



advant
ENGINEERS

**CALDERSHAW CENTRE
INGS LANE
ROCHDALE
OL12 7LQ**

Drainage Strategy

DOCUMENT No:
23083-DSR-001-A

Issue Sheet.

Prepared	Date		Checked	Date
M M	19-03-24		M M	19-03-24

Revisions	Comment	Date
A	Initial Issue	19-03-24

The report is based on the information that has been acquired and / or made available to Advant Engineers via the various searches and consultations undertaken as part of the Drainage Strategy. In some cases, anecdotal information has been relied upon, where documented evidence has been lacking.

The conclusions drawn in the above report are considered correct although any subsequent additional information may allow refinement of the conclusions.

All work carried out in preparing this report has utilised and is based upon Advant Engineers current professional knowledge and understanding of current UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and cause any conclusions to become inappropriate or incorrect.

This report has been prepared using information contained in maps and documents prepared by others. Advant Engineers can accept no responsibility for the accuracy of such information.

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1. Introduction

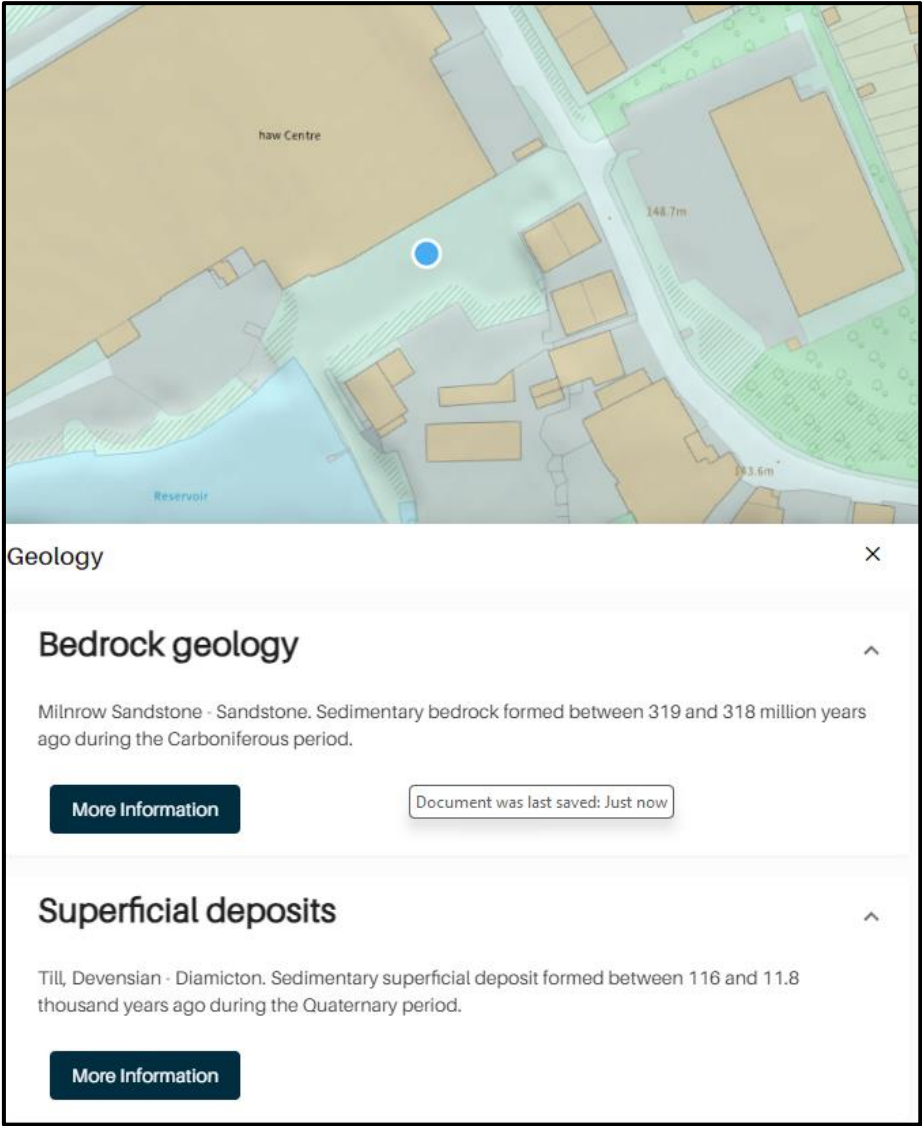
- 1.1. Advant Engineers Ltd has been commissioned by I.Q.7 LTD, to undertake a Drainage Strategy in connection with the proposed development at the land off Ings Lane in Rochdale. The proposal consists of 9 new build industrial / commercial units with access road and parking.
- 1.2. This report should be read in conjunction with drawing 23083-101 and associated architectural and engineering drawings.

2. Existing Site

- 2.1. The site currently is a greenfield piece of waste land located between existing industrial units, and is located off Ings Road, the overall site area is 2,962m² (0.296ha). (See Appendix A for location plan).
- 2.2. This site can be located at the following co-ordinates 387844E, 414531N and the nearest postcode is OL12 7LQ and can be seen on the below extract.



2.3. Without a site investigation we have referred to the British Geological Survey website¹, according to the BS website the ground conditions are described as:



2.4. The site falls steeply from the North to the South with a steep level difference that will need to be regraded.

3. Proposed Development

3.1. The proposed development is for 9 new build industrial / commercial units with associated parking and a new private access into the site. (See Appendix B for layout)

4. Drainage Strategy

4.1. Surface Water

- 4.2. The surface water drainage should be designed in accordance with the SUD hierarchy providing evidence to each step before moving on to the next one, the SUDS hierarchy is as follows:

SOURCE (INFILTRATION)



WATERCOURSE



SURFACE WATER SEWER

- 4.3. The expected ground conditions as shown on the BGS website indicate clay type material on sandstone, which is expected to not have an acceptable level of infiltration, as well as the amount of made ground required to build the site up and the elevated nature of the site compared to the neighbouring property, all amount together to discount the use of soakaways.
- 4.4. The next level on the hierarchy is discharge to a watercourse, as there are no suitable watercourses in the vicinity of the site then this has been discounted as an option.
- 4.5. Next would be to discharge to a surface water sewer, according to the sewer records there is a public surface water sewer that crosses the site, it is therefore proposed to discharge to this sewer at a controlled rate.
- 4.6. As the site is greenfield then greenfield rates should be utilised as the discharge rate back to the public surface water sewer, the greenfield rates for this site are as follows: (See Appendix C for calc).

