



**TRAFFORD LEARNING
VOCATION CENTRE,
REDBY STREET
MANCHESTER
M11 2NP**

Drainage Strategy

DOCUMENT No:
22034-DSR-001-A

Issue Sheet.

Prepared	Date		Checked	Date
M M	08-02-24		M M	08-02-24

Revisions	Comment	Date
A	Initial Issue	08-02-24

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

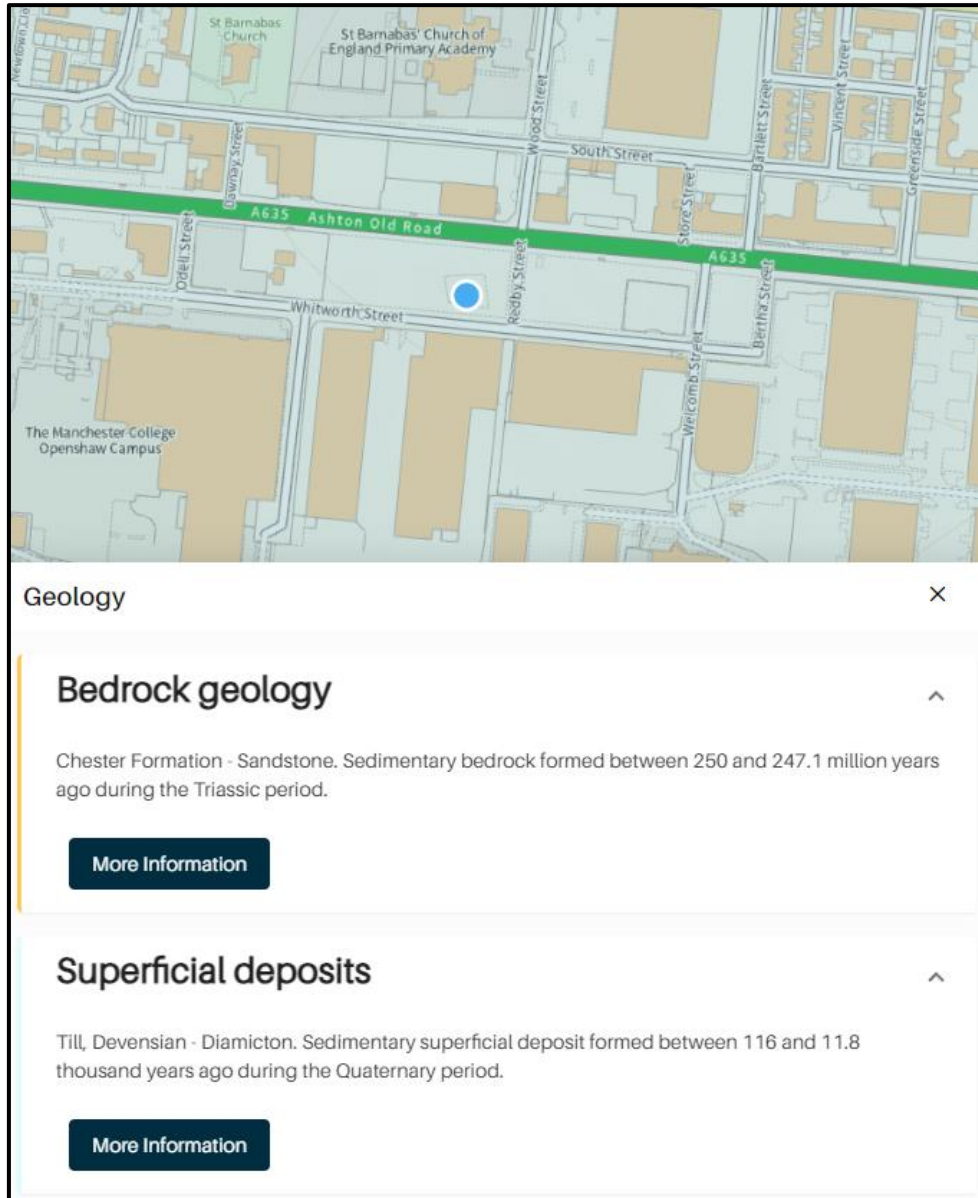
- 1.1. Advant Engineers Ltd has been commissioned by Trafford Learning Centre, to undertake a Drainage Strategy in connection with the proposed development at Redby Street in Manchester. The proposal consists of a new 3 storey independent Learning and Vocation Centre.
- 1.2. This report should be read in conjunction with drawing 22034-101 and associated architectural and engineering drawings.

2. Existing Site

- 2.1. The site is rough scrub land that has some previous hard standing showing through, albeit there are no proven drainage connections for this area and therefore will be considered to be greenfield, the existing site area is 2,701m² (0.27ha). (See Appendix A for Existing Site Plans).
- 2.2. This site is in Flood Zone 1 and can be located at the following co-ordinates 387806E, 397428N and the nearest postcode is M11 2NP as shown on the below extract.



- 2.3. At the time of writing the report there had been no site investigation undertaken, we have therefore referred to the BGS website which describes the site as being.



- 2.4. A topographical survey has been provided and the site is fairly flat with levels ranging from 61.20 to 62.2 which provides a grade of approx. 1:80.
- 2.5. To the north and south of the site are existing public combined sewer, there is also a length of adopted combine sewer that starts in the site and will need to be abandoned. (See Appendix B for sewer records).

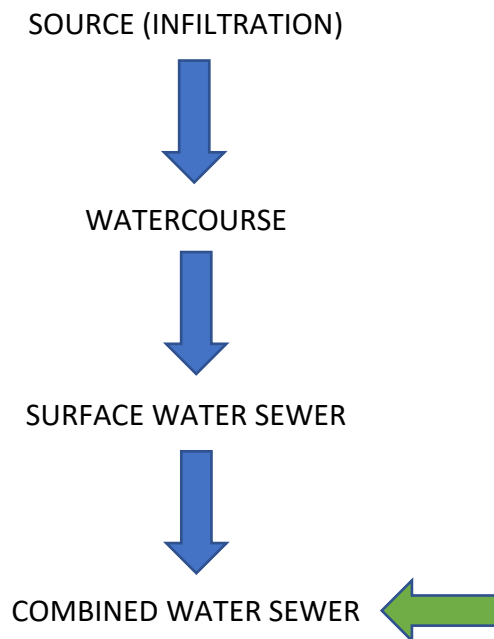
3. Proposed Development

- 3.1. The proposal is a new build independent school, it is over 3 storeys and includes an outdoor play area as well as parking. (See Appendix C for proposed layout plans).

4. Drainage Strategy

4.1. Surface Water

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



- 4.3. Based on the expected ground conditions, proximity to the highway and the likely presence of made ground then the use of infiltration has been discounted.
- 4.4. The next level on the hierarchy is discharge to a watercourse, as there are no 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, as there are none in the vicinity then we are proposing to connect into the existing combined sewer that crosses the site at a controlled rate with attenuation provided on site.

