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2023

**Civil Engineering Planning Report
Serviced Sites Moate**

Civil Engineering Planning Report
Proposed Serviced Sites, Killeenboylegan, Moate, Co. Westmeath

Document Control Sheet

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1. Introduction

This report outlines the Civil Engineering deliverables completed for the part 8 planning application associated with the proposed residential housing development in Killeenboylegan, Moate, Co. Westmeath.

- a) The development of 10 individual plots under the Ready to Build scheme, for the building of a property for occupation as the principal private residence of the purchaser.
- b) Associated site development works including internal road, paths, paving, parking, drainage, landscaped public open space, street lighting and associated boundary treatments.
- c) Providing a foul sewer with a separate storm sewer to connect to existing drainage infrastructure, and all associated site development works to complete the development.

A general outline of the proposed works is provided in Figure 1.1 below.

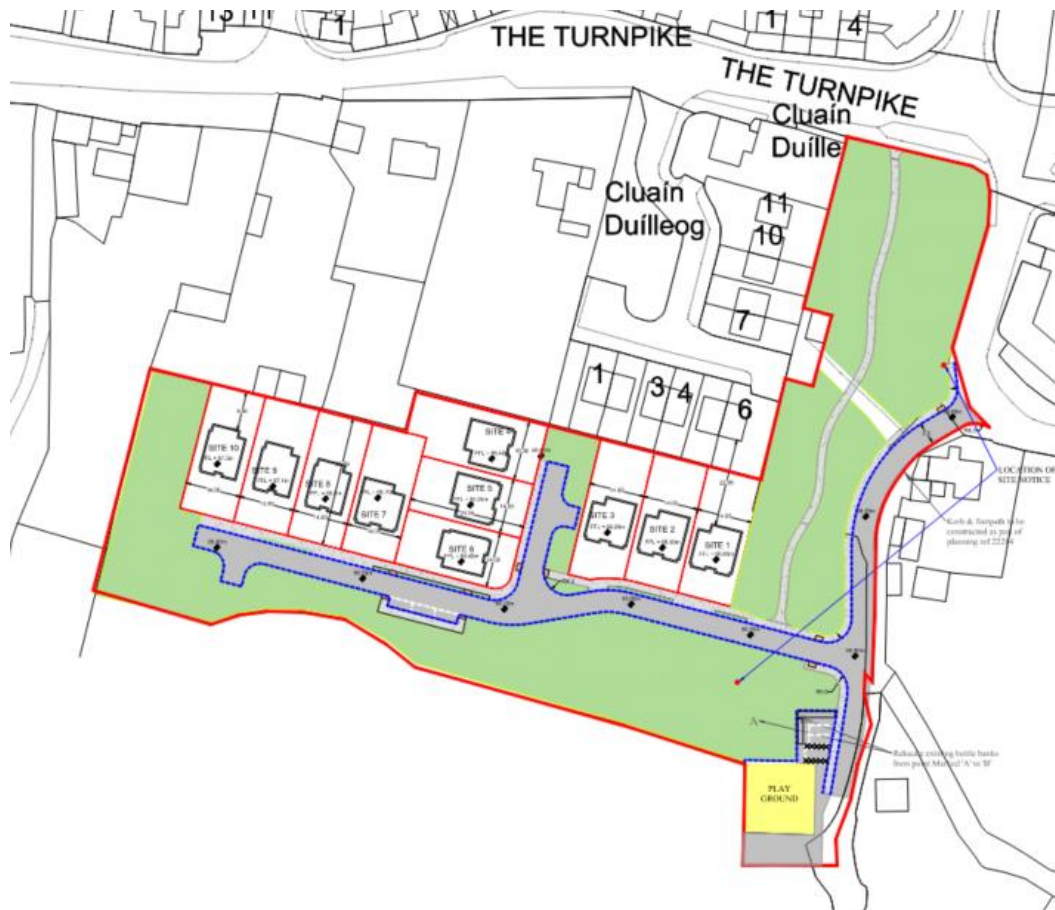


Figure 1.1 – Proposed Architectural Site Layout

2. Design Codes & Standards

The civil engineering works presented in this report and the accompanying drawings have been designed in accordance with the following codes of practice and standards:

