Proposed Residential Development
At Moneyduff, Oranmore,
Co. Galway
For
Arlum Ltd.

Report on Civil Works
Planning Stage

Rev D

February 2019

TOBIN CONSULTING ENGINEERS

TOBIN
Patrick J. Tobin & Co. Ltd.

Report on Civil Works Planning Stage

PROJECT: **Proposed Residential Development at Moneyduff, Oranmore, Co. Galway**

CLIENT: **Arlum Ltd.**

COMPANY: **TOBIN Consulting Engineers**
Fairgreen House
Fairgreen
Galway

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DOCUMENT AMENDMENT RECORD

Client: Arlum Ltd.

Project: Proposed Residential Development at Moneyduff, Oranmore, Co. Galway

Title: Report on Proposed Civil Works

PROJECT NUMBER: 10402				**DOCUMENT REF:** 10402/04/01			
D	Revised Foul Lengths	FG	27/02/19	BR	27/02/19	BH	27/02/19
C	Revised Ground Levels	RD	18/06/18	BR	18/06/18	BH	18/06/18
B	Civil Works Design Report	RD	28/05/18	BR	29/05/18	BH	29/05/18
A	Civil Works Design Report	JK	26/02/18	BR	27/02/18	BH	28/02/18
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers							

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Associated Drawings

1 INTRODUCTION

This report has been prepared to detail the Civil Works Planning submission element of a residential development at Moneyduff, Oranmore, Co. Galway. It should be read in conjunction with the foul and storm design drawings as outlined and noted herein.

This report details the foul and storm drainage design and the water main details for the development. The proposed development includes an estate of 212 no. houses (16 no. 4-bedroom detached, 54 no. 3-bedroom semi-detached, 34 no. 4-bedroom semi-detached, 16 no. 3-bedroom terrace, 12 no. 2-bedroom terrace, 24 no. 3-bedroom semi-detached with attics, 56 no. 2 & 3 bedroom duplex, 1 no. crèche), open space and circulation system, on a site of some 8.85 ha.

It is proposed that the wastewater will flow via gravity to a pumping station to the west of the site and discharge via rising main to an existing foul sewer as shown on drawing No. 10402-2000 & 2002. This report outlines the P.E.'s and wastewater flow rate. Details of storm design and water main are also presented within the report.

1.1 Waste water drainage system overview

Details of the Foul Sewer can be found in Appendix B of this document and on Drawing No. 10402-2004 & 10402-2005. It is proposed that all pipes will be thermoplastic structured wall pipes. The maximum pipe diameter is to be 225mm, with a maximum and minimum gradient of 1/60 and 1/200. All velocities at said gradients fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment.

1.2 Storm drainage system overview

The storm water drainage design has been designed to cater for all surface water runoff from all hard surfaces in the proposed development including roadways, roofs etc. All stormwater generated on site from roadways and roofs will discharge via Oil/Petrol Interceptor to one of 5 no. proposed soakaways which are situated in the centre, north and west of the site. The stormwater will soak away through the soil. The soakaways shall be constructed of a cellular storage unit providing 95% porosity which will also attenuate storm water during and post storm events prior to infiltrating through the soil.

Details of the soakaways are shown in Appendix C and located on Drawings.

The maximum pipe diameter is to be 375mm, with a maximum and minimum gradient of 1/36 and 1/250. All velocities at said gradients fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment.

2 WASTE WATER DRAINAGE DESIGN

2.1 Introduction

The pipework for the drainage system has been designed to provide for six times the dry weather flow in accordance with the Recommendations for Site Development Works as published by the Department of the Environment and Local Government. The design calculations are displayed in Appendix A. The input reference no., manhole upstream, manhole downstream, length of pipe, population equivalent, size, invert upstream (A), invert downstream (B), resulting gradient, flow rate and capacity of each foul sewer pipe within the network are tabulated in the design calculations.

2.2 Loading rates

Residential Houses

An average capacity per dwelling has been taken as 5.22 PE which accounts for the varying sizes of the dwellings throughout the site. The person per dwelling has been derived from the EPA guidelines for domestic sewerage design whereby a 2 bedroom dwelling accounts for 4 PE and an additional 1 no. PE for every additional bedroom thereafter. An additional assumed loading of 20 PE has been taken into account to cater for the crèche building.

House Type	Bedrooms	Equivalent PE	No. of Houses	Total PE
A	4	6	34	204
B	3	5	54	270
C	4	6	16	96
D	3	5	16	80
E	3	6	24	144
G1	2	4	25	100
G2	3	5	25	125
H	2	4	6	24
J	2	4	12	48
Creche	N/A	20	1	20
		Total	**212 & Creche**	**1111**

1111/213 = 5.22 – Average PE per dwelling

150 ltr per head per day has been taken into account for the sewer design as per Irish Water *Code of Practice for Wastewater Infrastructure - section 3.6 Hydraulic Design for Gravity Sewers*. The foul sewer design has been designed using Microdrainage 2017.1.2 designing software. Results can be found in Appendix B.

2.3 Wastewater Discharge

It is proposed to discharge via gravity to a pumping station located in the West of the site and then discharge via rising main to the existing public foul sewer Manhole as shown on drg. no. 10402-2005. The existing MH and existing 300mm dia foul sewer is located to the North-east of proposed development. The rising main will discharge to a rising main discharge manhole (as per IW standard Detail CDS-WW-29) prior to entering the existing MH to which the final connection will be made.

2.4 Pumping Station Design

A typical detail of the pumping station can be found in Appendix F. The pumping station will be designed in accordance with the requirements set out in the Irish Water specification for wastewater systems IW-CDS-5030-03. The pumping station will be 15m from the boundary of the nearest dwelling as shown on drg. no. 10402-2000.

From IW-CDS-5030-03, storage required for pumping station = 24 hr storage for total flow at 600l/dwelling/day

Therefore:
216 x 600 = 129,600 litres/day

Where 216 = 212 no. dwelling + 1 no. crèche (equivalent of 4 no. houses)

24 hour storage required
Therefore, tank volume required = 130 m3 for 24 hour storage

3 STORM WATER DRAINAGE DESIGN

3.1 Introduction

Storm water drainage design calculations are shown in Appendix B of this report. Detailed design calculations are based on the 30 year return period plus an additional 10% for climate change. The pipe ref. No., manhole No. upstream, manhole No. downstream, length of pipe, ground level at manhole upstream, ground level at manhole downstream, impermeable area for each pipe section, invert level upstream, invert level downstream, gradient, capacity and rate of flow for each pipe section are detailed. Prior to discharge to the soakaways, it is proposed to install oil separators/silt traps at the inlet, thus reducing the amount of debris etc. entering the soakaways. Surface water from hard surfaces in the proposed development including roadways and roofs, as shown on Dwg. No. 10402-2004 & 2005, will flow by gravity to the soakaways. Results of the storm water calculations can be found in Appendix B.

3.2 Soakaway Design

The soakaways are designed to hold water for the largest storage required over a 48 hour storm period with rainfall depths taken for the 30 year return period for sliding durations obtained from Met Eireann. The stormwater discharges to groundwater. The cell unit is constructed on top of a clean stone base which extends to formation level or existing site levels. These stone beds allow for more capacity and an extra factor of safety.

Results of the calculations can be found in Appendix C and details of the soakaways unit are shown on drawings.

4 WATER MAIN

4.1 General over view

The Water main has been designed in accordance with the Recommendations for Site Development Works published by the Department of the Environment and Local Government.

The water supply required for the proposed development shall be via a 150mm dia watermain as per Irish Water requirements. A connection to the existing 200mm upvc watermain at the entrance to the Coill Clocha housing estate is proposed. The route for the 150mm watermain from this location to the proposed development will be via the Coill Clocha estate road which has been taken in charge by GCC. An existing Irish Water asset, a 125mm PE watermain, currently serves

customers within the Coill Clocha estate; however, The new 150mm water main will be laid offline to avoid disruption to customers currently being served by the existing 125mm watermain.

The watermain arrangement is shown on drawing No. 10402-2001, 10405-2002 and 10402-2003. It is proposed to serve to site using a 150mm dia 'spine' watermain down to the main junction in the proposed development. All other branch mains from the 150mm will be 100mm PE. In accordance with Local authority standards, a water meter and Logging Device (Larson Type) are proposed at the connection into the proposed site. A sluice valve, strainer and 100mm Ø by-pass arrangement is also proposed to allow for possible disconnection of water meters by the Local Authority.

5 CONCLUSION

The Report should be read in conjunction with the associated Drawings, layouts and specifications. We trust that adequate detail has been provided for Wastewater drainage layout and Storm water drainage layout. Should you require any further detail, we will be happy to meet and supply same, as you may deem appropriate.

APPENDIX A

Stormwater Drainage Design Calculations

Fairgreen House
Fairgreen Road
Galway

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Micro Drainage | Network 2017.1.2

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	300
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

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	17.200	0.172	100.0	0.075	5.00	0.0	0.600	o	150	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	5.29	4.550	0.075	0.0	0.0	0.0	1.00	17.8	10.2

Fairgreen House
Fairgreen Road
Galway

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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
S1.001	40.200	0.201	200.0	0.116	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	19.400	0.194	100.0	0.069	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	31.200	0.156	200.0	0.083	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	26.700	0.267	100.0	0.044	5.00	0.0	0.600	o	100	Pipe/Conduit	
S3.001	26.400	0.258	102.3	0.086	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	8.000	0.040	200.0	0.000	0.00	0.0	0.600	o	300	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)
S1.001	50.00	6.01	4.303	0.191	0.0	0.0	0.0	0.92	36.6	25.9
S2.000	50.00	5.32	3.850	0.069	0.0	0.0	0.0	1.00	17.8	9.3
S1.002	50.00	6.48	3.506	0.343	0.0	0.0	0.0	1.11	78.3	46.4
S3.000	50.00	5.58	4.075	0.044	0.0	0.0	0.0	0.77	6.0	6.0
S3.001	50.00	5.92	3.683	0.130	0.0	0.0	0.0	1.29	51.4	17.6
S1.003	50.00	6.60	3.350	0.473	0.0	0.0	0.0	1.11	78.3	64.1

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
S4.000	19.300	0.193	100.0	0.121	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	31.000	0.155	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	5.000	0.060	83.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	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)
S4.000	50.00	5.32	4.475	0.121	0.0	0.0	0.0	1.00	17.8	16.4
S4.001	50.00	5.88	4.207	0.121	0.0	0.0	0.0	0.92	36.6	16.4
S1.004	50.00	6.65	3.310	0.594	0.0	0.0	0.0	1.72	121.8	80.4
S1.005	50.00	6.68	3.175	0.594	0.0	0.0	0.0	1.28	141.1	80.4
S1.006	50.00	6.70	3.165	0.594	0.0	0.0	0.0	1.28	141.1	80.4

Fairgreen House
Fairgreen Road
Galway

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Manhole Schedules for Storm

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)
S1	6.000	1.450	Open Manhole	1200	S1.000	4.550	150				
S2	6.000	1.697	Open Manhole	1200	S1.001	4.303	225	S1.000	4.378	150	
S3	5.200	1.350	Open Manhole	1200	S2.000	3.850	150				
S4	5.350	1.844	Open Manhole	1200	S1.002	3.506	300	S1.001	4.102	225	521
								S2.000	3.656	150	
S5	5.500	1.425	Open Manhole	1200	S3.000	4.075	100				
S6	5.500	1.817	Open Manhole	1200	S3.001	3.683	225	S3.000	3.808	100	
S7	5.400	2.050	Open Manhole	1200	S1.003	3.350	300	S1.002	3.350	300	
								S3.001	3.425	225	
S8	5.900	1.425	Open Manhole	1200	S4.000	4.475	150				
S9	5.600	1.393	Open Manhole	1200	S4.001	4.207	225	S4.000	4.282	150	
S10	5.400	2.090	Open Manhole	1200	S1.004	3.310	300	S1.003	3.310	300	
								S4.001	4.052	225	667
S11	5.400	2.225	Open Manhole	1350	S1.005	3.175	375	S1.004	3.250	300	
S12	5.400	2.235	Open Manhole	1350	S1.006	3.165	375	S1.005	3.165	375	
S	5.400	2.245	Open Manhole	1200		OUTFALL		S1.006	3.155	375	

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	150	S1	6.000	4.550	1.300	Open Manhole	1200
S1.001	o	225	S2	6.000	4.303	1.472	Open Manhole	1200
S2.000	o	150	S3	5.200	3.850	1.200	Open Manhole	1200
S1.002	o	300	S4	5.350	3.506	1.544	Open Manhole	1200
S3.000	o	100	S5	5.500	4.075	1.325	Open Manhole	1200
S3.001	o	225	S6	5.500	3.683	1.592	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	17.200	100.0	S2	6.000	4.378	1.472	Open Manhole	1200
S1.001	40.200	200.0	S4	5.350	4.102	1.023	Open Manhole	1200
S2.000	19.400	100.0	S4	5.350	3.656	1.544	Open Manhole	1200
S1.002	31.200	200.0	S7	5.400	3.350	1.750	Open Manhole	1200
S3.000	26.700	100.0	S6	5.500	3.808	1.592	Open Manhole	1200
S3.001	26.400	102.3	S7	5.400	3.425	1.750	Open Manhole	1200

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)
S1.003	o	300	S7	5.400	3.350	1.750	Open Manhole	1200
S4.000	o	150	S8	5.900	4.475	1.275	Open Manhole	1200
S4.001	o	225	S9	5.600	4.207	1.168	Open Manhole	1200
S1.004	o	300	S10	5.400	3.310	1.790	Open Manhole	1200
S1.005	o	375	S11	5.400	3.175	1.850	Open Manhole	1350
S1.006	o	375	S12	5.400	3.165	1.860	Open Manhole	1350

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)
S1.003	8.000	200.0	S10	5.400	3.310	1.790	Open Manhole	1200
S4.000	19.300	100.0	S9	5.600	4.282	1.168	Open Manhole	1200
S4.001	31.000	200.0	S10	5.400	4.052	1.123	Open Manhole	1200
S1.004	5.000	83.3	S11	5.400	3.250	1.850	Open Manhole	1350
S1.005	2.000	200.0	S12	5.400	3.165	1.860	Open Manhole	1350
S1.006	2.000	200.0	S	5.400	3.155	1.870	Open Manhole	1200

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	1440
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	12

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	30	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	720

Storage Structures for Storm

Cellular Storage Manhole: S12, DS/PN: S1.006

Invert Level (m) 3.165 Infiltration Coefficient Side (m/hr) 0.00004 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00004 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	483.0	483.0	0.800	483.0	553.4	0.900	0.0	553.4

