Project Title

Flood Risk Assessment
& Outline Drainage Strategy

At

Bowersgate School
Vision House
100 Floats Road
Wythenshawe
Manchester
M23 9PL

For

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Executive Summary

Item	Brief Description
Development Proposed	Application for the construction of a new MUGA to the rear of the site to replace a small parking and landscaped area at Bowersgate School, Vision House, 100 Floats Road, Wythenshawe, Manchester, M23 9PL.
Flood Risk Review	Tidal: Low Risk Flood Zone 1 Fluvial: Low Risk Flood Zone 1 Surface Water: Low / Medium Risk Sewer & Drainage: Low Risk Groundwater: Low Risk Reservoir: Low Risk
Geology	A review of the BGS online mapping has indicated the MUGA area to encompass no Superficial Deposits, underlain by bedrock comprising the Bollin Mudstone Member - Mudstone.
Infiltration Rate	Based on the assessment of the BGS data set and the limited superficial deposit over mudstone, infiltration as a means of draining the site has been discounted.
Nearest Watercourses	The nearest named watercourse is located beneath the western end of the main entrance road and is known as Mill Brook, flowing in a north westerly direction.
Nearest Adopted Sewers and onsite private drainage	The United Utilities (UU) sewer records have been reviewed and indicate there to be a 450mm diameter combined water sewer flowing south within Floats Road. A CCTV survey of the existing private drainage network serving the building and external areas has indicated that the surface water flows in a westerly direction and outfalls unrestricted to Mill Brook with the foul drainage outfalling to the combined sewer.
Existing Discharge Rate	For the purpose of this assessment the area of the MUGA is classed as Brownfield with discharge rates defined below based on the modified rational method and an impermeable area of 300m^2: 1yr (30mm/hr) – 2.5l/s 30yr (65mm/hr) – 5.4/s 100yr (95mm/hr) – 7.9l/s
Surface Water Drainage Outfall and SuDS Hierarchal Approach	The proposed MUGA will be constructed in Permeable surfacing. Due to the underlying Mudstone, a land drain will collect the residual runoff passing into the stone subbase and outfall to the existing network at a peak rate not exceeding 2l/s.
Maintenance Responsibility	New School.
Foul Drainage Strategy	No new foul drainage is proposed.

1.0 Introduction

1.1 PG Consulting (PGC) has been appointed by the Witherslack Group to prepare this Flood Risk Assessment & Outline Drainage Strategy to support a planning application for the construction of a new MUGA to the rear of the site to replace a small parking and landscaped area at Bowersgate School, Vision House, 100 Floats Road, Wythenshawe, Manchester, M23 9PL.

1.2 The indicative layout for this application can be found in Appendix A.

1.3 The assessment has been undertaken in line with Section 14 of the National Planning Policy Framework (NPPF) plus the accompanying Planning Policy Guidance (PPG) on Flood Risk.

1.4 This Flood Risk Assessment (FRA) has been commissioned by Witherslack Group and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A.

1.5 The report has been commissioned to identify any flood-related issues associated with the proposed developments and any likely constraints that could be imposed plus consider the outline drainage strategy for it. The following issues have been suggested by the Environment Agency (EA) & Manchester City Council and subsequently addressed within this report.

- Identify available data relating to flood risk at the site.
- Determine whether the site is at risk from flooding from all sources, including but not exhaustive, from breach or overtopping of any existing flood defences, watercourse flooding, surface water flooding and/or ground water flooding.
- If at risk from any source, devise appropriate measures to prevent flood risk whilst not compromising the flood risk elsewhere.
- Consider the flood risk from all other sources.
- Determine the current surface water drainage regime and assess impacts as a result of the proposed development.
- Discuss if required Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk. Determine any potential increase in surface water runoff as a result of the proposed development.
- Devise an appropriate outline foul and surface water drainage strategy to deal with any increase in surface water runoff and include for climate change.
- Consider the recommendations of the Manchester City Council Strategic Flood Risk Assessment (SFRA).
- Prepare the Flood Risk Assessment and Surface Water Drainage Strategy report.
- Assess mitigation measures & off-site impacts and define any residual risks.

2.0 Development Description and Location

2.1 Site Location

The site is referenced in Table 1, and a site location map is provided in Appendix A.

Item	Brief Description
Site name	Bowersgate School, Wythenshawe.
Site address and location	Bowersgate School, Vision House, 100 Floats Road, Wythenshawe, Manchester, M23 9PL.
Council Area	Manchester City Council
Approximate Grid Reference	OS: 380324, 388741
General Locality	The development is located some 12km to the southwest of Manchester City Centre.

Table 1: Site Referencing Information

2.2 Existing site Description

2.2.1 The wider site is irregular in planned shape and encompasses a new school building, recently replacing a former office building, with a considerable area of tarmac parking to the north and also a large area of grass land located to the east of the building. There are shrubs and trees located on all borders of the site.

2.2.2 The site sits within a largely industrial and commercial area of Wythenshawe.

2.2.3 The closest residential areas are 250m to the west and 200m to the east of the development site. Access is from and will continue to be from Float Roads to the southwest.

2.2.4 Figure 1 identifies the overall site location details. Further details of the existing layout can be seen on the Red Line Plans in Appendix A

