Site Specific Flood Risk Assessment

and Drainage Strategy

for

Miles Platting 7.5b

Manchester

M40 7AR

Client Name: Lovell

Our ref: LRD32455

Date: May 2022

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FRA and Drainage Strategy

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1. Introduction

1.1 As part of the planning process it is necessary to prepare a site-specific flood risk assessment and drainage strategy for the development site off Bradford Road, Miles Platting, Manchester.

1.2 The development area is less than 1 hectare and therefore a flood risk assessment is not a requirement of the National Planning Policy Framework (NPPF).

1.3 The proposed development site falls within the Conurbation Core Critical Drainage Area (CDA) which requires flood risk assessments for development sites greater than 0.50 hectare. The total proposed development site area is 0.66 hectares; a site-specific flood risk assessment is required to comply with the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA.

1.4 The site is situated in a zone of low flood risk as defined by the Environment Agency (see Environment Agency Flood Maps in Appendix C).

1.5 The National Planning Policy Framework (NPPF) Paragraph 162 seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. This assessment will demonstrate that all sources of flooding have been considered and that development of the site is appropriate.

1.6 The drainage assessment will seek to demonstrate that consideration has been given to the discharge hierarchy as required in the Technical Guidance to the NPPF Paragraph 080.

2. Development Description and Location

2.1 The proposed development involves the construction of a 28 dwellings, associated infrastructure and new private road.

2.2 The development site is located in Miles Platting, Manchester and is adjacent to Bradford Road.

Grid Reference: SJ 86210 99077
x: 386210 y: 399077
Site area: 6,592m^2 (0.66 ha)

2.3 According to the NPPF Technical Guide, Table 2 the development falls within the 'more vulnerable' risk classification. The 'more vulnerable' classification covers buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels etc.

2.4 The site is in Flood Zone 1 and is therefore suitable for all vulnerability classifications.

2.5 The proposed development is consistent with Local Development Documents. It is in a low flood risk area and therefore satisfies the sequential test as it is in a zone with a low probability of flooding.

2.6 The site is located in Flood Zone 1 and therefore satisfies the requirements of the Sequential Test; whose aim is to direct development to these areas. The Exception Test is not required as all land uses are permitted in this zone.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Figure 1: Table 3 Flood risk vulnerability and flood zone 'compatibility' from NPPF Technical Guide

3. Definition of the Flood Hazard

3.1 The NPPF outlines the forms of flooding that may affect development as fluvial (rivers), tidal, surface water, ground water, and infrastructure failure. The following have been identified as potential sources of flooding that may affect the development: fluvial, surface water, groundwater, and infrastructure failure. Flooding from tidal sources will not affect the site as the site is not in close proximity to the sea.

3.2 Sources of Flooding

3.2.1 Fluvial (River) Flooding

The site is not close to any rivers, the nearest river is the River Medlock which is approximately 600m East of the site. The Rochdale Canal is 264m north west of the site. The Ashton Canal is 164m to the south of the site. Flood maps provided on the Environment Agency website and in the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA (Figure 1.7B and 1.8B) indicate that the site is outside the 1 in 100 years plus climate change and the 1 in 1000 year plus climate change zones of flooding.

Based in this information the site is categorised as being in Flood Zone 1 and at low risk of fluvial flooding.

3.2.2 Surface Water

Sources of surface water flooding are typically sheet flow from adjacent land or surface flow caused by surcharged sewers and/or the in ability of rainwater to drain off the surface through infiltration or traditional drainage systems. The Environment Agency surface water flood map (Figure 2) identifies that Sandal Street and the intersection with Varley Street is susceptible to surface water flooding. The flooding is largely constrained to the roadway in the flood maps and this is supported by a review of the topographic survey which indicates the site is approximately 600mm higher than the roadway in this area.

