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Comhairle Chontae Uíbh Fhailí
Offaly County Council

Offaly County Council

Proposed Development of 13 No. Residential Units at Beechgrove, Belmont, Co. Offaly

Planning Stage Engineering Report



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Contents Amendment Record



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1 INTRODUCTION

1.1 Introduction

Malone O'Regan have been commissioned to prepare drainage, water supply and road infrastructure plans in relation to a proposed housing development at Beechgrove, Belmont, Co. Offaly. This report has been prepared to describe the proposed infrastructure and to support a planning application for the development.

The proposed development is fully described on the drawings which accompany this planning submission. Where reference is made to drawings and drawing numbers within this report these should be taken as meaning those drawings produced by Malone O'Regan unless specifically stated otherwise.

1.2 The Site

The proposed site is located on Breechgrove, Belmont, which is accessed via Chapel Lane and subsequently local road L3007. The site is located at the southwestern edge of Belmont Village, approximately 250m from the village core.

- To the east of the site is an existing residential development along Breechgrove.
- Immediately to the north, west and south of the site are currently undeveloped greenfield areas. The undeveloped land to the north of the site is zoned for future *Residential* development.

The proposed development is located within land partially zoned for *Residential* development, with a section in the east of the site zoned for *Open Space*.



Figure 1 – Proposed Site Location

1.3 *Project Description*

The proposed development includes the construction of 13 residential units via 6 No. single-storey semi-detached houses and 1 No. detached house. Details of the proposed development are indicated on the architect's plans.

1.4 *Site Topography*

The proposed site has an overall area of 0.97 hectares. A topographical survey has been conducted which indicates that the site generally slopes towards the northern and southern boundaries of the existing site. The existing ground level falls from the highest elevation of +54.58m centrally on the eastern boundary of the site to a lowest elevation of +51.79m at the south eastern boundary of the site and an elevation of +53.70m at the northern boundary of the site.

1.5 *Consultation*

In preparing this planning application Malone O'Regan consulted with the following personnel within the Local Authority and within Irish Water:

Ms Noelle McGinley

Offaly County Council, Executive Architect

Mr Paul McDonald

OCC, Senior Executive Technician

A Pre-Connection Enquiry Form was submitted to Irish Water. We await a response from Irish Water.

1.6 *References*

Reference has been made to the following publications in the preparation of this report.

- Greater Dublin Regional Code of Practice for Drainage Works, Version 6.0.
- Greater Dublin Strategic Drainage Study.
- Offaly County Development Plan 2016-2022.
- EPA Wastewater Treatment Manuals, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels.
- Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009
- Irish Water Code of Practice for Water Infrastructure
- Irish Water Code of Practice for Wastewater Infrastructure

2 SURFACE WATER DRAINAGE DESIGN

2.1 Proposed Layout

The proposed surface water drainage layout is indicated on Malone O'Regan drawing number 19055 - BEL-101 Drainage Layout Rev P. It is proposed that all surface water generated on the site will be collected by gullies and directed towards a new attenuation tank from where it will be discharged into the existing 300mm concrete combined sewer located on Beechgrove Road at a controlled rate. The rate of discharge will be controlled using a Hydrobrake and will be limited to 2 l/s/Ha, as required by the Offaly County Council. This will ensure that the rate of surface water discharge from the proposed site is not greater than that from the existing greenfield site.

2.2 Sustainable Drainage Systems

It is proposed to include the following SuDS measures as part of the development:

- As described in Section 2.1 above it is proposed to provide on-site attenuation in the form of a 215m³ attenuation tank. The discharge from the underground attenuation system will be limited to 2 l/s/Ha.
- Permeable paving will be specified in driveways of the proposed dwellings. An overflow pipe will be connected to the main drainage network.

2.3 Attenuation / Run-off Calculations

Development Area Details

Area – Proposed	
Item	Area (m ²)
Roof Area	1542
Paving and Car Parking Areas	1741
Roads	980
Green Area	5409
Total Area	9672 (0.97 hectares)
Impermeable Area – Proposed	4947 (0.49 hectares)

Rainfall Data

The rainfall data used was based on Met Eireann Rainfall Data for Belmont. The rainfall data and drainage criteria employed is as follows:

M5 – 60 = 16.7mm (Max. rainfall in 1 hour for 5 year return period)

M5 – 2D = 50.0mm (Max. rainfall in 2 days for 5 year return period)

Ratio, r = 0.33 (M5 – 60 / M5 - 2D)

Standard Average Annual Rainfall (SAAR) = 1101mm

Climate change increase = 20%

When calculating the required size of attenuation tank using Malone O'Regan design spreadsheets, an additional 20% was added to the above rainfall intensities to account for the future effects of climate change.