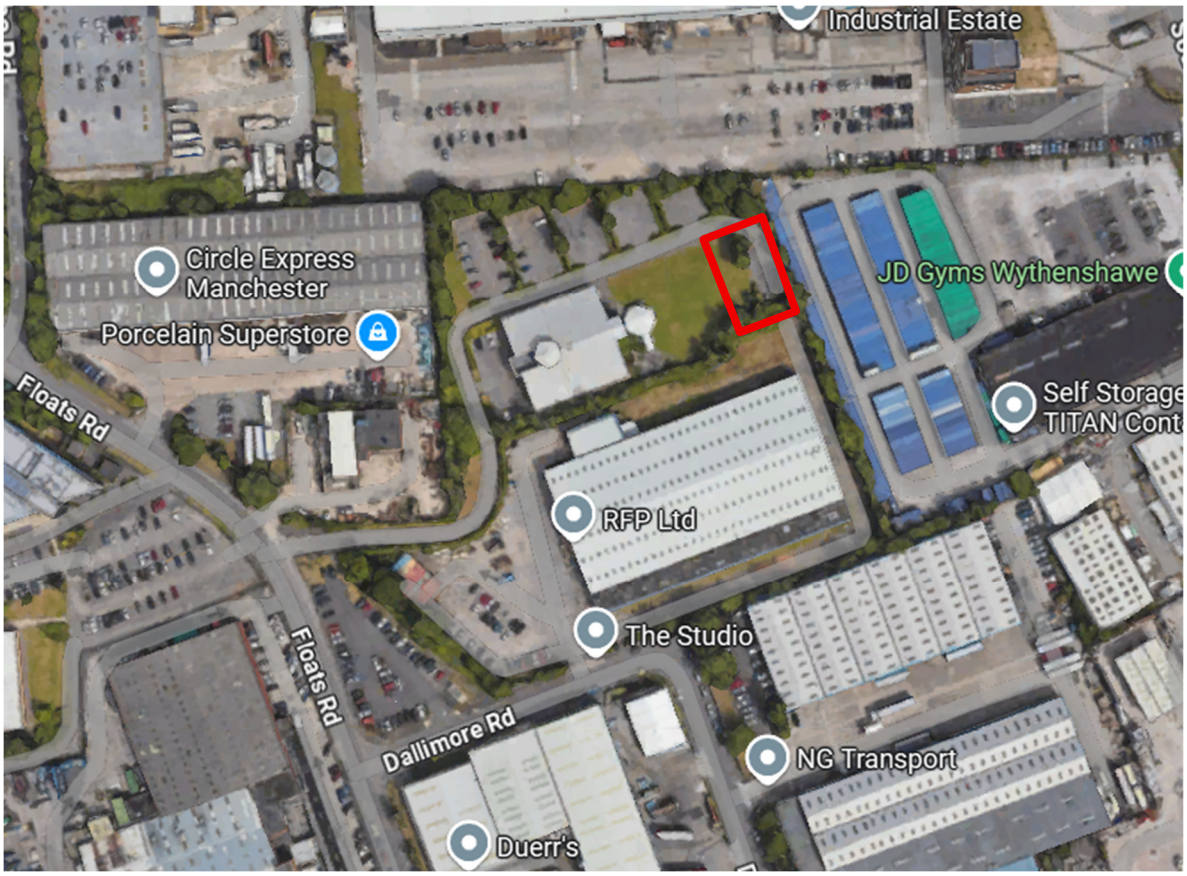


Figure 1: Location Plan

2.3 Topographical Survey

2.3.1 A detailed topographical survey has been completed . This indicates the area of the MUGA to be relatively flat from 32.80m AOD and 33.10m AOD.

3.0 Planning Policy and Consultation

3.1 National Planning Policy Framework

3.1.1 The indicative flood maps provided by the Environment Agency locate the development area within low-risk Flood Zone 1 classification, i.e., land assessed as having less than a 1 in 1000 annual probability of fluvial flooding (<0.1%) in any year.

3.1.2 As a requirement of the new NPPF (2024), Section 14, the proposed development must satisfy the requirements of the Sequential Test and where applicable the Exception Test.

Sequential Test:

3.1.3 Under the NPPF (2024) and accompanying Planning Policy Guidance (PPG), Flood Zone 1 is defined as Low probability flood risk. The proposal is for an educational development, which in line with Table 1 is classified as 'More Vulnerable'.

3.1.4 Placing both these criteria into Table 2 (Flood Risk Vulnerability and Flood Zone Incompatibility), More Vulnerable development in Flood Zone 1 determines that the 'Development is Appropriate' and that the Exception Test is not applicable to this development proposal.

3.2 Strategic Flood Risk Assessment (SFRA)

3.2.1 SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or local planning authorities should prepare SFRA's in consultation with the EA.

3.2.2 Manchester City Council, in consultation with the Greater Manchester Combined Authority, produced the Greater Manchester Level 2 Strategic Flood Risk Assessment (2020) to demonstrate and define its understanding and role in managing flood risk. A fundamental aim of the strategy is that the Council embraces and supports its role as Lead Local Flood Authority, and this means taking the lead in helping with infrastructure development and re-development and working with other bodies in dealing with flood risk. The Council wants to encourage and wherever possible enforce current thinking and guidance and be able to provide improvements through working better together. The Strategy is aimed at providing an overview and assessment of local flood risk, setting out objectives and measures for how the Council will manage and reduce local flood risk. This Strategy builds on existing and developing approaches to flood risk management and promotes the use of a wide range of measures to manage flood risk. Risk should be managed in a co-ordinated way within catchments and balance the needs of communities, the economy and the environment.

3.2.2. A summary of the main elements from the SFRA associated with the district is detailed below. The full report can be obtained from the Manchester City Council website.

- The most significant sources of flood risk are fluvial and surface water.
- To better understand local flood risk and make best use of available information in order to better manage flood risk to people, businesses, property, infrastructure and the natural environment.
- To reduce the potential impact and costs of flooding in the Borough.
- To ensure resilience of local water bodies and drainage assets.
- To ensure appropriate development in areas of flood risk.
- To develop a collaborative partnership approach to flood risk management and cooperate with other Risk Management Authorities (RMAs) and key stakeholders working across catchments.
- To assist communities in understanding information on flood risk and support themselves.
- To encourage, support and provide flood risk management which seeks to enhance and protect the environment.
- For all sites, development proposals should look at opportunities to incorporate SuDS to reduce the risk of surface water flooding.
- All proposed developments must ensure that foul and surface water are kept separate.

4.0 Definition of Flood Hazard

4.0.1 Flood risk to the proposed development building is considered from all sources of flooding, as defined by the NPPF.

4.1 Sources of information

4.1.1 The following section defines the flood risk receptors and anticipated flood risk. Section 4.7 then summarises the probability of flooding and the likely impacts. Table 2 defines the main sources of information used in the identification of flood risk.

Source of Information	Details
Environment Agency	Various Flood Maps from EA website
United Utilities	Sewer Records
Manchester City Council	SFRA Report & Various Maps

Table 2: Sources of information used in the identification of flood risk

4.2 Flooding from River (Fluvial)

4.2.1 As mentioned in earlier sections, the closest identified watercourse is located along the northwestern boundary.

4.2.2 The National Planning Policy Framework (NPPF) categorises fluvial and tidal flood risk as follows:

- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
- Zone 3a (high probability) - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b The Functional Floodplain - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map).

4.2.3 Figure 2 below locates the site on the Environment Agency's indicative floodplain map. The development site holds a low-risk Flood Zone 1 classification, i.e., land assessed as having less than a 1 in 1000 annual probability of fluvial flooding (<0.1%) in any year. Based on this the risk from fluvial flood water is therefore reduced to acceptable levels and no further assessment is required.