- 4.6. Treating the site as greenfield then we should restrict the discharge from site to greenfield rates wherever practically possible, which for this site would be as follows: (See Appendix D for calc).

$$\begin{aligned} \text{QBAR} &= 1.75 \text{ l/s} \\ 1 \text{ in } 1 \text{ Year} &= 1.52 \text{ l/s} \\ 1 \text{ in } 30 \text{ Year} &= 2.97 \text{ l/s} \\ 1 \text{ in } 100 \text{ Year} &= 3.64 \text{ l/s} \end{aligned}$$

- 4.7. The above greenfield rates are considered too small to be restricted to as the orifice size would be at risk of blockages, we are therefore proposing to restrict the discharge to **5.0l/s** with attenuation on site for the **1 in 100 Year + 40%** climate change rainfall event with attenuation provided in the sub-base of the permeable paving areas and a cellular attenuation tank. (See Appendix E for Drainage Layout and Appendix F for drainage calcs).

4.8. Foul Drainage

- 4.9. The foul drainage is proposed to connect into the public combined sewer located north of the site.

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	✓	Potential for a rainwater harvesting unit to be installed into the car park to serve part of the building.
Green Roof	✓	All the roofs are pitched and therefore would not be suitable for a Green Roof
Blue Roof	X	Attenuation is provided below ground in this instance in conjunction with a green roof.
Infiltration Systems	X	Ground conditions are not suitable.
Proprietary Treatment Systems	✓	Flow control to be installed.
Filter Strips	X	Ground conditions are not suitable.
Filter Drains	X	Ground conditions are not suitable.
Swales	X	Site constraints doesn't allow.
Bioretention Systems	✓	Rain gardens are being used in soft landscaped areas.
Trees	✓	New trees are being proposed as part of the new landscaping
Pervious Pavements	✓	Permeable paving on all parking bays are being proposed
Attenuation Storage Tanks	✓	Sub base of permeable paving as well as a cellular tank.
Detention Basins	X	Insufficient land use for basins
Ponds and Wetlands	X	Insufficient land use for ponds

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
Rainwater Harvesting	✓		
Green Roof	✓		
Flow Control Device	✓		
Rain Garden	✓		
Trees	✓		
Pervious Pavements	✓		
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. Rainwater Harvesting

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

6.5. Green Roof

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

6.6. 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

6.7. Rain Garden

Maintenance schedule	Required action	Typical frequency
Regular inspections	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
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	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	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

6.8. Trees

Operation and maintenance requirements for trees (after CRWA, 2009)		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

6.9. Pervious Pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6.10. 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. Conclusion

- 7.1. Advant Engineers Ltd has been commissioned by Trafford Learning Centre, to undertake a Drainage Strategy in connection with the proposed development at Redby Street in Manchester. The proposal consists of a new 3 storey independent Learning and Vocation Centre.
- 7.2. The site is a greenfield site and is 2,701m² (0.27ha).
- 7.3. It is proposed to discharge the surface water to the combined public sewer via the existing drainage on site.
- 7.4. The surface water will be restricted to **5.0 l/s** for the 1 in 100 year + 40% climate change rainfall event with attenuation provided in the subbase of the permeable paving and a cellular storage tank.
- 7.5. Foul drainage is to be discharged to the public combined sewer located north of the site.
- 7.6. All public surface water/foul water drainage should be designed in accordance with the Water Authority and Sewers for Adoption.
- 7.7. All private surface water and surface water/foul water drainage should be designed in accordance with the current Building Regulations Part H.

**APPENDIX A
EXISTING LAYOUT PLANS**



General Notes

The Architect shall have no responsibility for any use made of this document other than for that which it was prepared and issued.

All dimensions should be checked on site. Do not scale from this drawing

To be read in conjunction with all other Consultant's drawings.

The Architect to be immediately notified of any discrepancies.

Copyright on this drawing retained by the Architect.

