



MCD CIVIL ENGINEERING CONSULTANTS LTD.

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Date: 20 March 2020

Your Ref:

Our Ref: PT17/001

Engineering Report

Housing Scheme at Craddockstown, Naas, Co. Kildare for KARE.

1 Introduction

The proposed development is to consist of 3 new two bedroomed dwellings at Craddockstown, Naas, Co. Kildare. The proposed development will connect to the existing public road immediately to the west of the development site.

It is proposed to connect foul drainage from the proposed development to an existing foul drainage network on the adjacent housing development site.

A new watermain complete with service meter, hydrants, sluice and scour valves shall be provided.

A new surface water drainage network shall collect surface water from paved surfaces and footpaths on the access road and shall connect to the existing surface water drainage system serving the adjacent housing development.

This report contains the following appendices;

1. Surface Water Drainage Design
2. Foul Drainage Design

This engineering report shall be read in conjunction with the following drawings;

Drg. No.	Title	Size	Scale
PT17/01/01/01	Site Layout Plan	A1	1:250
PT17/01/02/01	Details – Sheet 1	A1	1:25/1:20

2 Road Design

The proposed residential estate is to be accessed from an existing public roadway immediately to the west of the development site.

The proposed roadway serving the new residential development shall be 6.0m wide with a 1.0m grass verge and 2.0m concrete footpath. The roadway and footpaths shall be constructed in accordance with the requirements of NRA *"Specification for Roadworks"* and the DoELG *"Recommendations for Site Development Works for Housing Areas"*.

California Bearing Ratio testing (CBR) will be carried out on the proposed road alignment in accordance with BS 1377: Part 4: Section 7 in order to confirm the depth of sub-base required.

The road construction shall consist of a single combined wearing and basecourse layer, 80mm thickness at any point, consisting of 40mm nominal size single course bitumen macadam, complying with BS 4987.

A capping layer (if required) and sub base thickness to be determined following CBR testing and shall be in accordance with BS 1377: Part 4 recommendations. The Sub-base layer shall not be less than 150mm thickness and shall consist of Type B Clause 804 material and shall be well compacted in accordance with Clause 802, *"Specification for Roadworks"*.

Roadbase shall be 150mm thick and shall consist of dense bitumen macadam 40mm nominal size dense Roadbase in accordance with BS 4987: Part 1 and shall be compacted in accordance with clause 705, 802 or 809 of the *"Specification for Roadworks"*

The roadway shall have 1:40 crossfall. Minimum gradients do not exceed 1:200. Turning areas and junction radii are in accordance with the minimum recommendations of *"Site Development Works for Housing Areas"* and are suitable for turning a Fire Appliance or large refuse truck.

The footpaths shall be constructed using 37.5N air entrained paving quality concrete 100mm thick and increased to 150mm thick at residential entrances. The footpaths shall be founded on 150mm thick layer of clause 804 Type B material and a separation layer shall be used between the concrete and the sub-base. The footpaths shall have 1:40 cross fall. Joints shall be provided at 3.0m centres.

250mm x 125mm Precast concrete kerbing complying with I.S. 146 shall be laid on a 300mm x 100mm concrete bed and haunch. Kerbs shall be dished at vehicle access points with an upstand of not more than 25mm and at pedestrian crossings with an upstand of no more than 10mm. Buff coloured tactile paving shall be provided at all pedestrian crossing points.

The road geometry is shown on drawing PT17/001/01/01. The road and footpath construction details are shown on drawing PT17/001/02/01.

3 Surface Water Drainage

The surface water drainage network has been designed in accordance with the requirements of IS EN 752: 2008. The surface water drainage calculations are presented in the appendix to this report.

The drainage system has been design to achieve flow velocities in the range of 0.75m/s to 3.0m/s to ensure self cleansing velocities are achieved and that pipe scour does not result in steeper gradients. The minimum pipe size used is 225mm diameter.

All pipework shall be PVCu laid to gradients shown on the drawing. Pipe cover shall be not less than 0.6m in gardens, 0.9m in open spaces and footpaths and 1.2m in roadways. Where pipe cover is less than these minimum requirements the pipes shall be surrounded with 150mm concrete surround.

There are no potential conflict points with the foul sewer drainage pipework.

Surface water drainage from the individual houses shall discharge to individual soakaways. Soakaway tests in accordance with BRE 365 shall be carried out on site in the location of the proposed soakaways during the construction stage to confirm that the minimum size of soakaway proposed is adequate. The subsoil is a uniformly graded free draining gravel.

4 Foul Sewerage

The foul sewerage drainage network has been designed in accordance with the requirements of BS EN 752: 2008. The foul sewerage drainage calculations are presented in the appendix to this report.