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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)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	0.900
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	300
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

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	33.000	0.165	200.0	0.139	5.00	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	40.64	5.60	4.475	0.139	0.0	0.0	0.0	0.92	36.6	18.4

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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
S2.000	24.600	0.123	200.0	0.124	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	53.000	0.212	250.0	0.211	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	53.500	0.214	250.0	0.186	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	9.800	0.039	250.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	58.600	0.293	200.0	0.203	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	70.900	0.284	250.0	0.198	0.00	0.0	0.600	o	300	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)
S2.000	41.08	5.45	4.675	0.124	0.0	0.0	0.0	0.92	36.6	16.6
S1.001	38.30	6.49	4.235	0.474	0.0	0.0	0.0	0.99	70.0	59.0
S1.002	36.50	7.27	3.948	0.660	0.0	0.0	0.0	1.14	126.1	78.3
S1.003	36.20	7.41	3.734	0.660	0.0	0.0	0.0	1.14	126.1	78.3
S3.000	39.38	6.06	3.875	0.203	0.0	0.0	0.0	0.92	36.6	26.0
S3.001	36.54	7.25	3.507	0.401	0.0	0.0	0.0	0.99	70.0	47.6

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
S1.004	11.200	0.045	250.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	4.600	0.023	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	2.000	0.008	250.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	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)
S1.004	35.85	7.58	3.148	1.061	0.0	0.0	0.0	1.14	126.1	123.6
S1.005	35.73	7.64	3.003	1.061	0.0	0.0	0.0	1.28	141.1	123.6
S1.006	35.67	7.67	2.980	1.061	0.0	0.0	0.0	1.14	126.1	123.6
S1.007	35.62	7.69	2.972	1.061	0.0	0.0	0.0	1.28	141.1	123.6

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Manhole Schedules for Storm

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)
S1	5.600	1.125	Open Manhole	1200	S1.000	4.475	225				
S2	5.800	1.125	Open Manhole	1200	S2.000	4.675	225				
S3	5.900	1.665	Open Manhole	1200	S1.001	4.235	300	S1.000	4.310	225	
								S2.000	4.552	225	242
S4	5.300	1.352	Open Manhole	1350	S1.002	3.948	375	S1.001	4.023	300	
S5	5.200	1.466	Open Manhole	1350	S1.003	3.734	375	S1.002	3.734	375	
S6	5.000	1.125	Open Manhole	1200	S3.000	3.875	225				
S7	5.100	1.593	Open Manhole	1200	S3.001	3.507	300	S3.000	3.582	225	
S8	5.200	2.052	Open Manhole	1350	S1.004	3.148	375	S1.003	3.695	375	547
								S3.001	3.223	300	
S9	5.200	2.197	Open Manhole	1350	S1.005	3.003	375	S1.004	3.103	375	100
S10	5.200	2.220	Open Manhole	1350	S1.006	2.980	375	S1.005	2.980	375	
S11	5.200	2.228	Open Manhole	1350	S1.007	2.972	375	S1.006	2.972	375	
SOF B	5.300	2.338	Open Manhole	1200		OUTFALL		S1.007	2.962	375	

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	5.600	4.475	0.900	Open Manhole	1200
S2.000	o	225	S2	5.800	4.675	0.900	Open Manhole	1200
S1.001	o	300	S3	5.900	4.235	1.365	Open Manhole	1200
S1.002	o	375	S4	5.300	3.948	0.977	Open Manhole	1350
S1.003	o	375	S5	5.200	3.734	1.091	Open Manhole	1350
S3.000	o	225	S6	5.000	3.875	0.900	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	33.000	200.0	S3	5.900	4.310	1.365	Open Manhole	1200
S2.000	24.600	200.0	S3	5.900	4.552	1.123	Open Manhole	1200
S1.001	53.000	250.0	S4	5.300	4.023	0.977	Open Manhole	1350
S1.002	53.500	250.0	S5	5.200	3.734	1.091	Open Manhole	1350
S1.003	9.800	250.0	S8	5.200	3.695	1.130	Open Manhole	1350
S3.000	58.600	200.0	S7	5.100	3.582	1.293	Open Manhole	1200

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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)
S3.001	o	300	S7	5.100	3.507	1.293	Open Manhole	1200
S1.004	o	375	S8	5.200	3.148	1.677	Open Manhole	1350
S1.005	o	375	S9	5.200	3.003	1.822	Open Manhole	1350
S1.006	o	375	S10	5.200	2.980	1.845	Open Manhole	1350
S1.007	o	375	S11	5.200	2.972	1.853	Open Manhole	1350

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)
S3.001	70.900	250.0	S8	5.200	3.223	1.677	Open Manhole	1350
S1.004	11.200	250.0	S9	5.200	3.103	1.722	Open Manhole	1350
S1.005	4.600	200.0	S10	5.200	2.980	1.845	Open Manhole	1350
S1.006	2.000	250.0	S11	5.200	2.972	1.853	Open Manhole	1350
S1.007	2.000	200.0	SOF B	5.300	2.962	1.963	Open Manhole	1200

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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)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	0.900
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	225
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

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	29.600	0.148	200.0	0.158	5.00	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	40.82	5.54	5.475	0.158	0.0	0.0	0.0	0.92	36.6	21.0

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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
S1.001	33.500	0.168	200.0	0.110	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	29.500	0.148	199.3	0.157	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	36.700	0.184	199.5	0.122	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	69.700	1.162	60.0	0.089	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	14.800	0.148	100.0	0.084	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	25.500	0.128	199.2	0.056	0.00	0.0	0.600	o	375	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)
S1.001	39.17	6.14	5.327	0.268	0.0	0.0	0.0	0.92	36.6	34.1
S2.000	40.82	5.53	5.475	0.157	0.0	0.0	0.0	0.92	36.7	20.8
S2.001	39.03	6.20	5.327	0.279	0.0	0.0	0.0	0.92	36.7	35.4
S1.002	37.63	6.77	5.143	0.636	0.0	0.0	0.0	2.03	143.8	77.8
S3.000	41.67	5.25	4.050	0.084	0.0	0.0	0.0	1.00	17.8	11.4
S1.003	36.88	7.10	3.677	0.776	0.0	0.0	0.0	1.28	141.4	93.0

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
S4.000	32.300	0.897	36.0	0.128	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	28.000	0.204	137.3	0.065	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	5.100	0.026	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	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)
S4.000	41.44	5.32	4.875	0.128	0.0	0.0	0.0	1.68	29.7	17.2
S4.001	40.25	5.74	3.903	0.193	0.0	0.0	0.0	1.11	44.3	25.2
S1.004	36.73	7.17	3.549	0.969	0.0	0.0	0.0	1.28	141.1	115.7
S1.005	36.67	7.19	3.324	0.969	0.0	0.0	0.0	1.28	141.1	115.7
S1.006	36.62	7.22	3.314	0.969	0.0	0.0	0.0	1.28	141.1	115.7

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Manhole Schedules for Storm

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)
S1	6.700	1.225	Open Manhole	1200	S1.000	5.475	225				
S2	6.600	1.273	Open Manhole	1200	S1.001	5.327	225	S1.000	5.327	225	
S3	6.700	1.225	Open Manhole	1200	S2.000	5.475	225				
S4	6.600	1.273	Open Manhole	1200	S2.001	5.327	225	S2.000	5.327	225	
S5	6.400	1.257	Open Manhole	1200	S1.002	5.143	300	S1.001	5.160	225	
								S2.001	5.143	225	
S6	5.100	1.050	Open Manhole	1200	S3.000	4.050	150				
S7	5.100	1.423	Open Manhole	1350	S1.003	3.677	375	S1.002	3.981	300	229
								S3.000	3.902	150	
S8	6.000	1.125	Open Manhole	1200	S4.000	4.875	150				
S9	5.300	1.397	Open Manhole	1200	S4.001	3.903	225	S4.000	3.978	150	
S10	5.100	1.551	Open Manhole	1350	S1.004	3.549	375	S1.003	3.549	375	
								S4.001	3.699	225	
S11	5.100	1.776	Open Manhole	1350	S1.005	3.324	375	S1.004	3.524	375	200
S12	5.100	1.786	Open Manhole	1350	S1.006	3.314	375	S1.005	3.314	375	
S	5.100	1.796	Open Manhole	1200		OUTFALL		S1.006	3.304	375	

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	6.700	5.475	1.000	Open Manhole	1200
S1.001	o	225	S2	6.600	5.327	1.048	Open Manhole	1200
S2.000	o	225	S3	6.700	5.475	1.000	Open Manhole	1200
S2.001	o	225	S4	6.600	5.327	1.048	Open Manhole	1200
S1.002	o	300	S5	6.400	5.143	0.957	Open Manhole	1200
S3.000	o	150	S6	5.100	4.050	0.900	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	29.600	200.0	S2	6.600	5.327	1.048	Open Manhole	1200
S1.001	33.500	200.0	S5	6.400	5.160	1.016	Open Manhole	1200
S2.000	29.500	199.3	S4	6.600	5.327	1.048	Open Manhole	1200
S2.001	36.700	199.5	S5	6.400	5.143	1.032	Open Manhole	1200
S1.002	69.700	60.0	S7	5.100	3.981	0.819	Open Manhole	1350
S3.000	14.800	100.0	S7	5.100	3.902	1.048	Open Manhole	1350

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)
S1.003	o	375	S7	5.100	3.677	1.048	Open Manhole	1350
S4.000	o	150	S8	6.000	4.875	0.975	Open Manhole	1200
S4.001	o	225	S9	5.300	3.903	1.172	Open Manhole	1200
S1.004	o	375	S10	5.100	3.549	1.176	Open Manhole	1350
S1.005	o	375	S11	5.100	3.324	1.401	Open Manhole	1350
S1.006	o	375	S12	5.100	3.314	1.411	Open Manhole	1350

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)
S1.003	25.500	199.2	S10	5.100	3.549	1.176	Open Manhole	1350
S4.000	32.300	36.0	S9	5.300	3.978	1.172	Open Manhole	1200
S4.001	28.000	137.3	S10	5.100	3.699	1.176	Open Manhole	1350
S1.004	5.100	200.0	S11	5.100	3.524	1.202	Open Manhole	1350
S1.005	2.000	200.0	S12	5.100	3.314	1.411	Open Manhole	1350
S1.006	2.000	200.0	S	5.100	3.304	1.421	Open Manhole	1200

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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)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	300
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

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	21.300	0.217	98.2	0.089	5.00	0.0	0.600	o	150	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	41.35	5.35	5.775	0.089	0.0	0.0	0.0	1.01	17.9	12.0

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
S2.000	35.300	0.343	102.9	0.043	5.00	0.0	0.600	o	100	Pipe/Conduit	
S1.001	43.800	0.219	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	20.200	0.202	100.0	0.077	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	18.200	0.091	200.0	0.064	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	46.700	0.234	200.0	0.089	0.00	0.0	0.600	o	300	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)
S2.000	40.14	5.78	5.450	0.043	0.0	0.0	0.0	0.76	6.0	5.6
S1.001	38.10	6.57	4.982	0.132	0.0	0.0	0.0	0.92	36.6	16.3
S3.000	41.40	5.34	5.550	0.077	0.0	0.0	0.0	1.00	17.8	10.4
S1.002	37.33	6.90	4.763	0.273	0.0	0.0	0.0	0.92	36.6	33.1
S1.003	35.81	7.60	4.597	0.362	0.0	0.0	0.0	1.11	78.3	42.1

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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
S4.000	62.500	0.417	149.9	0.086	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	33.400	0.167	200.0	0.096	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.002	38.400	0.192	200.0	0.189	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.000	13.300	0.133	100.0	0.060	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	23.700	0.119	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S6.000	24.000	0.480	50.0	0.108	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	41.000	0.205	200.0	0.099	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)
S4.000	39.60	5.98	5.750	0.086	0.0	0.0	0.0	1.07	42.4	11.1
S4.001	38.07	6.58	5.333	0.182	0.0	0.0	0.0	0.92	36.6	22.5
S4.002	36.75	7.16	5.091	0.371	0.0	0.0	0.0	1.11	78.3	44.3
S5.000	41.74	5.22	4.850	0.060	0.0	0.0	0.0	1.00	17.8	8.1
S1.004	35.18	7.91	4.289	0.793	0.0	0.0	0.0	1.28	141.1	90.7
S6.000	41.56	5.28	5.075	0.108	0.0	0.0	0.0	1.43	25.2	14.6
S6.001	39.48	6.02	4.520	0.207	0.0	0.0	0.0	0.92	36.6	26.6

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
S7.000	13.200	0.189	69.8	0.014	5.00	0.0	0.600	o	100	Pipe/Conduit	
S8.000	32.900	0.329	100.0	0.044	5.00	0.0	0.600	o	100	Pipe/Conduit	
S6.002	24.500	0.123	199.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	4.600	0.123	37.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	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)
S7.000	41.69	5.24	3.950	0.014	0.0	0.0	0.0	0.92	7.2	1.9
S8.000	40.32	5.71	4.575	0.044	0.0	0.0	0.0	0.77	6.0	5.8
S6.002	38.36	6.47	3.636	0.265	0.0	0.0	0.0	0.92	36.7	33.0
S1.005	35.13	7.94	3.363	1.058	0.0	0.0	0.0	2.97	328.1	120.8
S1.006	35.08	7.96	3.240	1.058	0.0	0.0	0.0	1.28	141.1	120.8
S1.007	35.03	7.99	3.230	1.058	0.0	0.0	0.0	1.28	141.1	120.8

Manhole Schedules for Storm

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)
S1	7.200	1.425	Open Manhole	1200	S1.000	5.775	150				
S2	6.800	1.350	Open Manhole	1200	S2.000	5.450	100				
S3	6.800	1.818	Open Manhole	1200	S1.001	4.982	225	S1.000	5.558	150	501
								S2.000	5.107	100	
S4	6.900	1.350	Open Manhole	1200	S3.000	5.550	150				
S5	6.900	2.137	Open Manhole	1200	S1.002	4.763	225	S1.001	4.763	225	
								S3.000	5.348	150	510
S6	6.700	2.103	Open Manhole	1200	S1.003	4.597	300	S1.002	4.672	225	
S7	7.100	1.350	Open Manhole	1200	S4.000	5.750	225				
S8	7.200	1.867	Open Manhole	1200	S4.001	5.333	225	S4.000	5.333	225	
S9	7.150	2.059	Open Manhole	1200	S4.002	5.091	300	S4.001	5.166	225	
S10	6.300	1.450	Open Manhole	1200	S5.000	4.850	150				
S11	6.200	1.912	Open Manhole	1350	S1.004	4.289	375	S1.003	4.364	300	
								S4.002	4.899	300	536
								S5.000	4.717	150	204
S12	6.500	1.425	Open Manhole	1200	S6.000	5.075	150				
S13	5.800	1.280	Open Manhole	1200	S6.001	4.520	225	S6.000	4.595	150	
S14	5.400	1.450	Open Manhole	1200	S7.000	3.950	100				
S15	6.000	1.425	Open Manhole	1200	S8.000	4.575	100				

