

KILKENNY COUNTY
COUNCIL
Development at
St. Francis Brewery, Kilkenny
Water Infrastructure Design Report
(WIDR02)

October 2017



Consulting Engineers
Ormonde Road
Kilkenny

For Further Information:

T: + 353 56 7702761

F: + 353 56 7790728

E: info@mpa.ie

W: www.mpa.ie

Prepared By:

A handwritten signature in black ink, appearing to read 'Liam Judge', is written over a horizontal line.

Liam Judge BEng MIEI


Checked By:

A handwritten signature in blue ink, appearing to read 'Martin Peters', is written over a horizontal line.

Martin Peters BSc Eng, MSc Eng, CEng
MIEI, MStructE, Dip Planning

For and on behalf of
MPA Consulting Engineers

DOCUMENT CONTROL SHEET

	Client	Kilkenny County Council							
	Project Title	Proposed Development at St. Francis Brewery, Kilkenny.							
	Project Ref.	141078							
	Document Title	Water Infrastructure Design Report							
	Document No.	141078-WIDR02							
	This Document Comprises	DCS	TOC	Text	LOT	LOG	LOF	LOD	Appendices
		1	1	6	-	-	-	-	2
Check									

Revision	Status	Author	Reviewed By	Approved By	Issues Date
D01	Draft	LMJ	MJP	MJP	15-10-15
F01	Final	LMJ	MJP	MJP	16-10-15
F02	Final	LMJ	MJP	MJP	25-10-17

Contents:

1.0 INTRODUCTION	1
1.1 General.....	1
2.0 FOUL DRAINAGE SYSTEM	2
2.1 General.....	2
2.2 Gravity System	2
3.0 STORM	3
3.1 General.....	3
3.2 Gravity System	3
4.0 WATERMAIN	5
4.1 General.....	5
4.2 Design Data.....	5
5.0 SUMMARY AND CONCLUSIONS	6
5.1 Summary	6
5.2 Conclusions	6

APPENDICES:

Appendix A – Foul Sewer Design Sheets

Appendix B – Storm Sewer Design Sheets

1.0 INTRODUCTION

1.1 General

- 1.1.1 This report which has been prepared by MPA Consulting Engineers contains information on the design of foul drainage system, storm water drainage system and watermain to be constructed for the proposed development at St Francis Brewery, Kilkenny.
- 1.1.2 The application relates to a site of approximately 6.75 hectares. All designs have been carried out to take account of all development proposed on site.
- 1.1.3 The design of the systems has been carried out to take account of the requirements of the Building Regulations, BS8301: Code of Practice for Building Drainage and the requirements of Kilkenny County Council. The foul sewer has been designed in accordance with the Colebrook-White formulas, B.S. 752: 2008, Drain & Sewer Systems and the current Building Regulations. Calculations of design flows were carried out using the Discharge Units Method in accordance with BS EN 12056-2:2000.
- 1.1.4 The existing building is currently served by mains foul by means of a gravity sewer. The site is currently served by the existing Brewery storm drainage which discharges to the Breagagh & Nore Rivers. The site is also served by public mains water served from the public road.
- 1.1.1 The proposed foul system is a gravity feed system which conveys the effluent to the existing public main on Horse Barrack Lane.
- 1.1.2 The storm water system proposed for the development is a gravity system which conveys storm water to the existing storm drainage network within the site.
- 1.1.3 The overall services masterplan for the area has been considered during the design of the proposed foul and storm sewers to facilitate the future provision of this network.
- 1.1.4 As part of the proposed development it is proposed to collect rainwater from a portion of the building which shall be stored in the basement of the building for reuse. There will be an overflow arrangement from this rain water harvesting storage tank which shall overflow to the existing storm water network which discharges to the Breagagh River.
- 1.1.5 The proposed watermain will connect to the public supply on Water Gate Street and a looped watermain with fire hydrants will be provided.

