VASA Club, Blackley

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY STATEMENT

Version 1.2

OCTOBER 2026

Chapter RE WBL Ltd and Jigsaw Homes North

VASA Club, Blackley

Flood Risk Assessment & Drainage Strategy Statement

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Site Investigation

1 Introduction

1.1 Background

1.1.1 Link was commissioned by Chapter RE WBL Ltd and Jigsaw Homes North to prepare a Flood Risk Statement and associated Drainage Strategy in respect to a proposed development at White Moss Road, Blackley.

1.1.2 As required by Manchester City Council, the Local Planning Authority, and the Manchester Local Plan, this report has been prepared to provide a Flood Risk Assessment, Sustainable Drainage Strategy, and Drainage Management Plan in support of a full planning application.

1.1.3 The proposed scheme shall comprise a residential development of circa 43 apartments, associated car parking spaces and a communal garden area.

1.1.4 The proposed site plan is included within **Appendix A**.

1.2 Site Location

1.2.1 The site is located at VASA Club, Blackley and will be accessed of White Moss Road. The site location is outlined in Figure 1. The Nearest Post Code is M9 7EQ.

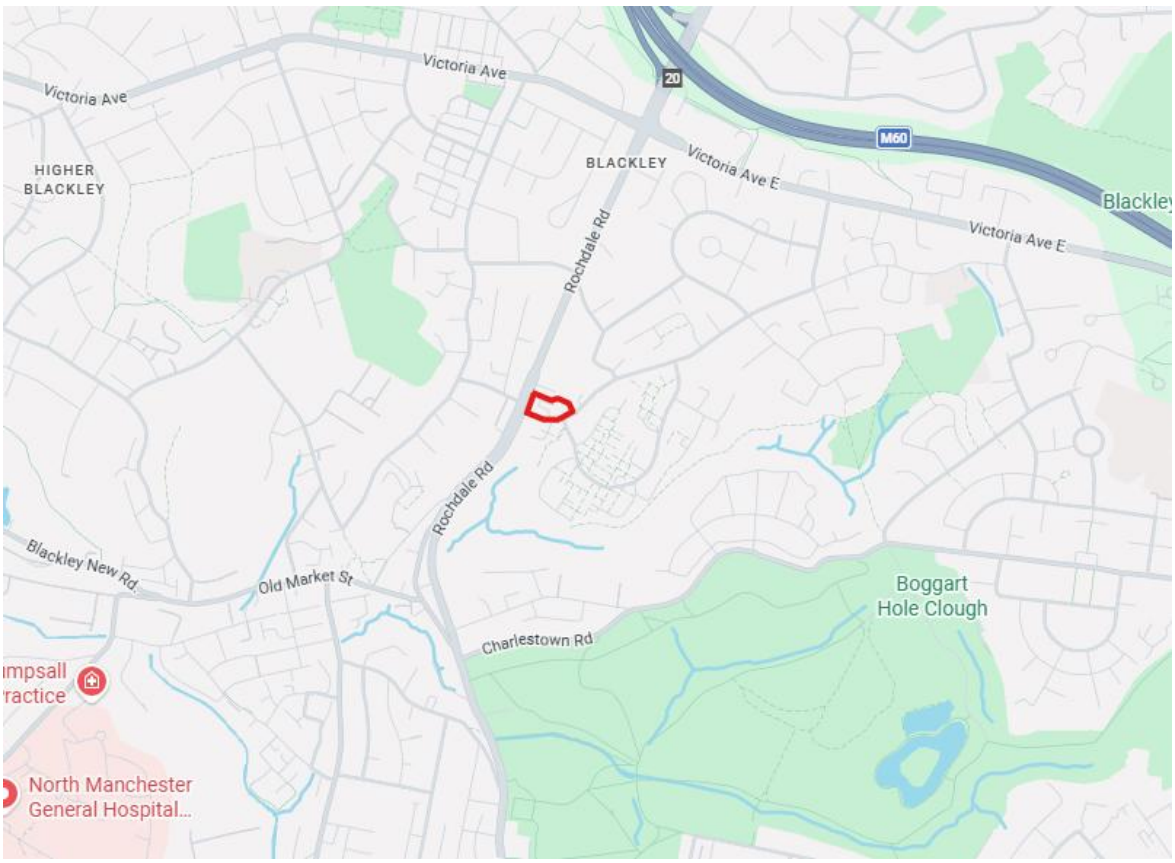


Figure 1. Site Location

1.3 Topography

1.3.1 A detailed topographical survey of the site has been completed by Survey Solutions on the 28.04.2026. The survey shows the existing site level range to between circa 77.0 mAOD and 80.3 mAOD. The site generally falls from North-East to South-West.