LEGEND

— Site Boundary

STREET

WHITWORTH STREET

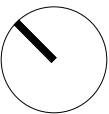
REDBY STREET

PH
815 817 821

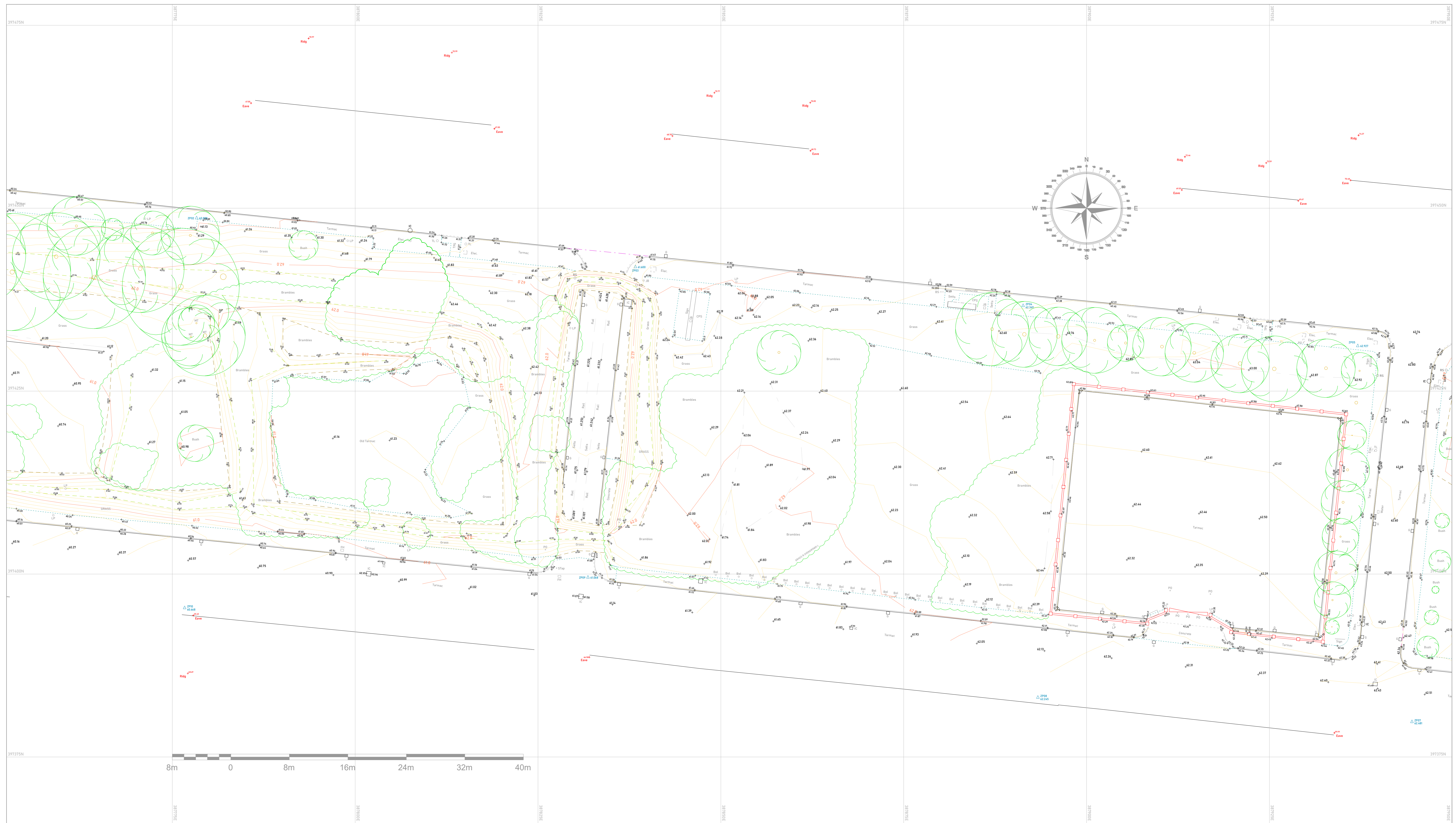
Shelter

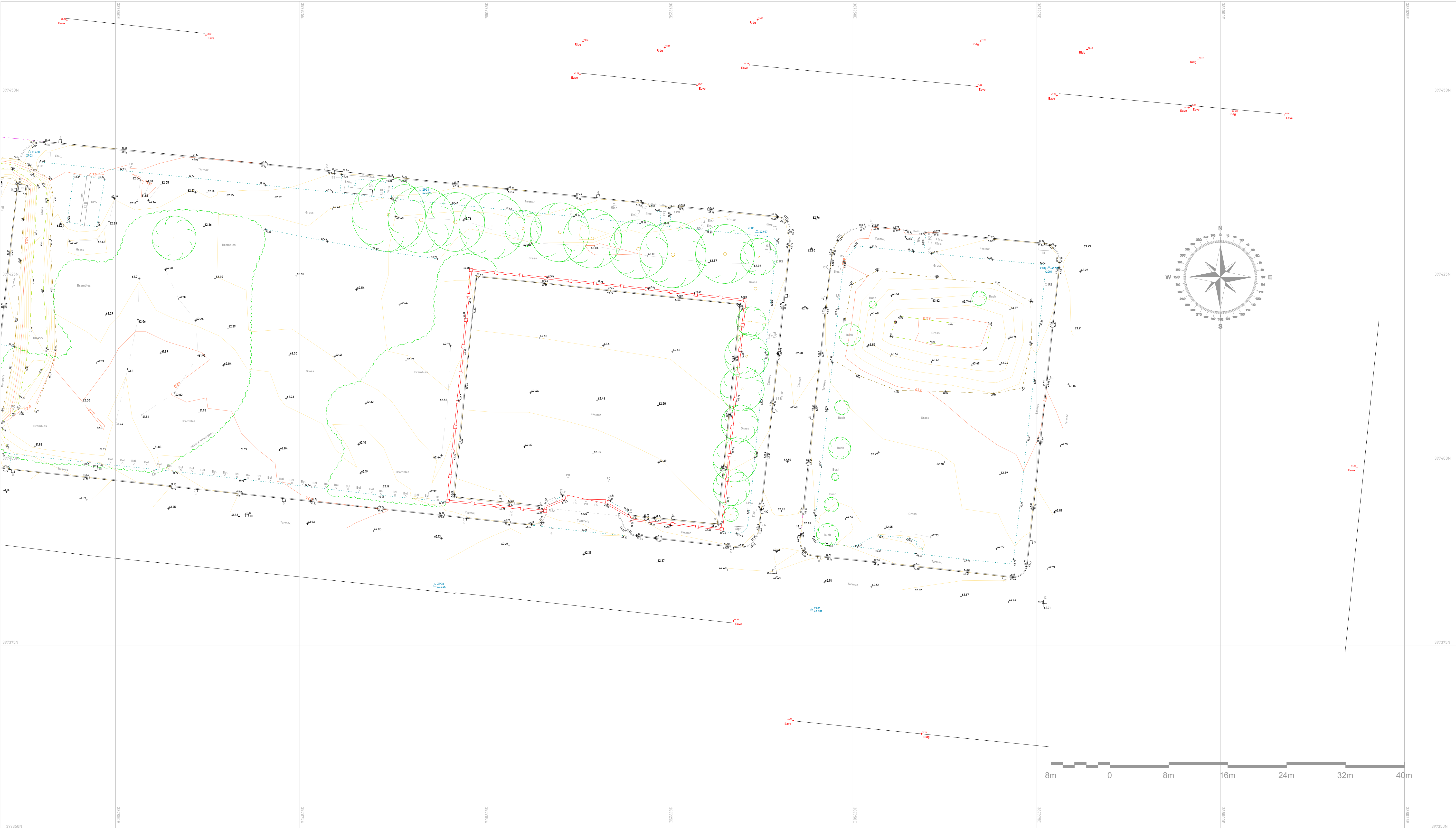
61.4m

Warehouse



P1 03/03/22 SA SH Initial Issue				
No.	Date	Dwn	Chk	App Revision or reason for issue
Client				
Trafford Learning Vocational Centre				
createitstudios ... leave an impression				
Create It Studios (NW) Ltd Universal Square Devonshire Street North Manchester M12 6JH info@createitstudios.co.uk				
Project Title				
Redby St, Manchester M11 2NP				
Scale / North Point				
1 : 500				
Drawing Title				
Existing Site Plan				
Drawing Number				Revision
A1417(01)AP001				P1
Drawing Status				
Preliminary				

[illegible]



Grid	Building Canopy	Wall	Fence	Gate	Manhole	Control Station	Lamp Post	Pipe	Pipe	Tree
Contours (Minor)	Embankment Top	Channel	Fence Closed Board	Waters Edge	Inspection Chamber	Levels Spot	Telegraph Pole	Down Pipe	Down Pipe	Tree Canopy
Contours (Major)	Embankment Bottom	Kerb	Fence Chain Link	Drain	Road Gully	Levels Eaves	Electrical Pole	Borehole	Borehole	Vegetation Extents
Building	Change Of Surface	Drop Kerb	Fence Post & Rail	Overhead Cable	BT Cover	Levels Ridge	Stop Tap	Bollard	Bollard	Hedge
Building Garage	Concrete	Road Edge	Fence Post & Wire	Steps	Electrical Cover	Levels Invert	Gas Valve	Trial Pit	Trial Pit	

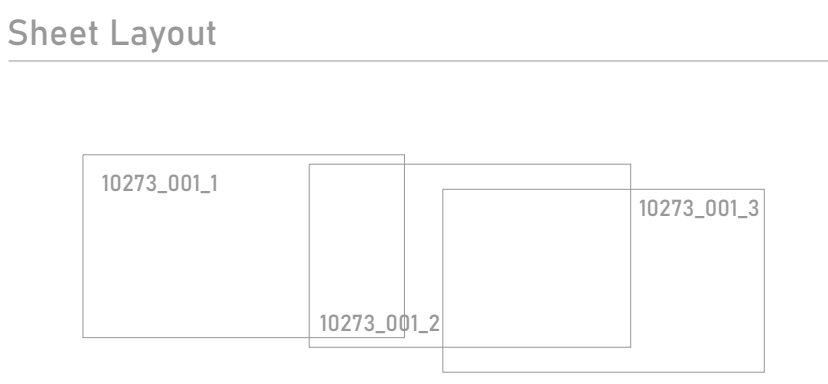
Project	Redby St
Drawing Title	Topographic Survey
Drawing Number	10273_001_3
Revision	-
Scale @ A1	1:250
Client	CreateIt Studios
Date	May 2022
Surveyor	ZP
Drawn by	ZP
Checked by	NB

Revision notes		
Rev	Date	Comments
-	-	-

Drawing Notes

Survey undertaken on the 18th of May, 2022.

Coordinated to National Grid using GPS, Levels to OS Datum.