- “Irish Building Regulations Technical Guidance Documents” Department of the Environment and Local Government
- “Greater Dublin Strategic Drainage Study” published under the National Development Plan
- CIRIA Report “C697 – Sustainable Drainage Systems”
- EPA - Wastewater Treatment Manuals – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels
- EPA – Guidance on the Authorisation of Discharges to Groundwater (EPA, 2011)
- Irish Water Water Code of Practice
- Irish Water Wastewater Code of Practice
- Design Manual for Urban Roads and Streets

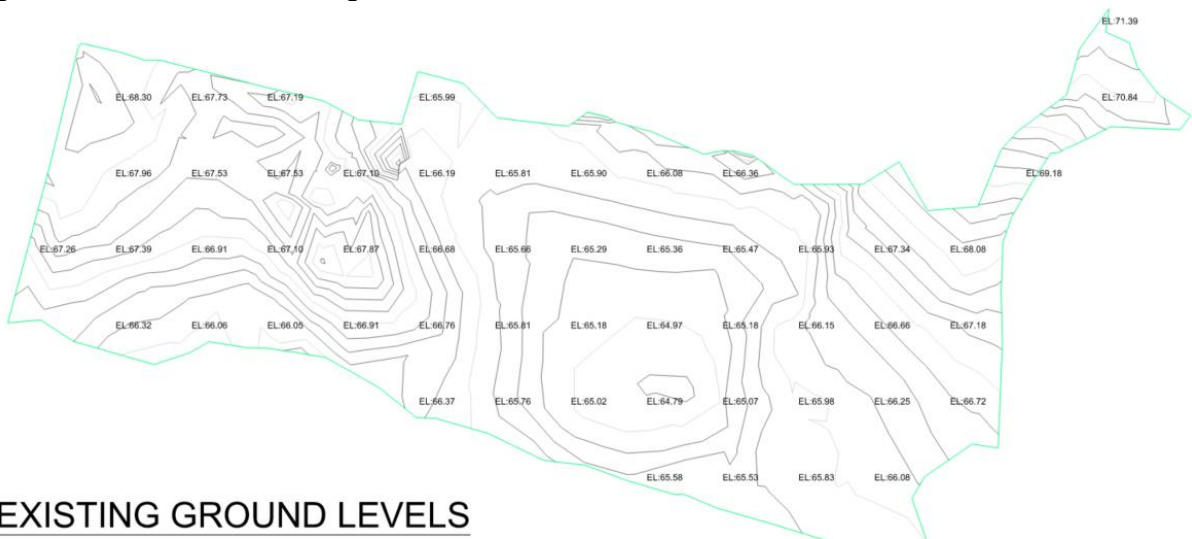
3. Site Location and Description

The site of the proposed development is an undeveloped site with a total site area of 1.15ha or 11,560m², situated in Killeenboylegan, south-east of Moate town in Co. Westmeath. The site is located at the corner of the L-1307 road, and it is bounded to the north and west by residential properties, to the south by a capped landfill and to the east by agricultural lands. The site is currently a greenfield site with a line of trees and shrubs bordering the site along the west boundary, a stone wall along the residential houses to the north and a wooden fence along the east boundary.

The development will have 1 No. vehicular entrance located to the east of the site, off the existing L1307 Road.

3.1 Site Topography

A topographical survey was carried out on the site. The topography of the site typically falls from 67.00mOD on the eastern boundary towards the centre of the site to a low of 64.8mOD before rising again to the west where there is a high point on a localised hill of 67.90mOD before flattening off towards the western boundary. A contour map showing the existing ground levels is shown in figure 3.2 below.



EXISTING GROUND LEVELS

Figure 3.2 – Site Contour Map

4. Water and Wastewater Services

4.1 Irish Water Correspondence

A pre-connection enquiry was lodged with Irish Water in August 2023 for both water and wastewater connections. A confirmation of feasibility (COF) letter was received in December 2023 confirming that both water and wastewater connections for the site are feasible without infrastructure upgrades by Irish Water. A copy of the COF letter from Irish Water is attached in Appendix A.

Existing water, wastewater and surface water infrastructure maps in the locality of the site have been sourced from the public infrastructure maps available in QGIS software and are attached in Appendix B.