QBAR = 2.67 l/s
 1 in 1 Year = 2.32 l/s
 1 in 30 Year = 4.53 l/s
 1 in 100 Year = 5.55 l/s

4.7. To achieve the QBAR rate for this site we would require an orifice size of 31mm, we consider this too small for a site of this nature as it would be susceptible to blockages, therefore we propose a discharge rate of 5.6 l/s which is the 1 in 100 year greenfield rate and allows for a 44mm orifice, ideally we would prefer an orifice sized no lower than 50mm but then we would be exceeding the equivalent greenfield rate.

4.8. Therefore, it is proposed to discharge to the public surface water sewer at a controlled rate of **5.6 l/s** and the **1 in 100 Year + 40%** climate change rainfall event is attenuated on site within a cellular attenuation tank. (See Appendix D for Drainage Layout and Appendix E for drainage calcs).

4.9. Foul Drainage

4.10. The foul drainage is proposed to connect into the public foul sewer located in Ings Lane.

5. SUDS Elements

5.1. All new surface water drainage systems should implement SUDS features where reasonably possible, these features are incorporated to offer benefits in Water Quality, Water Quantity, Amenity and Biodiversity. Below we have considered each SUDS element and determined its use within this particular development

COMPONENT	SUITABILITY	REASON
Rainwater Harvesting	X	Site not suitable.
Green Roof	X	Roof not suitable for a Green Roof.
Blue Roof	X	Roof not suitable for a Blue Roof.
Infiltration Systems	X	Ground conditions not suitable
Proprietary Treatment Systems	✓	Flow control to be installed.
Filter Strips	X	Ground conditions not suitable
Filter Drains	X	Ground conditions not suitable
Swales	X	Ground conditions not suitable
Bioretention Systems	X	Site constraints do not allow.
Trees	X	Site constraints do not allow.
Rain Garden	X	Site constraints do not allow.
Pervious Pavements	X	Final site usage not suitable.
Attenuation Storage Tanks	✓	Cellular attenuation tank proposed.
Detention Basins	X	Permeable paving used for storage
Ponds and Wetlands	X	Permeable paving used for storage

6. SUDS Maintenance

- 6.1. Upon selection of the SUDS elements to be incorporated into the surface water drainage scheme then a maintenance plan needs to be adopted along with responsibility of the maintenance.
- 6.2. The responsibility can general be with 3 different bodies, it could be 'Private' which means the responsibility remains with the homeowner, it could be 'Public' which means it will be adopted and be the responsibility of the local authority or water authority, or it could be 'Management Company' which means a specialist company could be employed or created for the purpose of maintaining those elements, for the management company there would be an annual charge that the home owners would be expected to pay each year.

	PRIVATE	PUBLIC	MANAGEMENT
Flow Control Device	✓		
Attenuation Tank	✓		

- 6.3. With each element the relevant responsible person(s) / company will need to undertake different tasks on varying frequencies to ensure the peak performance of the SUDS system and remove the risk of flooding or failure, the maintenance regime and regularity for each element are outlined in the tables below.

6.4. Flow Control Device

An example of operation and maintenance requirements for a proprietary treatment system		
Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