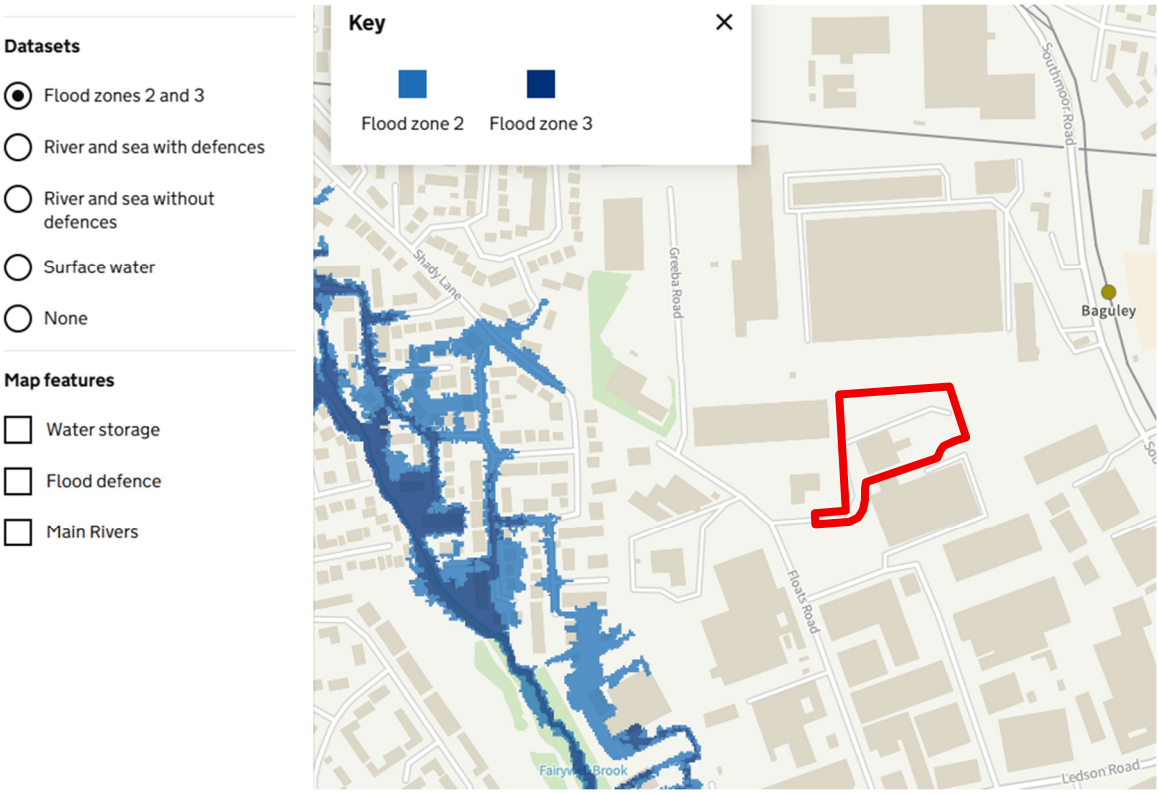


Figure 2 – The EA's Fluvial Flood Map for Planning

4.3 Flooding from Land and Surface Waters (Overland Flow)

4.3.1 The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- High risk means that each year this area has a chance of flooding of greater than 3.3%.
- Medium risk means that each year this area has a chance of flooding between 1% and 3.3%.
- Low risk means that each year this area has a chance of flooding between 0.1% and 1%.
- Very Low risk means that each year this area has a chance of flooding of less than 0.1%.

4.3.2 The general area within and surrounding the development site falls predominantly in a northwesterly direction to mimic the falls of the local watercourses. There is a moderate fall away from the retained building in all other directions.

4.3.3 The Environment Agency's surface water flood maps indicate the area of the MUGA and sprinkler tanks to be at relatively low risk of surface water flooding for the 1 in 30 year (Figure 3) adjacent the building but more of a greater risk of flooding for the 1 in 100 year (figure 4). This is due to a low point in the existing topography where any surplus rainwater water has the potential to be retained on the surface.

4.3.4 It is noted these maps do not consider the existing drainage infrastructure serving these areas that will collect this rainwater and direct into the underlying drainage network, such that in reality the extent of any such surface water flooding would be significantly reduced.

4.3.5 There are no identified existing surface water flow routes through the site that need to be maintained.

4.3.6 As both areas will retain existing levels and for outdoor play / commercial use, the risk is considered low.

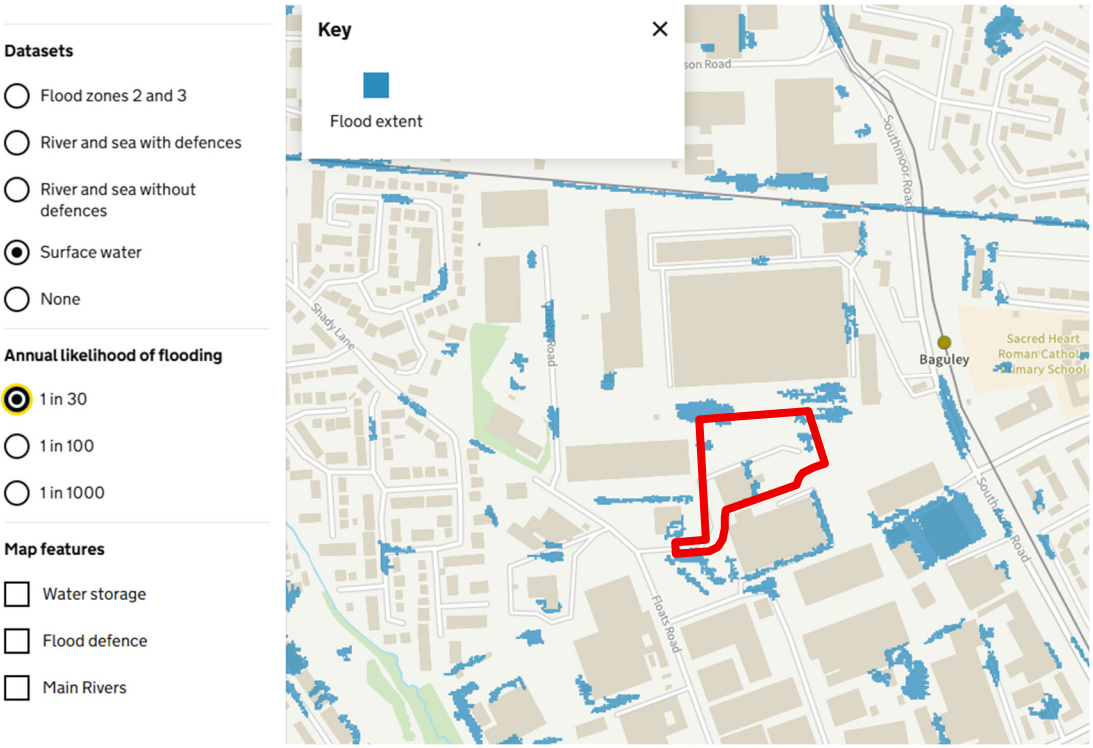


Figure 3 – Extract EA Flood Risk Mapping - Flood Risk from Surface Water 1 in 30 year

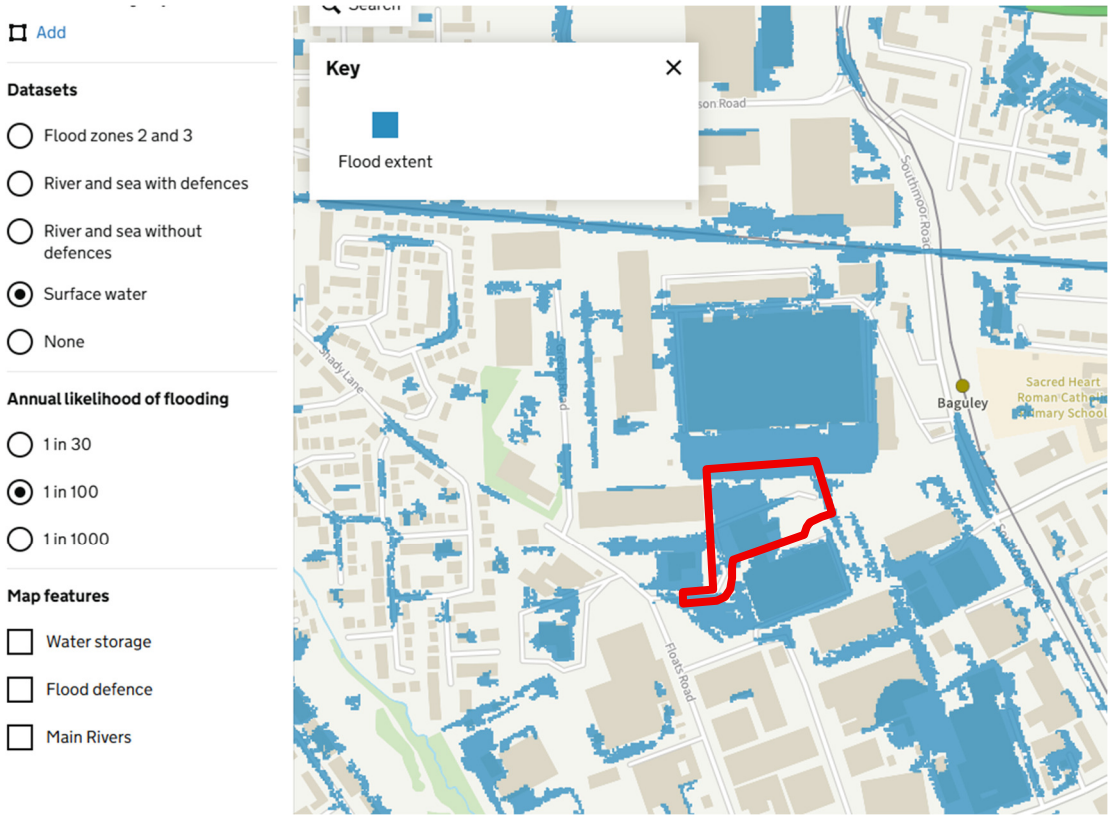


Figure 4 – Extract EA Flood Risk Mapping - Flood Risk from Surface Water 1 in 100 year

