MWP

Gerald Griffin Street Housing Development

Engineering Report

December 2023

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1. General

1.1 Introduction

Malachy Walsh and Partners (MWP) Consulting Engineers have been commissioned by MMD Construction Ltd. to be their Civil & Structural Engineering Consultants for a proposed apartment development at Gerald Griffin Street, Cork.

This report has been prepared as part of a Part 8 Planning Application by MMD Construction Ltd. for the proposed Apartment development. The report describes the design strategy for surface water and foul water drainage design along with the development water supply, roads/footpaths.

The proposed development consists of 67 no. residential apartment units and a community facility on a brown-field site which is located between Gerald Griffin Avenue and Burkes Avenue.

A pre-connection enquiry form and associated location map and calculations have been submitted to Uisce Eireann in respect of proposed connections to the existing watermain and combined sewer network.

2. Foul Water Drainage Design

2.1 Existing Foul Water Drainage

In accordance with Cork City Council drainage record drawings, the existing drainage infrastructure in the vicinity of the proposed development site consists of combined sewers. There is a mainline trunk sewer flowing from the North Monastery Road end to Gerald Griffin Street via Burke's Avenue. This is a 1050mm diameter sewer along Burke's Avenue. The sewer changes direction at the junction between Burke's Avenue and Gerald Griffin Street and flows in a North-Easterly direction along Gerald Griffin Street. There is an existing 225mm diameter combined sewer which commences at the upper end of Gerald Griffin Avenue and flows in a South-Easterly direction intercepting with the combined sewer on Gerald Griffin Street.

2.2 Proposed Foul Water Drainage

2.2.1 Proposed Foul Drainage Infrastructure

The basic approach adopted for the design of the proposed foul water drainage is to connect each block of apartments to a new 225mm diameter foul sewer along Burke's Avenue. It is proposed that internal foul stacks will connect via 150mm diameter branch lines to the new foul sewer. The new 225mm diameter foul sewer will connect into the existing combined sewer on Gerald Griffin Street via a new manhole constructed on this existing sewer.

2.2.2 Foul Loading

The foul wastewater discharge calculation is detailed in Appendix B. The calculation is in accordance with Uisce Eireann Wastewater Code of Practice document. The results are outlined under;

- No. of Apartment Units = 67
- Total No. of Occupants = 181 people
- Calculated Dry Weather Flow (DWF) = 29.85 m^3/day (0.35 l/s)
- Calculated Design Foul Flow = 165.52 m^3/day (1.92 l/s)

Due to proposals to incorporate water conservations measures within the units including dual flush toilets, it is most likely that the actual foul flows will be significantly less than the calculated flows.

2.2.3 Design Criteria

The foul water sewers have been designed in accordance with the "Recommendations for Site Development Works for Housing Areas" design guide published by the Department of Environment, Heritage and local Government (DoEHLG) and with the aid of "Sewer for Adoptions – 7th Edition" published by WRc plc.

The foul drainage network has been designed as follows:

- Wastewater flow per capita is 150l/s
- The minimum diameter of the foul water sewer shall be 150mm diameter.

- The minimum gradient of the foul water sewers shall be 1:200.
- Flow velocities shall be minimum 0.75m/sec, when pipes are flowing half full.
- Design flow is calculated as 6 x Dry Weather Flow (DWF).

3. Storm Water Drainage Design

3.1 Existing Storm Water Drainage

The roads and laneways surrounding the proposed development site are currently served by combined sewers as described in Section 2.1. There is no evidence of existing storm water drainage infrastructure within the proposed development boundary. The surface of site is predominantly pervious in nature and hence rainfall on the site predominantly infiltrates to ground.

3.2 Proposed Storm Water Drainage Design

3.2.1 Proposed Storm Drainage Infrastructure

It is proposed to lay a new 225mm diameter storm sewer along Burke's Avenue to collect storm water runoff from this laneway. This laneway is not currently served by any storm water gullies and hence storm water runoff is directed onto Gerald Griffin Street. The proposed drainage strategy consists of new drainage channels and road gullies at regular intervals along Burke's Avenue to intercept the surface water flow. The proposed new storm water sewer extends to the junction with Gerald Griffin Street at which point the new storm sewer is connected into the existing combined sewer via a new manhole constructed on this existing sewer.

Burke's Avenue is currently paved and hence storm water runoff from this avenue will not increase as a result of this development. Hence it is not proposed to attenuate the storm flow in the new storm sewer serving this avenue.

