OUR REF: 16-254-190227-01RP

COYLE KENNEDY
Consulting Engineers

Third Floor
GW Business Centre
Great West House
Great West Road
Brentford TW8 9DF
England

Tel: +44 (0)203 393 1174
Fax: +44 (0)203 004 1234

Drainage Report

For

Fitzroy Park Development

27th February 2019

REV A 20TH SEPTEMBER 2019

REV B 20TH JULY 2020

REV C 14TH AUGUST 2020

Irish Office:
GFSC
Moneenageisha Road
Galway
Ireland

Tel: +353 (0)91 752000
Fax: +353 (0)91 753000

website: www.coylekennedy.com
email: mail@ coylekennedy.com

Coyle Kennedy Limited
Registered in Ireland 346183

Directors:
Brian Coyle BE CEng MIEI MIStructE
Tadhg Kennedy BE MEngSc CEng MIEI MIStructE

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 – see reports by LBH Wembley in relation to same.

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

For surface water drainage, 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/infiltration trench via percolation within the existing made ground and head/superficial deposits to the Heath.

Attenuation of the surface water is proposed in several different ways.

- The surface from the parking areas and vehicle trafficked areas will be attenuated using stormwater tanks.
- Attenuation will be provided on the roofs of the houses using blue roofs.
- Additional stormwater attenuation tanks will be used adjacent to Millfield Lane.

See appendix B for a summary of the attenuation volumes and a schematic showing how the green/blue roof functions.

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

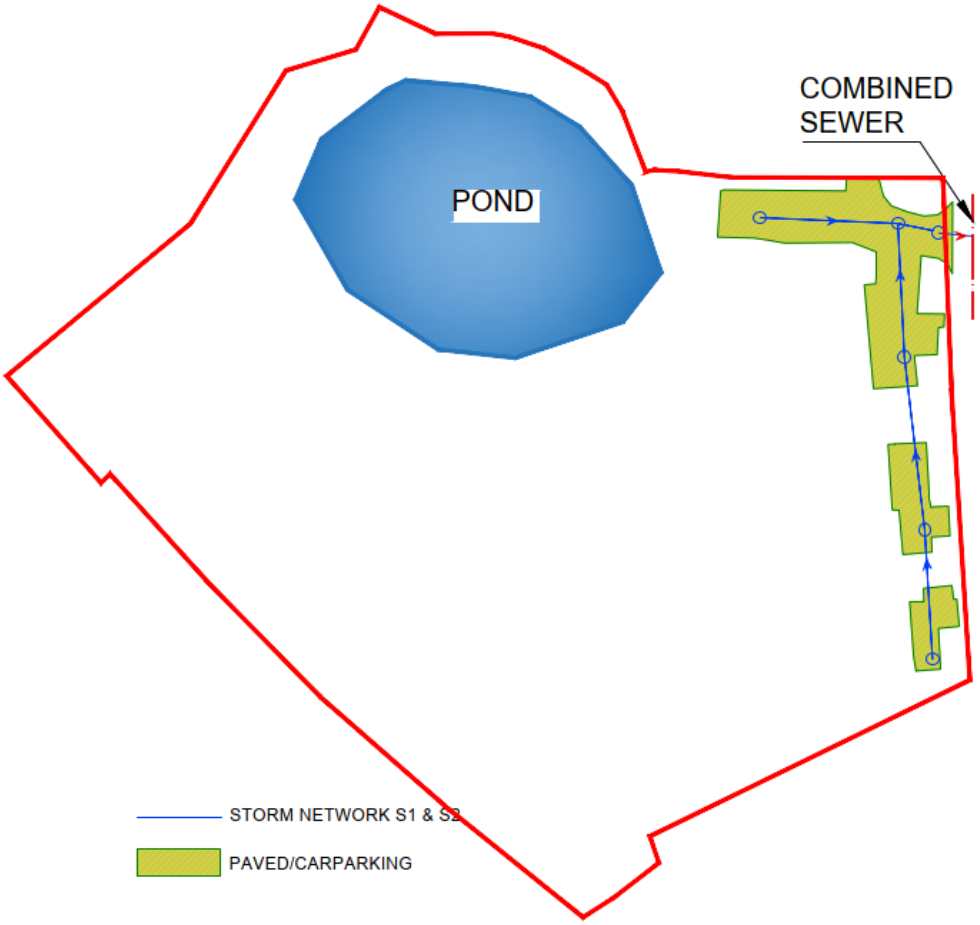


Figure 1.

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

Figure 2.

Plan indicating Blue/Green Roofs, Access Path Attenuation and Infiltration trench 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.

