OUR REF: 16-254-190227-01RP

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Drainage Report

For

Fitzroy Park Development

27th February 2019

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REV A 20TH SEPTEMBER 2019

CONTENTS

INTRODUCTION

It is the intention of the applicant to redevelop this property through the removal of the existing large house and replacement of this by five new smaller homes in accordance with documents lodged. It is proposed that this development will be connected to the existing services that exist on Fitzroy Park & Millfield Lane adjacent to the site.

This report, in conjunction with calculations and relevant drawings included in the appendices demonstrates the proposed surface water network and foul water network for the development. The drawings also incorporate the attenuation requirement as identified in the report by LBH Wembley.

SURFACE WATER DISPOSAL

At present the area around the existing house and driveway drains into the combined sewer that runs beneath Fitzroy Park, and the remainder of the site drains across Millfield Lane to the Heath.

The proposed redevelopment will largely follow the existing drainage principals with some improvements.

For surface water drainage purposes the surface water networks have been divided up as follows;

- (i) taking the runoff from the paved carparking & road areas & discharging to the combined sewer running beneath Fitzroy Park via attenuation and a hydrocarbon interceptor. Refer to Figure 1.
- (ii) taking runoff from proposed blue/green roofs, paved areas & footpaths discharging through the attenuation/swale via percolation within the existing made ground to the Heath. An overflow from the attenuation/swale is proposed to eliminate the current discharge across as agreed with Mr. Bob Warnock on site on the 10 May 2018. Refer to Figure 2.

Attenuation of the surface water is proposed at both discharge locations.

Attenuation will be provided by means of storage tanks, green roofs and a swale.

Refer to Coyle Kennedy drawings in Appendix A for details of proposed storm water networks and relevant calculations.

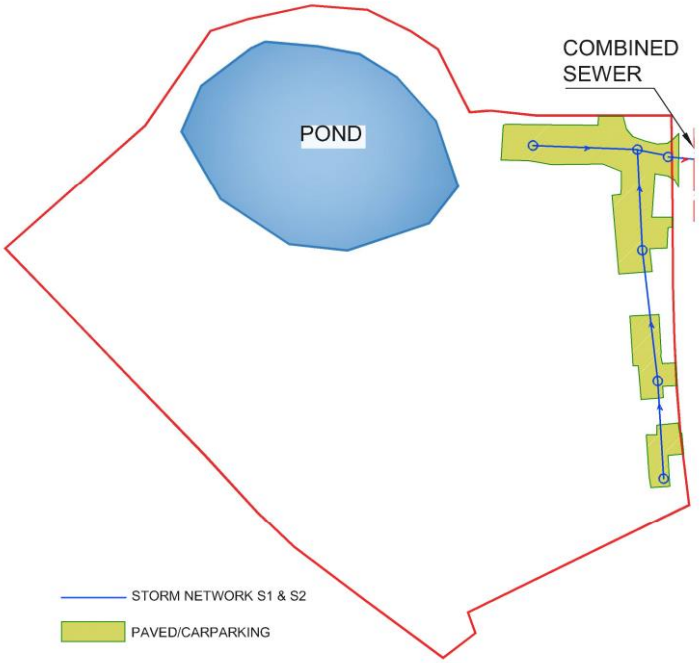

Figure 1.

Paved Carparking & Road areas discharging to the combined sewer running beneath Fitzroy Park.

Figure 2.

Plan indicating Blue/Green Roofs, Access Path Attenuation and Swale location.

FOUL WATER NETWORK

It is intended that sanitary effluent will be collected on site via traditional gravity pipe networks. There will be two foul sewer networks. Effluent from plots 1,2 & 3 will be collected in a traditional gravity sewer & discharge to the combined sewer that runs beneath Fitzroy Park. See Figure 3 below. Effluent from plots 4 & 5 on the lower side of the site will be collected in a pumping chamber and pumped through a rising main to the existing combined sewer that runs beneath Fitzroy Park, along the Eastern boundary of the site. See Figure 3 below

Refer to Coyle Kennedy drawings in Appendix A for details of proposed foul network and relevant calculations.

Figure 3.

Plan indicating foul water network.

Appendix A

Surface & Foul Water Layout Drawings

With

Sections and Calculations

NOTES

GENERAL NOTES:

1...ALL COYLE KENNEDY DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTS DRAWINGS AND ALL OTHER RELEVANT DRAWINGS.