The proposed apartments and all associated lands to the South of the site will be served by a new 225mm diameter storm water sewer within the site boundary. Similar to the proposal for Burke's Avenue, it is proposed to provide drainage channels and road gullies at regular centers to intercept the surface water flow from the paved areas in this area of the development.

On the basis that the area served by this proposed sewer is currently pervious in nature, it is proposed to incorporate an attenuation tank on the proposed storm sewer network to attenuate flows to the equivalent Greenfield runoff rates. The equivalent Greenfield runoff rate for the site has been calculated as 2.98l/s. Based on this maximum permitted outflow, the required attenuation tank size has been calculated as 105m^3. Outflow from the attenuation tank is routed via a flow control chamber to the existing combined sewer on Gerald Griffin Avenue. The flow control chamber will restrict the flow to the equivalent Greenfield runoff rate of 2.98 l/s.

Other disposal options including discharge to existing storm sewer or stream/river are not feasible/practical. The possibility of discharging to ground within the site boundary has also been ruled out due to insufficient overburden depths across the site and the proximity of proposed soakaway areas to proposed building foundations.

3.2.2 Design Criteria

The proposed storm water drainage network has been designed and modelled using WinDes Microdrainage software in accordance with the “Recommendations for site development works for Housing Areas” design guide and the Greater Dublin Strategic Drainage Study (GDSDS).

The storm drainage network has been designed as follows:

- The minimum diameter of main line storm water sewer shall be 150mm Ø.
- The minimum gradient of mainline storm water sewer shall be 1:200.
- Flow velocities shall be minimum 0.75m/sec, when pipes are flowing half full.
- The storm return period for the design of drainage pipework shall be 1:5 years.
- A rainfall intensity of 50mm/hr has been adopted.
- Green areas or park land have been taken to be 100% permeable.
- Climate change of 10% has been accounted for as per the GDSDS.
- The expected depth of rainfall to occur from a storm with a return period of 5 years lasting a duration of 60minutes (M5-60) is 18.400mm.
- The ratio (R) between the M5-60 and the expected depth of rainfall to occur from a storm with a return period of 5 years lasting a duration of 2 days (M5-2day) is 0.259mm.

Please refer to Appendix A for detailed calculations of the proposed storm water drainage infrastructure.

4. Watermain Design

4.1 Existing Watermain

Based on Cork City Council Watermain record drawings, there are existing public mains on three of the roads bounding the proposed development site. There is also good provision of existing fire hydrants with the exception of the North-West corner of the site.

There is no evidence of any existing watermain within the site boundary or any existing connections serving the site.

4.2 Proposed Watermain

It is proposed to provide a new 150mm diameter HDPE watermain along Burke’s Avenue to serve the proposed development. It is proposed to provide 63mm diameter connections from this watermain to serve individual apartment blocks.

It is proposed to construct 1 no. additional hydrant at the end of the proposed new watermain which is located outside the North-West corner of the site.

The final location and quantity of the fire hydrants to serve the new development shall be in compliance with the granted Fire Safety Certificate for the proposed development.

It is generally accepted that the daily wastewater loading can be used to evaluate an approximation of the water demand for a development. On this basis a water demand of some 29.85m^3 is estimated. A water meter will be installed on the 150mm diameter watermain serving the overall development.

A pre-connection enquiry form and associated location map and calculations have been submitted to Uisce Eireann in respect of proposed connections to the existing watermain. The calculated daily water demand as noted above has been included as part of this enquiry.

5. Road and Footpath Design

5.1 Existing Roads and Footpaths

5.1.1 Existing Burke's Avenue

Burke's Avenue is a cul-de-sac which provides a rear entry point to Neptune Stadium. It also serves to provide fire tender access to the stadium. This avenue is currently in a poor state of repair. The existing macadam surface has broken down in a number of locations. There is evidence of patch repairs having been carried out over an extended period and hence the existing surface is generally rough and lumpy throughout.

5.1.2 Existing Gerald Griffin Avenue

Gerald Griffin Avenue is one way street which links Gerald Griffin Street to North Monastery Road. The avenue is approximately 3m wide with a 1m footpath on the southern side only. Any on-street parking along the avenue is required to mount the footpath in order to facilitate free passage of vehicles. This makes the avenue unfriendly from a pedestrian perspective as the footpath is commonly blocked by parked cars. The existing road surface consists of macadam which is in reasonable condition through there is some evidence of localized patch repairs. The footpath to the southern side of the road is a concrete footpath.