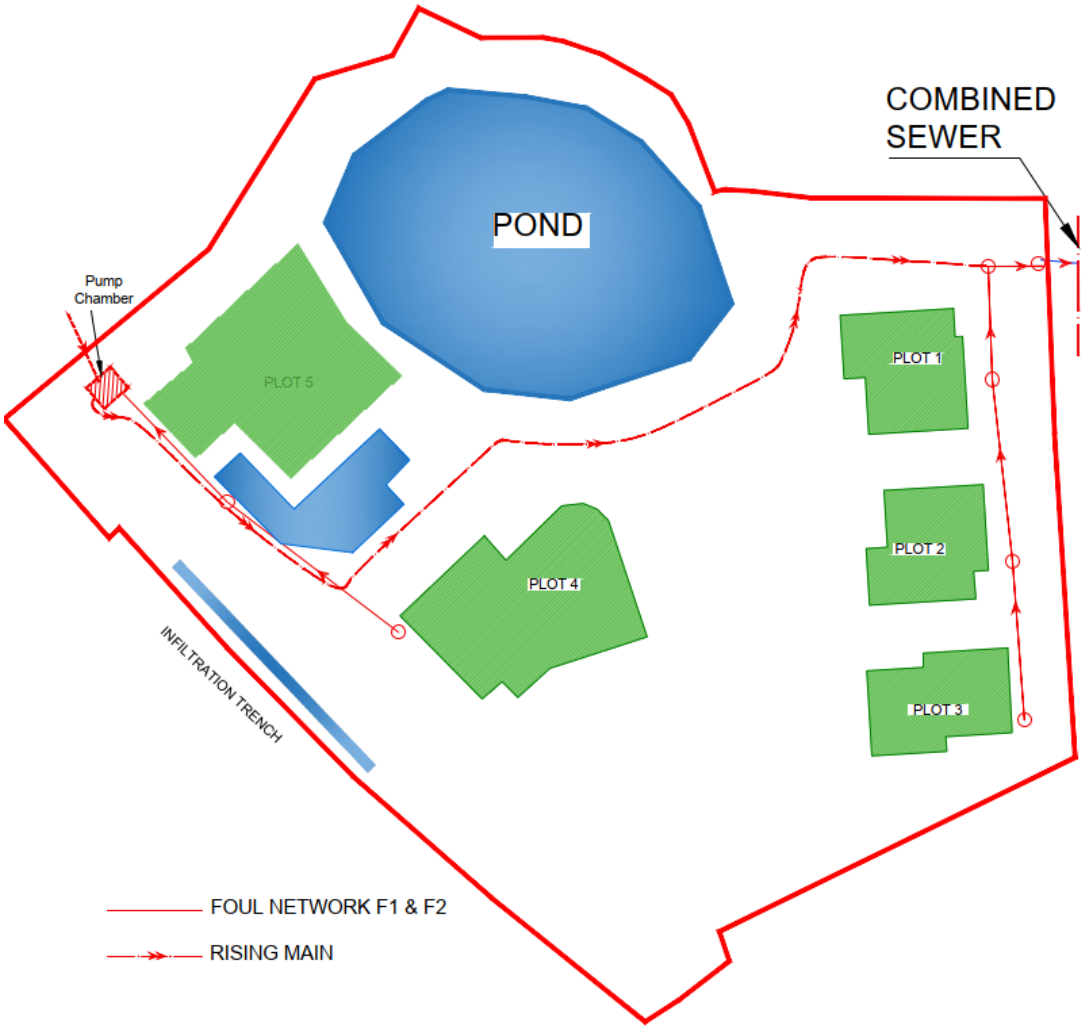


Figure 3.

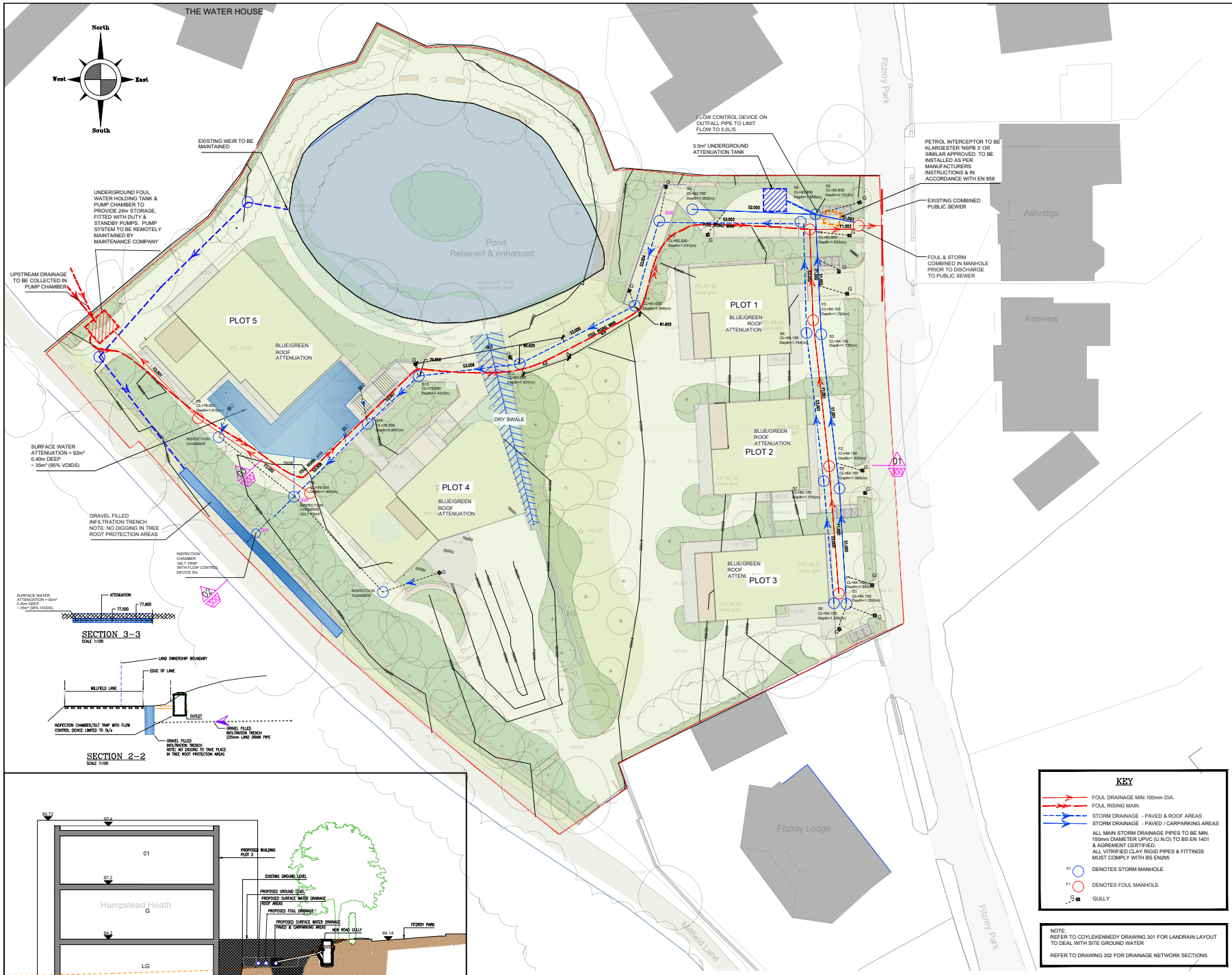
Plan indicating foul water network.