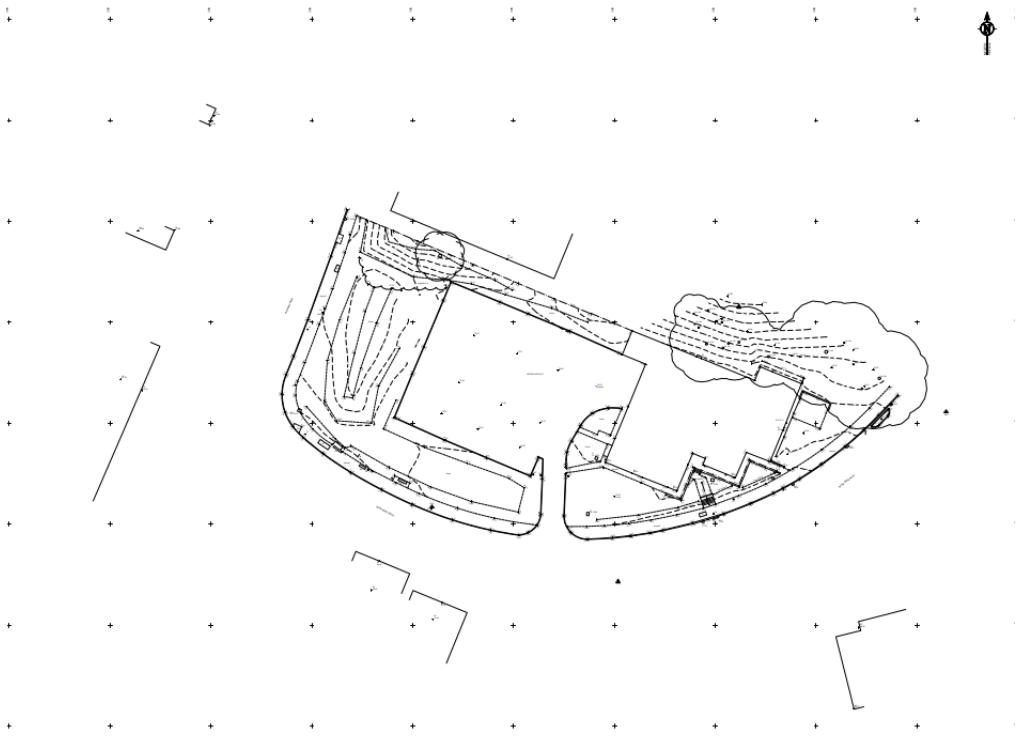


Figure 2. Topographical Survey

1.3.2 The main features within the site are an existing social club building and adjacent paved car parking area, all surrounded by grass verges.

1.4 Existing Drainage

1.4.1 It is assumed that the existing drainage discharges into the manhole chamber to the south of the site. From here it discharges into the existing United Utilities combined sewer in White Moss Road.

1.5 Flood Zones and Vulnerability Classification

1.5.1 The formal flood zone mapping shows the site to be located entirely within Flood Zone 1. Table 1 below indicates what uses of land are appropriate for each flood zone, as set out within Annex 3 – Flood risk vulnerability and flood zone 'compatibility' in the NPPF. The proposed use would be defined as 'less vulnerable'; hence the proposed use is deemed acceptable.

Table 1. Flood risk vulnerability and flood zone 'incompatibility'

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓
Zone 2	✓	Exception Test	✓	✓
Zone 3a	Exception Test	×	Exception Test	✓
Zone 3b	Exception Test	×	×	×

2 FLOOD RISK

2.1 Introduction

2.1.1 The site is shown to be at a low risk of flooding from all sources except surface water flooding.

2.2 Flood Risk from Surface Water

2.2.1 A source of flood risk to the site is from surface water flooding created by the site itself or adjacent areas. Figure 3, places the majority of the site at a very low risk of flooding from surface water, with only a small area (<0.01ha) being subject to medium to high risk of flooding. These areas are shown to be prone to flooding due to the site's existing topography and features including the paved car park which likely is impermeable resulting in the pooling of storm water.



Figure 3: Risk of Flooding from Surface Water: 0.1% AEP (1in1000Y)

2.2.2 The proposed drainage strategy will account for the entire site. Therefore, the proposed development will not be affected by surface water flooding and will not impact the potential overland flood flows.

3 MITIGATION

3.1 Residual Risks

3.1.1 Residual risks are the risks that remain once the flood risk management measures described above have been implemented. These are typically associated with extreme events that overwhelm drainage systems exceeding the flood levels used to design any mitigation measures. The primary residual risks that will affect this development are:

- An extreme rainfall event which exceeds the capacity of the proposed surface water drainage system to both intercept and convey the flows. (alter the remainder of this paragraph to be more relevant to the development) During such an event, water that is unable to enter the formal drainage system will flow over the ground through the development. The risk can be reduced by designing site levels to direct any runoff towards the highways, adjacent watercourses, or other corridors running through the site.
- A lack of, or insufficient, maintenance of the installed drainage system which may cause flow restriction

4 PROPOSED DRAINAGE STRATEGY

4.1 Outfall Assessment

4.1.1 As required by Part H of Building Regulations, and Flood risk and coastal change - paragraph 056 in the Planning Practice Guidance of the NPPF and the National SuDS Guidance (Standard 1) the required Drainage Hierarchy has been considered in the development of this strategy as summarised in Table 2.

Table 2 - Outfall Assessment

Outfall Options	Available	Comment
Collection for non-potable use	×	Options for incorporating rainwater harvesting systems have been evaluated. Due to the small site area and dense site plan, collection for non-potable use is not deemed feasible.
Discharge into the Ground	×	The use of infiltration outfall has been discounted as borehole records suggest the geology consists of clays down to 7.31 m which are considered to have extremely low to no permeability.
Watercourse	×	The nearest available watercourse is approximately 250 m away, across 3rd party owned land and therefore discharge to this watercourse is deemed not feasible also.
Surface Water Sewer, Highway Drain, or another Surface drainage system	×	Not considered due to no sewers within the vicinity of the site.
Combined Sewer	✓	The existing Combined Sewer network runs adjacent to the bottom of the site and as such it is proposed a connection to it will be made.