5.2 Proposed Road and Footpath Design

Roads have been designed with the aid of the "Design Manual for Urban Road and Streets" (DMURS) published by Department of Transport, Tourism and Sport. The DMURS aims to aid the design of safer, more attractive and vibrant streets which will generate and sustain communities and neighbourhoods. As well as cars and other vehicles this encompasses pedestrians, cyclists and those using public transport. Research has shown that narrow carriageways are one of the most effective measures of traffic calming. This has been factored into the design of the street upgrade works included within this project scope.

As part of the overall project scope, Burke's Avenue and Gerald Griffin Avenue are to be upgraded. The existing wall enclosing the proposed development site is to be demolished along the full length of Burke's Avenue and also along the lower end of Gerald Griffin Avenue where the wall is not retaining thereby creating more open spaces. In accordance with the design philosophy contained within the DMURS, footpath widths are being maximized and road carriageway widths minimized in order to redress priority afforded to pedestrians over motorists. In accordance with a shared space approach it is proposed that new footpaths and open pedestrian areas adjacent to the new apartment buildings are flush with the adjacent carriageway.

Appendix A
Storm Water Drainage Design

Greenfield Runoff Rate

Mean Annual Flood Flow Rate Equation for Greenfield Catchments IH123

$$Qbar = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$$

Where,

Qbar = Mean Annual Peak Flow (m^3/s)

Area = Catchment Area (km^2)

SAAR = Standard Annual Average Rainfall (mm)

Soil = Soil Index

Area = 0.002810 km^2 (2810.30m^2)

SAAR = 1139mm

Soil Index = 0.40

QBar = $0.00108 \times 0.002810^{0.89} \times 1139^{1.17} \times 0.40^{2.17}$

= 2.987×10^{-3} m^3/s

= 2.987 l/s

= 10.633/s/ha

Soil	WRAP	Runoff	Soil value	Soil Characteristics
1	Very high	Very low	0.15	Sandy, well drained
2	High	Low	0.3	Intermediate soils (Sandy)
3	Moderate	Moderate	0.4	Intermediate soils (Silty)
4	Low	High	0.45	Clayey, poorly drained
5	Very low	Very High	0.5	Steel, rocky areas

Burke's Avenue Network Design

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	18.400	Add Flow / Climate Change (%)	10
Ratio R	0.259	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.360	0.681	25.5	0.057	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	24.140	1.207	20.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	16.202	0.810	20.0	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	16.560	0.828	20.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	12.502	0.625	20.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	9.785	0.489	20.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	7.510	0.215	34.9	0.014	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	2.997	0.030	99.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.11	15.900	0.057	0.0	0.0	0.8	2.60	103.4	8.4
S1.001	50.00	5.25	15.219	0.079	0.0	0.0	1.1	2.94	116.9	11.8
S1.002	50.00	5.34	14.012	0.104	0.0	0.0	1.4	2.94	116.9	15.5
S1.003	50.00	5.43	13.202	0.119	0.0	0.0	1.6	2.94	116.9	17.7
S1.004	50.00	5.50	12.374	0.134	0.0	0.0	1.8	2.94	116.9	19.9
S1.005	50.00	5.56	11.749	0.134	0.0	0.0	1.8	2.94	116.8	19.9
S2.000	50.00	5.06	11.475	0.014	0.0	0.0	0.2	2.22	88.3	2.1
S1.006	50.00	5.60	11.260	0.148	0.0	0.0	2.0	1.31	52.0	22.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	17.325	1.425	Open Manhole	1200	S1.000	15.900	225				
S2	16.990	1.771	Open Manhole	1200	S1.001	15.219	225	S1.000	15.219	225	
S3	15.930	1.918	Open Manhole	1200	S1.002	14.012	225	S1.001	14.012	225	
S4	14.825	1.623	Open Manhole	1200	S1.003	13.202	225	S1.002	13.202	225	
S5	13.885	1.511	Open Manhole	1200	S1.004	12.374	225	S1.003	12.374	225	
S6	13.174	1.425	Open Manhole	1200	S1.005	11.749	225	S1.004	11.749	225	
S7	12.900	1.425	Open Manhole	1200	S2.000	11.475	225				
S7	12.685	1.425	Open Manhole	1200	S1.006	11.260	225	S1.005	11.260	225	
								S2.000	11.260	225	
S	12.500	1.270	Open Manhole	0		OUTFALL		S1.006	11.230	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	567135.939	572880.705	567135.939	572880.705	Required	
S2	567151.041	572872.142	567151.041	572872.142	Required	
S3	567174.903	572868.495	567174.903	572868.495	Required	
S4	567190.650	572864.686	567190.650	572864.686	Required	
S5	567205.939	572858.321	567205.939	572858.321	Required	
S6	567217.440	572853.419	567217.440	572853.419	Required	
S7	567220.377	572846.490	567220.377	572846.490	Required	
S7	567226.762	572850.445	567226.762	572850.445	Required	
S	567227.829	572853.245			No Entry	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	17.325	15.900	1.200	Open Manhole	1200
S1.001	o	225	S2	16.990	15.219	1.546	Open Manhole	1200
S1.002	o	225	S3	15.930	14.012	1.693	Open Manhole	1200
S1.003	o	225	S4	14.825	13.202	1.398	Open Manhole	1200
S1.004	o	225	S5	13.885	12.374	1.286	Open Manhole	1200
S1.005	o	225	S6	13.174	11.749	1.200	Open Manhole	1200
S2.000	o	225	S7	12.900	11.475	1.200	Open Manhole	1200
S1.006	o	225	S7	12.685	11.260	1.200	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.360	25.5	S2	16.990	15.219	1.546	Open Manhole	1200
S1.001	24.140	20.0	S3	15.930	14.012	1.693	Open Manhole	1200
S1.002	16.202	20.0	S4	14.825	13.202	1.398	Open Manhole	1200
S1.003	16.560	20.0	S5	13.885	12.374	1.286	Open Manhole	1200
S1.004	12.502	20.0	S6	13.174	11.749	1.200	Open Manhole	1200
S1.005	9.785	20.0	S7	12.685	11.260	1.200	Open Manhole	1200
S2.000	7.510	34.9	S7	12.685	11.260	1.200	Open Manhole	1200
S1.006	2.997	99.9	S	12.500	11.230	1.045	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	12.500	11.230	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	0	Number of Storage Structures	0

