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Engineering Report

Cappaghfinn HD Phase III,

Fingal County Council

Project Ref: P3333
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McMahon Associates

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1.0 Introduction

McMahon Associates have prepared this Engineering Services Report to provide a description of the proposed services strategy to be adopted for Phase III of Cappaghfinn Housing Development. The development will consist of 70 new units, a mixture of apartments and terraced units and associated car parking facilities with hard and soft landscaping.

The proposed development is located adjacent to Cappagh Road, Dublin 11 (ITM: 711296, 739799) northwest of Finglas. The site contains an existing ring fort which is to be retained as part of the development as a green space feature in the centre. The site is bounded on the east and south by residential developments. It is bounded by the North city business Park to the north and with a existing halting site to the west. The M50 motorway is just beyond the immediate bounding of the site approximately 150m to the north at its closest and runs in a northeast to southeast direction.

2.0 Existing Site and Services

Currently the site is a green field which contains an unclassified ring fort which is to be preserved in-situ and be incorporated as a visual amenity in the centre of the development. The natural topography falls gradually from north to south. There is an existing watercourse to the south of the site. Access to the site will be from two locations, the main access will be directly off Heathfield Avenue to the south which itself leads directly onto Cappagh Road. A second access will be from Heathfield Terrace which is an existing development to the east.

A Topographical Survey was carried out and made available to us.

2.1 Foul Water

Irish Water (IW) record mapping provided to us by Fingal County Council (FCC) indicates that there is an IW foul sewer which runs along Cappagh Road approximately 90m to the south. A separate survey document was provided to us by FCC which indicates the existing foul sewer infrastructure in Heathfield Avenue & Heathfield Park with a spur left at the entrance to our development. This infrastructure is not indicated on the IW records, which suggests that it has not been adopted by IW as yet.

2.2 Surface Water

Please refer to report by McCloy Consulting.

2.3 Watermain

There is existing IW watermain infrastructure available to us adjacent to our site. An existing spur is indicated on IW record mapping at the entrance to the development at Heathfield Avenue. From the records it appears to be a 150mm MOPCV pipe left for a future connection to our development.

There is a second option to connect our development to a 100mm MOPVC watermain in Heathfield Terrace to the east of our site.

Should the initial location not be feasible both of these are suitable connection locations.

3.0 Foul Water Drainage Design *(Refer to drawing C-03)*

The foul water drainage network will be separate to the surface water drainage system and will comply with "Irish Water - Code of Practise of Wastewater Infrastructure: Dec 2017 IW-CDS-5030-03".

The foul water will be collected from the each proposed dwelling unit via ventilated soil pipes and inspection chambers which then discharge to a demarcation chamber located within a maximium 1m of the property boundary on the private side. These demarcation chambers in turn then discharge to the main 225mm uPVC foul sewer which runs throughout the main development

It is proposed that the gravity foul sewer will be served by 225mm Ø lateral drains which will flow to the south of the site and connect into the existing foul sewer, a new manhole will be required on the spur connection. Confirmation of the invert level at the connection point will be required as will confirmation of the ownership of the sewer infrastructure prior to construction.

The peak wastewater loading for the building was estimated using guidance from “Irish Water Code of Practise for Wastewater”. This guidance states that dry weather flow (DWF) should be taken as 446 litres / dwelling / day with a peaking factor of 6 used to calculate peak flow for a development of this size. Therefore the DWF calculated for this development is 446 x 70 = 31,220 l / day or 0.361 l/s. The peak flow is therefore, 0.361 x 6 = 2.17 l/s.

The pipes were designed with a roughness coefficient (k_s) of 1.5mm and designed to achieve a minimum self-cleansing velocity of 0.75m/s when flowing half full. Details of the foul drainage pipe design can be found in Appendix A.

4.0 Surface Water Drainage Design & SUDS

Please refer to report by McCloy Consulting.

5.0 Flood Summary

Please refer to McCloys Consulting Report.

6.0 Watermain Design *(Refer to drawing C-04)*

An independent 100mm Ø connection to the existing watermain, which is located in adjacent Heathfield Avenue will be required.

For fire fighting purposes and as per IW regulations fire hydrants have been located around the development so that all units are within 46m of a hydrant and all hydrants are located a minimum of 6m from a building

The average daily domestic demand (ADDD) is taken as 150 l/day and an average of occupancy of 2.7 persons per dwelling. Therefore the ADDD is calculated for the development as 150 x 2.7 x 70 = 28,350 l/day or 0.328 l/s for the development.

The average day / peak week demand is taken as 1.25 times the ADDD therefore, 0.328 x 1.25 = 0.410 l/s.

The peak demand is taken as 5 times the average day/peak week, therefore peak demand is 0.410 x 5 = 2.05 l/s.