6.5. Attenuation Tank

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

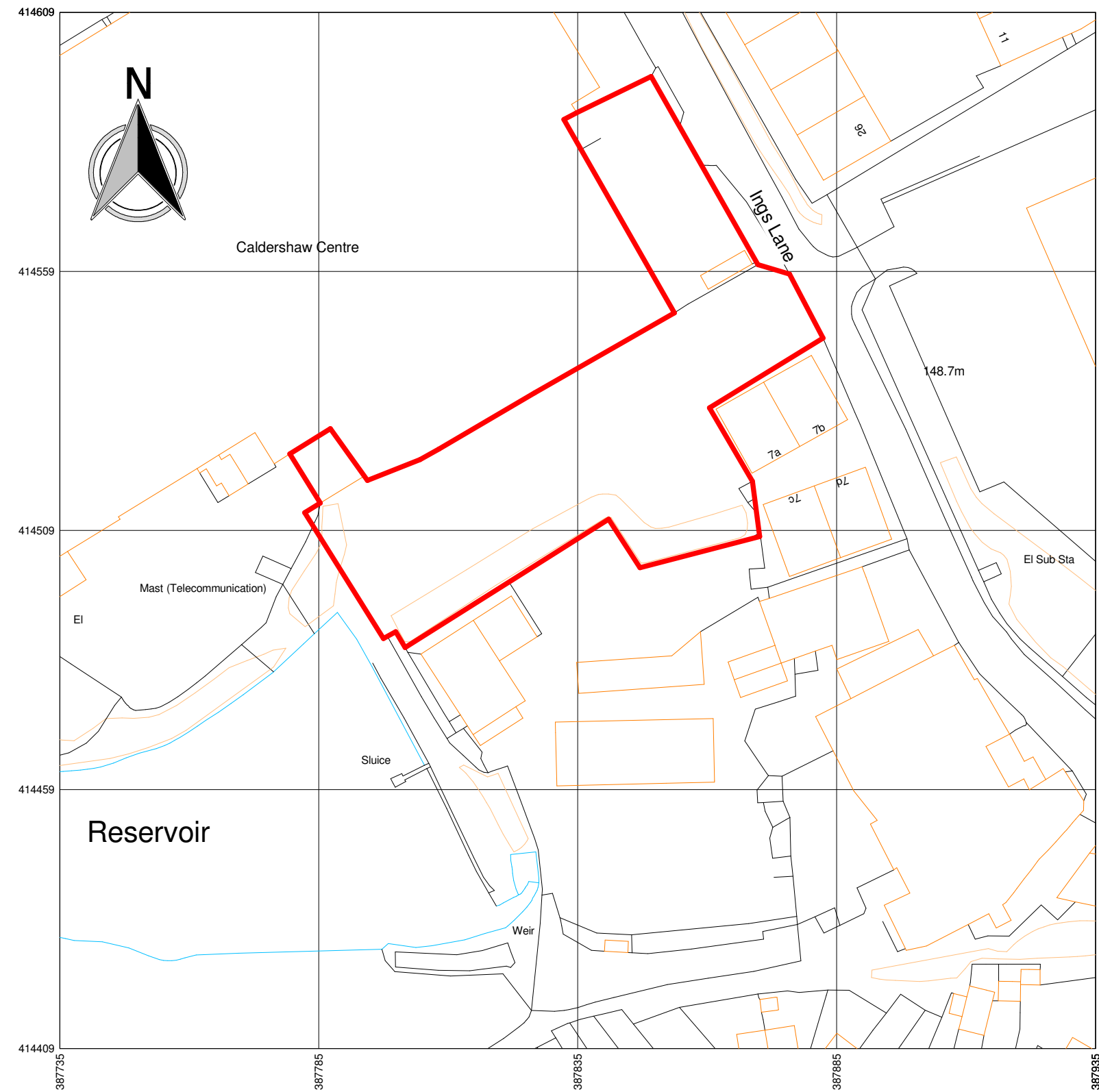
7. Flood Exceedance Events

- 7.1. Although the surface water drainage has been designed to accommodate the 1 in 100 year + 40% climate change rainfall event with no flooding, we have to consider events that exceed this and what happens to any flooding that may occur.
- 7.2. To illustrate this event, we have produced a Flood Exceedance Layout plan (See Appendix F for layout) and from this we can see that flood would occur at the flow control manhole (S13) and then would follow the road as per the original contours of the site.

8. Conclusion

- 8.1. Advant Engineers were commissioned by I.Q.7. LTD to undertake a Drainage Strategy for the proposed industrial / commercial development at Ings Lane, Rochdale. This report will be provided as supporting documentation as part of a planning application.
- 8.2. The site is currently greenfield, and it is 2,962m² (0.296ha).
- 8.3. It is proposed to discharge the surface water to the public surface water sewer that crosses the site.
- 8.4. The surface water will be restricted to **5.6 l/s** for the 1 in 100 year + 40% climate change rainfall event with attenuation provided in a cellular storage tank.
- 8.5. Foul drainage is to be discharged to the public foul sewer that crosses the site.
- 8.6. The flood exceedance event allows water flows to follow the road and match the existing undeveloped overland flows.
- 8.7. All public surface water/foul water drainage should be designed in accordance with the Water Authority and Sewers for Adoption.
- 8.8. All private surface water and surface water/foul water drainage should be designed in accordance with the current Building Regulations Part H.

**APPENDIX A
LOCATION PLAN**



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ALL DIMENSIONS SHOULD BE CHECKED ON SITE.

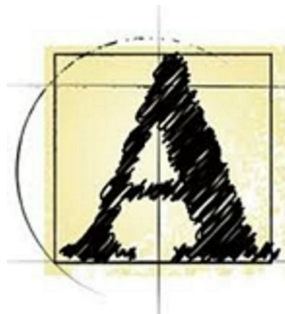
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NOTES

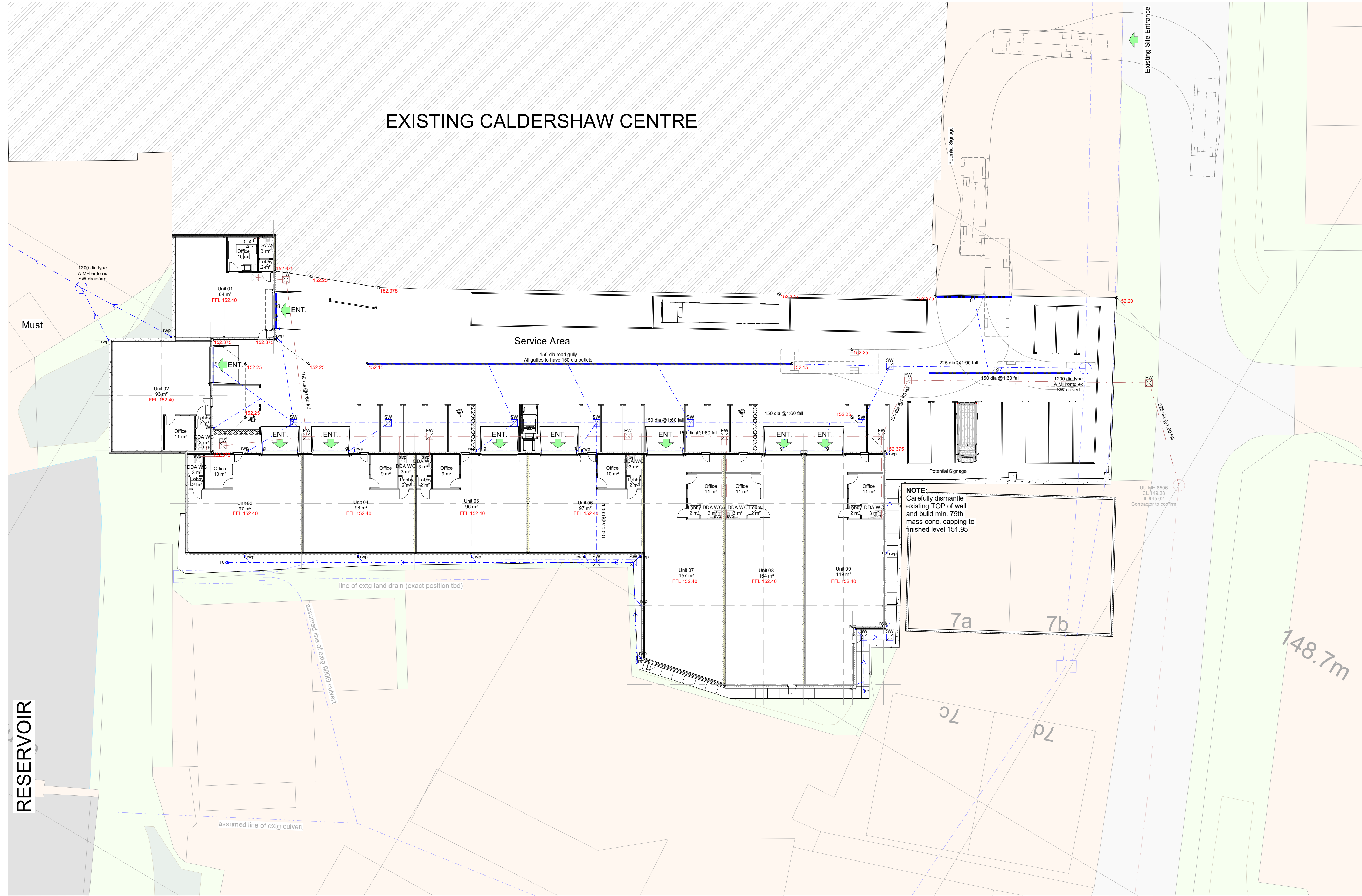
CLIENT I.Q.7. LTD			
P0	First Issue	AC	KK
15/09/2023			
REVISION / DESCRIPTION		DRAWN	CHECKED

