	9.1,	10.0,	10.8,	13.3,	16.1,	18.0,	20.5,	22.8,	24.6,	25.8,
30 mins	6.3,	8.6,	9.8,	11.7,	12.9,	13.8,	16.9,	20.3,	22.5,	25.6,	28.3,	30.4,	31.8,
1 hours	8.3,	11.2,	12.7,	15.0,	16.5,	17.7,	21.4,	25.5,	28.2,	31.9,	35.1,	37.6,	39.3,
2 hours	10.9,	14.6,	16.5,	19.3,	21.2,	22.6,	27.1,	32.1,	35.3,	39.7,	43.5,	46.5,	48.5,
3 hours	12.9,	17.1,	19.2,	22.4,	24.5,	26.1,	31.1,	36.7,	40.2,	45.1,	49.4,	52.6,	54.8,
4 hours	14.5,	19.1,	21.4,	24.9,	27.1,	28.9,	34.4,	40.3,	44.2,	49.4,	54.0,	57.5,	59.8,
6 hours	17.0,	22.3,	25.0,	28.8,	31.4,	33.3,	39.5,	46.1,	50.4,	56.2,	61.2,	65.1,	67.6,
9 hours	20.1,	26.0,	29.1,	33.4,	36.3,	38.5,	45.3,	52.7,	57.5,	63.9,	69.5,	73.7,	76.5,
12 hours	22.5,	29.1,	32.4,	37.1,	40.2,	42.6,	50.0,	58.0,	63.1,	70.0,	75.9,	80.5,	83.4,
18 hours	26.5,	33.9,	37.7,	43.1,	46.5,	49.2,	57.5,	66.3,	72.0,	79.6,	86.1,	91.1,	94.4,
24 hours	29.8,	37.9,	42.0,	47.8,	51.6,	54.5,	63.4,	73.0,	79.0,	87.2,	94.2,	99.5,	103.0,
2 days	37.5,	46.7,	51.3,	57.8,	61.9,	65.1,	74.8,	85.0,	91.4,	100.0,	107.3,	112.8,	116.4,
3 days	44.1,	54.3,	59.3,	66.3,	70.8,	74.2,	84.6,	95.5,	102.3,	111.3,	119.0,	124.8,	128.5,
4 days	50.0,	61.1,	66.5,	74.1,	78.9,	82.5,	93.5,	105.0,	112.2,	121.7,	129.7,	135.7,	139.6,
6 days	60.9,	73.5,	79.6,	88.0,	93.4,	97.4,	109.6,	122.2,	129.9,	140.3,	149.0,	155.4,	159.6,
8 days	70.9,	84.8,	91.5,	100.7,	106.6,	110.9,	124.1,	137.7,	146.0,	157.1,	166.4,	173.2,	177.7,
10 days	80.3,	95.4,	102.6,	112.6,	118.9,	123.5,	137.7,	152.2,	161.0,	172.7,	182.5,	189.8,	194.5,
12 days	89.4,	105.6,	113.3,	123.9,	130.6,	135.6,	150.6,	165.9,	175.2,	187.5,	197.8,	205.4,	210.3,
16 days	106.6,	124.9,	133.5,	145.3,	152.8,	158.2,	174.8,	191.6,	201.8,	215.2,	226.4,	234.6,	240.0,
20 days	123.1,	143.2,	152.7,	165.6,	173.7,	179.7,	197.6,	215.8,	226.8,	241.2,	253.1,	262.0,	267.7,
25 days	143.0,	165.3,	175.7,	189.9,	198.7,	205.3,	224.8,	244.5,	256.4,	271.9,	284.8,	294.3,	300.4,

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

M5-60 = 17.7
M5-2D = 65.1
ratio r = 0.272

23197 - Fair Green, Oldcastle, Co. Meath

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Summary of Areas Draining to Proposed Soakaway