As the development will require in excess of 20m3 of water per day the development will require a bulk meter at the connection point for the development.

6.0 Roads and Parking Layout *(Refer to drawing C-01)*

The road and footpath layouts have been designed according to the standards set out in Design Manual for Urban Roads and Streets (DMURS). Road carriageway widths are a minimum of 5.5m, footpaths are all 2.0m wide and are therefore deemed compliant with DMURS. Corner radii in the junctions in the development are set at 6m which is in line with DMURS which states 4.5 - 6m radii should be used when occasional large vehicles will be using them. As refuse vehicles will be using the development weekly we have deemed this compliant.

Horizontal road alignment around the ring fort, which is to be retained, is 44.75m. Therefore to be compliant with DMURS the design speed for this road should be capped at 30km/h. This was confirmed as acceptable by FCC. Traffic calming measures in the form of raised tables have been introduced to the design in keeping with the recommendations of DMURS to limit straights to 70m or less.

Visibility splays have been set to the standards of DMURS i.e. 23m and are deemed compliant throughout the development. The use of parking areas as turning heads and been deemed acceptable by FCC therefore the layout is deemed compliant with the "Recommendations for Site Development Works for Housing Areas".

Based on the requirements set out in the FCC development plan, 113.5 parking spaces are required for this development. 136 No. parking spaces have been provided and therefore the development is deemed compliant.

Appendix A:

- Foul Network Calcs & Details

FOUL SEWERAGE DESIGN

Design Criteria for FOUL DESIGN PLANNING.FWS

Pipe Sizes Foul Design Planning Manhole Sizes Foul Design Planning

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	10
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	0.000
Persons per House	1.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for FOUL DESIGN PLANNING.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	34.678	0.578	60.0	0.000	32	0.0	1.500	o	225	Pipe/Conduit	
1.001	74.147	0.741	100.0	0.000	40	0.0	1.500	o	225	Pipe/Conduit	
1.002	22.385	0.373	60.0	0.000	28	0.0	1.500	o	225	Pipe/Conduit	
2.000	23.512	0.392	60.0	0.000	40	0.0	1.500	o	225	Pipe/Conduit	
1.003	28.421	0.284	100.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
1.004	63.541	0.410	155.0	0.000	20	0.0	1.500	o	225	Pipe/Conduit	
3.000	31.353	0.523	60.0	0.000	20	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	74.334	0.000	0.0	32	0.0	13	0.40	1.48	59.0	0.4
1.001	73.756	0.000	0.0	72	0.1	21	0.43	1.15	45.6	0.8
1.002	73.015	0.000	0.0	100	0.1	22	0.57	1.48	59.0	1.1
2.000	73.034	0.000	0.0	40	0.0	14	0.43	1.48	59.0	0.5
1.003	72.642	0.000	0.0	140	0.1	29	0.53	1.15	45.6	1.6
1.004	72.358	0.000	0.0	160	0.2	34	0.48	0.92	36.6	1.8
3.000	72.471	0.000	0.0	20	0.0	10	0.34	1.48	59.0	0.2

Network Design Table for FOUL DESIGN PLANNING.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.005	64.614	0.348	185.5	0.000	16	0.0	1.500	o	225	Pipe/Conduit	
4.000	52.865	0.881	60.0	0.000	24	0.0	1.500	o	225	Pipe/Conduit	
5.000	27.363	0.456	60.0	0.000	16	0.0	1.500	o	225	Pipe/Conduit	
5.001	53.096	0.885	60.0	0.000	14	0.0	1.500	o	225	Pipe/Conduit	
5.002	36.185	0.181	200.0	0.000	10	0.0	1.500	o	225	Pipe/Conduit	
1.006	27.299	0.300	91.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	71.948	0.000	0.0	196	0.2	40	0.48	0.84	33.5	2.2
4.000	72.481	0.000	0.0	24	0.0	11	0.36	1.48	59.0	0.3
5.000	73.122	0.000	0.0	16	0.0	9	0.32	1.48	59.0	0.2
5.001	72.666	0.000	0.0	30	0.0	13	0.39	1.48	59.0	0.3
5.002	71.781	0.000	0.0	40	0.0	19	0.28	0.81	32.2	0.5
1.006	71.600	0.000	0.0	260	0.3	38	0.67	1.20	47.9	3.0