Appendix A

Surface & Foul Water Layout Drawings

With

Sections and Calculations



SECTION 3–3
SCALE 1:100

SECTION 2–2
SCALE 1:100

SECTION 1–1
SCALE 1:100

KEY

- FOUL DRAINAGE MIN.100mm DIA.
- FOUL RISING MAIN
- STORM DRAINAGE - PAVED & ROOF AREAS
- STORM DRAINAGE - PAVED / CARPARKING AREAS

ALL MAIN STORM DRAINAGE PIPES TO BE MIN. 150mm DIAMETER UPVC (U.N.O) TO BS EN 1401 & AGREMENT CERTIFIED. ALL VITRIFIED CLAY RIGID PIPES & FITTINGS MUST COMPLY WITH BS EN295

- S1 DENOTES STORM MANHOLE
- F1 DENOTES FOUL MANHOLE
- G GULLY

NOTE:
REFER TO COYLEKENNEDY DRAWING 301 FOR LANDRAIN LAYOUT TO DEAL WITH SITE GROUND WATER

REFER TO DRAWING 302 FOR DRAINAGE NETWORK SECTIONS

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 LEAKMIX IS SPECIFIED ALL LEAKMIX 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.
3. 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 RANGE 9 TABLE 3 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.
4. 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 S AND 0.15 FOR CLASS F.
5. THE MINIMUM THICKNESS OF BEDDING MATERIAL UNDER THE BARREL OF THE PIPE SHOULD BE 100MM
6. UNPORTED 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
7. ALL PVC-U PIPES AND FITTINGS USED FOR DRAIN AND SEWER MUST COMPLY WITH BS EN1401
8. ALL VITRIFIED CLAY RIGID PIPES & FITTINGS MUST COMPLY WITH BS EN295

F.–8L/0

Rev.	Revision	Date
D	LAYOUT REVISED	16/07/2020
C	LAYOUT REVISED, ATTENUATION AREA & INFILTRATION TRENCH REVISED	16/07/2020
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

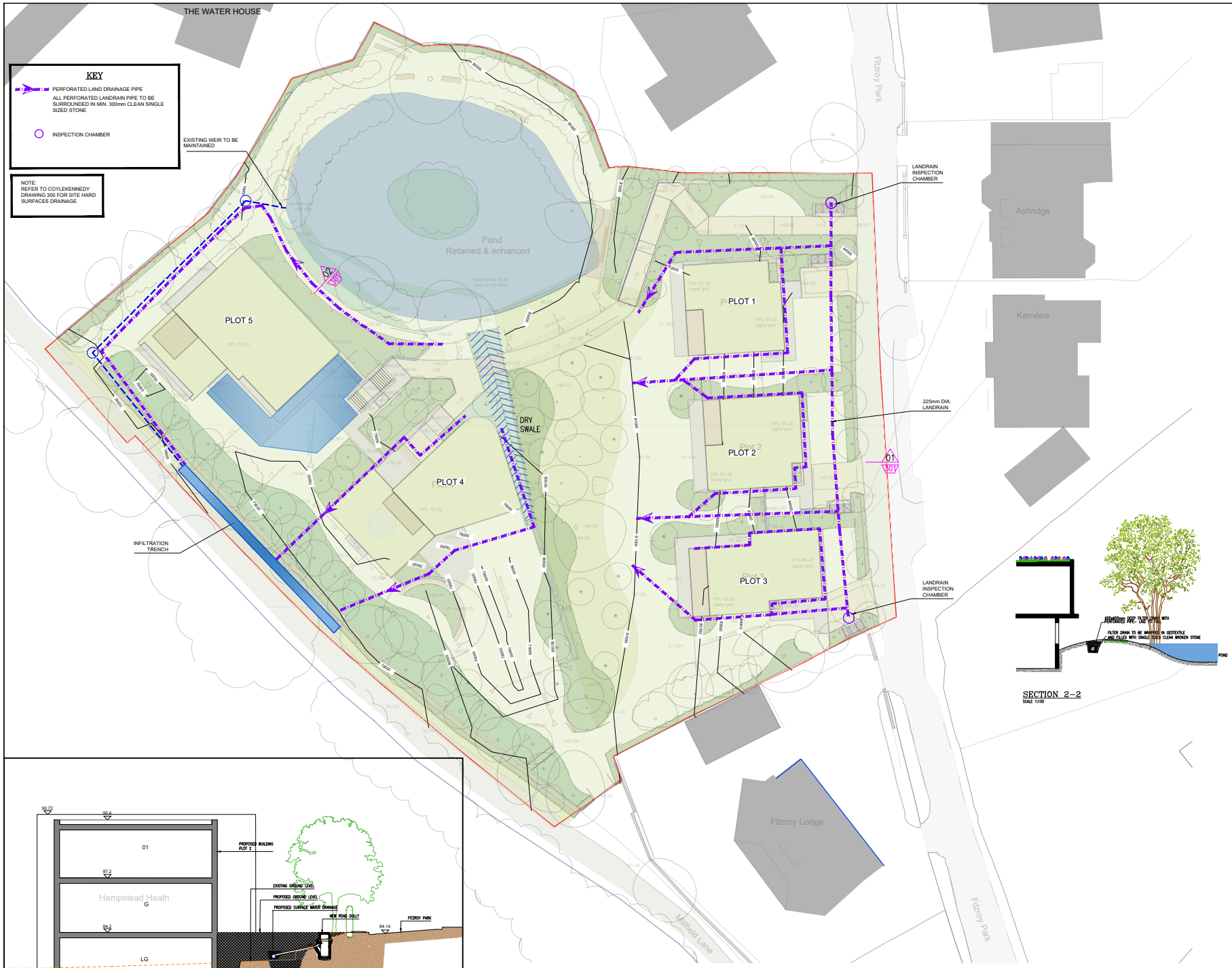
COYLE KENNEDY
Consulting Engineers
Third Floor,
GW Business Centre,
Great West House,
Great West Road,
Brentford TW8 9DF,
England
Tel: +44(0)203 393 1174 Website: www.coylekennedy.com
Fax: +44(0)203 004 1234 email: mail@coylekennedy.com