Site Area (within redline boundary) = 6,009m^2

Surface Treatment Description	Total Measured Area (m^2)	Runoff Coefficient Applied	Total Effective Area (m^2)
Asphalt Ballcourts & Pump Track	758	0.95	720.1
Self Binding Gravel Paths	923	0.85	784.55
Permeable Paving	209	0.65	135.85
Porous Safety Play Surfacing	947	0.25	236.75
Soft Landscaping	2073	0.25	518.25
TOTAL	4910		2395.5

BM BARRETT MAHONY	**Project:**	Fair Green, Oldcastle, Co. Meath		**By: POD**
	Calculation:	Soakaway Design		
				Approved:
	Sheet Number:	1	**Date:**	29.06.23	POD

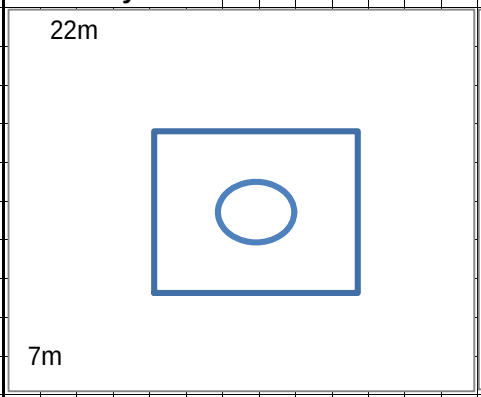
Catchment Details				
Catchment Area			2,396	m²
Location			Scotland & N Ireland	
City/Town			Other	
M5-60	-	Override-	17.7	
r Ratio	-	Override-	0.272	
Runoff Coefficient			100	%

Design Storm Details		
Return Period	100	years
Climate Change Allowance	1.2	

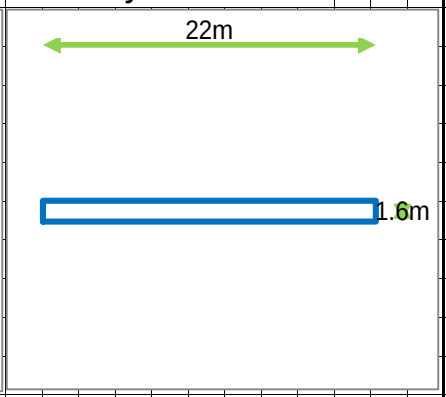
Ground Information			
Infiltration Rate	0.036	m/hr	1.00E-05 m/s
Factor of Safety	1.5		(TBC)

Soakaway Design		
Soakaway Shape	Rectangular Trench/Pit	
Number of Soakaways	1	
Length	7.00	m
Width	22.00	m
Effective Depth	1.60	m
Backfill Porosity	95	%
Additional Outflow (If Any)	0	l/s
Base Infiltration Factor	1	