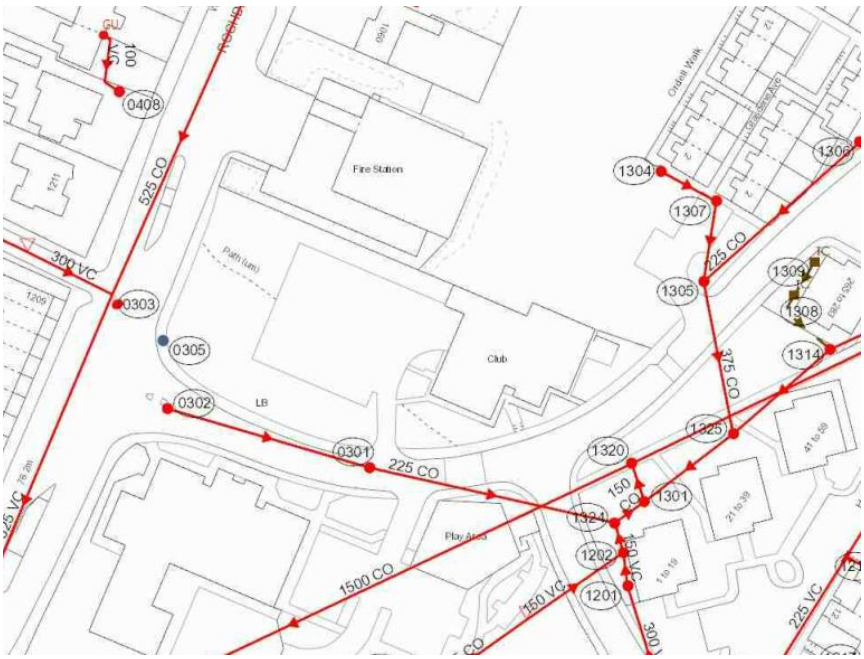


Figure 4: Existing Combined Sewer Network

4.2 Runoff Rate Assessment

4.2.1 Runoff rates have been calculated based on an existing catchment area of 0.07ha. The Greater Manchester Sustainable Drainage Design Guide highlights an appropriate brownfield discharge rate calculation. This calculation will be based on the existing impermeable area that discharges to the existing combined sewer.

$$Q = 2.78 * Cv * Cr * I * A$$

Table 3. Runoff Rate Assessment

Return Period	Greenfield Runoff rate (l/s)	Brownfield Runoff rate (l/s)	Proposed Runoff rate (l/s)
Qbar	0.1	N.A.	10.1
1 Year	0.1	10.12	10.1
30 Year	0.2	23.52	10.1
100 Year	0.2	29.60	10.1

4.2.2 Greenfield Runoff calculation using the HR Wallingford online tool can be found in **Appendix C**.

4.3 Climate Change Allowance

4.3.1 The proposed drainage strategy has taken into account the latest climate change allowances guidance issued by the Environment Agency (Last updated 27th May 2022).

4.3.2 To assess the climate change allowance required for the development, the peak rainfall climate change allowance by management catchment has been

4.3.3 The development is located within the United Utilities Management Catchment.

Table 4. Peak Rainfall Climate Change Allowances

Epoch	Central allowance	Upper end allowance
3.3% Annual Exceedance Rainfall Event (1 in 30Y)		
2050s	25%	35%
2070s	30%	40%
1% Annual Exceedance Rainfall Event (1 in 100Y)		
2050s	25%	40%
2070s	30%	45%

4.3.4 The proposed development's lifetime will be beyond 2100, therefore the Upper End Allowances must be taken into account for both the 1% and 3.3% AEP events for the period of 2061 to 2125.

4.3.5 In accordance with the EA's Climate Change guidance, the development will need to ensure that that during the 1% AEP event including for the Upper end allowance for climate change:

- There is no increase in flood risk elsewhere;
- The development will be safe from surface water flooding;

4.4 SuDS Assessment

4.4.1 As part of the surface water drainage strategy for the site a number of Sustainable Drainage Systems where considered. Table 5 provides a list of the options considered and a justification for their inclusion or omission.

Table 5. SuDS Features Assessment

SuDS Features	Proposed	Justification
Rainwater Harvesting System	No	The use of rainwater harvesting is not considered economically viable on this site considering low water usage, installation, operational costs and scale of the development.
Green Roofs	No	The use of a green roof is deemed not viable due to space. The site will benefit from solar panels which will occupy the roof space.
Infiltration Systems	No	It is expected that we infiltration will not be viable due to the underlying ground conditions.
Proprietary Treatment Systems	Yes	The use of a downstream defender is proposed in order to provide effective treatment of the surface water.
Filter Strips	No	Filter strips have not been considered the most effective proposal for this site due to the proposed site layout.
Filter Drains	Yes	Filter Drains have been proposed.
Swales	No	Swales are not suitable for this scheme due to available space and proposed land use.
Bioretention Systems	No	Bioretention Systems have not been considered the most effective proposal for this site due to the lack of available landscape areas.
Porous Pavements	Yes	Porous paving has been assessed as the most effective method to treat the most likely source of site contaminates from the parking bays. All surface works from the parking areas shall drain via the voided sub-base offering the required treatment. The available storage within the voided sub-base shall provide the required interception.
Attenuation Storage Tanks (oversized pipes)	Yes	The attenuation tank will reduce the quantity of rainfall runoff reaching the watercourse. Cellular Attenuation Tanks are provided in order to attenuate surface water due to the restricted discharge.

Detention Basins	No	There is insufficient space for a detention basin on this site.
Ponds and Wetlands	No	There is insufficient space for a pond on this site.

4.5 Water Quality

4.5.1 As shown on the drainage strategy drawings in **Appendix C**, water quality is provided for the car park areas and for the building.

