HOLLOW/
IENNINC

Bm/5017/Drainstrat

Drainage Strategy, Land of Lancaster Lane, Brockholes

Report Date:
11 May 2020

Engineer:
Brian Menmuir

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Registered in England and Wales No. 06689016

Introduction

Purpose of the Assessment

Holloway Jennings have been commissioned to undertake a Sustainable Drainage Strategy to support the planning application in respect of proposed residential development located off Lancaster Lane, Brockholes.

Site location and Description

The proposed development site is a greenfield site within an existing residential area, located to the east of Brockholes town centre. The existing site area covers approximately 0.47 ha. The site is all green space with the exception of the existing Lancaster Lane. Existing site access is via Lancaster Lane.

The existing site is triangular in shape bounded by A616 to the west, Lancaster Lane to the east with a potential development site to the south. The surrounding area is mainly residential uses with light industry to the north.

No drainage systems are currently installed on site.

Development Proposals

The proposed development is for nine new residential units to be constructed along with associated access roads/paths. See attached drawings 5017 -\701D and -\702E for locations and size of proposed developments.

Existing access to the site will be retained off Lancaster Lane although this will be modified. The entrance to Lancaster Lane off River Holme View will be upgraded to allow access to the development.

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Drainage Management

See attached drawings 5017 -\601B and -\602B for proposed drainage layout.

Surface Water

Due to the space restrictions on site a SUDs system capable of attenuating the surface water is unpractical. As such it is proposed to attenuate on site via a private drainage system and discharge into the existing sewer network via a flow regulated manhole. The proposals show new surface water discharges connecting into the existing public sewer on River Holme Road. The existing manhole on River Holme View will be relocated to allow the surface water connection. Where existing pipes are now redundant, they should be fully removed or grouted.

The new drainage system will be privately maintained and has been designed to accommodate the run-off rates for the 1:30 and 1:100+40% climate events within storage tanks under the non-adopted highway. The run-off is discharged to the existing sewer through a hydro-brake limiting discharge to 5.0l/s.

There are no alterations to the layout/fall of any existing drains which would affect discharge rates.

Foul Water

New private foul network is connected to the existing via a repositioned manhole on River Holme View. The extra volume of foul waste is not considered as excessive and will not impact on the existing system.

Highway Drainage

Highway drainage servicing the adopted highway has been designed to store run-off from 1:30 and 1:100+40% climate events. It is discharged into a relocated manhole on River Holme View via a hydro-brake limiting flow to 5.0l/s.

Maintenance

An on-going maintenance scheme will be agreed in regard to private systems.

Inspection Chambers and Gully Traps

It is recommended that the chambers/traps be inspected monthly for the first three months and thereafter at six monthly intervals. Emptying to be determined on site subject to silt collection rate.

Geo cellular Units

The major aim of the maintenance regime for this type of storage system is to prevent siltation of the throughflow / distribution pipes or of the modular storage system itself. A catch pit chamber upstream of the tank is recommended and its sump would require regular cleaning so it is not allowed to overfill and let silt enter the distribution pipes. The frequency at which the catch pit should be emptied needs to be determined on site. It is recommended that the system be inspected monthly for the first three months and thereafter at six monthly intervals. In addition, it is suggested that the installation should be inspected immediately following the first major storm event after installation.

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Notes.

REV	COMMENT	DATE	DRAWN	CHECK
B	Drainage layout revised	18.05.20		
A	Drainage layout revised	15.04.20		

