

Inspection photosPlace:
ReadingRoad:
2 Norman PlaceDate:
06/09/2023section number:
29PLR:
? X

Photo: 284_5a, 00:00:00
6.5m, Debris silt, 50 % cross-sectional area loss, Start,



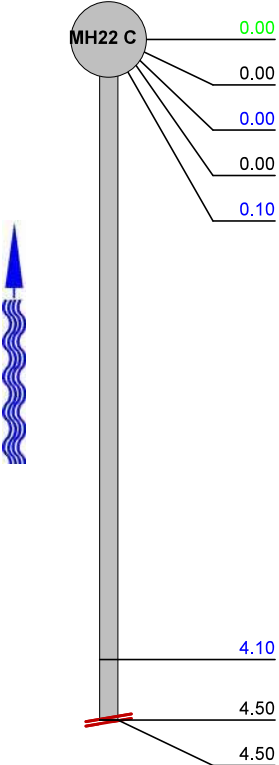
Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 30	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH22 C
Place: Reading	District:	end MH: SA
Location:	Tape No.:	Total length: 4.5 m

Purpose:	Shape/Size: Circular dia 100 mm
Use: Foul	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:
Location details:

1:50	position	code	observation	counter	photo	grade
	<u>0.00</u>	MH	Manhole Remark: MH22 C	00:00:00		(Constr) 0
	<u>0.00</u>	ST	Start of Survey	00:00:00		(Misc) 0
	<u>0.00</u>	WL	Water level, 40 % height/diameter	00:00:00		(Serv) 0
	<u>0.00</u> S1	CU	Camera Underwater, Start	00:00:00		(Misc) 0
	<u>0.10</u>	DES	Debris silt, 10 % cross-sectional area loss	00:00:00		(Serv) 1
	<u>4.10</u>	WL	Water level, 0 % height/diameter	00:00:00		(Serv) 0
	<u>4.50</u> F1	CU	Camera Underwater, Finish	00:00:00		(Misc) 0
	<u>4.50</u>	SA	Survey abandoned, Remark: Restricted Leverage	00:00:00		(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 31	PLR: MH23 X X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH23 X
Place: Reading	District:	end MH: Colvert
Location:	Tape No.:	Total length: 27.7 m

Purpose:	Shape/Size: Circular dia 300 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:
Location details:

1:225	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH23 X	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	13.70	WL	Water level, 5 % height/diameter	00:00:00		(Serv) 0
	20.77	GP	General Condition photograph	00:00:00		(Misc) 0
	23.20	WL	Water level, 0 % height/diameter	00:00:00		(Serv) 0
	27.70	FH	Finish Survey, Remark: Colvert	00:00:00	35_6a	(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

Inspection photosPlace:
ReadingRoad:
2 Norman PlaceDate:
06/09/2023section number:
31PLR:
MH23 X X

Photo: 35_6a, 00:00:00
27.7m, Finish Survey, Remark: Culvert



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 32	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH23 A
Place: Reading	District:	end MH: SA
Location:	Tape No.:	Total length: 29.8 m

Purpose:	Shape/Size: Circular dia 225 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:
Location details:

1:225	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH23 A	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	5.78	GP	General Condition photograph	00:00:00	306_3a	(Misc) 0
	14.45	GP	General Condition photograph	00:00:00	307_4a	(Misc) 0
	15.10	DES	Debris silt, 5 % cross-sectional area loss	00:00:00		(Serv) 1
	15.70	DES	Debris silt, 5 % cross-sectional area loss			(Serv) 1
	16.80	WL	Water level, 5 % height/diameter	00:00:00		(Serv) 0
	18.90	WL	Water level, 0 % height/diameter	00:00:00		(Serv) 0
	19.50	LD	Line of Sewer deviates down	00:00:00		(Serv) 0
	21.10	DES	Debris silt, 5 % cross-sectional area loss	00:00:00		(Serv) 1
	26.20	MH	Manhole Remark: MH	00:00:00	314_11a	(Constr) 0
	29.80	SA	Survey abandoned, Remark: Rescricited leverage	00:00:00		(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

Inspection photos

 Place:
Reading

 Road:
2 Norman Place

 Date:
06/09/2023

 section number:
32

 PLR:
 ? **X**


Photo: 306_3a, 00:00:00
5.78m, General Condition photograph



Photo: 307_4a, 00:00:00
14.45m, General Condition photograph



Photo: 314_11a, 00:00:00
26.2m, Manhole Remark: MH



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 33	PLR: SA X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH23 B
Place: Reading	District:	end MH: SA
Location:	Tape No.:	Total length: 16 m

Purpose:	Shape/Size: Circular dia 100 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:

Location details:

1:125	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH23 B	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	6.06	GP	General Condition photograph	00:00:00	319_3a	(Misc) 0
	8.10	LR	Line of Sewer deviates right	00:00:00		(Serv) 0
	8.90	JN	Junction at 02 o'clock, dia 100 mm	00:00:00	321_5a	(Constr) 0
	12.10	LL	Line of Sewer deviates left	00:00:00		(Serv) 0
	13.80	JDM	Joint displaced. Medium	00:00:00	323_7a	(Struct) 1
	15.30	LL	Line of Sewer deviates left	00:00:00		(Serv) 0
	16.00	LU	Line of Sewer deviates up	00:00:00		(Serv) 0
	16.00	SA	Survey abandoned, Remark: Unable to pass bend	00:00:00		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

Inspection photos

 Place:
Reading

 Road:
2 Norman Place

 Date:
06/09/2023

 section number:
33

 PLR:
SA X


Photo: 319_3a, 00:00:00
6.06m, General Condition photograph



Photo: 321_5a, 00:00:00
8.9m, Junction at 02 o'clock, dia 100 mm



Photo: 323_7a, 00:00:00
13.8m, Joint displaced. Medium



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 34	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH23 C
Place: Reading	District:	end MH: MH14
Location:	Tape No.:	Total length: 26.6 m

Purpose:	Shape/Size: Circular dia 100 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:

Location details:

1:200	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH23 C	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	6.19	GP	General Condition photograph	00:00:00	329_3a	(Misc) 0
	10.10	JN	Junction at 10 o'clock, dia 100 mm	00:00:00	330_4a	(Constr) 0
	17.70	WL	Water level, 5 % height/diameter	00:00:00		(Serv) 0
	18.90	S1 CU	Camera Underwater, Start	00:00:00		(Misc) 0
	20.90	F1 CU	Camera Underwater, Finish	00:00:00		(Misc) 0
	25.40	WL	Water level, 0 % height/diameter	00:00:00		(Serv) 0
	26.20	MH	Manhole Remark: MH15 X	00:00:00	335_9a	(Constr) 0
	26.60	FH	Finish Survey, Remark: MH14	00:00:00		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

Inspection photos

Place: Reading	Road: 2 Norman Place	Date: 06/09/2023	section number: 34	PLR: ? X
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Photo: 329_3a, 00:00:00
6.19m, General Condition photograph



Photo: 330_4a, 00:00:00
10.1m, Junction at 10 o'clock, dia 100 mm



Photo: 335_9a, 00:00:00
26.2m, Manhole Remark: MH15 X



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 35	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH24 B
Place: Reading	District:	end MH: SA
Location:	Tape No.:	Total length: 4.9 m

Purpose:	Shape/Size: Circular dia 100 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:
Location details:

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH24 B	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	3.30	S1 DE	Debris, 20 % cross-sectional area loss, Start, Remark: Roots	00:00:00		(Serv) 1
	4.20	F1 DE	Debris, 20 % cross-sectional area loss, Finish	00:00:00		(Serv) 1
	4.90	DE	Debris, 95 % cross-sectional area loss	00:00:00	344_5a	(Serv) 1
	4.90	SA	Survey abandoned, Remark: Unable to pass blockage	00:00:00		(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