PROJECT: Fitzroy Park Development

CLIENT: Geoff Springer

TITLE: SITE DRAINAGE LAYOUT

PROJECT No.	STATUS – DRAWING No.
16–254	P-300
DATE: APRIL 2018	DRAWING REV.
SCALE: 1:200 @ A1, 1:400 @ A3 / BY: AC / CHECKED: TK	D



SECTION 2–2
SCALE 1:100

SECTION 1–1
SCALE 1:100

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 DAS/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 LEAKMIX IS SPECIFIED ALL LEAKMIX 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 ENQUIRES 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 S AND 0.15 FOR CLASS F.
6. THE MINIMUM THICKNESS OF BEDDING MATERIAL UNDER THE BARREL OF THE PIPE SHOULD BE 100MM
7. UNPORTED 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

F.-BL/0

Rev.	Revision	Date
C	LAYOUT REVISED	14/08/2020
B	LAND DRAINS REVISED, INFILTRATION TRENCH REPLACES SWALE	16/07/2020
A	SWALE AND ATTENUATION LOCATION ADDED	27/08/2019

DRAWING STATUS

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

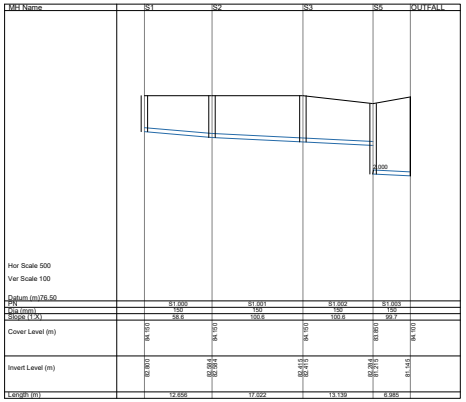
COYLE KENNEDY
Consulting Engineers
Third Floor,
GW Business Centre,
Great West House,
Great West Road,
Brentford TW8 9DF,
England
Tel: +44(0)203 393 1174 Website: www.coylekennedy.com
Fax: +44(0)203 004 1234 email: mail@coylekennedy.com

PROJECT: Fitzroy Park Development

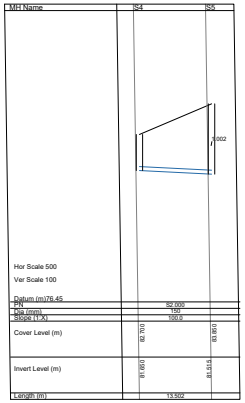
CLIENT: Geoff Springer

TITLE: SITE LAND–DRAINAGE LAYOUT

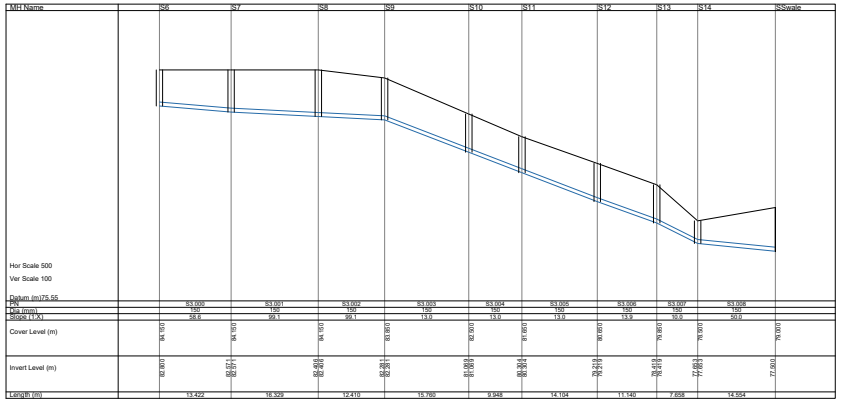
PROJECT No.	STATUS – DRAWING No.
16–254	P-301
DATE: APRIL 2018	DRAWING REV.
SCALE: 1:200 @ A1, 1:400 @ A3 / BY: AC / CHECKED: TK	C