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DRAWING STATUS: APPROVAL

CLIENT: PETRAIN CONSTRUCTION

PROJECT: BROCKHOLES DEVELOPMENT LANCASTER LANE

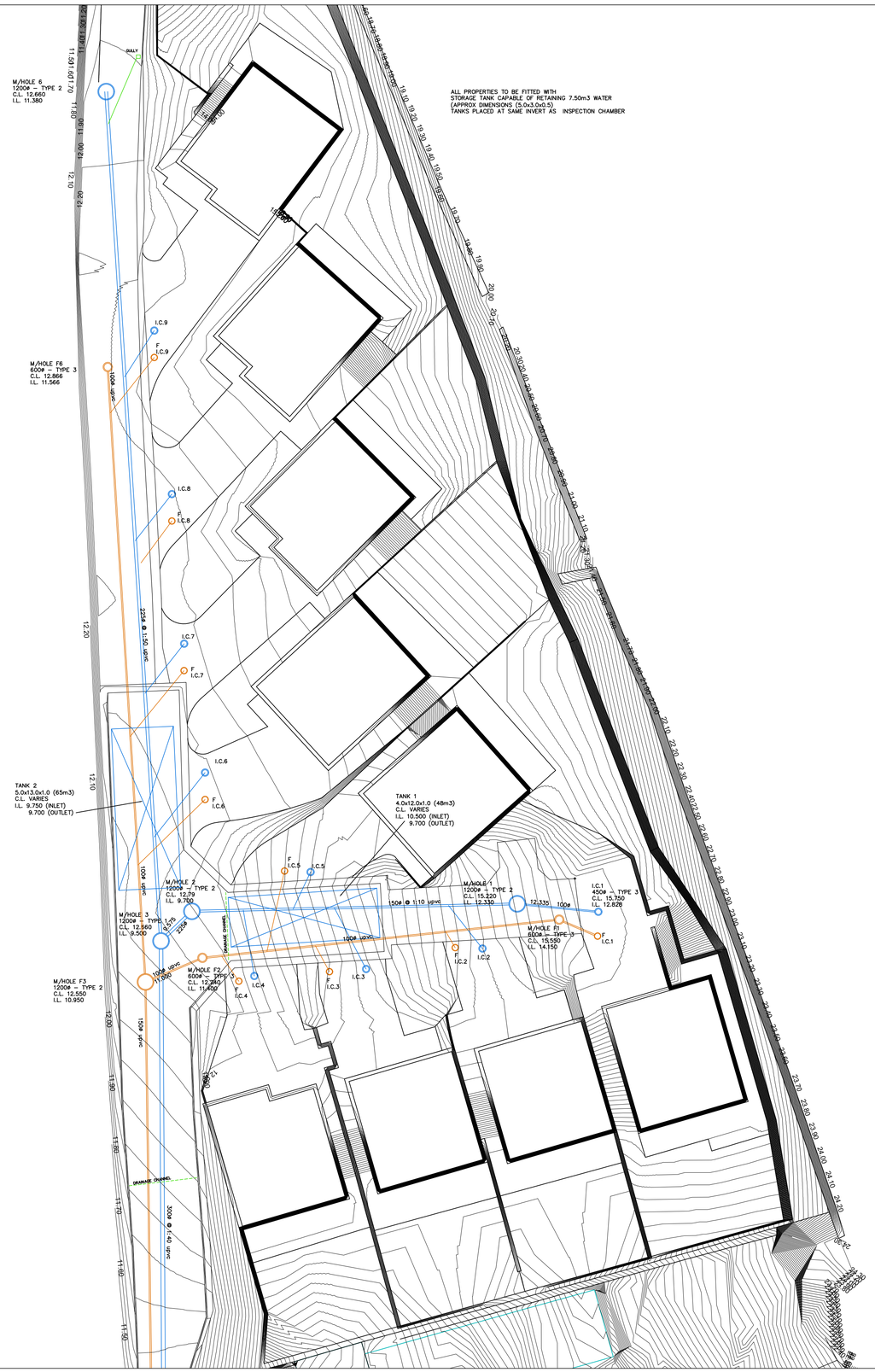
TITLE: PROPOSED DRAINAGE SHEET 1

DESIGNED:	CHECKED:	DRAWN:

SCALE @ SIZE:	DATE:
A1	APR 2020

PROJECT No:	DRAWING No:	REV:
5017	601	B

H-3-264-312



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REV	COMMENT	DATE	DRAWN	CHECK
B	Drainage layout revised	18.04.20		
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DRAWING STATUS:
APPROVAL

CLIENT:
PETRAIN CONSTRUCTION

PROJECT:
BROCKHOLES
DEVELOPMENT
LANCASTER LANE

TITLE:
PROPOSED DRAINAGE
SHEET 2

DESIGNED:	CHECKED:	DRAWN:

SCALE @ SIZE:	DATE:
A1	APR 2020

PROJECT No:	DRAWING No:	REV:
5017	602	B

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	x
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)
IC1	0.019	5.00	15.750	450	1081.835	1044.974	2.850
1	0.080	5.00	15.220	1200	1075.301	1045.608	2.920
2			12.790	1200	1049.100	1045.009	3.215
6	0.093	5.00	12.730	1200	1042.203	1111.002	1.830
3	0.039	5.00	12.660	1200	1046.615	1042.616	3.160
4	0.025	5.00	11.250	1500	1046.941	984.927	3.198
5			10.724	1200	1044.384	966.462	2.974
Existing			10.621		1040.905	960.242	3.021
Tank 1			13.430		1057.221	1045.194	3.630
Tank 2			12.680		1045.900	1053.703	2.980

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)
1.000	IC1	1	6.565	0.600	12.900	12.350	0.550	11.9	100	5.05	47.2
1.001	1	Tank 1	18.085	0.600	12.300	10.500	1.800	10.0	150	5.14	46.8
1.0011	Tank 1	2	8.123	0.600	9.800	9.575	0.225	36.1	150	5.22	46.5
1.002	2	3	3.450	0.600	9.700	9.500	0.200	17.2	225	5.24	46.5
2.000	6	Tank 2	57.418	0.600	10.900	9.750	1.150	49.9	225	5.52	45.5
2.0011	Tank 2	3	11.110	0.600	9.700	9.575	0.125	88.9	225	5.65	45.1
1.003	3	4	57.690	0.600	9.500	8.052	1.448	39.8	300	6.03	43.8
1.004	4	5	18.641	0.600	8.052	7.750	0.302	61.7	150	6.28	43.1
1.005	5	Existing	7.127	0.600	7.750	7.600	0.150	47.5	150	6.36	42.8

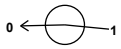
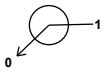
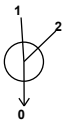
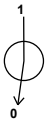
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.249	17.7	2.4	2.750	2.770	0.019	0.0	25	1.589
1.001	3.197	56.5	12.6	2.770	2.780	0.099	0.0	48	2.574
1.0011	1.680	29.7	12.5	3.480	3.065	0.099	0.0	68	1.607
1.002	3.165	125.9	12.5	2.865	2.935	0.099	0.0	48	2.045
2.000	1.855	73.8	11.5	1.605	2.705	0.093	0.0	59	1.352
2.0011	1.387	55.2	11.4	2.755	2.860	0.093	0.0	69	1.097
1.003	2.498	176.6	27.4	2.860	2.898	0.231	0.0	79	1.830
1.004	1.282	22.7	29.9	3.048	2.824	0.256	0.0	150	1.306
1.005	1.463	25.9	29.7	2.824	2.871	0.256	0.0	150	1.490

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	6.565	11.9	100	Circular_Default Sewer Type	15.750	12.900	2.750	15.220	12.350	2.770
1.001	18.085	10.0	150	Circular_Default Sewer Type	15.220	12.300	2.770	13.430	10.500	2.780
1.0011	8.123	36.1	150	Circular_Default Sewer Type	13.430	9.800	3.480	12.790	9.575	3.065
1.002	3.450	17.2	225	Circular_Default Sewer Type	12.790	9.700	2.865	12.660	9.500	2.935
2.000	57.418	49.9	225	Circular_Default Sewer Type	12.730	10.900	1.605	12.680	9.750	2.705
2.0011	11.110	88.9	225	Circular_Default Sewer Type	12.680	9.700	2.755	12.660	9.575	2.860
1.003	57.690	39.8	300	Circular_Default Sewer Type	12.660	9.500	2.860	11.250	8.052	2.898
1.004	18.641	61.7	150	Circular_Default Sewer Type	11.250	8.052	3.048	10.724	7.750	2.824
1.005	7.127	47.5	150	Circular_Default Sewer Type	10.724	7.750	2.824	10.621	7.600	2.871