2...ALL SETTING OUT, INSULATION, DPC, SCREED AND RADON PROTECTION DETAILS BY ARCHITECT.

3...DETAILED SPECIFICATIONS (IF NOT ISSUED) ARE AVAILABLE AT ENGINEERS OFFICE FOR INSPECTION BY CONTRACTORS, BY APPOINTMENT.

4...DETAILS OF SUBSTRUCTURE GAS/WATER PROOFING MEMBRANES TO BE BY A REPUTABLE, COMPETENT SUPPLIER.

5...THE CONTRACTOR SHALL BE DEEMED TO HAVE ALLOWED FOR, WITHIN HIS TENDER, EMPLOYING A CHARTERED STRUCTURAL ENGINEER WITH ADEQUATE PROFESSIONAL INDEMNITY INSURANCE TO ASSESS, DESIGN AND DETAIL SUCH TEMPORARY WORKS AS ARE NECESSARY TO OFFER SUPPORT TO EXISTING AND/OR CONSTRUCTED ELEMENTS DURING THE CONSTRUCTION PERIOD. THIS APPLIES TO ELEMENTS WITHIN THE SITE AND NEIGHBOURING THE SITE.

6...THE CONTRACTOR IS DEEMED TO HAVE VISITED THE SITE AND CONSULTED WITH RELEVANT AUTHORITIES AND BE SATISFIED IN RELATION TO THE SITES SURROUNDINGS, EXISTING SERVICES, LEVELS, BOUNDARIES, GROUND CHARACTERISTICS AND ANY OTHER SITE CONSTRAINTS.

7...ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BUILDING REGULATIONS.

8...WHERE LEANMIX IS SPECIFIED ALL LEANMIX TO BE GRADE GEN 3. UNLESS NOTED OTHERWISE.

9...ALL LEVELS ARE STRUCTURAL LEVELS (U.N.O.)

10...ALL COLUMNS CENTERED ON GRIDS (U.N.O.)

11...DO NOT SCALE FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY

DRAINAGE NOTES :

1...CONTRACTOR TO MAKE ALL NECESSARY ENQUIRIES REGARDING LOCATION OF EXISTING SEWERS, ELECTRICAL AND OTHER SERVICES ON SITE.

2...ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH PART H BUILDING REGULATIONS AND WHERE RELEVANT 'SEWERS FOR ADOPTION 6th EDITION' A DESIGN & CONSTRUCTION GUIDE FOR DEVELOPERS.

4...BEDDING MATERIAL TO BE 10mm SINGLE SIZED AGGREGATE COMPLYING WITH THE REQUIREMENTS OF AGGREGATES FOR CONCRETE'. FOR RIGID PIPES THE GRANULAR MATERIAL SHOULD CONFORM TO BS EN 1610 ANNEX B TABLE B AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm TO 10mm FOR 100mm PIPES; 14mm FOR 150mm PIPES; 20mm FOR 150mm - 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.

5...THE PREPARED UNDERBED OF THE TRENCH SHOULD CONSIST OF BEDDING MATERIAL FOR THE FULL WIDTH OF THE TRENCH AND LAID TO THE CORRECT GRADIENT. COMPACTION FRACTION MAXIMUM 0.3 FOR CLASS N OR B AND 0.15 FOR CLASS F

6...THE MINIMUM THICKNESS OF BEDDING MATERIAL UNDER THE BARREL OF THE PIPE SHOULD BE 100MM

7...IMPORTED BEDDING MATERIAL AND BACKFILL USING 'AS DUG MATERIAL' MUST BE APPROVED BY ENGINEER. BACKFILL WITH SELECTED OR GRANULAR FILL FREE FROM STONES LARGER THAN 40mm

8...ALL PVC-U PIPES AND FITTINGS USED FOR DRAIN AND SEWER MUST COMPLY WITH BS EN1401

9...ALL VITRIFIED CLAY RIGID PIPES & FITTINGS MUST COMPLY WITH BS EN295

Rev.	Revision	Date
B	GENERAL REVISIONS	27/08/2019
A	DRAINAGE NETWORKS REVISED	27/02/2019

DRAWING STATUS

P	PRELIMINARY	A	APPROVAL	T	TENDER
C	CONSTRUCTION	R	RECORD	I	INFORMATION

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PROJECT: Fitzroy Park Development

