Appendix F

Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Chris Heath
Site name:	LONUX
Site location:	Hayes

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.51205° N
Longitude:	0.39467° W
Reference:	4158160609
Date:	Feb 04 2025 15:34

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	2.833

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	617	617
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

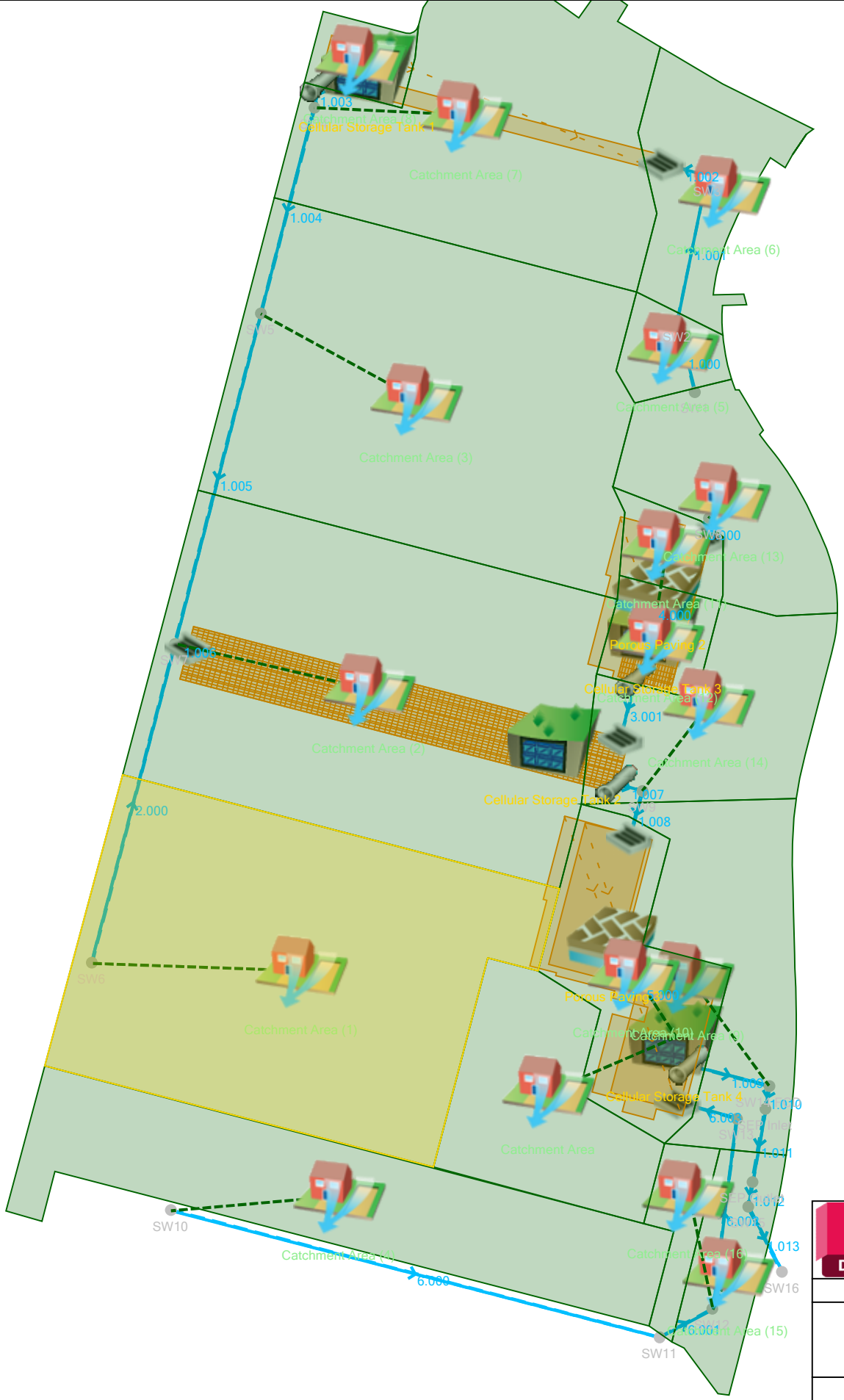
(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	11.8	11.8
1 in 1 year (l/s):	10.03	10.03
1 in 30 years (l/s):	27.14	27.14
1 in 100 year (l/s):	37.64	37.64
1 in 200 years (l/s):	44.13	44.13



DRN

Date: 22/08/2024 15:32:07
Designed by: CDH
Checked by: JET
File: LON8-ARUP-SS-SS-M3-C-52101.i
Plot Scale: 1:1026

InfoDrainage 2024.4

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SW3	Manhole	511559.083	180624.966	29.700	2.100	27.600	Circular	1.350
SW2	Manhole	511553.497	180598.032	29.400	1.660	27.740	Circular	1.350
SW1	Manhole	511556.743	180584.876	29.300	1.490	27.810	Circular	1.350
SW14 FCD	Manhole	511570.519	180456.749	29.500	2.675	26.825	Circular	1.500
SEP Inlet	Manhole	511569.774	180452.507	29.500	2.700	26.800	Circular	0.900
SEP Outlet	Manhole	511567.402	180439.003	29.500	2.800	26.700	Circular	0.900
SW15	Manhole	511566.606	180434.468	29.500	2.825	26.675	Circular	1.500
SW16	Manhole	511572.847	180422.449	29.500	2.890	26.610	Circular	1.200
SW4	Manhole	511486.497	180637.421	29.500	1.970	27.530	Circular	1.500
SW5	Manhole	511476.610	180599.439	29.500	2.165	27.335	Circular	1.500
SW8	Manhole	511559.364	180561.609	29.600	2.100	27.500	Circular	1.350
SW9	Manhole	511547.069	180511.227	29.600	2.690	26.910	Circular	1.500
SW12	Manhole	511559.962	180415.600	29.400	2.305	27.095	Circular	1.200
SW13	Manhole	511564.519	180450.714	29.700	2.785	26.915	Circular	1.350
SW7	Manhole	511460.708	180538.353	29.600	2.580	27.020	Circular	1.500
SW6	Manhole	511445.394	180479.524	29.700	2.280	27.420	Circular	1.500
SW11	Manhole	511550.255	180410.337	29.750	2.540	27.210	Circular	1.200
SW10	Manhole	511459.995	180433.833	29.750	1.900	27.850	Circular	1.350

Name	Lock
SW3	None
SW2	None
SW1	None
SW14 FCD	None
SEP Inlet	None
SEP Outlet	None
SW15	None
SW16	None
SW4	None
SW5	None
SW8	None
SW9	None
SW12	None
SW13	None
SW7	None
SW6	None
SW11	None
SW10	None

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Inlets

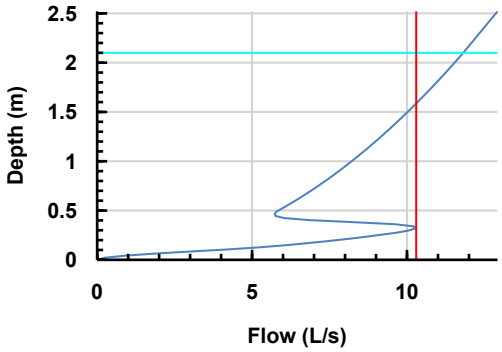
Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW3	Inlet	Catchment Area (6)	(None)	No Restriction
	Inlet (1)	1.001	(None)	No Restriction
SW2	Inlet	Catchment Area (5)	(None)	No Restriction
	Inlet (1)	1.000	(None)	No Restriction
SW14 FCD	Inlet (1)	Catchment Area (9) 1.009	(None)	No Restriction
SEP Inlet	Inlet	1.010	(None)	No Restriction
SEP Outlet	Inlet	1.011	(None)	No Restriction
SW15	Inlet	1.012	(None)	No Restriction
SW16	Inlet	1.013	(None)	No Restriction
SW4	Inlet	1.003	(None)	No Restriction
	Inlet (1)	Catchment Area (7)	(None)	No Restriction
SW5	Inlet	1.004	(None)	No Restriction
	Inlet (1)	Catchment Area (3)	(None)	No Restriction
SW8	Inlet	Catchment Area (13)	(None)	No Restriction
SW9	Inlet	Catchment Area (14)	(None)	No Restriction
	Inlet (1)	1.007	(None)	No Restriction
SW12	Inlet	6.001 Catchment Area (16)	(None)	No Restriction
	Inlet (2)	Catchment Area (15)	(None)	No Restriction
SW13	Inlet	6.002	(None)	No Restriction
SW7	Inlet	1.005 2.000	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
SW6	Inlet	Catchment Area (1)	(None)	No Restriction
SW11	Inlet	6.000	(None)	No Restriction
SW10	Inlet	Catchment Area (4)	(None)	No Restriction

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SW3	Outlet	1.002	Free Discharge
SW2	Outlet	1.001	Free Discharge
SW1	Outlet	1.000	Free Discharge
SW14 FCD	Outlet	1.010	Hydro-Brake®

Invert Level (m)	26.825
Design Depth (m)	2.100
Design Flow (L/s)	11.8
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0131-1180-2100-1180



SEP Inlet	Outlet	1.011	Free Discharge
SEP Outlet	Outlet	1.012	Free Discharge
SW15	Outlet	1.013	Free Discharge
SW4	Outlet	1.004	Free Discharge
SW5	Outlet	1.005	Free Discharge
SW8	Outlet	3.000	Free Discharge
SW9	Outlet	1.008	Free Discharge
SW12	Outlet	6.002	Free Discharge
SW13	Outlet	6.003	Free Discharge
SW7	Outlet	1.006	Free Discharge
SW6	Outlet	2.000	Free Discharge
SW11	Outlet	6.001	Free Discharge
SW10	Outlet	6.000	Free Discharge

Porous Paving 3

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.500
Depth (m)	1.070
Base Level (m)	28.430
Paving Layer Depth (mm)	100
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	59.408
Long. Slope (1:X)	10000.00
Width (m)	15.279
Total Volume (m³)	264.141

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	1.008
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	5.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	10000.0

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Porous Paving 2

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.500
Depth (m)	0.880
Base Level (m)	28.620
Paving Layer Depth (mm)	100
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	32.260
Long. Slope (1:X)	10000.00
Width (m)	14.619
Total Volume (m³)	110.360

Inlets

Outlets

Outlet

Outgoing Connection	4.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	10000.0

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Cellular Storage Tank 1

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.500
Depth (m)	0.840
Base Level (m)	27.555
Number of Crates Long	87
Number of Crates Wide	6
Number of Crates High	4
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	209.383

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	1.002
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.003
Outlet Type	Free Discharge

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Cellular Storage Tank 4

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.500
Depth (m)	1.260
Base Level (m)	26.870
Number of Crates Long	41
Number of Crates Wide	32
Number of Crates High	6
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	786.602

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (10) 5.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	6.003
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.009
Outlet Type	Free Discharge

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Cellular Storage Tank 2

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.600
Depth (m)	1.260
Base Level (m)	27.000
Number of Crates Long	83
Number of Crates Wide	20
Number of Crates High	6
Porosity (%)	100
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	1047.140

Inlets

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	1.006
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	3.001
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.007
Outlet Type	Free Discharge

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Cellular Storage Tank 3

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.500
Depth (m)	1.260
Base Level (m)	27.060
Number of Crates Long	29
Number of Crates Wide	20
Number of Crates High	6
Porosity (%)	100
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	366.580