Proportional discharge and proportional velocities have been considered in the design. The drainage system has been designed to achieve flow velocities in the range of 0.75m/s to 3.0m/s to ensure self cleansing velocities are achieved and that pipe scour does not result in steeper gradients.

Given the low number of housing units the recommendation of the Irish Water Code of Practice for Wastewater has been followed which permits lower flows where the gradient is limited to not shallower than 1:100 for a 150mm diameter pipe. All such pipes with low flows have gradients of not less than 1:60 in accordance with the code of practice. The minimum pipe size used where any drain serves more than 1 dwelling is 150mm diameter.

Pipe cover shall be not less than 0.6m in gardens, 0.9m in open spaces and footpaths and 1.2m in roadways. Where pipe cover is less than these minimum requirements the pipes shall be surrounded with 150mm concrete surround. The manhole details are presented on drawing PT17/01/02/01.

There are not conflict/crossover points.

5 Water Supply

It is proposed to serve the residential development from a connection to an existing Local Authority / Irish Water watermain.

The watermain in the proposed development shall be a 100mm diameter Class C HDPE watermain and shall be laid in the footpaths and verges other than at road crossings. Road crossings shall be made in ductile iron pipework and fitted with sluice valves in accordance with B.S. 5163. The supply pipework shall not be less than 0.9m below footpath level.

Fire hydrants shall be provided so that no house is greater than 46m from a hydrant. Hydrants are located such that they are not likely to be blocked or covered. Hydrants shall comply with the requirements of the Chief Fire Officer and the recommendations of section 4.12, *"Recommendations for Site Development Works for Housing Areas"*. The watermain shall have a minimum pressure of 2 bar at all locations.

All service connections shall be made in the footpath and the service pipes shall be fitted with local authority approved water meters. The supply service pipe shall not be less than 0.75m below ground.

Marker plates and warning tape shall be provided in accordance with the requirements of *"Recommendations for Site Development Works for Housing Areas"*. The layout of the proposed watermain and its valves and fittings is shown on drawing P17/01/01/01.


Cormac Dooley, BE MSc MIEI
MCD Civil Engineering Consultants Ltd.

Appendix A

1.0 Surface Water Drainage Design

Surface Water Drainage Calculations for Housing Scheme at Craddockstown, Naas, Co. Kildare.

For

**KARE,
c/o McLoughlin Architecture.**

Prepared by

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Project Information

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Client KARE
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Project Description Housing Scheme
Development Address Craddockstown, Naas, Co. Kildare
Issue Date 20/03/2020

General Data

Kinematic Viscosity of Water ν 1.14E-06 m²/s at 15 degrees
Gravitational Constant g 9.81 m/s²
Pipe Roughness ks 0.6 mm
Proportional Depth Ratio d/D 0.500
Angle for Calculation of Hydraulic Radius Φ 3.142 radians
Diameter Scaling Factor for Partially Full Pipes ψ 1.000

Catchment Data

Return Period T 2 yr
Time of Entry Te 8.0 min
Volumetric Coefficient Cv 0.9
Run-off Coefficient Cr 1.3

Velocity

Lower Velocity Limit 0.75 m/s

Manhole (#)	Easting (m)	Northing (m)	Cover Level (m)
SW 1.0	152.184	135.804	116.500
SW 2.0	152.352	106.207	118.000
SW 3.0	125.872	104.354	117.800
SW 4.0	125.872	94.969	118.115
SW 4.1	137.868	94.667	117.850
SW 5.0	93.882	95.779	117.885

Pipe	Diameter	Length	Grade	Upstream MH				Downstream MH			
				Manhole	Easting	Northing	Invert Level	Manhole	Easting	Northing	Invert Level
(#)	(mm)	(m)	(1 in)	(#)	(m)	(m)	(m)	(#)	(m)	(m)	(m)
1	225	32.00	150.00	SW 5.0	93.882	95.779	116.148	SW 4.0	125.872	94.969	115.778
2	225	12.00	150.00	SW 4.1	137.868	94.667	116.324	SW 4.0	125.872	94.969	116.148
3	225	9.39	150.00	SW 4.0	125.872	94.969	116.387	SW 3.0	125.872	104.354	116.342
4	225	26.54	150.00	SW 3.0	125.872	104.354	116.650	SW 2.0	152.352	106.207	116.387
5	225	29.60	150.00	SW 2.0	152.352	106.207	116.600	SW 1.0	152.184	135.804	116.387

Pipe	Contributing Areas (Catchment)			
	Paved Area	Sum of Paved Areas	Roofed Area	Sum of Roofed Area
(#)	(m ²)	(m ²)	(m ²)	(m ²)
1	537	537	0	0
2	857	857	0	0
3	0	1394	0	0
4	0	1394	0	0
5	0	1394	0	0

