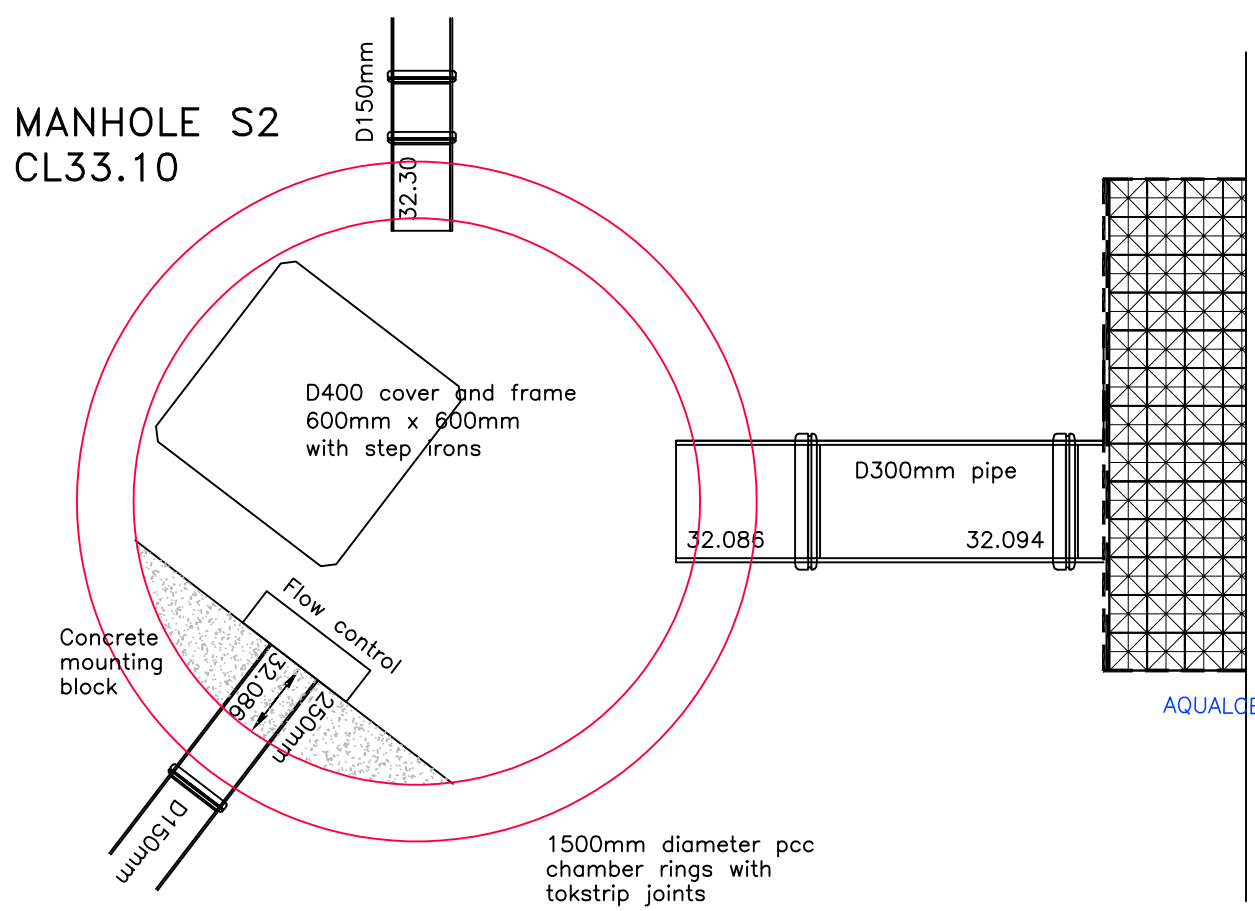
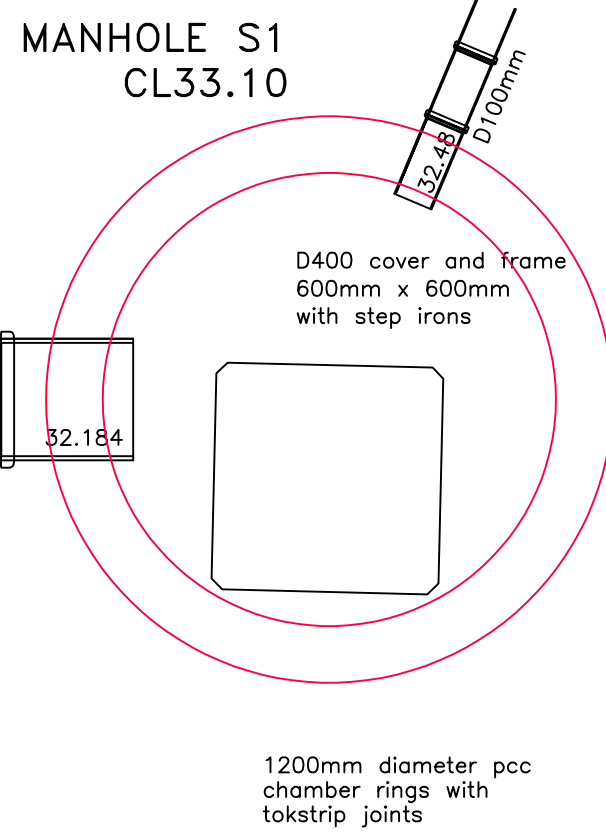