4.4 Flooding from Sewers and Private Drainage

4.4.1 The United Utilities (UU) sewer records have been reviewed and indicate there to be a 450mm diameter combined water sewer flowing south within Floats Road.

4.4.2 A CCTV survey of the existing private drainage network serving the building and external areas has indicated that the surface water flows in a westerly direction and outfalls unrestricted to Mill Brook.

4.4.3 The drainage networks serving the existing building ensure that the development footprint is protected from the impact of flooding. Thus, flood risk to the site from sewers is diminished to acceptable levels.

4.5 Flooding from Groundwater

4.5.2 Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or maybe localised sands or river gravels in valley bottoms underlain by less permeable rocks.

4.5.3 No site investigation has been carried out at the site. British Geological Survey mapping confirmed that the bedrock strata for the whole site is designated as a Principal Aquifer.

4.5.4 The Strategic Flood Risk Assessment (SFRA) maps for the area indicate that the site is not at risk of groundwater flooding.

4.5.5 Based on these findings, plus the fact the building is elevated above all surrounding ground levels and adjacent watercourse, the risk of groundwater flooding is considered to be Low.

4.6 Flooding from Other Water Features

4.6.2 There are no other artificial water bodies in close proximity.

4.7 Summary

Below is a table summary of the flood risks associated with the development site.

Source	Probability of Flood Risk	Impacts	Remarks
Tidal	Low	Low	The development building is not influenced by Tidal flood risk.
Fluvial (Watercourse)	Low	Low	The development buildings and surrounding landscaped areas are located within a low flood risk zone 1 designation.
Surface (Overland Flood Flow)	Low-Medium	Low	The site areas are located within a Low-Medium Risk surface water flood zone. Existing drainage networks and proposed use will remove this risk.
Sewers & New Drainage	Low	Low	Existing drainage networks currently discharge the impermeable areas to adjacent watercourse. No changes to the surface water runoff strategy.
Groundwater	Low	Low	No indication through SFRA or local borehole records that site is at risk of groundwater flooding.
Artificial Sources	Low	Low	No artificial sources in close proximity.

Table 3 – Flood Risk Summary

5.0 Outline Drainage Strategy

5.1 Existing Drainage

5.1.1 As per Section 4.4, the UU sewer records have been reviewed and show that there are no sewers passing within the development site. A combined water sewer and watercourse are located outside the development boundary.

5.1.2 A CCTV survey of the existing private drainage network serving the building and external areas has indicated that the surface water flows in a westerly direction and outfalls unrestricted to Mill Brook with the foul drainage outfalling to the combined sewer.

5.2 Existing Runoff

5.2.1 The area of the proposed MUGA can be classed as Brownfield with the hard paved areas draining unrestricted to the surface water drainage. Table 4 below defines the existing Brownfield runoff rates based on the modified rational method and respective rainfall intensities, with an impermeable area from the roof and driveway of 0.030ha.

Impermeable Areas (ha)	1 yr (30mm/hr)	30yr (65mm/hr)	100yr (95mm/hr)
0.030	2.5 l/s	5.4 l/s	7.9 l/s

Table 4: Existing Brownfield Runoff Rates

5.3 Hydrological Assessment

5.3.1 The nearest named watercourse is located beneath the western end of the main entrance road and is known as Mill Brook, flowing in a north westerly direction.

5.4 Geology

5.4.1 No formal site investigation has been undertaken at this time. A review of the BGS online mapping has indicated the MUGA area to encompass no Superficial Deposits, underlain by bedrock comprising the Bollin Mudstone Member - Mudstone.

5.4.2 In light of these findings, it is considered that infiltration would not be suitable.

5.5 Sustainable Drainage Systems (SuDS) Assessment

5.5.1 Based on the SuDS assessment, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Assessment has determined that the underlying ground would not be suitable for infiltration.
Connection to Watercourse	Yes	Reuse existing connection to watercourse at a peak rate not exceeding 2l/s. via the retained private drainage network identified in close proximity.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity
Connection to Combined Sewer	No	Higher options available.

Table 5: SuDS Hierarchal Approach

5.6 Surface Water Drainage Strategy

5.6.1 The general principle of the surface water drainage strategy is for the new MUGA to permeate through to the underlying stone. Any residual water will then be collected by a new land drain that will outfall to the existing surface water network at a controlled rate not exceeding 2l/s. Attenuation for the extreme events will be retained in the no fines stone subbase.

5.6.2 The proposed drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance, i.e. up to the 30-year storm return period criterion and tested for the 1 in 100-year return period including a 45% increase to account for climate change to confirm that there is no flood risk to the units.

5.6.3 A small hydraulic model has been simulated in the Causeway Flow Design Software for the new permeable surfacing and a peak rate of 2l/s.

5.6.4 Drawing PGC1510-DR-C-001 in Appendix C indicates the Drainage Strategy based on the Architects masterplan intent, with the outline hydraulic calculations in Appendix D

5.7 Foul Water Drainage Strategy

5.7.1 No new foul drainage is proposed.

6.0 Management Measures, Off Site Impacts and Residual Risk

6.1 Flood Risk Management Measures

6.1.1 The assessment has determined that the flood risk from all sources has been considered and found not to be a flood risk generator to the development.

6.1.2 There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the on-site drainage facilities.

6.1.3 The school will be responsible for site cleanliness and drain cleansing to ensure that the surface water drainage system will always operate at its maximum efficiency.

6.2 Off Site Impacts

6.2.1 The development of the site does not impair the hydraulic continuity of any watercourse and the current 'local hydraulics' of distributing watercourses / outfalls.