Manhole Schedules for Storm

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)
S16	5.450	1.814	Open Manhole	1200	S6.002	3.636	225	S6.001	4.315	225	679
								S7.000	3.761	100	
								S8.000	4.246	100	485
S17	5.750	2.387	Open Manhole	1350	S1.005	3.363	375	S1.004	4.170	375	807
								S6.002	3.513	225	
S18	5.750	2.510	Open Manhole	1350	S1.006	3.240	375	S1.005	3.240	375	
S19	5.300	2.070	Open Manhole	1350	S1.007	3.230	375	S1.006	3.230	375	
SOF D	5.300	2.080	Open Manhole	1200		OUTFALL		S1.007	3.220	375	

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	150	S1	7.200	5.775	1.275	Open Manhole	1200
S2.000	o	100	S2	6.800	5.450	1.250	Open Manhole	1200
S1.001	o	225	S3	6.800	4.982	1.593	Open Manhole	1200
S3.000	o	150	S4	6.900	5.550	1.200	Open Manhole	1200
S1.002	o	225	S5	6.900	4.763	1.912	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	21.300	98.2	S3	6.800	5.558	1.092	Open Manhole	1200
S2.000	35.300	102.9	S3	6.800	5.107	1.593	Open Manhole	1200
S1.001	43.800	200.0	S5	6.900	4.763	1.912	Open Manhole	1200
S3.000	20.200	100.0	S5	6.900	5.348	1.402	Open Manhole	1200
S1.002	18.200	200.0	S6	6.700	4.672	1.803	Open Manhole	1200

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)
S1.003	o	300	S6	6.700	4.597	1.803	Open Manhole	1200
S4.000	o	225	S7	7.100	5.750	1.125	Open Manhole	1200
S4.001	o	225	S8	7.200	5.333	1.642	Open Manhole	1200
S4.002	o	300	S9	7.150	5.091	1.759	Open Manhole	1200
S5.000	o	150	S10	6.300	4.850	1.300	Open Manhole	1200
S1.004	o	375	S11	6.200	4.289	1.537	Open Manhole	1350

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)
S1.003	46.700	200.0	S11	6.200	4.364	1.537	Open Manhole	1350
S4.000	62.500	149.9	S8	7.200	5.333	1.642	Open Manhole	1200
S4.001	33.400	200.0	S9	7.150	5.166	1.759	Open Manhole	1200
S4.002	38.400	200.0	S11	6.200	4.899	1.001	Open Manhole	1350
S5.000	13.300	100.0	S11	6.200	4.717	1.333	Open Manhole	1350
S1.004	23.700	200.0	S17	5.750	4.170	1.205	Open Manhole	1350

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)
S6.000	o	150	S12	6.500	5.075	1.275	Open Manhole	1200
S6.001	o	225	S13	5.800	4.520	1.055	Open Manhole	1200
S7.000	o	100	S14	5.400	3.950	1.350	Open Manhole	1200
S8.000	o	100	S15	6.000	4.575	1.325	Open Manhole	1200
S6.002	o	225	S16	5.450	3.636	1.589	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)
S6.000	24.000	50.0	S13	5.800	4.595	1.055	Open Manhole	1200
S6.001	41.000	200.0	S16	5.450	4.315	0.910	Open Manhole	1200
S7.000	13.200	69.8	S16	5.450	3.761	1.589	Open Manhole	1200
S8.000	32.900	100.0	S16	5.450	4.246	1.104	Open Manhole	1200
S6.002	24.500	199.2	S17	5.750	3.513	2.012	Open Manhole	1350

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)
S1.005	o	375	S17	5.750	3.363	2.012	Open Manhole	1350
S1.006	o	375	S18	5.750	3.240	2.135	Open Manhole	1350
S1.007	o	375	S19	5.300	3.230	1.695	Open Manhole	1350

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)
S1.005	4.600	37.4	S18	5.750	3.240	2.135	Open Manhole	1350
S1.006	2.000	200.0	S19	5.300	3.230	1.695	Open Manhole	1350
S1.007	2.000	200.0	SOF D	5.300	3.220	1.705	Open Manhole	1200

Fairgreen House
Fairgreen Road
Galway

Date 18/06/2018 14:52 | Designed by RD
File STORM NETWORK E - DESIGN - REV C.MDX | Checked by BR
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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)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	0.750
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	0.75
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	300
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

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	68.200	0.273	249.8	0.382	5.00	0.0	0.600	o	300	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	39.15	6.15	4.100	0.382	0.0	0.0	0.0	0.99	70.0	48.6

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Fairgreen Road
Galway

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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
S2.000	43.000	0.266	161.7	0.063	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	66.900	0.268	250.0	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	13.100	0.052	251.9	0.028	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	66.400	0.332	200.0	0.233	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	32.600	0.130	250.0	0.114	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	6.800	0.100	68.0	0.000	0.00	0.0	0.600	o	300	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)
S2.000	40.36	5.70	4.175	0.063	0.0	0.0	0.0	1.03	40.8	8.3
S1.001	36.49	7.27	3.827	0.477	0.0	0.0	0.0	0.99	70.0	56.6
S1.002	36.02	7.50	3.559	0.505	0.0	0.0	0.0	0.99	69.7	59.1
S3.000	39.02	6.20	3.800	0.233	0.0	0.0	0.0	0.92	36.6	29.5
S3.001	37.67	6.75	3.393	0.347	0.0	0.0	0.0	0.99	70.0	42.5
S1.003	35.90	7.56	3.263	0.852	0.0	0.0	0.0	1.91	135.0	99.4

Fairgreen House
Fairgreen Road
Galway

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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
S1.004	4.600	0.023	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	2.000	0.010	200.0	0.000	0.00	0.0	0.600	o	375	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)
S1.004	35.78	7.62	3.088	0.852	0.0	0.0	0.0	1.28	141.1	99.4
S1.005	35.72	7.64	3.065	0.852	0.0	0.0	0.0	1.28	141.1	99.4
S1.006	35.67	7.67	3.055	0.852	0.0	0.0	0.0	1.28	141.1	99.4

Fairgreen House
Fairgreen Road
Galway

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Manhole Schedules for Storm

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)
S1	5.650	1.550	Open Manhole	1200	S1.000	4.100	300				
S2	5.450	1.275	Open Manhole	1200	S2.000	4.175	225				
S3	5.300	1.473	Open Manhole	1200	S1.001	3.827	300	S1.000	3.827	300	
								S2.000	3.909	225	7
S4	5.150	1.591	Open Manhole	1200	S1.002	3.559	300	S1.001	3.559	300	
S5	5.000	1.200	Open Manhole	1200	S3.000	3.800	225				
S6	5.000	1.607	Open Manhole	1200	S3.001	3.393	300	S3.000	3.468	225	
S7	5.050	1.787	Open Manhole	1200	S1.003	3.263	300	S1.002	3.507	300	245
								S3.001	3.263	300	
S8	5.000	1.912	Open Manhole	1350	S1.004	3.088	375	S1.003	3.163	300	
S9	5.000	1.935	Open Manhole	1350	S1.005	3.065	375	S1.004	3.065	375	
S10	5.000	1.945	Open Manhole	1350	S1.006	3.055	375	S1.005	3.055	375	
SOF E	5.200	2.155	Open Manhole	1200		OUTFALL		S1.006	3.045	375	

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	300	S1	5.650	4.100	1.250	Open Manhole	1200
S2.000	o	225	S2	5.450	4.175	1.050	Open Manhole	1200
S1.001	o	300	S3	5.300	3.827	1.173	Open Manhole	1200
S1.002	o	300	S4	5.150	3.559	1.291	Open Manhole	1200
S3.000	o	225	S5	5.000	3.800	0.975	Open Manhole	1200
S3.001	o	300	S6	5.000	3.393	1.307	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	68.200	249.8	S3	5.300	3.827	1.173	Open Manhole	1200
S2.000	43.000	161.7	S3	5.300	3.909	1.166	Open Manhole	1200
S1.001	66.900	250.0	S4	5.150	3.559	1.291	Open Manhole	1200
S1.002	13.100	251.9	S7	5.050	3.507	1.243	Open Manhole	1200
S3.000	66.400	200.0	S6	5.000	3.468	1.307	Open Manhole	1200
S3.001	32.600	250.0	S7	5.050	3.263	1.487	Open Manhole	1200

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)
S1.003	o	300	S7	5.050	3.263	1.487	Open Manhole	1200
S1.004	o	375	S8	5.000	3.088	1.537	Open Manhole	1350
S1.005	o	375	S9	5.000	3.065	1.560	Open Manhole	1350
S1.006	o	375	S10	5.000	3.055	1.570	Open Manhole	1350

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)
S1.003	6.800	68.0	S8	5.000	3.163	1.537	Open Manhole	1350
S1.004	4.600	200.0	S9	5.000	3.065	1.560	Open Manhole	1350
S1.005	2.000	200.0	S10	5.000	3.055	1.570	Open Manhole	1350
S1.006	2.000	200.0	SOF E	5.200	3.045	1.780	Open Manhole	1200

APPENDIX B

Foul Drainage Design Calculations

Fairgreen House
Fairgreen Road
Galway

Date 27/02/2019 09:31
File 10402-FOUL SEWER DESIGN - REV C.MDX

Designed by RD
Checked by BR

Micro Drainage | Network 2017.1.2

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Domestic (l/s/ha)	0.00	Maximum Backdrop Height (m)	1.500
Industrial Peak Flow Factor	0.00	Domestic Peak Flow Factor	6.00	Min Design Depth for Optimisation (m)	1.100
Flow Per Person (l/per/day)	150.00	Add Flow / Climate Change (%)	0	Min Vel for Auto Design only (m/s)	0.75
Persons per House	5.28	Minimum Backdrop Height (m)	0.200	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

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
F1.000	31.900	0.630	50.6	0.000	5	0.0	1.500	o	150	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)
F1.000	4.630	0.000	0.0	5	0.0	12	0.41	1.23	21.8	0.3

Network Design Table for Foul - Main

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
F2.000	18.000	0.300	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F1.001	33.000	0.275	120.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F3.000	22.700	0.378	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F1.002	40.900	0.205	199.5	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F4.000	12.700	0.212	60.0	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F4.001	40.000	0.400	100.0	0.000	6	0.0	1.500	o	150	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)
F2.000	4.300	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F1.001	4.000	0.000	0.0	13	0.0	23	0.41	0.80	14.1	0.7
F3.000	4.300	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F1.002	3.725	0.000	0.0	17	0.0	27	0.35	0.81	32.3	0.9
F4.000	4.750	0.000	0.0	5	0.0	13	0.39	1.13	20.0	0.3
F4.001	4.460	0.000	0.0	11	0.0	21	0.42	0.88	15.5	0.6

Network Design Table for Foul - Main

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
F1.003	55.600	0.278	200.0	0.000	8	0.0	1.500	o	225	Pipe/Conduit	
F5.000	27.800	0.695	40.0	0.000	4	0.0	1.500	o	100	Pipe/Conduit	
F1.004	53.600	0.268	200.0	0.000	13	0.0	1.500	o	225	Pipe/Conduit	
F1.005	47.800	0.239	200.0	0.000	16	0.0	1.500	o	225	Pipe/Conduit	
F1.006	32.200	0.161	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.000	59.000	0.590	100.0	0.000	9	0.0	1.500	o	150	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)
F1.003	3.520	0.000	0.0	36	0.0	38	0.45	0.81	32.2	2.0
F5.000	4.550	0.000	0.0	4	0.0	12	0.44	1.05	8.3	0.2
F1.004	3.242	0.000	0.0	53	0.0	46	0.50	0.81	32.2	2.9
F1.005	2.974	0.000	0.0	69	0.0	52	0.54	0.81	32.2	3.8
F1.006	2.706	0.000	0.0	69	0.0	52	0.54	0.81	32.2	3.8
F6.000	3.750	0.000	0.0	9	0.0	19	0.39	0.88	15.5	0.5

Network Design Table for Foul - Main

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
F6.001	57.800	0.385	150.0	0.000	6	0.0	1.500	o	225	Pipe/Conduit	
F6.002	36.700	0.184	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.000	33.900	0.613	55.3	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
F7.001	34.100	0.651	52.4	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F8.000	30.500	0.555	55.0	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
F8.001	40.000	0.667	60.0	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F7.002	67.300	0.673	100.0	0.000	0	0.0	1.500	o	150	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)
F6.001	3.160	0.000	0.0	15	0.0	23	0.38	0.94	37.2	0.8
F6.002	2.775	0.000	0.0	15	0.0	25	0.34	0.81	32.2	0.8
F7.000	5.350	0.000	0.0	7	0.0	14	0.44	1.18	20.8	0.4
F7.001	4.737	0.000	0.0	12	0.0	18	0.53	1.21	21.4	0.7
F8.000	5.350	0.000	0.0	7	0.0	14	0.44	1.18	20.9	0.4
F8.001	4.795	0.000	0.0	12	0.0	19	0.51	1.13	20.0	0.7
F7.002	4.086	0.000	0.0	24	0.0	30	0.53	0.88	15.5	1.3

Network Design Table for Foul - Main

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
F1.007	17.400	0.087	200.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F1.008	50.000	0.250	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F9.000	27.400	0.457	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F10.000	30.000	0.500	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F10.001	27.000	0.450	60.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F9.001	29.900	0.199	150.0	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)
F1.007	2.545	0.000	0.0	113	0.0	67	0.63	0.81	32.2	6.2
F1.008	2.458	0.000	0.0	113	0.0	67	0.63	0.81	32.2	6.2
F9.000	3.850	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F10.000	5.052	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F10.001	4.552	0.000	0.0	7	0.0	15	0.43	1.13	20.0	0.4
F9.001	3.393	0.000	0.0	11	0.0	20	0.34	0.94	37.2	0.6

Network Design Table for Foul - Main

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
F1.009	50.000	0.250	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F11.000	16.200	0.540	30.0	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
F11.001	23.400	0.780	30.0	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
F12.000	35.500	0.336	105.7	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F11.002	43.000	0.215	200.0	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)
F1.009	2.208	0.000	0.0	124	0.0	70	0.64	0.81	32.2	6.8
F11.000	6.650	0.000	0.0	8	0.0	13	0.57	1.60	28.3	0.4
F11.001	6.110	0.000	0.0	14	0.0	17	0.68	1.60	28.3	0.8
F12.000	5.550	0.000	0.0	10	0.0	20	0.40	0.85	15.1	0.6
F11.002	5.214	0.000	0.0	24	0.0	31	0.39	0.81	32.2	1.3