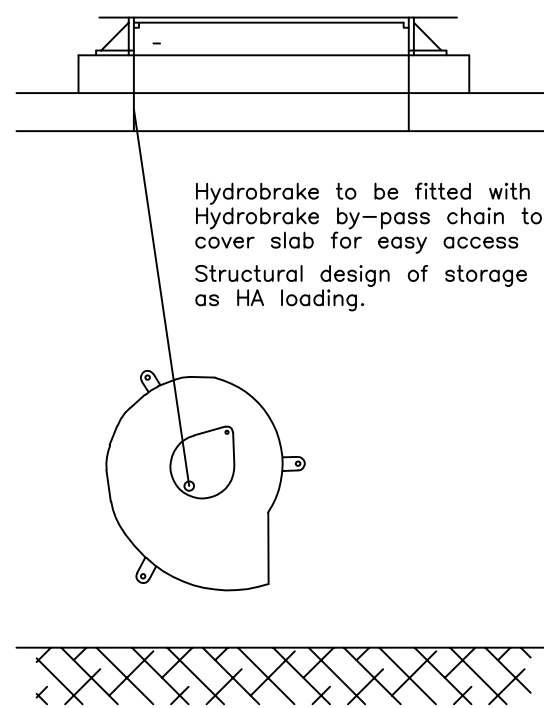




