

Surface Water Drainage Calculations

For a site referred to as

Loreto College Expansion Project

Undertaken on behalf of

Loreto College

Job No: 10939

Document No: 10939-WML-ZZ-XX-CA-C-0001

Date: April 2023

Project No. & Name:	10939 – Loreto College Expansion	Status:	Prepared by:	Rev:	Date:
Document Ref:	10939-WML-00-XX-CA-C-0001	Preliminary	Daniel Baker	P01	April 2023

General Notes

1. The calculations within this document have been undertaken using MicroDrainage Software version 2020.
2. This document is to be read in conjunction with the following documents;
 - a. 10939-WML-ZZ-XX-DR-C-1001 – Proposed Drainage GA
 - b. 10939-WML-00-XX-RP-C-9002 – Drainage Strategy Document

Summary of Results

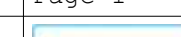
1. The following summary demonstrates that the outgoing flow rates for the new development works are less than or equal to those of the pre-development (Greenfield) site.

Greenfield Runoff Rate* (l/s)	Proposed Site Runoff Rate – Manhole S9 (l/s)
Q1: 1.4 Q30: 2.7 Q100: 3.3	1: 1.3 30: 2.1 100+40%: 3.0

Greenfield Runoff Calculation

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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL		
Date 16/03/2023 14:21 File	Designed by DBaker Checked by	
Innovyze		Source Control 2020.1.3
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 1 Soil 0.450 Area (ha) 0.283 Urban 0.000 SAAR (mm) 860 Region Number Region 10 Results 1/s QBAR Rural 1.6 QBAR Urban 1.6 Q1 year 1.4 Q1 year 1.4 Q30 years 2.7 Q100 years 3.3		
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Proposed Surface Water Network Calculation

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Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

« - Indicates pipe capacity < flow

Network Results Table

WML Consulting Ltd		Page 3
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL		
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Innovyze	Network 2020.1.3	

Network 2020.1.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	32.930	1.290	Open Manhole	600	S3.000	31.640	225				
S2	32.930	1.400	Open Manhole	600	S3.001	31.530	225	S3.000	31.530	225	
S3	32.630	1.430	Open Manhole	600	S3.002	31.200	225	S3.001	31.200	225	
S4	32.630	1.630	Open Manhole	600	S3.003	31.000	225	S3.002	31.000	225	
S5	32.500	1.700	Open Manhole	600	S3.004	30.800	225	S3.003	30.800	225	
S6	31.750	1.030	Open Manhole	600	S4.000	30.720	225				
S7	32.500	1.980	Open Manhole	1200	S3.005	30.520	225	S3.004	30.520	225	
								S4.000	30.520	225	
S8	31.750	1.500	Open Manhole	1200	S3.006	30.250	225	S3.005	30.250	225	
S-EXMH2	32.000	1.790	Open Manhole	1200	S5.000	30.210	225				
S-TANK	32.000	1.800	Junction		S3.007	30.200	225	S3.006	30.200	225	
								S5.000	30.200	225	
S9	31.750	1.750	Open Manhole	1350	S3.008	30.000	225	S3.007	30.200	225	
S10	31.650	1.800	Open Manhole	1200	S3.009	30.000	150	S3.008	29.850	225	
S10	31.660	1.910	Open Manhole	1200		OUTFALL		S3.009	29.750	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	383323.046	395970.102	383323.046	395970.102	Required	
S2	383333.697	395972.852	383333.697	395972.852	Required	
S3	383336.863	396005.700	383336.863	396005.700	Required	
S4	383316.088	396007.748	383316.088	396007.748	Required	
S5	383314.166	395987.842	383314.166	395987.842	Required	
S6	383292.051	395961.471	383292.051	395961.471	Required	
S7	383287.046	395980.834	383287.046	395980.834	Required	