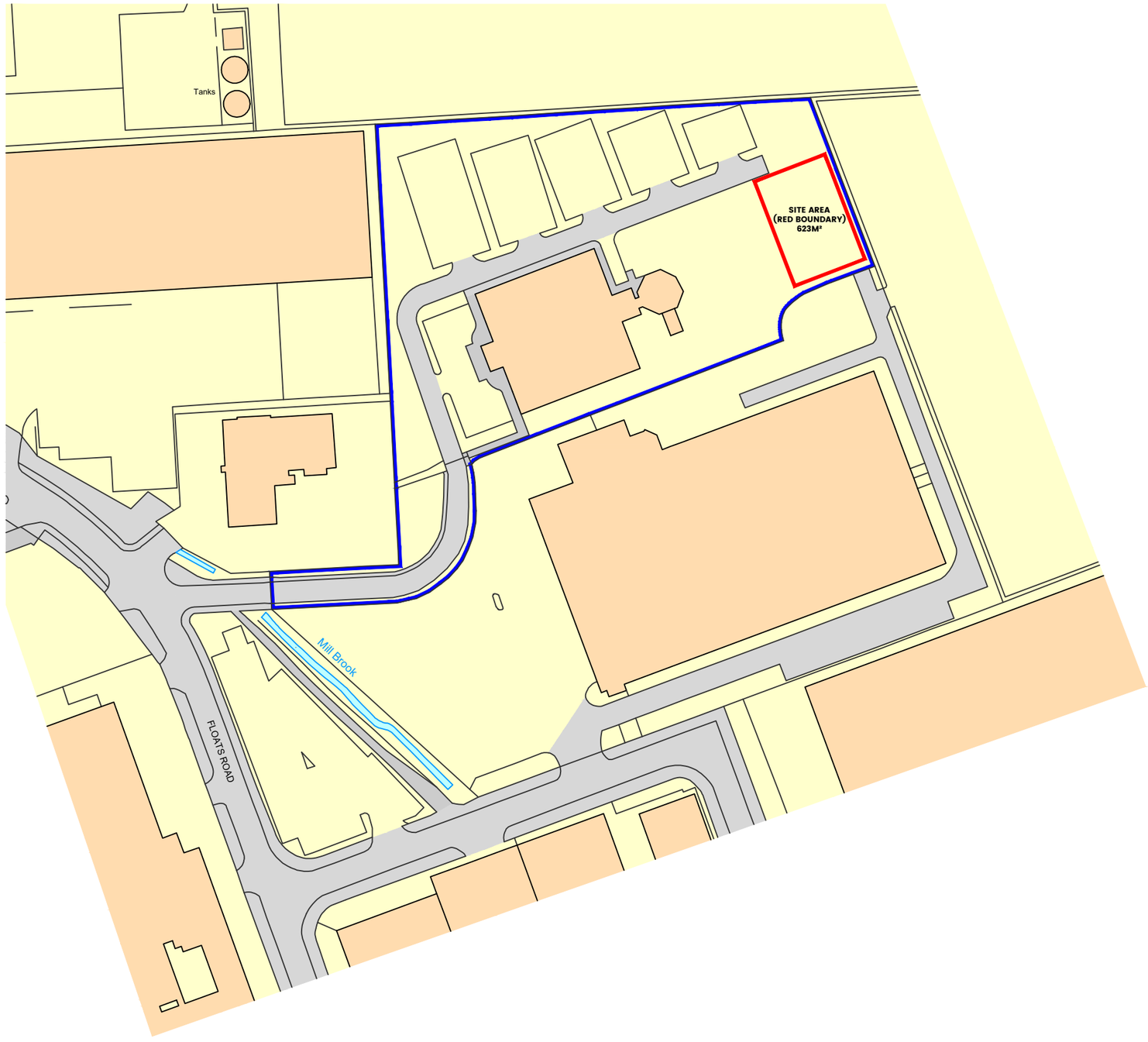
6.2.2 Surface water runoff will be reduced from the pre-development regime.

6.2.3 As there is no flood displacement or increased rate of runoff as part of this proposal into the adjacent watercourse, the proposed development will therefore not increase flood risk onto its locality.

6.3 Residual Risk

6.3.1 With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

Appendix A – Architects Drawing



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0 10m 25m 50m 100m 150m

SCALE 1:1250

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Rev	Description	By	Date

Project Location:

VISION HOUSE
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WYTHENSHAWE
MANCHESTER
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Drawing Title:

SITE LOCATION PLAN

Drawing Status: PLANNING PERMISSION

Scale:	Size:	Date:	Drawn By:	Chkd By:
1:1250	A3	07/26	AW	CG

Job No:	Dwg No:	Revision:
AG25/0475	17	.

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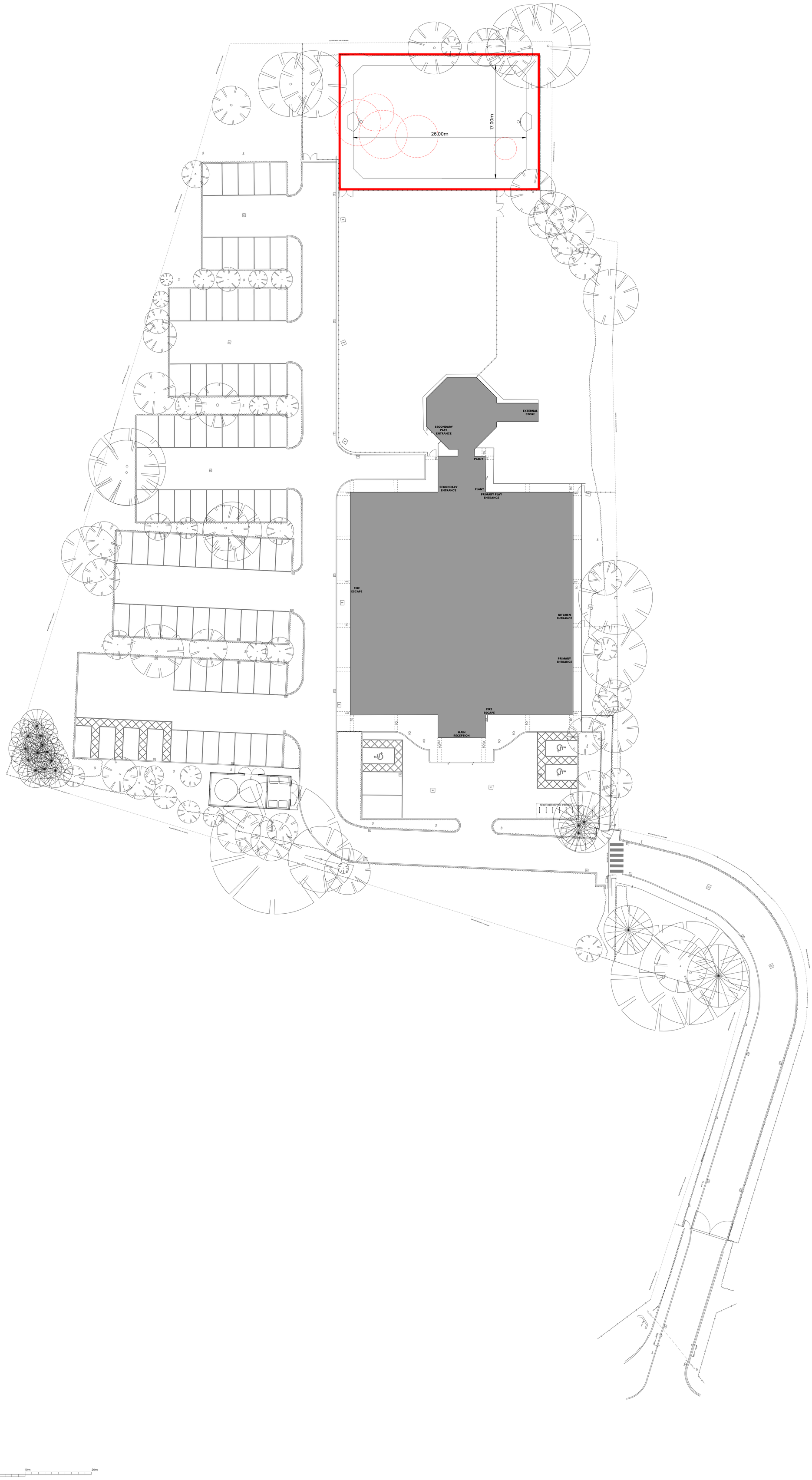
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LEGEND