FLOW CONTROL ELEVATION

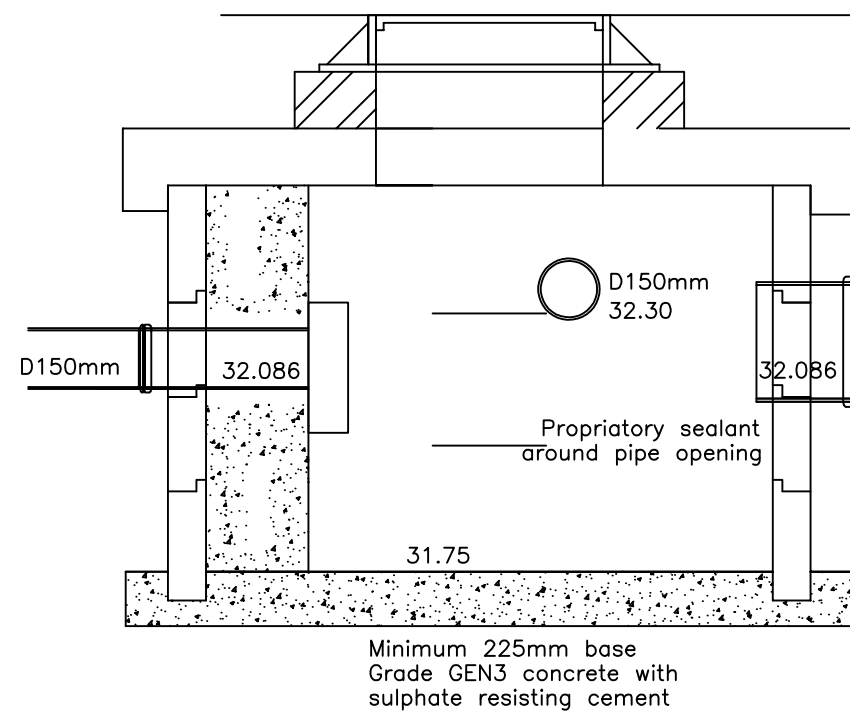


SEE WAVIN DRAWING FOR FULL DETAILS

S2 control manhole
Hydrobrake with
bypass door from
Hydro International UK
Shearwater House
Clevedon Hall Estate
Victoria Road
Clevedon BS21 7RD
Tel 01275 878371
MD-SH-0096-3500-0500-3500
Head 0.50m Flow 3.5 lts/sec

MANHOLE S2 CL33.10

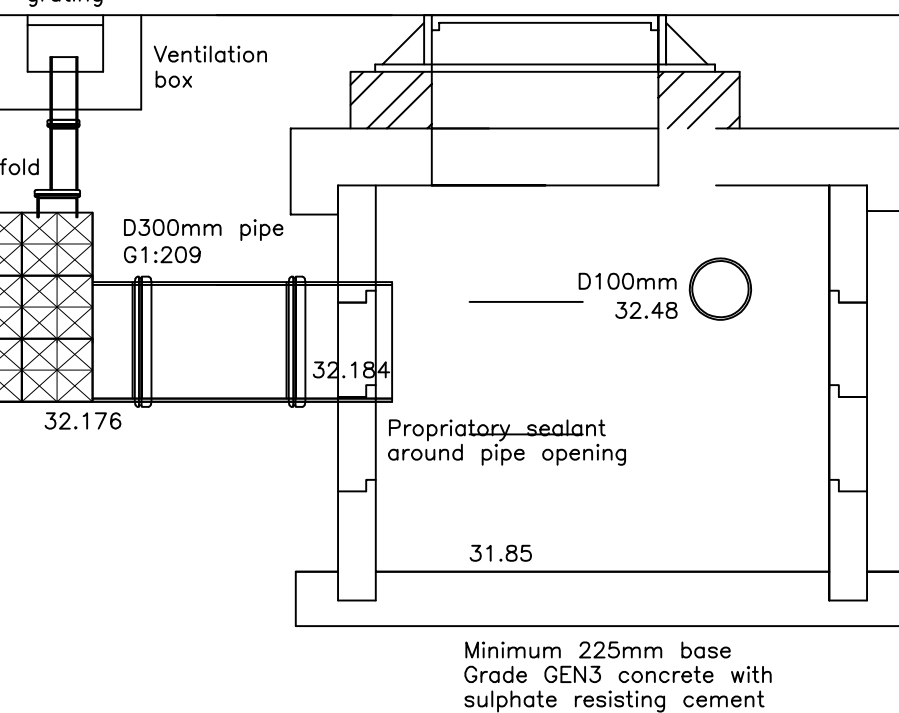
Manhole covers must have 600x600mm clear opening and shall be class D400 BSEN124 150mm deep frame