CLIENT: Geoff Springer

TITLE: SITE DRAINAGE LAYOUT

PROJECT No.: 16-254

DATE: APRIL 2018

SCALE: 1:200 @ A1, 1:400 @ A3

BY: AC

CHECKED: TK

STATUS - DRAWING No.: P-300

DRAWING REV.: B

NOTES

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F₀–8L/0

Rev.	Revision	Date
A	Swale and attenuation location added	27/08/2019

DRAWING STATUS

P	PRELIMINARY	A	APPROVAL	T	TENDER
C	CONSTRUCTION	R	RECORD	I	INFORMATION

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PROJECT: Fitzroy Park Development

CLIENT: Geoff Springer

TITLE: SITE LAND–DRAINAGE LAYOUT

PROJECT No.: 16–254

STATUS – DRAWING No.: P-301

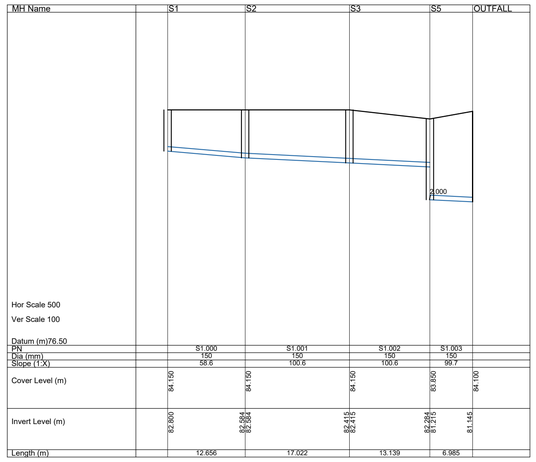
DATE: APRIL 2018

DRAWING REV.: A

SCALE: 1:200 @ A1, 1:400 @ A3

BY: AC

CHECKED: TK



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Datum (m)	76.50				
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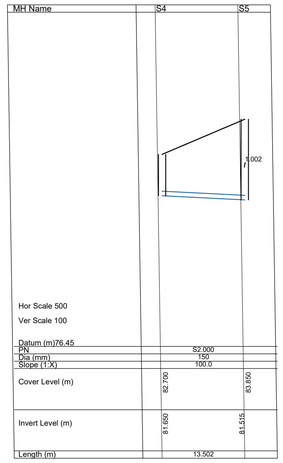
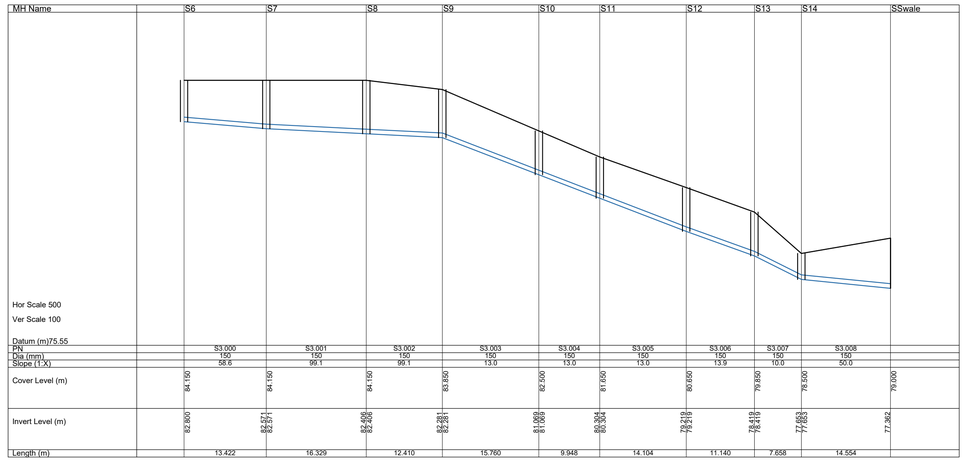
Dia (mm)	150	150	150	150	
Slope (1:X)	58.6	100.6	100.6	99.7	
Cover Level (m)	84.150	84.150	84.150	83.850	84.100
Invert Level (m)	82.800	82.594 82.584	82.415 82.405	82.284 81.415	81.145
Length (m)		12.656	17.022	13.139	6.985