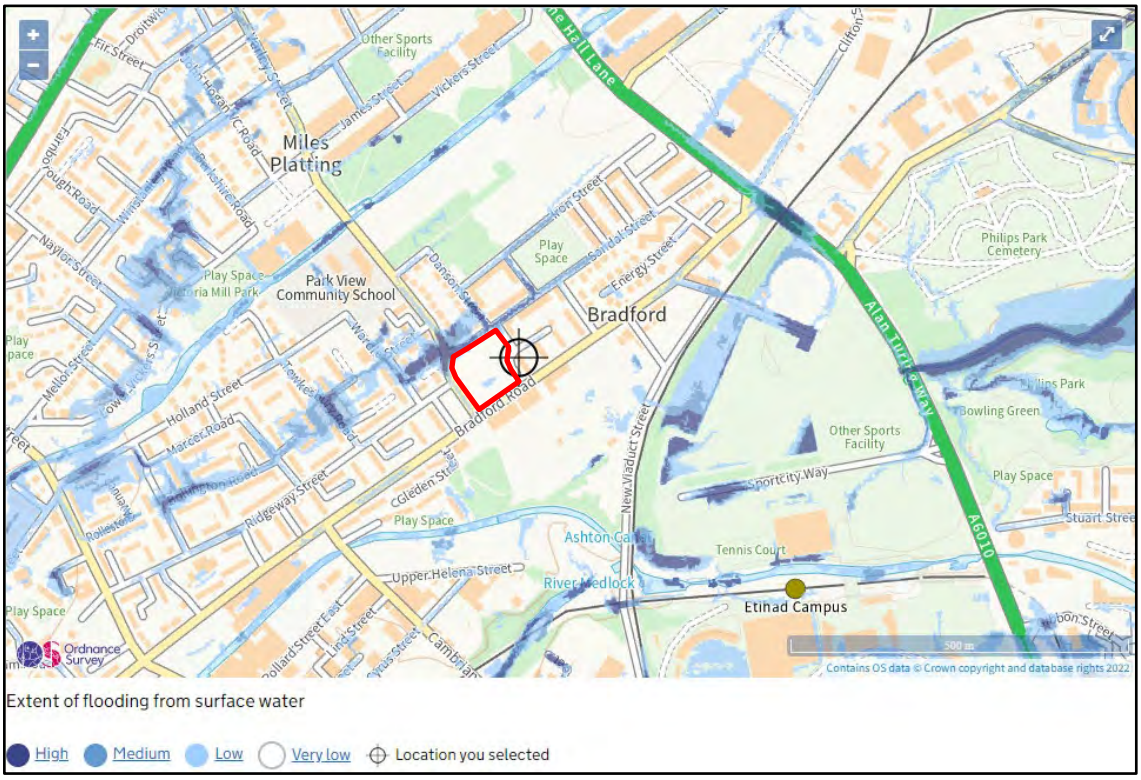


Figure 2: Extract of Environment Agency Surface Water Flood Map.

Proposed levels within the site should set so as to mitigate the risk of surface water flooding shown on the EA surface water flood risk map.

The risk from surface water flooding to the site can be considered low.

3.2.3 Flooding from Groundwater

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA confirms that the site is not in an area subject to ground water flooding (Groundwater Flooding drawing GW_2.1).

Careful consideration of proposed site levels and the general topography of the site will mitigate any future risk.

The risk from groundwater flooding to the site is low.

3.2.4 Flooding from Sewers

Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development is not likely to increase the risk posed by sewer flooding as the surface water runoff, a primary cause of sewer surcharging, from the site is to be managed in accordance with the requirements of the NPPF and the Statutory Undertaker (United Utilities).

The sewers in the vicinity of the site are operated by United Utilities. The sewer records show that the area is serviced by a combined sewer network. There are existing sewers in Varley Street (375x300 VC sewer) and Bradford Road (508x381 brick sewer) and combined sewers ranging from 225mm VC sewers to 1125x750 brick sewers within the development red line boundary. The development proposal has considered the location of the sewers within the site with those proposed to be retained provided easements in line with United Utilities requirements. There is also a culverted watercourse (1500x1110 brick) in Sandal Street. An extract from the public sewer record is included in Appendix A for reference.

There were no recorded DG5 incidents listed in the SFRA.

Surface water is often a major component of sewer flooding and the surface water from the site will be in line with the requirements of the LLFA and United Utilities to mitigate the surface water contribution from the development site to sewer flooding.

Careful consideration of proposed site levels and the general topography of the site will mitigate any future risk posed by sewer flooding.

The site is deemed to be at low risk of sewer flooding.

3.2.5 Flooding from Infrastructure

The Rochdale Canal is 264m north west of the site. The Ashton Canal is 164m to the south of the site.

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA (Figure MM_3.2B) shows the flood risk from the canal. The plan indicates that the site is not at risk of flooding from the Canal.

The Reservoir Screening map (drawing MM_3.1) confirms the site is not at risk of reservoir flooding.

The site can be deemed to be at low risk of flooding from infrastructure failure.

3.3 The Environment Agency flood maps and the maps contained within the SFRA confirm the development sites are in flood zone 1. There are no recorded incidents of historic flooding in the SFRA that affect the site.

The NPPF requires the proposed drainage plan ensure that the runoff caused by the development does not contribute to flooding offsite; this approach will help reduce off site flooding that could be attributed to the site.

3.4 In line with current best practice and the requirement of the statutory undertaker the proposed drainage will be a separate system with the surface water discharging to the culverted watercourse in Sandal Street and foul water discharging to the public combined sewer in Varley Street.

3.5 There are no other known risks to the site.

4. Probability

4.1 The site is located within flood zone 1, the lowest risk category and the zone to which development is directed by NPPF guidelines.

4.2 The area of the site is covered in the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA. The SFRA shows the site to be outside of any areas of historic flooding and surface water flooding but close to areas susceptible to surface water flooding. The site is outside areas susceptible to groundwater flooding, flooding from infrastructure failure and fluvial flooding. The risk of flooding from these sources is low.

4.3 The site is located in an area where topographic relief provides natural protection against any exceedance event.

4.4 The proposed drainage will be designed with future climate change in mind so the risk of flooding by run-off emanating from the development will be low.