WML Consulting Ltd					Page 4																																																
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Manhole Schedules for Storm <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S8</td><td>383275.428</td><td>395977.831</td><td>383275.428</td><td>395977.831</td><td>Required</td><td rowspan="2"></td></tr><tr><td>S-EXMH2</td><td>383270.633</td><td>395961.052</td><td>383270.633</td><td>395961.052</td><td>Required</td></tr><tr><td>S-TANK</td><td>383277.700</td><td>395968.043</td><td></td><td></td><td>No Entry</td><td></td></tr><tr><td>S9</td><td>383271.555</td><td>395976.830</td><td>383271.555</td><td>395976.830</td><td>Required</td><td rowspan="2"></td></tr><tr><td>S10</td><td>383257.032</td><td>395973.076</td><td>383257.032</td><td>395973.076</td><td>Required</td></tr><tr><td>S10</td><td>383235.840</td><td>395973.898</td><td></td><td></td><td>No Entry</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S8	383275.428	395977.831	383275.428	395977.831	Required		S-EXMH2	383270.633	395961.052	383270.633	395961.052	Required	S-TANK	383277.700	395968.043			No Entry		S9	383271.555	395976.830	383271.555	395976.830	Required		S10	383257.032	395973.076	383257.032	395973.076	Required	S10	383235.840	395973.898			No Entry	
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<u>PIPELINE SCHEDULES for Storm</u> <u>Upstream Manhole</u> <table><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr><tr><td>S3.000</td><td>o</td><td>225</td><td>S1</td><td>32.930</td><td>31.640</td><td>1.065</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.001</td><td>o</td><td>225</td><td>S2</td><td>32.930</td><td>31.530</td><td>1.175</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.002</td><td>o</td><td>225</td><td>S3</td><td>32.630</td><td>31.200</td><td>1.205</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.003</td><td>o</td><td>225</td><td>S4</td><td>32.630</td><td>31.000</td><td>1.405</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.004</td><td>o</td><td>225</td><td>S5</td><td>32.500</td><td>30.800</td><td>1.475</td><td>Open Manhole</td><td>600</td></tr><tr><td>S4.000</td><td>o</td><td>225</td><td>S6</td><td>31.750</td><td>30.720</td><td>0.805</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.005</td><td>o</td><td>225</td><td>S7</td><td>32.500</td><td>30.520</td><td>1.755</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.006</td><td>o</td><td>225</td><td>S8</td><td>31.750</td><td>30.250</td><td>1.275</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S5.000</td><td>o</td><td>225</td><td>S-EXMH2</td><td>32.000</td><td>30.210</td><td>1.565</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.007</td><td>o</td><td>225</td><td>S-TANK</td><td>32.000</td><td>30.200</td><td>1.575</td><td>Junction</td><td></td></tr><tr><td>S3.008</td><td>o</td><td>225</td><td>S9</td><td>31.750</td><td>30.000</td><td>1.525</td><td>Open Manhole</td><td>1350</td></tr><tr><td>S3.009</td><td>o</td><td>150</td><td>S10</td><td>31.650</td><td>30.000</td><td>1.500</td><td>Open