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PROPOSED RESIDENTIAL DEVELOPMENT AT THE REAR OF NO 13. NEWLANDS DRIVE CLONDALKIN CO. DUBLIN

DRAINAGE DESIGN REPORT

Prepared by GK, Consulting Engineers

Client: **H.H.M Investments Ltd**

Date: May 2022

Introduction

GK Consulting Engineers have undertaken a detailed assessment of proposed foul & surface water drainage infrastructure, associated with the proposed new dwellings at Newlands Drive ,Clondalkin, Co. Dublin. It is proposed to construct a 2No. 2 storey dwellings.

It is proposed to outfall the foul sewer to an existing 225 mm foul sewer public drain located at the front of the property along Newlands Park. The surface water runoff for paved areas percolates onsite to porous paving. Due to insufficient setback distances for an infiltration trench, the roof runoff outfalls to the existing 150 mm surface public sewer on Newlands Drive.

Scope

This report outlines the proposals for the provision of services to facilitate the proposed new dwellings. This report should be read in conjunction with all relevant drawings as part of this submission.

This report has been based on available information & drainage maps compiled from South Dublin County Council.

Existing site services local authority networks

The existing site is serviced the following site infrastructure.

Foul Sewer
An existing 225 mm foul sewer public drain located at the front of the property along Newlands Park.

SURFACE WATER
An existing 150mm diameter combined sewer is located on Newlands Drive

WATER MAIN
An existing 125mm MDPE diameter watermain is located at the front of the property along Newlands Park.

Reference publications

Code of Practice – Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. ≤ 10)
Greater Dublin Strategic Drainage Study – Volumes 1 to 6
Greater Dublin Regional Code of Practice for Drainage Works – Version 6.0 Technical Guidance Documents – Part B
Recommendations for Site Development Works for Housing Areas

Surface water design summary

It is proposed to install permeable paving for hard standing areas. The surface drainage layout is indicated on Site Layout Drawing C102

The pipe network is designed for a rainfall intensity of 50mm/hr, BS8301 8.8.2 or 1in 2year return period

Surface water pipe network design

The system is designed in accordance with BS8301: 1985 British Standard Code of Practice for Building Drainage.

Check Pipe network design for a worst-case storm with 1:2 year return period.

The worst-case storm duration is when the storm duration equals the time of concentration of the system.

BS8301 8.8.3 *(Wallingford Rational Method)*

From drawings - effective impermeable area drained to surface water sewer is 100m² from roof runoff

Time of concentration = time of entry + (length of drain / full bore velocity of flow)

BS8301 8.8.4 (c)

Time of entry for a two-year return period is 4 to 7 mins

For a flat catchments we take the longer time of 7 mins = 420 s

Taking an average velocity = 0.75m/s

Total length of drain picking up the development catchment = 50m approx

t = 420 + (50 / 0.75) = 480s t = 8 mins

Referring to published Met office rainfall data:

Closest data is for storm duration of 15 mins with a two-year return period,

Rainfall = 7.0mm per 15min period

= 28.0 mm per hour

$Q=A_p \times i \times Cv \times Cr \times 2.78$ (area drained by section of network 100m2)

Q= 100 x 28.0 x 1.3 x .8 x 2.78

Q= 0.8 l/s

Extreme Rainfall Return Periods

Location: Dublin City Centre
Average Annual Rainfall: 751

Maximum rainfall (mm) of indicated duration expected in the indicated return period.

	Return Period (years)								
Duration	1/2	1	2	5	10	20	30	50	100
1 min				1.8	2.1	2.5	2.8	3.1	3.6
2 min				3.0	3.5	4.3	4.8	5.4	6.2
5 min				5.4	6.4	7.7	8.6	9.9	11.3
10 min				7.7	9.2	11.3	12.6	14.5	16.8
15 min	4.6	5.8	6.6	9.3	11.6	14.3	16.1	18.7	22
30 min	6.2	7.8	8.8	12.4	15.4	18.8	21.1	24	28
60 min	8.2	10.4	11.5	16.0	19.7	24	27	31	36
2 hour	11.0	13.6	15.3	20.5	25	30	33	37	43
4 hour	15.1	18.4	20.4	27	32	37	41	46	52
6 hour	18.1	22.2	24	32	37	44	48	53	61
12 hour	23.5	28	31	40	47	54	59	66	75
24 hour	29	35	38	49	57	66	71	79	89
48 hour	36	43	47	59	69	78	85	94	106
96 hour									