4.2 Water Supply

The proposed development will connect to the existing watermain located to the east on Clara Road. The anticipated water demand for the development has been calculated in accordance with Irish Water – Code of Practice for Water Infrastructure. Given that the proposal is for a residential housing development, the water usage per person has been taken as 150 litres per day, the ultimate number of new units is 10 and the average occupancy has been taken at 4 per dwelling (conservative). As calculated in **Appendix C** for the residential units, the anticipated total daily flow for the development will be approximately 6 m³/day.

The watermain shall have a minimum cover of 900mm and shall be overlain with tape containing a tracer wire. The watermain shall also be located a minimum of 3m away from any structure as per Irish Water Code of Practice requirements. Air valves to BS5159 and sluice valves to BS5163 where required shall be installed on site. Where a main is terminating in a cul-de-sac, it will be terminated in loops in accordance with the requirements of Irish Water Code of Practice for Water Infrastructure. The proposed watermain network incorporates sufficient fire hydrants to ensure that all buildings are within 46m of same as per BS750.

All watermain infrastructure shall be designed and constructed in accordance with Irish Water documents “Code of Practice for Water Infrastructure” and “Water Infrastructure Standard Details”. Please refer to ORS drawing no. 230894-ORS-Z2-00-DR-CE-400 for details of the proposed water supply infrastructure.

4.3 Wastewater Network

There is an existing wastewater sewer traversing the western portion of the site. This sewer is 300mm diameter and is proposed to be diverted within the internal roads of the site to facilitate development. A diversion application has been made to Irish Water to undertake this work, the Irish Water reference number is DIV23227.

The proposed wastewater connection for the site will connect into the proposed diverted sewer and ultimately outfall to the southwest of the site.

The anticipated wastewater volume generated from the entire subject development has been

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calculated in accordance with Irish Water – Code of Practice for Wastewater Infrastructure. The water usage per person has been taken as 150 litres per day. The proposed number of new units is 10 and the average occupancy has been taken at 4 per dwelling (conservative). Therefore, as calculated in **Appendix D**, the anticipated total daily flow for the development will be approximately 6 m³/day. This translates to a Dry Weather Flow of 0.07l/s or Peak Dry Weather Flow (6.0DWF) of 0.42l/s.

The proposed internal wastewater sewer will consist of a series of 150mm - 225mm diameter sewers falling in ranges of between 1:60 to 1:200. 100mm diameter pipes will be provided between access junctions falling at a minimum grade of 1 in 60. All internal wastewater drainage will be separate to surface water drainage infrastructure in accordance with Irish Water standards. Proposed wastewater sewer loading calculations are attached in **Appendix D**.

All wastewater infrastructure shall be designed and constructed in accordance with Irish Water documents “Code of Practice for Wastewater Infrastructure” and “Wastewater Infrastructure Standard Details”.

Please refer to ORS drawing no. 230894-ORS-Z2-00-DR-CE-400 for details of the proposed wastewater drainage infrastructure.

5. Surface Water Drainage

5.1 Drainage Strategy

The proposed site will be served via below ground gravity pipework which will predominantly run below the proposed internal roads within the development. The surface water network will be fed via on-road gullies and an outlet pipe from each site to cater for the runoff from building roofs via guttering and downpipes. The surface water network will be attenuated within one of the public open spaces on the site and flow controlled to greenfield runoff rates prior to outfalling into a dedicated surface water drainage sewer which will ultimately outfall to the adjacent surface water network to the southeast.

There is an existing surface water network located to the east of the site on the access road from near the L-1307 junction. The surface water sewer flow from north to south and outfalls into a drainage ditch south of the subject site.

In developing the surface water design for the site, a range of SuDS measures were reviewed. Measures which were deemed suitable in controlling the quality and quantity of water discharged from the development include:

- Collection of excess roof rainwater and run-off from impermeable surfaces and attenuating this run-off prior to discharge to outfall locations,
- The use of trapped gullies throughout the development,
- The use of an oil interceptor.

It is proposed to collect run-off generated from impermeable areas of the site and attenuate the runoff in the attenuation storage located in the public open space to the southeast of the site. The discharge from the tank will be flow controlled to greenfield runoff rates and will discharge to a surface water line located in the access road. Discharge rates will be limited to greenfield run-off rates.