Manhole</td><td>1200</td></tr></table> <u>Downstream Manhole</u> <table><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr><tr><td>S3.000</td><td>11.000</td><td>100.0</td><td>S2</td><td>32.930</td><td>31.530</td><td>1.175</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.001</td><td>33.000</td><td>100.0</td><td>S3</td><td>32.630</td><td>31.200</td><td>1.205</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.002</td><td>20.876</td><td>104.4</td><td>S4</td><td>32.630</td><td>31.000</td><td>1.405</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.003</td><td>19.999</td><td>100.0</td><td>S5</td><td>32.500</td><td>30.800</td><td>1.475</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.004</td><td>28.010</td><td>100.0</td><td>S7</td><td>32.500</td><td>30.520</td><td>1.755</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S4.000</td><td>20.000</td><td>100.0</td><td>S7</td><td>32.500</td><td>30.520</td><td>1.755</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.005</td><td>12.000</td><td>44.4</td><td>S8</td><td>31.750</td><td>30.250</td><td>1.275</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.006</td><td>10.048</td><td>201.0</td><td>S-TANK</td><td>32.000</td><td>30.200</td><td>1.575</td><td>Junction</td><td></td></tr><tr><td>S5.000</td><td>9.940</td><td>994.0</td><td>S-TANK</td><td>32.000</td><td>30.200</td><td>1.575</td><td>Junction</td><td></td></tr><tr><td>S3.007</td><td>10.722</td><td>0.0</td><td>S9</td><td>31.750</td><td>30.200</td><td>1.325</td><td>Open Manhole</td><td>1350</td></tr><tr><td>S3.008</td><td>15.000</td><td>100.0</td><td>S10</td><td>31.650</td><td>29.850</td><td>1.575</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.009</td><td>21.208</td><td>84.8</td><td>S10</td><td>31.660</td><td>29.750</td><td>1.760</td><td>Open Manhole</td><td>1200</td></tr></table> <u>Free Flowing Outfall Details for Storm</u> <table><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D,L (mm)</th><th>W (mm)</th></tr><tr><td>S3.009</td><td>S10</td><td>31.660</td><td>29.750</td><td>0.000</td><td>1200</td><td>0</td></tr></table>										PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S3.000	o	225	S1	32.930	31.640	1.065	Open Manhole	600	S3.001	o	225	S2	32.930	31.530	1.175	Open Manhole	600	S3.002	o	225	S3	32.630	31.200	1.205	Open Manhole	600	S3.003	o	225	S4	32.630	31.000	1.405	Open Manhole	600	S3.004	o	225	S5	32.500	30.800	1.475	Open Manhole	600	S4.000	o	225	S6	31.750	30.720	0.805	Open Manhole	600	S3.005	o	225	S7	32.500	30.520	1.755	Open Manhole	1200	S3.006	o	225	S8	31.750	30.250	1.275	Open Manhole	1200	S5.000	o	225	S-EXMH2	32.000	30.210	1.565	Open Manhole	1200	S3.007	o	225	S-TANK	32.000	30.200	1.575	Junction		S3.008	o	225	S9	31.750	30.000	1.525	Open Manhole	1350	S3.009	o	150	S10	31.650	30.000	1.500	Open Manhole	1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S3.000	11.000	100.0	S2	32.930	31.530	1.175	Open Manhole	