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PROJECT TITLE Caldershaw Centre, Ings Lane, Rochdale	
PLANNING SUBMISSION	
DRAWING TITLE Location Plan	SCALE @ A3 1 : 1000
DATE 10/09/2023	REVISION P0
DRAWING No. 89107-ACC-ZZ-00-DP-A-0001	

**APPENDIX B
PROPOSED LAYOUT**



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DO NOT SCALE FROM THIS DRAWING
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NOTES



1 Proposed - Site Plan
1 : 200

				CLIENT I.Q.7. LTD		PROJECT TITLE Caldershaw Centre, Ings Lane, Rochdale	
				33 Mere Drive Clifton Swinton Manchester, M27 8SD United Kingdom M: +44 (0)746 264 4148 E: achiguma@icloud.com		PLANNING SUBMISSION	
						DRAWING TITLE Proposed Site Plan	
						SCALE @ A1 1 : 200	
						DATE 10/09/2023	
						DRAWING NO. 89107-ACC-ZZ-00-DP-A-0101	
						VERSION P1	
				REVISION / DESCRIPTION P1 Vehicle turning circle added P0 First Issue		DRAWN / CHECKED / DATE AC KK 10/11/2023 AC KK 15/09/2023	

**APPENDIX C
GREENFIELD CALCULATION**

Calculated by:	Michael Mickethwaite
Site name:	Caldershaw
Site location:	Rochdale

Site Details

Latitude:	53.62693° N
Longitude:	2.18508° W
Reference:	4179044664
Date:	Mar 18 2024 15:10

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.

Runoff estimation approach **IH124**

Site characteristics

Total site area (ha): **0.296**

Methodology

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

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.

Soil characteristics

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

(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.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1193	1193
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $SPR/SPRHOST \leq 0.3$?

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

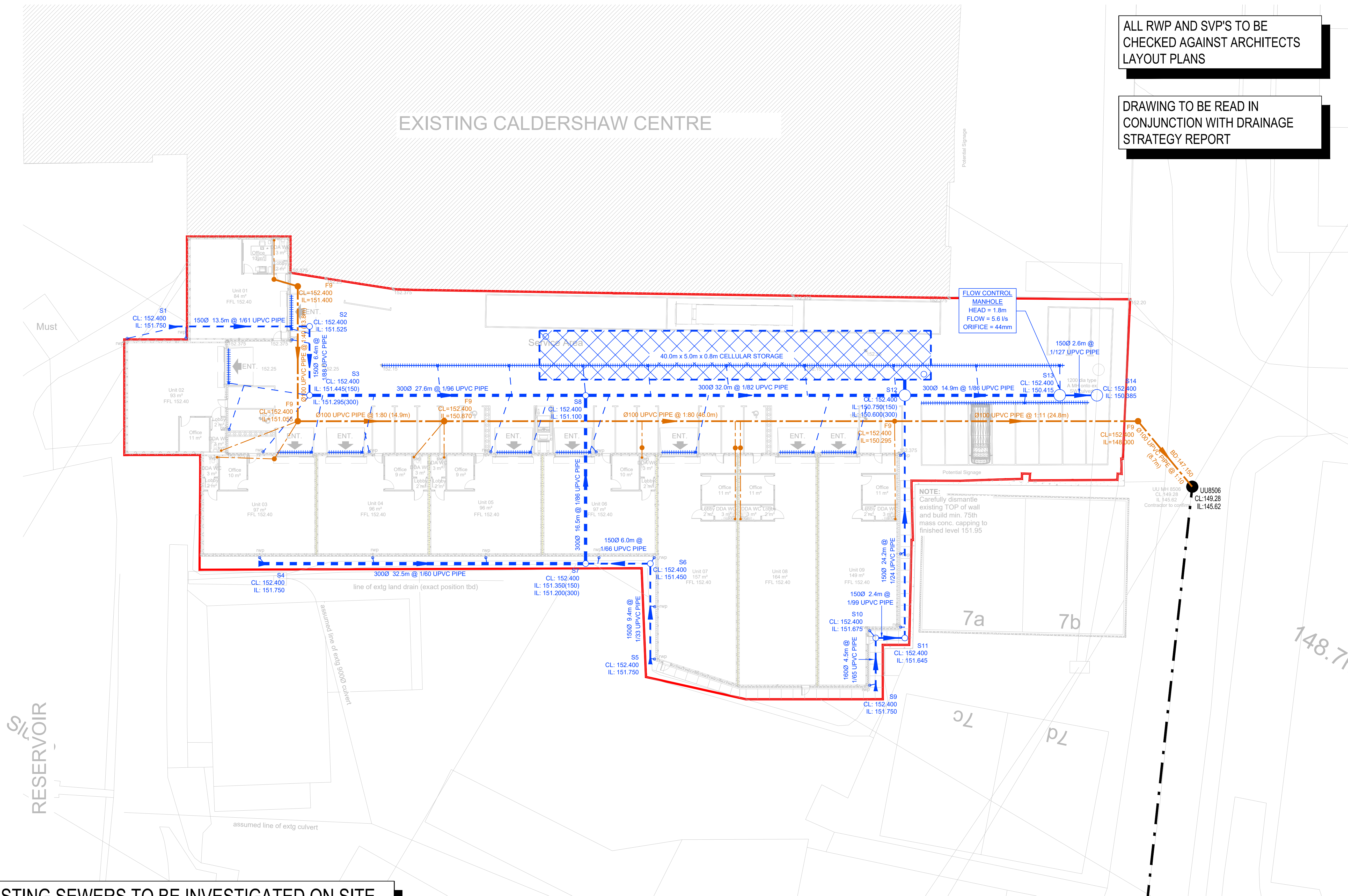
Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	2.67	2.67
1 in 1 year (l/s):	2.32	2.32
1 in 30 years (l/s):	4.53	4.53
1 in 100 year (l/s):	5.55	5.55
1 in 200 years (l/s):	6.32	6.32