Inlets

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (11) 4.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (12)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	3.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	3.001
Outlet Type	Free Discharge

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW3	29.700 27.600	Diameter / Length: 1.350	{1} 1.001	Pipe	27.600	Diam/Width:300	Manhole
E:511559.083 N:180624.966	2.100		{a} 1.002	Pipe	27.600	Diam/Width:300	Not Applicable
SW2	29.400 27.740	Diameter / Length: 1.350	{1} 1.000	Pipe	27.740	Diam/Width:300	Manhole
E:511553.497 N:180598.032	1.660		{a} 1.001	Pipe	27.740	Diam/Width:300	Not Applicable
SW1	29.300 27.810	Diameter / Length: 1.350					Manhole
E:511556.743 N:180584.876	1.490		{a} 1.000	Pipe	27.810	Diam/Width:300	Not Applicable
SW14 FCD	29.500 26.825	Diameter / Length: 1.500	{1} 1.009	Pipe	26.825	Diam/Width:450	Manhole
E:511570.519 N:180456.749	2.675		{a} 1.010	Pipe	26.825	Diam/Width:525	Not Applicable
SEP Inlet	29.500 26.800	Diameter / Length: 0.900	{1} 1.010	Pipe	26.800	Diam/Width:525	Manhole
E:511569.774 N:180452.507	2.700		{a} 1.011	Pipe	26.800	Diam/Width:525	Not Applicable

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SEP Outlet	29.500 26.700	Diameter / Length: 0.900	{1} 1.011	Pipe	26.700	Diam/Width:525	Manhole
E:511567.402 N:180439.003	2.800		{a} 1.012	Pipe	26.700	Diam/Width:525	Not Applicable
SW15	29.500 26.675	Diameter / Length: 1.500	{1} 1.012	Pipe	26.675	Diam/Width:525	Manhole
E:511566.606 N:180434.468	2.825		{a} 1.013	Pipe	26.675	Diam/Width:525	Not Applicable
SW16	29.500 26.610	Diameter / Length: 1.200	{1} 1.013	Pipe	26.610	Diam/Width:525	Manhole
E:511572.847 N:180422.449	2.890						Not Applicable
SW4	29.500 27.530	Diameter / Length: 1.500	{1} 1.003	Pipe	27.530	Diam/Width:450	Manhole
E:511486.497 N:180637.421	1.970		{a} 1.004	Pipe	27.530	Diam/Width:450	Not Applicable
SW5	29.500 27.335	Diameter / Length: 1.500	{1} 1.004	Pipe	27.335	Diam/Width:450	Manhole
E:511476.610 N:180599.439	2.165		{a} 1.005	Pipe	27.335	Diam/Width:450	Not Applicable

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW8	29.600 27.500	Diameter / Length: 1.350					Manhole
E:511559.364 N:180561.609	2.100		{a} 3.000	Pipe	27.500	Diam/Width:300	Not Applicable
SW9	29.600 26.910	Diameter / Length: 1.500	{1} 1.007	Pipe	26.910	Diam/Width:450	Manhole
E:511547.069 N:180511.227	2.690		{a} 1.008	Pipe	26.910	Diam/Width:450	Not Applicable
SW12	29.400 27.095	Diameter / Length: 1.200	{1} 6.001	Pipe	27.095	Diam/Width:375	Manhole
E:511559.962 N:180415.600	2.305		{a} 6.002	Pipe	27.095	Diam/Width:375	Not Applicable
SW13	29.700 26.915	Diameter / Length: 1.350	{1} 6.002	Pipe	26.915	Diam/Width:375	Manhole
E:511564.519 N:180450.714	2.785		{a} 6.003	Pipe	26.915	Diam/Width:375	Not Applicable
SW7	29.600 27.020	Diameter / Length: 1.500	{1} 1.005 {2} 2.000	Pipe Pipe	27.020 27.020	Diam/Width:450 Diam/Width:450	Manhole
E:511460.708 N:180538.353	2.580		{a} 1.006	Pipe	27.020	Diam/Width:450	Not Applicable

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW6	29.700 27.420	Diameter / Length: 1.500					Manhole
E:511445.394 N:180479.524	2.280		{a} 2.000	Pipe	27.420	Diam/Width:450	Not Applicable
SW11	29.750 27.210	Diameter / Length: 1.200	{1} 6.000	Pipe	27.210	Diam/Width:375	Manhole
E:511550.255 N:180410.337	2.540		{a} 6.001	Pipe	27.210	Diam/Width:375	Not Applicable
SW10	29.750 27.850	Diameter / Length: 1.350					Manhole
E:511459.995 N:180433.833	1.900		{a} 6.000	Pipe	27.850	Diam/Width:375	Not Applicable

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.700	27.600	27.706	0.106	22.7	0.152	0.000	21.7	10.037	OK
SW2	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.400	27.740	27.791	0.051	5.6	0.072	0.000	5.1	2.413	OK
SW1	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.300	27.810	27.810	0.000	0.0	0.000	0.000	0.0	0.000	OK
SW14 FCD	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	26.825	27.057	0.232	7.1	0.411	0.000	7.1	165.170	OK
SEP Inlet	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	26.800	26.849	0.049	7.1	0.031	0.000	7.1	161.971	OK
SEP Outlet	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	26.700	26.755	0.055	7.1	0.035	0.000	7.1	161.918	OK
SW15	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	26.675	26.729	0.054	7.1	0.095	0.000	7.1	161.836	OK
SW16	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	26.610	26.662	0.052	7.1	0.000	0.000	7.1	161.836	OK
SW4	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.500	27.530	27.661	0.131	55.2	0.231	0.000	43.1	28.697	OK
SW5	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.500	27.335	27.564	0.229	126.4	0.404	0.000	117.4	60.802	OK
SW8	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.600	27.500	27.555	0.055	19.8	0.078	0.000	19.6	8.571	OK
SW9	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.600	26.910	27.163	0.253	23.7	0.446	0.000	0.0	9.287	OK
SW12	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.400	27.095	27.259	0.164	52.8	0.185	0.000	49.7	26.568	OK
SW13	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.700	26.915	27.072	0.157	49.7	0.225	0.000	46.5	26.371	OK
SW7	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.600	27.020	27.368	0.348	289.6	0.615	0.000	265.4	134.365	OK
SW6	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.700	27.420	27.591	0.171	86.2	0.302	0.000	82.4	37.513	OK
SW11	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.750	27.210	27.336	0.126	42.0	0.143	0.000	37.0	19.717	OK
SW10	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.750	27.850	27.983	0.133	45.6	0.191	0.000	42.0	19.829	OK

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.700	27.600	27.780	0.180	55.5	0.258	0.000	53.4	24.354	OK
SW2	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.400	27.740	27.819	0.079	13.6	0.113	0.000	12.6	5.943	OK
SW1	FEH 2022: 30 years: +0 %: 720 mins: Winter	29.300	27.810	27.971	0.161	0.1	0.230	0.000	0.0	0.072	OK
SW14 FCD	FEH 2022: 30 years: +0 %: 600 mins: Summer	29.500	26.825	27.239	0.414	10.4	0.732	0.000	10.3	386.596	OK
SEP Inlet	FEH 2022: 30 years: +0 %: 600 mins: Summer	29.500	26.800	26.859	0.059	10.3	0.037	0.000	10.3	386.331	OK
SEP Outlet	FEH 2022: 30 years: +0 %: 480 mins: Winter	29.500	26.700	26.767	0.067	10.3	0.043	0.000	10.3	355.792	OK
SW15	FEH 2022: 30 years: +0 %: 480 mins: Winter	29.500	26.675	26.740	0.065	10.3	0.115	0.000	10.3	355.690	OK
SW16	FEH 2022: 30 years: +0 %: 480 mins: Winter	29.500	26.610	26.673	0.063	10.3	0.000	0.000	10.3	355.690	OK
SW4	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.500	27.530	27.875	0.345	135.0	0.609	0.000	83.8	91.135	OK
SW5	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.500	27.335	27.876	0.541	211.7	0.956	0.000	203.2	152.914	Surcharged
SW8	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.600	27.500	27.587	0.087	48.3	0.124	0.000	48.1	20.929	OK
SW9	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.600	26.910	27.362	0.452	58.0	0.799	0.000	0.0	23.259	Surcharged
SW12	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.400	27.095	27.396	0.301	129.8	0.341	0.000	123.4	64.992	OK
SW13	FEH 2022: 30 years: +0 %: 15 mins: Winter	29.700	26.915	27.172	0.257	117.4	0.368	0.000	120.1	63.676	OK
SW7	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.600	27.020	27.597	0.577	598.6	1.020	0.000	593.9	330.811	Surcharged
SW6	FEH 2022: 30 years: +0 %: 15 mins: Winter	29.700	27.420	27.721	0.301	197.8	0.533	0.000	180.9	91.507	OK
SW11	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.750	27.210	27.447	0.237	103.7	0.268	0.000	91.2	48.206	OK
SW10	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.750	27.850	28.077	0.227	111.4	0.325	0.000	103.7	48.353	OK

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.700	27.600	27.960	0.360	70.9	0.515	0.000	66.9	31.538	Surcharged
SW2	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.400	27.740	27.960	0.220	17.6	0.315	0.000	15.3	8.363	OK
SW1	FEH 2022: 100 years: +0 %: 1440 mins: Summer	29.300	27.810	28.656	0.846	0.1	1.210	0.000	1.5	0.508	Surcharged
SW14 FCD	FEH 2022: 100 years: +0 %: 720 mins: Winter	29.500	26.825	27.391	0.566	36.0	1.001	0.000	10.3	529.500	Surcharged
SEP Inlet	FEH 2022: 100 years: +0 %: 600 mins: Winter	29.500	26.800	26.859	0.059	11.0	0.037	0.000	10.3	444.803	OK
SEP Outlet	FEH 2022: 100 years: +0 %: 600 mins: Winter	29.500	26.700	26.767	0.067	10.3	0.043	0.000	10.3	444.684	OK
SW15	FEH 2022: 100 years: +0 %: 1440 mins: Summer	29.500	26.675	26.740	0.065	10.3	0.115	0.000	10.3	648.936	OK
SW16	FEH 2022: 100 years: +0 %: 1440 mins: Summer	29.500	26.610	26.673	0.063	10.3	0.000	0.000	10.3	648.936	OK
SW4	FEH 2022: 100 years: +0 %: 30 mins: Summer	29.500	27.530	27.932	0.402	146.8	0.710	0.000	134.0	196.753	OK
SW5	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.500	27.335	28.467	1.132	263.7	2.001	0.000	192.9	218.622	Surcharged
SW8	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.600	27.500	27.600	0.100	62.5	0.144	0.000	62.2	27.131	OK
SW9	FEH 2022: 100 years: +0 %: 1440 mins: Winter	29.600	26.910	28.649	1.739	9.4	3.073	0.000	9.3	154.929	Surcharged
SW12	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.400	27.095	27.485	0.390	157.7	0.441	0.000	153.1	84.048	Surcharged
SW13	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.700	26.915	27.216	0.301	153.1	0.431	0.000	160.2	82.118	OK
SW7	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.600	27.020	28.508	1.488	613.8	2.630	0.000	609.5	423.800	Surcharged
SW6	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.700	27.420	29.020	1.600	272.8	2.827	0.000	269.9	118.039	Surcharged
SW11	FEH 2022: 100 years: +0 %: 15 mins: Winter	29.750	27.210	27.502	0.292	127.8	0.330	0.000	108.0	62.530	OK
SW10	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.750	27.850	28.123	0.273	144.2	0.390	0.000	136.4	62.519	OK