The following design criteria has been incorporated into the design:

- Pipes are designed for small catchment areas as defined in GDSDS, based on the Modified Rational Method and a rainfall intensity of 50mm/hour onto impermeable surfaces.
- All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/s.
- Surface water pipework will be laid to a gradient no flatter than 1:500.
- The GDSDS requirements with respect to interception volume, long-term storage volume and treatment volume have been considered.
- Minimum surface water pipe size of 225mm
- Minimum depth of cover to pipework of 1.2m below roads without appropriate protection
- Maximum depth of pipework 5m
- Roughness value for surface water pipework, k_s 0.6mm

5.2 Catchment and SuDS Systems

The proposed site layout has been designed as one surface water catchment. The catchment will have a gravity surface water drainage network which will outfall into an attenuation system in the Public Open Space. The attenuation system has been sized to store the runoff from a 1:100-year storm of critical duration plus a 20% climate change allowance.

A breakdown of the different land uses across the site is included below in Table 5.1 below.

Table 5.1 – Catchment Land Uses/Area

Catchment Area	Areas (Hectares)
Roof Areas (95% impermeable)	0.126
Road/Paving Areas (90% impermeable)	0.326
Landscaped Green Space (10% impermeable)	0.704
Catchment: Total Area	1.156

Refer to ORS drawing nos. 230894-ORS-Z2-XX-DR-CE-421 for typical SuDS details.

5.3 Flow Controls

A flow control device will be fitted to the outlet manhole from the site. This will be fitted to a 225mm diameter outlet pipe and will have a pull chord bypass. To allow maintenance, a penstock valve (or similar approved) will be installed on the inlet to the flow control manhole.

5.4 Bypass Interceptors

As surface water is to be collected from the roads and car parking areas with a low risk of spillage, a Class 1 Petrol/Oil Bypass Interceptor will be installed prior to discharge into the attenuation tank. All surface water shall be drained from impermeable areas through precast lockable gully traps.

Please refer to ORS drawing nos. 230894-ORS-Z2-00-DR-CE-400, 230894-ORS-Z2-XX-DR-CS-420, 230894-ORS-Z2-XX-DR-CS-421.

6. Flood Risk Identification

The Floodinfo.ie website was consulted for high level information on any potential flood risk on the site. The site is not in an area of defined flood risk under the OPW mapping and there is no indication of any likely past or future flood incidences in the vicinity of the site. Refer to figure 6.1 below.

The development will present no significant increase in risk of flooding either within the site or downstream of the site. Surface water runoff will be limited to greenfield runoff rates via flow control measures.