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

**APPENDIX D
PROPOSED DRAINAGE LAYOUT**

EXISTING SEWERS TO BE INVESTIGATED ON SITE
FOR BOTH SURFACE AND FOUL WITH THE
INTENTION OF UTILISING AN EXISTING CONNECTION



COVER AND INVERTS OF EXISTING
SEWERS SHOULD BE CHECKED ON
SITE PRIOR TO CONSTRUCTION

ALL RWP AND SVP'S TO BE
CHECKED AGAINST ARCHITECTS
LAYOUT PLANS

DRAWING TO BE READ IN
CONJUNCTION WITH DRAINAGE
STRATEGY REPORT

NOTES

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KEY

- PROP SW SEWER
- PROP FW SEWER
- EX SW SEWER
- EX FW SEWER



A	INITIAL ISSUE	MJM	19.03.24
REV	AMENDMENTS	BY	DATE

PRELIMINARY

STATUS	CHK'D
PRELIMINARY	MJM
FOR COMMENT	
FOR APPROVAL	
FOR CONSTRUCTION	
AS BUILT	



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CONTRACT
CALDERSHAW CENTRE
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ROCHDALE

TITLE
PROPOSED DRAINAGE
LAYOUT PLAN

DRAWN	MJM	CHK'D	MJM
SCALE	1:200 @ A1	DATE	19.03.24

JOB No	DRG No	REV
23083	101	A

APPENDIX E
SURFACE WATER DRAINAGE CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.012	5.00	152.400	900	-1.936	28.051	0.650
S2	0.011	5.00	152.400	900	11.849	28.051	0.875
S3	0.065	5.00	152.400	900	11.849	21.007	1.105
S4	0.024	5.00	152.400	900	7.220	3.799	0.650
S5	0.020	5.00	152.400	900	46.683	-5.904	0.650
S6	0.012	5.00	152.400	900	46.683	3.799	0.950
S7			152.400	900	40.070	3.799	1.200
S8	0.077	5.00	152.400	900	40.070	20.987	1.400
S9	0.007	5.00	152.400	900	69.718	-8.656	0.650
S10			152.400	900	69.718	-3.801	0.725
S11	0.024	5.00	152.400	900	72.690	-3.801	0.755
S12	0.077	5.00	152.400	900	72.690	21.007	1.800
S13			152.400	1200	88.523	21.007	1.985
S14			152.400	1200	92.327	21.007	2.015

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	S1	S2	13.785	0.600	151.750	151.525	0.225	61.3	150	5.18	50.0
3.001	S2	S3	7.044	0.600	151.525	151.445	0.080	88.1	150	5.29	50.0
3.002	S3	S8	28.221	0.600	151.295	151.000	0.295	95.7	300	5.58	50.0
1.000	S4	S7	32.850	0.600	151.750	151.200	0.550	59.7	300	5.27	50.0
1.001	S7	S8	17.188	0.600	151.200	151.000	0.200	85.9	300	5.44	50.0
2.000	S5	S6	9.703	0.600	151.750	151.450	0.300	32.3	150	5.09	50.0
2.001	S6	S7	6.613	0.600	151.450	151.350	0.100	66.1	150	5.18	50.0
1.002	S8	S12	32.620	0.600	151.000	150.600	0.400	81.6	300	5.89	48.9
4.000	S9	S10	4.855	0.600	151.750	151.675	0.075	64.7	150	5.06	50.0
4.001	S10	S11	2.972	0.600	151.675	151.645	0.030	99.1	150	5.11	50.0
4.002	S11	S12	24.808	0.600	151.645	150.750	0.895	27.7	150	5.33	50.0
1.003	S12	S13	15.833	0.600	150.600	150.415	0.185	85.6	300	6.05	48.0
1.004	S13	S14	3.804	0.600	150.415	150.385	0.030	126.8	300	6.09	47.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.287	22.7	1.6	0.500	0.725	0.012	0.0	27	0.749
3.001	1.071	18.9	3.1	0.725	0.805	0.023	0.0	41	0.795
3.002	1.607	113.6	11.9	0.805	1.100	0.088	0.0	65	1.054
1.000	2.038	144.0	3.3	0.350	0.900	0.024	0.0	31	0.846
1.001	1.697	119.9	7.6	0.900	1.100	0.056	0.0	51	0.959
2.000	1.776	31.4	2.7	0.500	0.800	0.020	0.0	30	1.088
2.001	1.238	21.9	4.3	0.800	0.900	0.032	0.0	45	0.969
1.002	1.742	123.1	29.3	1.100	1.500	0.221	0.0	99	1.437
4.000	1.252	22.1	0.9	0.500	0.575	0.007	0.0	21	0.626
4.001	1.009	17.8	0.9	0.575	0.605	0.007	0.0	24	0.538
4.002	1.919	33.9	4.2	0.605	1.500	0.031	0.0	35	1.308
1.003	1.700	120.2	42.8	1.500	1.685	0.329	0.0	123	1.560
1.004	1.395	98.6	42.5	1.685	1.715	0.329	0.0	137	1.344

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.000	13.785	61.3	150	Circular	152.400	151.750	0.500	152.400	151.525	0.725
3.001	7.044	88.1	150	Circular	152.400	151.525	0.725	152.400	151.445	0.805
3.002	28.221	95.7	300	Circular	152.400	151.295	0.805	152.400	151.000	1.100
1.000	32.850	59.7	300	Circular	152.400	151.750	0.350	152.400	151.200	0.900
1.001	17.188	85.9	300	Circular	152.400	151.200	0.900	152.400	151.000	1.100
2.000	9.703	32.3	150	Circular	152.400	151.750	0.500	152.400	151.450	0.800
2.001	6.613	66.1	150	Circular	152.400	151.450	0.800	152.400	151.350	0.900

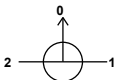
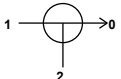
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.000	S1	900	Manhole	Adoptable	S2	900	Manhole	Adoptable
3.001	S2	900	Manhole	Adoptable	S3	900	Manhole	Adoptable
3.002	S3	900	Manhole	Adoptable	S8	900	Manhole	Adoptable
1.000	S4	900	Manhole	Adoptable	S7	900	Manhole	Adoptable
1.001	S7	900	Manhole	Adoptable	S8	900	Manhole	Adoptable
2.000	S5	900	Manhole	Adoptable	S6	900	Manhole	Adoptable
2.001	S6	900	Manhole	Adoptable	S7	900	Manhole	Adoptable