4.5.2 As per Table 26.2 in CIRIA 753 The SuDS Manual, the car parks are classes as having a 'Medium' Pollution Hazard Level. The corresponding pollution indices for these hazard levels for the three main sources of pollution are provided below in Table 6.

Table 6 - Pollution Hazard Level and Indices.

Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Medium	0.7	0.6	0.7

4.5.3 For the car park areas, pollution treatment is provided through a combination of permeable paving and the detention basin whilst the service yards/access roads are treated through a combination of petrol interceptors and the detention basin. Therefore, the following water quality assessment has been carried out separately for the two different pollution risk areas.

4.5.4 Table 26.3 in CIRIA 753 provides mitigation indices for various SuDS features against the three main sources of pollution. The corresponding mitigation indices in CIRIA 753 for permeable paving and an Advanced Vortex downstream defender for each of the sources of pollution are provided below in Table 6.

Table 7 - SuDS Mitigation Indices.

SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Advanced Vortex	0.5	0.4	0.5

4.5.5 As the combinations above form treatment trains, CIRIA 753 recommends use of the following formula for an equivalent mitigation index for SuDS in series.

Total SuDS mitigation index = mitigation index$_1$ + 0.5 (mitigation index$_2$)

Where mitigation index$_n$ = mitigation index for component n

4.5.6 Using the above formula and mitigation indices, the equivalent mitigation indices for each of the pollution risk areas are outlined below in Table 7. Where the calculated mitigation index would be greater than 1.00, this is denoted as >0.95 as the index cannot be greater than 1.00.

Table 7 – Pollution Treatment Assessment.

SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Pollution Risk: Medium	0.7	0.6	0.7
Permeable Paving + Detention Basin	0.7 + 0.5(0.5) = 0.95	0.6 + 0.4(0.5) = 0.80	0.7 + 0.5(0.5) = 0.95

4.5.7 This demonstrates that the SuDS treatment trains proposed for the development are more than sufficient to treat the anticipated pollution on site, hence water quality has been achieved through the drainage strategy.

5 DRAINAGE MANAGEMENT PLAN

5.1 Responsibility

5.1.1 The occupier of the proposed development shall be responsible for the maintenance and operation of the drainage system, including any attenuation and flow control devices.

5.2 Maintenance of Pipe Networks

5.2.1 Maintenance and management of main storm sewers and chambers inclusive of pipework from paved areas and buildings (but excluding internal building drainage) should be visually inspected and jetted/cleaned as required. As a minimum, this should be carried out every 5 years. Methods of inspection to give indications of blockages etc. may include:

- Pulling a mandrel through the pipe to identify physical faults (e.g., disjointed pipes).
- Flushing/jetting.
- CCTV.
- Measurement of water depths in pipe entries, catchpits or interceptors along a drain run may identify potentially blocked pipes.

5.2.2 Gully gratings, manhole gratings and channel gratings shall be visually inspected at least once every year and replaced or re-set if damaged or dislodged. Gullies should be inspected at least once every year, ideally during springtime as the autumn and winter seasons produce the most detritus build up in the form of leaves, litter and silt. This material should be removed from the channels and disposed of at a licensed tip. This material should not be tipped in other areas of the development as it may pose a pollution threat to the surrounding drainage system.

5.2.3 Jetting should only be carried out after removal of the silt and debris, as jetting alone will simply wash the debris further downstream without removing the problem.

5.3 Maintenance of SuDS Features

5.3.1 The regular and correct maintenance of the SuDS feature is essential to the continued performance. The SuDS Manual C753 provides advice on the management of the system. The recommended maintenance regimes for the green roofs, proprietary treatment systems, filter drains, permeable pavements, attenuation storage tanks, and detention basins are given in Tables 12.5, 14.2, 16.1, 20.15, 21.3 and 22.1 in the SuDS Manual C753 respectively, which will form the basis of the strategy for the provided development

Table 9 - Table 14.2 of CIRIA 753

TABLE 14.2 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

Table 10 - Table 16.1 of CIRIA 753

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table 11 - Table of CIRIA 753

TABLE 20.15 Operation and maintenance requirements for 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 glyphospate 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

Table 12 – Table 21.3 of CIRIA 753

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

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

5.3.2 It should be noted that maintenance regimes detailed above are initial recommendations and the actual maintenance work undertaken should be adapted to suit the system performance by the maintenance provider.

6 CONCLUSION

6.1.1 This site-specific Flood Risk Assessment has been prepared in accordance with NPPF guidance and local policy on Flood Risk. The government approved flood mapping shows the site to be located within Flood Zone 1 flood risk from both fluvial and pluvial sources on the site. Further to this, the proposed levels on the site shall be set such that in the unlikely event of these systems failing the development on the site will remain protected.

6.1.2 The drainage strategy demonstrated that an appropriate drainage system for both foul and surface water can be provided on the site which discharges to a suitable outfall with runoff rates being limited at the 1in1 year brownfield discharge rate. Subject to the mitigation measures proposed, the development may proceed without being subject to significant flood risk. Moreover, the development will not significantly increase flood risk to the wider catchment area.

APPENDIX A

Proposed Site Plan



Proposed Site Plan
1 : 200

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- Report Errors and Omissions to the Architect.
- Check all dimensions on site
- Drawing to be read in conjunction with the Health and Safety Plan and all relevant Risk Assessments

1:1
1:200
2m 4 6 8 10 12

N

All Design Subject to full surveys inc but not limited to Topographical, Services, Highways adoption, Phase 2 desktop, Ecological, BNG

Schedule of Accomodation:
16no. 37% 1b2p Apartments @ 51m²
(of which 2no are M4(3) @ 61m2)

27no. 63% 2b3p Apartments @ 61m²
43 no. Total

All NDSS / M4(2) (& 2no M4(3) (4%))
35No. 80% car parking (of which 2no.dis.)