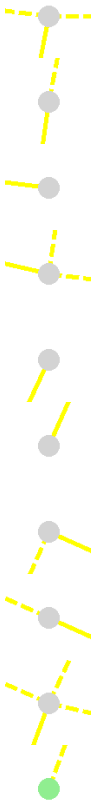
Manhole Schedules for FOUL DESIGN PLANNING.FWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	75.334	1.000	Open Manhole	1200	1.000	74.334	225				
2	75.245	1.489	Open Manhole	1200	1.001	73.756	225	1.000	73.756	225	
3	74.440	1.425	Open Manhole	1200	1.002	73.015	225	1.001	73.015	225	
9	74.201	1.167	Open Manhole	1200	2.000	73.034	225				
4	74.328	1.686	Open Manhole	1200	1.003	72.642	225	1.002	72.642	225	
								2.000	72.642	225	
5	74.042	1.684	Open Manhole	1200	1.004	72.358	225	1.003	72.358	225	
10	73.471	1.000	Open Manhole	1200	3.000	72.471	225				
6	73.635	1.687	Open Manhole	1200	1.005	71.948	225	1.004	71.948	225	
								3.000	71.948	225	
11	74.433	1.952	Open Manhole	1200	4.000	72.481	225				
12	74.005	0.883	Open Manhole	1200	5.000	73.122	225				
13	74.106	1.440	Open Manhole	1200	5.001	72.666	225	5.000	72.666	225	
14	74.106	2.325	Open Manhole	1200	5.002	71.781	225	5.001	71.781	225	
7	73.959	2.359	Open Manhole	1200	1.006	71.600	225	1.005	71.600	225	
								4.000	71.600	225	
								5.002	71.600	225	
8	73.800	2.500	Open Manhole	0		OUTFALL		1.006	71.300	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	711342.869	739845.776	711342.869	739845.776	Required	
2	711374.372	739831.281	711374.372	739831.281	Required	
3	711441.731	739800.289	711441.731	739800.289	Required	
9	711487.439	739797.396	711487.439	739797.396	Required	

Manhole Schedules for FOUL DESIGN PLANNING.FWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
4	711463.927	739797.390	711463.927	739797.390	Required	
5	711458.472	739769.497	711458.472	739769.497	Required	
10	711480.546	739702.651	711480.546	739702.651	Required	
6	711449.443	739706.601	711449.443	739706.601	Required	
11	711408.893	739769.152	711408.893	739769.152	Required	
12	711293.929	739732.842	711293.929	739732.842	Required	
13	711305.068	739757.835	711305.068	739757.835	Required	
14	711353.522	739736.123	711353.522	739736.123	Required	
7	711386.513	739721.258	711386.513	739721.258	Required	
8	711377.065	739695.647			No Entry	



PIPELINE SCHEDULES for FOUL DESIGN PLANNING.FWS

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)
1.000	o	225	1	75.334	74.334	0.775	Open Manhole	1200
1.001	o	225	2	75.245	73.756	1.264	Open Manhole	1200
1.002	o	225	3	74.440	73.015	1.200	Open Manhole	1200
2.000	o	225	9	74.201	73.034	0.942	Open Manhole	1200
1.003	o	225	4	74.328	72.642	1.461	Open Manhole	1200
1.004	o	225	5	74.042	72.358	1.459	Open Manhole	1200
3.000	o	225	10	73.471	72.471	0.775	Open Manhole	1200
1.005	o	225	6	73.635	71.948	1.462	Open Manhole	1200
4.000	o	225	11	74.433	72.481	1.727	Open Manhole	1200
5.000	o	225	12	74.005	73.122	0.658	Open Manhole	1200
5.001	o	225	13	74.106	72.666	1.215	Open Manhole	1200
5.002	o	225	14	74.106	71.781	2.100	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)
1.000	34.678	60.0	2	75.245	73.756	1.264	Open Manhole	1200
1.001	74.147	100.0	3	74.440	73.015	1.200	Open Manhole	1200
1.002	22.385	60.0	4	74.328	72.642	1.461	Open Manhole	1200
2.000	23.512	60.0	4	74.328	72.642	1.461	Open Manhole	1200
1.003	28.421	100.0	5	74.042	72.358	1.459	Open Manhole	1200
1.004	63.541	155.0	6	73.635	71.948	1.462	Open Manhole	1200
3.000	31.353	60.0	6	73.635	71.948	1.462	Open Manhole	1200
1.005	64.614	185.5	7	73.959	71.600	2.134	Open Manhole	1200
4.000	52.865	60.0	7	73.959	71.600	2.134	Open Manhole	1200
5.000	27.363	60.0	13	74.106	72.666	1.215	Open Manhole	1200
5.001	53.096	60.0	14	74.106	71.781	2.100	Open Manhole	1200
5.002	36.185	200.0	7	73.959	71.600	2.134	Open Manhole	1200

PIPELINE SCHEDULES for FOUL DESIGN PLANNING.FWS

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)
1.006	o	225	7	73.959	71.600	2.134	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)
1.006	27.299	91.0	8	73.800	71.300	2.275	Open Manhole	0

Free Flowing Outfall Details for FOUL DESIGN PLANNING.FWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	8	73.800	71.300	0.000	0	0