Pipeline Schedule

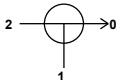
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	32.620	81.6	300	Circular	152.400	151.000	1.100	152.400	150.600	1.500
4.000	4.855	64.7	150	Circular	152.400	151.750	0.500	152.400	151.675	0.575
4.001	2.972	99.1	150	Circular	152.400	151.675	0.575	152.400	151.645	0.605
4.002	24.808	27.7	150	Circular	152.400	151.645	0.605	152.400	150.750	1.500
1.003	15.833	85.6	300	Circular	152.400	150.600	1.500	152.400	150.415	1.685
1.004	3.804	126.8	300	Circular	152.400	150.415	1.685	152.400	150.385	1.715

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	S8	900	Manhole	Adoptable	S12	900	Manhole	Adoptable
4.000	S9	900	Manhole	Adoptable	S10	900	Manhole	Adoptable
4.001	S10	900	Manhole	Adoptable	S11	900	Manhole	Adoptable
4.002	S11	900	Manhole	Adoptable	S12	900	Manhole	Adoptable
1.003	S12	900	Manhole	Adoptable	S13	1200	Manhole	Adoptable
1.004	S13	1200	Manhole	Adoptable	S14	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	-1.936	28.051	152.400	0.650	900				
						0	3.000	151.750	150
S2	11.849	28.051	152.400	0.875	900				
						0	3.001	151.525	150
S3	11.849	21.007	152.400	1.105	900				
						0	3.002	151.295	300
S4	7.220	3.799	152.400	0.650	900				
						0	1.000	151.750	300
S5	46.683	-5.904	152.400	0.650	900				
						0	2.000	151.750	150
S6	46.683	3.799	152.400	0.950	900				
						0	2.001	151.450	150
S7	40.070	3.799	152.400	1.200	900				
						0	1.001	151.200	300
S8	40.070	20.987	152.400	1.400	900				
						1	3.002	151.000	300
						2	1.001	151.000	300
						0	1.002	151.000	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S9	69.718	-8.656	152.400	0.650	900		0	4.000	151.750	150
S10	69.718	-3.801	152.400	0.725	900		1	4.000	151.675	150
						0	4.001	151.675	150	
S11	72.690	-3.801	152.400	0.755	900		1	4.001	151.645	150
						0	4.002	151.645	150	
S12	72.690	21.007	152.400	1.800	900		1	4.002	150.750	150
						2	1.002	150.600	300	
						0	1.003	150.600	300	
S13	88.523	21.007	152.400	1.985	1200		1	1.003	150.415	300
						0	1.004	150.415	300	
S14	92.327	21.007	152.400	2.015	1200		1	1.004	150.385	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node S13 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.800	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	5.0		
Invert Level (m)	150.415	Diameter (m)	0.042		