Inspection photosPlace:
ReadingRoad:
2 Norman PlaceDate:
06/09/2023section number:
35PLR:
? X

Photo: 344_5a, 00:00:00
4.9m, Debris, 95 % cross-sectional area loss



Inspection report

Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 36	PLR: MH25 X X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH25 X
Place: Reading	District:	end MH: MH24
Location:	Tape No.:	Total length: 5.2 m

Purpose:	Shape/Size: Circular dia 300 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:
Location details:

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Manhole Remark: MH25 X	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	4.80	MH	Manhole Remark: MH	00:00:00	349_3a	(Constr) 0
	5.20	FH	Finish Survey, Remark: MH24	00:00:00		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

Inspection photosPlace:
ReadingRoad:
2 Norman PlaceDate:
06/09/2023section number:
36PLR:
MH25 X X

Photo: 349_3a, 00:00:00
4.8m, Manhole Remark:MH



Inspection report

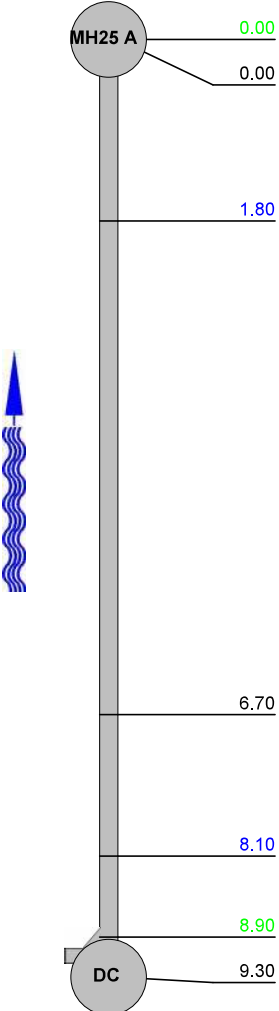
Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 37	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH25 A
Place: Reading	District:	end MH: DC
Location:	Tape No.:	Total length: 9.3 m

Purpose:	Shape/Size: Circular dia 100 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:

Location details:

1:75	position	code	observation	counter	photo	grade
						
	0.00	MH	Manhole Remark: MH25 A	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	1.80	LR	Line of Sewer deviates right	00:00:00		(Serv) 0
	6.70	GP	General Condition photograph	00:00:00	41_4a	(Misc) 0
	8.10	LL	Line of Sewer deviates left	00:00:00		(Serv) 0
	8.90	JN	Junction at 03 o'clock, dia 100 mm	00:00:00	371_6a	(Constr) 0
	9.30	FH	Finish Survey, Remark: DP	00:00:00		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

Inspection photos

 Place:
Reading

 Road:
2 Norman Place

 Date:
06/09/2023

 section number:
37

 PLR:
? X


Photo: 41_4a, 00:00:00
 6.7m, General Condition photograph



Photo: 371_6a, 00:00:00
 8.9m, Junction at 03 o'clock, dia 100 mm



Inspection report

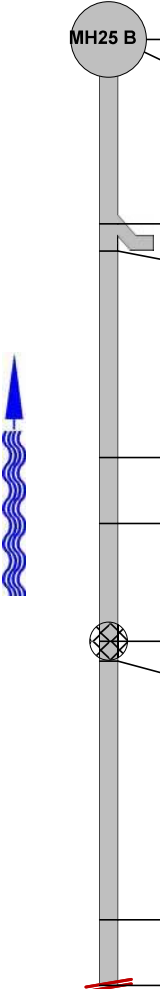
Date: 06/09/2023	Job N°: 60390	Weather: Dry	Operator: SWA	section number: 38	PLR: ? X
Present:	Vehicle:	Camera: Solo pro Camera	Preset:	Cleaned: No	Grade:

Road: 2 Norman Place	Division:	start MH: MH25 B
Place: Reading	District:	end MH: SA
Location:	Tape No.:	Total length: 34.4 m

Purpose:	Shape/Size: Circular dia 300 mm
Use: Surface water	Material: Vitrified clay Pipe length:
Catchment:	Lining:
	Category:

Comment:

Location details:

1:275	position	code	observation	counter	photo	grade
						
	0.00	MH	Manhole Remark: MH25 B	00:00:00		(Constr) 0
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	6.70	JN	Junction at 10 o'clock, dia 150 mm	00:00:00	360_3a	(Constr) 0
	7.70	S1 DES	Debris silt, 5 % cross-sectional area loss, Start	00:00:00		(Serv) 1
	15.20	F1 DES	Debris silt, 5 % cross-sectional area loss, Finish	00:00:00		(Serv) 1
	17.60	WL	Water level, 5 % height/diameter	00:00:00		(Serv) 0
	21.90	MH	Manhole Remark: MH	00:00:00	363_7a	(Constr) 0
	22.60	LR	Line of Sewer deviates right	00:00:00		(Serv) 0
	32.00	WL	Water level, 5 % height/diameter	00:00:00		(Serv) 0
	34.40	SA	Survey abandoned, Remark: Rescricted leverage	00:00:00		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

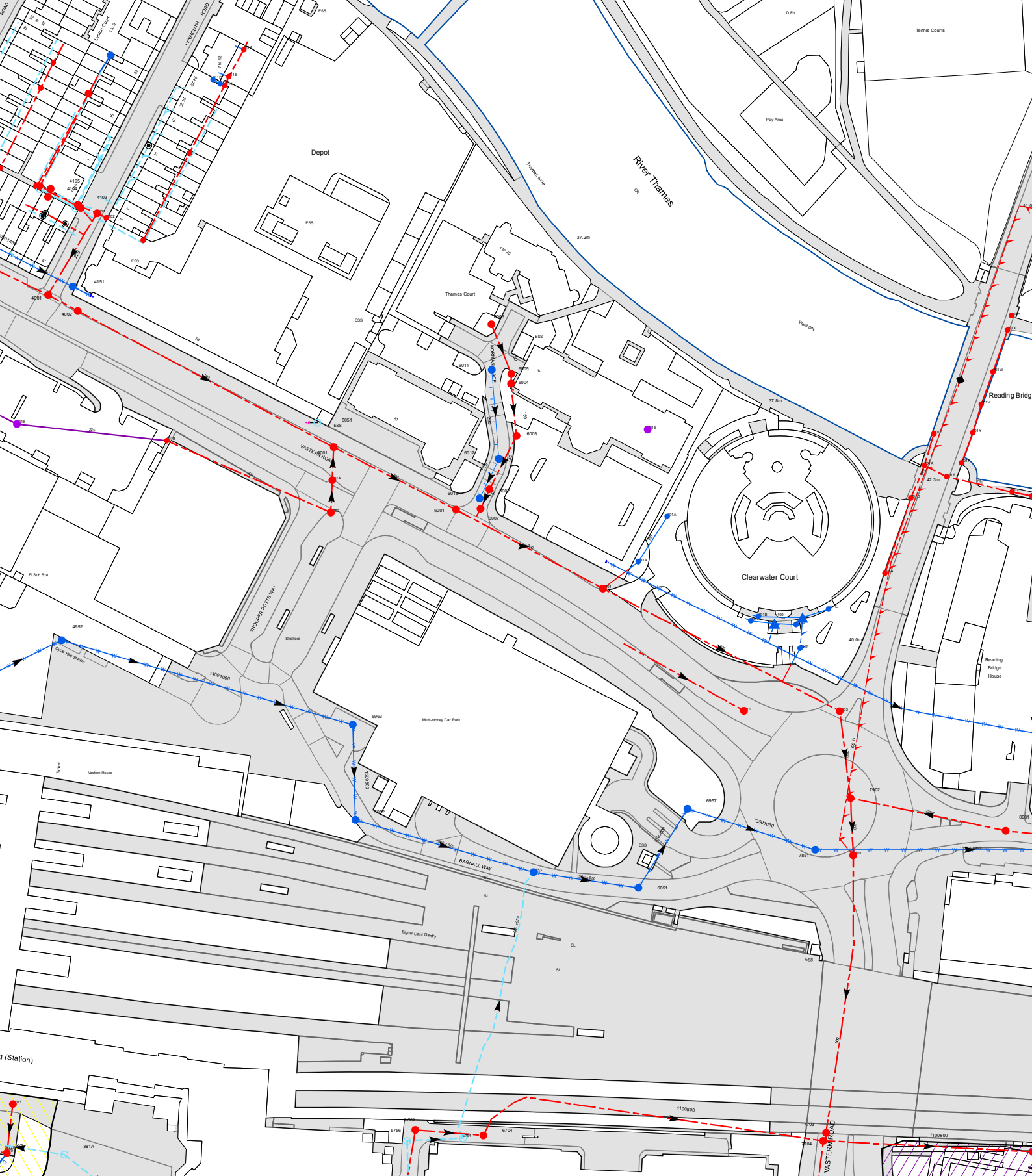
Inspection photosPlace:
ReadingRoad:
2 Norman PlaceDate:
06/09/2023section number:
38PLR:
? X