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.700	27.600	27.729	0.129	31.9	0.184	0.000	30.5	14.033	OK
SW2	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.400	27.740	27.800	0.060	7.8	0.086	0.000	7.3	3.384	OK
SW1	FEH 2022: 2 years: +40 %: 1440 mins: Summer	29.300	27.810	27.825	0.015	0.0	0.021	0.000	0.0	0.080	OK
SW14 FCD	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	26.825	27.138	0.313	9.2	0.553	0.000	9.1	229.151	OK
SEP Inlet	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	26.800	26.855	0.055	9.1	0.035	0.000	9.1	224.251	OK
SEP Outlet	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	26.700	26.763	0.063	9.1	0.040	0.000	9.1	224.182	OK
SW15	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	26.675	26.736	0.061	9.1	0.108	0.000	9.1	224.077	OK
SW16	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	26.610	26.669	0.059	9.1	0.000	0.000	9.1	224.077	OK
SW4	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.500	27.530	27.680	0.150	77.4	0.264	0.000	56.0	42.349	OK
SW5	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.500	27.335	27.626	0.291	172.8	0.515	0.000	155.6	86.546	OK
SW8	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.600	27.500	27.565	0.065	27.7	0.093	0.000	27.5	11.995	OK
SW9	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.600	26.910	27.221	0.311	33.2	0.550	0.000	0.0	13.144	OK
SW12	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.400	27.095	27.298	0.203	74.6	0.229	0.000	70.5	37.231	OK
SW13	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.700	26.915	27.106	0.191	70.5	0.274	0.000	65.2	36.773	OK
SW7	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.600	27.020	27.451	0.431	397.0	0.762	0.000	431.6	189.270	OK
SW6	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.700	27.420	27.627	0.207	120.8	0.366	0.000	115.7	52.506	OK
SW11	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.750	27.210	27.367	0.157	59.2	0.178	0.000	52.4	27.618	OK
SW10	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.750	27.850	28.011	0.161	63.8	0.230	0.000	59.2	27.746	OK

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.700	27.600	28.022	0.422	74.4	0.604	0.000	67.5	34.042	Surcharged
SW2	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.400	27.740	28.025	0.285	19.1	0.408	0.000	14.4	9.203	OK
SW1	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.300	27.810	28.026	0.216	1.0	0.308	0.000	1.7	0.724	OK
SW14 FCD	FEH 2022: 30 years: +40 %: 480 mins: Winter	29.500	26.825	27.495	0.670	38.0	1.184	0.000	10.3	366.065	Surcharged
SEP Inlet	FEH 2022: 30 years: +40 %: 480 mins: Winter	29.500	26.800	26.859	0.059	10.6	0.037	0.000	10.3	341.122	OK
SEP Outlet	FEH 2022: 30 years: +40 %: 480 mins: Winter	29.500	26.700	26.767	0.067	10.3	0.043	0.000	10.3	340.937	OK
SW15	FEH 2022: 30 years: +40 %: 1440 mins: Winter	29.500	26.675	26.740	0.065	10.3	0.115	0.000	10.3	825.592	OK
SW16	FEH 2022: 30 years: +40 %: 1440 mins: Winter	29.500	26.610	26.673	0.063	10.3	0.000	0.000	10.3	825.592	OK
SW4	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.500	27.530	28.531	1.001	394.0	1.769	0.000	144.6	204.066	Surcharged
SW5	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.500	27.335	28.716	1.381	284.9	2.440	0.000	204.7	240.305	Surcharged
SW8	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.600	27.500	27.605	0.105	67.5	0.150	0.000	67.2	29.315	OK
SW9	FEH 2022: 30 years: +40 %: 1440 mins: Winter	29.600	26.910	28.722	1.812	14.0	3.202	0.000	14.0	289.218	Surcharged
SW12	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.400	27.095	27.519	0.424	169.6	0.479	0.000	161.8	90.620	Surcharged
SW13	FEH 2022: 30 years: +40 %: 15 mins: Winter	29.700	26.915	27.223	0.308	155.6	0.441	0.000	165.6	88.474	OK
SW7	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.600	27.020	28.681	1.661	666.3	2.935	0.000	658.7	456.573	Surcharged
SW6	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.700	27.420	29.185	1.765	294.7	3.119	0.000	278.0	127.342	Surcharged
SW11	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.750	27.210	27.588	0.378	151.0	0.427	0.000	115.6	67.584	Surcharged
SW10	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.750	27.850	28.136	0.286	155.7	0.409	0.000	151.0	67.388	OK

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW3	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.700	27.600	28.269	0.669	78.9	0.957	0.000	71.6	43.483	Surcharged
SW2	FEH 2022: 100 years: +40 %: 600 mins: Winter	29.400	27.740	29.055	1.315	18.5	1.882	0.000	23.2	30.637	Surcharged
SW1	FEH 2022: 100 years: +40 %: 600 mins: Winter	29.300	27.810	29.055	1.245	0.5	1.781	0.000	17.2	1.302	Flood Risk
SW14 FCD	FEH 2022: 100 years: +40 %: 960 mins: Winter	29.500	26.825	28.978	2.153	17.2	3.805	0.000	11.8	909.789	Surcharged
SEP Inlet	FEH 2022: 100 years: +40 %: 960 mins: Winter	29.500	26.800	26.863	0.063	11.8	0.040	0.000	11.8	903.517	OK
SEP Outlet	FEH 2022: 100 years: +40 %: 960 mins: Winter	29.500	26.700	26.772	0.072	11.8	0.046	0.000	11.8	903.369	OK
SW15	FEH 2022: 100 years: +40 %: 960 mins: Winter	29.500	26.675	26.745	0.070	11.8	0.123	0.000	11.8	903.165	OK
SW16	FEH 2022: 100 years: +40 %: 960 mins: Winter	29.500	26.610	26.677	0.067	11.8	0.000	0.000	11.8	903.165	OK
SW4	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.500	27.530	28.668	1.138	542.8	2.011	0.000	197.2	299.874	Surcharged
SW5	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.500	27.335	29.095	1.760	369.2	3.110	0.000	241.6	318.078	Surcharged
SW8	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.600	27.500	27.625	0.125	87.5	0.179	0.000	87.1	37.911	OK
SW9	FEH 2022: 100 years: +40 %: 600 mins: Summer	29.600	26.910	29.006	2.096	96.0	3.704	0.000	94.1	588.116	Surcharged
SW12	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.400	27.095	27.890	0.795	238.4	0.899	0.000	227.4	116.534	Surcharged
SW13	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.700	26.915	27.302	0.387	227.4	0.554	0.000	212.1	113.754	Surcharged
SW7	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.600	27.020	29.060	2.040	790.6	3.604	0.000	791.8	579.420	Surcharged
SW6	FEH 2022: 100 years: +40 %: 15 mins: Winter	29.700	27.420	29.700	2.280	358.4	4.153	0.124	342.7	163.596	Flood
SW11	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.750	27.210	28.034	0.824	181.9	0.932	0.000	168.4	87.373	Surcharged
SW10	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.750	27.850	28.914	1.064	201.8	1.523	0.000	181.9	87.143	Surcharged

LONUX:	Date: 27/02/0025		
	Designed by: CDH	Checked by:	Approved By:
Report Details: Audit Report Storm Phase: Storm	Aup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

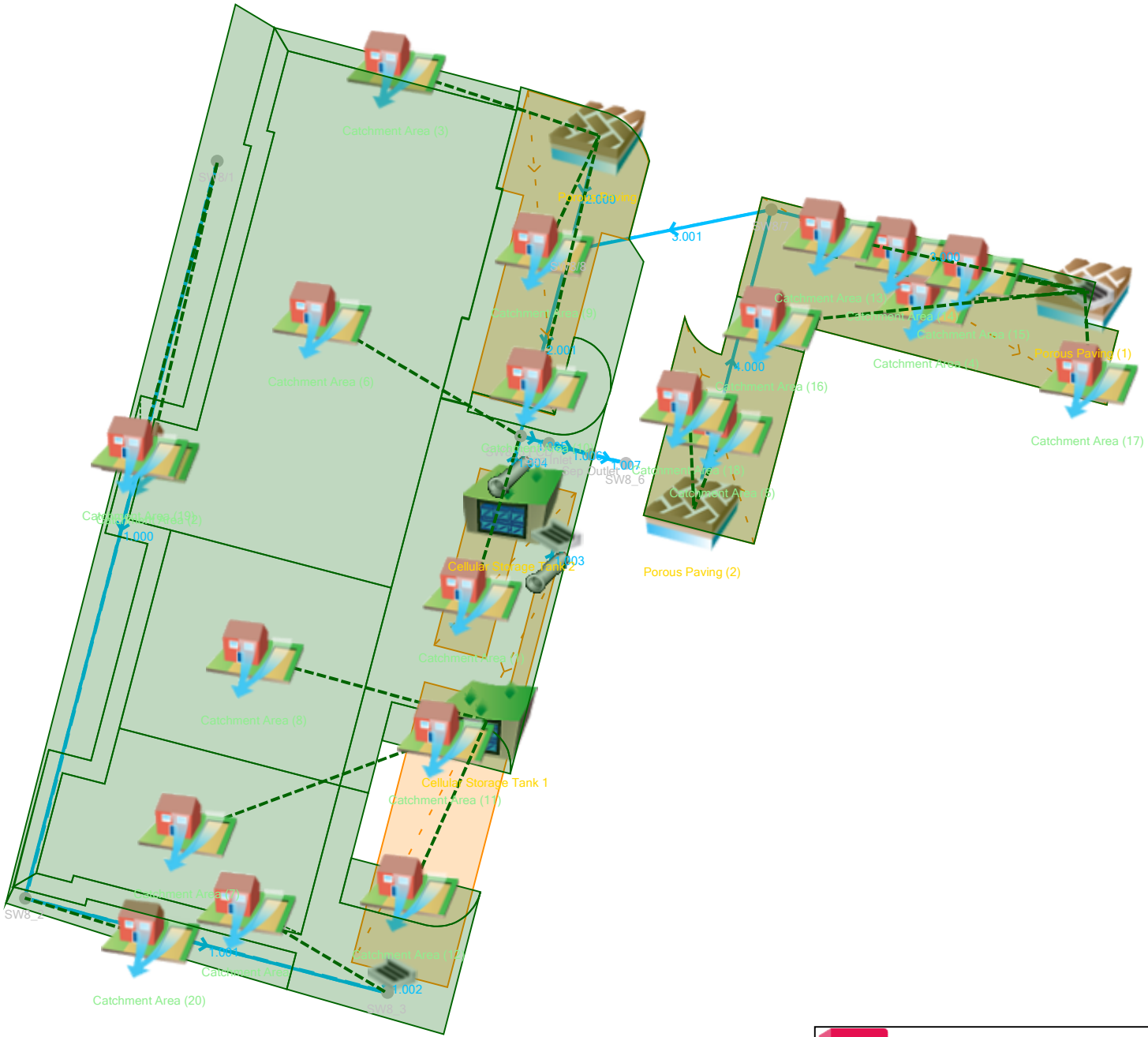
Discharge Volume

Details

Selected Rainfall	Storm
FEH 2022	100 years: +40 %: 360 mins: Winter

Results

Outfall	Audit Discharge Volume (m^3)	Actual Discharge Volume (m^3)	Pass/Fail
SW16	1140.654	2676.561	Fail