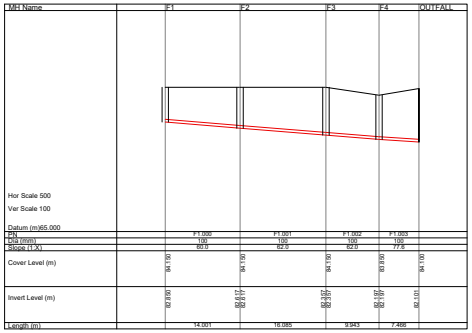
SECTION THROUGH STORM NETWORK 1



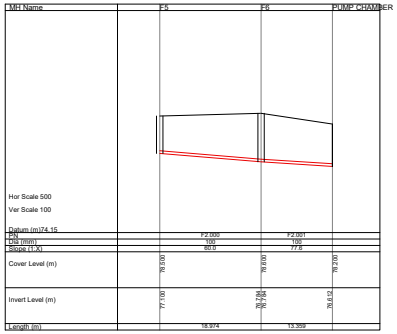
SECTION THROUGH STORM NETWORK 2



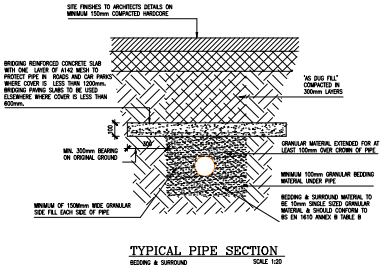
SECTION THROUGH STORM NETWORK 3



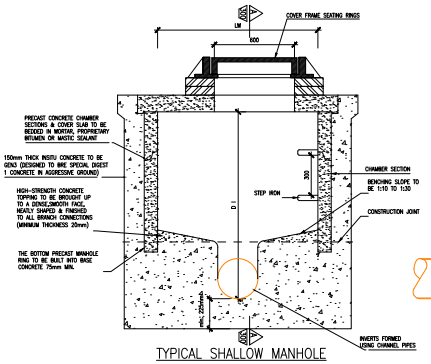
SECTION THROUGH FOUL NETWORK 1



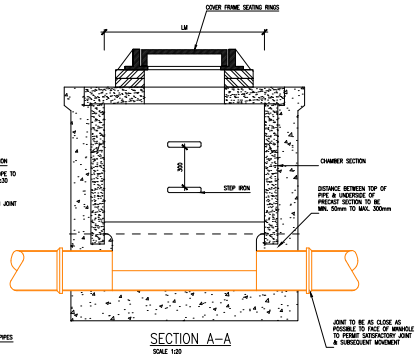
SECTION THROUGH FOUL NETWORK 3



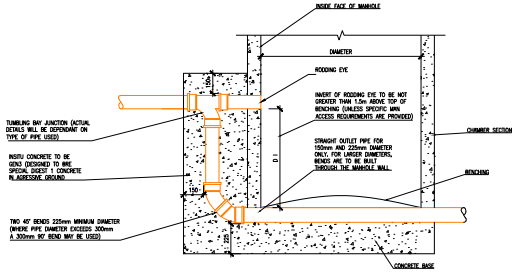
TYPICAL PIPE SECTION
BEDDING & SURROUND
SCALE 1:20



TYPICAL SHALLOW MANHOLE
SCALE 1:20



SECTION A–A
SCALE 1:20



TYPICAL EXTERNAL VERTICAL BACKDROP
SCALE 1:20

REFER TO DRAWING 300 FOR PLAN LAYOUT OF SEWERS

F. – 8/1

A	NETWORK UPDATED	22/7/20
Rev.	Revision	Date

DRAWING STATUS

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

COYLE KENNEDY
Consulting Engineers
GFSC,
Moneenageisha Rd,
Galway.
Tel: +353 (0)91 752000
Fax: +353 (0)91 753000
Website: www.coylekennedy.com
email: mail@coylekennedy.com

PROJECT
Fitzroy Park Development

CLIENT
Geoff Springer

TITLE
DRAINAGE NETWORK SECTIONS

PROJECT No. 16–254

STATUS – DRAWING No.
P-302

DATE
FEBRUARY 2019

DRAWING REV.
A

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

Appendix B

Attenuation Summary

55 Fitzroy Park - Attenuation Summary

COYLE KENNEDY
Consulting Engineers

Third Floor
GW Business Centre
Great West House
Great West Road
Brentford TW8 9DF
England

Tel: +44 (0)203 393 1174
Fax: +44 (0)203 004 1234

website: www.coylekennedy.com
email: mail@coylekennedy.com

There is a total storage volume requirement of approximately of 160m^3, which is made up as follows:

Make up of attenuation volumes:

Attenuation tank – 95% voids	= 35m^3
Blue and Green roof	
Plot 1 - 101m^2 of roof by 150mm deep	= 15.2m^3
Plot 2 - 98m^2 of roof by 150mm deep	= 14.7m^3
Plot 3 - 95m^2 of roof by 150mm deep	= 14.3m^3
Plot 4 - 214m^2 of roof by 150mm deep	= 32.1m^3
Plot 5 - 329m^2 of roof by 150mm deep	= 49.4m^3
Total	= 160.7 m^3