Photo: 360_3a, 00:00:00
6.7m, Junction at 10 o'clock, dia 150 mm



Photo: 363_7a, 00:00:00
21.9m, Manhole Remark: MH

Appendix E – Thames Water Sewer Records and PPSE Response



played area is 500 m and the centre of the map is located at OS coordinates 471636,174023

Accepted by Thames Water for any error or omission. The actual position of the mains and services must be verified and established on site before any works are undertaken.

ce Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



Matt Freeman

Hexa Consulting
Studio 22
46 The Calls
Leeds, West Yorkshire
LS2 7EY



07 June 2024

Pre-planning enquiry: Confirmation of sufficient capacity (Foul Only)

Site: 2 Norman Place, Reading RG1 8DA

Dear Matt,

Thank you for providing information on your development.

Proposal 250 Flats

Proposed foul discharge via gravity in between FWMH SU71746001 and SU71736901 (300mm)

Proposed surface water discharge into private surface water network.

No surface water will discharge to Thames Water assets.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.



The disposal hierarchy being:

1. rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2. rainwater infiltration to ground at or close to source
3. rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. controlled rainwater discharge to a surface water sewer or drain
6. controlled rainwater discharge to a combined sewer

Where connection to the public sewerage network is still required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Please see our [FAQ's leaflet](#) for additional information.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you have any further questions, please contact me on 0774 764 6498.

Kind Regards,

A handwritten signature in black ink that reads "Long Tran".

Long Tran

Developer Services – Adoptions Engineer, Sewer Adoptions Team

Tel: 0800 009 3921

Get advice on making your sewer connection correctly at connectright.org.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk

Appendix F – Reading Borough Council Correspondence

Matt Freeman

From: Djanie, Samuel <samuel.djanie@stantec.com>
Sent: 18 October 2023 18:09
To: Matt Freeman
Cc: Shean, Sam
Subject: RE: Vastern Ditch Culvert [Filed 06 Nov 2023 14:47]

Categories: Filed by Mail Manager

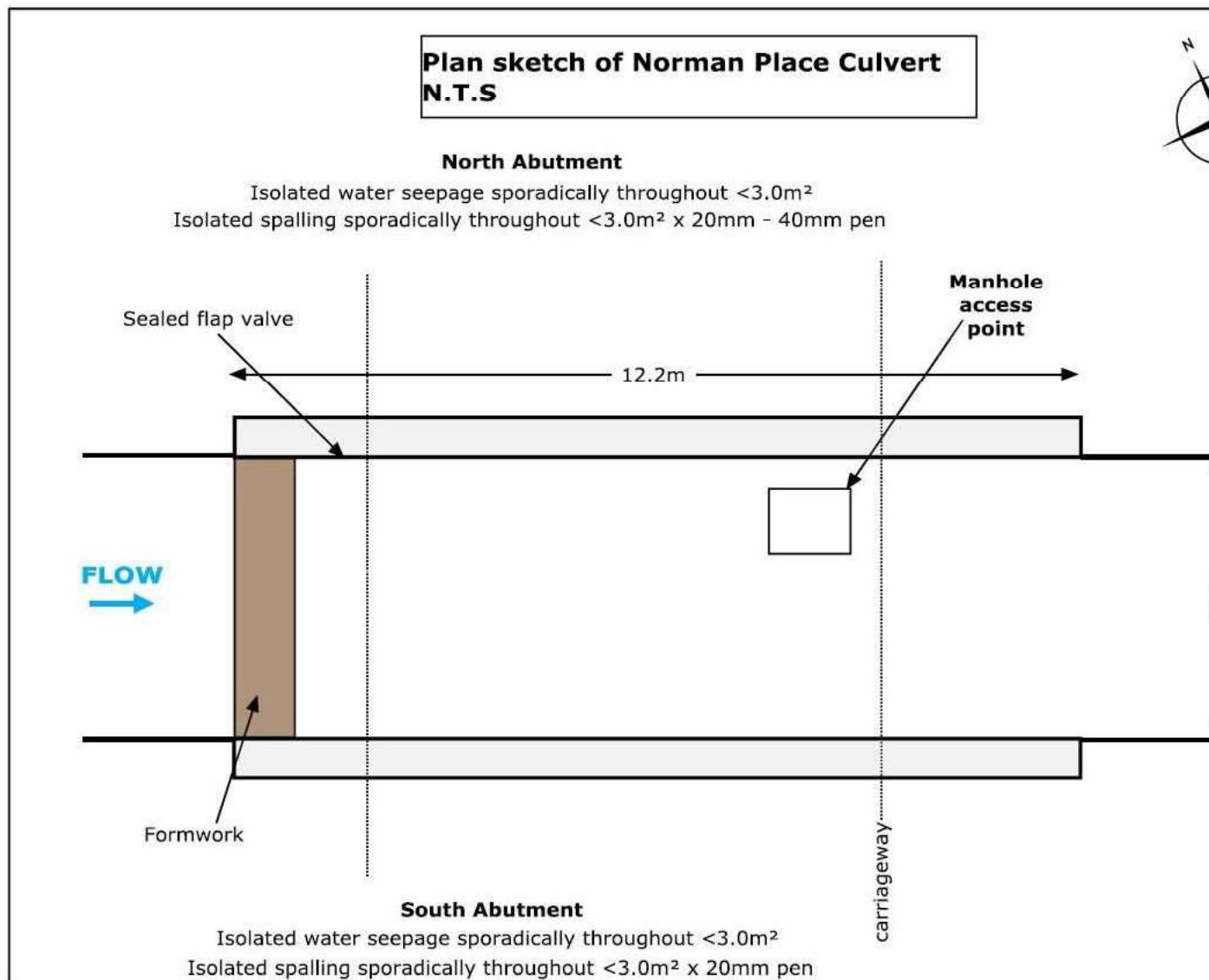
Hi Matt,

There are no as-built drawings of the culvert under Norman Place but the below images may be useful to you. The structure under Norman Place is a concrete box culvert. The section of culvert outside the highway boundary is not maintained by Reading Borough Council so we don't have any information on it. However, I know the culvert continues almost parallel to Vastern Road and passes under George Street where it is a brick arch. I'd advise you to undertake independent investigations to confirm the line of the culvert and its make-up.

Note that if you're planning to undertake any works near the section of culvert within highway boundary, aspects of your design may be subject to technical approval.