Date: 07/08/2024 15:06:50
Designed by: CDH
Checked by:
File: LON8-ARUP-SS-SS-M3-C-52101.i
Plot Scale: 1:783
InfoDrainage 2024.4

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Chris Heath
Site name:	LON8
Site location:	Hayes

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.51173° N
Longitude:	0.39457° W
Reference:	1089435577
Date:	Feb 07 2025 15:29

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.880

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	617	617
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	3.67	3.67
1 in 1 year (l/s):	3.12	3.12
1 in 30 years (l/s):	8.43	8.43
1 in 100 year (l/s):	11.69	11.69
1 in 200 years (l/s):	13.71	13.71

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SW8_2	Manhole	511406.397	180303.444	29.850	2.260	27.590	Circular	1.200
SW8_3	Manhole	511453.947	180291.065	29.200	1.850	27.350	Circular	1.200
SW8_6	Manhole	511485.250	180360.536	28.900	1.750	27.150	Circular	1.350
SW8_5 FCD	Manhole	511471.435	180364.133	29.500	2.235	27.265	Circular	1.500
Sep Inlet	Manhole	511475.160	180363.163	29.300	2.060	27.240	Circular	1.200
Sep Outlet	Manhole	511480.729	180361.713	29.000	1.820	27.180	Circular	1.200
SW8/1	Manhole	511431.591	180400.218	29.850	1.600	28.250	Circular	0.450
SW8/7	Manhole	511504.358	180393.844	28.700	0.765	27.935	Circular	1.200
SW8/8	Manhole	511477.784	180388.520	29.500	1.835	27.665	Circular	1.200

Name	Lock
SW8_2	None
SW8_3	None
SW8_6	None
SW8_5 FCD	None
Sep Inlet	None
Sep Outlet	None
SW8/1	None
SW8/7	None
SW8/8	None

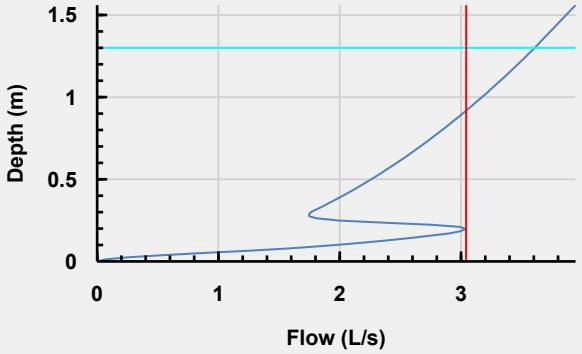
Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW8_2	Inlet	1.000	(None)	No Restriction
	Inlet (1)	Catchment Area (20)	(None)	No Restriction
SW8_3	Inlet	1.001	(None)	No Restriction
	Inlet (1)	Catchment Area	(None)	No Restriction
SW8_6	Inlet (1)	1.007	(None)	No Restriction
SW8_5 FCD	Inlet	1.004 2.001	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
	Inlet (2)	Catchment Area (6)	(None)	No Restriction
Sep Inlet	Inlet (1)	1.005	(None)	No Restriction
Sep Outlet	Inlet	1.006	(None)	No Restriction
SW8/1	Inlet	Catchment Area (2)	(None)	No Restriction
	Inlet (1)	Catchment Area (19)	(None)	No Restriction
SW8/7	Inlet	3.000 4.000	(None)	No Restriction
SW8/8	Inlet	3.001 2.000	(None)	No Restriction

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SW8_2	Outlet	1.001	Free Discharge
SW8_3	Outlet	1.002	Free Discharge
SW8_5 FCD	Outlet	1.005	Hydro-Brake®
	Invert Level (m)	27.265	
	Design Depth (m)	1.300	
	Design Flow (L/s)	3.6	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0081-3600-1300-3600	
Sep Inlet	Outlet	1.006	Free Discharge
Sep Outlet	Outlet	1.007	Free Discharge
SW8/1	Outlet	1.000	Free Discharge
SW8/7	Outlet	3.001	Free Discharge
SW8/8	Outlet	2.001	Free Discharge



Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.700
Depth (m)	0.450
Base Level (m)	28.250
Paving Layer Depth (mm)	150
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	42.775
Long. Slope (1:X)	10000.00
Width (m)	12.416
Total Volume (m³)	48.328

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.075
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (3)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (9)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (10)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	2.000
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	10000.0

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Stormwater Controls Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.500
Depth (m)	0.450
Base Level (m)	28.050
Paving Layer Depth (mm)	150
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	52.839
Long. Slope (1:X)	10000.00
Width (m)	12.457
Total Volume (m³)	59.240

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (4)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (13)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (14)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (15)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (16)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (17)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	3.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	10000.0

Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.800
Depth (m)	0.450
Base Level (m)	28.350
Paving Layer Depth (mm)	150
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	31.105
Long. Slope (1:X)	10000.00
Width (m)	12.275
Total Volume (m³)	34.363

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (18)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	4.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	10000.0

Cellular Storage Tank 1

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.500
Depth (m)	0.840
Base Level (m)	27.325
Number of Crates Long	53
Number of Crates Wide	20
Number of Crates High	4
Porosity (%)	100
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	446.535

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (7)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	1.002
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (11)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (12)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.003
Outlet Type	Free Discharge

Cellular Storage Tank 2

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.500
Depth (m)	0.840
Base Level (m)	27.300
Number of Crates Long	17
Number of Crates Wide	24
Number of Crates High	4
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.21
Total Volume (m³)	164.152

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.003
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.004
Outlet Type	Free Discharge

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW8_2	29.850 27.590	Diameter / Length: 1.200	{1} 1.000	Pipe	27.590	Diam/Width:300	Manhole
E:511406.397 N:180303.444	2.260		{a} 1.001	Pipe	27.590	Diam/Width:300	Not Applicable
SW8_3	29.200 27.350	Diameter / Length: 1.200	{1} 1.001	Pipe	27.350	Diam/Width:300	Manhole
E:511453.947 N:180291.065	1.850		{a} 1.002	Pipe	27.350	Diam/Width:300	Not Applicable
SW8_6	28.900 27.150	Diameter / Length: 1.350	{1} 1.007	Pipe	27.150	Diam/Width:300	Manhole
E:511485.250 N:180360.536	1.750						Not Applicable
SW8_5 FCD	29.500 27.265	Diameter / Length: 1.500	{1} 1.004 {2} 2.001	Pipe Pipe	27.265 27.265	Diam/Width:300 Diam/Width:150	Manhole
E:511471.435 N:180364.133	2.235		{a} 1.005	Pipe	27.265	Diam/Width:300	Not Applicable
Sep Inlet	29.300 27.240	Diameter / Length: 1.200	{1} 1.005	Pipe	27.240	Diam/Width:300	Manhole
E:511475.160 N:180363.163	2.060		{a} 1.006	Pipe	27.240	Diam/Width:300	Not Applicable

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Manhole Schedule Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Sep Outlet	29.000 27.180	Diameter / Length: 1.200	{1} 1.006	Pipe	27.180	Diam/Width:300	Manhole
E:511480.729 N:180361.713	1.820		{a} 1.007	Pipe	27.180	Diam/Width:300	Not Applicable
SW8/1	29.850 28.250	Diameter / Length: 0.450					Manhole
E:511431.591 N:180400.218	1.600		{a} 1.000	Pipe	28.250	Diam/Width:300	Not Applicable
SW8/7	28.700 27.935	Diameter / Length: 1.200	{1} 3.000 {2} 4.000	Pipe Pipe	27.935 27.935	Diam/Width:150 Diam/Width:150	Manhole
E:511504.358 N:180393.844	0.765		{a} 3.001	Pipe	27.935	Diam/Width:150	Not Applicable
SW8/8	29.500 27.665	Diameter / Length: 1.200	{1} 3.001 {2} 2.000	Pipe Pipe	27.665 27.665	Diam/Width:150 Diam/Width:100	Manhole
E:511477.784 N:180388.520	1.835		{a} 2.001	Pipe	27.665	Diam/Width:150	Not Applicable

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.850	27.590	27.681	0.091	18.8	0.103	0.000	14.5	8.822	OK
SW8_3	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.200	27.350	27.441	0.091	23.4	0.103	0.000	21.8	12.513	OK
SW8_6	FEH 2022: 2 years: +0 %: 240 mins: Winter	28.900	27.150	27.188	0.038	3.0	0.000	0.000	3.0	72.283	OK
SW8_5 FCD	FEH 2022: 2 years: +0 %: 480 mins: Summer	29.500	27.265	27.534	0.269	12.4	0.475	0.000	3.0	200.645	OK
Sep Inlet	FEH 2022: 2 years: +0 %: 1440 mins: Summer	29.300	27.240	27.275	0.035	3.0	0.040	0.000	3.0	271.263	OK
Sep Outlet	FEH 2022: 2 years: +0 %: 240 mins: Winter	29.000	27.180	27.220	0.040	3.0	0.045	0.000	3.0	72.283	OK
SW8/1	FEH 2022: 2 years: +0 %: 15 mins: Summer	29.850	28.250	28.336	0.086	17.4	0.014	0.000	15.8	7.626	OK
SW8/7	FEH 2022: 2 years: +0 %: 360 mins: Summer	28.700	27.935	27.970	0.035	2.1	0.039	0.000	2.1	32.227	OK
SW8/8	FEH 2022: 2 years: +0 %: 360 mins: Summer	29.500	27.665	27.704	0.039	3.5	0.044	0.000	3.5	46.007	OK

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.850	27.590	27.749	0.159	46.6	0.180	0.000	38.5	21.681	OK
SW8_3	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.200	27.350	27.506	0.156	60.1	0.177	0.000	57.2	30.089	OK
SW8_6	FEH 2022: 30 years: +0 %: 360 mins: Winter	28.900	27.150	27.188	0.038	3.0	0.000	0.000	3.0	438.337	OK
SW8_5 FCD	FEH 2022: 30 years: +0 %: 360 mins: Winter	29.500	27.265	27.819	0.554	25.0	0.979	0.000	3.0	635.354	Surcharged
Sep Inlet	FEH 2022: 30 years: +0 %: 360 mins: Winter	29.300	27.240	27.275	0.035	3.0	0.040	0.000	3.0	438.338	OK
Sep Outlet	FEH 2022: 30 years: +0 %: 360 mins: Winter	29.000	27.180	27.220	0.040	3.0	0.045	0.000	3.0	438.337	OK
SW8/1	FEH 2022: 30 years: +0 %: 15 mins: Summer	29.850	28.250	28.391	0.141	42.6	0.022	0.000	39.2	18.575	OK
SW8/7	FEH 2022: 30 years: +0 %: 180 mins: Summer	28.700	27.935	27.997	0.062	6.4	0.070	0.000	6.4	44.123	OK
SW8/8	FEH 2022: 30 years: +0 %: 180 mins: Summer	29.500	27.665	27.794	0.129	12.1	0.146	0.000	11.9	74.348	OK