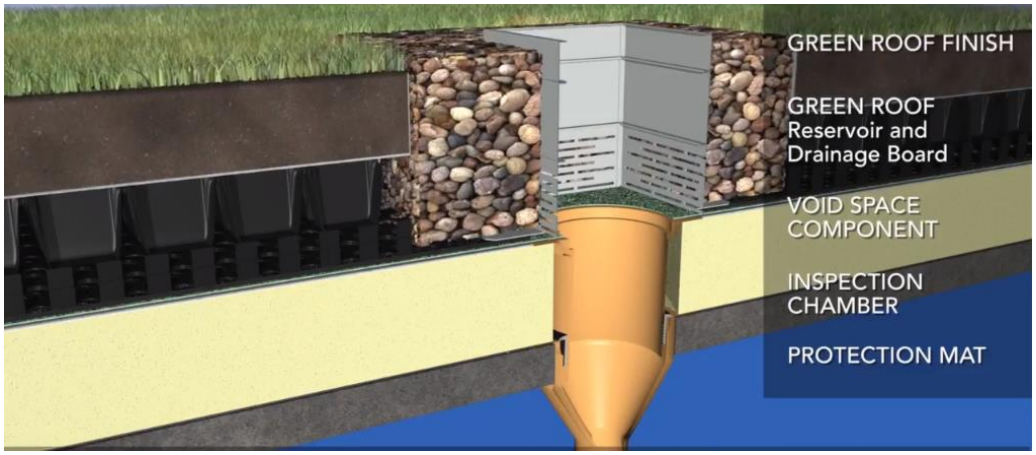
Irish Office:
GFSC
Moneenageisha Road
Galway
Ireland

Tel: +353 (0)91 752000
Fax: +353 (0)91 753000

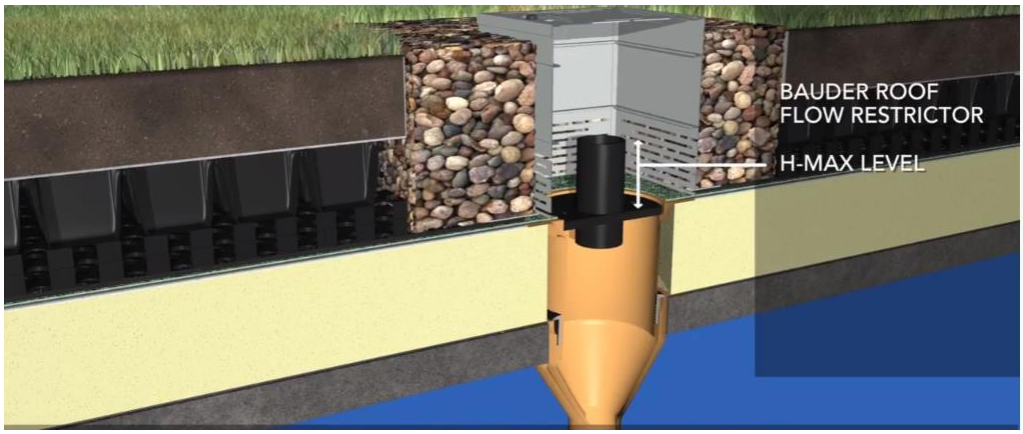
CKCE Limited
Registered in England 11566522

Directors:
Brian Coyle BE CEng MIEI MIStructE
Tadhg Kennedy BE MEngSc CEng MIEI MIStructE