Attenuation Design & Outflow Connection

Calculations for the design of the attenuation pipe network are provided in Appendix A. The attenuation pipe network has been sized to cater for a 1 in 100 year storm event.

The required attenuation volume has been calculated using Malone O'Regan design spreadsheets. The calculations provided in Appendix A show that the required volume of attenuation storage for a 1 in 100 year storm event is **227 m³**.

3 WATERMAINS

3.1 Proposed Layout

The proposed preliminary water main layout is indicated on drawing *19055-BEL-101 Drainage Layout Rev P* which accompanies this application. It is proposed to connect to the existing water main located on Beechgrove Road at the eastern site boundary.

A Pre-Connection Enquiry Form was submitted to Irish Water. We await a response from Irish Water.

3.2 Residential Water Demand Calculations

The average and peak water demand rates were calculated in accordance with the Irish Water Code of Practice for Water Infrastructure which assumes a loading rate of 150 litres / person / day and an average occupancy ratio of 2.7 persons per dwelling. The average day, peak week demand is taken as 1.25 times the average daily domestic demand. The peak demand is taken to be 5 times the average day, peak week demand.

Number of residential properties = 13

Average Daily Domestic Demand = $13 \times 150 \times 2.7$ = 5,265 litres / day
= 0.061 l/s

Average Day Peak Week Demand = 0.061×1.25 = 0.076 l/s

Peak Demand (Residential) = 0.076×5 = 0.381 l/s

Normal Demand (assuming principal water usage over 8 hrs) = $0.076 \times 24/8$ = 0.229 l/s

The proposed water meter type is to be confirmed with Offaly City Council / Irish Water.

4 FOUL WATER DRAINAGE DESIGN

4.1 Proposed Layout

The proposed preliminary foul drainage layout is indicated on drawing 19055 - BEL-101 Drainage Layout Rev PR which accompanies this application.

It is proposed to discharge all foul water from the site into the existing 225mm concrete combined sewer located on Beechgrove, via a new manhole.

It is proposed to provide a network of gravity sewers within the site to collect foul waste from each property and discharge it towards the manhole described above.

A Pre-Connection Enquiry Form was submitted to Irish Water. We await a response from Irish Water.

4.2 Foul Discharge Calculations

The average and peak discharge rates were calculated using loading rates provided in the Irish Water Code of Practice for Wastewater Infrastructure:

Dry Weather Flow (DWF) = 446 litres per dwelling

Number of properties = 13

Total DWF = 446×13 = 5,798 litres / day
= 0.067 l/s

Peak Discharge = $6 \times \text{DWF}$ = 6×0.067
= 0.403 l/s

5 ACCESS AND CIRCULATION

5.1 Existing Road Network and Access

The main vehicle routes surrounding the site of the proposed development are Chapel Lane, located to the north of the proposed site, and local road L3007, located to the east of the proposed site. Vehicular access will be facilitated at the eastern boundary of the site off Beechgrove.

The existing sightlines and access for emergency vehicles will not be altered.

5.2 Road Safety Records

Records of historical traffic collisions are available on the Road Safety Authority website. Figure 2 shows accident data in the vicinity of the proposed site. It can be seen there has been 1 No. minor recorded collisions on a local road but none in the vicinity of the proposed development. There does not appear to be any particularly dangerous junctions in the immediate vicinity of the site.