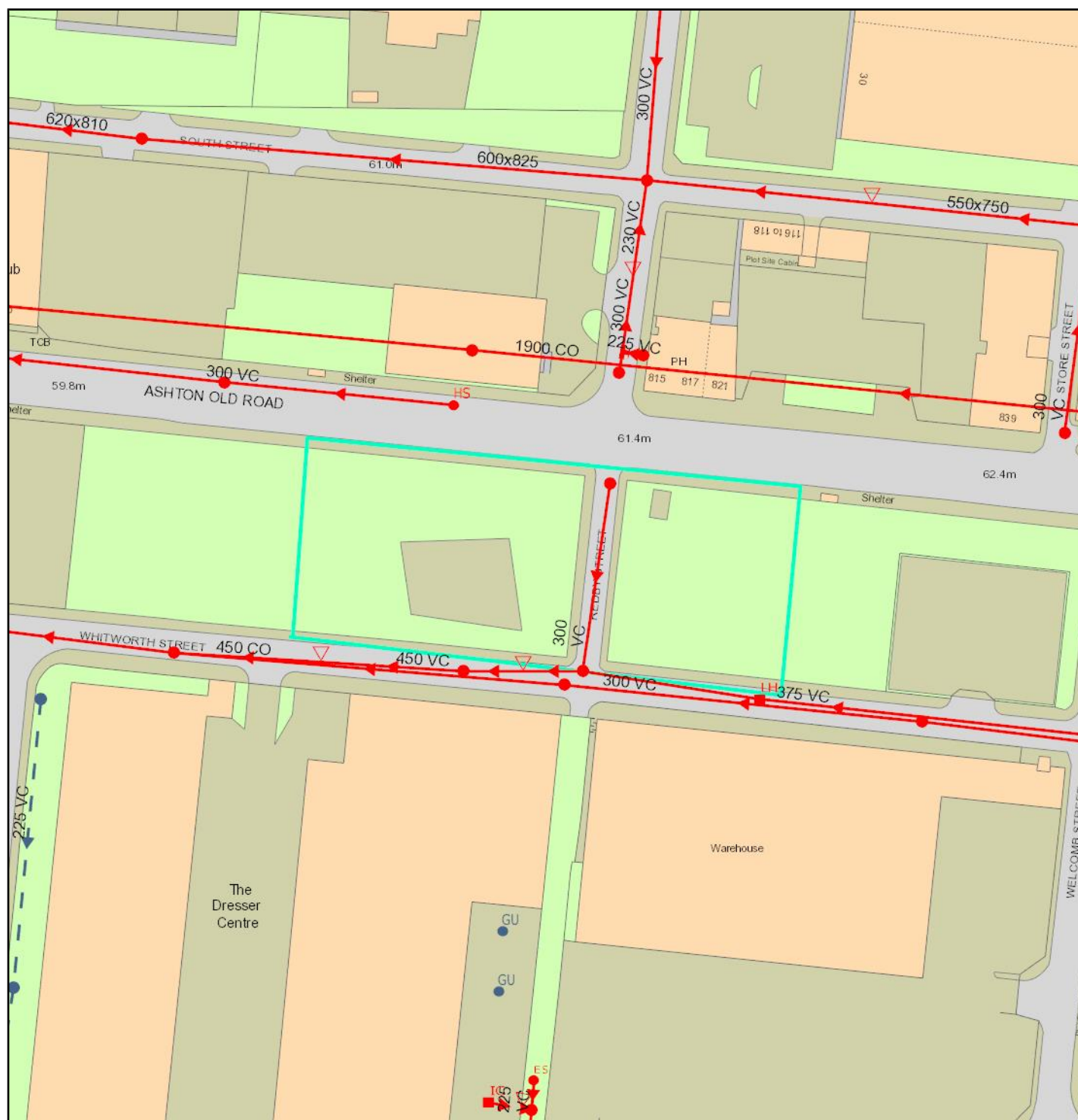
Email info@ntbsurvey.com | www.ntbsurvey.com | Tel: 01254 496307

Station	Easting	Northing	Level
ZP01	387716.133	397430.223	63.337
ZP01	387720.124	397433.254	60.052
ZP02	387778.354	397448.653	60.978
ZP03	387838.312	397441.979	61.600
ZP04	387891.328	397456.078	62.349
ZP05	387937.084	397431.184	62.927
ZP06	387976.152	397430.222	63.361
ZP07	387944.495	397379.807	62.481
ZP08	387976.148	397383.154	62.245
ZP09	387831.829	397399.550	61.068
ZP10	387776.463	397395.175	60.646
ZP11	387716.589	397412.094	59.572

**APPENDIX B
SEWER RECORDS**

SEWER RECORD

Redby Street



The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

© United Utilities Water PLC 2017. The plan is based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office, Crown copyright 100022432 and United Utilities Water PLC copyrights are reserved. Unauthorised reproduction will infringe these copyrights.

**APPENDIX C
PROPOSED LAYOUTS**



General Notes

The Architect shall have no responsibility for any use made of this document other than for that which it was prepared and issued.

All dimensions should be checked on site. Do not scale from this drawing

To be read in conjunction with all other Consultant's drawings.

The Architect to be immediately notified of any discrepancies.

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LEGEND

- Site Boundary
- 2.1m High anti-climb security fence
- 7No. EV Charging point
- Proposed beech hedging to eastern and western boundaries
- Proposed Silver Birch Trees

P8	15/08/23	SA	SH	Added Tree Type and Hedging
P7	21/03/23	AK	SH	Add Charging Point
P6	04/11/22	SA	SH	Amended Car Park and Access
P5	22/04/22	SA	SH	Amended WC Layout
P4	11/04/22	SA	SH	Amended Proposed
P3	28/03/22	SA	SH	Amended Proposed
P2	17/03/22	SA	SH	Amended Proposed
P1	03/03/22	SA	SH	Initial Issue

Client

Trafford Learning Vocational Centre

createitstudios
... leave an impression

Create It Studios (NW) Ltd
Universal Square
Devonshire Street North
Manchester
M12 6JH
info@createitstudios.co.uk

Project Title

Redby St, Manchester M11 2NP

Scale / North Point

As indicated

Drawing Title

Proposed Site Plan

Drawing Number	Revision
A1417(02)AP001	P8
Drawing Status	
Preliminary	

**APPENDIX D
GREENFIELD CALCS**

Calculated by:	Michael Micklethwaite
Site name:	Redby Street
Site location:	Manchester

Site Details

Latitude:	53.47338° N
Longitude:	2.18515° W
Reference:	163803382
Date:	Feb 08 2024 10:27

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):	0.27
-----------------------	------

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):	900	900
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 $SPR/SPRHOST \leq 0.3$?