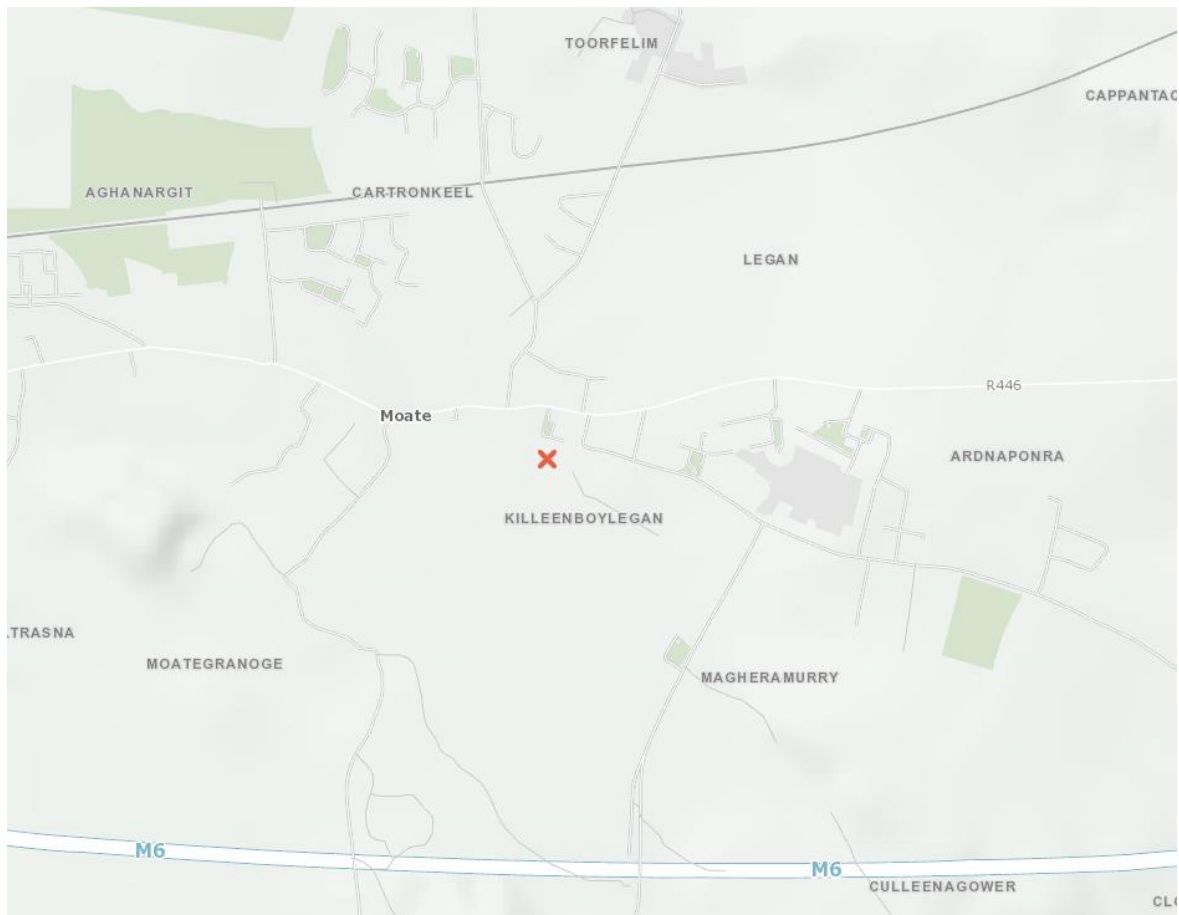


Figure 6.1 – Floodinfo Map – approximate site location marked with red X.

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7. Health and Safety

ORS understand their health and safety responsibilities as set out in the Health and Safety at Work (Construction) Regulations 2013.

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Appendix A – Irish Water Correspondence

CONFIRMATION OF FEASIBILITY

Karine Mamikonjana
Block A
Marlinstown Office Park
Mullingar
Westmeath
N91W5NN

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

19 December 2023

**Our Ref: CDS23005967 Pre-Connection Enquiry
Killeenboylegan, Moate, Co. Westmeath**

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 10 unit(s) at Killeenboylegan, Moate, Co. Westmeath, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible without infrastructure upgrade by Irish Water
- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

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

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

Where can you find more information?

Stiúirtheoirí / Directors: Tony Keohane (Cathaoirleach / Chairman), Niall Gleeson (POF / CEO), Christopher Banks, Fred Barry, Gerard Britchfield, Liz Joyce, Patricia King, Eileen Maher, Cathy Mannion, 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

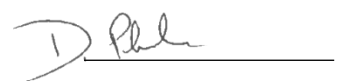
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Uisce Éireann is a design activity company, limited by shares. Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

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

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,

A handwritten signature in black ink, appearing to read 'D. Phelan', is written over a horizontal line. A second horizontal line is drawn below the first one.