600	S3.001	33.000	100.0	S3	32.630	31.200	1.205	Open Manhole	600	S3.002	20.876	104.4	S4	32.630	31.000	1.405	Open Manhole	600	S3.003	19.999	100.0	S5	32.500	30.800	1.475	Open Manhole	600	S3.004	28.010	100.0	S7	32.500	30.520	1.755	Open Manhole	1200	S4.000	20.000	100.0	S7	32.500	30.520	1.755	Open Manhole	1200	S3.005	12.000	44.4	S8	31.750	30.250	1.275	Open Manhole	1200	S3.006	10.048	201.0	S-TANK	32.000	30.200	1.575	Junction		S5.000	9.940	994.0	S-TANK	32.000	30.200	1.575	Junction		S3.007	10.722	0.0	S9	31.750	30.200	1.325	Open Manhole	1350	S3.008	15.000	100.0	S10	31.650	29.850	1.575	Open Manhole	1200	S3.009	21.208	84.8	S10	31.660	29.750	1.760	Open Manhole	1200	Outfall Pipe Number	Outfall Name	C. 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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL		
Date 26/04/2023 23:20 File 10939 - Surface Water -...	Designed by DBaker Checked by	
Innovyze	Network 2020.1.3	
Online Controls for Storm Orifice Manhole: S9, DS/PN: S3.008, Volume (m³): 2.9 Diameter (m) 0.042 Discharge Coefficient 0.600 Invert Level (m) 30.200		
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Storage Structures for Storm Cellular Storage Manhole: S-TANK, DS/PN: S3.007 Invert Level (m) 30.200 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>150.0</td><td>150.0</td><td>2.600</td><td>0.0</td><td>194.1</td></tr><tr><td>0.200</td><td>150.0</td><td>159.8</td><td>2.800</td><td>0.0</td><td>194.1</td></tr><tr><td>0.400</td><td>150.0</td><td>169.6</td><td>3.000</td><td>0.0</td><td>194.1</td></tr><tr><td>0.600</td><td>150.0</td><td>179.4</td><td>3.200</td><td>0.0</td><td>194.1</td></tr><tr><td>0.800</td><td>150.0</td><td>189.2</td><td>3.400</td><td>0.0</td><td>194.1</td></tr><tr><td>1.000</td><td>0.0</td><td>194.1</td><td>3.600</td><td>0.0</td><td>194.1</td></tr><tr><td>1.200</td><td>0.0</td><td>194.1</td><td>3.800</td><td>0.0</td><td>194.1</td></tr><tr><td>1.400</td><td>0.0</td><td>194.1</td><td>4.000</td><td>0.0</td><td>194.1</td></tr><tr><td>1.600</td><td>0.0</td><td>194.1</td><td>4.200</td><td>0.0</td><td>194.1</td></tr><tr><td>1.800</td><td>0.0</td><td>194.1</td><td>4.400</td><td>0.0</td><td>194.1</td></tr><tr><td>2.000</td><td>0.0</td><td>194.1</td><td>4.600</td><td>0.0</td><td>194.1</td></tr><tr><td>2.200</td><td>0.0</td><td>194.1</td><td>4.800</td><td>0.0</td><td>194.1</td></tr><tr><td>2.400</td><td>0.0</td><td>194.1</td><td>5.000</td><td>0.0</td><td>194.1</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	150.0	150.0	2.600	0.0	194.1	0.200	150.0	159.8	2.800	0.0	194.1	0.400	150.0	169.6	3.000	0.0	194.1	0.600	150.0	179.4	3.200	0.0	194.1	0.800	150.0	189.2	3.400	0.0	194.1	1.000	0.0	194.1	3.600	0.0	194.1	1.200	0.0	194.1	3.800	0.0	194.1	1.400	0.0	194.1	4.000	0.0	194.1	1.600	0.0	194.1	4.200	0.0	194.1	1.800	0.0	194.1	4.400	0.0	194.1	2.000	0.0	194.1	4.600	0.0	194.1	2.200	0.0	194.1	4.800	0.0	194.1	2.400	0.0	194.1	5.000	0.0	194.1
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Stanley Green Business Park