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	IC1	450	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.001	1	1200	Manhole	Adoptable	Tank 1		Junction	
1.0011	Tank 1		Junction		2	1200	Manhole	Adoptable
1.002	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
2.000	6	1200	Manhole	Adoptable	Tank 2		Junction	
2.0011	Tank 2		Junction		3	1200	Manhole	Adoptable
1.003	3	1200	Manhole	Adoptable	4	1500	Manhole	Adoptable
1.004	4	1500	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.005	5	1200	Manhole	Adoptable	Existing		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
IC1	1081.835	1044.974	15.750	2.850	450				
						0	1.000	12.900	100
1	1075.301	1045.608	15.220	2.920	1200		1	1.000	12.350	100
							0	1.001	12.300	150
2	1049.100	1045.009	12.790	3.215	1200		1	1.0011	9.575	150
							0	1.002	9.700	225
6	1042.203	1111.002	12.730	1.830	1200					
						0	2.000	10.900	225
3	1046.615	1042.616	12.660	3.160	1200		1	2.0011	9.575	225
							2	1.002	9.500	225
							0	1.003	9.500	300
4	1046.941	984.927	11.250	3.198	1500		1	1.003	8.052	300
							0	1.004	8.052	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
5	1044.384	966.462	10.724	2.974	1200		1	1.004	7.750	150
							0	1.005	7.750	150
Existing	1040.905	960.242	10.621	3.021			1	1.005	7.600	150
Tank 1	1057.221	1045.194	13.430	3.630			1	1.001	10.500	150
							0	1.0011	9.800	150
Tank 2	1045.900	1053.703	12.680	2.980			1	2.000	9.750	225
							0	2.0011	9.700	225

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Detailed		

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 %)
2	0	0	0
30	0	0	0
100	40	0	0

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	8.052	Product Number	CTL-SHE-0083-5000-3000-5000
Design Depth (m)	3.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node Tank 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	9.800
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)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	48.0	0.0	1.000	48.0	0.0	1.001	0.0	0.0

Node Tank 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	9.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	65.0	0.0	1.000	65.0	0.0	1.001	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 93.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	12.930	0.030	3.2	0.0088	0.0000	OK
15 minute winter	1	10	12.356	0.056	16.5	0.0947	0.0000	OK
120 minute winter	2	96	9.852	0.277	11.9	0.3132	0.0000	OK
15 minute winter	6	10	10.969	0.069	15.4	0.1473	0.0000	OK
120 minute winter	3	96	9.851	0.351	13.6	0.4843	0.0000	SURCHARGED
120 minute winter	4	96	9.851	1.799	14.2	3.4599	0.0000	SURCHARGED
120 minute winter	5	96	7.791	0.041	3.9	0.0460	0.0000	OK
120 minute winter	Existing	96	7.640	0.040	3.9	0.0000	0.0000	OK
15 minute winter	Tank 1	12	9.868	0.068	16.3	3.0821	0.0000	OK
120 minute winter	Tank 2	96	9.851	0.151	10.6	9.3509	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	IC1	1.000	1	3.2	1.653	0.180	0.0126	
15 minute winter	1	1.001	Tank 1	16.3	2.739	0.289	0.1079	
120 minute winter	2	1.002	3	10.5	1.050	0.083	0.1178	
15 minute winter	6	2.000	Tank 2	14.9	1.461	0.202	0.5841	
120 minute winter	3	1.003	4	12.7	0.318	0.072	4.0625	
120 minute winter	4	Hydro-Brake®	5	3.9				
120 minute winter	5	1.005	Existing	3.9	1.043	0.153	0.0270	44.7
15 minute winter	Tank 1	1.0011	2	12.4	0.846	0.418	0.1028	
120 minute winter	Tank 2	2.0011	3	-5.8	0.863	-0.104	0.3788	