Simulation Criteria for Storm

Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.400	Storm Duration (mins)	30
Ratio R	0.259		

Gerald Griffin Avenue Network Design

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	18.400	Add Flow / Climate Change (%)	10
Ratio R	0.259	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	15.354	0.698	22.0	0.079	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	24.951	0.832	30.0	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	9.712	0.441	22.0	0.055	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	8.082	0.367	22.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	4.156	0.129	32.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	8.488	0.386	22.0	0.004	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	11.884	0.119	99.9	0.041	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	13.968	0.156	89.5	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	11.889	0.372	32.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.09	19.375	0.079	0.0	0.0	1.1	2.80	111.4	11.7
S1.001	50.00	5.26	18.677	0.137	0.0	0.0	1.8	2.40	95.3	20.3
S1.002	50.00	5.32	16.268	0.192	0.0	0.0	2.6	2.80	111.3	28.6
S1.003	50.00	5.37	15.827	0.192	0.0	0.0	2.6	2.80	111.4	28.6
S1.004	50.00	5.40	15.460	0.192	0.0	0.0	2.6	2.31	92.0	28.6
S2.000	50.00	5.05	14.742	0.004	0.0	0.0	0.1	2.80	111.4	0.6
S3.000	50.00	5.15	14.475	0.041	0.0	0.0	0.5	1.31	52.0	6.0
S1.005	50.00	5.57	14.356	0.277	0.0	0.0	3.8	1.38	55.0	41.3
S1.006	50.00	5.65	14.200	0.277	0.0	0.0	3.8	2.32	92.3	41.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	21.100	1.725	Open Manhole	1200	S1.000	19.375	225				
S2	20.340	1.663	Open Manhole	1200	S1.001	18.677	225	S1.000	18.677	225	
S3	19.500	3.232	Open Manhole	1200	S1.002	16.268	225	S1.001	17.845	225	1577
S4	17.940	2.113	Open Manhole	1200	S1.003	15.827	225	S1.002	15.827	225	
S5	16.885	1.425	Open Manhole	1200	S1.004	15.460	225	S1.003	15.460	225	
S6	16.810	2.068	Open Manhole	1200	S2.000	14.742	225				
S7	15.900	1.425	Open Manhole	1200	S3.000	14.475	225				
S6	16.800	2.444	Open Manhole	1200	S1.005	14.356	225	S1.004	15.331	225	975
								S2.000	14.356	225	
								S3.000	14.356	225	
S7	15.900	1.700	Open Manhole	1200	S1.006	14.200	225	S1.005	14.200	225	
S	15.085	1.257	Open Manhole	1200		OUTFALL		S1.006	13.828	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	567122.336	572858.439	567122.336	572858.439	Required	
S2	567136.767	572853.193	567136.767	572853.193	Required	
S3	567160.667	572846.028	567160.667	572846.028	Required	
S4	567170.135	572843.865	567170.135	572843.865	Required	
S5	567178.014	572842.064	567178.014	572842.064	Required	
S6	567186.099	572833.318	567186.099	572833.318	Required	
S7	567193.722	572842.332	567193.722	572842.332	Required	
S6	567181.947	572840.721	567181.947	572840.721	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	567194.404	572834.400	567194.404	572834.400	Required	
S	567201.293	572824.711			No Entry	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	21.100	19.375	1.500	Open Manhole	1200