Soakaway Plan

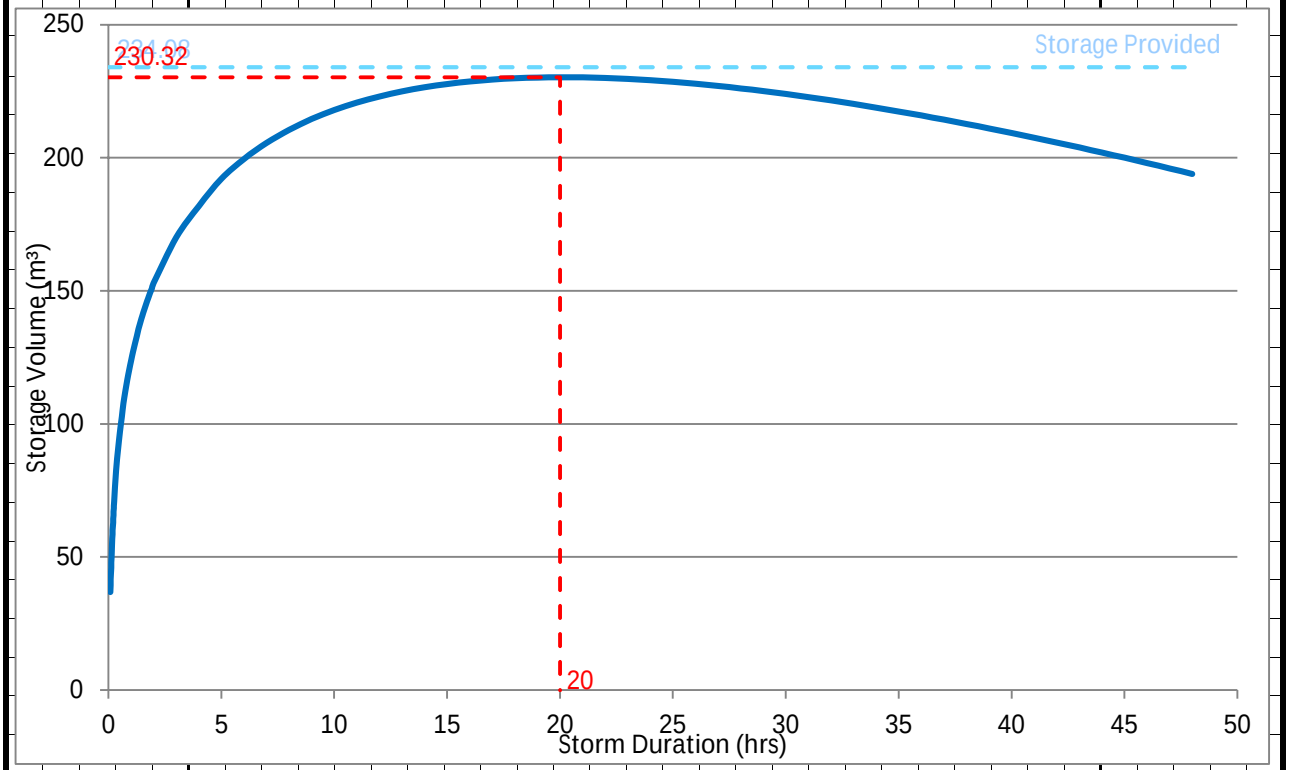


Soakaway Cross Section



BM BARRETT MAHONY	**Project:**	Fair Green, Oldcastle, Co. Meath			**By: POD**
	Calculation:	Soakaway Design			
					Approved:
	Sheet Number:	2	**Date:**	29.06.23	POD

Results



Maximum Storage Volume Required:	**230.32**	m³ (20hr Storm)	
Storage Volume Provided:	**234.08**	m³	Acceptable
Time of Emptying:	**9.1**	Hours	Acceptable

APPENDIX II

Irish Water Record Maps

Waste Water Network

Uisce Éireann
Irish Water

Legend

Sewer Gravity Mains (Irish Water owned)

Liquid

Foul

Sewer Pressurized Mains (Irish Water owned)

Liquid

Foul

Sewer

Manhole

Standard

OTHER Other;

Sewer Discharge

Discharge

OTHER Other;

Sewer

Fitting

VC Vent/Col

0 20 40 80 m

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

Scale @ A3:	1:2,500
Drawing No.:	IW-AGG-2018-000
Drawn By:	CD
Checked By:	<Add Name>
Approved By:	<Add Name>
Drawn Date	26/06/2023
Checked Date:	<dd/mm/yyyy>
Approved Date:	<dd/mm/yyyy>