Dermot Phelan
Connections Delivery Manager

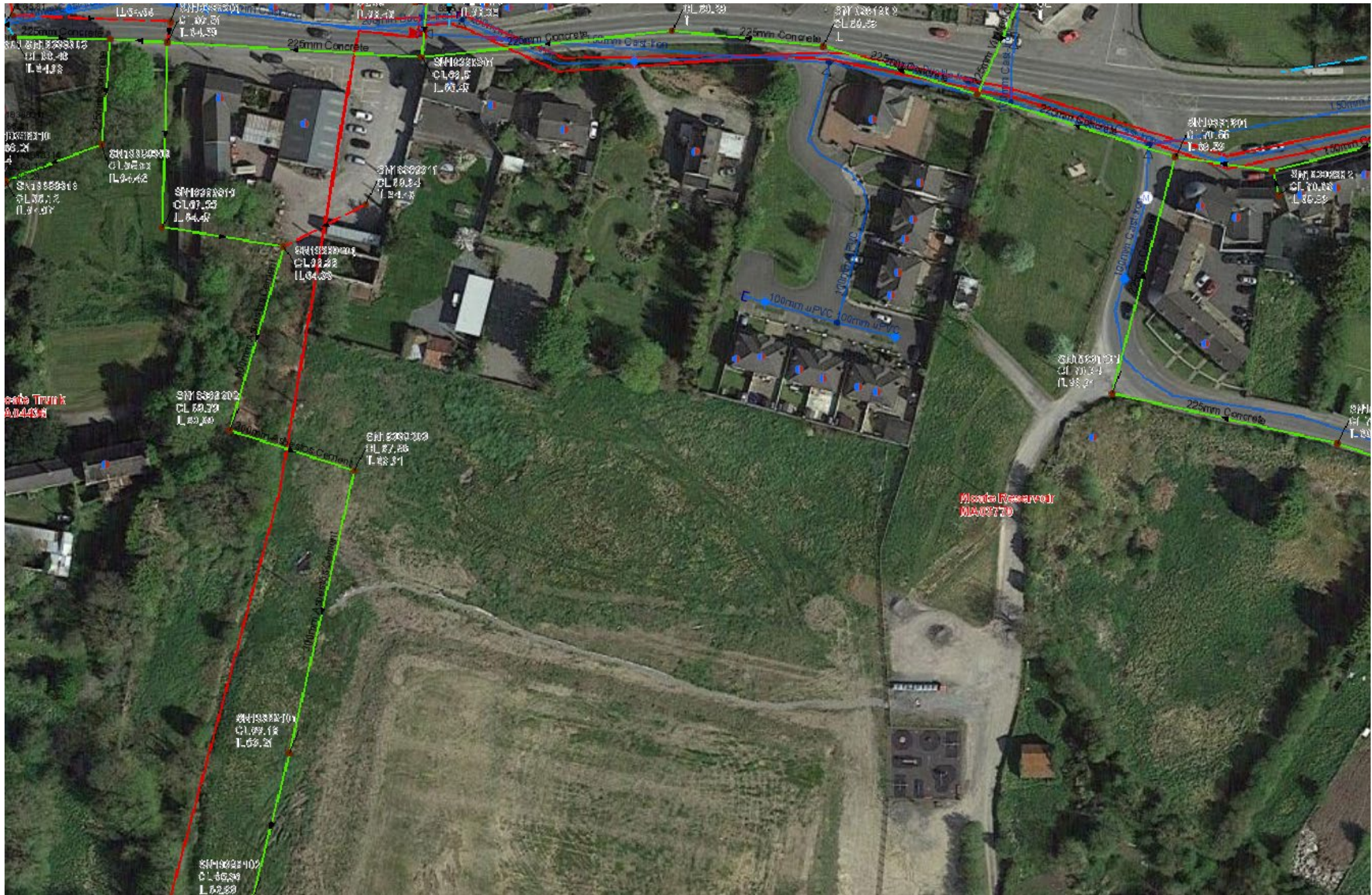
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	<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.
When should I submit a Connection Application?	<ul style="list-style-type: none"> • A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	<ul style="list-style-type: none"> • Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	<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>
Fire flow Requirements	<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
Plan for disposal of storm water	<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.
Where do I find details of Uisce Éireann's network(s)?	<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>

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Appendix B – Existing Services Infrastructure Maps



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Appendix C – Water Demand Calculation



PROPOSED WATER DEMAND CALCULATIONS

ORS Ref:

230894

CLIENT: Westmeath County Council

PROJECT DESCRIPTION: Proposed Residential Development at Killeenboylegan, Moate, Co. Westmeath

DRAWING REFERENCE: 230894-ORS-Z2-00-DR-CE-400

Unit Type:	Number of:	Flow (l/day/person):	Persons per Dwelling:	Total Flow (l/day)
Residential	10	150	4	6000
Residential				
	Total Flow (l/day):	6000	Total Flow (m³/day):	6
	Average Hour Water Demand	0.07	l/s	
	Peak Hour Water Demand (Average Hour Water Demand x 5)	0.35	l/s	

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Appendix D – Wastewater Demand Calculation

PROPOSED FOUL SEWER DESIGN CALCULATIONS



ORS Ref:

230894

CLIENT: Westmeath County Council ID5:N7D7:N8D7D5:N7

PROJECT DESCRIPTION: Proposed Residential Development at Killeenboylegan, Moate, Co. Westmeath

DRAWING REFERENCE: 230894-ORS-Z2-00-DR-CE-400

Unit Type:	Number of:	Flow (l/day/person):	BOD (g/day/person)	Persons	Total Flow (l/day)	BOD (g/day/person)	P.E.
Residential	10	150	60	4	6000	240	4
				Total	6000	240	4
Residential Total Flow per day						6000	litres/day
Residential Dry Weather Flow (DWF)						0.07	litres/second
Peak Dry Weather Flow						0.42	l/s @ 6 x DWF

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Appendix E – Surface Water Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	16.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.320	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
5	0.058	5.00	65.800	1350	619034.768	738239.372	1.156
4	0.062	5.00	66.000	1350	619054.697	738234.280	1.415
3	0.014	5.00	66.100	1350	619052.619	738226.097	1.539
2		5.00	66.500	1200	619085.485	738218.222	1.950
1			66.500	1200	619093.897	738216.506	2.000
7	0.086	5.00	66.500	1350	618966.756	738246.038	1.400
6	0.048	5.00	66.200	1350	619012.203	738235.431	1.491
6.1	0.092	5.00	65.950	1200	619019.618	738269.470	1.050
8	0.092	5.00	66.900	1200	618939.684	738252.927	1.510
9		5.00	66.300	1200	619076.031	738228.846	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.004	4	3	8.443	0.600	64.585	64.561	0.024	350.0	375	6.87	50.0
1.003	5	4	20.569	0.600	64.644	64.585	0.059	350.0	375	6.73	50.0
3.000	9	4	22.015	0.600	65.000	64.890	0.110	200.0	225	5.40	50.0
1.002	6	5	22.907	0.600	64.709	64.644	0.065	350.0	375	6.37	50.0
2.000	6.1	6	34.837	0.600	64.900	64.784	0.116	300.0	300	5.64	50.0
1.001	7	6	46.668	0.600	65.100	64.709	0.391	119.4	375	5.97	50.0
1.000	8	7	27.935	0.600	65.390	65.250	0.140	199.5	225	5.51	50.0
4.000	2	1	8.585	0.600	64.550	64.500	0.050	171.7	225	5.14	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.004	4	3	0.963	106.3	59.5	1.040	1.164	0.439
1.003	5	4	0.963	106.3	51.1	0.781	1.040	0.377
3.000	9	4	0.921	36.6	0.0	1.075	0.885	0.000
1.002	6	5	0.963	106.3	43.2	1.116	0.781	0.319
2.000	6.1	6	0.902	63.8	12.5	0.750	1.116	0.092
1.001	7	6	1.657	183.0	24.2	1.025	1.116	0.178
1.000	8	7	0.922	36.7	12.4	1.285	1.025	0.092
4.000	2	1	0.995	39.5	0.0	1.725	1.775	0.000

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	16.200	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.320	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	20	0	0
30	20	0	0
100	20	0	0

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective (HE)	Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	64.550	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 2 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	33.500
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	64.550	Main Channel Slope (1:X)	200.0
Safety Factor	2.0	Time to half empty (mins)	256	Main Channel n	0.040

Inlets

3

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	110.0	0.0	1.000	110.0	0.0	1.001	0.0	0.0