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.850	27.590	27.780	0.190	60.7	0.214	0.000	50.5	28.115	OK
SW8_3	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.200	27.350	27.546	0.196	78.6	0.222	0.000	74.9	38.808	OK
SW8_6	FEH 2022: 100 years: +0 %: 360 mins: Winter	28.900	27.150	27.188	0.038	3.0	0.000	0.000	3.0	574.164	OK
SW8_5 FCD	FEH 2022: 100 years: +0 %: 360 mins: Winter	29.500	27.265	27.993	0.728	34.0	1.287	0.000	3.0	847.366	Surcharged
Sep Inlet	FEH 2022: 100 years: +0 %: 360 mins: Winter	29.300	27.240	27.275	0.035	3.0	0.040	0.000	3.0	574.165	OK
Sep Outlet	FEH 2022: 100 years: +0 %: 360 mins: Winter	29.000	27.180	27.220	0.040	3.0	0.045	0.000	3.0	574.164	OK
SW8/1	FEH 2022: 100 years: +0 %: 15 mins: Summer	29.850	28.250	28.416	0.166	55.2	0.026	0.000	51.1	24.047	OK
SW8/7	FEH 2022: 100 years: +0 %: 120 mins: Summer	28.700	27.935	28.082	0.147	9.6	0.166	0.000	9.2	47.863	OK
SW8/8	FEH 2022: 100 years: +0 %: 180 mins: Summer	29.500	27.665	28.026	0.361	17.3	0.408	0.000	17.2	102.305	Surcharged

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.850	27.590	27.702	0.112	26.5	0.127	0.000	21.1	12.384	OK
SW8_3	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.200	27.350	27.461	0.111	33.5	0.126	0.000	31.6	17.410	OK
SW8_6	FEH 2022: 2 years: +40 %: 360 mins: Summer	28.900	27.150	27.188	0.038	3.0	0.000	0.000	3.0	304.664	OK
SW8_5 FCD	FEH 2022: 2 years: +40 %: 1440 mins: Summer	29.500	27.265	27.672	0.407	10.0	0.719	0.000	3.0	431.078	Surcharged
Sep Inlet	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.300	27.240	27.275	0.035	3.0	0.040	0.000	3.0	304.665	OK
Sep Outlet	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.000	27.180	27.220	0.040	3.0	0.045	0.000	3.0	304.664	OK
SW8/1	FEH 2022: 2 years: +40 %: 15 mins: Summer	29.850	28.250	28.353	0.103	24.4	0.016	0.000	22.3	10.661	OK
SW8/7	FEH 2022: 2 years: +40 %: 240 mins: Summer	28.700	27.935	27.980	0.045	3.5	0.051	0.000	3.5	31.987	OK
SW8/8	FEH 2022: 2 years: +40 %: 360 mins: Summer	29.500	27.665	27.719	0.054	6.4	0.062	0.000	6.4	68.789	OK

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.850	27.590	27.791	0.201	65.8	0.227	0.000	54.8	30.374	OK
SW8_3	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.200	27.350	27.566	0.216	85.1	0.244	0.000	81.1	41.876	OK
SW8_6	FEH 2022: 30 years: +40 %: 360 mins: Summer	28.900	27.150	27.188	0.038	3.0	0.000	0.000	3.0	618.532	OK
SW8_5 FCD	FEH 2022: 30 years: +40 %: 360 mins: Summer	29.500	27.265	28.050	0.785	50.1	1.387	0.000	3.0	916.156	Surcharged
Sep Inlet	FEH 2022: 30 years: +40 %: 360 mins: Summer	29.300	27.240	27.275	0.035	3.0	0.040	0.000	3.0	618.533	OK
Sep Outlet	FEH 2022: 30 years: +40 %: 360 mins: Summer	29.000	27.180	27.220	0.040	3.0	0.045	0.000	3.0	618.532	OK
SW8/1	FEH 2022: 30 years: +40 %: 15 mins: Summer	29.850	28.250	28.424	0.174	59.7	0.028	0.000	55.4	25.970	OK
SW8/7	FEH 2022: 30 years: +40 %: 60 mins: Winter	28.700	27.935	28.029	0.094	9.0	0.106	0.000	9.1	29.077	OK
SW8/8	FEH 2022: 30 years: +40 %: 120 mins: Summer	29.500	27.665	28.053	0.388	17.8	0.439	0.000	17.7	92.293	Surcharged

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Type: Junctions Summary Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

FEH 2022: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW8_2	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.850	27.590	27.839	0.249	85.9	0.281	0.000	71.4	39.057	OK
SW8_3	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.200	27.350	27.642	0.292	110.6	0.330	0.000	105.0	54.311	OK
SW8_6	FEH 2022: 100 years: +40 %: 600 mins: Winter	28.900	27.150	27.191	0.041	3.6	0.000	0.000	3.6	204.304	OK
SW8_5 FCD	FEH 2022: 100 years: +40 %: 600 mins: Winter	29.500	27.265	28.630	1.365	34.8	2.411	0.000	3.6	603.183	Surcharged
Sep Inlet	FEH 2022: 100 years: +40 %: 600 mins: Winter	29.300	27.240	27.279	0.039	3.6	0.044	0.000	3.6	204.380	OK
Sep Outlet	FEH 2022: 100 years: +40 %: 600 mins: Winter	29.000	27.180	27.224	0.044	3.6	0.050	0.000	3.6	204.304	OK
SW8/1	FEH 2022: 100 years: +40 %: 15 mins: Summer	29.850	28.250	28.457	0.207	77.4	0.033	0.000	72.4	33.606	OK
SW8/7	FEH 2022: 100 years: +40 %: 30 mins: Winter	28.700	27.935	28.112	0.177	9.5	0.200	0.000	9.6	17.268	Surcharged
SW8/8	FEH 2022: 100 years: +40 %: 30 mins: Winter	29.500	27.665	28.031	0.366	18.2	0.414	0.000	18.1	35.378	Surcharged

Colt LON8:	Date: 27/02/0025		
	Designed by: CDH	Checked by: JET	Approved By: JET
Report Details: Audit Report Storm Phase: Storm	Arup, Central Square: Forth Street Newcastle upon Tyne NE1 3PL		

Discharge Volume

Details

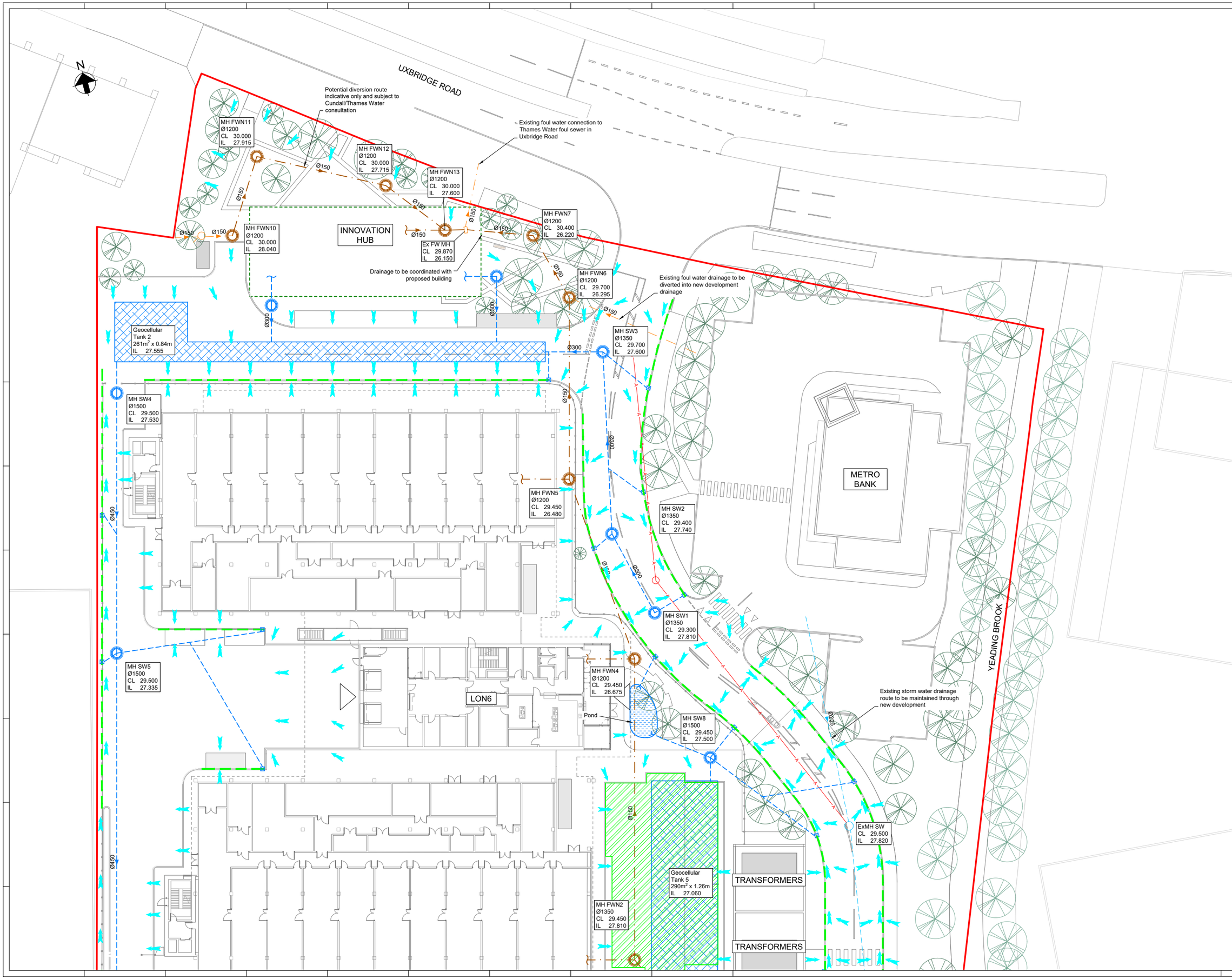
Selected Rainfall	Storm
FEH 2022	100 years: +40 %: 360 mins: Winter

Results

Outfall	Audit Discharge Volume (m^3)	Actual Discharge Volume (m^3)	Pass/Fail
SW8_6	354.315	814.614	Fail

Appendix G

Proposed Drainage Layouts



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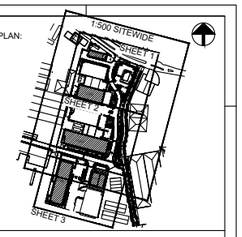

Notes

1. All drainage subject to detailed level design.
2. Outfall invert levels based upon GPRS levels. To be confirmed by survey.
3. All linear drainage and linear drainage outfalls subject to detailed design following confirmation of levels.
4. All gully and linear drainage leads to be 150dia unless noted otherwise.
5. All storm and foul water building connections subject to architect and MEP engineer design.
6. Drainage routes to be coordinated with below ground services.
7. HydroBrake to be unit CHE-0133-1180-2000-1180, 11.8 l/s at 2.0m head
8. Porous car park formation level to be 500mm min. above top of geocellular tank.