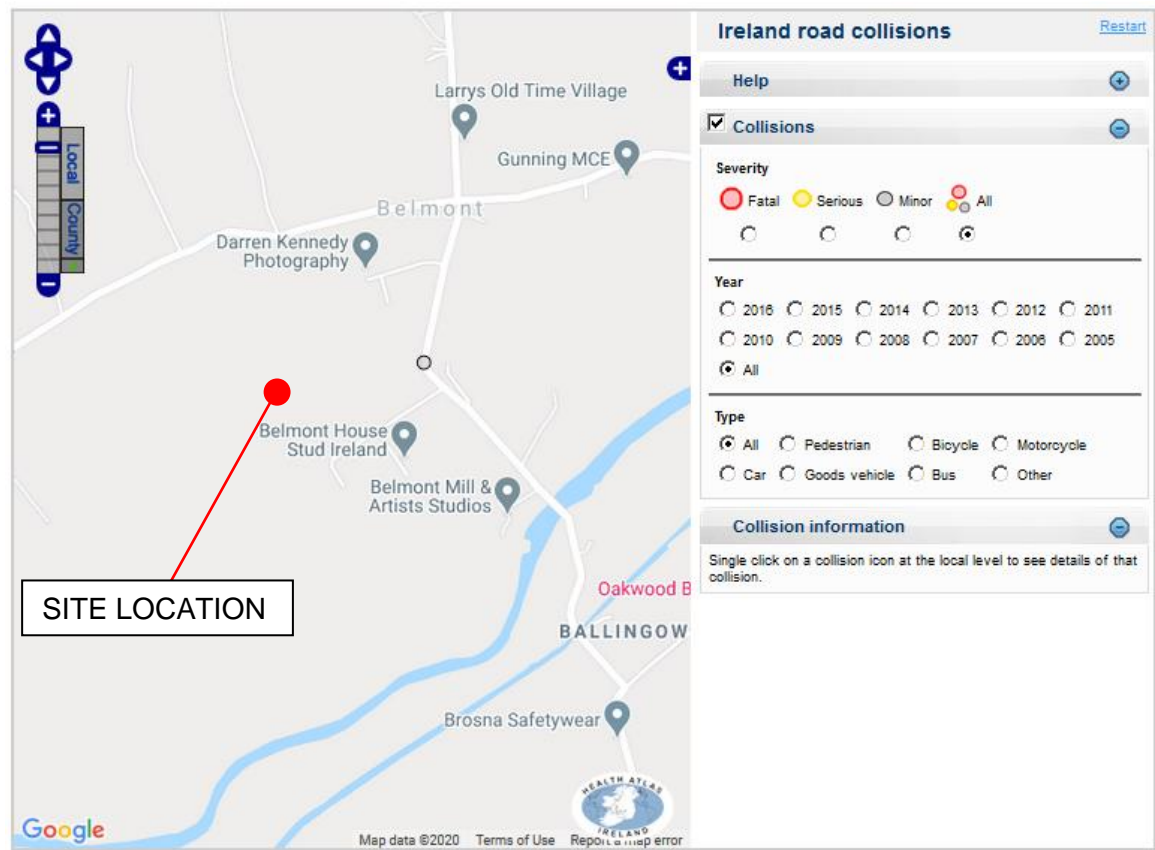


Figure 2 Road Collision Data (Source: Road Safety Authority)

5.3 Construction Phase

The works Contractor will be required to provide a detailed Construction Traffic Management Plan prior to work commencement. This report will propose measures to minimise construction vehicles and construction vehicle movements on site as well as personnel parking and movement. This will be agreed with Offaly County Council prior to commencement of the proposed works.

Typically Construction Management Plans would include the following measures:

- Construction fencing and hoarding will be erected as required with defined vehicular access points for the site.
- The surrounding road network will be signed to define the access and egress routes for construction vehicles.
- The arrival of delivery vehicles will be locally managed in order to minimise the impact of this traffic on the surrounding road network.
- A dust minimisation plan will be developed incorporating truck wheel washes at the construction site entrance and / or a programme of road sweeping.

APPENDIX A – ATTENUATION CALCULATIONS

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Offaly County Council, Belmont Housing Development

Surface Water Drainage Calculations
Proposed Attenuation Storage Capacity

These calculations are based on "Engineering Hydrology" by E.M.Wilson (4th Edition)
 The approach is also similar to BRE Digest 365 "Soakaway Design"
 These are based on the "Wallingford Procedure" and the "Flood Studies Report"

The Storage "S" required is the maximum difference between Inflow "I" and Outflow "O".
 The main parameters used are the 2 day M5 rainfall modified as necessary for the appropriate return storm period, the rainfall ratio "r" and appropriate growth factors for the return period required.
 All these values are included in "Wilson".

The calculation also depends on the area of the site and also the allowable run-off from the site.

The first stage is the calculation of the impermeable area in square metres.

Site Area sq. m.	9672			0.97	ha
Roof Area sq. m.	1542	Impermeability Factor	0.95	0.15	ha
Paving and Car Parking Areas sq.m.	1741	Impermeability Factor	0.9	0.16	ha
Roads sq.m.	980	Impermeability Factor	0.85	0.08	ha
Green Area sq.m.	5409	Impermeability Factor	0.2	0.11	ha
Total ha.				<u><u>0.49</u></u>	ha

The following values are taken from "Wilson" Appendix A. Irish maps related to the site location.