2.0 FOUL DRAINAGE SYSTEM

2.1 General

- 2.1.1 There is an existing foul sewer network servicing the existing building on the site. This network passes through the former Brewery Site and is subsequently connected to the public mains on John's Bridge Rd.
- 2.1.2 Due to the nature of the demolition & refurbishment works to be carried out, it is deemed necessary to provide an alternative foul sewer network.
- 2.1.3 The new foul sewer has been designed in accordance with the Colebrook-White formulas, BS EN 752:2008 – Drain & Sewer Systems Outside Buildings and the current Building Regulations. Calculations of design flows were carried out using the Discharge Units Method in accordance with BS EN 12056-2:2000 Gravity Drainage Systems.
- 2.1.4 The drawings included with this submission show the proposed Foul Sewer Layout (Drawing No. 141078/PL/003).
- 2.1.5 The proposed system consists of gravity sewers on the site which convey all the effluent from the proposed development to a Local Authority foul sewer which crosses the lands adjacent to the proposed site.

2.2 Gravity System

- 2.2.1 The pipes for the foul sewerage system consist of 225mm diameter uPVC pipes, at gradients varying from 1:100 to 1:225. The foul system has been designed to take account of all foul drainage requirements on the proposed site.
- 2.2.2 The foul sewer design sheet is shown in Appendix A, it can be seen here that the maximum peak flow is 17.1 l/s. This figure was determined by using the discharge units set out in BS EN 12056-2:2000, based on the layout of the proposed building.
- 2.2.3 The proportional velocities have been extrapolated from the Wavinsewer Systems Design Manual for uPVC pipes based on the proportional capacity, and from this the partial velocity / design velocity has been calculated.
- 2.2.4 It can be seen in Appendix A that all pipes have been designed with adequate capacity and the partial velocities for all pipes are 0.70 m/s or greater as per BS EN 752:2008 – Drain & Sewer Systems Outside Buildings, thereby ensuring adequate self-cleansing velocities for the entire system.

3.0 STORM

3.1 General

- 3.1.1 There is an existing storm water network servicing the existing Brewery site. The existing site is comprised of buildings, covered areas and hard standing areas, therefore all storm water falling on the site is collected via the existing network. This network is connected into the overall drainage network of the St Francis Brewery site which discharges to the Breaghagh & Nore Rivers.
- 3.1.2 There is currently existing surface water drainage located on Horse Barrack Lane which shall partially be re-used along with providing additional drainage in the form of slot drains and road gully's.
- 3.1.3 The proposed development shall generate no additional storm water runoff, however due to the regeneration, a new system which will be connected to the existing outfall is required.
- 3.1.4 It is proposed to provide a new gravity storm water network on the site, connecting to the existing storm water network which is located within the site. This existing storm sewer discharges to the Breaghagh River and the Nore.
- 3.1.5 The gravity storm sewer system has been designed in accordance with the Colebrook-White formulas and the Modified Rational Method, where:

$$Q_p = CiA$$

and

$$Q_p = \text{Peak Flow (l/s)}$$

$$C = C_v \times C_r \text{ (} C_v = 0.75 \text{ \& } C_r = 1.3 \text{)}$$

$$i = \text{Rainfall intensity (mm/hr)}$$

- 3.1.6 A storm sewer layout has been included with this submission (Drawing No. 141078/PL/004).

3.2 Gravity System

- 3.2.1 The pipe network serving the development has been designed in accordance with the Modified Rational Method, utilising rainfall data for the Kilkenny area from Met Eireann. The rational design sheet has been included in Appendix B of this report.
- 3.2.2 As can be seen from these tables the storm frequency proposed is 1 in 2 years, thereby ensuring an appropriate level of service for the storm drainage system. The time of entry has been taken to be 4 minutes in accordance with Recommendations for Site Development

Works. Appropriate pipe roughness coefficients have been taken from the pipe manufacturer's literature.

- 3.2.3 The pipes required to drain the proposed development are 225mm in diameter, all at falls varying from 1:118 to 1:250.
- 3.2.4 It can be seen in Appendix B that all pipes have been designed with adequate capacity and the partial velocities for all pipes are above 0.70 m/s, as per BS EN 752:2008 – Drain & Sewer Systems Outside Buildings, thereby ensuring adequate self-cleansing velocities for the entire system.