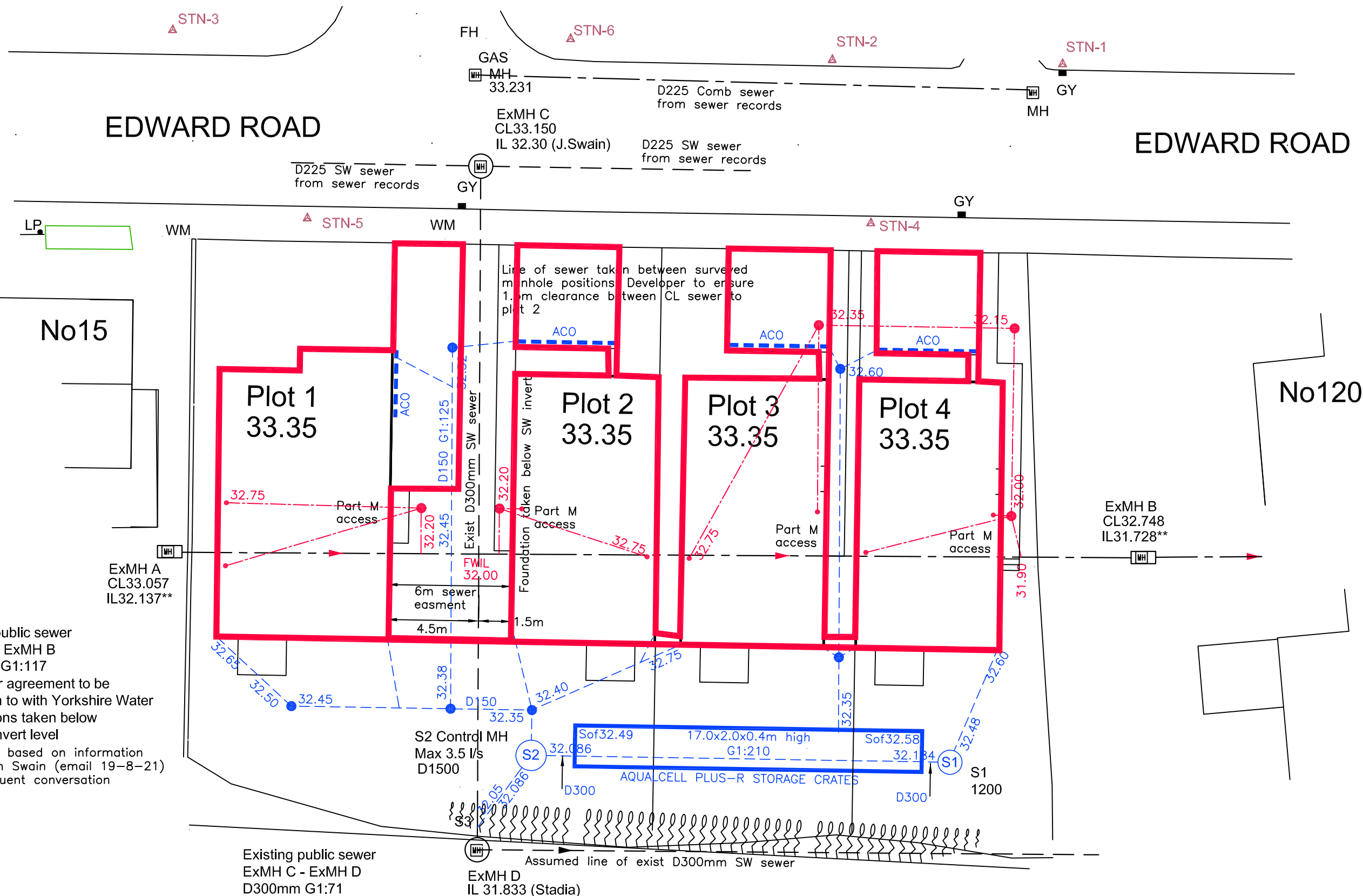
Reinforced concrete cover slab to be kitemarked and to BSEN1917:2002 bedded on mortar, proprietary bitumen or resin mastic sealant and to be kitemarked
Precast reinforced concrete chamber rings to BS5911 bedded on tokstrip jointing compound to form water tight seal
Ring to be built into manhole base concrete minimum 100mm
Grade GEN3 concrete sulphate resistant
Double width step irons to be type D class 1 complying with BSEN13101:2002 spaced at 250 mm centres to be cast in vertical alignment for manholes less than 6m to soffit, galvanised mild steel and plastic encapsulated steps are preferred.

MANHOLE S1 CL33.10

Manhole covers must have 600x600mm clear opening and shall be class D400 BSEN124 150mm deep frame



Reinforced concrete cover slab to be kitemarked and to BSEN1917:2002 bedded on mortar, proprietary bitumen or resin mastic sealant and to be kitemarked
Precast reinforced concrete chamber rings to BS5911 bedded on tokstrip jointing compound to form water tight seal
Ring to be built into manhole base concrete minimum 100mm
Grade GEN3 concrete sulphate resistant
Double width step irons to be type D class 1 complying with BSEN13101:2002 spaced at 250 mm centres to be cast in vertical alignment for manholes less than 6m to soffit, galvanised mild steel and plastic encapsulated steps are preferred.