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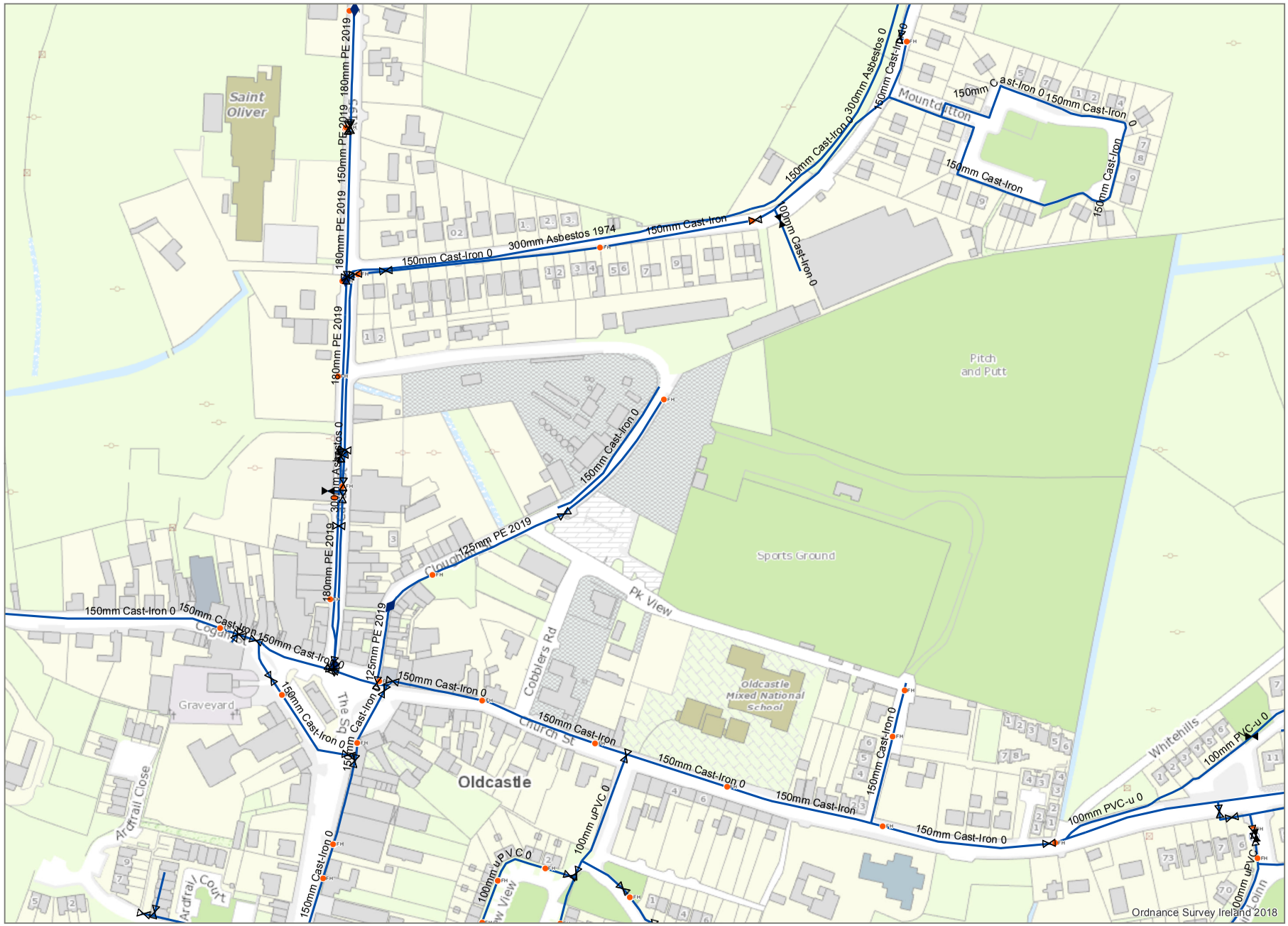