Network Design Table for Foul - Main

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
F13.000	20.700	0.345	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F11.003	18.000	0.100	180.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F11.004	45.400	0.568	80.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F14.000	24.500	0.397	61.7	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F15.000	15.300	0.258	59.3	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
F14.001	33.400	0.334	100.0	0.000	9	0.0	1.500	o	150	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)
F13.000	5.650	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F11.003	4.999	0.000	0.0	32	0.0	35	0.45	0.85	34.0	1.8
F11.004	4.899	0.000	0.0	36	0.0	30	0.62	1.28	51.1	2.0
F14.000	5.750	0.000	0.0	4	0.0	11	0.35	1.12	19.7	0.2
F15.000	6.450	0.000	0.0	2	0.0	8	0.29	1.14	20.1	0.1
F14.001	5.353	0.000	0.0	15	0.0	24	0.46	0.88	15.5	0.8

Network Design Table for Foul - Main

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
F11.005	50.300	0.279	180.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F16.000	25.400	0.635	40.0	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F16.001	40.900	0.682	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F11.006	35.100	1.404	25.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F17.000	11.900	0.198	60.1	0.000	1	0.0	1.500	o	150	Pipe/Conduit	
F17.001	35.700	0.595	60.0	0.000	4	0.0	1.500	o	150	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)
F11.005	4.332	0.000	0.0	51	0.0	44	0.52	0.85	34.0	2.8
F16.000	5.250	0.000	0.0	5	0.0	12	0.44	1.39	24.5	0.3
F16.001	4.615	0.000	0.0	9	0.0	17	0.47	1.13	20.0	0.5
F11.006	3.933	0.000	0.0	60	0.0	29	1.08	2.30	91.5	3.3
F17.000	3.750	0.000	0.0	1	0.0	6	0.23	1.13	20.0	0.1
F17.001	3.552	0.000	0.0	5	0.0	13	0.39	1.13	20.0	0.3

Network Design Table for Foul - Main

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
F18.000	30.100	0.502	60.0	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
F17.002	31.200	0.312	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F17.003	22.300	0.223	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F19.000	33.000	0.550	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
F17.004	64.700	0.431	150.1	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)
F18.000	3.750	0.000	0.0	7	0.0	15	0.43	1.13	20.0	0.4
F17.002	2.957	0.000	0.0	12	0.0	21	0.43	0.88	15.5	0.7
F17.003	2.645	0.000	0.0	12	0.0	21	0.43	0.88	15.5	0.7
F19.000	3.750	0.000	0.0	4	0.0	11	0.36	1.13	20.0	0.2
F17.004	2.422	0.000	0.0	16	0.0	24	0.38	0.94	37.2	0.9

Network Design Table for Foul - Main

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
F20.000	11.700	0.195	60.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F21.000	10.700	0.195	54.9	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F20.001	26.500	0.442	60.0	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
F20.002	41.800	0.418	100.0	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
F17.005	45.000	0.250	180.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F11.007	12.600	0.070	180.0	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)
F20.000	4.050	0.000	0.0	3	0.0	10	0.33	1.13	20.0	0.2
F21.000	4.050	0.000	0.0	3	0.0	10	0.34	1.18	20.9	0.2
F20.001	3.855	0.000	0.0	12	0.0	19	0.51	1.13	20.0	0.7
F20.002	3.413	0.000	0.0	18	0.0	26	0.49	0.88	15.5	1.0
F17.005	1.991	0.000	0.0	34	0.0	36	0.46	0.85	34.0	1.9
F11.007	1.741	0.000	0.0	94	0.0	59	0.62	0.85	34.0	5.2

Network Design Table for Foul - Main

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
F1.010	3.000	0.017	180.0	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)
F1.010	1.671	0.000	0.0	218	0.0	92	0.78	0.85	34.0	12.0

Manhole Schedules for Foul - Main

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)
F1	5.880	1.250	Open Manhole	1200	F1.000	4.630	150				
F2	5.200	0.900	Open Manhole	1200	F2.000	4.300	150				
F3	5.350	1.350	Open Manhole	1200	F1.001	4.000	150	F1.000	4.000	150	
								F2.000	4.000	150	
F4	5.400	1.100	Open Manhole	1200	F3.000	4.300	150				
F5	5.400	1.675	Open Manhole	1200	F1.002	3.725	225	F1.001	3.725	150	
								F3.000	3.922	150	122
F6	6.000	1.250	Open Manhole	1200	F4.000	4.750	150				
F7	6.000	1.540	Open Manhole	1200	F4.001	4.460	150	F4.000	4.538	150	78
F8	5.600	2.080	Open Manhole	1200	F1.003	3.520	225	F1.002	3.520	225	
								F4.001	4.060	150	465
F9	5.800	1.250	Open Manhole	1200	F5.000	4.550	100				
F10	5.300	2.058	Open Manhole	1200	F1.004	3.242	225	F1.003	3.242	225	
								F5.000	3.855	100	488
F11	5.300	2.326	Open Manhole	1200	F1.005	2.974	225	F1.004	2.974	225	
F12	5.300	2.594	Open Manhole	1200	F1.006	2.706	225	F1.005	2.735	225	29
F13	5.000	1.250	Open Manhole	1200	F6.000	3.750	150				
F14	5.100	1.940	Open Manhole	1200	F6.001	3.160	225	F6.000	3.160	150	
F15	5.200	2.425	Open Manhole	1200	F6.002	2.775	225	F6.001	2.775	225	

Manhole Schedules for Foul - Main

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)
F16	6.700	1.350	Open Manhole	1200	F7.000	5.350	150				
F17	6.630	1.893	Open Manhole	1200	F7.001	4.737	150	F7.000	4.737	150	
F18	6.700	1.350	Open Manhole	1200	F8.000	5.350	150				
F19	6.630	1.835	Open Manhole	1200	F8.001	4.795	150	F8.000	4.795	150	
F20	6.400	2.314	Open Manhole	1200	F7.002	4.086	150	F7.001	4.086	150	
								F8.001	4.128	150	42
F21	5.100	2.555	Open Manhole	1200	F1.007	2.545	225	F1.006	2.545	225	
								F6.002	2.592	225	47
								F7.002	3.413	150	793
F22	5.300	2.842	Open Manhole	1200	F1.008	2.458	225	F1.007	2.458	225	
F23	5.100	1.250	Open Manhole	1200	F9.000	3.850	150				
F24	6.200	1.148	Open Manhole	1200	F10.000	5.052	150				
F25	6.000	1.448	Open Manhole	1200	F10.001	4.552	150	F10.000	4.552	150	
F26	5.100	1.707	Open Manhole	1200	F9.001	3.393	225	F9.000	3.393	150	
								F10.001	4.102	150	634
F27	5.300	3.092	Open Manhole	1200	F1.009	2.208	225	F1.008	2.208	225	
								F9.001	3.194	225	986
F28	7.400	0.750	Open Manhole	1200	F11.000	6.650	150				
F29	7.200	1.090	Open Manhole	1200	F11.001	6.110	150	F11.000	6.110	150	

Manhole Schedules for Foul - Main

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)
F30	6.800	1.250	Open Manhole	1200	F12.000	5.550	150				
F31	6.800	1.586	Open Manhole	1200	F11.002	5.214	225	F11.001	5.330	150	41
								F12.000	5.214	150	
F32	6.900	1.250	Open Manhole	1200	F13.000	5.650	150				
F33	6.900	1.901	Open Manhole	1200	F11.003	4.999	225	F11.002	4.999	225	
								F13.000	5.305	150	231
F34	6.700	1.801	Open Manhole	1200	F11.004	4.899	225	F11.003	4.899	225	
F35	7.000	1.250	Open Manhole	1200	F14.000	5.750	150				
F36	7.700	1.250	Open Manhole	1200	F15.000	6.450	150				
F37	7.400	2.047	Open Manhole	1200	F14.001	5.353	150	F14.000	5.353	150	
								F15.000	6.192	150	839
F38	6.200	1.869	Open Manhole	1200	F11.005	4.332	225	F11.004	4.332	225	
								F14.001	5.019	150	612
F39	6.700	1.450	Open Manhole	1200	F16.000	5.250	150				
F40	5.800	1.185	Open Manhole	1200	F16.001	4.615	150	F16.000	4.615	150	
F41	5.300	1.367	Open Manhole	1200	F11.006	3.933	225	F11.005	4.053	225	119
								F16.001	3.933	150	
F42	5.000	1.250	Open Manhole	1200	F17.000	3.750	150				
F43	5.000	1.448	Open Manhole	1200	F17.001	3.552	150	F17.000	3.552	150	

Manhole Schedules for Foul - Main

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)
F44	5.000	1.250	Open Manhole	1200	F18.000	3.750	150				
F45	5.100	2.143	Open Manhole	1200	F17.002	2.957	150	F17.001	2.957	150	
								F18.000	3.248	150	291
F46	5.000	2.355	Open Manhole	1200	F17.003	2.645	150	F17.002	2.645	150	
F47	5.000	1.250	Open Manhole	1200	F19.000	3.750	150				
F48	5.150	2.728	Open Manhole	1200	F17.004	2.422	225	F17.003	2.422	150	
								F19.000	3.200	150	703
F49	5.650	1.600	Open Manhole	1200	F20.000	4.050	150				
F50	5.650	1.600	Open Manhole	1200	F21.000	4.050	150				
F51	5.300	1.445	Open Manhole	1200	F20.001	3.855	150	F20.000	3.855	150	
								F21.000	3.855	150	
F52	5.420	2.007	Open Manhole	1200	F20.002	3.413	150	F20.001	3.413	150	
F53	5.300	3.309	Open Manhole	1200	F17.005	1.991	225	F17.004	1.991	225	
								F20.002	2.995	150	929
F54	5.450	3.709	Open Manhole	1200	F11.007	1.741	225	F11.006	2.529	225	788
								F17.005	1.741	225	
F55	5.300	3.629	Open Manhole	1200	F1.010	1.671	225	F1.009	1.958	225	287
								F11.007	1.671	225	
F	5.300	3.646	Open Manhole	1200		OUTFALL		F1.010	1.654	225	