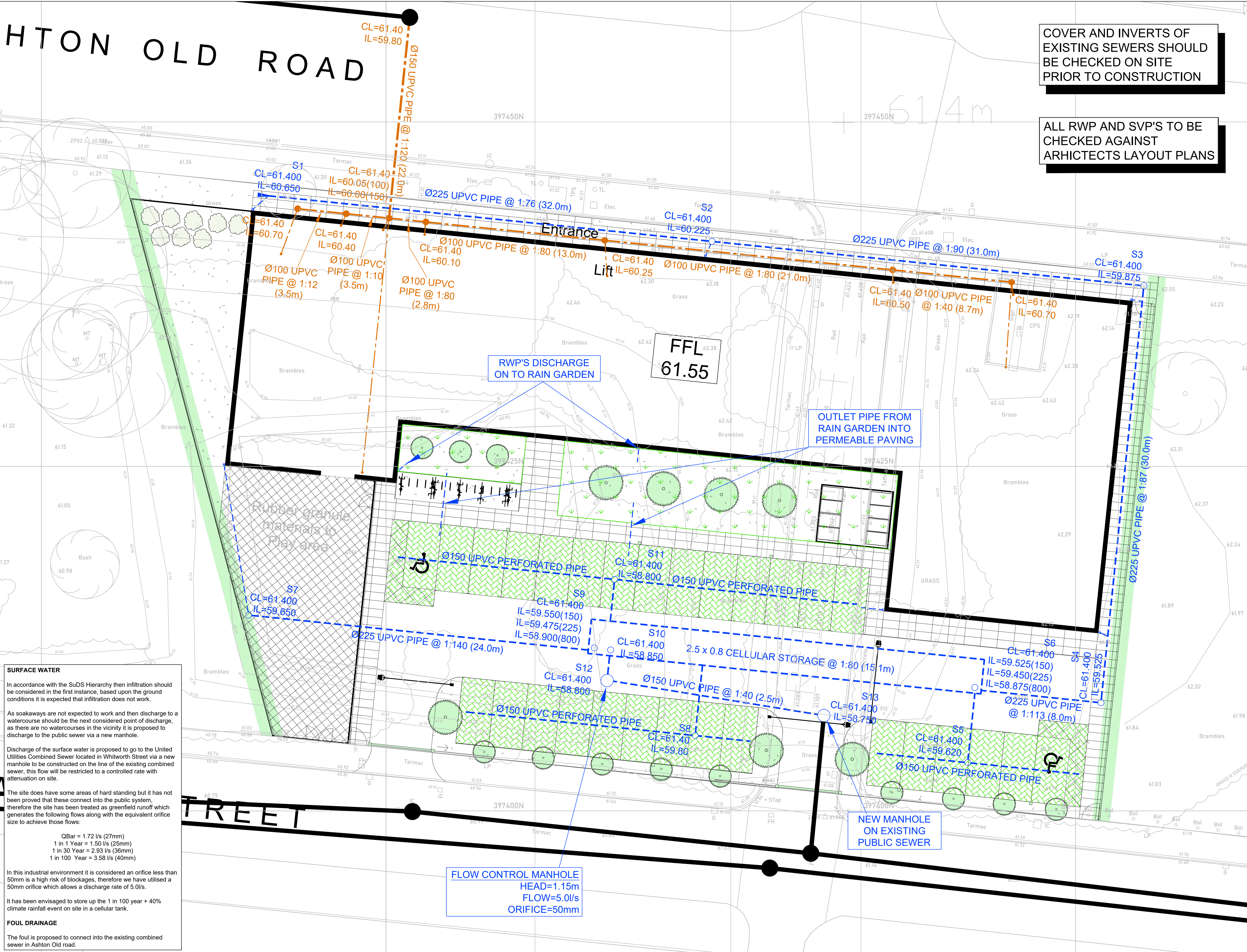
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	1.75	1.75
1 in 1 year (l/s):	1.52	1.52
1 in 30 years (l/s):	2.97	2.97
1 in 100 year (l/s):	3.64	3.64
1 in 200 years (l/s):	4.15	4.15

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 E
PROPOSED DRAINAGE LAYOUT**



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

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

- 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
 3. DO NOT SCALE FROM THE DRAWING. USE WRITTEN DIMENSIONS ONLY.
 4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
 5. DISCREPANCIES MUST BE REPORTED BACK TO THE ENGINEER PRIOR TO CONSTRUCTION.
 6. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ADVANT ENGINEERS DRAWINGS AND SPECIFICATIONS.

KEY

- EXISTING COMBINED SEWER
- PROPOSED FOUL SEWER
- PROPOSED SW SEWER
- PERMEABLE PAVING
- RAIN GARDEN

SURFACE WATER

In accordance with the SuDS Hierarchy then infiltration should be considered in the first instance, based upon the ground conditions it is expected that infiltration does not work.

As soakaways are not expected to work and then discharge to a watercourse should be the next considered point of discharge, as there are no watercourses in the vicinity it is proposed to discharge to the public sewer via a new manhole.

Discharge of the surface water is proposed to go to the United Utilities Combined Sewer located in Whitworth Street via a new manhole to be constructed on the line of the existing combined sewer, this flow will be restricted to a controlled rate with attenuation on site.

The site does have some areas of hard standing but it has not been proved that these connect into the public system, therefore the site has been treated as greenfield runoff which generates the following flows along with the equivalent orifice size to achieve those flows:

QBar = 1.72 l/s (27mm)
1 in 1 Year = 1.50 l/s (25mm)
1 in 30 Year = 2.93 l/s (36mm)
1 in 100 Year = 3.58 l/s (40mm)

In this industrial environment it is considered an orifice less than 50mm is a high risk of blockages, therefore we have utilised a 50mm orifice which allows a discharge rate of 5.0l/s.

It has been envisaged to store up the 1 in 100 year + 40% climate rainfall event on site in a cellular tank.

FOUL DRAINAGE

The foul is proposed to connect into the existing combined sewer in Ashton Old road.

B	LAYOUT UPDATED	MJM	29.01.24
A	INITIAL ISSUE	MJM	29.07.22
REV	AMENDMENTS	BY	DATE

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

advant
ENGINEERS

Building 3 Leeds City West Business Park,
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leeds@advantengineers.co.uk

CLIENT

TRAFFORD LEARNING
VOCATION CENTRE

CONTRACT

REDBY STREET
MANCHESTER
M11 2NP

TITLE

DRAINAGE LAYOUT PLAN

DRAWN	MJM	CHK'D	MJM
SCALE	1:125 @ A1	DATE	29.07.22

JOB No	DRG No	REV
22034	101	B

APPENDIX F
PROPOSED SURFACE WATER CALCS

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	✓

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

Cell 800 Link Type

Shape	Closed Rectangular	Auto Increment (mm)	500
Barrels	1	Follow Ground	x
Height (mm)	800		

Available Diameters (mm)

500

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.027	5.00	61.400	600	387790.695	397444.714	0.750
S2	0.027	5.00	61.400	600	387823.632	397441.326	1.175
S3	0.027	5.00	61.400	600	387854.960	397438.103	1.525
S4	0.027	5.00	61.400	600	387851.847	397407.848	1.875
S5	0.010	5.00	61.400	600	387842.181	397403.511	1.780
S6	0.027	5.00	61.400	600	387842.713	397408.716	2.525
S7	0.027	5.00	61.400	600	387790.030	397414.208	1.750
S8	0.010	5.00	61.400	600	387814.381	397406.471	1.600
S9	0.027	5.00	61.400	600	387815.056	397411.574	2.500
S10	0.027	5.00	61.400	1200	387816.234	397411.430	2.550
S11	0.000	5.00	61.400	1200	387816.577	397416.802	1.750
S12	0.000		61.400	1200	387816.031	397409.458	2.600
S13			61.400	1200	387831.754	397406.922	2.666