2 Day M5 Rainfall mm	50
Ratio "r" %	33%
SAAR(yearly Rainfall) mm	1101
Soil	0.3

60 minute M5 Rainfall as Percentage of 2Day M5 Rainfall	Ratio r	=	33%
Allowable outflow =		=	1.9344 l/s
Allowable outflow from the site (Council recommendations)		=	2 l/s/ha

Time	%	M5	Growth	Area	MT	Inflow	Outflow	Capacity	
		mm	Factor(10 Year)	Factor	Factor	"I"	"O"	Required	
							"I"- "O"	"I"- "O" = "S"	
1 min		3.3	1.7	1.15	1	1.90	9.39	0.12	9.27
2min		5.7	2.9	1.16	1	3.31	16.35	0.24	16.11
5 min		10.3	5.2	1.18	1	6.08	30.06	0.60	29.46
10 min		14.8	7.4	1.18	1	8.73	43.19	1.20	41.99
15 min		17.7	8.9	1.18	1	10.44	51.66	1.80	49.86
30 min		23.3	11.7	1.18	1	13.75	68.00	3.60	64.40
60 min		30	15.0	1.17	1	17.55	86.81	7.20	79.61
2 hour		38	19.0	1.16	1	22.04	109.02	14.40	94.62
4 hour		48	24.0	1.15	1	27.60	136.53	28.80	107.73
6 hour		55	27.5	1.14	1	31.35	155.08	43.20	111.88
12 hour		68	34.0	1.14	1	38.76	191.73	86.40	105.33
24 hour		85	42.5	1.13	1	48.03	237.56	172.80	64.76
48 hour		106	53.0	1.12	1	59.36	293.63	345.60	-51.97

Size of attenuation (1 in 10 year event) = 112 m³

Time	R5 %	M5 mm	Growth Factor(30 Year)	Area Factor	MT Factor	Inflow "I"	Outflow "O"	Capacity Required "I"- "O" = "S"	
1 min		3.3	1.7	1.39	1	2.29	11.35	0.12	11.23
2min		5.7	2.9	1.41	1	4.02	19.88	0.24	19.64
5 min		10.3	5.2	1.44	1	7.42	36.68	0.60	36.08
10 min		14.8	7.4	1.46	1	10.80	53.44	1.20	52.24
15 min		17.7	8.9	1.48	1	13.10	64.79	1.80	62.99
30 min		23.3	11.7	1.49	1	17.36	85.87	3.60	82.27
60 min		30	15.0	1.48	1	22.20	109.81	7.20	102.61
2 hour		38	19.0	1.47	1	27.93	138.16	14.40	123.76
4 hour		48	24.0	1.45	1	34.80	172.14	28.80	143.34
6 hour		55	27.5	1.44	1	39.60	195.89	43.20	152.69
12 hour		68	34.0	1.42	1	48.28	238.82	86.40	152.42
24 hour		85	42.5	1.38	1	58.65	290.12	172.80	117.32
48 hour		106	53.0	1.34	1	71.02	351.31	345.60	5.71

Size of attenuation (1 in 30 year event) = 153 m³

Time	R5 %	M5 mm	Growth Factor(100 Year)	Area Factor	MT Factor	Inflow "I"	Outflow "O"	Capacity Required "I"- "O" = "S"	
1 min		3.3	1.7	1.87	1	3.09	15.26	0.12	15.14
2min		5.7	2.9	1.88	1	5.36	26.50	0.24	26.26
5 min		10.3	5.2	1.97	1	10.15	50.19	0.60	49.59
10 min		14.8	7.4	1.98	1	14.65	72.48	1.20	71.28
15 min		17.7	8.9	1.95	1	17.26	85.37	1.80	83.57
30 min		23.3	11.7	1.91	1	22.25	110.07	3.60	106.47
60 min		30	15.0	1.85	1	27.75	137.27	7.20	130.07
2 hour		38	19.0	1.78	1	33.82	167.29	14.40	152.89
4 hour		48	24.0	1.73	1	41.52	205.38	28.80	176.58
6 hour		55	27.5	1.71	1	47.03	232.61	43.20	189.41
12 hour		68	34.0	1.62	1	55.08	272.46	86.40	186.06
24 hour		85	42.5	1.58	1	67.15	332.16	172.80	159.36
48 hour		106	53.0	1.53	1	81.09	401.12	345.60	55.52

Size of attenuation (1 in 100 year event) = 189 m³

Size of Attenuation Storage with 20% Climate Change 227 m³