4.0 WATERMAIN

4.1 General

4.1.1 The water main will be laid out as per Drawing No. 141078/PL/005 - Proposed Watermain Layout. Watermain Details (Drawing No. 141078/PL/031) have also been included in this submission.

4.1.2 A 100mm diameter HDPE watermain will serve the development. This will be served by connecting to the existing public supply water main fronting the site on WaterGate Street.

4.2 Design Data

4.2.1 A water meter, air valves, scour valves, stop cocks and sluice valves as required, will be provided around the site as shown on the Watermain Layout Drawing No. 141078/PL/005.

4.2.2 Screw down type fire hydrants complying with B.S. 750: 1984 will be provided as shown, as can be seen hydrants are not located in roadways or parking spaces, and no building is more than 46m from a hydrant. Hydrant outlets will be no more than 300mm below finished ground level.

4.2.3 A looped water main layout is to be adopted to ensure no dead ends and provide balanced pressure throughout.

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary

- 5.1.1 This report which has been prepared by MPA Consulting Engineers contains information on the design of the foul drainage, storm water drainage and watermain to be constructed for the proposed development at St Francis Brewery, Kilkenny.
- 5.1.2 All pipes in the proposed foul gravity system have been set up so as to ensure adequate capacity and self-cleansing velocities are obtained. These velocities are designed to be a minimum of 0.70 m/s in the foul line which conveys the effluent to a local authority sewer which runs along Horse Barrack Lane.
- 5.1.3 The storm drainage strategy caters for all storm water collected within the site. The proposed storm drainage shall be connected into the existing storm sewer located on the site, as shown on Storm Drainage Drawing No. 141078/PL/004.
- 5.1.4 The overall services masterplan for the area has been considered during the design of the proposed foul and storm sewers to facilitate the future provision of this network.
- 5.1.5 A connection to a potable water supply can be made easily via an existing watermain on WaterGate Street fronting the site.

5.2 Conclusions

- 5.2.1 The report has shown that the foul drainage proposed for the site has sufficient capacity and a connection to an appropriate public mains can be established without difficulty, thus ensuring adequate drainage for the proposed development.
- 5.2.2 As can be seen from the preceding information, the new storm system on the site has sufficient capacity, and connection to an appropriate outfall can be established without difficulty, thus ensuring adequate drainage for the proposed development.

Appendix A

Foul Sewer Design Sheets



Contract
Development at St Francis Brewery,
Kilkenny
Part of Structure
Foul Drainage System

Drawing ref.
141078/C/003

Calculations by
LMJ

Job ref.
141078

Calc. Sheet No.
1 of 1

Checked by
MJP

Date
25.10.17

MPA
Consulting Engineers
Ormonde Road
Kilkenny
T: + 353 56 77 02761
F: + 353 56 77 90728
E: info@mpa.ie
W: www.mpa.ie

(Design in accordance with B.S. EN 752:2008 DRAIN & SEWER SYSTEMS OUTSIDE BUILDINGS)

1 Frequency Factors (K)

1.2

2 Pipe Material

uPVC

Effective roughness (Ks)

0.6 mm

Sewer Ref.	US/CL m	US/IL m	DS/IL m	Length m	Fall m	Grad 1 in	Dia mm	Cover to US Soffit m	Vel m/s	Discharge Units Per Run	Discharge Units Cum	Peak Flow l/s	Cap l/s	Proportional Capacity	Proportional Velocity	Design Velocity m/s
F1.0 F1.1	45.385	44.760	44.450	31.0	0.310	100	225	0.400	1.31	15	15	4.6	52.03	0.089	0.592	0.77
F1.1 F1.2	45.385	44.450	44.353	21.8	0.097	225	225	0.710	0.87	119	134	13.9	34.70	0.400	0.933	0.81
F1.2 F1.3	45.385	44.353	44.278	16.8	0.075	225	225	0.807	0.87	38	172	15.7	34.69	0.454	0.977	0.85
F1.3 EXIST	45.385	44.278	44.241	8.3	0.037	225	225	0.882	0.87	30	202	17.1	34.69	0.492	1.005	0.88
F2.0 F2.1	45.385	44.760	44.425	37.5	0.335	112	225	0.400	1.24	15	15	4.6	49.17	0.095	0.610	0.75
F2.1 F1.3	45.385	44.425	44.278	16.5	0.147	112	225	0.735	1.24	15	30	6.6	49.11	0.134	0.709	0.88
F3.0 F1.2	45.385	44.760	44.620	26	0.140	186	225	0.400	0.96	38	38	7.4	38.18	0.194	0.785	0.75