S1.001	o	225	S2	20.340	18.677	1.438	Open Manhole	1200
S1.002	o	225	S3	19.500	16.268	3.007	Open Manhole	1200
S1.003	o	225	S4	17.940	15.827	1.888	Open Manhole	1200
S1.004	o	225	S5	16.885	15.460	1.200	Open Manhole	1200
S2.000	o	225	S6	16.810	14.742	1.843	Open Manhole	1200
S3.000	o	225	S7	15.900	14.475	1.200	Open Manhole	1200
S1.005	o	225	S6	16.800	14.356	2.219	Open Manhole	1200
S1.006	o	225	S7	15.900	14.200	1.475	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	15.354	22.0	S2	20.340	18.677	1.438	Open Manhole	1200
S1.001	24.951	30.0	S3	19.500	17.845	1.430	Open Manhole	1200
S1.002	9.712	22.0	S4	17.940	15.827	1.888	Open Manhole	1200
S1.003	8.082	22.0	S5	16.885	15.460	1.200	Open Manhole	1200
S1.004	4.156	32.2	S6	16.800	15.331	1.244	Open Manhole	1200
S2.000	8.488	22.0	S6	16.800	14.356	2.219	Open Manhole	1200
S3.000	11.884	99.9	S6	16.800	14.356	2.219	Open Manhole	1200
S1.005	13.968	89.5	S7	15.900	14.200	1.475	Open Manhole	1200
S1.006	11.889	32.0	S	15.085	13.828	1.032	Open Manhole	1200

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	15.085	13.828	0.000	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.400	Storm Duration (mins)	30
Ratio R	0.259		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.006, Volume (m^3): 2.4

Unit Reference	MD-SHE-0079-3000-1200-3000
Design Head (m)	1.200
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	14.200
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0
Flush-Flo™	0.348	2.9
Kick-Flo®	0.707	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Storage Structures for Storm

Tank or Pond Manhole: S7, DS/PN: S1.006

Invert Level (m) 14.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	92.0	1.200	92.0	1.201	0.0

Design Audit Report for Storm

Filename	C:\Users\maneesha.sankar\Desktop\24213\Microdrainage Models\Updated\24213-attenuation tank-20231130.MDX
Network Name	Storm
Date Audited	30/11/2023 15:04
Pipes	9
Current Network Slope (1:X)	29.4
Storms Used (mins)	15min Summer, 30min Summer, 60min Summer, 120min Summer, 180min Summer, 240min Summer, 360min Summer, 480min Summer, 600min Summer, 720min Summer, 960min Summer, 1440min Summer, 2160min Summer, 2880min Summer, 4320min Summer, 5760min Summer, 7200min Summer, 8640min Summer, 10080min Summer, 15min Winter, 30min Winter, 60min Winter, 120min Winter, 180min Winter, 240min Winter, 360min Winter, 480min Winter, 600min Winter, 720min Winter, 960min Winter, 1440min Winter, 2160min Winter, 2880min Winter, 4320min Winter, 5760min Winter, 7200min Winter, 8640min Winter, 10080min Winter

Audit	**Failures**	**Status**
Manhole Sizes	0	Passed
Surcharge	0	Passed
Flood	0	Passed
Storage	0	Passed
Pipe Diameters	0	Passed
Pipe Lengths	0	Passed
Coordinate Accuracy	0	Not Run
Cover Levels	0	Passed
Backdrops	1	Failed
Full Bore Velocity	0	Passed
Proportional Velocity	1	Failed
Crossings/Conflicts	0	Not Run
Manhole Headloss	0	Passed
ICP Audit	0	Not Run
Pipe Intersection Offset	0	Not Run
Half Drain	0	Not Run

Manhole Size Audit

All Manhole Sizes comply with manhole size settings.