SECTION THROUGH STORM NETWORK 1



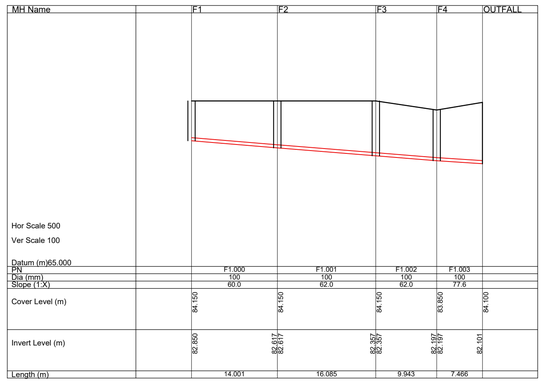
MH Name	S4	S5
Datum (m)	76.45	
PN	S2.000	
Dia (mm)	150	
Slope (1:X)	100.0	
Cover Level (m)	82.700	83.850
Invert Level (m)	81.650	81.515
Length (m)		13.502

SECTION THROUGH STORM NETWORK 2



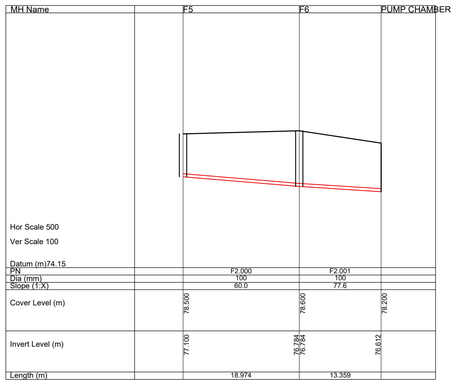
MH Name	S6	S7	S8	S9	S10	S11	S12	S13	S14	SSwale
Datum (m)	75.55									
PN	S3.000	S3.001	S3.002	S3.003	S3.004	S3.005	S3.006	S3.007	S3.008	
Dia (mm)	150	150	150	150	150	150	150	150	150	
Slope (1:X)	58.6	99.1	99.1	13.0	13.0	13.0	13.9	10.0	50.0	
Cover Level (m)	84.150	84.150	84.150	83.850	82.500	81.650	80.650	79.850	78.500	79.000
Invert Level (m)	82.800	82.571 82.561	82.406 82.396	82.281 82.281	81.069 81.069	80.304 80.304	79.519 79.519	78.419 78.419	77.653 77.653	77.362
Length (m)		13.422	16.329	12.410	15.760	9.948	14.104	11.140	7.658	14.554

SECTION THROUGH STORM NETWORK 3



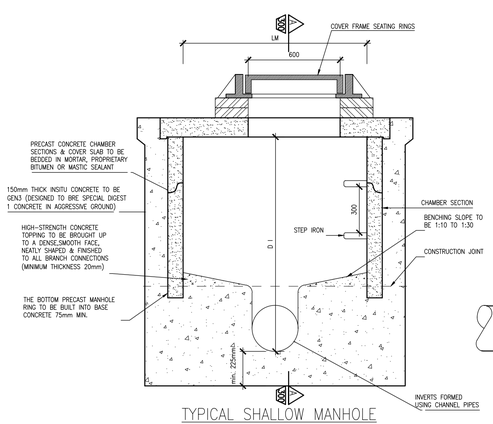
MH Name	F1	F2	F3	F4	OUTFALL
Datum (m)	65.000				
PN	F1.000	F1.001	F1.002	F1.003	
Dia (mm)	100	100	100	100	
Slope (1:X)	60.0	62.0	62.0	77.6	
Cover Level (m)	84.150	84.150	84.150	83.850	84.100
Invert Level (m)	82.860	82.617 82.607	82.357 82.347	82.197 82.197	82.101
Length (m)		14.001	16.085	9.943	7.466

SECTION THROUGH FOUL NETWORK 1

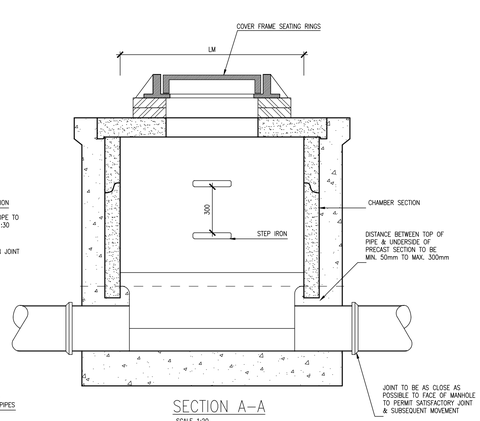


MH Name	F5	F6	PUMP CHAMBER
Datum (m)	74.15		
PN	F2.000	F2.001	
Dia (mm)	100	100	
Slope (1:X)	60.0	77.6	
Cover Level (m)	78.500	78.600	78.200
Invert Level (m)	77.100	76.784 76.784	76.612
Length (m)		18.974	13.359