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	150.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	0.0	0.800	200.0	0.0	0.801	0.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.56%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	151.778	0.028	1.7	0.0277	0.0000	OK
15 minute winter	S2	10	151.569	0.044	3.3	0.0390	0.0000	OK
15 minute winter	S3	10	151.361	0.066	12.4	0.1192	0.0000	OK
15 minute winter	S4	10	151.781	0.031	3.4	0.0432	0.0000	OK
15 minute winter	S5	10	151.780	0.030	2.8	0.0378	0.0000	OK
15 minute winter	S6	10	151.499	0.049	4.5	0.0434	0.0000	OK
15 minute winter	S7	11	151.251	0.051	7.8	0.0325	0.0000	OK
15 minute winter	S8	10	151.118	0.118	30.6	0.2041	0.0000	OK
15 minute winter	S9	10	151.772	0.022	1.0	0.0188	0.0000	OK
15 minute winter	S10	11	151.699	0.024	1.0	0.0152	0.0000	OK
15 minute winter	S11	10	151.681	0.036	4.3	0.0463	0.0000	OK
180 minute winter	S12	156	150.768	0.168	13.5	32.2556	0.0000	OK
180 minute winter	S13	152	150.769	0.354	6.9	0.4005	0.0000	SURCHARGED
15 minute summer	S14	1	150.385	0.000	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	3.000	S2	1.7	0.521	0.074	0.0449	
15 minute winter	S2	3.001	S3	3.2	0.774	0.169	0.0291	
15 minute winter	S3	3.002	S8	12.2	0.672	0.107	0.5218	
15 minute winter	S4	1.000	S7	3.3	0.577	0.023	0.1937	
15 minute winter	S5	2.000	S6	2.8	0.752	0.089	0.0364	
15 minute winter	S6	2.001	S7	4.4	0.932	0.202	0.0314	
15 minute winter	S7	1.001	S8	7.7	0.488	0.064	0.2871	
15 minute winter	S8	1.002	S12	31.1	2.018	0.252	0.5454	
15 minute winter	S9	4.000	S10	1.0	0.579	0.044	0.0082	
15 minute winter	S10	4.001	S11	1.0	0.379	0.053	0.0075	
15 minute winter	S11	4.002	S12	4.2	1.300	0.125	0.0809	
180 minute winter	S12	1.003	S13	6.9	0.219	0.058	0.8798	
180 minute winter	S13	Orifice	S14	2.1				42.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.56%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	151.793	0.043	4.2	0.0436	0.0000	OK
15 minute winter	S2	10	151.598	0.073	7.9	0.0647	0.0000	OK
15 minute winter	S3	10	151.399	0.104	30.3	0.1888	0.0000	OK
15 minute winter	S4	10	151.798	0.048	8.3	0.0663	0.0000	OK
15 minute winter	S5	10	151.798	0.048	6.9	0.0597	0.0000	OK
15 minute winter	S6	10	151.533	0.083	11.1	0.0738	0.0000	OK
15 minute winter	S7	11	151.280	0.080	19.1	0.0506	0.0000	OK
15 minute winter	S8	10	151.188	0.188	75.2	0.3260	0.0000	OK
15 minute winter	S9	10	151.785	0.035	2.4	0.0297	0.0000	OK
15 minute winter	S10	10	151.716	0.041	2.4	0.0262	0.0000	OK
15 minute winter	S11	10	151.704	0.059	10.6	0.0749	0.0000	OK
180 minute winter	S12	176	151.057	0.457	26.3	87.4792	0.0000	SURCHARGED
180 minute winter	S13	176	151.057	0.642	4.4	0.7257	0.0000	SURCHARGED
15 minute summer	S14	1	150.385	0.000	2.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	3.000	S2	4.1	0.658	0.182	0.0876	
15 minute winter	S2	3.001	S3	7.8	0.970	0.412	0.0566	
15 minute winter	S3	3.002	S8	30.0	0.886	0.264	0.9610	
15 minute winter	S4	1.000	S7	8.2	0.748	0.057	0.3644	
15 minute winter	S5	2.000	S6	6.9	0.931	0.218	0.0718	
15 minute winter	S6	2.001	S7	10.9	1.162	0.498	0.0620	
15 minute winter	S7	1.001	S8	18.8	0.640	0.157	0.5267	
15 minute winter	S8	1.002	S12	75.5	2.289	0.613	1.3159	
15 minute winter	S9	4.000	S10	2.4	0.683	0.108	0.0171	
15 minute winter	S10	4.001	S11	2.4	0.461	0.132	0.0154	
15 minute winter	S11	4.002	S12	10.5	1.666	0.309	0.1627	
180 minute winter	S12	1.003	S13	4.4	0.274	0.036	1.1149	
180 minute winter	S13	Orifice	S14	2.9				59.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.56%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	151.800	0.049	5.4	0.0497	0.0000	OK
15 minute winter	S2	10	151.611	0.086	10.2	0.0760	0.0000	OK
15 minute winter	S3	10	151.415	0.120	39.3	0.2171	0.0000	OK
15 minute winter	S4	10	151.805	0.055	10.8	0.0754	0.0000	OK
15 minute winter	S5	10	151.805	0.055	9.0	0.0686	0.0000	OK
15 minute winter	S6	10	151.549	0.099	14.3	0.0881	0.0000	OK
15 minute winter	S7	10	151.291	0.091	24.8	0.0578	0.0000	OK
240 minute winter	S8	236	151.222	0.222	18.6	0.3862	0.0000	OK
15 minute winter	S9	10	151.790	0.040	3.1	0.0342	0.0000	OK
15 minute winter	S10	10	151.724	0.049	3.1	0.0312	0.0000	OK
15 minute winter	S11	10	151.713	0.068	13.8	0.0870	0.0000	OK
240 minute winter	S12	236	151.222	0.622	27.7	119.1843	0.0000	SURCHARGED
240 minute winter	S13	236	151.222	0.807	7.7	0.9129	0.0000	SURCHARGED
15 minute summer	S14	1	150.385	0.000	2.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	3.000	S2	5.4	0.696	0.235	0.1065	
15 minute winter	S2	3.001	S3	10.1	1.030	0.532	0.0689	
15 minute winter	S3	3.002	S8	38.9	0.939	0.342	1.1586	
15 minute winter	S4	1.000	S7	10.6	0.807	0.074	0.4402	
15 minute winter	S5	2.000	S6	8.9	0.984	0.285	0.0881	
15 minute winter	S6	2.001	S7	14.2	1.230	0.648	0.0762	
15 minute winter	S7	1.001	S8	24.4	0.673	0.203	0.6350	
240 minute winter	S8	1.002	S12	18.6	1.124	0.151	2.0622	
15 minute winter	S9	4.000	S10	3.1	0.710	0.139	0.0213	
15 minute winter	S10	4.001	S11	3.1	0.490	0.171	0.0190	
15 minute winter	S11	4.002	S12	13.6	1.782	0.402	0.2587	
240 minute winter	S12	1.003	S13	7.7	0.265	0.064	1.1149	
240 minute winter	S13	Orifice	S14	3.3				76.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.56%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	S1	232	152.275	0.525	1.4	0.5275	0.0000	FLOOD RISK
240 minute winter	S2	232	152.275	0.750	2.7	0.6658	0.0000	FLOOD RISK
240 minute winter	S3	232	152.275	0.980	10.4	1.7763	0.0000	FLOOD RISK
240 minute winter	S4	232	152.275	0.525	2.8	0.7214	0.0000	FLOOD RISK
240 minute winter	S5	232	152.275	0.525	2.4	0.6571	0.0000	FLOOD RISK
240 minute winter	S6	232	152.275	0.825	3.8	0.7333	0.0000	FLOOD RISK
240 minute winter	S7	232	152.275	1.075	10.2	0.6835	0.0000	FLOOD RISK
240 minute winter	S8	232	152.275	1.275	26.1	2.2129	0.0000	FLOOD RISK
240 minute winter	S9	232	152.275	0.525	0.8	0.4471	0.0000	FLOOD RISK
240 minute winter	S10	232	152.275	0.600	1.1	0.3814	0.0000	FLOOD RISK
240 minute winter	S11	232	152.275	0.630	3.6	0.8009	0.0000	FLOOD RISK
240 minute winter	S12	232	152.274	1.674	38.5	154.5931	0.0000	FLOOD RISK
240 minute winter	S13	232	152.274	1.859	6.5	2.1024	0.0000	FLOOD RISK
15 minute summer	S14	1	150.385	0.000	2.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	S1	3.000	S2	1.4	0.496	0.062	0.2427	
240 minute winter	S2	3.001	S3	2.7	0.739	0.143	0.1240	
240 minute winter	S3	3.002	S8	10.4	0.731	0.091	1.9873	
240 minute winter	S4	1.000	S7	2.8	0.543	0.019	2.3133	
240 minute winter	S5	2.000	S6	2.4	0.727	0.076	0.1708	
240 minute winter	S6	2.001	S7	3.8	0.896	0.173	0.1164	
240 minute winter	S7	1.001	S8	-7.4	0.526	-0.061	1.2104	
240 minute winter	S8	1.002	S12	25.8	1.203	0.210	2.2971	
240 minute winter	S9	4.000	S10	0.8	0.543	0.036	0.0855	
240 minute winter	S10	4.001	S11	-1.1	0.368	-0.061	0.0523	
240 minute winter	S11	4.002	S12	3.6	1.022	0.106	0.4367	
240 minute winter	S12	1.003	S13	6.5	0.299	0.054	1.1149	
240 minute winter	S13	Orifice	S14	5.0				94.2