Regards,

Samuel Djanie

BSc MSc DIC CEng MICE PEGhIE

Associate – Transport Infrastructure

Caversham Bridge House, Waterman Place, Reading RG1 8DN

Direct: +44 1189 523165

Mobile: +44 7958 958567

samuel.djanie@stantec.com

Stantec



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From: Matt Freeman <matt.freeman@hexaconsulting.co.uk>

Sent: Wednesday, October 18, 2023 3:13 PM

To: Djanie, Samuel <samuel.djanie@stantec.com>

Subject: Vastern Ditch Culvert

Hi Samuel,

I've been passed your details from Sam Shean at RBC in relation to the Vastern ditch culvert.

I'm working on a project at Norman Place/Vastern Road in Reading and I'm aware of a culverted watercourse adjacent to Vastern Road. I've done some digging around to find some information on the culvert but there are scant details available, other than that it is there!

Based on two buried services/CCTV drainage surveys, it appears that the culvert is quite shallow (circa 1.5-2m below ground level). I'm planning to get accurate information on the position and depth of the culvert through trial pits at a couple of points along the length.

The primary issue is that the proposals will come close to the (assumed) position of the culvert – see attached drawing illustrating the preliminary proposals and the existing below ground drainage. The building is going to move slightly further away from Vastern Road but we're proposing to go no closer to Vastern Road than the existing car park serving the Covea building. The building will require piled foundations so all loads will be taken below the level of the culvert and no additional loading will be placed on the culvert. It's the design team's proposal to locate the building no closer than the red line as shown in the image below. The red line corresponds to the frontage of each of the nearby properties/buildings and the blue line is our site boundary.



Do you have any further information on the culvert – record drawings, plotted route – anything really that can assist with our understanding of its position, size and construction?

Many thanks,

Matt Freeman

Principal Engineer

e: Matt.Freeman@hexaconsulting.co.uk

t: 0113 3023260

a: Hexa Consulting Ltd, Studio 22, 46 The Calls, Leeds, LS2 7EY



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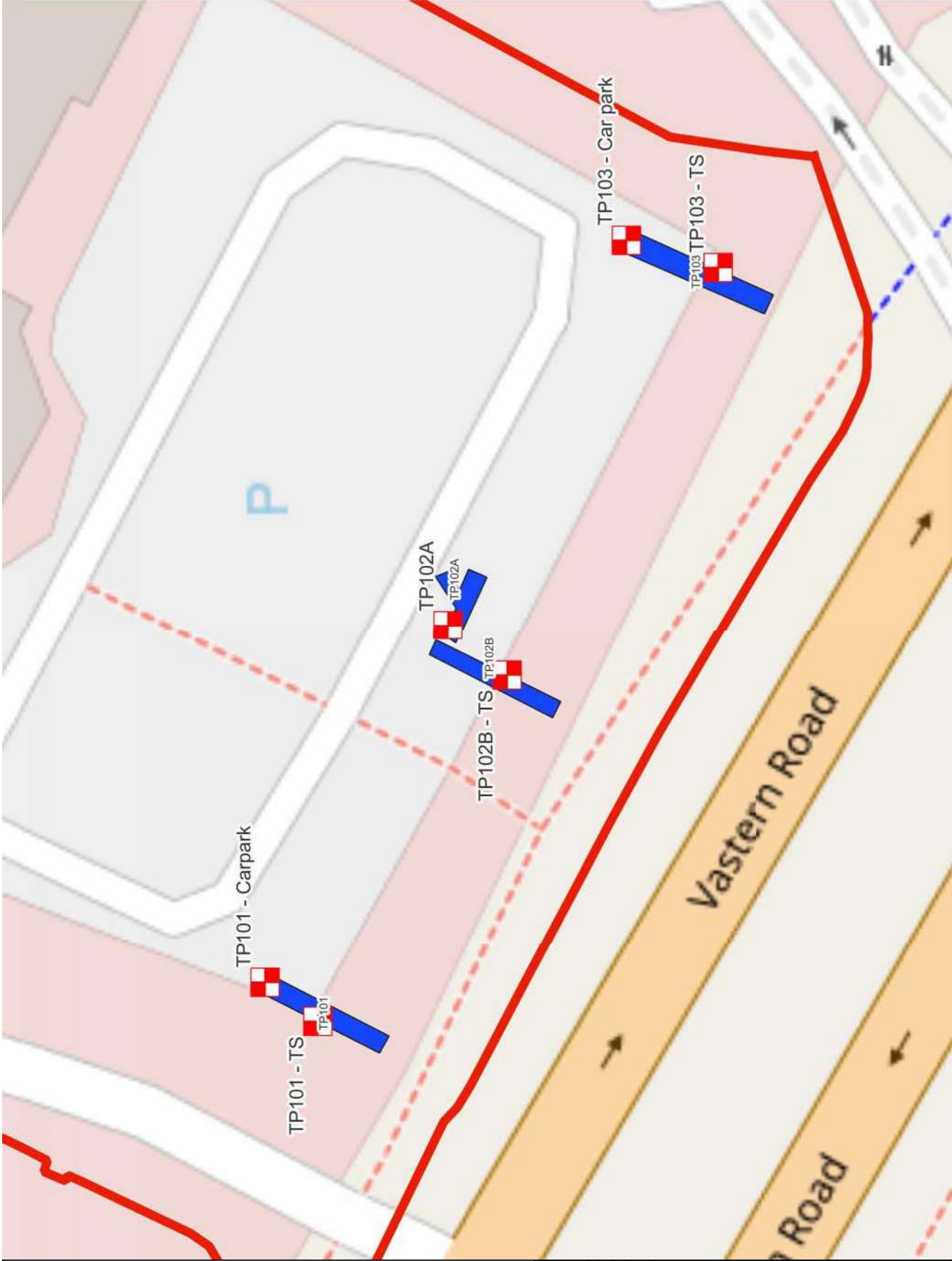
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Appendix G – Culverted Watercourse Survey