SECTION THROUGH FOUL NETWORK 3



TYPICAL SHALLOW MANHOLE
SCALE 1:20



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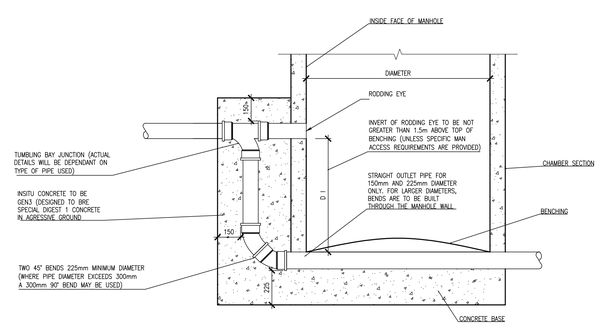

TYPICAL EXTERNAL VERTICAL BACKDROP
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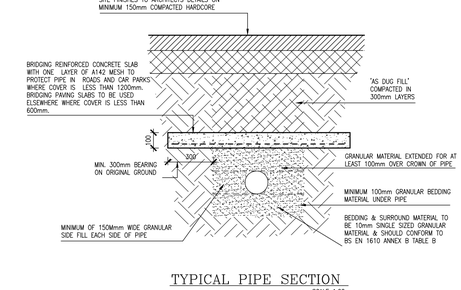

TYPICAL PIPE SECTION
BEDDING & SURROUND SCALE 1:20

REFER TO DRAWING 300 FOR PLAN LAYOUT OF SEWERS

Rev.	Revision	Date
	F_{in} – 8/1	

DRAWING STATUS

P	PRELIMINARY	A	APPROVAL	T	TENDER
C	CONSTRUCTION	R	RECORD	I	INFORMATION

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PROJECT
Fitzroy Park Development

CLIENT
Geoff Springer

TITLE
DRAINAGE NETWORK SECTIONS

PROJECT No.	STATUS – DRAWING No.
16–254	**P-302**
DATE: FEBRUARY 2019	DRAWING REV.
SCALE: 1:500,1:100:,1:20 @ A1 1:1000,1:200,1:40 @ A3	BY: AC / CHECKED: TK
	-

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.436	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	58	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

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
S1.000	12.656	0.216	58.6	0.003	15.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	17.022	0.169	100.6	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.002	13.139	0.131	100.6	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.000	13.502	0.135	100.0	0.012	15.00	0.0	0.600	o	150	Pipe/Conduit
S1.003	6.985	0.070	99.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.000	13.422	0.229	58.6	0.006	15.00	0.0	0.600	o	150	Pipe/Conduit
S3.001	16.329	0.165	99.1	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.002	12.410	0.125	99.1	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.003	15.760	1.212	13.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.004	9.948	0.765	13.0	0.000	0.00	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	55.32	15.16	82.800	0.003	0.0	0.0	0.0	1.32	23.3	0.6
S1.001	54.69	15.44	82.584	0.007	0.0	0.0	0.0	1.00	17.7	1.5
S1.002	54.22	15.66	82.415	0.014	0.0	0.0	0.0	1.00	17.7	2.8
S2.000	55.18	15.22	81.650	0.012	0.0	0.0	0.0	1.00	17.8	2.3
S1.003	53.97	15.78	81.515	0.026	0.0	0.0	0.0	1.01	17.8	5.1
S3.000	55.30	15.17	82.800	0.006	0.0	0.0	0.0	1.32	23.3	1.1
S3.001	54.70	15.44	82.571	0.012	0.0	0.0	0.0	1.01	17.8	2.3
S3.002	54.25	15.64	82.406	0.017	0.0	0.0	0.0	1.01	17.8	3.4
S3.003	54.05	15.74	82.281	0.017	0.0	0.0	0.0	2.81	49.6	3.4
S3.004	53.93	15.80	81.069	0.017	0.0	0.0	0.0	2.81	49.6	3.4