Key to drainage

- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Porous pavement
- Geocellular storage tank
- Gully
- Linear drainage channel

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P01	14/03/25	For Planning	Arup	COLT
P01.02	28/02/25	WIP For Planning	Arup	COLT
P01.01	15/10/24	50% Review	Arup	COLT

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PROJECT NAME:
HDP Masterplan

DRAWING TITLE:
Drainage Layout (Sheet 1)

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
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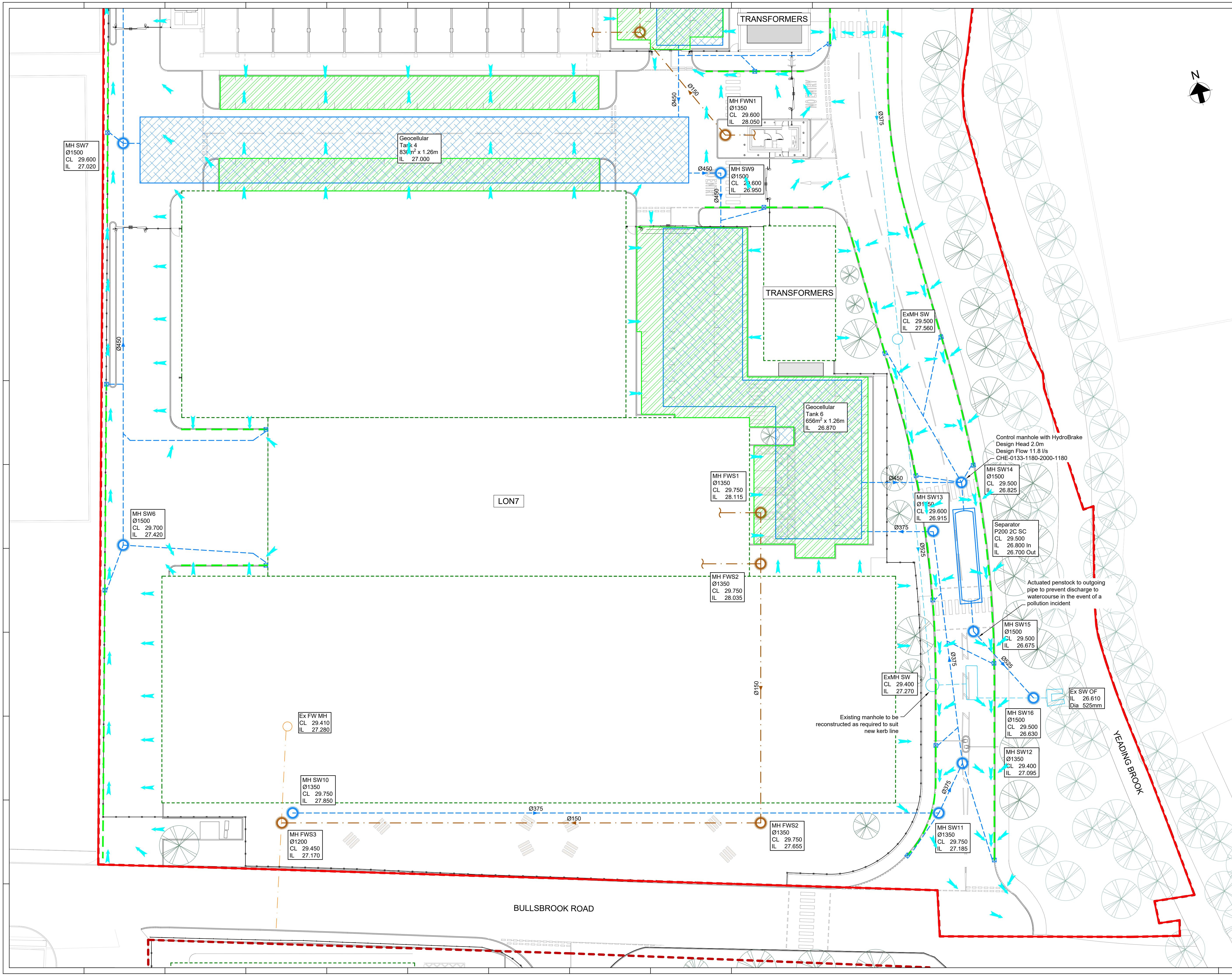
DRAWING NUMBER: LONUX-ARUP-DC-LP-DR-C-52201
REVISION: P01



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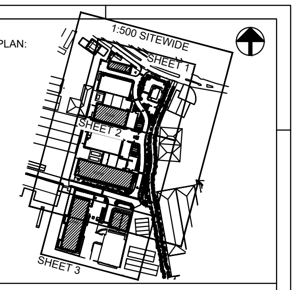

Notes

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3. All linear drainage and linear drainage outfalls subject to detailed design following confirmation of levels.
4. All gully and linear drainage leads to be 150dia unless noted otherwise.
5. All storm and foul water building connections subject to architect and MEP engineer design.
6. Drainage routes to be coordinated with below ground services.
7. HydroBrake to be unit CHE-0133-1180-2000-1180, 11.8 l/s at 2.0m head
8. Porous car park formation level to be 500mm min. above top of geocellular tank.

Key to drainage

- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Porous pavement
- Geocellular storage tank
- Gully
- Linear drainage channel

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P01.01	15/10/24	50% Review	Arup	COLT

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DRAWING TITLE:
Drainage Layout (Sheet 2)

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
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DRAWING NUMBER: LONUX-ARUP-DC-LP-DR-C-52202
REVISION: P01

BULLSBROOK ROAD

Ex TWL 3401
CL 29.878
IL 26.868

MH FW5
Ø1200
CL 29.600
IL 27.220

MH FW6
Ø1200
CL 29.850
IL 27.100

MH FW4
Ø1200
CL 29.100
IL 27.415

Ex TWL 4401
CL 28.530
IL 27.440

MH SW7
Ø1200
CL 28.700
IL 27.935

ASSUMED ROUTE Ø450

MH SW1
Ø450
CL 29.850
IL 28.250

MH SW8
Ø1500
CL 29.500
IL 27.665

Ex SW MH014
CL 28.810
IL 26.990

Ex SW MH011
CL 28.840
IL 27.030

MH FW3
Ø1350
CL 28.900
IL 27.650

Existing foul drainage diverted to new drainage

FW MH012
CL 28.900
IL 27.670

MH SW9
Ø1500
CL 29.500
IL 27.265

MH FW1
Ø1200
CL 29.700
IL 27.910

MH FW2
Ø1350
CL 29.000
IL 27.750

Ex SW MH010
CL 28.800
IL 27.050

SUB-STATION 2

Control manhole with HydroBrake Unit CHE-0081-3600-1300-3600 3.6 l/s at 1.3m head

MH SW6
Ø450
CL 29.600
IL 28.250

MH SW10
Ø1350
CL 28.900
IL 27.075 (Ø375)
IL 27.150 (Ø300)

Class 1 full retention separator SPEL P0451C/ESR
IL in 27.240
IL out 27.180

Geocellular Tank 2
162m² x 0.84m
IL 27.300

Ex SW MH009
CL 28.810
IL 27.150

LON8

Ex SW MH008
CL 28.820
IL 27.340

MH SW5
Ø450
CL 29.600
IL 28.250

Geocellular Tank 1
474m² x 0.84m
IL 27.325

UNIT 2

Ex SW MH007
CL 28.810
IL 27.540

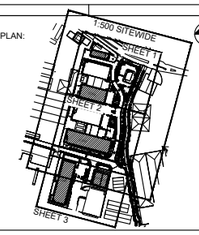
MH SW4
Ø450
CL 29.600
IL 28.250

Ex FW MH017
CL 28.800
IL 28.240

MH SW2
Ø1200
CL 29.850
IL 27.590

MH SW3
Ø1200
CL 29.200
IL 27.350

KEY PLAN:



Notes

1. All drainage subject to detailed level design.
2. Outfall invert level at MH SW10 assumed based upon surveyed upstream levels. To be confirmed by survey.
3. All linear drainage and linear drainage outfalls subject to detailed design following confirmation of levels.
4. All gully and linear drainage leads to be 150dia unless noted otherwise.
5. All storm and foul water building connections subject to architect and MEP engineer design.
6. Drainage routes to be coordinated with below ground services.
7. HydroBrake to be unit CHE-0081-3600-1300-3600 3.6 l/s at 1.3m head.
8. Porous car park formation level to be 700mm minimum below lowest finished surface level.

Key to drainage

- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Proposed filter drain
- Porous pavement
- Geocellular storage tank
- Gully
- Linear drainage channel

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P01	14/03/25	For Planning	Arup	COLT
P01.02	28/02/25	WIP For Planning	Arup	COLT
P01.01	15/10/24	50% Review	Arup	COLT

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PROJECT NAME:
HDP Masterplan

DRAWING TITLE:
Drainage Layout

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	CH	JT	1:250	A1	S3

DRAWING NUMBER: LON8-ARUP-DC-LP-DR-C-52201
REVISION: P01

N

UXBRIDGE ROAD

INNOVATION HUB

LON6

METRO BANK

TRANSFORMERS

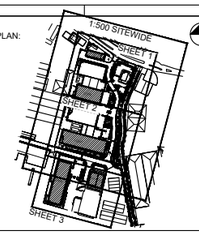
TRANSFORMERS

YEADING BROOK

0 5 10 Metres

Scale 1:250

KEY PLAN:



Notes

1. All exceedance flow paths subject to detailed level design.

Key

- Overland exceedance flow path
- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Geoceullular storage tank
- Gully
- Linear drainage channel

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
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P01.01	28/02/25	WIP For Planning	Arup	COLT

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PROJECT NAME:

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DRAWING TITLE:

Proposed Overland Flow Path (Sheet 1)

STATUS:

S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	DC	JT	1:250	A1	S3

DRAWING NUMBER: LONUX-ARUP-SW-LP-DR-C-52210

REVISION: P01

N

TRANSFORMERS

TRANSFORMERS

LON7

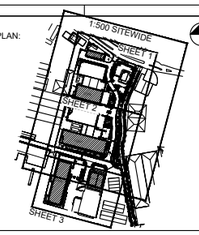
BULLSBROOK ROAD

YEADING BROOK

0 5 10 Metres

Scale 1:250

KEY PLAN:



Notes

1. All exceedance flow paths subject to detailed level design.

Key

- Overland exceedance flow path
- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Geoceullular storage tank
- Gully
- Linear drainage channel

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P01	28/02/25	For Planning	Arup	COLT
P01.01	28/02/25	WIP For Planning	Arup	COLT

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DRAWING TITLE:

Proposed Overland Flow Path (Sheet 2)

STATUS:

S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
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DRAWING NUMBER: LONUX-ARUP-SW-LP-DR-C-52211

REVISION: P01

BULLSBROOK ROAD

N

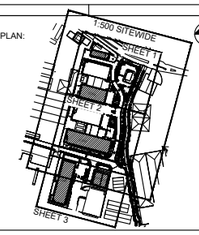
LON8

SUB-STATION 2

UNIT 2

RE

KEY PLAN:



Notes

1. All exceedance flow paths subject to detailed level design.

Key

- Overland exceedance flow path
- Site boundary
- Proposed building outline
- Existing storm water drainage
- Existing foul water drainage
- Proposed storm water drainage
- Proposed foul water drainage
- Proposed filter drain
- Geocellular storage tank
- Gully
- Linear drainage channel

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P01.01	28/02/25	WIP For Planning	Arup	COLT

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PROJECT NAME:
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DRAWING TITLE:
Overland Flow Path

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	CH	JT	1:250	A1	S3

DRAWING NUMBER: LON8-ARUP-SW-LP-DR-C-52210
REVISION: P01

Appendix H

Combined Utility Plan

Proposed Substation

Proposed 8No 150mm ducts from LV cables from new incoming LV switchboard to Innovation Hub. TBC by Aecom

Proposed 6No 150mm ducts from LV cables from new incoming LV switchboard to Innovation Hub. TBC by Aecom