Key

 Log Locations

 Trial Pits





Scale

1:300

Paper Size

A4

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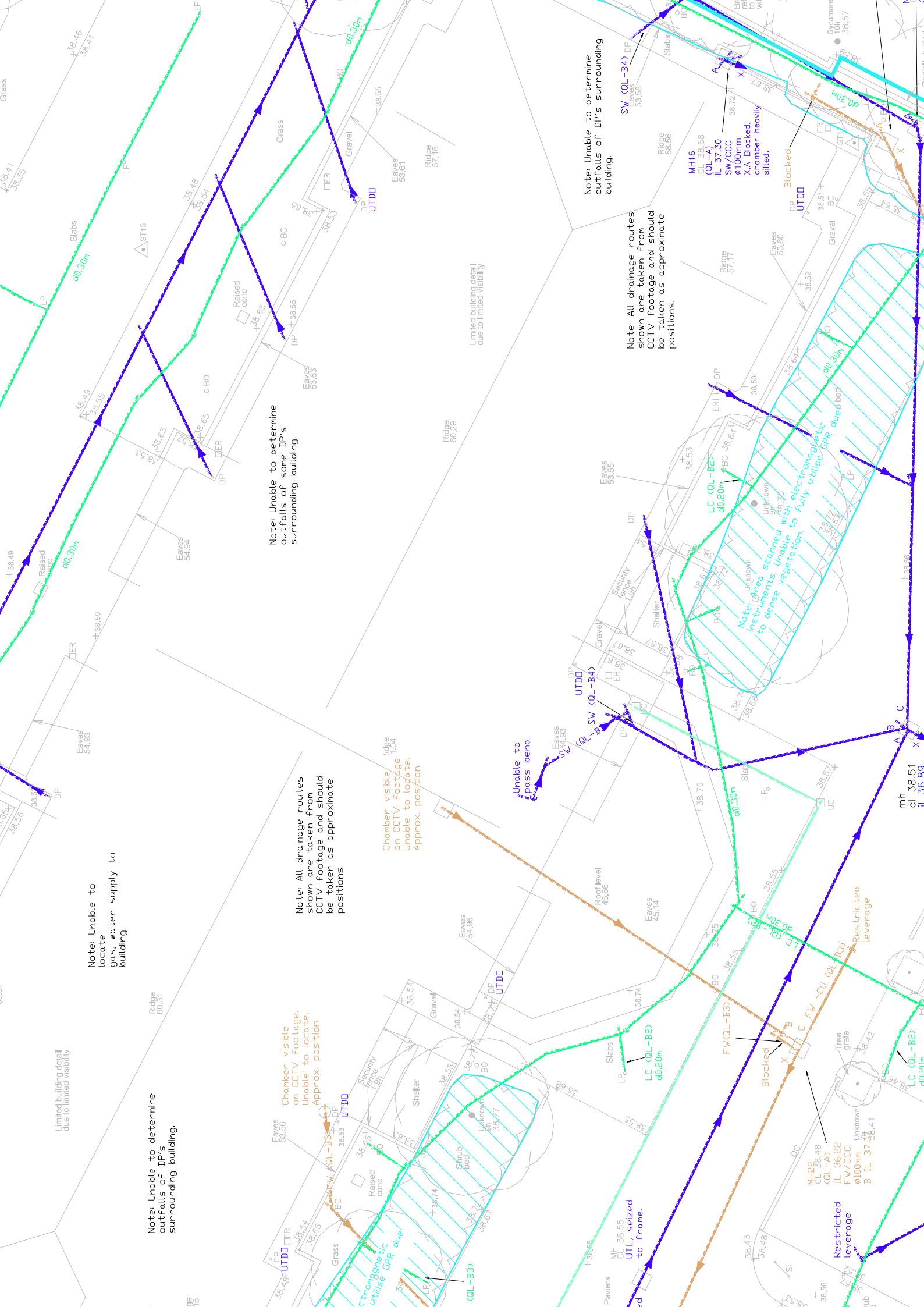
Omnia Consulting, Suite 1 Pure Offices, One Port Way, Port Solent, Portsmouth, PO6 4TY

T: (01489) 808 088

E: info@omnia-consulting.co.uk

W: www.omnia-consulting.co.uk

Job Title: Norman Place, Vastern Road	Client: Hexa Consulting Ltd	Project Number: B11101	Date: 06/12/2023		Drawing Title: Figure 3.0 Intrusive Location Plan
			Authorised By: L. McDonald		



Note: Unable to locate gas, water supply to building.

Note: Unable to determine outfalls of DP's surrounding building.

Note: All drainage routes shown are taken from CCTV footage and should be taken as approximate positions.

Chamber visible on CCTV footage. 1.04 Unable to locate. Approx. position.

Note: Unable to determine outfalls of some DP's surrounding building.

Limited building detail due to limited visibility

Note: Unable to determine outfalls of DP's surrounding building.

Note: All drainage routes shown are taken from CCTV footage and should be taken as approximate positions.

Note: Area scanned with electromagnetic instruments. Unable to fully utilise GPR due to dense vegetation.

Restricted leverage

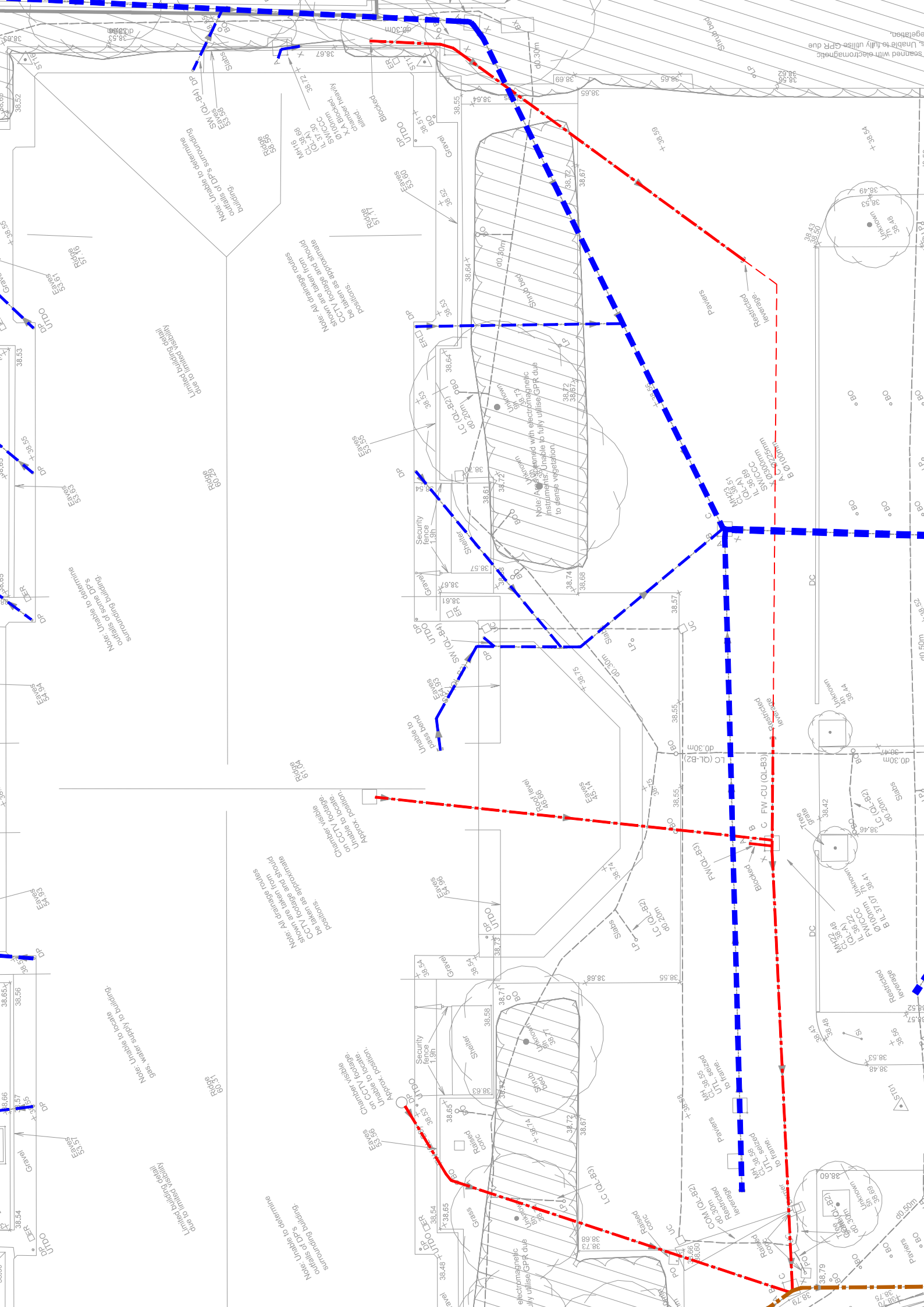
Restricted leverage

mh cl 38.51 il 36.89

Restricted leverage

Restricted leverage

Appendix H – Drainage Drawings





Green roof outlines removed from above to provide clarity. Refer to Landscape Architect's plans for green roof details and specification.