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	32.339	0.600	60.650	60.225	0.425	76.1	225	5.36	50.0
1.001	S2	S3	31.494	0.600	60.225	59.875	0.350	90.0	225	5.74	49.8
1.002	S3	S4	30.414	0.600	59.875	59.525	0.350	86.9	225	6.10	47.6
1.003	S4	S6	8.511	0.600	59.525	59.450	0.075	113.5	225	6.22	47.1
2.000	S5	S6	3.233	0.600	59.620	59.525	0.095	34.0	150	5.03	50.0
3.000	S7	S9	24.539	0.600	59.650	59.475	0.175	140.2	225	5.37	50.0
4.000	S8	S9	3.233	0.600	59.800	59.725	0.075	43.1	150	5.04	50.0
3.001	S9	S10	13.523	0.600	58.900	58.850	0.050	270.5	2500	5.47	50.0
1.004	S6	S10	15.570	0.600	58.875	58.850	0.025	622.8	2500	6.39	46.1
1.005	S10	S12	1.983	0.600	58.850	58.800	0.050	39.7	300	6.40	45.9
1.006	S11	S10	2.564	0.600	59.650	59.550	0.100	25.6	300	5.01	45.8
1.006_1	S12	S13	15.926	0.600	58.800	58.734	0.066	241.3	300	6.67	47.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.500	59.7	3.7	0.525	0.950	0.027	0.0	37	0.834
1.001	1.379	54.8	7.3	0.950	1.300	0.054	0.0	55	0.961
1.002	1.403	55.8	10.5	1.300	1.650	0.081	0.0	65	1.079
1.003	1.226	48.8	13.8	1.650	1.725	0.108	0.0	81	1.056
2.000	1.731	30.6	1.4	1.630	1.725	0.010	0.0	21	0.868
3.000	1.102	43.8	3.7	1.525	1.700	0.027	0.0	44	0.670
4.000	1.537	27.2	1.4	1.450	1.525	0.010	0.0	23	0.796
3.001	2.284	4567.5	8.7	1.700	1.750	0.064	0.0	12	0.280
1.004	1.501	3001.3	18.1	1.725	1.750	0.145	0.0	25	0.294
1.005	2.504	177.0	29.4	2.250	2.300	0.236	0.0	82	1.871
1.006	3.117	220.3	0.0	1.450	1.550	0.000	0.0	0	0.000
1.006_1	1.007	71.2	30.6	2.300	2.366	0.236	0.0	137	0.971

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	32.339	76.1	225	Circular	61.400	60.650	0.525	61.400	60.225	0.950
1.001	31.494	90.0	225	Circular	61.400	60.225	0.950	61.400	59.875	1.300
1.002	30.414	86.9	225	Circular	61.400	59.875	1.300	61.400	59.525	1.650
1.003	8.511	113.5	225	Circular	61.400	59.525	1.650	61.400	59.450	1.725
2.000	3.233	34.0	150	Circular	61.400	59.620	1.630	61.400	59.525	1.725
3.000	24.539	140.2	225	Circular	61.400	59.650	1.525	61.400	59.475	1.700
4.000	3.233	43.1	150	Circular	61.400	59.800	1.450	61.400	59.725	1.525
3.001	13.523	270.5	2500	Cell 800	61.400	58.900	1.700	61.400	58.850	1.750

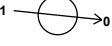
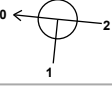
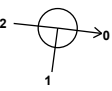
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	600	Manhole	Adoptable	S2	600	Manhole	Adoptable
1.001	S2	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
1.002	S3	600	Manhole	Adoptable	S4	600	Manhole	Adoptable
1.003	S4	600	Manhole	Adoptable	S6	600	Manhole	Adoptable
2.000	S5	600	Manhole	Adoptable	S6	600	Manhole	Adoptable
3.000	S7	600	Manhole	Adoptable	S9	600	Manhole	Adoptable
4.000	S8	600	Manhole	Adoptable	S9	600	Manhole	Adoptable
3.001	S9	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable

Pipeline Schedule

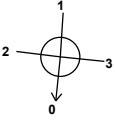
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	15.570	622.8	2500	Cell 800	61.400	58.875	1.725	61.400	58.850	1.750
1.005	1.983	39.7	300	Circular	61.400	58.850	2.250	61.400	58.800	2.300
1.006	2.564	25.6	300	Circular	61.400	59.650	1.450	61.400	59.550	1.550
1.006_1	15.926	241.3	300	Circular	61.400	58.800	2.300	61.400	58.734	2.366

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	S6	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.005	S10	1200	Manhole	Adoptable	S12	1200	Manhole	Adoptable
1.006	S11	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.006_1	S12	1200	Manhole	Adoptable	S13	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	387790.695	397444.714	61.400	0.750	600				
						0	1.000	60.650	225
S2	387823.632	397441.326	61.400	1.175	600				
						0	1.000	60.225	225
						1	1.001	60.225	225
S3	387854.960	397438.103	61.400	1.525	600				
						0	1.001	59.875	225
						1	1.002	59.875	225
S4	387851.847	397407.848	61.400	1.875	600				
						0	1.002	59.525	225
						1	1.003	59.525	225
S5	387842.181	397403.511	61.400	1.780	600				
						0	2.000	59.620	150
S6	387842.713	397408.716	61.400	2.525	600				
						1	2.000	59.525	150
						2	1.003	59.450	225
						0	1.004	58.875	2500
S7	387790.030	397414.208	61.400	1.750	600				
						0	3.000	59.650	225
S8	387814.381	397406.471	61.400	1.600	600				
						0	4.000	59.800	150
S9	387815.056	397411.574	61.400	2.500	600				
						1	4.000	59.725	150
						2	3.000	59.475	225
						0	3.001	58.900	2500

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	387816.234	397411.430	61.400	2.550	1200		1 1.006 2 3.001 3 1.004 0 1.005	59.550 58.850 58.850 58.850	300 2500 2500 300
S11	387816.577	397416.802	61.400	1.750	1200		0 1.006	59.650	300
S12	387816.031	397409.458	61.400	2.600	1200		1 1.005 0 1.006_1	58.800 58.800	300 300
S13	387831.754	397406.922	61.400	2.666	1200		1 1.006_1	58.734	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
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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
150	40	0	0

Node S12 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.150	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	5.0		
Invert Level (m)	58.800	Diameter (m)	0.047		

Node S11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	59.650
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Time to half empty (mins)	216

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	171.0	0.0	0.300	171.0	0.0	0.301	0.0	0.0

Node S8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	59.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Time to half empty (mins)	144

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	104.0	0.0	0.300	104.0	0.0	0.301	0.0	0.0

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	59.620
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	232