* Denotes imperial pipe design as per B.S. EN 752:2008 - Drain & Sewer Systems Outside Buildings - Section 9.6.3.1 Design for self cleansing

Appendix B

Storm Sewer Design Sheets



Contract
Development at St Francis Brewery,
Kilkenny.
Part of Structure
Storm Drainage System

Job ref.
141078

Calc. Sheet No.
1 of 1

Martin Peters Associates
Consulting Engineers
Ormonde Road
Kilkenny
T: + 353 56 77 02761
F: + 353 56 77 90728
E: info@mpa.ie
W: www.mpa.ie

Drawing ref.
141078/PL/004

Calculations by
LMJ

Checked by
MJP

Date
25.10.17

Surface Water Sewer Network Schedule

Design Data: Station Name - **Kilkenny**

M5-2min **3.1** Design return period **2**

Ks = 0.06 uPVC **Ks = 0.60 Concrete**

US MH Ref:	US MH CL [mod]	US MH IL [mod]	DS MH IL [mod]	Length [m]	Gradient [1 in...]	Pipe Diameter [mm]	Cover to US Soffit [m]	Velocity [m/s]	Time of Flow [min]	Time of Conc. [min]	Rate of Rainfall [mm/hr]	Total Area [m ²]	% Imperv.	Imperv. Area [m ²]	Cumul. Imperv. Area [m ²]	Actual Rate of Flow [m ³ /s]	Allow. Rate of Flow [m ³ /s]	Proportional Capacity	Proportional Velocity	Design Velocity [m/s]	Note	
S1.0	S1.1	45.385	44.796	44.710	17.2	200	225	0.364	1.13	0.254	4.254	56.71	524	100	586	586	0.009	0.045	0.20	0.790	0.89	
S1.1	S1.2	45.385	44.710	44.505	41	200	225	0.450	1.13	0.605	4.858	53.92	176	100	176	762	0.011	0.045	0.25	0.823	0.93	
S1.2	S1.3	45.385	43.780	43.685	17	179	225	1.380	1.20	0.236	5.094	52.94	1280	100	1280	2042	0.029	0.048	0.61	1.061	1.27	
S2.0	S2.1	45.385	44.810	44.685	27	216	225	0.350	1.09	0.415	4.415	55.92	65	100	890	890	0.013	0.043	0.31	0.865	0.94	
S2.1	S2.2	45.385	44.685	44.600	16	188	225	0.475	1.17	0.228	4.643	54.86	62	100	606	1496	0.022	0.046	0.48	0.996	1.16	
S2.2	S2.3	45.385	44.600	44.500	14	140	225	0.560	1.37	0.171	4.814	54.11	136	100	274	1770	0.026	0.054	0.48	0.995	1.36	
S2.3	S1.3	45.385	43.850	43.685	19.4	118	225	1.310	1.50	0.216	5.030	53.20	136	100	274	2044	0.029	0.060	0.49	1.007	1.51	
S3.0	S3.1	44.820	43.990	43.800	45	237	225	0.605	1.03	0.726	4.726	54.49	773	100	773	773	0.011	0.041	0.28	0.842	0.87	
S3.1	S3.2	45.100	43.800	43.750	12.5	250	225	1.075	1.00	0.208	4.208	56.95	773	100	773	773	0.012	0.040	0.30	0.856	0.86	
S3.2	S3.3	44.950	43.750	43.600	26.3	175	225	0.975	1.21	0.362	4.362	56.18	773	100	773	773	0.012	0.048	0.24	0.821	0.99	