- EXISTING BUILDING
- ELEMENTS REMOVED



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Rev	Description	By	Date
A	BOUNDARIES UPDATED FENCE TYPES UPDATED	AW	26.03.26
B	FENCE DETAILS REMOVED	AW	30.03.26
C	MUGA OMMITTED	AW	14.05.26
D	TREES UPDATED	AW	15.05.26
E	PLANTING UPDATED BIRD BOX ADDED	AW	28.05.26
F	MUGA REINSTATED	AW	23.07.26

Project Location:

BOWERSGATE SCHOOL
FLOATS ROAD
WYTHENSHAWE
MANCHESTER
M23 9PL

Drawing Title:

PROPOSED SITE PLAN

Drawing Status:	Scale:	Size:	Date:	Drawn By:	Chkd By:
PLANNING PERMISSION	1:200	A0	02/26	AW	CG

Job No:	Dwg No:	Revision:
AG25/0475	36	F

Appendix B – Topographical Survey

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GRID

To local grid based on osm15crsgrid3

control point

spot level
+ gl 11.1

All linework described by layering system or nearby text

wall (see text for height / width / type)

fence (see text nearby for height / type)

gate

hedge scaled to width

overhead line

deciduous tree

defined by trunk & one point on canopy

(girth size and position +/- 50mm)

conifer tree

defined by trunk & one point on canopy

(girth size and position +/- 50mm)

GENERAL ABBREVIATIONS

ac box - air conditioning box
av - air valve
bt - British Telecom
bt - British Telecom
conc - concrete
conc bol - concrete bollard
conc wall - concrete wall
ctv - cable TV
d/s - down shaft
ds - down spout
dw&g - down spout with gulley
ew - electricity meter
edg cut grass - edge cut grass
el - electricity
el sub st. - elec. substation
face conc. - face of concrete
face clad. - face of cladding
face brick - face of brickwork
f hyd - fire hydrant
gcv - gcv rope/relay
lp - lamp post
rod. eye - rodding eye
ret wall - retaining wall
rsj - steel rsj
swill - swill bin
tel - tel. sub station/cable text
tcd 20cm - surface drain
w bay - shop bay
wv - water valve
tree - trunks
ts. - traffic signal
utility - utility (unknown)

LEVEL ABBREVIATIONS

ch=50.11 - cover level
dpc=50.11 - dpc level
eav=50.11 eaves level
gu=50.11 - gulley cover level
gu=50.11 - gulley top level
gutter=50.11 - gutter level
ridge=50.11 - ridge
t=50.11 - crown level
oh=50.11 - overhead level
o/s=50.11 - overflow
ridge=50.11 - ridge level
sill=50.11 - sill level
spot=50.11 - spot
top conc=50.11 - top of concrete
tp=50.11 dia 10 - top of pipe
top wall=50.11 - top of wall
twall=50.11 - top of wall
wat=50.11 - water level

FENCE ABBREVIATIONS

b/w - barbed wire
c/l - chain link
c/b - close boarded
cl - corrugated iron
c/p - concrete panel
c/b/a - creedt barrier
h/r - hand rail
m/w - metal
par - palisade
panel - panel
p/w - palisade/fence
pick - pikkett
p/r - post & rail
r/w - railway
sec. - security fence
wood - wooden fence

Anderton Gables
RICS
PRESTON | 01772 562900
Thomas Carter House, 1&2 Cross Street, Preston, Lancashire, PR1 3LT
MANCHESTER | 0161 696 7119
Canada House, Suite G, Chepstow Street, Manchester, M1 5FW
LIVERPOOL | 0151 832 3850
Avenue HQ, Floor 2, 4 St. Pauls Square, Liverpool, L3 9SJ
W andertongables.co.uk
E info@andertongables.co.uk

Rev.	Description	By	Date

Project Location

VISION HOUSE
FLOATS ROAD
WYTHENSHAWE
MANCHESTER
M23 9PL

Drawing Title

TOPOGRAPHICAL SURVEY
SHEET 1 of 3

Drawing Status SURVEY

Scale	Size	Drwn	Chkd	Chkd By
1:100	A0	12/25	CG	AW

Job No AG25/0475 | Dwg No 03 | Revision -

SCALE 1:100

0 1m 2m 5m 10m

assumed fence line - no access

N W E S

NOTES:

This drawing is Copyright of Anderton Gables

No scaling, dimensions, areas, etc. other than those figured are to be taken from this drawing. All dimensions to be checked on site by the contractor and any discrepancies to be reported.

This drawing is for use of the named client and purpose for which it is prepared only and as such should not be used at any other location or for any other purposes

All work must comply with relevant British Standards and Building Regulation requirements

Any drawing errors and/or omissions are to be reported to the Designer

This drawing is to be read in conjunction with any other Designers or other Consultants information

GRID
To local grid based on osgrid10cmgrid3

control point
CP 101.11

spot level
+ 99.11

All linework described by layering system or nearby text

wall (see text for height / width / type)

fence (see text nearby for height / type)

gate

hedge scaled to width
HEDGE

Top of retaining wall/kerb line

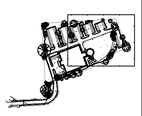
deciduous tree
defined by trunk & one point on canopy
(girth size and position +/- 50mm)

conifer tree
defined by trunk & edge of canopy
(girth size and position +/- 50mm)

GENERAL ABBREVIATIONS
ac box - air conditioning box
av - air valve
bt - British Telecom
bt - British Telecom
conc. - concrete
conc. bollard - concrete bollard
conc. wall - concrete wall
cty - cable TV
dp - down pipe
ds - down spout
dwg - dwarf sign/ post with galley
edg - edge of kerb
edg cut grass - edge cut grass
el - electricity
el sub st. - elec. substation
feat conc. - face of concrete
face clad - face of cladding
face brick - face of brick
f.f.g.l. - fire hydrant
gcv - gas valve/stay
lp - lamp post
nod. eye - nodding eye
ret. wall - retaining wall
rsj - steel rsj
sw/l - soft level
t.b.m. - temp. bulk indicative text
tcd - drain - surface drain
w bay - shop bay
wv - water valve
tree - trunks
ts. - traffic signal
utility - utility (unknown)

LEVEL ABBREVIATIONS
ch=92.11 - cover level
dp=103.11 - dip level
eav=93.11 eaves level
gs=92.11 - gully grate level
gs=92.11 - gullley top level
gutter=93.11 - gutter level
inv=92.11 - invert level
lt=92.11 - crwell level
sh=93.11 - overhead level
ridge=93.11 - ridge level
ridge=93.11 - ridge level
sill=92.11 - sill level
spot=92.11 - spot level
top conc=93.11 - top of concrete
tp=93.11 dia 10 - top of pipe
top of wall=93.11 - top of wall
tw=92.11 - top of wall
wat=92.11 - water level

FENCE ABBREVIATIONS
b/w - barbed wire
c/l - chain link
c/t/s - close boarded
cl - corrugated iron
ornamental - ornamental panel
o/t/w - creosit barrier
h/r - hand rail
p/r - post & rail
par - palisade
panel - panel
pal/pal - palisade
pick - picket
p/r - post & rail
t/w - trellis work
wire - security fence
wood - wooden fence