Key
- Site Boundary
- Vision Splay
- Trees to be removed
- Proposed position of existing speed traffic sign

GIA: 3436.52 m²

Rev.	Date	Drn.		Chkd.
H	22.09.26	JE	Generally updated following client comments	CL
G	02.09.26	SW	Planning issue	CL
F	28.08.26	JE	Coordinated with landscape layout & Site boundary line updated	CL
E	26.08.26	JE	Updated in accordance with Landscape and Transport Consulatant comments	CL
D	04.08.26	SW	updated to suit client feedback and latest building plan	CL
C	30.06.26	JE	Drawings generally updated following BSA technical review and Design Team comments	CL
B	29.06.26	JE	Issued for comments	CL
A	18.06.26	JE	WIP Issue	CL

BowkerSadler

Project
White Moss Road, Blackley

Client
Chapter RE / Jigsaw

Drawing
Proposed Site Plan

Scale	Sheet Size	Drawn	Checked	Date
As indicated	@ A1	CY	SW	12.05.26

Project No.	Originator	Zone	Level	Form	Discipline	Number	Revision
25-041 -	BSA -	XX -	XX -	D -	A -	**1010**	H

Status
Planning

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APPENDIX B

Topographical Survey

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Level	ET	EP+Transformer	RSD	Roller Shutter Door
AB	Air Brick	FB	Flower Bed	RSJ	Rolled Steel Joint
AR	Assumed Route	FC/Ce	False Ceiling Level	SI	Sign Post
AV	Air Valve	FBD	Floor Board Direction	SL	Window Sill Level
BB	Bellaha Beacon	FH	Fire Hydrant	SP	Arch Spring Point Level
BH	Bore Hole	FL	Floor Level	SV	Stop Valve
BL	Bed Level	FW	Foul Manhole	SW	Soil Vent Pipe
BO	Bollard	FW	Foul Water	SY	Cattle Grid
BS	Bus Stop	GG	Gully Grate	Tac	Tactile Paving
BU	Bush	GV	Gas Valve	TC	Telecom Cover
B/W	Barbed Wire Fence	HL	Window Head Level	TH	Trial Pit
BX	Box (Utilities)	IC	Inspection Cover	THL	Threshold Level
C/B	Close Board Fence	IL	Invert Level	TL	Traffic Light
CL	Cover Level	IR	Iron Railings	ToF	Top of Fence
C/L	Chain Link Fence	KO	Kerb Outlet	ToW	Top of Wall
C-Lev	Ceiling Level	LP	Lamp Post	TP	Telegraph Pole
Col.	Column	MH	Manhole	TS	Traffic Signal Cover
C/P	Chestnut Paling Fence	MP	Marker Post	TV	Cable TV Cover
CR	Cable Riser	NB	Name Board	UC	Unknown Cover
C/W	Chicken Wire	OHL	Overhead Line (approx)	Uk	Unknown Tree
DC	Drainage Channel	Pan	Panel Fence	UMG	Unmade Ground
Dil.	Dilapidated	PB	Post Box	USB	Under Slide Beam
DL	Door Level	PM	Parking Meter	UTL	Unable To Lift
DP	Down Pipe	PO	Post	UTS	Unable To Survey
DR	Drain	P/R	Post & Rail Fence	VP	Vent Pipe
EBx	Electric Box	P/W	Post & Wire Fence	WB	Waste Bin
EC	Electric Supply Cover	RE	Roofing Eye	WH	Weep Hole
EL	Eaves Level	RL	Ridge Level	WL	Water Level
EP	Electric Pole	RP	Reflector Post	WM	Water Meter
ER	Earth Rod	RS	Road Sign	WO	Wash Out
				△	Survey Control Station

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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This drawing should only be scaled using digital methods.

SURVEY STATIONS

Name	Easting	Northing	Height
ST01	386043.808	403323.368	78.521
ST02	386080.734	403308.663	78.705
JB01	386145.783	403342.226	80.184
JB1A	386104.706	403363.131	83.390