PIPELINE SCHEDULES for Foul - Main

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)
F1.000	o	150	F1	5.880	4.630	1.100	Open Manhole	1200
F2.000	o	150	F2	5.200	4.300	0.750	Open Manhole	1200
F1.001	o	150	F3	5.350	4.000	1.200	Open Manhole	1200
F3.000	o	150	F4	5.400	4.300	0.950	Open Manhole	1200
F1.002	o	225	F5	5.400	3.725	1.450	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)
F1.000	31.900	50.6	F3	5.350	4.000	1.200	Open Manhole	1200
F2.000	18.000	60.0	F3	5.350	4.000	1.200	Open Manhole	1200
F1.001	33.000	120.0	F5	5.400	3.725	1.525	Open Manhole	1200
F3.000	22.700	60.0	F5	5.400	3.922	1.328	Open Manhole	1200
F1.002	40.900	199.5	F8	5.600	3.520	1.855	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F4.000	o	150	F6	6.000	4.750	1.100	Open Manhole	1200
F4.001	o	150	F7	6.000	4.460	1.390	Open Manhole	1200
F1.003	o	225	F8	5.600	3.520	1.855	Open Manhole	1200
F5.000	o	100	F9	5.800	4.550	1.150	Open Manhole	1200
F1.004	o	225	F10	5.300	3.242	1.833	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)
F4.000	12.700	60.0	F7	6.000	4.538	1.312	Open Manhole	1200
F4.001	40.000	100.0	F8	5.600	4.060	1.390	Open Manhole	1200
F1.003	55.600	200.0	F10	5.300	3.242	1.833	Open Manhole	1200
F5.000	27.800	40.0	F10	5.300	3.855	1.345	Open Manhole	1200
F1.004	53.600	200.0	F11	5.300	2.974	2.101	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F1.005	o	225	F11	5.300	2.974	2.101	Open Manhole	1200
F1.006	o	225	F12	5.300	2.706	2.369	Open Manhole	1200
F6.000	o	150	F13	5.000	3.750	1.100	Open Manhole	1200
F6.001	o	225	F14	5.100	3.160	1.715	Open Manhole	1200
F6.002	o	225	F15	5.200	2.775	2.200	Open Manhole	1200
F7.000	o	150	F16	6.700	5.350	1.200	Open Manhole	1200
F7.001	o	150	F17	6.630	4.737	1.743	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)
F1.005	47.800	200.0	F12	5.300	2.735	2.340	Open Manhole	1200
F1.006	32.200	200.0	F21	5.100	2.545	2.330	Open Manhole	1200
F6.000	59.000	100.0	F14	5.100	3.160	1.790	Open Manhole	1200
F6.001	57.800	150.0	F15	5.200	2.775	2.200	Open Manhole	1200
F6.002	36.700	200.0	F21	5.100	2.592	2.284	Open Manhole	1200
F7.000	33.900	55.3	F17	6.630	4.737	1.743	Open Manhole	1200
F7.001	34.100	52.4	F20	6.400	4.086	2.164	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F8.000	o	150	F18	6.700	5.350	1.200	Open Manhole	1200
F8.001	o	150	F19	6.630	4.795	1.685	Open Manhole	1200
F7.002	o	150	F20	6.400	4.086	2.164	Open Manhole	1200
F1.007	o	225	F21	5.100	2.545	2.330	Open Manhole	1200
F1.008	o	225	F22	5.300	2.458	2.617	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)
F8.000	30.500	55.0	F19	6.630	4.795	1.685	Open Manhole	1200
F8.001	40.000	60.0	F20	6.400	4.128	2.122	Open Manhole	1200
F7.002	67.300	100.0	F21	5.100	3.413	1.537	Open Manhole	1200
F1.007	17.400	200.0	F22	5.300	2.458	2.617	Open Manhole	1200
F1.008	50.000	200.0	F27	5.300	2.208	2.867	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F9.000	o	150	F23	5.100	3.850	1.100	Open Manhole	1200
F10.000	o	150	F24	6.200	5.052	0.998	Open Manhole	1200
F10.001	o	150	F25	6.000	4.552	1.298	Open Manhole	1200
F9.001	o	225	F26	5.100	3.393	1.482	Open Manhole	1200
F1.009	o	225	F27	5.300	2.208	2.867	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)
F9.000	27.400	60.0	F26	5.100	3.393	1.557	Open Manhole	1200
F10.000	30.000	60.0	F25	6.000	4.552	1.298	Open Manhole	1200
F10.001	27.000	60.0	F26	5.100	4.102	0.848	Open Manhole	1200
F9.001	29.900	150.0	F27	5.300	3.194	1.881	Open Manhole	1200
F1.009	50.000	200.0	F55	5.300	1.958	3.117	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F11.000	o	150	F28	7.400	6.650	0.600	Open Manhole	1200
F11.001	o	150	F29	7.200	6.110	0.940	Open Manhole	1200
F12.000	o	150	F30	6.800	5.550	1.100	Open Manhole	1200
F11.002	o	225	F31	6.800	5.214	1.361	Open Manhole	1200
F13.000	o	150	F32	6.900	5.650	1.100	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)
F11.000	16.200	30.0	F29	7.200	6.110	0.940	Open Manhole	1200
F11.001	23.400	30.0	F31	6.800	5.330	1.320	Open Manhole	1200
F12.000	35.500	105.7	F31	6.800	5.214	1.436	Open Manhole	1200
F11.002	43.000	200.0	F33	6.900	4.999	1.676	Open Manhole	1200
F13.000	20.700	60.0	F33	6.900	5.305	1.445	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F11.003	o	225	F33	6.900	4.999	1.676	Open Manhole	1200
F11.004	o	225	F34	6.700	4.899	1.576	Open Manhole	1200
F14.000	o	150	F35	7.000	5.750	1.100	Open Manhole	1200
F15.000	o	150	F36	7.700	6.450	1.100	Open Manhole	1200
F14.001	o	150	F37	7.400	5.353	1.897	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)
F11.003	18.000	180.0	F34	6.700	4.899	1.576	Open Manhole	1200
F11.004	45.400	80.0	F38	6.200	4.332	1.644	Open Manhole	1200
F14.000	24.500	61.7	F37	7.400	5.353	1.897	Open Manhole	1200
F15.000	15.300	59.3	F37	7.400	6.192	1.058	Open Manhole	1200
F14.001	33.400	100.0	F38	6.200	5.019	1.031	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F11.005	o	225	F38	6.200	4.332	1.643	Open Manhole	1200
F16.000	o	150	F39	6.700	5.250	1.300	Open Manhole	1200
F16.001	o	150	F40	5.800	4.615	1.035	Open Manhole	1200
F11.006	o	225	F41	5.300	3.933	1.142	Open Manhole	1200
F17.000	o	150	F42	5.000	3.750	1.100	Open Manhole	1200
F17.001	o	150	F43	5.000	3.552	1.298	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)
F11.005	50.300	180.0	F41	5.300	4.053	1.022	Open Manhole	1200
F16.000	25.400	40.0	F40	5.800	4.615	1.035	Open Manhole	1200
F16.001	40.900	60.0	F41	5.300	3.933	1.217	Open Manhole	1200
F11.006	35.100	25.0	F54	5.450	2.529	2.696	Open Manhole	1200
F17.000	11.900	60.1	F43	5.000	3.552	1.298	Open Manhole	1200
F17.001	35.700	60.0	F45	5.100	2.957	1.993	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F18.000	o	150	F44	5.000	3.750	1.100	Open Manhole	1200
F17.002	o	150	F45	5.100	2.957	1.993	Open Manhole	1200
F17.003	o	150	F46	5.000	2.645	2.205	Open Manhole	1200
F19.000	o	150	F47	5.000	3.750	1.100	Open Manhole	1200
F17.004	o	225	F48	5.150	2.422	2.503	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)
F18.000	30.100	60.0	F45	5.100	3.248	1.702	Open Manhole	1200
F17.002	31.200	100.0	F46	5.000	2.645	2.205	Open Manhole	1200
F17.003	22.300	100.0	F48	5.150	2.422	2.578	Open Manhole	1200
F19.000	33.000	60.0	F48	5.150	3.200	1.800	Open Manhole	1200
F17.004	64.700	150.1	F53	5.300	1.991	3.084	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F20.000	o	150	F49	5.650	4.050	1.450	Open Manhole	1200
F21.000	o	150	F50	5.650	4.050	1.450	Open Manhole	1200
F20.001	o	150	F51	5.300	3.855	1.295	Open Manhole	1200
F20.002	o	150	F52	5.420	3.413	1.857	Open Manhole	1200
F17.005	o	225	F53	5.300	1.991	3.084	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)
F20.000	11.700	60.0	F51	5.300	3.855	1.295	Open Manhole	1200
F21.000	10.700	54.9	F51	5.300	3.855	1.295	Open Manhole	1200
F20.001	26.500	60.0	F52	5.420	3.413	1.857	Open Manhole	1200
F20.002	41.800	100.0	F53	5.300	2.995	2.155	Open Manhole	1200
F17.005	45.000	180.0	F54	5.450	1.741	3.484	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

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)
F11.007	o	225	F54	5.450	1.741	3.484	Open Manhole	1200
F1.010	o	225	F55	5.300	1.671	3.404	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)
F11.007	12.600	180.0	F55	5.300	1.671	3.404	Open Manhole	1200
F1.010	3.000	180.0	F	5.300	1.654	3.421	Open Manhole	1200

APPENDIX C

Soakaway Design Calculations

Project No.	10402	Client :	Arlum LTD	Project:	Moneyduff

Soakaway A Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 30 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

	m2	(%) Permeability Factor	m2
Area	8520	0.9	7668
		Total	**7668**

Drained Area = **7668** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
20	**24**	**0.8**

a_{s50} 35.2 m^2

Void Ratio 95 %

Infiltration Rate (f) 4.0000E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M30 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 95% voids	Check
10.00	12.2	102.905	0.845	102	107	OK
15.00	14.3	120.618	1.267	119	126	OK
30.00	17.7	149.296	2.534	147	154	OK
60.00	21.8	183.879	5.069	179	188	OK
120.00	26.9	226.896	10.138	217	228	OK
360.00	37.4	315.462	30.413	285	300	OK
720.00	46.2	389.688	60.826	329	346	OK
1440.00	56.9	479.940	121.651	358	377	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 138309E, 223647N with 10% added for climate change
Highlighted cell is is volume required for critcal storm duration

Project No.	10402	Client :	Arlum LTD	Project:	Moneyduff

Soakaway B Design to BRE 365

Design Procedure I - O = S

where;

I = Inflow from impermeable area to be drained

O = Outflow infiltrating into the soil during rainfall

S = Storage required

I = A x R

where;

A = the impermeable area drained to the soakaway;

R = the total rainfall in a 30 yrdesign storm

$O = a_{s50} \times f \times D$

where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth

f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway

D = the storm Duration

	m2	(%) Permeability Factor	m2
Area Area	10600	0.9	9540
		Total	**9540**

Drained Area = **9540** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
45	**10**	**1.2**

a_{s50} 66 m^2

Void Ratio 95 %

Infiltration Rate (f) 1.5200E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M30 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 95% voids	Check
10.00	12.2	128.027	6.019	122	128	OK
15.00	14.3	150.064	9.029	141	148	OK
30.00	17.7	185.744	18.058	168	177	OK
60.00	21.8	228.769	36.115	193	203	OK
120.00	26.9	282.289	72.230	210	221	OK
360.00	37.4	392.476	216.691	176	185	OK
720.00	46.2	484.823	433.382	51	54	OK
1440.00	56.9	597.109	866.765	-270	-284	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 138309E, 223647N with 10% added for climate change

Highlighted cell is is volume required for critcal storm duration

Project No.	10402	Client :	Arlum LTD	Project:	Moneyduff

Soakaway C Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 30 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

	m2	(%) Permeability Factor	m2
Area Area	9690	0.9	8721
		Total	**8721**

Drained Area = **8721** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
36	**18**	**0.8**

a_{s50} 43.2 m^2

Void Ratio 95 %

Infiltration Rate (f) 2.0000E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M30 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 95% voids	Check
10.00	12.2	117.036	0.518	117	123	OK
15.00	14.3	137.181	0.778	136	144	OK
30.00	17.7	169.798	1.555	168	177	OK
60.00	21.8	209.130	3.110	206	217	OK
120.00	26.9	258.054	6.221	252	265	OK
360.00	37.4	358.782	18.662	340	358	OK
720.00	46.2	443.201	37.325	406	427	OK
1440.00	56.9	545.847	74.650	471	496	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 138309E, 223647N with 10% added for climate change
Highlighted cell is is volume required for critcal storm duration

Project No.	10402	Client :	Arlum LTD	Project:	Moneyduff

Soakaway D Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 30 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

	m2	(%) Permeability Factor	m2
Area Area	10580	0.9	9522
		Total	**9522**

Drained Area = **9522** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
19	**17**	**1.2**

a_{s50} 43.2 m^2

Void Ratio 95 %

Infiltration Rate (f) 2.4000E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M30 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 95% voids	Check
10.00	12.2	127.785	6.221	122	128	OK
15.00	14.3	149.781	9.331	140	148	OK
30.00	17.7	185.393	18.662	167	176	OK
60.00	21.8	228.338	37.325	191	201	OK
120.00	26.9	281.756	74.650	207	218	OK
360.00	37.4	391.735	223.949	168	177	OK
720.00	46.2	483.908	447.898	36	38	OK
1440.00	56.9	595.982	895.795	-300	-316	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 138309E, 223647N with 10% added for climate change
Highlighted cell is is volume required for critcal storm duration

Project No.	10402	Client :	Arlum LTD	Project:	Moneyduff

Soakaway E Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 30 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

	m2	(%) Permeability Factor	m2
Area Area	8520	0.9	7668
		Total	**7668**

Drained Area = **7668** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
25	**16**	**1.2**

a_{s50} 49.2 m^2

Void Ratio 95 %

Infiltration Rate (f) 1.2900E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M30 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 95% voids	Check
10.00	12.2	102.905	3.808	99	104	OK
15.00	14.3	120.618	5.712	115	121	OK
30.00	17.7	149.296	11.424	138	145	OK
60.00	21.8	183.879	22.848	161	170	OK
120.00	26.9	226.896	45.697	181	191	OK
360.00	37.4	315.462	137.091	178	188	OK
720.00	46.2	389.688	274.182	116	122	OK
1440.00	56.9	479.940	548.364	-68	-72	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 138309E, 223647N with 10% added for climate change
Highlighted cell is is volume required for critcal storm duration

APPENDIX D

Storm Drainage Sections

Fairgreen House
Fairgreen Road
Galway

Date 18/06/2018 12:16 | Designed by RD
File STORM NETWORK A DESIGN REV C SIM.MDX | Checked by BR
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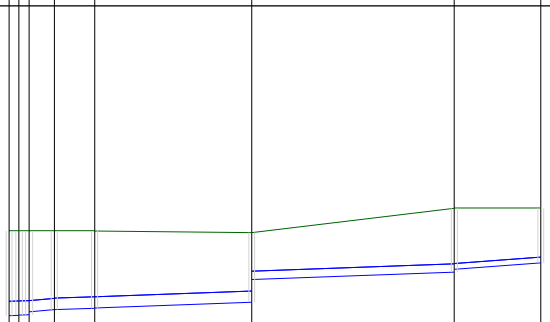
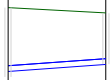
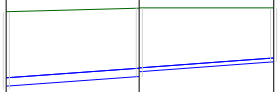
MH Name	S			S4	S2		
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000							
PN				S1.002	S1.001		
Dia (mm)				300	225		
Slope (1:X)				200.0	200.0		
Cover Level (m)	5.400		5.400	5.350	6.000	6.000	
Invert Level (m)			3.350	3.350 3.506	4.102 4.303	4.378 4.550	
Length (m)				31.200	40.200		

MH Name	S4	S3	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		S2.000	
Dia (mm)		150	
Slope (1:X)		100.0	
Cover Level (m)	5.350	5.200	
Invert Level (m)	3.656	3.850	
Length (m)		19.400	

MH Name	S7	S6	S5	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000				
PN		S3.001	S3.000	
Dia (mm)		225	100	
Slope (1:X)		102.3	100.0	
Cover Level (m)	5.400	5.500	5.500	
Invert Level (m)		3.425 3.683	3.808 4.075	
Length (m)		26.400	26.700	

Fairgreen House
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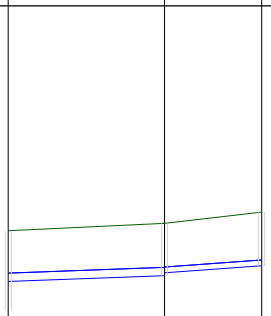
MH Name	S10	S9	S8	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000				
PN		S4.001	S4.000	
Dia (mm)		225	150	
Slope (1:X)		200.0	100.0	
Cover Level (m)	5.400	5.600	5.900	
Invert Level (m)		4.052 4.207	4.282 4.475	
Length (m)		31.000	19.300	

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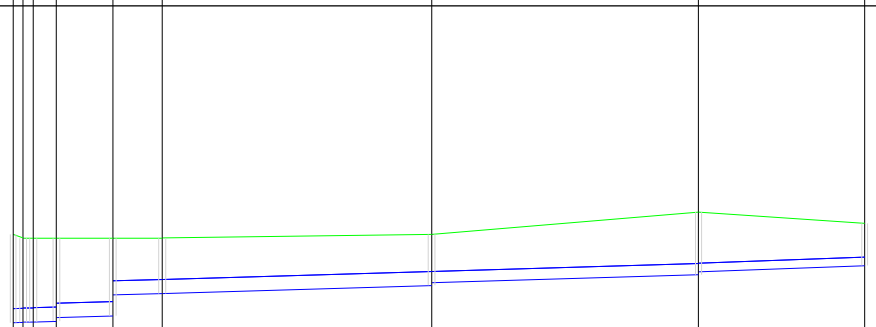
MH Name	SOF B			S4	S3	S1
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000						
PN				S1.002	S1.001	S1.000
Dia (mm)				375	300	225
Slope (1:X)				250.0	250.0	200.0
Cover Level (m)	5.300	5.200	5.200	5.300	5.900	5.600
Invert Level (m)		3.103 3.148	3.734 3.734	3.948	4.023 4.235	4.310 4.475
Length (m)				53.500	53.000	33.000

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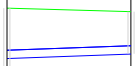
MH Name	S3	S2	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		200.0	
Cover Level (m)	5.900	5.800	
Invert Level (m)	4.552	4.675	
Length (m)		24.600	

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MH Name	S8	S7	S6	
Hor Scale 1500 Ver Scale 200 Datum (m)-3.000				
PN		S3.001	S3.000	
Dia (mm)		300	225	
Slope (1:X)		250.0	200.0	
Cover Level (m)	5.200	5.100	5.000	
Invert Level (m)	3.223	3.507	3.582	3.875
Length (m)		70.900	58.600	