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	79.0	0.0	0.300	79.0	0.0	0.301	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: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	60.688	0.038	3.8	0.0381	0.0000	OK
15 minute winter	S2	11	60.280	0.055	7.5	0.0411	0.0000	OK
15 minute winter	S3	11	59.942	0.067	11.1	0.0429	0.0000	OK
15 minute winter	S4	11	59.617	0.092	14.6	0.0523	0.0000	OK
30 minute winter	S5	21	59.637	0.017	1.1	0.3997	0.0000	OK
120 minute winter	S6	98	59.117	0.242	6.4	0.1202	0.0000	OK
15 minute winter	S7	10	59.695	0.045	3.8	0.0264	0.0000	OK
30 minute winter	S8	23	59.815	0.015	1.1	0.5118	0.0000	OK
120 minute winter	S9	98	59.117	0.217	2.8	0.1084	0.0000	OK
120 minute winter	S10	98	59.117	0.267	8.4	0.3585	0.0000	OK
15 minute summer	S11	1	59.650	0.000	0.0	0.0000	0.0000	OK
120 minute winter	S12	96	59.117	0.317	7.5	0.3584	0.0000	SURCHARGED
15 minute summer	S13	1	58.734	0.000	2.0	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	1.000	S2	3.7	0.631	0.063	0.1929	
15 minute winter	S2	1.001	S3	7.4	0.844	0.134	0.2764	
15 minute winter	S3	1.002	S4	11.0	0.880	0.198	0.3825	
15 minute winter	S4	1.003	S6	14.7	1.023	0.300	0.1219	
30 minute winter	S5	2.000	S6	0.7	0.701	0.023	0.0033	
120 minute winter	S6	1.004	S10	4.9	0.058	0.002	9.9055	
15 minute winter	S7	3.000	S9	3.7	0.671	0.084	0.1347	
30 minute winter	S8	4.000	S9	0.5	0.582	0.019	0.0028	
120 minute winter	S9	3.001	S10	1.3	0.040	0.000	8.1853	
120 minute winter	S10	1.005	S12	7.5	0.446	0.042	0.1355	
15 minute summer	S11	1.006	S10	0.0	0.000	0.000	0.0000	
120 minute winter	S12	Orifice	S13	2.5				30.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	60.709	0.059	9.3	0.0595	0.0000	OK
15 minute winter	S2	10	60.314	0.089	18.5	0.0662	0.0000	OK
15 minute winter	S3	11	59.986	0.111	27.4	0.0709	0.0000	OK
15 minute winter	S4	11	59.688	0.163	36.1	0.0929	0.0000	OK
15 minute winter	S5	12	59.651	0.031	3.5	0.7427	0.0000	OK
180 minute winter	S6	148	59.567	0.692	11.8	0.3437	0.0000	OK
15 minute winter	S7	10	59.721	0.071	9.3	0.0422	0.0000	OK
30 minute winter	S8	21	59.828	0.028	2.7	0.9774	0.0000	OK
180 minute winter	S9	148	59.567	0.667	5.2	0.3326	0.0000	OK
180 minute winter	S10	148	59.567	0.717	11.8	0.9625	0.0000	SURCHARGED
15 minute summer	S11	1	59.650	0.000	0.0	0.0000	0.0000	OK
180 minute winter	S12	148	59.567	0.767	7.3	0.8670	0.0000	SURCHARGED
15 minute summer	S13	1	58.734	0.000	3.0	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	1.000	S2	9.2	0.804	0.154	0.3716	
15 minute winter	S2	1.001	S3	18.1	1.062	0.330	0.5374	
15 minute winter	S3	1.002	S4	27.3	1.078	0.489	0.7653	
15 minute winter	S4	1.003	S6	36.3	1.264	0.745	0.2441	
15 minute winter	S5	2.000	S6	2.4	0.982	0.079	0.0080	
180 minute winter	S6	1.004	S10	7.9	0.065	0.003	27.4128	
15 minute winter	S7	3.000	S9	9.1	0.862	0.207	0.2589	
30 minute winter	S8	4.000	S9	1.8	0.835	0.067	0.0070	
180 minute winter	S9	3.001	S10	1.8	0.040	0.000	23.3855	
180 minute winter	S10	1.005	S12	7.3	0.445	0.041	0.1396	
15 minute summer	S11	1.006	S10	0.0	0.000	0.000	0.0000	
180 minute winter	S12	Orifice	S13	4.0				71.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	60.718	0.068	12.1	0.0681	0.0000	OK
15 minute winter	S2	10	60.329	0.104	24.0	0.0773	0.0000	OK
15 minute winter	S3	10	60.004	0.129	35.6	0.0823	0.0000	OK
120 minute winter	S4	118	59.769	0.244	15.2	0.1391	0.0000	SURCHARGED
120 minute winter	S5	118	59.769	0.149	7.3	3.5782	0.0000	OK
120 minute winter	S6	118	59.768	0.893	20.4	0.4441	0.0000	SURCHARGED
120 minute winter	S7	118	59.768	0.118	3.8	0.0700	0.0000	OK
15 minute winter	S8	13	59.834	0.034	4.5	1.1659	0.0000	OK
120 minute winter	S9	118	59.768	0.868	8.9	0.4334	0.0000	SURCHARGED
120 minute winter	S10	118	59.768	0.918	20.1	1.2335	0.0000	SURCHARGED
120 minute winter	S11	118	59.769	0.118	9.6	6.8210	0.0000	OK
120 minute winter	S12	118	59.768	0.968	6.8	1.0952	0.0000	SURCHARGED
15 minute summer	S13	1	58.734	0.000	3.4	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	1.000	S2	11.9	0.857	0.200	0.4536	
15 minute winter	S2	1.001	S3	23.5	1.138	0.429	0.6543	
15 minute winter	S3	1.002	S4	35.3	1.132	0.633	0.9431	
120 minute winter	S4	1.003	S6	15.2	1.033	0.312	0.3385	
120 minute winter	S5	2.000	S6	-6.6	0.843	-0.216	0.0569	
120 minute winter	S6	1.004	S10	13.7	0.082	0.005	31.1585	
120 minute winter	S7	3.000	S9	3.8	0.676	0.087	0.7479	
15 minute winter	S8	4.000	S9	2.5	0.913	0.093	0.0090	
120 minute winter	S9	3.001	S10	8.8	0.067	0.002	27.0620	
120 minute winter	S10	1.005	S12	6.8	0.439	0.039	0.1396	
120 minute winter	S11	1.006	S10	-9.6	-0.405	-0.044	0.1036	
120 minute winter	S12	Orifice	S13	4.5				73.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.51%