IMPERMEABLE AREA = 510sqm

PRIVATE DRAINAGE

All drainage to comply with BS8301
100mm drains to be laid at minimum gradient 1 : 80, 150mm drains to be laid at minimum gradient 1 : 150.
All drainage to be 100mm diameter, unless otherwise stated. All final connections to main sewer to be 150mm diameter. All connections joints to remain flexible.
Drains passing under buildings to be retained flexible with a bed and surround of pea gravel. All drains to be bridged over with concrete lintels when passing through walls.
All foundations to be taken below invert level of localized drains where within 1.00m of foundations.
All sink wastes not connected to an inspection chamber or manhole to be connected via a roddable gully.
225mm dia inspection chambers to be laid at a maximum depth of 600mm below finished ground level.
450mm dia inspection chambers to be laid at a maximum depth of 1200mm below finished ground level.
1200 x 1000mm pc concrete sections to BS 5911 to be laid at a maximum depth of 3.00m below finished ground level.

--- Rodding eye
--- Aco channel or similar



GRID- Related to Ordnance Survey using One Point Localisation on Station S4. Orientation at OS Grid North.
LEVEL- Related to Ordnance Survey by connection to the OS Active Network by G.P.S.

- F. Storage structure details added 8-10-21
E. Note revised a client instruction 7-10-21
D. Layout revised as Architects plan. Storage increased drainage adjusted 7-10-21
C. Note added to 1.5m offset easement following YW email 24/9/21. other dimensions removed for client / architect consideration. 106 note added 27-9-21
B. Plots 1-3 adjusted to give 1.2m Part M access & maintain offset sewer easement 14-9-21
A. Plot 3 annotated part M rear access. Layout revised as client instruction 27-8-21

DRAINAGE STRATEGY

SURFACE WATER

An existing D300mm surface water sewer passes through the site north to south. After extensive discussions with YW we intend to design around the surveyed position with an offset 6.0m easement, as agreed
Surface water from the development will be collected in a cellular storage structure 17.0x2.0x0.4m high, discharge from which will be limited to 3.5 l/s as YW response U309205.
The storage will be designed to accommodate the 100year storm with a 40% allowance for climate change.

FOUL WATER

An existing D150mm combined sewer passes through the site west to east. It intended to enter in to a build over agreement with YW. The sewer will be CCTV surveyed to ensure no defects prior to construction and after to ensure the pipe is in good condition.
Adjacent foundation taken below invert level

Trial holes to be taken at all drainage crossing points and checked prior to ANY work on site