Results for 2 year +20% CC Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute summer	5	132	64.958	0.314	19.9	0.7624	0.0000	OK
180 minute summer	4	132	64.958	0.373	22.0	0.8602	0.0000	OK
180 minute summer	3	132	64.957	0.396	21.7	0.6411	0.0000	OK
180 minute summer	2	132	64.957	0.407	13.1	0.4609	0.0000	SURCHARGED
15 minute summer	1	1	64.500	0.000	5.0	0.0000	0.0000	OK
15 minute summer	7	11	65.198	0.098	28.4	0.2612	0.0000	OK
180 minute summer	6	132	64.958	0.249	18.8	0.5175	0.0000	OK
15 minute summer	6.1	10	64.999	0.099	15.0	0.2871	0.0000	OK
15 minute summer	8	10	65.491	0.101	14.9	0.2378	0.0000	OK
15 minute summer	9	1	65.000	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
180 minute summer	5	1.003	4	18.4	0.368	0.173	2.1457	
180 minute summer	4	1.004	3	20.9	0.306	0.196	0.9307	
180 minute summer	3	Flow through pond	2	13.1	0.080	0.005	35.5913	
180 minute summer	2	Hydro-Brake®	1	5.0				76.6
15 minute summer	7	1.001	6	28.1	0.734	0.153	1.9448	
180 minute summer	6	1.002	5	16.5	0.510	0.155	2.0163	
15 minute summer	6.1	2.000	6	15.0	0.681	0.236	0.8344	
15 minute summer	8	1.000	7	14.5	0.862	0.397	0.4711	
15 minute summer	9	3.000	4	0.0	0.000	0.000	0.0000	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute summer	5	172	65.328	0.684	32.4	1.6622	0.0000	SURCHARGED
180 minute summer	4	176	65.328	0.743	37.8	1.7147	0.0000	SURCHARGED
180 minute summer	3	176	65.328	0.767	36.6	1.2395	0.0000	OK
180 minute summer	2	176	65.328	0.778	20.6	0.8794	0.0000	SURCHARGED
15 minute summer	1	1	64.500	0.000	5.0	0.0000	0.0000	OK
180 minute summer	7	176	65.328	0.228	18.5	0.6074	0.0000	OK
180 minute summer	6	172	65.328	0.619	32.3	1.2878	0.0000	SURCHARGED
180 minute summer	6.1	176	65.328	0.428	9.6	1.2370	0.0000	SURCHARGED
15 minute summer	8	10	65.539	0.149	27.4	0.3508	0.0000	OK
180 minute summer	9	176	65.328	0.328	1.4	0.3706	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
180 minute summer	5	1.003	4	31.4	0.303	0.295	2.2687	
180 minute summer	4	1.004	3	35.1	0.318	0.330	0.9312	
180 minute summer	3	Flow through pond	2	20.6	0.086	0.008	76.3076	
180 minute summer	2	Hydro-Brake®	1	5.0				104.4
180 minute summer	7	1.001	6	18.5	0.533	0.101	4.2082	
180 minute summer	6	1.002	5	26.4	0.456	0.248	2.5266	
180 minute summer	6.1	2.000	6	9.4	0.563	0.147	2.4532	
15 minute summer	8	1.000	7	26.7	1.009	0.729	0.7412	
180 minute summer	9	3.000	4	-1.4	-0.106	-0.038	0.8756	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
240 minute summer	5	216	65.599	0.955	37.5	2.3205	0.0000	FLOOD RISK
240 minute summer	4	216	65.598	1.013	43.7	2.3400	0.0000	SURCHARGED
240 minute summer	3	216	65.598	1.037	43.1	1.6774	0.0000	OK
240 minute summer	2	216	65.598	1.048	23.7	1.1857	0.0000	SURCHARGED
15 minute summer	1	1	64.500	0.000	5.0	0.0000	0.0000	OK
240 minute summer	7	216	65.599	0.499	20.1	1.3296	0.0000	SURCHARGED
240 minute summer	6	216	65.599	0.890	33.6	1.8513	0.0000	SURCHARGED
240 minute summer	6.1	216	65.599	0.699	10.4	2.0198	0.0000	SURCHARGED
240 minute summer	8	216	65.599	0.209	10.4	0.4902	0.0000	OK
240 minute summer	9	216	65.598	0.598	1.1	0.6767	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
240 minute summer	5	1.003	4	36.7	0.333	0.345	2.2687	
240 minute summer	4	1.004	3	41.5	0.376	0.390	0.9312	
240 minute summer	3	Flow through pond	2	23.7	0.090	0.009	103.8594	
240 minute summer	2	Hydro-Brake®	1	5.1				124.4
240 minute summer	7	1.001	6	20.0	0.473	0.109	5.1473	
240 minute summer	6	1.002	5	31.1	0.410	0.292	2.5266	
240 minute summer	6.1	2.000	6	8.9	0.538	0.140	2.4532	
240 minute summer	8	1.000	7	10.3	0.786	0.281	1.0927	
240 minute summer	9	3.000	4	-1.1	-0.043	-0.030	0.8756	