A1 Commercial North
Commercial
257,165 m²

A1-0-2
Type 4HB
1B2P
50,639 m²

A1-0-3
Type 4B
1B2P
51,575 m²

A1-0-4
Type 15Ba
2B3P
69,252 m²

A1-0-Anc1
Bin Stor
Plant
68,133 m²

B1
Bike Store 1
Plant
106,274 m²

B1
Sprinkler tank
Plant
259,646 m²

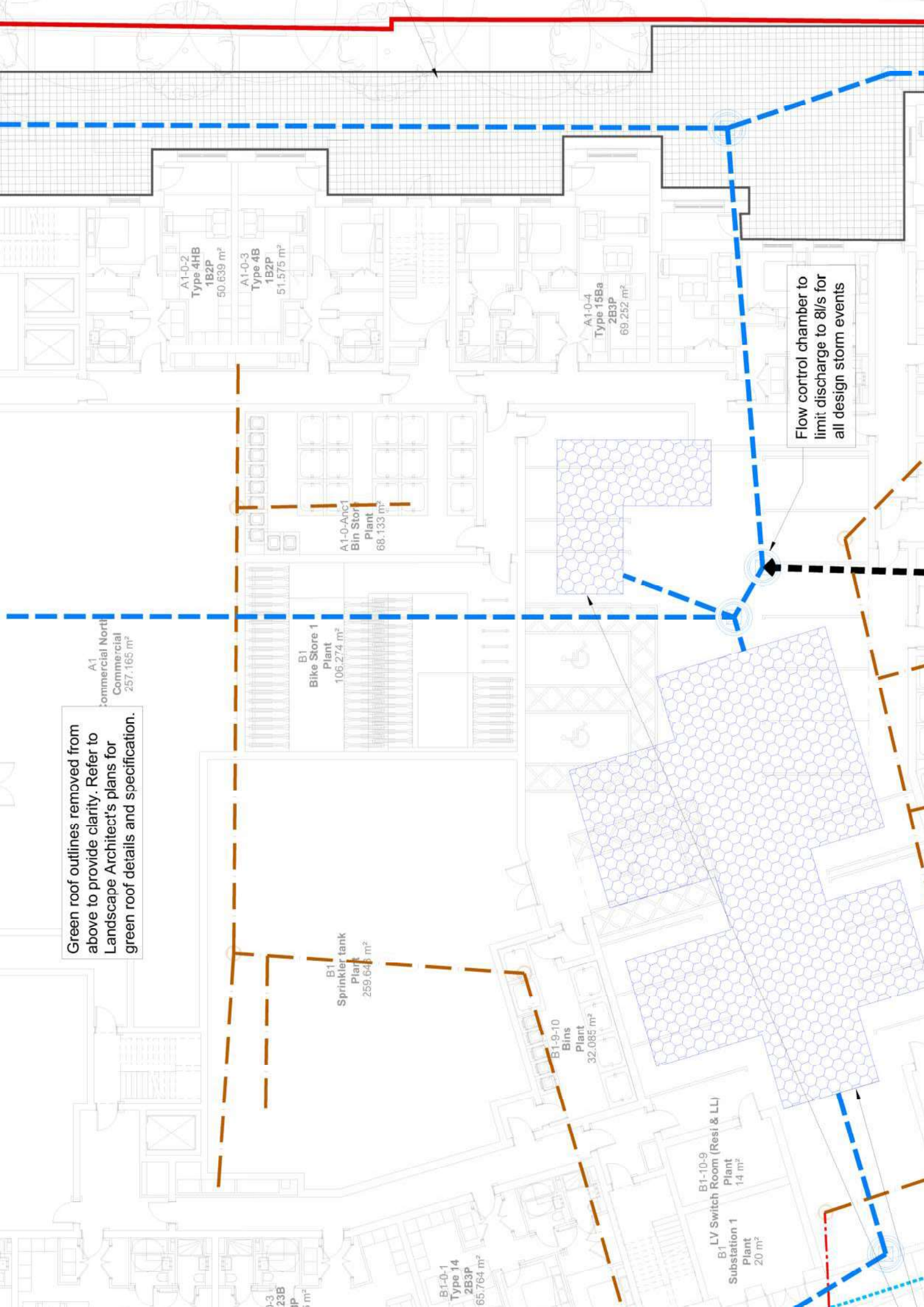
B1-9-10
Bins
Plant
32,085 m²

B1-10-9
LV Switch Room (Resi & LL)
Plant
14 m²

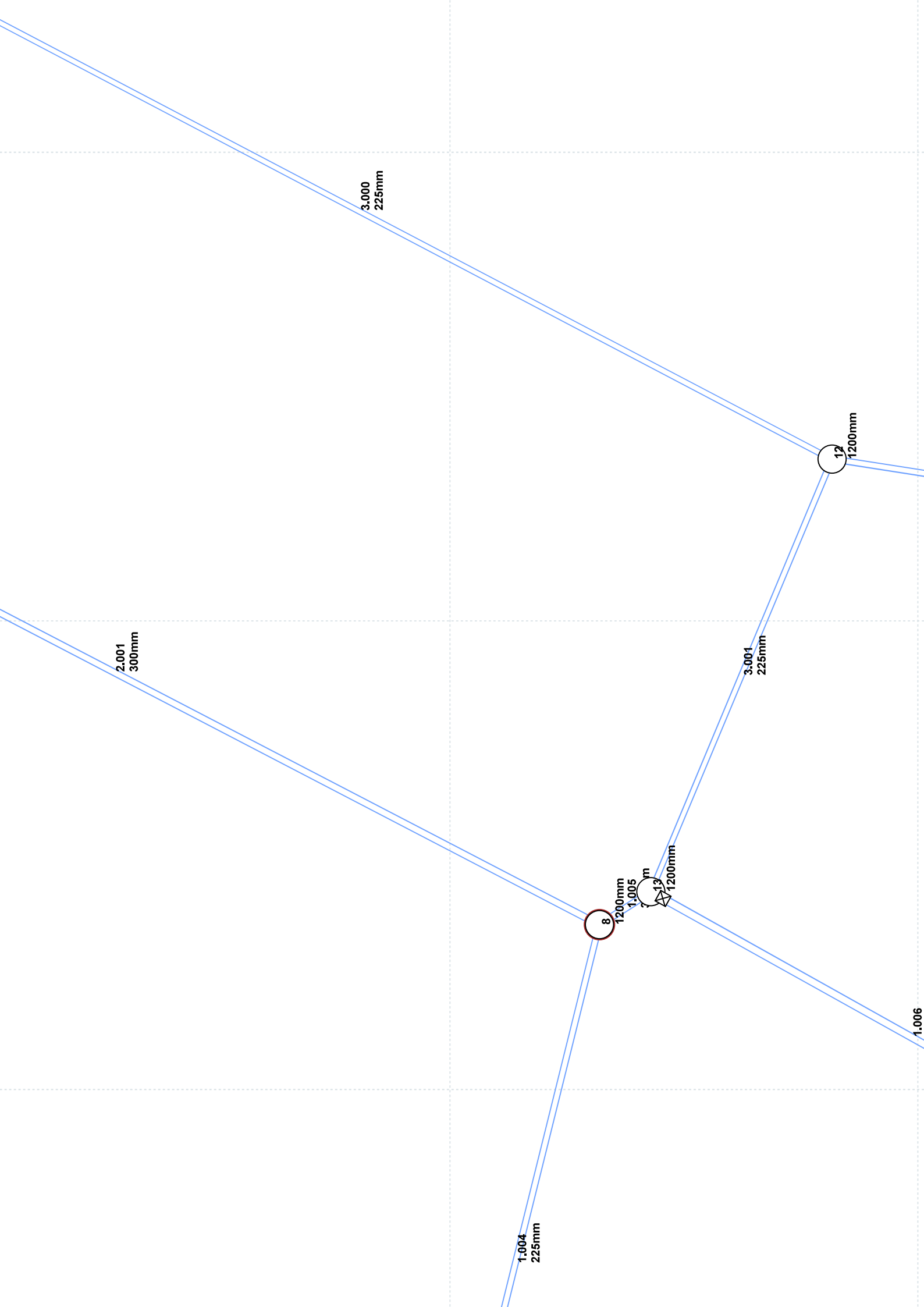
Substation 1
Plant
20 m²

B1-0-1
Type 14
2B3P
65,764 m²

Flow control chamber to limit discharge to 8/s for all design storm events



Appendix I - Hydraulic Calculations





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Surface Water Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
6	0.040	5.00	38.300	1200	471674.381	174082.358	0.850
1	0.040	5.00	38.500	600	471649.097	174084.501	1.050
7	0.040	5.00	38.300	1200	471688.611	174075.154	1.100
2	0.040	5.00	38.500	600	471643.187	174082.927	1.100
8	0.040	5.00	38.600	1200	471667.037	174033.611	1.650
9	0.040	5.00	38.500	600	471708.118	174064.145	1.100
10	0.040	5.00	38.500	600	471677.688	173999.937	1.150
11	0.040	5.00	38.500	1200	471685.721	174015.996	1.300
12	0.040	5.00	38.500	1200	471686.906	174023.665	1.350
3	0.040	5.00	38.600	600	471637.226	174071.227	1.300
4	0.040	5.00	38.600	1200	471637.262	174054.806	1.400
13	0.030	5.00	38.600	1200	471668.444	174031.415	1.700
13_OUT			38.450		471656.059	174009.182	1.650
5			38.600	1200	471638.157	174040.795	1.500



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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.000	6	7	15.950	0.600	37.450	37.275	0.175	91.1	225	5.19	50.0
1.003	4	5	14.040	0.600	37.200	37.100	0.100	140.4	225	5.76	50.0
2.001	7	8	46.811	0.600	37.200	37.000	0.200	234.1	300	5.96	50.0
1.000	1	2	6.116	0.600	37.450	37.400	0.050	122.3	225	5.09	50.0
1.005	8	13	2.608	0.600	36.950	36.900	0.050	52.2	300	6.32	50.0
3.000	9	12	45.701	0.600	37.400	37.150	0.250	182.8	225	5.79	50.0
4.000	10	11	17.956	0.600	37.350	37.200	0.150	119.7	225	5.25	50.0
4.001	11	12	7.760	0.600	37.200	37.150	0.050	155.2	225	5.37	50.0
3.001	12	13	20.023	0.600	37.150	36.900	0.250	80.1	225	6.02	50.0
1.002	3	4	16.421	0.600	37.300	37.200	0.100	164.2	225	5.55	50.0
1.004	5	8	29.760	0.600	37.100	36.950	0.150	198.4	225	6.30	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.000	1.370	54.5	7.6	0.625	0.800	0.040	0.0	57	0.972
1.003	1.101	43.8	30.4	1.175	1.275	0.160	0.0	138	1.188
2.001	1.023	72.3	15.2	0.800	1.300	0.080	0.0	93	0.814
1.000	1.181	46.9	7.6	0.825	0.875	0.040	0.0	61	0.873
1.005	2.181	154.2	53.1	1.350	1.400	0.280	0.0	121	1.984
3.000	0.964	38.3	7.6	0.875	1.125	0.040	0.0	68	0.756
4.000	1.194	47.5	7.6	0.925	1.075	0.040	0.0	60	0.876
4.001	1.047	41.6	15.2	1.075	1.125	0.080	0.0	94	0.965
3.001	1.462	58.1	30.4	1.125	1.475	0.160	0.0	116	1.478
1.002	1.017	40.5	22.8	1.075	1.175	0.120	0.0	121	1.047
1.004	0.924	36.8	30.4	1.275	1.425	0.160	0.0	156	1.029



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Links

Name	US Node	DS Node	Length (m)	ks (mm)/n	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.006	13	13_OUT	25.450	0.600	36.900	36.800	0.100	254.5	300	6.75	50.0	
1.001	2	3	13.131	0.600	37.400	37.300	0.100	131.3	225	5.28	50.0	
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)			
1.006	0.981	69.3	89.2	1.400	1.350	0.470	0.0	300	0.993			