R.A.B.
ENGINEERING
DESIGN LTD

12 BERRY HOLME CLOSE
SHEFFIELD S35 1AB
TEL.(0114)2464871

Blackstone Developments

Edward Road, Barnsley
Proposed drainage layout
IMPERMEABLE AREAS

DRAWN BY rab
SCALE 1:200 (A1) DATE Aug21
DRAWING No 1139-1-imp REV F

PRELIMINARY ONLY

Technical Specification

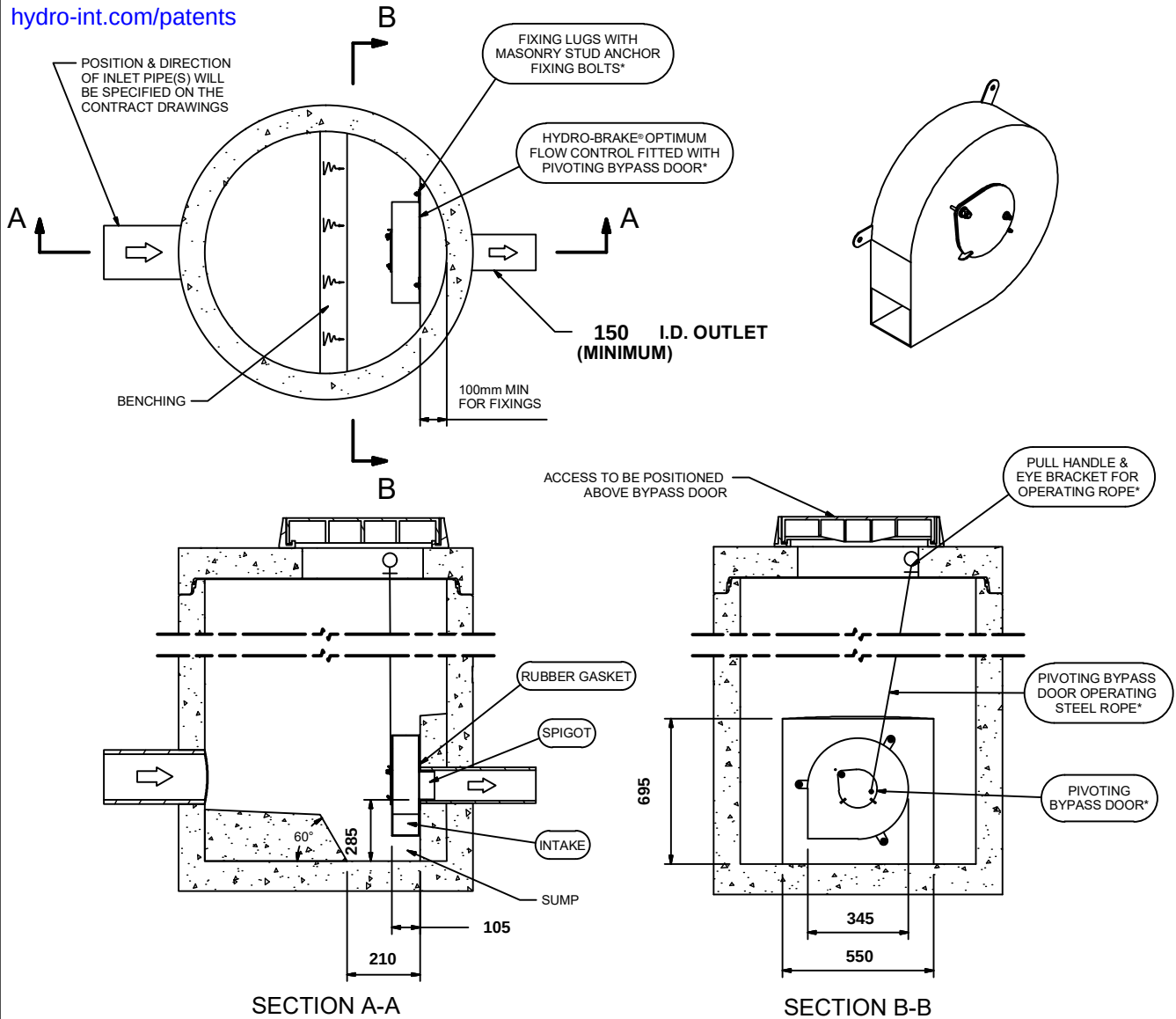
Control Point	Head (m)	Flow (l/s)
Primary Design	0.500	3.500
Flush-Flo™	0.162	3.487
Kick-Flo®	0.359	3.010
Mean Flow		2.928

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



hydro-int.com/patents



IMPORTANT: ○ LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
 ALL CIVIL AND INSTALLATION WORK BY OTHERS
 * WHERE SUPPLIED
 HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
 CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0096-3500-0500-3500 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International®