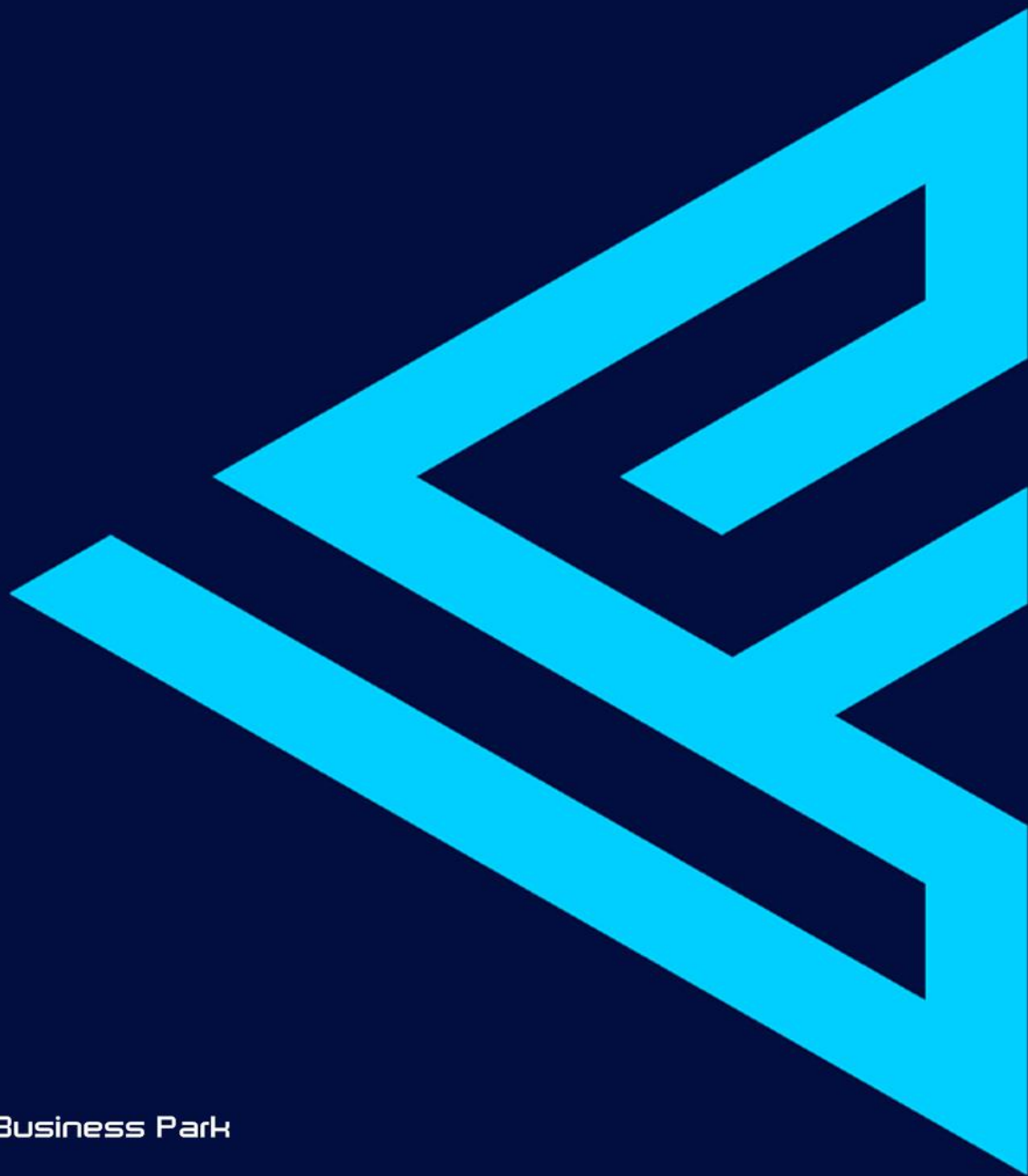
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	60.731	0.081	17.0	0.0814	0.0000	OK
120 minute winter	S2	118	60.479	0.254	10.8	0.1885	0.0000	SURCHARGED
120 minute winter	S3	118	60.479	0.604	16.2	0.3846	0.0000	SURCHARGED
120 minute winter	S4	118	60.478	0.953	21.6	0.5441	0.0000	SURCHARGED
120 minute winter	S5	118	60.478	0.858	19.0	7.4606	0.0000	SURCHARGED
120 minute winter	S6	118	60.478	1.603	28.3	0.7965	0.0000	SURCHARGED
120 minute winter	S7	118	60.477	0.827	11.4	0.4890	0.0000	SURCHARGED
120 minute winter	S8	118	60.477	0.677	12.3	10.5896	0.0000	SURCHARGED
120 minute winter	S9	118	60.478	1.578	14.9	0.7872	0.0000	SURCHARGED
120 minute winter	S10	118	60.478	1.628	37.6	2.1858	0.0000	SURCHARGED
120 minute winter	S11	118	60.478	0.828	32.6	17.8931	0.0000	SURCHARGED
120 minute winter	S12	118	60.477	1.677	7.6	1.8970	0.0000	SURCHARGED
15 minute summer	S13	1	58.734	0.000	4.0	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	1.000	S2	16.8	0.927	0.282	0.5901	
120 minute winter	S2	1.001	S3	10.8	0.936	0.197	1.2526	
120 minute winter	S3	1.002	S4	16.2	0.957	0.290	1.2096	
120 minute winter	S4	1.003	S6	22.9	1.113	0.471	0.3385	
120 minute winter	S5	2.000	S6	-17.1	-1.219	-0.559	0.0569	
120 minute winter	S6	1.004	S10	21.8	0.083	0.007	31.1585	
120 minute winter	S7	3.000	S9	7.9	0.739	0.179	0.9759	
120 minute winter	S8	4.000	S9	-11.3	0.838	-0.418	0.0569	
120 minute winter	S9	3.001	S10	15.1	0.056	0.003	27.0620	
120 minute winter	S10	1.005	S12	7.6	0.451	0.043	0.1396	
120 minute winter	S11	1.006	S10	-32.6	-0.775	-0.148	0.1806	
120 minute winter	S12	Orifice	S13	5.9				90.3

Results for 150 year +40% CC Critical Storm Duration. Lowest mass balance: 99.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	S1	188	61.172	0.522	3.5	0.5231	0.0000	FLOOD RISK
240 minute winter	S2	188	61.172	0.947	7.0	0.7024	0.0000	FLOOD RISK
240 minute winter	S3	188	61.171	1.296	10.5	0.8258	0.0000	FLOOD RISK
240 minute winter	S4	188	61.171	1.646	13.9	0.9396	0.0000	FLOOD RISK
240 minute winter	S5	188	61.170	1.550	10.3	7.7341	0.0000	FLOOD RISK
240 minute winter	S6	188	61.170	2.295	17.7	1.1406	0.0000	FLOOD RISK
240 minute winter	S7	188	61.170	1.520	3.5	0.8983	0.0000	FLOOD RISK
240 minute winter	S8	188	61.170	1.370	12.4	10.8721	0.0000	FLOOD RISK
240 minute winter	S9	188	61.170	2.270	11.9	1.1327	0.0000	FLOOD RISK
240 minute winter	S10	188	61.170	2.320	26.6	3.1158	0.0000	FLOOD RISK
240 minute winter	S11	188	61.170	1.520	21.8	18.6764	0.0000	FLOOD RISK
240 minute winter	S12	188	61.170	2.370	7.8	2.6801	0.0000	FLOOD RISK
15 minute summer	S13	1	58.734	0.000	4.2	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	1.000	S2	3.5	0.613	0.059	1.2862	
240 minute winter	S2	1.001	S3	7.0	0.828	0.127	1.2526	
240 minute winter	S3	1.002	S4	10.4	0.851	0.187	1.2096	
240 minute winter	S4	1.003	S6	13.8	0.984	0.282	0.3385	
240 minute winter	S5	2.000	S6	-9.0	0.793	-0.295	0.0569	
240 minute winter	S6	1.004	S10	15.8	0.065	0.005	31.1585	
240 minute winter	S7	3.000	S9	4.1	0.629	0.093	0.9759	
240 minute winter	S8	4.000	S9	-11.5	0.744	-0.422	0.0569	
240 minute winter	S9	3.001	S10	8.8	0.040	0.002	27.0620	
240 minute winter	S10	1.005	S12	7.8	0.394	0.044	0.1396	
240 minute winter	S11	1.006	S10	-21.8	-0.576	-0.099	0.1806	
240 minute winter	S12	Orifice	S13	7.1				125.9



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