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

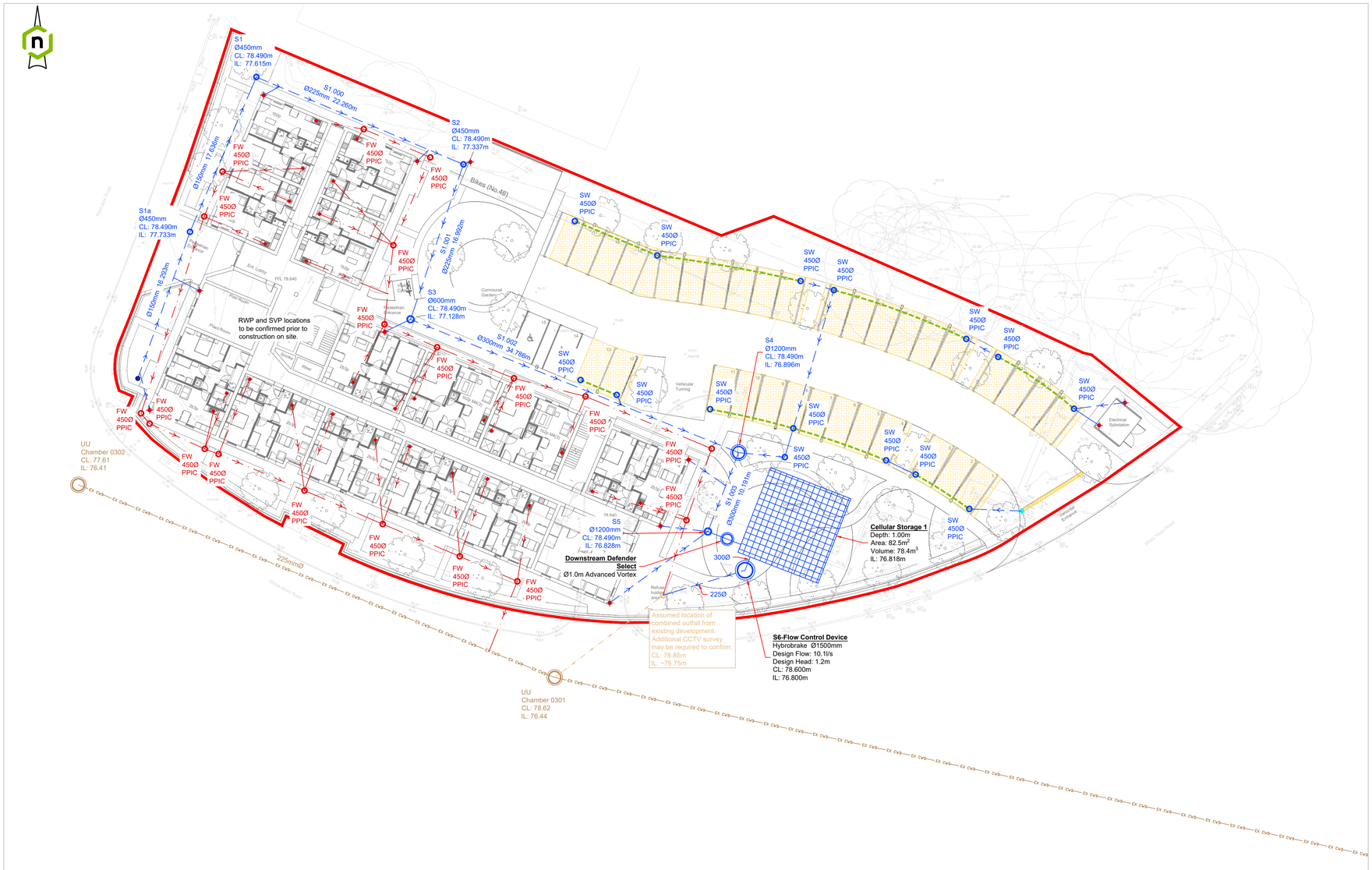
REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS
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UNDERGROUND SURVEYING
SITE ENGINEERING
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PROJECT TITLE: VASA Club, 283 White Moss Road, Blackley, Manchester, M9 6NZ				
DRAWING DETAIL: TOPOGRAPHICAL SURVEY Sheet 1 of 1				
CLIENT: CHAPTER REAL ESTATE LIMITED				SCALE: 1:200
SURVEYOR: JB / SO	SURVEY DATE: 28/04/2026	CHECKED BY: SR	APPROVED BY: SR	DWG STATUS: FINAL
DRAWING NUMBER: 85841MCLS-01			REVISION	ISSUE DATE: 30/04/2026

APPENDIX C

Drainage Strategy Drawings & Supporting Documents

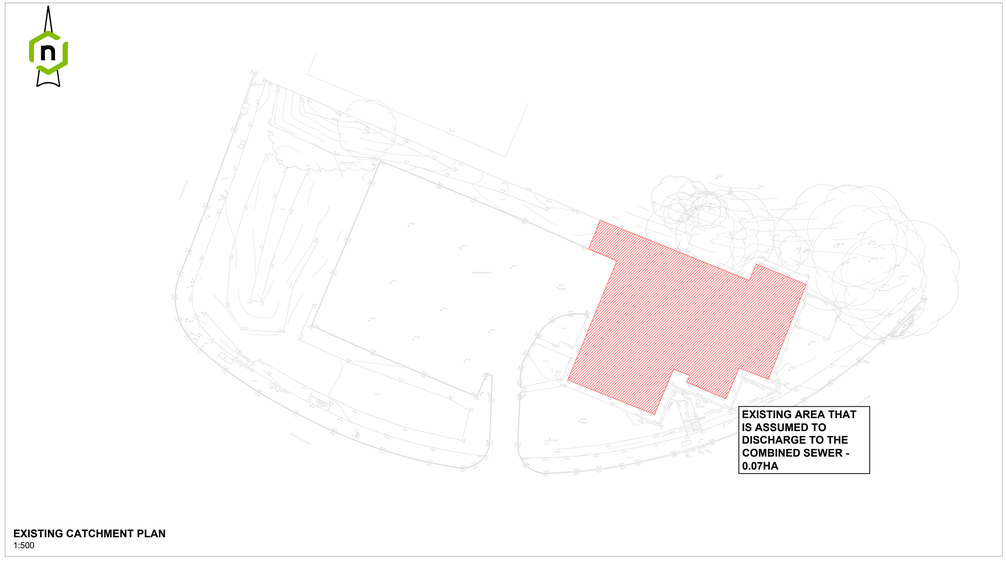


ALL DRAINAGE KEY

- EXISTING PUBLIC COMBINED SEWER
- EXISTING PUBLIC FOUL SEWER
- EXISTING PUBLIC STORM SEWER
- EXISTING COMBINED DRAINAGE
- PROPOSED PRIVATE FOUL DRAINAGE (150mm unless stated otherwise)
- PROPOSED PRIVATE STORM DRAINAGE
- PROPOSED RODDING EYE
- PROPOSED RAINWATER PIPE
- PROPOSED DRIVE GULLY
- PROPOSED ACO RainDrain, B125 GRATING WITH SUMP OUTLET UNIT
- PROPOSED FOUL SUB STACK (LOCATION CONFIRMED BY OTHERS)
- PROPOSED SOIL VENTED PIPE (LOCATION CONFIRMED BY OTHERS)
- CELLULAR CRATES TO ATTENUATE UP TO AND INCLUDING THE 1 IN 100Y STORM EVENT WITH CLIMATE CHANGE ALLOWANCE OF XX%
- PERMEABLE PAVING (DEPTH 450mm)
- PROPOSED PERFORATED PIPE