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Rev	Description	By	Date

Project Location:
VISION HOUSE
FLOATS ROAD
WYTHENSHAWE
MANCHESTER
M23 9PL

Drawing Title:
TOPOGRAPHICAL SURVEY
SHEET 2 of 3

Drawing Status: SURVEY

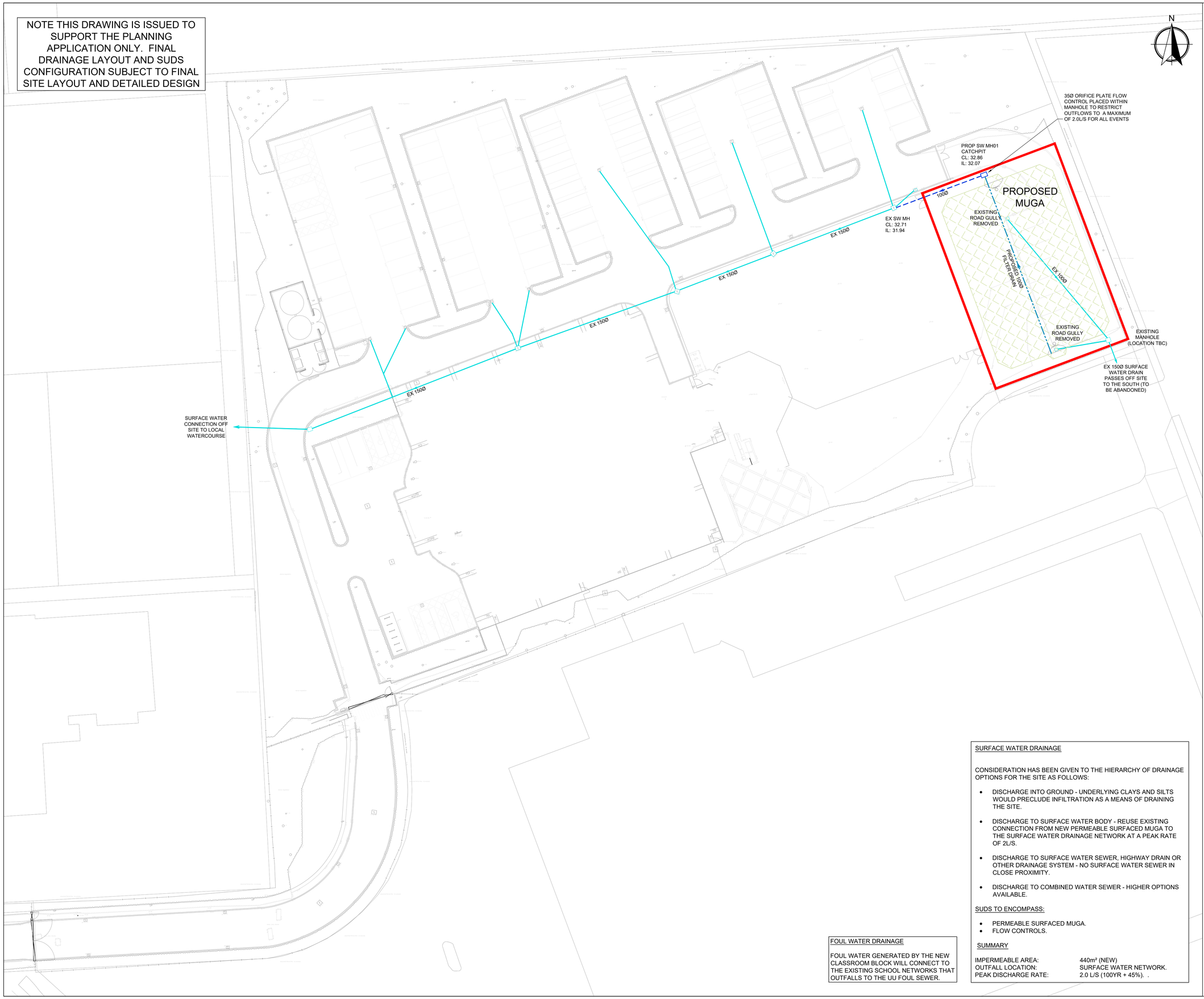
Scale	Size	Dated	Drawn	Chkd By
1:100	A0	12/25	CG	AW

Job No. AG25/0475 Dwg No. 04 Revision .

SCALE 1:100
0 1m 2m 5m 10m

Appendix C – PGC Drawings

NOTE THIS DRAWING IS ISSUED TO SUPPORT THE PLANNING APPLICATION ONLY. FINAL DRAINAGE LAYOUT AND SUDS CONFIGURATION SUBJECT TO FINAL SITE LAYOUT AND DETAILED DESIGN



GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUT FALLS IN RELATION TO EXISTING SEWERS PRIOR TO ANY CONSTRUCTION TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED.
4. DO NOT SCALE FROM THIS DRAWN, WORK TO DIMENSIONS OR COORDINATES PROVIDED. ALL LEVELS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.

KEY

- EXISTING SURFACE WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED LAND DRAINAGE BENEATH PERMEABLE SURFACING
- PROPOSED PERMEABLE SURFACING
- PROPOSED RED LINE SITE BOUNDARY

FOUL WATER DRAINAGE

FOUL WATER GENERATED BY THE NEW CLASSROOM BLOCK WILL CONNECT TO THE EXISTING SCHOOL NETWORKS THAT OUTFALLS TO THE UU FOUL SEWER.

SURFACE WATER DRAINAGE

CONSIDERATION HAS BEEN GIVEN TO THE HIERARCHY OF DRAINAGE OPTIONS FOR THE SITE AS FOLLOWS:

- DISCHARGE INTO GROUND - UNDERLYING CLAYS AND SILTS WOULD PRECLUDE INFILTRATION AS A MEANS OF DRAINING THE SITE.
- DISCHARGE TO SURFACE WATER BODY - REUSE EXISTING CONNECTION FROM NEW PERMEABLE SURFACED MUGA TO THE SURFACE WATER DRAINAGE NETWORK AT A PEAK RATE OF 2L/S.
- DISCHARGE TO SURFACE WATER SEWER, HIGHWAY DRAIN OR OTHER DRAINAGE SYSTEM - NO SURFACE WATER SEWER IN CLOSE PROXIMITY.
- DISCHARGE TO COMBINED WATER SEWER - HIGHER OPTIONS AVAILABLE.

SUDS TO ENCOMPASS:

- PERMEABLE SURFACED MUGA.
- FLOW CONTROLS.

SUMMARY

IMPERMEABLE AREA:	440m² (NEW)
OUTFALL LOCATION:	SURFACE WATER NETWORK.
PEAK DISCHARGE RATE:	2.0 L/S (100YR + 45%). .