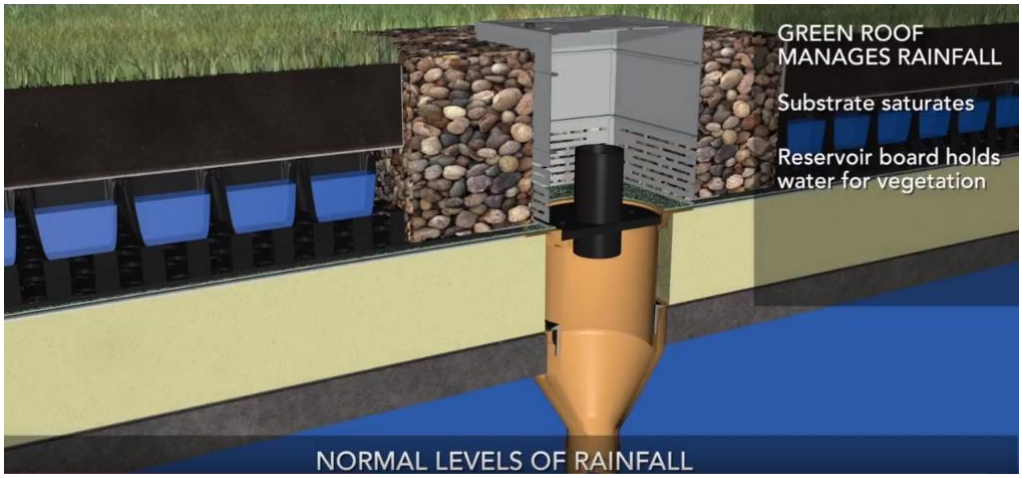
Blue and Green roof Process



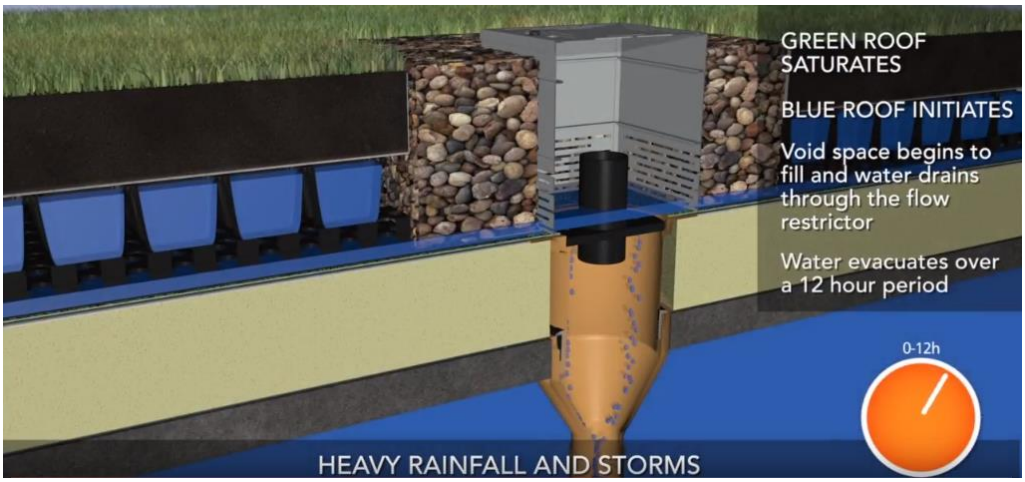
Green/Blue roof makeup



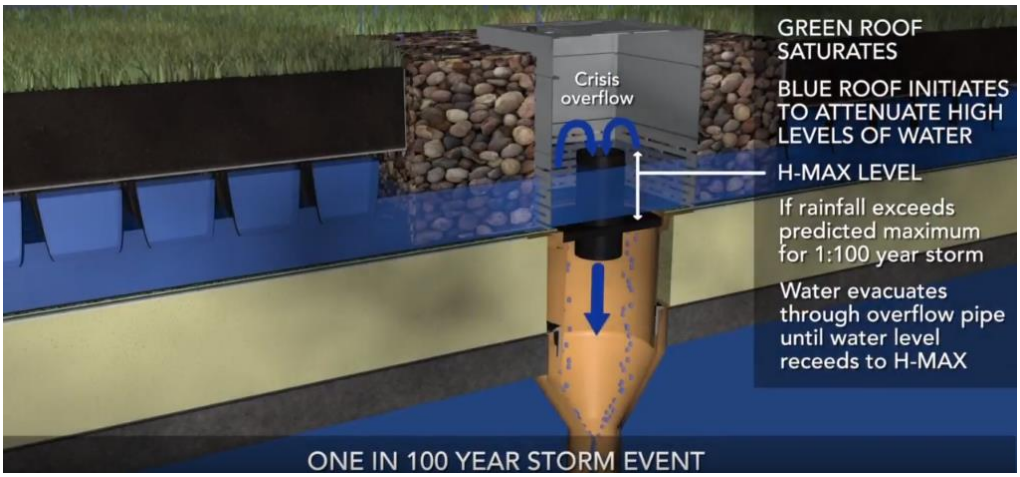
Maximum attenuation level



Normal levels of rainfall – sunstrate saturates, reservoir holds water for vegations – no discharge



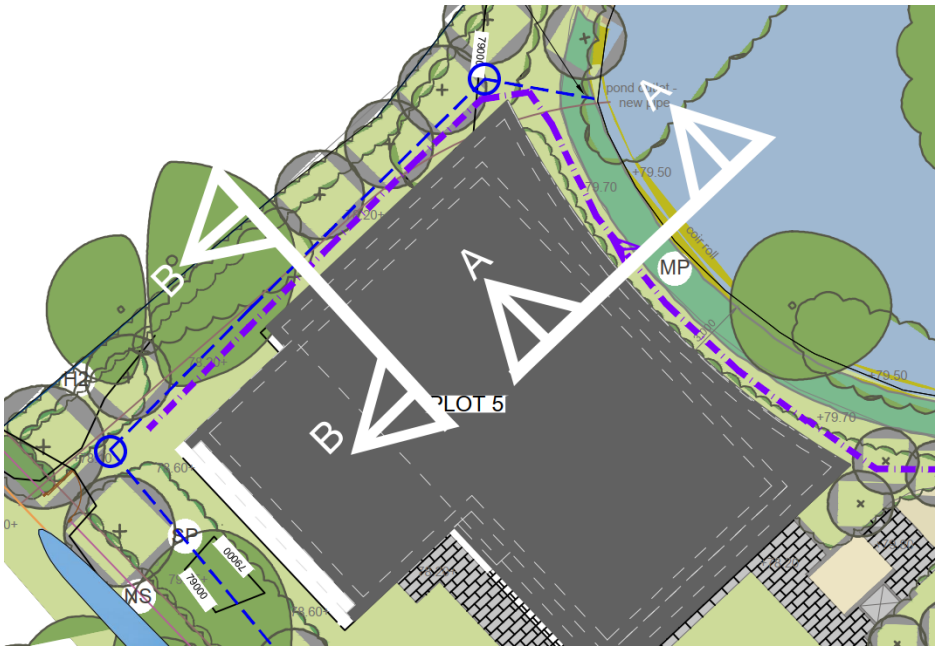
Heavy rainfall – water overflows the storage cells into the void space and drains through the flow restricter attenauting the discharge