GENERAL NOTES

1. THIS DRAWING SHOULD NOT BE PRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF LINK ENGINEERING.
2. DO NOT SCALE FROM THIS DRAWING. UNITS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THE CONTRACTOR IS TO CHECK ALL INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SEEK CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND.
4. ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME SPECIFIC DRAWINGS & SPECIFICATIONS.
6. BACKGROUND PLAN BASED ON TOPOGRAPHIC SURVEY DATA CREATED BY OTHERS AND SUPPLIED FOR THE PURPOSE OF CARRYING OUR ENGINEERING WORKS. WE CANNOT BE HELD RESPONSIBLE FOR THE CONTENT, COMPLETENESS AND ACCURACY PROVIDED TO US BY OTHERS. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS AND LEVELS ON SITE.
7. ALL DRAINAGE WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATION'S PART H AND / OR THE LATEST SEWERAGE SECTOR GUIDANCE APPENDIX C DESIGN AND CONSTRUCTION GUIDANCE.
8. ALL PROPOSED CONNECTIONS TO EXISTING PUBLIC SEWERS WILL BE SUBJECT TO A S106 APPLICATION. THE APPLICATION IS REQUIRED TO BE SUBMITTED BY THE APPOINTED CONTRACTOR.
9. PRIOR TO CONSTRUCTION THE EXISTING OUTFALL LOCATIONS ARE TO BE CONFIRMED AND VERIFIED.
10. THE RUNOFF RATES HAVE BEEN CALCULATED IN ACCORDANCE WITH ENVIRONMENT AGENCY'S (EA) RAINFALL RUNOFF MANAGEMENT FOR DEVELOPMENTS REPORT - SC030219.
11. THE CLIMATE CHANGE ALLOWANCES FOR THE 3.3% AND 1% AEP ARE IN ACCORDANCE WITH EA'S GUIDANCE "FLOOD RISK ASSESSMENTS: CLIMATE CHANGE ALLOWANCES".
12. THE ATTENUATION STORAGE HAS BEEN DESIGNED TO ACCOMMODATE UP TO AND INCLUDING THE 1 IN 100 YEAR RETURN PERIOD INCLUDING CLIMATE CHANGE ALLOWANCE AS PER THE EA GUIDANCE.
13. ALL INVERT & COVER LEVELS ARE SUBJECT TO FURTHER DETAIL DESIGN AS THE SITE LAYOUT DEVELOPS.
14. THIS INFORMATION IS PROVIDED TO SUPPORT A FULL PLANNING APPLICATION.
15. A SITE SPECIFIC FLOOD RISK STATEMENT HAS BEEN PROVIDED TO SUPPORT THE PLANNING APPLICATION. THE USE OF SOURCE CONTROL SUDS IS ENCOURGED WITHIN THIS DOCUMENT AND IT IS EXPECTED THAT MORE DETAIL OF THESE SUDS MEASURES WILL BE PROVIDED AT A LATER DATE. THESE SUDS MEASURES ARE LIKELY TO INCLUDE THE FOLLOWING, NOTE OTHER SYSTEMS COULD BE CONSIDERED ALSO;
    - RAIN GARDENS
    - RAIN WATER HARVESTING
    - PERMEABLE PAVING
17. ALL EXISTING DRAINAGE OUTFALLS ARE TO BE PROVED BY APPROPRIATE SURVEY AND CCTV SYSTEM AS REQUIRED TO ESTABLISH CONNECTION AND CONDITION. ANY REQUIRED REMEDIAL WORKS WITHIN THE SITE AREA SHALL BE UNDERTAKEN AS PART OF THE WORKS.
18. APPROPRIATE DISCHARGE CONSENTS ARE TO BE PROVIDED FOR ALL CONNECTIONS TO THE EXISTING DRAINAGE SYSTEMS.
19. CONSIDERATION WITHIN THE DESIGN IS TO BE GIVEN TO ACCESS FOR MAINTENANCE OF SUDS FEATURES INCLUDING LAY-BYS AND ACCESS TRACK TO PONDS AND CONTROL DEVICES.



EXISTING CATCHMENT PLAN
1:500

Rev.	Amendments	Date	By
P05	DRAWING NOTES REVISED	06.10.26	JAH
P04	UPDATED FOR REVISED LAYOUT	01.10.26	JAH
P03	UPDATED FOR REVISED LAYOUT	02.09.26	MM
P02	UPDATED FOR REVISED LAYOUT	18.08.26	JAH
P01	UPDATED TO DETAILED DESIGN	27.07.26	MM
P0	INITIAL DRAFT ISSUE.	24.07.26	TA

Revisions

Client
CHAPTER RE

LINK ENGINEERING
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Project
LE26066
VASA CLUB