DATE 10/8/2021 8:57 AM

SITE

DESIGNER richard bland

REF Edward road

SHE-0096-3500-0500-3500

Hydro-Brake® Optimum

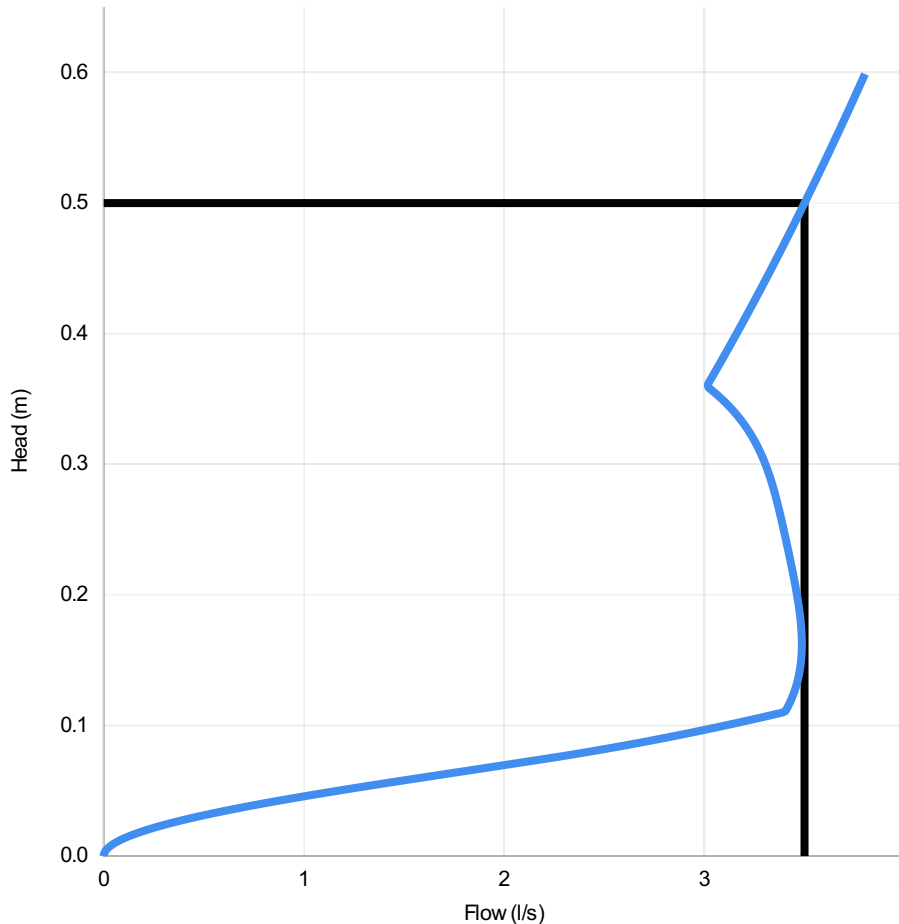
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.500	3.500
Flush-Flo	0.162	3.487
Kick-Flo®	0.359	3.010
Mean Flow		2.928



PT/329/0412

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Head (m)	Flow (l/s)
0.000	0.000
0.017	0.161
0.034	0.599
0.052	1.237
0.069	1.970
0.086	2.655
0.103	3.206
0.121	3.436
0.138	3.471
0.155	3.485
0.172	3.484
0.190	3.473
0.207	3.454
0.224	3.432
0.241	3.408
0.259	3.383
0.276	3.355
0.293	3.321
0.310	3.276
0.328	3.212
0.345	3.121
0.362	3.020
0.379	3.085
0.397	3.148
0.414	3.210
0.431	3.270
0.448	3.329
0.466	3.387
0.483	3.444
0.500	3.500

DESIGN ADVICE



The head/flow characteristics of this SHE-0096-3500-0500-3500 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International

DATE 08/10/2021 08:57

Site

DESIGNER richard bland

Ref Edward road

SHE-0096-3500-0500-3500

Hydro-Brake Optimum®

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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 - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	40
Ratio R	0.375	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	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.	0.750	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	Auto Design
1.000	17.000	0.086	197.7	0.010	4.00	0.0	0.600	[]	-3	Pipe/Conduit	
1.001	2.150	0.012	179.2	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	4.410	0.036	122.5	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)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.15	32.184	0.010	0.0	0.0	0.5	1.85	1477.0	1.9
1.001	50.00	4.18	32.098	0.051	0.0	0.0	2.8	1.17	82.8	9.7
1.002	50.00	4.27	32.086	0.051	0.0	0.0	2.8	0.91	16.0	9.7

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \ / open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
-3	[]	2000	400	90.0		0.667	0.800