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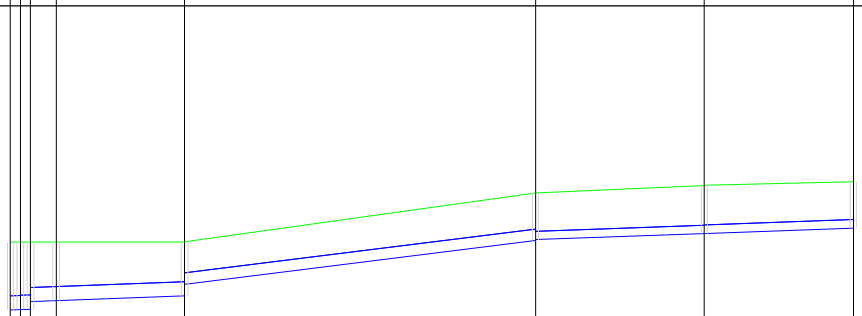
MH Name	S	S7	S5	S2	S1
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000					
PN		S1.003	S1.002	S1.001	S1.000
Dia (mm)		375	300	225	225
Slope (1:X)		199.2	60.0	200.0	200.0
Cover Level (m)	5.100	5.100	6.400	6.600	6.700
Invert Level (m)		3.549 / 3.677	3.981 / 5.143	5.160 / 5.327	5.327 / 5.475
Length (m)		25.500	69.700	33.500	29.600

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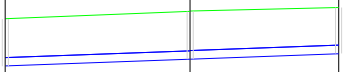
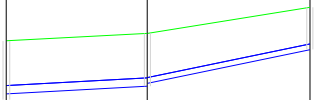
MH Name	S5	S4	S3	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000				
PN		S2.001	S2.000	
Dia (mm)		225	225	
Slope (1:X)		199.5	199.3	
Cover Level (m)	6.400	6.600	6.700	
Invert Level (m)		5.143 / 5.327	5.327 / 5.475	
Length (m)		36.700	29.500	

MH Name	S7	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000		
PN		
Dia (mm)		
Slope (1:X)		
Cover Level (m)	5.100	5.100
Invert Level (m)	3.902	4.050
Length (m)		

MH Name	S10	S9	S8	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000				
PN		S4.001	S4.000	
Dia (mm)		225	150	
Slope (1:X)		137.3	36.0	
Cover Level (m)	5.100	5.300	6.000	
Invert Level (m)		3.699 3.903	3.978 4.875	
Length (m)		28.000	32.300	

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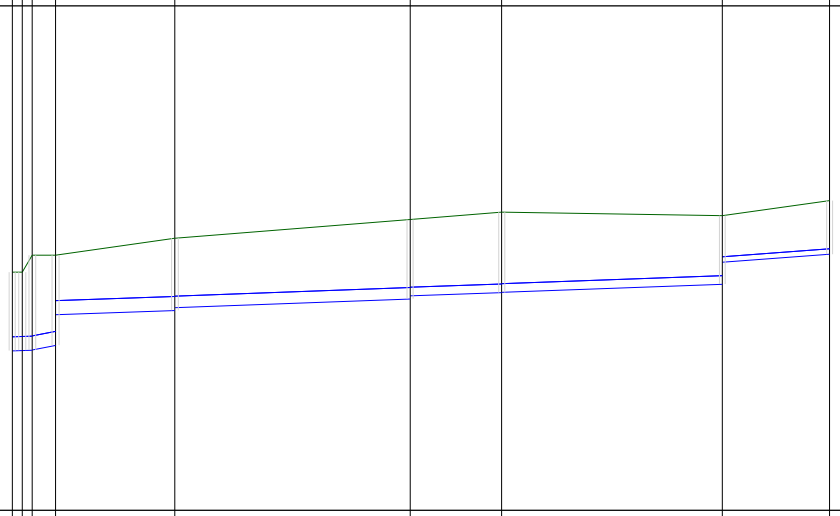
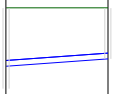
MH Name	SOF D	S11	S6		S3	S1
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000						
PN		S1.004	S1.003		S1.001	S1.000
Dia (mm)		375	300		225	150
Slope (1:X)		200.0	200.0		200.0	98.2
Cover Level (m)	5.300	6.200	6.700	6.900	6.800	7.200
Invert Level (m)		4.170 4.289	4.364 4.597	4.672 4.763	4.763 4.982	5.558 5.775
Length (m)		23.700	46.700		43.800	21.300

MH Name	S3	S2	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN		S2.000	
Dia (mm)		100	
Slope (1:X)		102.9	
Cover Level (m)	6.800	6.800	
Invert Level (m)	5.107	5.450	
Length (m)		35.300	

MH Name	S5	S4	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN		S3.000	
Dia (mm)		150	
Slope (1:X)		100.0	
Cover Level (m)	6.900	6.900	
Invert Level (m)	5.348	5.550	
Length (m)		20.200	

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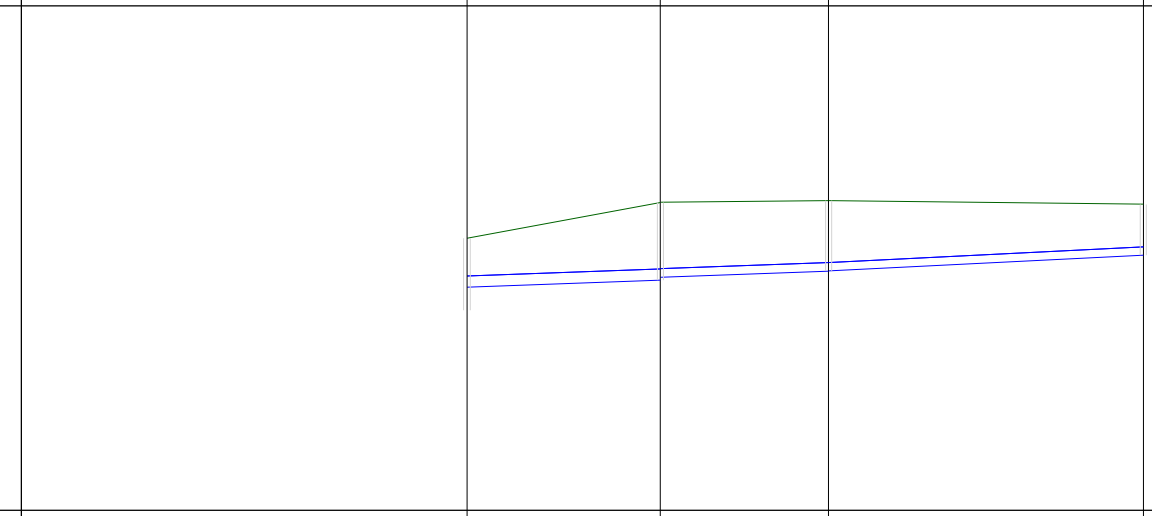
MH Name	S11	S9	S8	S7	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000					
PN		S4.002	S4.001	S4.000	
Dia (mm)		300	225	225	
Slope (1:X)		200.0	200.0	149.9	
Cover Level (m)	6.200	7.150	7.200	7.100	
Invert Level (m)		4.899 5.091	5.166 5.333	5.333 5.750	
Length (m)		38.400	33.400	62.500	

MH Name	S11		
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	6.200	6.300	
Invert Level (m)		4.717 4.850	
Length (m)			

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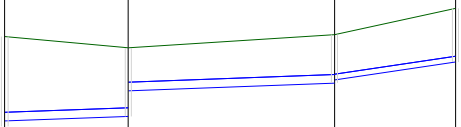
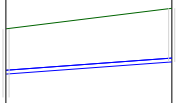
MH Name	S17	S16	S13	S12	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000					
PN		S6.002	S6.001	S6.000	
Dia (mm)		225	225	150	
Slope (1:X)		199.2	200.0	50.0	
Cover Level (m)	5.750	5.450	5.800	6.500	
Invert Level (m)		3.513 3.636	4.315 4.520	4.595 5.075	
Length (m)		24.500	41.000	24.000	

MH Name	S16		
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	5.450	5.400	
Invert Level (m)		3.761 3.950	
Length (m)			

MH Name	S16	S15	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		S8.000	
Dia (mm)		100	
Slope (1:X)		100.0	
Cover Level (m)	5.450	6.000	
Invert Level (m)	4.246	4.575	
Length (m)		32.900	

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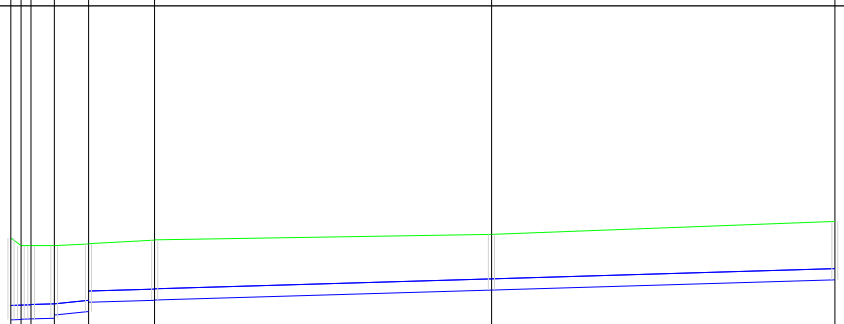
MH Name	SOF E				S3	S1	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000							
PN					S1.001	S1.000	
Dia (mm)					300	300	
Slope (1:X)					250.0	249.8	
Cover Level (m)	5.200		5.050	5.150	5.300	5.650	
Invert Level (m)			3.263	3.507 3.559	3.559 3.827	3.827 4.100	
Length (m)					66.900	68.200	

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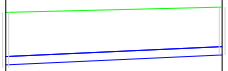
MH Name	S3	S2	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		161.7	
Cover Level (m)	5.300	5.450	
Invert Level (m)	3.909	4.175	
Length (m)		43.000	

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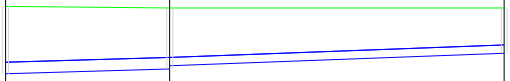
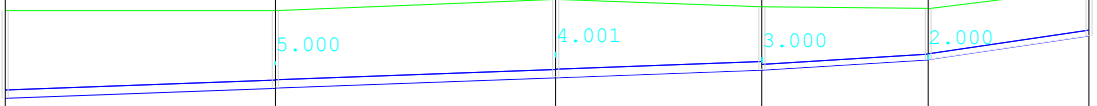
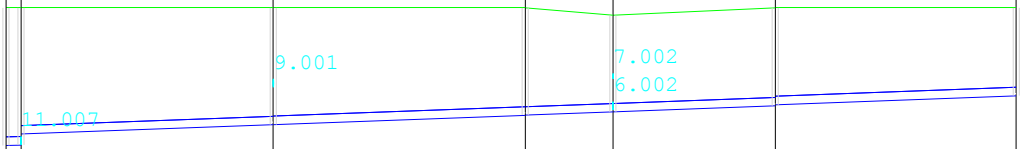
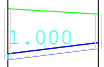
MH Name	S7	S6	S5	
Hor Scale 1500 Ver Scale 200 Datum (m)-3.000				
PN		S3.001	S3.000	
Dia (mm)		300	225	
Slope (1:X)		250.0	200.0	
Cover Level (m)	5.050	5.000	5.000	
Invert Level (m)		3.263 3.393	3.468 3.800	
Length (m)		32.600	66.400	

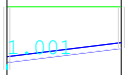
APPENDIX E

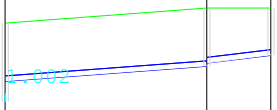
Foul Drainage Sections

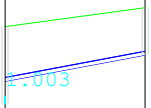
MH Name	F11	F10	F8	F5	F3	F1	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000							
PN		F1.004	F1.003	F1.002	F1.001	F1.000	
Dia (mm)		225	225	225	150	150	
Slope (1:X)		200.0	200.0	199.5	120.0	50.6	
Cover Level (m)	5.300	5.300	5.600	5.400	5.350	5.880	
Invert Level (m)		2.974	3.242	3.242	3.520	3.520	3.725	3.725	4.000	4.000	4.630	
Length (m)		53.600	55.600	40.900	33.000	31.900	

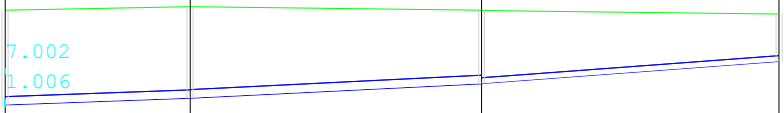
MH Name	F	F27	F22		F12	F11	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000							
PN		F1.009	F1.008		F1.006	F1.005	
Dia (mm)		225	225		225	225	
Slope (1:X)		200.0	200.0		200.0	200.0	
Cover Level (m)	5.300	5.300	5.300	5.100	5.300	5.300	
Invert Level (m)		1.958	2.208	2.208	2.458	2.458	2.545	2.545	2.706	2.735	2.974	
Length (m)		50.000	50.000		32.200	47.800	

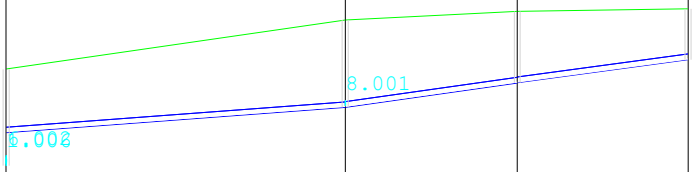
MH Name	F3		
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	5.350	5.200	
Invert Level (m)	4.000	4.300	
Length (m)			

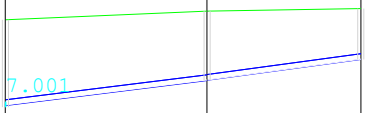
MH Name	F5	F4	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN		F3.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	5.400	5.400	
Invert Level (m)	3.922	4.300	
Length (m)		22.700	

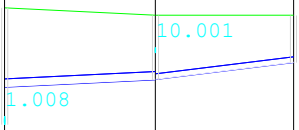
MH Name	F8	F7		
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000				
PN		F4.001		
Dia (mm)		150		
Slope (1:X)		100.0		
Cover Level (m)	5.600	6.000	6.000	
Invert Level (m)	4.060	4.460	4.538 4.750	
Length (m)		40.000		

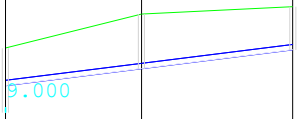
MH Name	F10	F9	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN		F5.000	
Dia (mm)		100	
Slope (1:X)		40.0	
Cover Level (m)	5.300	5.800	
Invert Level (m)	3.855	4.550	
Length (m)		27.800	