Existing Substation to be decommissioned and replaced with a new substation

Existing Foul Drainage to be reconnected to proposed Foul Network

Proposed 6No Ø150mm ducts from generator to Innovation Hub. TBC by Aecom

EXTENT OF BT RELOCATION ALONG UXBRIDGE ROAD TO BE CONFIRMED

Uxbridge Rd

Proposed 2No. 110mm ducts BT connection to Innovation Hub

Proposed WHR Flow (Heating) Return Pipework 2No Ø400mm

Proposed DN75 HDPE Mains Water

Proposed 2No. Ø150mm ducts from LV switchroom to Metrobank future connection

Existing Power Supply to Metrobank to be maintained at all times

Innovation Hub

Proposed 2No Ø110mm ducts to Innovation Hub

L LON6

L LON6

K LON6

K LON6

A LON6

A LON6

Proposed below ground Fuel Dump Line. All pipework DN100 (175mm OD)

Proposed buried fuel dump tank (16m3 gross volume Ø2000 x 5230 mm)

Proposed WHR Flow (Heating) Return Pipework 2No Ø125mm

Proposed WHR Flow (Heating) Return Pipework 2No Ø400mm

Metro Bank

Yeading Brook

Proposed DN75 HDPE Mains Water

Proposed Foul Water Manhole position TBC at next design stage RIBA3

Proposed 4No Ø150mm ducts from Life Safety Generator to high level in basement

Proposed 1No Ø225mm rainwater harvesting pipe

Proposed rainwater harvesting tank

POE

MMR

INCOMING MV SWITCHROOM

Proposed 4No Ø150mm ducts from LL LV switchroom to highlevel in basementt

POE

MMR

CS

BBU

Proposed MV interconnection cable ducts. Size TBC by JSM

LON6

B LON6

B LON6

MMR

INCOMING MV SWITCHROOM

MMR

CS

POE

POE

Proposed 4No Ø150mm ducts from LL LV switchroom to highlevel in basementt

Existing 10No. Ø110mm for LON4/5/8 to be maintained

Tx

Eastern side of LON6 - not enough space to accommodate proposed underground utilities and its infrastructure within property ownership boundary/fence (chambers, etc). For review and discussion.

C LON6

C LON6

Proposed below ground Fuel Dump Line. All pipework DN100 (175mm OD)

Proposed buried fuel dump tank (16m3 gross volume Ø2000 x 5230 mm)

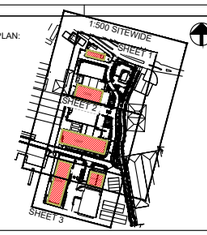
Tx

J

J

NOTES:
1. Do not scale from this drawing.
2. This drawing has been produced for RIBA Stage 2 Issue.
3. Drawings are outline only and subject to coordination with existing services and design development by the MEP Engineer (Cundall) and Landscape Architect (Murdoch).
4. Refer to drawings LONUX-ARUP-DC-LP-DR-C-52201 and LONUX-ARUP-DC-LP-DR-C-52202 for drainage strategy layouts.
5. Refer to drawings LONUX-ARUP-DC-LP-DR-C-70401 to 70405 for typical sections.

KEY PLAN:



KEY:

- Site Boundary
- Proposed Surface water pipe
- Proposed Foul water pipe
- Proposed 2No Ø400mm pipes WHR (Heating) LON6
- Proposed 2No Ø125mm pipes WHR (Heating) LON6 and Innov. Hub
- Proposed 8xØ110 PEP Comms ducts
- Proposed 12xØ110 POE Comms ducts
- Relocation 10xØ110 existing comms ducts for LON4/5/8 east of Metrobank
- Proposed Comms Ring 3x6 Ø110mm
- Proposed Comms Ring (Interconnection) 3x6 Ø110mm
- Proposed MVA cable route
- Proposed MVB cable route
- Proposed LV cable route
- Proposed MV Power pit 3.0m x 3.0m
- Proposed Comms pit 3.2m x 1.8m
- Proposed LV Power pit 1.2m x 1.2m
- BT diversion option B
- Proposed 66kV cable route
- Proposed Attenuation tank
- Proposed SW Gully/Channel Outlet
- Proposed Fuel Dump Tank
- Proposed Building Basement Outline
- Proposed Building Outline (LON 7 & 8)
- Existing Surface Water
- Existing Foul/Surface Water
- Existing Foul Water
- Existing Comms 10xØ110mm for LON4/5/8 (to be retained)
- Existing Power Supply to MetroBank

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
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P01.02	28/02/25	WiP for Planning	Arup	COLT
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colt Data Centre Services, Colt House, 20 Great Eastern Street, London, EC2A 3EH, United Kingdom, www.coltdatacentres.net

PROJECT NAME:
HDP Masterplan

DRAWING TITLE:
Proposed Utilities Layout Sheet 2

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

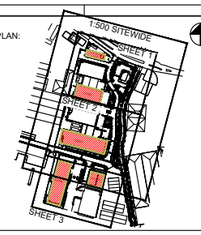
DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	AA	MF	1:250	A1	S3

DRAWING NUMBER: LONUX-ARUP-DC-LP-DR-C-70202

REVISION: P01

NOTES:
1. Do not scale from this drawing.
2. This drawing has been produced for RIBA Stage 2 Issue.
3. Drawings are outline only and subject to coordination with existing services and design development by the MEP Engineer (Cundall) and Landscape Architect (Murdoch).
4. Refer to drawings LONUX-ARUP-DC-LP-DR-C-52201 and LONUX-ARUP-DC-LP-DR-C-52202 for drainage strategy layouts.
5. Refer to drawings LONUX-ARUP-DC-LP-DR-C-70401 to 70405 for typical sections.

KEY PLAN:



KEY:

- Site Boundary
- Proposed Surface water pipe
- Proposed Foul water pipe
- Proposed 2No Ø400mm pipes WHR (Heating) LON6
- Proposed 2No Ø125mm pipes WHR (Heating) LON6 and Innov. Hub
- Proposed 8xØ110 PEP Comms ducts
- Proposed 12xØ110 POE Comms ducts
- Relocation 10xØ110 existing comms ducts for LON4/5/8 east of Metrobank
- Proposed Comms Ring 3x6 Ø110mm
- Proposed Comms Ring (Interconnection) 3x6 Ø110mm
- Proposed MVA cable route
- Proposed MVB cable route
- Proposed LV cable route
- Proposed MV Power pit 3.0m x 3.0m
- Proposed Comms pit 3.2m x 1.8m
- Proposed LV Power pit 1.2m x 1.2m
- BT diversion option B
- Proposed 66kV cable route
- Proposed Attenuation tank
- Proposed SW Gully/Channel Outlet
- Proposed Fuel Dump Tank
- Proposed Building Basement Outline
- Proposed Building Outline (LON 7 & 8)
- Existing Surface Water
- Existing Foul/Surface Water
- Existing Foul Water
- Existing Comms 10xØ110mm for LON4/5/8 (to be retained)
- Existing Power Supply to MetroBank

J LON6 — J LON6
D LON7 — D LON7
E LON7 — E LON7
F LON7 — F LON7
G LON7 — G LON7
H LON7 — H LON7
I LON7 — I LON7

Tx
Tx
LON7

Proposed MV chambers location to be spatially coordinate at next design stage RIBA3 once architectural layout of proposed LON7 is confirmed

Interconnecting MV cables between MV switchrooms

POE
POE
POE
POE

Existing 10No. Ø110mm for LON4/5/8 to be maintained

SE corner of LON7 - not enough space to accommodate proposed underground utilities and its infrastructure within property ownership boundary/fence (chambers, etc). For review and discussion.

Existing Stormwater Outfall to be maintained and reused

Existing Substation to remain under operation

Bullsbrook Rd

Proposed 132kV (By Others)

Proposed 66kV (By Others)

N

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P01	14/03/25	For Planning	Arup	COLT
P01.02	28/02/25	WIP for Planning	Arup	COLT
P01.01	15/10/24	50% Review	Arup	COLT

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PROJECT NAME:
HDP Masterplan

DRAWING TITLE:
Proposed Utilities Layout Sheet 2

STATUS:
S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	AA	MF	1:250	A1	S3

DRAWING NUMBER: LONUX-ARUP-DC-LP-DR-C-70203
REVISION: P01

Existing Substation to remain under operation

N

Proposed 132kV (By Others)

LON7

BULLSBROOK ROAD

Proposed 66kV (By Others)

LON7

Car Parking (LON8)

Tx

Substation 2

Tx

LON8

Unit 2

Proposed 132kV to Substation 1

Proposed 11kV from Substation 2 to LON4&5

Relocated gas main

A

LON8

A

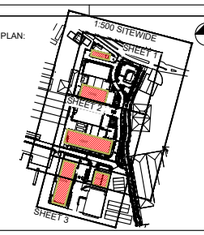
LON8

23.6

NOTES:

1. Do not scale from this drawing.
2. This drawing has been produced for RIBA Stage 2 Issue.
3. Drawings are outline only and subject to coordination with existing services and design development by the MEP Engineer (Cundall) and Landscape Architect (Murdoch).
4. Refer to drawings LON8-ARUP-DC-LP-DR-C-52201 for drainage strategy layouts.
5. Refer to drawing LON8-ARUP-DC-LP-DR-C-70410 for typical section.

KEY PLAN:



KEY:

- Site Boundary
- Proposed Surface water pipe
- Proposed Foul water pipe
- Proposed 16xØ110 PEP Comms ducts
- Relocation 10xØ110 existing comms ducts for LON4/5/8 east of Metrobank
- Proposed Comms Ring 3x6 Ø110mm
- Proposed MVA cable route
- Proposed MVB cable route
- Proposed 11 kV cable route
- Proposed 11 kV cable route (temporary)
- Proposed 132kV cable route (by others)
- Proposed MV Power pit 3.0m x 3.0m
- Proposed Comms pit 3.2m x 1.8m
- Proposed LV Power pit 1.2m x 1.2m
- Proposed 132kV Power pit 3.0m x 3.0m
- BT diversion option B
- Proposed 66kV cable route
- Proposed Attenuation tank
- Proposed SW Gully/Channel Outlet
- Proposed Fuel Dump Tank
- Proposed Building Basement Outline
- Proposed Building Outline (LON 7 & 8)
- Existing Surface Water
- Existing Foul/Surface Water
- Existing Foul Water
- Existing Comms 10xØ110mm for LON4/5/8 (to be retained)
- Existing Power Supply to MetroBank

REV.	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P01	14/03/25	For Planning	Arup	COLT
P01.03	28/02/25	WiP for Planning	Arup	COLT
P01.02	12/11/24	WiP Issue	Arup	COLT
P01.01	**15/10/24**	**50% Review**	**Arup**	**COLT**

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PROJECT NAME:

HDP Masterplan

DRAWING TITLE:

Proposed Utilities Layout LON8

STATUS:

S3 - COLT STAGE 2 - FOR PLANNING

DESIGNED:	DRAWN:	CHECKED:	SCALE:	SIZE:	STATUS:
ARUP	MF	JT	1:250	A1	S3

DRAWING NUMBER: LON8-ARUP-DC-LP-DR-C-70210

REVISION: P01

Appendix I

Drainage Maintenance and Management Plan

I.1 Introduction

The following sets out the construction and maintenance requirements for the drainage system.

All elements of the drainage system are private, and will remain the responsibility of the owner/operator to maintain.