Uisce Éireann
Irish Water

Legend

Non Boundary Valves
- Open
- Closed

Air Control Valves
- Air Control Valves

Non Boundary Meter
- Meter

Water Hydrants
- Fire Hydrant

Water Mains(Irish Water Owned)
- Potable Water

0 20 40 80 m

Coordinate System: TM65 Irish Grid Projection: Transverse Mercator	
Scale @ A3:	1:2,500
Drawing No.:	IW-AGG-2018-000
Drawn By:	CD
Checked By:	<Add Name>
Approved By:	<Add Name>
Drawn Date	26/06/2023
Checked Date:	<dd/mm/yyyy>
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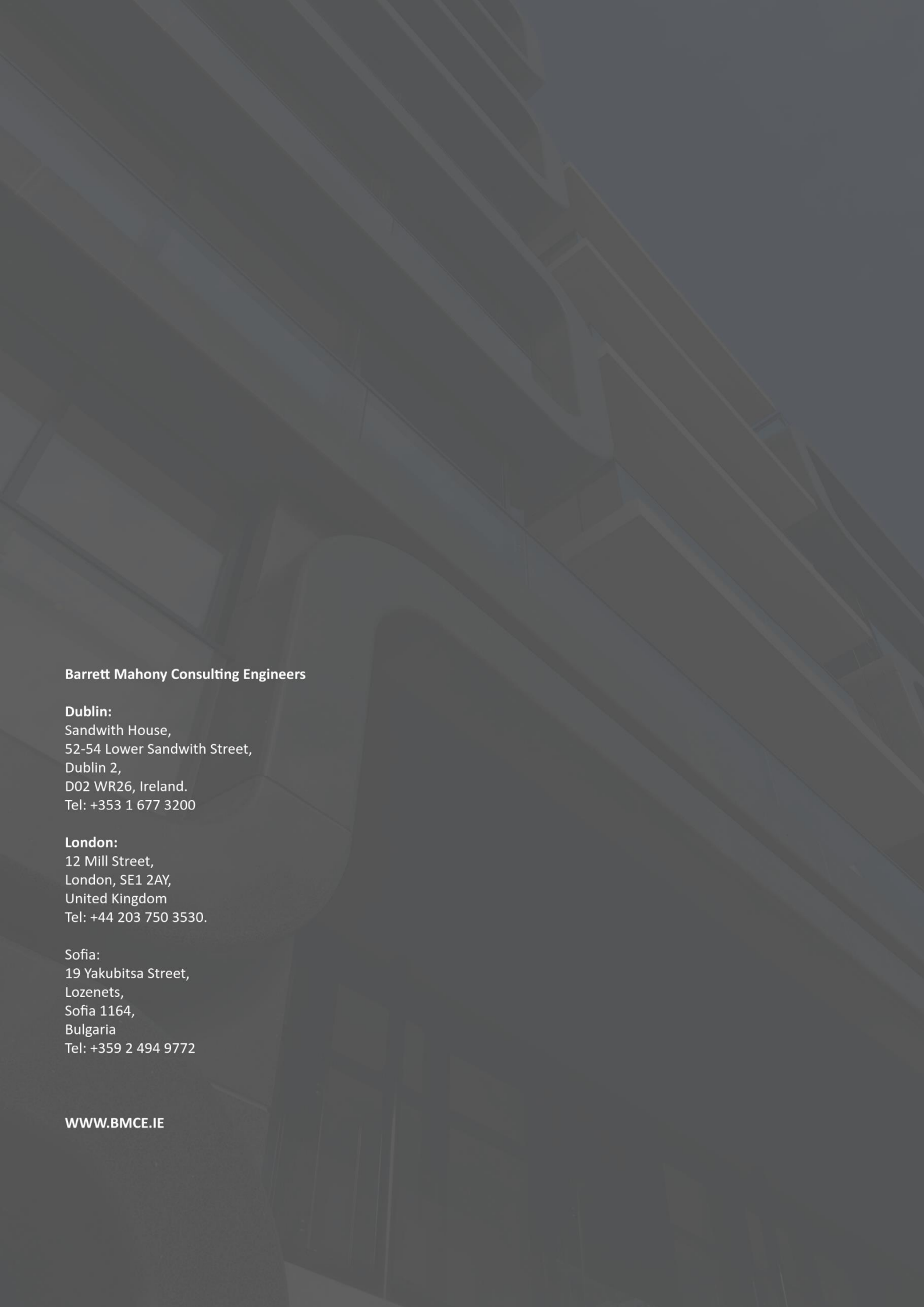
Water Network



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