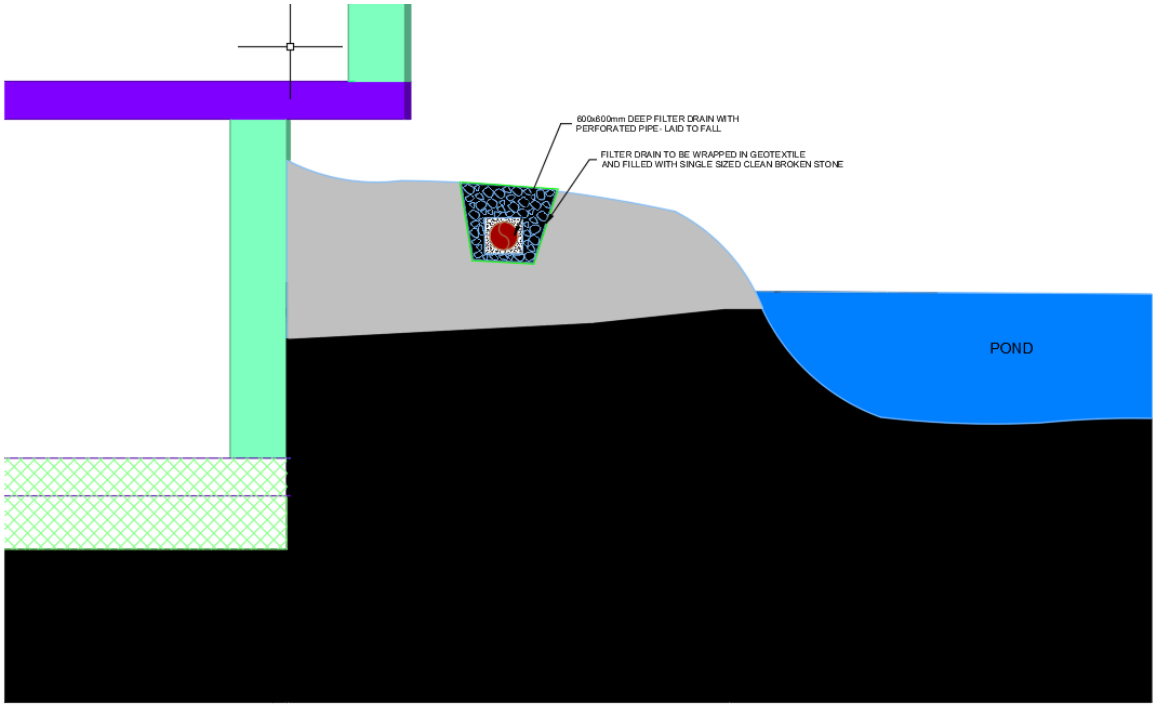
1:100 year event – if the rainfall exceeds the maximum 1:100 rainfall event the excess rainfall discharges the via the overflow pipe at high level – the remainder of the water is attenuted as normal.

Landscaping detail – typical detail shown adjacent to plot 5

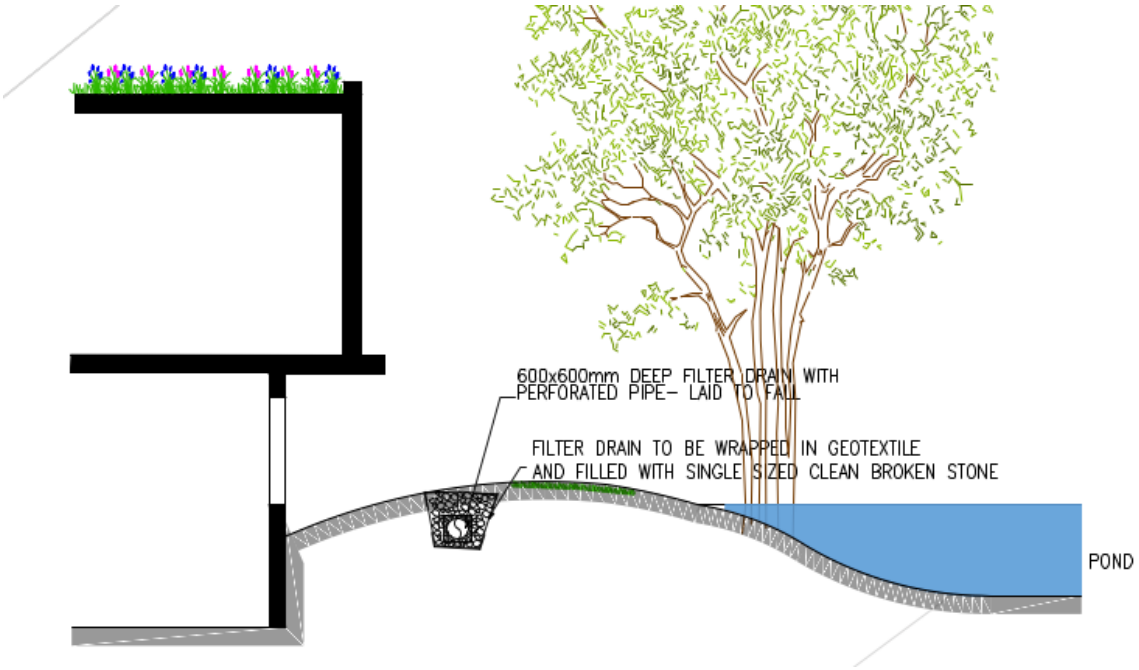
The details be low show the intent of the landscaping/drainage adjacent to divert the water away from the buildings to the attenuation/Infiltration trench area.



Layout of plat 4



Section A-A



Section B-B

Tadhg Kennedy
COYLE KENNEDY
CHARTERED ENGINEERS