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
S3.005	14.104	1.085	13.0	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.006	11.140	0.800	13.9	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.007	7.658	0.766	10.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S3.008	14.554	0.291	50.0	0.030	0.00	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)
S3.005	53.75	15.88	80.304	0.022	0.0	0.0	0.0	2.81	49.6	4.3
S3.006	53.60	15.95	79.219	0.026	0.0	0.0	0.0	2.71	48.0	5.1
S3.007	53.52	15.99	78.419	0.026	0.0	0.0	0.0	3.21	56.6	5.1
S3.008	53.17	16.16	77.653	0.056	0.0	0.0	0.0	1.43	25.2	10.7

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	250.00	Maximum Backdrop Height (m)	1.500
Persons per House	4.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	180

Designed with Level Soffits

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
F1.000	14.001	0.233	60.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit
F1.001	16.085	0.259	62.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit
F1.002	9.943	0.160	62.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit
F1.003	7.466	0.096	77.6	0.000	5	0.0	1.500	o	100	Pipe/Conduit
F2.000	18.974	0.316	60.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit
F2.001	13.359	0.172	77.7	0.000	1	0.0	1.500	o	100	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	82.850	0.000	0.0	1	0.0	7	0.26	0.86	6.8	0.1
F1.001	82.617	0.000	0.0	2	0.0	10	0.32	0.85	6.6	0.1
F1.002	82.357	0.000	0.0	3	0.0	12	0.37	0.85	6.6	0.2
F1.003	82.197	0.000	0.0	8	0.0	21	0.47	0.76	5.9	0.6
F2.000	77.100	0.000	0.0	1	0.0	7	0.26	0.86	6.8	0.1
F2.001	76.784	0.000	0.0	2	0.0	11	0.30	0.76	5.9	0.1

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Alan Clancy
Site name:	Fitzroy Park Development
Site location:	Fitzroy Park N6 6JA Parking area

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the drainage scheme.

Site coordinates

Latitude:	51.56695° N
Longitude:	0.15783° W
Reference:	6530830
Date:	2019-02-27T11:03:07

Methodology	IH124

Site characteristics

Total site area (ha)	0.1275
Significant public open space (ha)	0.08
Area positively drained (ha)	0.0475
Pervious area contribution (%)	30
Impermeable area (ha)	0.026
Percentage of drained area that is impermeable (%)	55
Impervious area drained via infiltration (ha)	0
Return period for infiltration system design (year)	10
Impervious area drained to rainwater harvesting systems (ha)	0
Return period for rainwater harvesting system design (year)	10
Compliance factor for rainwater harvesting system design (%)	66
Net site area for storage volume design (ha)	0.05
Net impermeable area for storage volume design (ha)	0.03

* Where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50 % of the 'area positively drained', the 'net site area' and the estimates of Qbar and other flow rates will have been reduced accordingly.

Design criteria

Volume control approach	controlled discharge

	Default	Edited
Climate change allowance factor	1.4	1.4
Urban creep allowance factor	1.1	1.1
Interception rainfall depth (mm)	5	5
Minimum flow rate (l/s)	5	5

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
Qbar total site area (l/s)	0.57	--
SOIL type	4	4
HOST class	N/A	N/A
SPR	0.47	0.47

Hydrology

	Default	Edited
SAAR (mm)	659	659
M5-60 Rainfall Depth (mm)	20	20
'r' Ratio M5-60/M5-2 day	0.4	0.4
Rainfall 100 yrs 6 hrs	63	
Rainfall 100 yrs 12 hrs	98.56	
FEH/FSR conversion factor	1.28	1.28
Hydrological region	6	
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 10 year	1.62	1.62
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Site discharge rates

	Default	Edited
Qbar total site area (l/s)	0.57	0.57
Qbar net site area (l/s)	0.21	0.21
1 in 1 year (l/s)	5	5
1 in 30 years (l/s)	5	5
1 in 100 years (l/s)	5	5

Estimated storage volumes

	Default	Edited
Interception storage (m^3)	1	1
Attenuation storage (m^3)	2	2
Long term storage (m^3)	0	0
Treatment storage (m^3)	3	3
Total storage *(excluding treatment)* (m^3)	3	3