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<p style="text-align: center;"><u>Simulation Criteria for Storm</u></p> <p> Volumetric Runoff Coeff 0.840 Additional Flow - % of Total Flow 40.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 0.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 </p> <p> Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 </p> <p style="text-align: center;"><u>Synthetic Rainfall Details</u></p> <p> Rainfall Model FSR Profile Type Winter Return Period (years) 1 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 19.000 Storm Duration (mins) 15 Ratio R 0.375 </p>		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 3, DS/PN: 1.002, Volume (m³): 2.7

Unit Reference	MD-SHE-0096-3500-0500-3500
Design Head (m)	0.500
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	96
Invert Level (m)	32.086
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	3.5
Flush-Flo™	0.162	3.5
Kick-Flo®	0.359	3.0
Mean Flow over Head Range	-	2.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1	1.200	5.2	3.000	8.1	7.000	12.1
0.200	3.5	1.400	5.6	3.500	8.7	7.500	12.6
0.300	3.3	1.600	6.0	4.000	9.2	8.000	13.0
0.400	3.2	1.800	6.3	4.500	9.8	8.500	13.4
0.500	3.5	2.000	6.7	5.000	10.3	9.000	13.8
0.600	3.8	2.200	7.0	5.500	10.7	9.500	14.1
0.800	4.3	2.400	7.3	6.000	11.2		
1.000	4.8	2.600	7.5	6.500	11.7		

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Summary of Results for 15 minute 1 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

		Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow / Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	Status
1.000	1 32.211		-0.373	0.000	0.00	1.9	OK
1.001	2 32.211		-0.187	0.000	0.07	3.7	OK
1.002	3 32.211		-0.025	0.000	0.27	3.3	OK

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Summary of Results for 30 minute 1 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

		Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow / Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	Status
1.000	1	32.215	-0.369	0.000	0.00	1.5	OK
1.001	2	32.215	-0.183	0.000	0.07	3.6	OK
1.002	3	32.216	-0.020	0.000	0.28	3.3	OK

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Network 2019.1

Summary of Results for 60 minute 1 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

		Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow / Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	Status
1.000	1 32.204		-0.380	0.000	0.00	1.0	OK
1.001	2 32.204		-0.194	0.000	0.06	3.4	OK
1.002	3 32.207		-0.029	0.000	0.27	3.2	OK

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Summary of Results for 15 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.366	-0.218	0.000	0.00		4.6	OK
1.001	2	32.366	-0.032	0.000	0.09		5.0	OK
1.002	3	32.370	0.134	0.000	0.29		3.5	SURCHARGED

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Network 2019.1

Summary of Results for 30 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.400	-0.184	0.000	0.00		3.5	OK
1.001	2	32.400	0.002	0.000	0.09		4.6	SURCHARGED
1.002	3	32.399	0.163	0.000	0.29		3.5	SURCHARGED

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Summary of Results for 60 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.401	-0.183	0.000	0.00		2.3	OK
1.001	2	32.401	0.003	0.000	0.11		5.9	SURCHARGED
1.002	3	32.459	0.223	0.000	0.29		3.5	SURCHARGED

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Summary of Results for 15 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Pipe	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	Flow	Status
							(l/s)	
1.000	1	32.450	-0.134	0.000	0.01		6.0	OK
1.001	2	32.450	0.052	0.000	0.10		5.6	SURCHARGED
1.002	3	32.449	0.213	0.000	0.29		3.5	SURCHARGED

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Summary of Results for 30 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.520	-0.064	0.000	0.00		4.6	OK
1.001	2	32.520	0.122	0.000	0.09		5.0	SURCHARGED
1.002	3	32.519	0.283	0.000	0.29		3.4	SURCHARGED

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Summary of Results for 60 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Pipe	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.549	-0.035	0.000	0.00		3.0	OK
1.001	2	32.549	0.151	0.000	0.11		5.8	SURCHARGED
1.002	3	32.557	0.321	0.000	0.29		3.5	SURCHARGED

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Summary of Results for 120 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

			Water	Surcharged	Flooded		Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1	32.468	-0.116	0.000	0.00		1.9	OK
1.001	2	32.468	0.070	0.000	0.15		7.9	SURCHARGED
1.002	3	32.609	0.373	0.000	0.29		3.4	SURCHARGED