REV	DATE	DRAWN	REV'D ENG.	NOTES
P3	05.08.26	PG	PG	RED LINE BOUNDARY AMENDED
P2	31.03.26	PG	PG	RED LINE BOUNDARY AMENDED
P1	06.03.26	PG	PG	PRELIMINARY ISSUE

CLIENT
WITHERSLACK GROUP LTD

PROJECT
BOWERSGATE SCHOOL,
FLOATS ROAD, MANCHESTER

DRAWING TITLE
DRAINAGE STRATEGY PLAN

DRAWING STATUS
INFORMATION

SCALE	DRAWN BY	ENGINEER	SHEET
1:200	PG	PG	A1

DRAWING No	REVISION
PGC1510-DR-C-001	P3

PG Consulting
Civil & Infrastructure Engineers
108 Ack Lane West,
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Appendix D – Outline Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	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	1.000	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

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Depth (m)	Invert Level (m)
SW01	0.044	5.00	32.860	900	600	0.790	32.070
EX MH			32.710	900		0.770	31.940

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	SW01	EX MH	13.000	0.600	32.070	31.940	0.130	100.0	150	5.22	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	1.005	17.8	8.0	0.640	0.620	0.044	0.0	71	0.979

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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	13.000	100.0	150	Circular	32.860	32.070	0.640	32.710	31.940	0.620

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW01	900	600	Manhole	Adoptable	EX MH	900	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
SW01	32.045	76.949	32.860	0.790	900	600				
							0	1.000	32.070	150
EX MH	5.266	70.000	32.710	0.770	900		1	1.000	31.940	150



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)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	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	40	0	0
100	45	0	0

Node SW01 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.600	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.0		
Invert Level (m)	32.070	Diameter (m)	0.035		

Node SW01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00036	Invert Level (m)	32.560	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00036	Time to half empty (mins)	78	Depth (m)	
Safety Factor	2.0	Width (m)	44.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

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Approval Settings

Node Size	✓	Maximum Full Bore Velocity (m/s)	3.000
Node Losses	✓	Proportional Velocity	✓
Link Size	✓	Return Period (years)	
Minimum Diameter (mm)	150	Minimum Proportional Velocity (m/s)	0.750
Link Length	✓	Maximum Proportional Velocity (m/s)	3.000
Maximum Length (m)	100.000	Surcharged Depth	✓
Coordinates	✓	Return Period (years)	
Accuracy (m)	1.000	Maximum Surcharged Depth (m)	0.100
Crossings	✓	Flooding	✓
Cover Depth	✓	Return Period (years)	30
Minimum Cover Depth (m)		Time to Half Empty	x
Maximum Cover Depth (m)	3.000	Discharge Rates	✓
Backdrops	✓	Discharge Volume	✓
Minimum Backdrop Height (m)		100 year 360 minute (m^3)	
Maximum Backdrop Height (m)	1.500	First Flush	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		First Flush Depth (mm)	5

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year +40% CC 180 minute summer	74.617	19.202
1 year 15 minute winter	76.857	30.991	30 year +40% CC 180 minute winter	48.503	19.202
1 year 30 minute summer	71.439	20.215	30 year +40% CC 240 minute summer	58.245	15.393
1 year 30 minute winter	50.133	20.215	30 year +40% CC 240 minute winter	38.697	15.393
1 year 60 minute summer	48.435	12.800	30 year +40% CC 360 minute summer	43.710	11.248
1 year 60 minute winter	32.179	12.800	30 year +40% CC 360 minute winter	28.413	11.248
1 year 120 minute summer	30.053	7.942	30 year +40% CC 480 minute summer	34.053	8.999
1 year 120 minute winter	19.966	7.942	30 year +40% CC 480 minute winter	22.624	8.999
1 year 180 minute summer	23.233	5.979	30 year +40% CC 600 minute summer	27.658	7.565
1 year 180 minute winter	15.102	5.979	30 year +40% CC 600 minute winter	18.898	7.565
1 year 240 minute summer	18.475	4.882	30 year +40% CC 720 minute summer	24.485	6.562
1 year 240 minute winter	12.274	4.882	30 year +40% CC 720 minute winter	16.456	6.562
1 year 360 minute summer	14.169	3.646	30 year +40% CC 960 minute summer	19.901	5.240
1 year 360 minute winter	9.210	3.646	30 year +40% CC 960 minute winter	13.183	5.240
1 year 480 minute summer	11.185	2.956	30 year +40% CC 1440 minute summer	14.225	3.812
1 year 480 minute winter	7.431	2.956	30 year +40% CC 1440 minute winter	9.560	3.812
1 year 600 minute summer	9.182	2.511	100 year +45% CC 15 minute summer	505.670	143.087
1 year 600 minute winter	6.274	2.511	100 year +45% CC 15 minute winter	354.856	143.087
1 year 720 minute summer	8.203	2.199	100 year +45% CC 30 minute summer	332.000	93.944
1 year 720 minute winter	5.513	2.199	100 year +45% CC 30 minute winter	232.982	93.944
1 year 960 minute summer	6.768	1.782	100 year +45% CC 60 minute summer	222.268	58.739
1 year 960 minute winter	4.483	1.782	100 year +45% CC 60 minute winter	147.669	58.739
1 year 1440 minute summer	4.949	1.326	100 year +45% CC 120 minute summer	134.215	35.469
1 year 1440 minute winter	3.326	1.326	100 year +45% CC 120 minute winter	89.169	35.469
30 year +40% CC 15 minute summer	376.189	106.449	100 year +45% CC 180 minute summer	101.219	26.047
30 year +40% CC 15 minute winter	263.992	106.449	100 year +45% CC 180 minute winter	65.795	26.047
30 year +40% CC 30 minute summer	244.900	69.298	100 year +45% CC 240 minute summer	78.690	20.795
30 year +40% CC 30 minute winter	171.860	69.298	100 year +45% CC 240 minute winter	52.280	20.795
30 year +40% CC 60 minute summer	163.225	43.136	100 year +45% CC 360 minute summer	58.701	15.106
30 year +40% CC 60 minute winter	108.443	43.136	100 year +45% CC 360 minute winter	38.157	15.106
30 year +40% CC 120 minute summer	98.613	26.061	100 year +45% CC 480 minute summer	45.550	12.038
30 year +40% CC 120 minute winter	65.516	26.061	100 year +45% CC 480 minute winter	30.262	12.038

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 600 minute summer	36.875	10.086	100 year +45% CC 960 minute summer	26.340	6.936
100 year +45% CC 600 minute winter	25.195	10.086	100 year +45% CC 960 minute winter	17.448	6.936
100 year +45% CC 720 minute summer	32.556	8.725	100 year +45% CC 1440 minute summer	18.700	5.012
100 year +45% CC 720 minute winter	21.879	8.725	100 year +45% CC 1440 minute winter	12.567	5.012

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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
30 minute summer	SW01	24	32.607	0.537	7.0	2.3453	0.0000	FLOOD RISK
30 minute summer	EX MH	24	31.972	0.032	1.8	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)
30 minute summer	SW01	1.000	EX MH	1.8	0.641	0.102	0.0368	4.4
30 minute summer	SW01	Infiltration		0.0				

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Results for 30 year +40% CC 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
60 minute summer	SW01	56	32.699	0.629	17.9	12.7593	0.0000	FLOOD RISK
60 minute summer	EX MH	56	31.974	0.034	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)
60 minute summer	SW01	1.000	EX MH	2.0	0.656	0.111	0.0391	18.8
60 minute summer	SW01	Infiltration		0.0				

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	SW01	61	32.747	0.677	24.4	19.1835	0.0000	FLOOD RISK
60 minute summer	EX MH	61	31.974	0.034	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)
60 minute summer	SW01	1.000	EX MH	2.0	0.663	0.115	0.0402	25.6
60 minute summer	SW01	Infiltration		0.0				

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