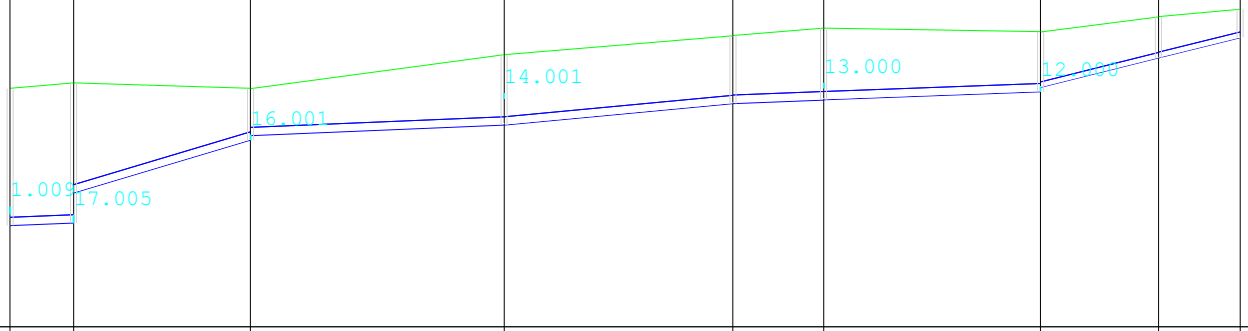
MH Name	F21	F15	F14	F13	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000					
PN		F6.002	F6.001	F6.000	
Dia (mm)		225	225	150	
Slope (1:X)		200.0	150.0	100.0	
Cover Level (m)	5.100	5.200	5.100	5.000	
Invert Level (m)		2.592 2.775	2.775 3.160	3.160 3.750	
Length (m)		36.700	57.800	59.000	

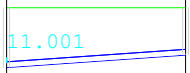
MH Name	F21	F20	F17	F16	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000					
PN		F7.002	F7.001	F7.000	
Dia (mm)		150	150	150	
Slope (1:X)		100.0	52.4	55.3	
Cover Level (m)	5.100	6.400	6.630	6.700	
Invert Level (m)		3.413 4.086	4.086 4.737	4.737 5.350	
Length (m)		67.300	34.100	33.900	

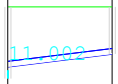
MH Name	F20	F19	F18	
Hor Scale 1500 Ver Scale 200 Datum (m) 0.000				
PN		F8.001	F8.000	
Dia (mm)		150	150	
Slope (1:X)		60.0	55.0	
Cover Level (m)	6.400	6.630	6.700	
Invert Level (m)	4.128	4.795	4.795 5.350	
Length (m)		40.000	30.500	

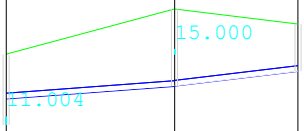
MH Name	F27	F26	F23	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000				
PN		F9.001	F9.000	
Dia (mm)		225	150	
Slope (1:X)		150.0	60.0	
Cover Level (m)	5.300	5.100	5.100	
Invert Level (m)	3.194	3.393	3.393 3.850	
Length (m)		29.900	27.400	

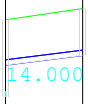
MH Name	F26	F25	F24	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000				
PN		F10.001	F10.000	
Dia (mm)		150	150	
Slope (1:X)		60.0	60.0	
Cover Level (m)	5.100	6.000	6.200	
Invert Level (m)		4.102 4.552	4.552 5.052	
Length (m)		27.000	30.000	

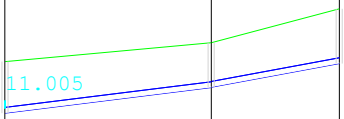
MH Name	F55		F41	F38	F34		F31	F29		
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000										
PN			F11.006	F11.005	F11.004		F11.002	F11.001		
Dia (mm)			225	225	225		225	150		
Slope (1:X)			25.0	180.0	80.0		200.0	30.0		
Cover Level (m)	5.300	5.450	5.300	6.200	6.700	6.900	6.800	7.200	7.400	
Invert Level (m)		1.671 1.741	2.529 3.933	4.053 4.332	4.332 4.899	4.899 4.999	4.999 5.214	5.330 6.110	6.110 6.650	
Length (m)			35.100	50.300	45.400		43.000	23.400		

MH Name	F31	F30	
Hor Scale 1500 Ver Scale 200 Datum (m) 0.000			
PN		F12.000	
Dia (mm)		150	
Slope (1:X)		105.7	
Cover Level (m)	6.800	6.800	
Invert Level (m)	5.214	5.550	
Length (m)		35.500	

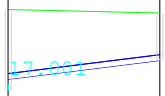
MH Name	F33	F32	
Hor Scale 1500 Ver Scale 200 Datum (m) 0.000			
PN		F13.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	6.900	6.900	
Invert Level (m)		5.305 5.650	
Length (m)		20.700	

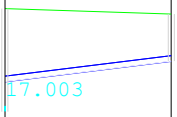
MH Name	F38	F37	F35	
Hor Scale 1500 Ver Scale 200 Datum (m) 0.000				
PN		F14.001	F14.000	
Dia (mm)		150	150	
Slope (1:X)		100.0	61.7	
Cover Level (m)	6.200	7.400	7.000	
Invert Level (m)	5.019	5.353	5.353 5.750	
Length (m)		33.400	24.500	

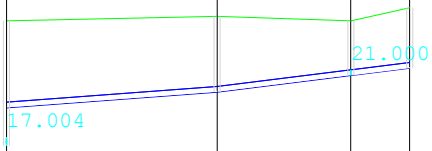
MH Name	F37		
Hor Scale 1500 Ver Scale 200 Datum (m)1.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	7.400	7.700	
Invert Level (m)	6.192	6.450	
Length (m)			

MH Name	F41	F40	F39	
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000				
PN		F16.001	F16.000	
Dia (mm)		150	150	
Slope (1:X)		60.0	40.0	
Cover Level (m)	5.300	5.800	6.700	
Invert Level (m)		3.933 4.615	4.615 5.250	
Length (m)		40.900	25.400	

MH Name	F54	F53	F48	F46	F45	F43		
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000		11.006	20.002	19.000		18.000		
PN		F17.005	F17.004	F17.003	F17.002	F17.001		
Dia (mm)		225	225	150	150	150		
Slope (1:X)		180.0	150.1	100.0	100.0	60.0		
Cover Level (m)	5.450	5.300	5.150	5.000	5.100	5.000	5.000	
Invert Level (m)		1.741	1.991	1.991	2.422	2.422	2.645	2.645	2.957	2.957	3.552	3.552	3.750	
Length (m)		45.000	64.700	22.300	31.200	35.700		

MH Name	F45	F44	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		F18.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	5.100	5.000	
Invert Level (m)	3.248	3.750	
Length (m)		30.100	

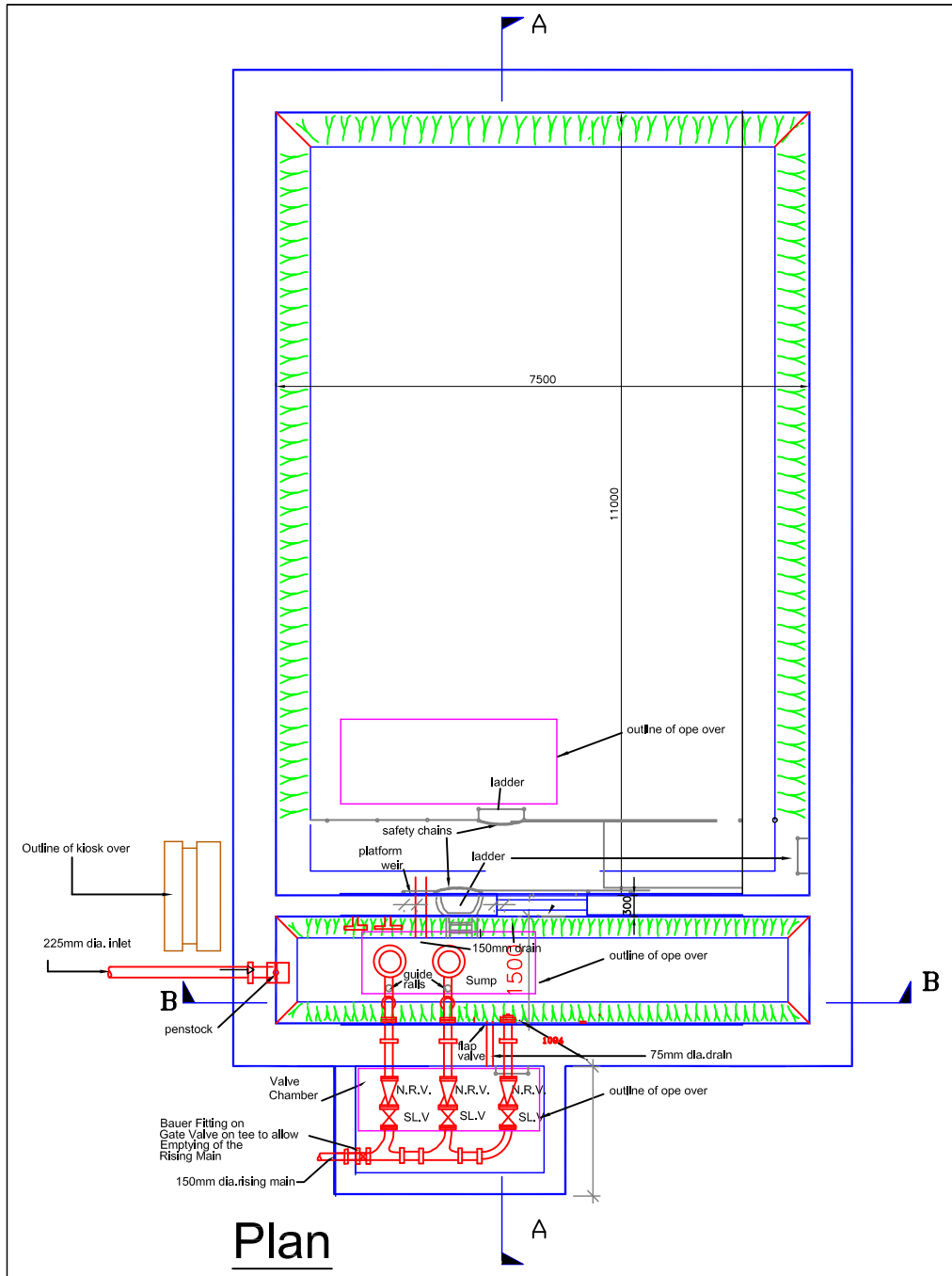
MH Name	F48	F47	
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000			
PN		F19.000	
Dia (mm)		150	
Slope (1:X)		60.0	
Cover Level (m)	5.150	5.000	
Invert Level (m)	3.200	3.750	
Length (m)		33.000	

MH Name	F53	F52	F51		
Hor Scale 1500 Ver Scale 200 Datum (m)-2.000					
PN		F20.002	F20.001		
Dia (mm)		150	150		
Slope (1:X)		100.0	60.0		
Cover Level (m)	5.300	5.420	5.300	5.650	
Invert Level (m)	2.995	3.413	3.413 3.855	3.855 4.050	
Length (m)		41.800	26.500		

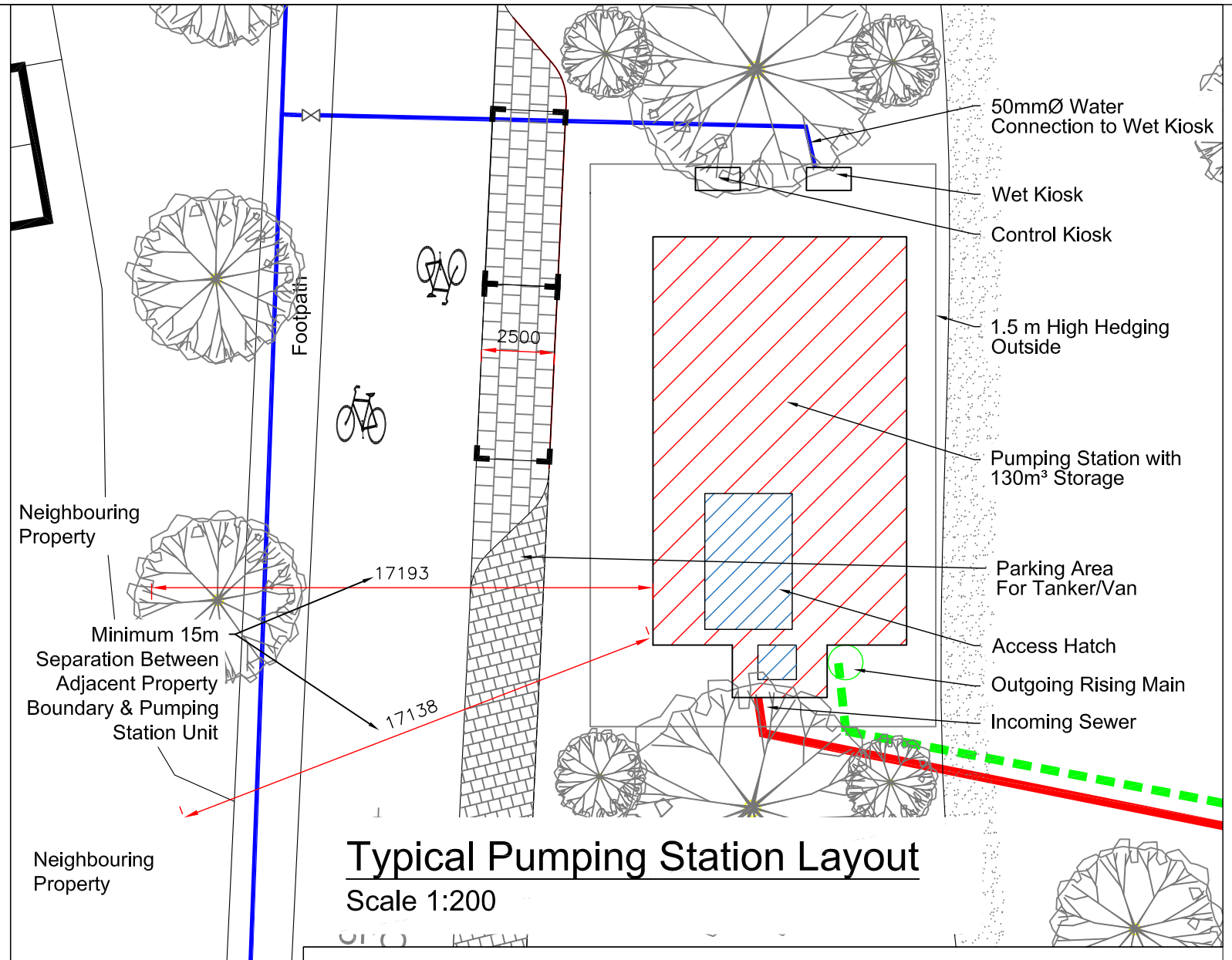
MH Name	F51		
Hor Scale 1500 Ver Scale 200 Datum (m)-1.000			
PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	5.300	5.650	
Invert Level (m)		4.050	
Length (m)			