I.2 Drainage features

I.2.1 Rain gardens

I.2.1.1 Construction

Rain gardens should ideally be constructed at the completion of development, to minimise erosion and sediment generation, and a dense and vigorous vegetative cover should be established over the contributing pervious catchment area before runoff is accepted into the facility.

Blinding, compaction and failure may occur during the site construction phase. Filter mediums should be covered with a temporary impermeable cover to collect all the silt and sediment that is washed into the depression during construction (i.e the system is acting as a silt basin during construction). This impermeable layer and accumulated silt should be removed once construction is completed, and the system is planted.

To minimise the risk of premature system failure, the following points should be closely monitored during the construction of rain gardens:

- Care should be taken not to over-compact the soils within the rain gardens, and particularly the filter and soil planting bed, as this will reduce filtration capacities.
- Construction plant should avoid running over rain gardens
- If mulch is required, it should be applied before planting. It should not be piled up around plants, as this will cause disease and encourage pests. It should be 50–75 mm thick and should be kept clear of plant stems by 50 mm to prevent excessive moisture around the stems.
- Care should be taken to ensure that geotextiles are not clogged or torn during construction.
- The filter medium should not be placed if it is saturated.

The filter medium should be tested to ensure that it meets criteria indicated on the drawings.

It is important to establish the planting in the systems as quickly as possible. Watering, weeding and replanting will be required during the establishment period to ensure that greater than 90% of plants survive and give good cover.

The surface of the filter medium should be free of localised depressions so that water is distributed evenly across the surface and prevents localised ponding and clogging. The surface levels should be within a tolerance of ± 25 mm for smaller systems and ± 40 mm for systems with an area greater than 300m^2. The thicknesses for the various layers should be constructed with a tolerance of + 25 mm (i.e they should not be less than the design thickness). Levels around the edge of the system should be within ± 25 mm of design levels.

I.2.1.2 Operation and maintenance

The main cause of failure of is clogging of the surface, which is easily visible. Blockages within the drainage system within the rain garden are not so easy to detect and therefore could potentially be ignored. Any prolonged surface ponding within the rain garden should be investigated.

During the first few months after installation, the system should be visually inspected after rainfall events, and the amount of deposition measured, to give the operator an idea of the expected rate of sediment

deposition. After this initial period, systems should be inspected each quarter, to verify the appropriate level of maintenance.

Litter picking should be frequent, as rubbish is detrimental to the visual appearance and operation.

Frequent street sweeping in the catchment area will increase the time interval between cleaning out the filter surface and will reduce the loading of fine suspended solids that can potentially clog the filter medium.

All vegetation management activities should take account of the need to maximise biosecurity and prevent the spread of invasive species.

Occasionally sediment will need to be removed (e.g. once deposits exceed 25 mm in depth). Sediment testing may be required before sediment excavation to determine its classification and appropriate disposal methods.

Table H1 table below provides operational and maintenance requirements for rain gardens.

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove litter and surface debris	Weekly
	Remove weeds	Monthly between April and October
	Inspect inlets and outlets for blockage	Monthly
	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
Occasional maintenance	Replace any plants, to maintain planting density	As required
Remedial actions	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	Occasional maintenance
	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Table H1 - Maintenance schedule – Rain gardens

I.2.2 Permeable surfaces

I.2.2.1 Construction

Construction build-ups, separation layers and surfacing should be installed in accordance with construction details to ensure that the pavement operates as intended.

Installed build-ups and surfaces should be protected from construction traffic to prevent over compaction and damage to the system.

Blinding, compaction and failure may occur during the site construction phase. Filter mediums should be covered with a temporary impermeable cover to collect all the silt and sediment that is washed onto the surface during construction. This impermeable layer and accumulated silt should be removed once construction is completed, and the final surfacing laid.

I.2.2.2 Operation and maintenance

Permeable surfaces need to be regularly swept, and silt/sediment removed to remain effective.

Any prolonged surface ponding or excessive runoff should be investigated and remedial works undertaken.

The table below provides operational and maintenance requirements for permeable surfaces.

Maintenance schedule	Required action	Frequency
Regular maintenance	Brush surfaces to reduce build-up of silts and retain permeability.	Monthly.
Occasional maintenance	Brush and vacuum surface.	Annually.
Remedial actions	Monitor effectiveness of permeable pavement and when water does not infiltrate immediately consider need for reinstatement of top layers or specialist cleaning.	As required.

Table H2 - Maintenance schedule – Permeable surfaces

I.2.3 Filter drains

I.2.3.1 Construction

Filter drains should be protected from untreated runoff from areas under construction. Untreated runoff is likely to contain large amounts of silt, debris and other pollutants, as this will cause rapid clogging of the systems. Silt control measures should be incorporated to manage runoff from unsurfaced areas during construction.

Geotextile and stone fill should be clean before construction. Backfill should be placed in 100 - 150mm layers and lightly compacted as required. All geotextiles should be wrapped and secured to prevent gravel or stone from clogging with sediments.

I.2.3.2 Operation and maintenance

Regular inspection and maintenance is important for the effective operation of the filter drains.

Systems should be inspected for silt, and silt removal should be undertaken as part of general inspection and maintenance. All silt should be removed from site.

The table below provides operational and maintenance requirements for filter drains.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and perforated pipework and chambers for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
Occasional maintenance	Clear perforated pipework of blockages	As required

Table H3 - Maintenance schedule – Filter drains

I.2.4 Ponds and basins

I.2.4.1 Construction

Surface water management measures during construction will be set out in a Construction Surface Water Management Plan, prepared by the Contractor prior to commencement of construction.

If ponds are used to store runoff as part of the construction surface water management system, localised silt control measures such as silt fences and settlement basins will be utilised as necessary to reduce as far as practical the quantity of silt passed to the ponds during construction.

A mixture of pre planted coir pallets and plug planting will be used in marginal areas to reduce vegetation establishment timescales.

Seed planting on the pond slopes will take place in late spring onwards to reduce the likelihood of seed getting washed away in stormwater events.

Care will be taken to ensure that the impermeable liner is not damaged during installation and is installed and lapped in accordance with the manufacturer's requirements.

I.2.4.2 Operation and maintenance

Regular inspection and maintenance are important for the effective operation of the ponds.

Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from site.

Grass clippings from grass cutting within the ponds should be disposed of either off site or outside the area of the ponds, to remove nutrients and pollutants.

Occasionally, sediment may need to be removed (e.g. once deposits exceed 25 mm in depth). Sediment testing may be required before sediment excavation to determine its classification and appropriate disposal methods.

Stepped access is provided to pond outlets to allow access to the ponds and outlet structures for maintenance.

Any damage due to sediment removal or erosion should be repaired and immediately reseeded or planted.

The table below provides operational and maintenance requirements for ponds and basins.

Maintenance schedule	Required action	Frequency
Inlet and outlet headwalls		
Regular maintenance	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect inlets and outlets for silt accumulation, establish appropriate silt removal frequencies.	Half yearly.
Occasional maintenance	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years or as required.
Remedial actions	Repair headwalls, access steps and screens.	As required.
	Repair and/or realign erosion protection.	As required.
Ponds (general)		
Regular maintenance	Remove litter and debris.	Monthly, or as required.
	Cut grass – in and round the ponds.	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required.
	Inspect banksides, structures, pipework etc for evidence of physical damage.	Monthly.

	Inspect vegetation coverage.	Monthly for 6 months, quarterly for 2 years, then half yearly.
	Inspect gabion walls for build-up of vegetation, and remove as required.	Annually.
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.	As required.
	Prune and trim any trees and remove cuttings.	Every 2 years or as required.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
	Remove and dispose of silt and sediment.	As required.
	Remove and dispose of oils or petrol residues using safe standard Practices.	As required.
	Replace damaged areas of gabion walls	As required.

Table H4 – Operation and maintenance Requirements for ponds and basins

I.2.5 Geocellular storage structures

I.2.5.1 Construction

The underground storage should be protected from untreated runoff from areas under construction. Untreated runoff is likely to contain large amounts of silt, debris and other pollutants, as this will cause rapid clogging of the storage. Silt control measures should be incorporated to manage runoff from unsurfaced areas during construction.

I.2.5.2 Operation and maintenance

The storage tank should be protected from significant accumulation of silt during operation, as gullies and open surface drainage features are limited.

The geocellular storage system should provide access for inspection and maintenance.

The table below provides operational and maintenance requirements for geocellular storage systems.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect system to identify defects and assess any accumulated debris.	Annually.
Occasional maintenance	Remove accumulated silt and debris	As required.

Table H5 - Maintenance schedule – Geocellular storage structures

I.2.6 Separators

I.2.6.1 Construction

Separators should be installed, alarmed and vented in accordance with national regulations and manufacturer's requirements.

The piped drainage system should be protected from untreated runoff from areas under construction. Untreated runoff is likely to contain large amounts of silt, debris and other pollutants, as this will cause rapid clogging of the systems. Silt control measures should be incorporated to manage runoff from unsurfaced areas during construction.

I.2.6.2 Operation and maintenance

The table below provides operational and maintenance requirements for manholes and the piped drainage system.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect for signs of blockage and oil spillage.	Annually.
	Provide maintenance in accordance with manufacturer's requirements.	Annually or as advised by manufacturer.
Remedial actions	Remove oil from separators and dispose using safe standard practices.	As required.

Table H6 – Operation and maintenance requirements for separators

I.2.7 Flow controls

I.2.7.1 Construction

Flow controls should be installed prior to connection of the drainage system to the outfall, in order to ensure that flows greater than permitted are not passed forward to the outfall.

I.2.7.2 Operation and maintenance

The flow control devices have been sized to reduce the risk of blockage, and as such should require limited maintenance.

The table below provides operational and maintenance requirements for flow control devices.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect flow control devices to ensure that they are undamaged and operational.	Annually.
Occasional maintenance	Remove sediment from flow control manholes.	Every 5 years or as required.
Remedial actions	Repair or replace flow control devices.	As required.

Table H7 - Maintenance schedule – Flow controls

I.2.8 Manholes and piped drainage system

I.2.8.1 Construction

The piped drainage system should be protected from untreated runoff from areas under construction. Untreated runoff is likely to contain large amounts of silt, debris and other pollutants, as this will cause rapid clogging of the systems. Silt control measures should be incorporated to manage runoff from unsurfaced areas during construction.

I.2.8.2 Operation and maintenance

The piped drainage system should be protected from significant accumulation of silt during operation, as gullies and open surface drainage features are limited.

The table below provides operational and maintenance requirements for manholes and the piped drainage system.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect chambers to identify defects and clear any accumulated debris.	Annually.
Remedial actions	Undertake repair works as necessary to inlets, outlets, benching, access arrangements and covers.	As required.

Table H8 - Maintenance schedule – Manholes and piped drainage system

I.2.9 Linear drains and gullies

I.2.9.1 Construction

Linear drains and gullies should be protected from untreated runoff from areas under construction. Untreated runoff is likely to contain large amounts of silt, debris and other pollutants, as this will cause rapid clogging of the systems. Silt control measures should be incorporated to manage runoff from unsurfaced areas during construction.

I.2.9.2 Operation and maintenance

The table below provides operational and maintenance requirements for manholes and the piped drainage system.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and remove silt accumulation. Dispose of silt using safe standard practices. Avoid jetting silt downstream to ponds.	Annually.
Remedial actions	Undertake repair work as necessary to covers and gratings.	As required.

Table H9 – Operation and maintenance requirements for linear drains and gullies