Earl Rd, Cheadle Hulme, SK8 6QL

Date 26/04/2023 23:20

File 10939 - Surface Water - ...

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Network 2020.1.3

Micro Drainage

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)

for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 1

Number of Online Controls 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.360

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

PN

US/MH Name

Storm

Return Period

Climate Change

First (X) Surge

First (Y) Flood

First (Z) Overflow

Overflow Act.

S3.000

S1

15 Winter

30

+0%

S3.001

S2

15 Winter

30

+0%

S3.002

S3

15 Winter

30

+0%

100/15 Summer

S3.003

S4

15 Winter

30

+0%

100/15 Summer

S3.004

S5

15 Winter

30

+0%

100/15 Summer

S4.000

S6

15 Winter

30

+0%

100/15 Summer

S3.005

S7

15 Winter

30

+0%

100/15 Summer

S3.006

S8

360 Winter

30

+0%

30/15 Summer

S5.000

S-EXMH2

360 Winter

30

+0%

30/60 Summer

S3.007

S-TANK

360 Winter

30

+0%

30/30 Winter

S3.008

S9

360 Winter

30

+0%

1/15 Summer

S3.009

S10

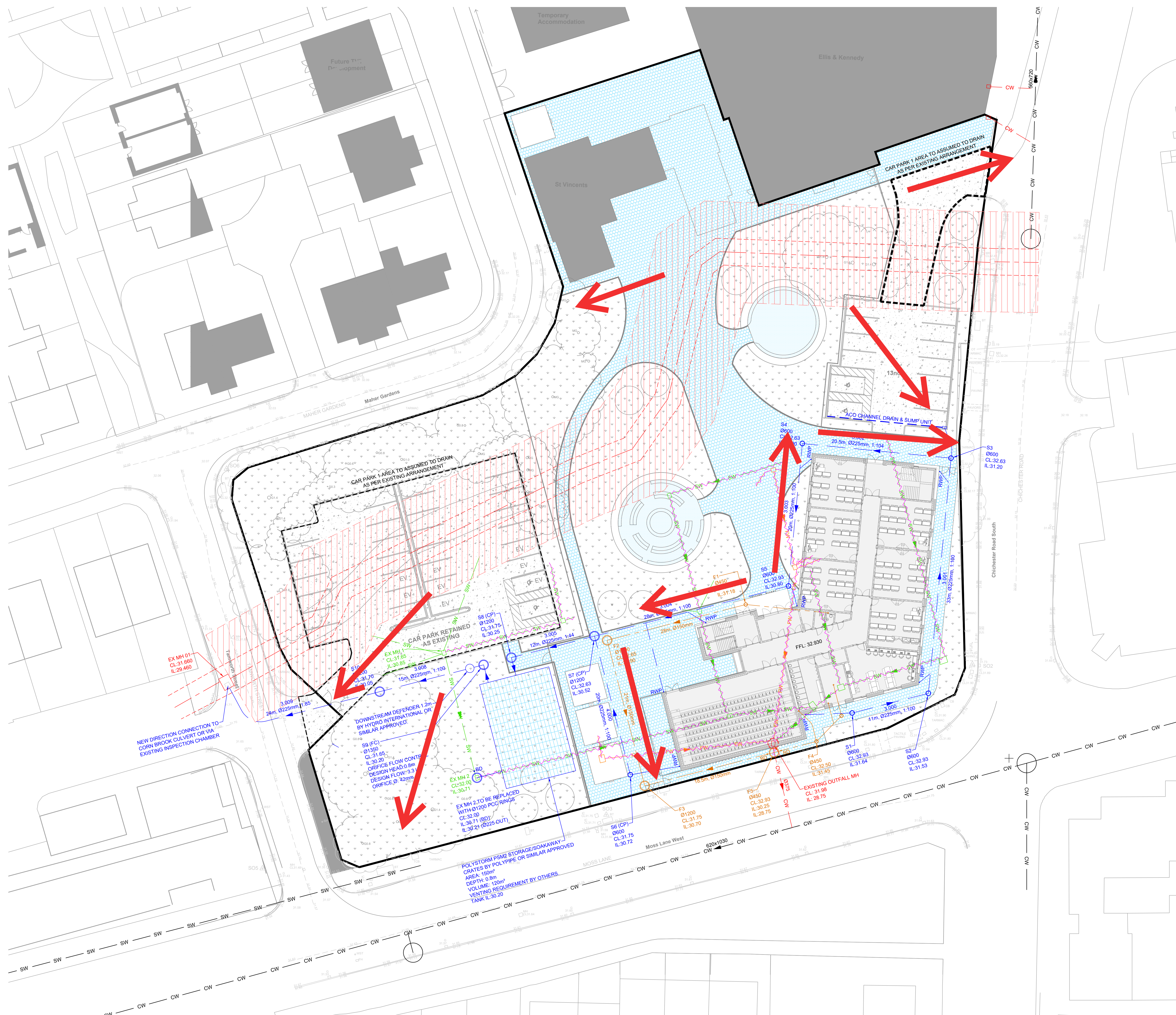
360 Winter

30

+0%

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Exceedance Flow Routes



EXCEEDANCE FLOW ROUTES