Drawing
DRAINAGE STRATEGY

Scale @ A1	Drawn	Checked	Rev
1:250	MM	TA	P05

Status: PLANNING (S5)
Originator: VCB-LINK-XX-XX-DR-C-0500

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	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)	17.000	Minimum Backdrop Height (m)	9.999
Ratio-R	0.400	Preferred Cover Depth (m)	0.650
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.053	5.00	78.490	450	386031.370	403374.997	0.875	77.615
2	0.006	5.00	78.490	450	386051.766	403366.080	1.153	77.337
3	0.072	5.00	78.490	600	386045.613	403350.241	1.362	77.128
4	0.085	5.00	78.490	600	386077.730	403336.879	1.594	76.896
5	0.021	5.00	78.490	600	386073.799	403327.477	1.662	76.828
6			78.600	1500	386076.559	403324.337	1.800	76.800
7			78.850	450	386074.736	403322.015	2.100	76.750

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	1	2	22.260	0.600	77.615	77.337	0.278	80.1	225	5.25	50.0
1.001	2	3	16.992	0.600	77.337	77.203	0.134	127.0	225	5.50	50.0
1.002	3	4	34.786	0.600	77.128	76.896	0.232	150.0	300	5.95	50.0
1.003	4	5	10.191	0.600	76.896	76.828	0.068	150.0	300	6.08	50.0
1.004	5	6	4.181	0.600	76.828	76.800	0.028	150.0	300	6.14	50.0
1.005	6	7	2.952	0.600	76.800	76.750	0.050	59.0	225	6.17	50.0

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	1.462	58.1	9.7	0.650	0.928	0.053	0.0	62	1.091
1.001	1.159	46.1	10.7	0.928	1.062	0.059	0.0	73	0.946
1.002	1.281	90.6	23.7	1.062	1.294	0.131	0.0	105	1.085
1.003	1.281	90.6	39.0	1.294	1.362	0.216	0.0	137	1.235
1.004	1.281	90.6	42.9	1.362	1.500	0.237	0.0	145	1.263
1.005	1.706	67.8	10.1	1.575	1.875	0.237	0.0	58	1.232

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	17.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	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	35	0	0
100	40	0	0

Node 6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	76.800	Product Number	CTL-SHE-0143-1010-1200-1010
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	10.1	Min Node Diameter (mm)	1500

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	76.823
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	88

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	82.5	0.0	1.000	82.5	0.0	1.001	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	77.671	0.056	8.1	0.0089	0.0000	OK
15 minute summer	2	10	77.406	0.069	8.9	0.0110	0.0000	OK
15 minute summer	3	10	77.221	0.093	19.5	0.0263	0.0000	OK
15 minute summer	4	11	77.034	0.138	32.1	0.0392	0.0000	OK
60 minute summer	5	41	76.998	0.170	23.8	0.0482	0.0000	OK
60 minute summer	6	41	76.998	0.198	23.5	14.0974	0.0000	OK
60 minute summer	7	41	76.802	0.052	7.9	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 summer	1	1.000	2	8.0	0.894	0.138	0.2006	
15 minute summer	2	1.001	3	8.8	0.881	0.191	0.1699	
15 minute summer	3	1.002	4	19.3	0.776	0.213	0.8751	
15 minute summer	4	1.003	5	31.6	1.012	0.349	0.3279	
60 minute summer	5	1.004	6	23.5	0.795	0.259	0.1894	
60 minute summer	6	1.005	7	7.9	1.044	0.117	0.0224	25.2

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Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	77.726	0.111	26.7	0.0176	0.0000	OK
30 minute summer	2	19	77.530	0.193	26.5	0.0306	0.0000	OK
60 minute summer	3	52	77.500	0.372	44.2	0.1053	0.0000	SURCHARGED
60 minute summer	4	52	77.499	0.603	66.5	0.1707	0.0000	SURCHARGED
60 minute summer	5	53	77.498	0.670	72.1	0.1897	0.0000	SURCHARGED
60 minute summer	6	53	77.497	0.697	71.3	54.1348	0.0000	SURCHARGED
180 minute winter	7	184	76.808	0.058	10.1	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 summer	1	1.000	2	26.5	1.168	0.456	0.5781	
30 minute summer	2	1.001	3	25.3	1.100	0.549	0.6453	
60 minute summer	3	1.002	4	39.5	0.760	0.436	2.4496	
60 minute summer	4	1.003	5	65.4	0.928	0.722	0.7176	
60 minute summer	5	1.004	6	71.3	1.054	0.787	0.2944	
60 minute summer	6	1.005	7	10.1	1.109	0.148	0.0268	83.0

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	78.097	0.482	35.7	0.0767	0.0000	SURCHARGED
120 minute summer	2	94	78.082	0.745	17.5	0.1185	0.0000	SURCHARGED
120 minute summer	3	94	78.082	0.954	37.4	0.2699	0.0000	SURCHARGED
120 minute summer	4	94	78.081	1.185	61.5	0.3354	0.0000	SURCHARGED
120 minute summer	5	94	78.080	1.252	66.9	0.3543	0.0000	SURCHARGED
120 minute summer	6	94	78.079	1.279	66.1	80.7135	0.0000	SURCHARGED
120 minute summer	7	94	76.809	0.059	10.1	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 summer	1	1.000	2	34.2	1.202	0.588	0.8853	
120 minute summer	2	1.001	3	16.4	0.977	0.356	0.6758	
120 minute summer	3	1.002	4	36.6	0.617	0.404	2.4496	
120 minute summer	4	1.003	5	60.7	0.862	0.670	0.7176	
120 minute summer	5	1.004	6	66.1	0.939	0.730	0.2944	
120 minute summer	6	1.005	7	10.1	1.111	0.150	0.0270	137.0

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