1.001	1.139	45.3	15.2	0.875	1.075	0.080	0.0	89	1.026			

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
	FSR Region	England and Wales	Winter CV	Additional Storage (m³/ha)	0.0
	M5-60 (mm)	17.000	Analysis Speed	Check Discharge Rate(s)	x
	Ratio-R	0.400	Skip Steady State	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	40	0	0
30	35	0	0				

Node 13 Online Hydro-Brake® Control

Flap Valve	x	Design Depth (m)	0.800	Product Number	CTL-SCU-0090-7500-0800-7500
Downstream Link	1.006	Design Flow (l/s)	7.5	Min Outlet Diameter (m)	0.150
Replaces Downstream Link	✓	Objective (CU)	Linear Discharge	Min Node Diameter (mm)	1200
Invert Level (m)	36.900	Sump Available	✓		



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Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	36.950
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	252

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	260.0	0.0	0.800	260.0	0.0
			0.801	0.0	0.0

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	37.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	168

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	30.0	0.0	0.150	30.0	0.0
			0.151	0.0	0.0

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	37.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	9

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	33.0	0.0	0.150	33.0	0.0
			0.151	0.0	0.0



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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event		US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter		6	12	37.493	0.043	6.2	1.2847	0.0000	OK
15 minute winter		1	13	37.495	0.045	6.2	1.4227	0.0000	OK
15 minute winter		7	12	37.273	0.073	9.5	0.0823	0.0000	OK
15 minute winter		2	11	37.470	0.070	9.3	0.0197	0.0000	OK
180 minute winter		8	144	37.121	0.171	12.8	42.4087	0.0000	OK
15 minute winter		9	10	37.460	0.060	6.2	0.0169	0.0000	OK
15 minute winter		10	10	37.404	0.054	6.2	0.0154	0.0000	OK
15 minute winter		11	10	37.293	0.093	12.3	0.1051	0.0000	OK
15 minute winter		12	11	37.250	0.100	24.2	0.1129	0.0000	OK
15 minute winter		3	11	37.400	0.100	15.0	0.0282	0.0000	OK
15 minute winter		4	11	37.319	0.119	20.8	0.1348	0.0000	OK
15 minute summer		13	9	37.133	0.233	27.1	0.2636	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	6	2.000	7	4.2	0.807	0.077	0.0835
15 minute winter	1	1.000	2	3.9	0.536	0.082	0.0478
15 minute winter	7	2.001	8	9.2	0.708	0.127	0.6087
15 minute winter	2	1.001	3	9.2	0.679	0.204	0.1798
180 minute winter	8	1.005	13	8.3	0.507	0.054	0.1266
15 minute winter	9	3.000	12	6.0	0.479	0.156	0.5795
15 minute winter	10	4.000	11	6.1	0.543	0.129	0.2048
15 minute winter	11	4.001	12	12.0	0.748	0.289	0.1251
15 minute winter	12	3.001	13	23.9	0.964	0.412	0.5448
15 minute winter	3	1.002	4	15.0	0.784	0.371	0.3145
15 minute winter	4	1.003	5	20.9	0.919	0.476	0.3185
15 minute summer	13	Hydro-Brake®	13 OUT	4.2			



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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event		US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer		13_OUT	1	36.800	0.000	4.2	0.0000	0.0000	OK
15 minute winter		5	11	37.231	0.131	20.9	0.1484	0.0000	OK
Link Event (Upstream Depth)		US Node	Link DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)	
15 minute winter		5	1.004	8	21.1	1.459	0.573	0.4781	