APPENDIX F

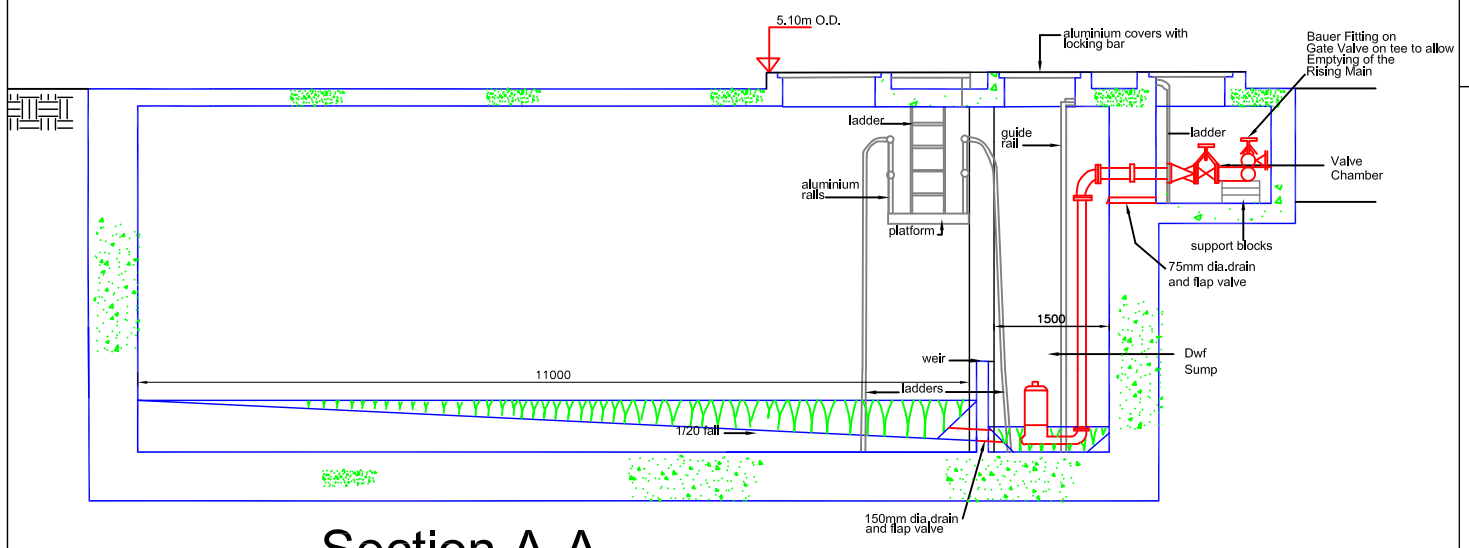
Typical Pumping Station Detail Drawing



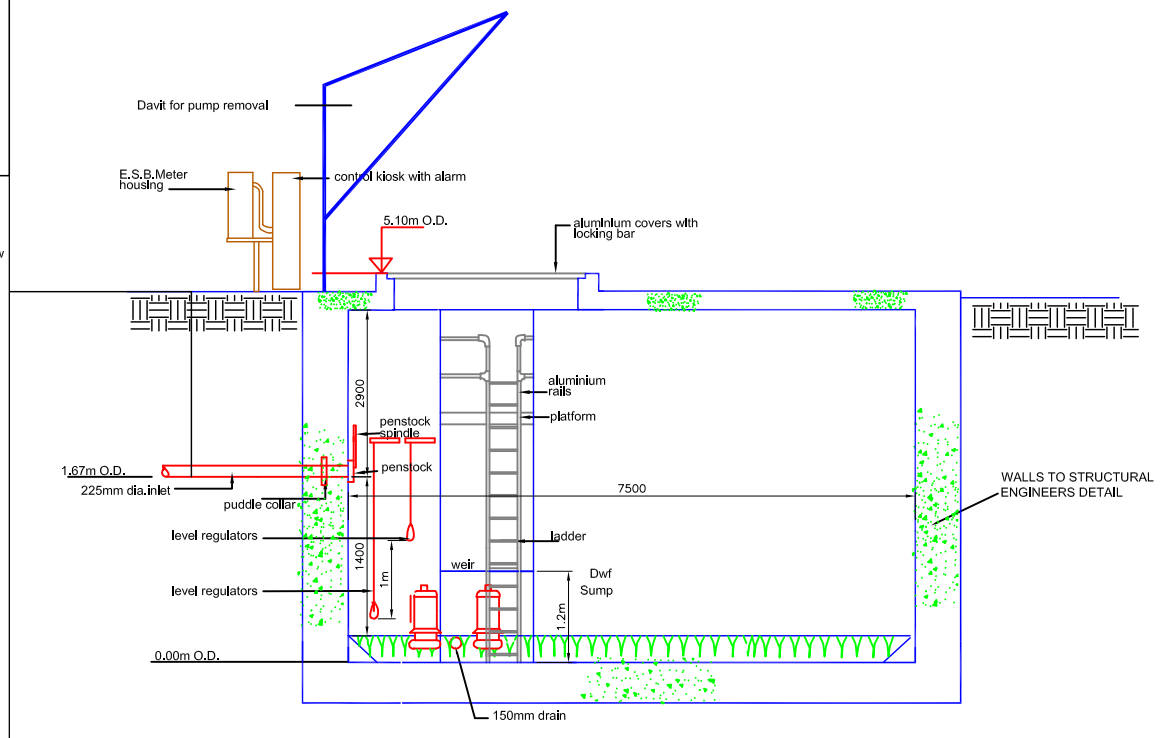
Plan
Scale 1:100



Typical Pumping Station Layout
Scale 1:200



Section A-A
Scale 1:100



Section B-B
Scale 1:100

THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

NOTES:
1. Pump Station to be in accordance with STD-WW-28.
2. Valves to have mass concrete thrust block as per standard detail STD-WW-28.
3. The design takes account of the following from the Hydro Environmental Flood Risk Assesment
   200 year flood level = 4.47m OD Malin
   1000 year flood level = 4.47m OD Malin
   Freeboard of 0.33m = 5.07m OD Malin

The levels of the slab are at 5.10m is above the levels as outlined.

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
6. FINISHED LEVELS SUBJECT TO ARCHITECTS APPROVAL

Rev	Date	Description	By	Chkd.
B	21.02.19	Wall Removed	FG	BR
A	20.06.2018	Issue for Planning	JK	BR

Client: ARLUM LTD.

Project: Residential Development Moneyduff, Oranmore Co. Galway

Title: Typical Pumping Station Details

Scale @ A1: 1:50 @A3: 1:100

Prepared by:	Checked:	Date:
JK	BR	March 2018

Project Director: Micheal McDonnell

Drawing Status: Planning

TOBIN
Patrick J. Tobin & Co. Ltd.
TOBIN Consulting Engineers,
Fairgreen House, Fairgreen Road,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: galway@tobin.ie
www.tobin.ie

Drawing No.: 10402-2013 Revision: B

APPENDIX G

Irish Water Pre-Enquiry Connection Correspondence

(Update Letter 29.01.2019)
(Original Letter 14.03.2018)

Your Ref: ABP-303294-18
Our Ref: 5558441046

An Bord Pleanála,
64 Marlborough Street,
Dublin 1
29/01/2019

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

Dear Sir/ Madam,

Re: 212no. residential units (156 houses and 56 apartments), a crèche and all associated site works.
Moneyduff, Oranmore, Galway

Irish Water has received notification of Arlum Ltd.'s request to enter into consultations under Section 5 of the Planning and Development (Housing) and Residential Tenancies Act 2016 in respect of the above mentioned proposed development.

Irish Water has issued a Confirmation of Feasibility for this development for 200 residential units.

The proposed development, as assessed for the Confirmation of Feasibility, is a standard connection, requiring no network or treatment plant upgrades for water or wastewater by either the customer or Irish Water. No third party consents are required for these connections to take place

Therefore, based upon the Confirmation of Feasibility issued by Irish Water, Irish Water confirms that subject to a compliant water and wastewater layout and a valid connection agreement being put in place between Irish Water and the developer, the proposed connection(s) to the Irish Water network(s) can be facilitated.

pp Michael Galvin

Maria O'Dwyer
Connections and Developer Services Manager

Arlum Ltd c/o Richard Daly
Tobin Consulting Engineers, Fairgreen House, Fairgreen road, Galway

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

14th March 2018

Dear Sir/Madam,

Re: Customer Reference No 5558441046 pre-connection enquiry - Subject to contract | Contract denied
Connection for Strategic Housing Development of 200 no. houses at Moneyduff, Oranmore, Co. Galway

Irish Water has reviewed your pre-connection enquiry in relation to
water and wastewater connections at Moneyduff, Oranmore, Co. Galway
Based upon the details you have provided with your pre-connection enquiry and on the capacity currently available as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed development's loadings and demands can be facilitated by the Irish Water network.

The existing Irish Water owned wastewater and watermain infrastructure has capacity to cater for the loadings and demands associated with the proposed development. Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. We note that you have forwarded on the layout of the water and wastewater services and this is currently being reviewed by Irish Water to facilitate the issue of a Statement of Design Acceptance. Irish Water will comment on the proposed routes of connection to the water and wastewater infrastructure as part of this design review process.

The confirmation of feasibility to connect to the Irish Water infrastructure does not extend to your fire flow requirements. To guarantee a flow to meet the Fire Authority requirements you should provide adequate fire storage capacity within your development if this is necessary.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed and appropriate connection fee paid at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Utility Regulation.

If you have any further questions, please contact James O Malley from the design team at jomalley@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

APPENDIX H

Irish Water Statement of Design Acceptance

Arlum Ltd c/o Richard Daly
Fairgreen House,
Fairgreen Road,
Galway,
Co. Galway

Uisce Éireann
Bosca OP 448
Oifig Sheachadta
na Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

28 February 2019

Re: Design Submission for Strategic Housing Development at Moneyduff, Oranmore, Co. Galway / 5558441046.

Dear Sir/Madam,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU) (https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water Representative

Name: James O'Malley
Phone: 0949043310
Email: jomalley@water.ie

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Appendix A

Document Title & Revision

- Proposed Drainage Watermain Key Plan 10402-2000 Revision D
- Proposed Watermain Layout Part 1 10402-2001 Revision B
- Proposed Watermain Layout Part 2 10402-2002 Revision B
- Proposed Watermain Layout Part 3 10402-2003 Revision B
- Proposed Drainage Layout Part 1 10402-2004 Revision B
- Proposed Drainage Layout Part 2 10402-2005 Revision B
- Proposed Roads Layout Part 1 10402-2006 Revision B
- Proposed Roads Layout Part2 10402-2007 Revision B
- Standard Watermain Details 10402-2014 Revision A

*For further information, visit **www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

Brendan Rudden

From: Kevin Murphy (C) <kevmurphy@water.ie>
Sent: 19 March 2019 11:36
To: Brendan Rudden
Cc: Michael Galvin; James O'Malley; Richard Daly
Subject: RE: SHD Development at Moneyduff, Oranmore

Hi Brendan,

Thanks for your email, having reviewed the drawings I'm in agreeance that the changes are hardly noticeable,

For this reason we do not see a reason to update the Statement of Design Acceptance, your current copy issued 28/02/19 will be sufficient for the SHD process; you may take this email as confirmation of same,

At connection application stage the construction drawings will be vetted again where we can identify what issues if any there may be,

Kind Regards,

Kevin

From: Brendan Rudden [mailto:Brendan.Rudden@tobin.ie]
Sent: 15 March 2019 14:57
To: Kevin Murphy (C)
Cc: Michael Galvin; James O'Malley; Richard Daly
Subject: RE: SHD Development at Moneyduff, Oranmore

Dear Kevin,
Thank you very much for the letter on Statement of Design Acceptance.
There has been a very minor change to the architect's layout in terms of the background only (*e.g.* some house footprint), since we received same.
There is no change to house numbers, drainage and watermain design or their respective layouts etc.
While the changes (background only) are hardly noticeable, we have adjusted the drawings to a revision upwards, *e.g.* 10402-2000D is now 10402-2000E, for absolute clarity, for the lodgement to ABP and for your team during Stage 3 of the SHD process.
Would we require, or would it be possible, to get an update to the letter accordingly?
If there are any queries, just let me know.
Thank You,
Brendan

Brendan Rudden BE, Chartered Engineer, MIEI
Project Engineer – Building & Infrastructure

TOBIN Consulting Engineers
Dublin I Galway I Castlebar I London
Telephone: +353 91 565 211
Email: brendan.rudden@tobin.ie
Website: http://www.tobin.ie

2017 Association of Consulting Engineers of Ireland Awards Winner: Design Excellence (Innovation)
2017 KPMG Property Industry Excellence Awards Winner: Community Benefit Project of the Year
2017 National Standards Authority of Ireland Awards Winner: Partners in Excellence

Letter Ref: CDS Statement of Design Acceptance

Arlum Ltd c/o Richard Daly
Fairgreen House
Fairgreen Road
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Co Galway

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Éire

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PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

18 June 2018

Dear Sir/Madam,

Re: Customer Reference No. 5558441046 Connection Application - Subject to contract | Contract denied
Connection for 212 No. Dwelling Houses and Crèche at Moneyduff, Oranmore, Co. Galway

Irish Water has reviewed your Design Submission in relation to water and wastewater connections at Moneyduff, Oranmore, Co. Galway. Based upon the details you have provided with your Design Submission, Irish Water has no objection to the proposals included in your Design Submission.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

This Statement of Design Acceptance does not relieve you or your designer(s) of responsibility for the proposals and it remains a requirement to comply fully with the Irish Water Codes of Practice and Standard Details. Ultimate responsibility (including, but not limited to any losses, costs, demands, damages, actions, expenses, negligence, and claims) for the detailed design, construction and provision of such pipes and related infrastructure shall rest entirely with the Customer, his/her designer(s), contractor(s), or other related party.

If you have any further questions, please contact James O'Malley from the design team on 0949043310 or email jomalley@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

NATIONAL NETWORK

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