Notes: Larger margins of error for 1, 2 ,5 and 10 minute values and for 100 year return periods
M560: 16 M52d: 56 M560/m52d: 0.29

BS8301 8.8.2 design for rainfall intensity of 50mm/hr

Outfall Flow = [(100x50/1000) / (60x60)] x1000 = 1.4 l/s

Summary

The surface water pipe network is designed to cater for an outfall of 1.4 l/s, per the requirements of BS8301 8.8.2

The proposed surface water network utilises 150mm diameter concrete/upvc pipes at a minimum fall of 1:100. The capacity of the proposed pipe is 22l/s

Surface water drainage design

The proposed surface water drainage scheme has been designed in accordance with Greater Dublin Strategic Drainage Study using sustainable drainage systems (SuDS).

A SuDS analysis of the site was carried out using the online tools available on www.irishsuds.com as directed by the Dublin City Council Water, Waste and Environmental services. The SuDS analysis determined the following options as feasible for the proposed works

- Soakaway
- Permeable Paving
- Green Roofs
- Rainwater Harvesting
- Percolation
- Water butts

Due to the restricted nature of the site, it is not feasible to provide an onsite soak way which achieves the minimum setback of 5m from the building & 3m from the boundary. There is also a high risk associated with providing a storm water attenuation tank. In particular the requirements for long-term maintenance & infiltration of water adjacent to foundations.
The rainwater runoff is entirely gathered from roof runoff. We propose to use above perforated drains & permeable paving, in the interest of water percolation. The remainder of roof runoff will drain directly the adjacent surface sewer.

Foul drainage

The foul drainage layout is indicated on Site Layout Drawing C101. The sewer discharges by gravity via an onsite 150mm diameter private sewer. The private foul sewer crosses the site & outfalls to an existing 225 mm foul sewer public drain located at the front of the property along Newlands Park

The pipe materials and gradients are chosen to ensure self-cleaning velocities (i.e. between approximately 0.75 and 1.8 m/sec) at flows greater than approximately 1/8 of the pipe bore.

Design summary

Design flow rate based on Discharge Units for the development:

Based on Table 4 & Fig. 2 BS8301

Discharge units per dwelling	=	14
Total Discharge units for 2 dwellings units	=	28

Peak flow rate from fig 2 BS8301 = 2.8 l/s

Calculation summary

The foul pipe network will be designed for 2.8 L/s based on the discharge unit method.

The onsite network will utilise 150mm diameter uPvc pipes at a the following gradients

1. Discharge from site = 1:100
2. Between AJ connections = 1:75
3. Head of sewer = 1:50

Allowable foul flow at 75% of proportional depth for 150mmdia pipes at min. gradient of 1:100 = 22L/s

Pipe sizes, gradients, invert and cover levels and connection to public sewers are shown on drawings

Water Supply

The lands subject to the planning application is serviced by an existing water mains along Newland Park. All water mains / service pipes are to be laid to the specification as detailed in 'Recommendations for Site Development Works for Housing Areas' by the DOE & Local Government.

It is proposed to connect a service pipe to this water main and distribute a water supply to the dwelling.

Reference is made to Irish Water Code of Practice for Water Infrastructure. Section 3.7.3, Average domestic daily demand in a development can be established based on daily per-capita consumption, house occupancy, number of properties, etc.

For design purposes the average daily domestic demand shall be based on a per-capita consumption of 150 l/person/day and an average occupancy ratio of 2.7 persons per dwelling unit. The average day/peak week demand should be taken as 1.25 times the average daily domestic demand.

Based on the Architects schedule of accommodation.

Number of Apartment units = 2

Average daily demand = 2x150x2.7 = 810 litres /day

Average hour demand = 810 /24x60x60= 0.001 litres /sec

Peak daily demand = 1.25 x 810= 1013 litres /day

Based on a 10hr day = 1013/ (10x60x60) = 0.028 l/s