Results for 30 year Critical Storm Duration. Lowest mass balance: 93.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	12.943	0.043	6.0	0.0125	0.0000	OK
15 minute winter	1	10	12.381	0.081	31.0	0.1368	0.0000	OK
180 minute winter	2	148	10.141	0.566	8.9	0.6405	0.0000	SURCHARGED
15 minute winter	6	10	10.997	0.097	29.2	0.2092	0.0000	OK
180 minute winter	3	148	10.141	0.641	12.8	0.8837	0.0000	SURCHARGED
180 minute winter	4	156	10.141	2.089	12.3	4.0163	0.0000	SURCHARGED
180 minute winter	5	156	7.792	0.042	4.2	0.0477	0.0000	OK
180 minute winter	Existing	156	7.641	0.041	4.2	0.0000	0.0000	OK
120 minute winter	Tank 1	116	10.142	0.342	12.7	15.6038	0.0000	SURCHARGED
180 minute winter	Tank 2	148	10.141	0.441	15.6	27.2570	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	IC1	1.000	1	6.0	1.944	0.337	0.0201	
15 minute winter	1	1.001	Tank 1	30.8	3.216	0.546	0.1734	
180 minute winter	2	1.002	3	9.9	1.004	0.079	0.1372	
15 minute winter	6	2.000	Tank 2	28.3	1.740	0.383	0.9697	
180 minute winter	3	1.003	4	10.9	0.324	0.062	4.0625	
180 minute winter	4	Hydro-Brake®	5	4.2				
180 minute winter	5	1.005	Existing	4.2	1.064	0.164	0.0284	91.1
120 minute winter	Tank 1	1.0011	2	9.6	0.683	0.324	0.1430	
180 minute winter	Tank 2	2.0011	3	-8.3	0.847	-0.151	0.4419	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 93.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	12.959	0.059	10.8	0.0172	0.0000	OK
15 minute winter	1	10	12.424	0.124	56.2	0.2076	0.0000	OK
240 minute winter	2	228	11.017	1.442	6.3	1.6305	0.0000	SURCHARGED
15 minute winter	6	10	11.040	0.140	52.9	0.3011	0.0000	OK
240 minute winter	3	228	11.017	1.517	18.5	2.0898	0.0000	SURCHARGED
240 minute winter	4	228	11.015	2.963	9.3	5.6988	0.0000	FLOOD RISK
240 minute winter	5	228	7.796	0.046	5.0	0.0520	0.0000	OK
240 minute winter	Existing	228	7.645	0.045	5.0	0.0000	0.0000	OK
240 minute winter	Tank 1	228	11.018	1.218	12.7	45.6228	0.0000	SURCHARGED
240 minute winter	Tank 2	228	11.017	1.317	16.0	61.7809	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	IC1	1.000	1	10.8	2.035	0.609	0.0361	
15 minute winter	1	1.001	Tank 1	55.8	3.532	0.987	0.2996	
240 minute winter	2	1.002	3	15.8	0.920	0.126	0.1372	
15 minute winter	6	2.000	Tank 2	51.6	2.002	0.699	1.7780	
240 minute winter	3	1.003	4	8.3	0.362	0.047	4.0625	
240 minute winter	4	Hydro-Brake®	5	5.0				
240 minute winter	5	1.005	Existing	5.0	1.112	0.193	0.0319	120.5
240 minute winter	Tank 1	1.0011	2	6.3	0.471	0.214	0.1430	
240 minute winter	Tank 2	2.0011	3	-6.5	0.779	-0.117	0.4419	