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Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	6	12	37.529	0.079	15.7	2.3268	0.0000	OK
15 minute winter	1	13	37.588	0.138	20.8	4.3576	0.0000	OK
180 minute winter	7	176	37.466	0.266	7.4	0.3005	0.0000	OK
15 minute winter	2	12	37.584	0.184	22.4	0.0520	0.0000	OK
180 minute winter	8	176	37.466	0.516	36.9	127.9417	0.0000	SURCHARGED
15 minute winter	9	10	37.498	0.098	15.7	0.0278	0.0000	OK
15 minute winter	10	12	37.495	0.145	15.7	0.0411	0.0000	OK
15 minute winter	11	12	37.484	0.284	31.3	0.3211	0.0000	SURCHARGED
180 minute winter	12	176	37.466	0.316	14.8	0.3572	0.0000	SURCHARGED
15 minute winter	3	12	37.564	0.264	34.7	0.0749	0.0000	SURCHARGED
15 minute winter	4	11	37.489	0.289	45.9	0.3265	0.0000	SURCHARGED
180 minute winter	13	172	37.466	0.566	17.4	0.6406	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	6	2.000	7	13.1	1.102	0.241	0.1900	
15 minute winter	1	1.000	2	16.1	0.784	0.343	0.1832	
180 minute winter	7	2.001	8	7.3	0.520	0.102	3.1925	
15 minute winter	2	1.001	3	23.9	0.796	0.529	0.4892	
180 minute winter	8	1.005	13	-12.3	-0.204	-0.080	0.1837	
15 minute winter	9	3.000	12	15.3	0.561	0.401	1.2883	
15 minute winter	10	4.000	11	15.6	0.632	0.328	0.6003	
15 minute winter	11	4.001	12	27.6	0.855	0.662	0.3086	
180 minute winter	12	3.001	13	14.6	0.478	0.252	0.7963	
15 minute winter	3	1.002	4	32.0	0.843	0.791	0.6531	
15 minute winter	4	1.003	5	43.3	1.088	0.988	0.5584	
180 minute winter	13	Hydro-Brake®	13_OUT	6.4				126.9



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Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	13_OUT	1	36.800	0.000	4.8	0.0000	0.0000	OK
180 minute winter	5	172	37.466	0.366	14.7	0.4141	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	5	1.004	8	13.9	0.831	0.379	1.1836	



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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	6	228	37.659	0.209	4.4	4.5251	0.0000	OK
15 minute winter	1	12	38.237	0.787	30.7	4.9409	0.0000	FLOOD RISK
240 minute winter	7	228	37.658	0.458	8.2	0.5186	0.0000	SURCHARGED
15 minute winter	2	12	38.227	0.827	39.8	0.2341	0.0000	FLOOD RISK
240 minute winter	8	228	37.658	0.708	37.9	175.7759	0.0000	SURCHARGED
15 minute winter	9	11	37.795	0.395	21.0	0.1117	0.0000	SURCHARGED
15 minute winter	10	11	37.836	0.486	21.0	0.1376	0.0000	SURCHARGED
15 minute winter	11	11	37.803	0.603	40.6	0.6825	0.0000	SURCHARGED
15 minute winter	12	11	37.739	0.589	74.7	0.6662	0.0000	SURCHARGED
15 minute winter	3	12	38.158	0.858	51.0	0.2429	0.0000	SURCHARGED
15 minute winter	4	12	37.974	0.774	66.8	0.8756	0.0000	SURCHARGED
240 minute winter	13	224	37.660	0.760	18.1	0.8593	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	6	2.000	7	4.1	0.779	0.075	0.6237	
15 minute winter	1	1.000	2	18.8	0.849	0.400	0.2432	
240 minute winter	7	2.001	8	7.2	0.484	0.099	3.2964	
15 minute winter	2	1.001	3	32.1	0.808	0.710	0.5222	
240 minute winter	8	1.005	13	-12.2	-0.173	-0.079	0.1837	
15 minute winter	9	3.000	12	18.0	0.560	0.470	1.8176	
15 minute winter	10	4.000	11	19.6	0.643	0.412	0.7141	
15 minute winter	11	4.001	12	38.7	0.973	0.930	0.3086	
15 minute winter	12	3.001	13	73.4	1.846	1.263	0.7963	
15 minute winter	3	1.002	4	48.2	1.211	1.191	0.6531	
15 minute winter	4	1.003	5	63.9	1.607	1.460	0.5584	
240 minute winter	13	Hydro-Brake®	13_OUT	7.3				165.9



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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US		Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node		Flood (m³)	Status
	Node	13_OUT					Vol (m³)	Vol (m³)		
15 minute summer	13_OUT	5	1	36.800	0.000	5.4	0.0000	0.0000	OK	
15 minute winter	5		13	37.691	0.591	63.9	0.6682	0.0000	SURCHARGED	
Link Event (Upstream Depth)	US		Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap		Link Vol (m³)	Discharge Vol (m³)
	Node	5					Vol (m³)	Vol (m³)		
15 minute winter	5		1.004	8	62.8	1.587	1.708	1.1836		



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File: 700135-HEX-ZZ-ZZ-CA-C-9290-P04_Hydra
Network: Storm Network
Matt Freeman
01/07/2024

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700113-HEX-00-XX-CA-C-9290-P04
Norman Place, Reading
Surface Water Hydraulic Calculations

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.93%

Node Event		US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	6	184	37.485	0.035	2.9	1.0319	0.0000	OK	
360 minute summer	1	184	37.487	0.037	2.9	1.1640	0.0000	OK	
360 minute winter	7	280	37.436	0.236	4.2	0.2667	0.0000	OK	
360 minute summer	2	184	37.454	0.054	5.6	0.0152	0.0000	OK	
360 minute winter	8	280	37.436	0.486	19.1	120.5385	0.0000	SURCHARGED	
360 minute summer	9	184	37.441	0.041	2.9	0.0117	0.0000	OK	
360 minute winter	10	280	37.436	0.086	2.1	0.0243	0.0000	OK	
360 minute winter	11	280	37.436	0.236	4.2	0.2670	0.0000	SURCHARGED	
360 minute winter	12	280	37.436	0.286	8.4	0.3235	0.0000	SURCHARGED	
360 minute winter	3	280	37.437	0.137	6.3	0.0387	0.0000	OK	
360 minute winter	4	280	37.437	0.237	8.5	0.2676	0.0000	SURCHARGED	
360 minute winter	13	272	37.435	0.535	10.0	0.6052	0.0000	SURCHARGED	
Link Event (Upstream Depth)		US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	6	2.000		7	2.7	0.712	0.050	0.1358	
360 minute summer	1	1.000		2	2.7	0.482	0.057	0.0350	
360 minute winter	7	2.001		8	4.2	0.441	0.058	3.0388	
360 minute summer	2	1.001		3	5.6	0.617	0.123	0.1192	
360 minute winter	8	1.005		13	6.1	0.276	0.039	0.1837	
360 minute summer	9	3.000		12	2.9	0.390	0.075	0.9394	
360 minute winter	10	4.000		11	2.1	0.442	0.044	0.4819	
360 minute winter	11	4.001		12	4.2	0.572	0.101	0.3086	
360 minute winter	12	3.001		13	8.4	0.304	0.144	0.7963	
360 minute winter	3	1.002		4	6.4	0.679	0.157	0.5337	
360 minute winter	4	1.003		5	8.4	0.761	0.192	0.5584	
360 minute winter	13	Hydro-Brake®	13	OUT	6.2				168.5



Hexa Consulting Limited
Studio 22
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Surface Water Hydraulic Calculations

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US		Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node		Flood (m³)	Status
	Node	13_OUT					Vol (m³)	Vol (m³)		
360 minute summer			8	36.800	0.000	5.8	0.0000	0.0000	OK	
360 minute winter	5		280	37.436	0.336	8.4	0.3804	0.0000		SURCHARGED
Link Event (Upstream Depth)	US		Link	DS	Outflow (l/s)	Velocity (m/s)	Flow/Cap		Link Vol (m³)	Discharge Vol (m³)
	Node	Node					Vol (m³)	Vol (m³)		
360 minute winter	5		1.004	8	8.0	0.727	0.217	1.1836		