Pipe Number	Pipe Length	Pipe Gradient	Assumed Diameter	Pipe Full Velocity	Sum of Paved Areas	Sum of Roof Areas	Time of Flow	Time of Concentration	Intensity on Paved Areas	Intensity on Roofs	Calculated Discharge	Pipe Capacity	Capacity Check	Velocity Check
	(m)	(1:x)	(mm)	(m/s)	(m ²)	(m ²)	(min)	(min)	(mm/hr)	(mm/hr)	(l/s)	(l/s)		
1	32.00	150	225	1.064	537	0	0.501	8.000	50	75	8.8	42.3	Ok	Ok
2	12.00	150	225	1.064	857	0	0.188	8.188	50	75	13.9	42.3	Ok	Ok
3	9.39	150	225	1.064	1394	0	0.147	8.335	50	75	22.7	42.3	Ok	Ok
4	26.54	150	225	1.064	1394	0	0.416	8.751	50	75	22.7	42.3	Ok	Ok
5	29.60	150	225	1.064	1394	0	0.464	9.215	50	75	22.7	42.3	Ok	Ok

Appendix B

1.0 Foul Drainage Design

Foul Sewer Drainage Calculations for Housing Scheme at Craddockstown, Naas, Co. Kildare.

For

**KARE,
c/o McLoughlin Architecture.**

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Telephone	<i>045 854900</i>

Project Description	<i>Housing Scheme</i>
Development Address	<i>Craddockstown, Naas, Co. Kildare</i>

Issue Date	<i>20/03/2020</i>
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General Data

<i>Kinematic Viscosity of Water</i>	<i>ν</i>	<i>1.14E-06 m²/s at 15 degrees</i>
<i>Gravitational Constant</i>	<i>g</i>	<i>9.81 m/s²</i>
<i>Pipe Roughness</i>	<i>ks</i>	<i>1.5 mm</i>

Velocity

<i>Lower Velocity Limit</i>	<i>0.75 m/s</i>
<i>Higher Velocity Limit</i>	<i>3.00 m/s</i>

Velocity is calculated using the Colebrook-White Equation for full pipe flow and the Butler - Pinkerton modified Colebrook-White Equation for proportional depth pipe flow.

Pipe	Diameter	Length	Grade	Upstream MH				Downstream MH			
				Manhole	Easting	Northing	Invert Level	Manhole	Easting	Northing	Invert Level
(#)	(mm)	(m)	(1 in)	(#)	(m)	(m)	(m)	(#)	(m)	(m)	(m)
1	150	13.41	60.00	FS 3.0	166.758	93.523	116.059	FS 2.0	153.408	94.810	115.835
2	150	13.82	34.00	FS 4.0	160.490	82.941	116.268	FS 2.0	153.408	94.810	115.835
3	150	14.77	34.00	FS 5.0	146.928	81.536	116.959	FS 2.0	153.408	94.810	115.835
4	150	41.00	60.00	FS 2.0	153.408	94.810	115.835	FS 1.0	153.408	135.805	115.152

Appliance Type	WHB	WC	Bath	Shower	Sink	W/Machine	D/Washer	Units	Discharge	Cumulative Discharge
Discharge Units per Appliance	0.3	1.8	0.8	0.6	0.8	0.8	0.8			
Pipe	Appliance Numbers							ΣDU	Q	ΣQ
(#)	(#)	(#)	(#)	(#)	(#)	(#)	(#)	(#)	(l/s)	(l/s)
1	1	1	0	1	2	1	1	5.9	1.2	1.2
2	1	1	0	1	2	1	1	5.9	1.2	1.2
3	1	1	0	1	2	1	1	5.9	1.2	1.2
4	0	0	0	0	0	0	0	0	0.0	3.6

Pipe	Length	Slope	Diameter	Pipe Capacity			Proportional Flow Properties			Pipe Velocity			Pipe Check
				Calculated Discharge	Full Bore Discharge	75% Depth Discharge	Prop. Flow Ratio	Prop. Depth	Prop. Area	Full Bore Velocity	Proportional Velocity	75% Depth Velocity	
(#)	(m)	(1 in)	(mm)	Q	Q _f	Q ₇₅	Q/Q _f	d	A _p	V _f	V _p	V ₇₅	(Design Comment)
1	13.41	60	150	1.214	20.005	23	0.06	25.279	19.67	1.13	0.62	1.28	Not Self-Cleansing. OK to IW Recommendations
2	13.82	34	150	1.214	26.610	30	0.05	22.022	16.11	1.51	0.75	1.71	Pipe Okay.
3	14.77	34	150	1.214	26.610	30	0.05	22.022	16.11	1.51	0.75	1.71	Pipe Okay.
4	41.00	60	150	3.643	20.005	23	0.18	43.738	42.86	1.13	0.86	1.28	Pipe Okay.