**APPENDIX F
FLOOD EXCEEDANCE LAYOUT**

EXISTING CALDERSHAW CENTRE

COVER AND INVERTS OF EXISTING
SEWERS SHOULD BE CHECKED ON
SITE PRIOR TO CONSTRUCTION

ALL RWP AND SVP'S TO BE
CHECKED AGAINST ARCHITECTS
LAYOUT PLANS

DRAWING TO BE READ IN
CONJUNCTION WITH DRAINAGE
STRATEGY REPORT

NOTES

1. THIS DRAWING IS PRODUCED FOR USE IN THIS PROJECT ONLY AND MAY NOT BE USED FOR ANY OTHER PURPOSE. THE CONSULTING ENGINEERS ACCEPT NO LIABILITY FOR THE USE OF THIS DRAWING OTHER THAN THE PURPOSE FOR WHICH IT WAS INTENDED IN CONNECTION WITH THIS PROJECT AS RECORDED ON THE TITLE BLOCK FIELDS 'PURPOSE FOR ISSUE' AND 'FILE STATUS CODE'.
2. THIS DRAWING MAY NOT BE REPRODUCED IN ANY FORM WITHOUT PRIOR WRITTEN AGREEMENT FROM ADVANT ENGINEERS.
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4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
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6. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ADVANT ENGINEERS DRAWINGS AND SPECIFICATIONS.

KEY

-  FLOOD EXCEEDANCE EVENT
-  FLOOD FLOW PATH



A	INITIAL ISSUE	MJM	19.03.24
REV	AMENDMENTS	BY	DATE

PRELIMINARY

STATUS	CHK'D
PRELIMINARY	MJM
FOR COMMENT	
FOR APPROVAL	
FOR CONSTRUCTION	
AS BUILT	



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I.Q.7 LTD

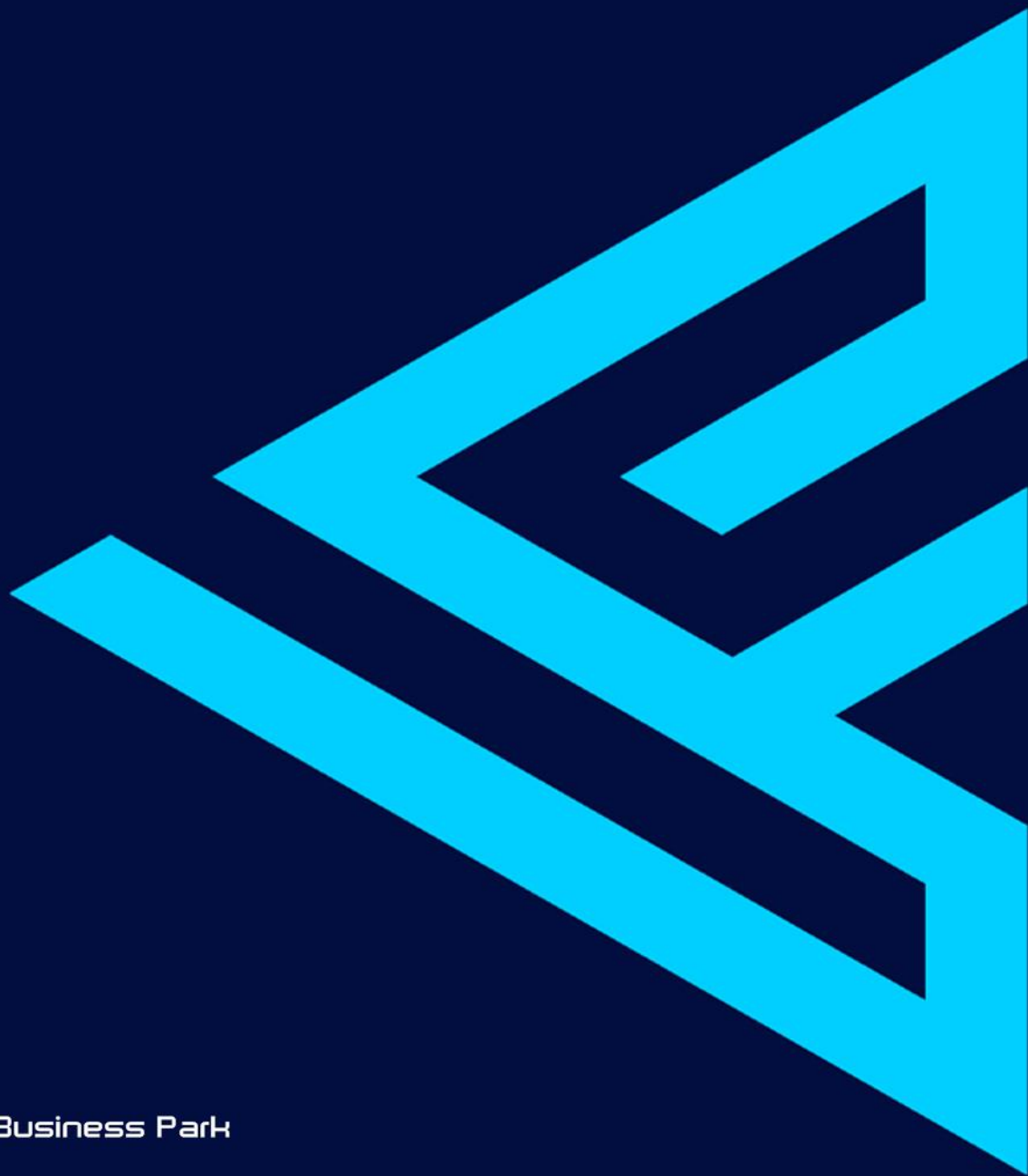
CONTRACT
CALDERSHAW CENTRE
INGS LANE
ROCHDALE

TITLE
FLOOD EXCEEDANCE
LAYOUT PLAN

DRAWN	MJM	CHK'D	MJM
SCALE	1:200 @ A1	DATE	19.03.24

JOB No	DRG No	REV
23083	103	A

EXISTING SEWERS TO BE INVESTIGATED ON SITE
FOR BOTH SURFACE AND FOUL WITH THE
INTENTION OF UTILISING AN EXISTING CONNECTION



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