Surcharge Audit

No pipes exceeded the 1000 mm surcharge limit for the 5 year +0% climate change storm.

Flood Audit

No pipes flood for the 100 year +0% climate change storm.

Storage Audit

Storage Volume is at typical design values.

Pipe Diameter Audit

All pipe diameters are >= 150 mm.

Pipe Length Audit

All pipe lengths are <= 100.000 m.

Coordinate Accuracy Audit

The Coordinate Accuracy Audit was not completed by user request.

Upstream Cover Level Audit

All pipes have Upstream Cover Depths within the range 1.000-6.000 m.

Downstream Cover Level Audit

All pipes have Downstream Cover Depths within the range 1.000-6.000 m.

Backdrop Audit

The following manholes have backdrops outside of the range 0.200-1.500m.

USMH Name	Incoming PN	Outgoing PN	Backdrop (m)
S3	1.001	1.002	1.577

Full Bore Velocity Audit

All pipes have Full Bore Velocity within the range 1.00-3.00 m/s.

Proportional Velocity Audit

The following pipes have Proportional Velocity outside of the range 0.75-3.00 m/s for the 1 year +0% climate change storm.

PN	Storm (mins)	Velocity (m/s)
S2.000	15min Winter	0.57

Crossings / Conflicts Audit

The Crossings / Conflicts Audit was not completed by user request.

Manhole Headloss Audit

All manholes have sufficient headloss.

Interim Code of Practice

The Interim Code of Practice Audit was not completed by user request

Pipe Intersection Offset Audit

The Pipe Intersection Offset Audit was not completed by user request.

Half Drain Audit

The Half Drain Audit was not completed by user request.

Appendix B
Foul Water Discharge Calculation

Project No. 24213			Project Title: Gerald Griffin Street Apartment Development	MWP
Date: Nov. 2023				
Calcs by	Calc Sheet No	Check by	Title: Irish Water Pre-Connection Application	
DSp			Foul Wastewater Discharge Calculation	

Ref				
	Foul Wastewater Discharge Calculation			
	Irish Water Code of Practice:		IW-CDS-5030-03 Rev 2 Appendix B	
	Dry Weather Flow (DWF) =	PG + I + E		
Eqn 1	Design Foul Flow =	[Pfdom x PG]+[Pfdom,ind x PeGe]+I+[Pftrade x E]		
Eqn 2	Design Flow =	Eqn 1 + [SW+SWe]		
	DWF	Dry Weather Flow		
	P	Population		
	G	Water Consumption/Capita (m^3/ca/day)		
	Pe	Commercial/Industrial Population		
	Ge	Commercial/Industrial Water Consumption per Capita		
	I	Infiltration		
	E	Trade Flow		
	Pfdom	Peaking factor Domestic		
	Pfdom,ind	Peaking factor for Domestic element of Industrial		
	Pftrade	Peaking factor for Trade Flow		
	SW	Surface Water Allowance (Domestic)		
	Swe	Surface Water Allowance (Commercial/Industrial)		
	No. of Apartment Units		67	
	Population estimate per Unit		2.7	IW CoP Section 2.2.1
	Total No. Occupants		181 people	
	G		0.15 m^3/person/day	[IW CoP (150 L/person/day)]
	PG		27.14 m^3/day	
	PG + I + E			
	P		181 people	
	G		0.15 m^3/person/day	
	I	10%	2.71	IW Table 2.4; for this site it is 10% Unit Consumption (PG)
	E	No trade flow	0	
Eqn 1	**Dry Weather Flow (DWF)**		**29.85 m^3/day**	
			0.35 l/s	(average DWF rate over 24 hours)
	Design Foul Flow			
	Pfdom		6	IW CoP Table 2.5
	PG		27 m^3/day	
	Pfdom,ind		0	
	PeGe		0	
	I		2.71 m^3/day	
	Pftrade		0	
	E		0	
Eqn 2	**Design Foul Flow**		**165.52 m^3/day**	
			1.92 l/s	(peak flow rate over 24 hours)
NOTE	Surface Water Misconnection Allowance (SW & SWe) not applicable because this foul sewer design is a private sewer in a small new apartment development. This sewer design does not relate to the design of Public Sewers.			