4.5 The probability of the site flooding can be considered to be low.

5. Climate Change

5.1 The main risk from climate change is the projected increase in frequency of extreme rainfall events. These events will likely lead to short-term capacity exceedance of the gullies and roof outlets serving the site and surrounds.

5.2 Current guidance within the NPPF is to allow for a 30% increase in rainfall intensity over existing rainfall intensities for the design life of the dwellings. Current guidance from the Environment

Agency states the impact of the upper end & central should be evaluated, the upper end allowance is 40% and the central allowance is 20%. These allowances should be considered in the design of the surface water management system for the proposed site.

5.3 Although the onsite drainage and attenuation will be designed to accommodate the increased runoff, building floor levels should be set to mitigate any residual risk from overland flow.

6. Detailed Development Proposals/Drainage Strategy

6.1 Details of the development layout are provided in Appendix A. The proposed development involves the construction of 28 dwellings and associated infrastructure. The development site is currently vacant but has previously been developed.

Figure 3: Previous development on the site in 2009 (Source: Google Earth)

6.2 A separate foul and surface water drainage system is proposed for the site.

6.3 The site is located in Flood Zone 1 and, is therefore, suitable for all types of development, no further evidence is required.

6.4 The site has been previously developed and can therefore be considered to be brownfield site.

6.5 The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA provides the following guidance in relation to brownfield sites:

"Development should aim for a minimum reduction in surface water runoff rates of 50% for brownfield sites, with an aim of reducing runoff to greenfield rates up to the 1 in 100-year storm event, considering climate change."

Although the site is classed a brownfield site insufficient data is available to model the runoff from the previous development. As such it will be necessary to limit surface water runoff, as close as reasonably practicable, to the greenfield runoff rates.

The greenfield runoff rates have been estimated using the HR Wallingford Greenfield Runoff Tool (www.uksuds.co.uk). Table 1 summarises the greenfield runoff rates for the cumulative site area.

Return Period	Greenfield Runoff Rate (l/s)
Q_{BAR}	4.41
1yr	3.84
30yr	7.50
100yr	9.18

Table 1: Greenfield Runoff Rates (from HR Wallingford, www.uksuds.com)

Surface water from the proposed development should be discharged in line with the surface water discharge hierarchy:

i. Discharge to soakaway
ii. Discharge to watercourse
iii. Discharge to surface water sewer
iv. Discharge to combined sewer.

Discharge to soakaway

The site investigation carried out by Betts Geo Consulting Engineers indicates that soakaways are likely not feasible due to the following reason:

- Cohesive strata and the presence of deep made ground.

Data available on the Soilscapes website (www.landis.org.uk) supports the conclusion drawn in the Betts report indicating the soil is categorised as Soilscape 17, slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage.

Based on the ground conditions it is necessary to consider the level 2 and 3 of the discharge hierarchy.

Discharge to watercourse/surface water sewer

There is a culverted watercourse in Sandal Street.

In line with the discharge hierarchy this level will need to be used ahead of the last tier.

Discharge to combined sewer

As there is a culverted watercourse near the site it is not necessary to consider discharge to the combined sewers in the vicinity of the site.

For the purpose of this FRA a discharge to the culverted watercourse will be considered.

6.6 As the proposed surface water networks will discharge to the culverted watercourse it will be necessary to restrict surface water discharge as close as practicable to the greenfield rates identified in section 6.5.

The Q_{BAR} rate for the site area is 4.41 l/s.

To reduce the risk of blockage within the flow control device it is normally permitted to the restrict the discharge rate to 5 l/s.

For the purpose of the drainage strategy a discharge rate of 5 l/s will be used to design the drainage proposal.

The proposed discharge rate complies with the SFRA and best practice requirements and is therefore deemed to offer the required improvements for discharges in critical drainage areas.

Since infiltration SuDS techniques have been ruled out through the presence of made-ground, clay sub-soils only non-infiltration SuDS remain an option. In achieving the required discharge rates offline attenuation in the form of cellular storage will be used in conjunction with a vortex flow control.

Small paths and patios are disconnected from the drainage network and will drain to adjacent landscaped areas where interception and surface infiltration will occur.

Driveways will be designed as Type C (tanked) permeable pavement systems. These systems, although there is no infiltration, have been identified within the SuDS Manual (CIRIA C753) as offering water quality improvements and having the ability to retain rainfall events up to 5mm.

An indicative drainage plan and calculations are included within the Appendix to demonstrate how the aforementioned discharge rate can be achieved.

The final drainage layout and storage volumes will be dependent on the site layout approved through the planning process and consultation with the LLFA and United Utilities with regards the discharge rate.

6.7 Foul water discharge from the development site will be discharged to the combined sewer in Varley Street.

7. Flood Risk Management Measures

7.1 The site, specifically the buildings, are protected from flooding by providing a finished floor level higher than the ground level adjacent to the building except as required for level access. The general slope of the external ground levels is away from the building to ensure runoff is not directed towards the buildings; this provides flood routes around the buildings during exceedance events.

7.2 Attenuation is to be provided for storms up to and including the 100-year plus climate change return period event. The inclusion of this storage mitigates the flood risk, both on and off site, which results from the development.

7.3 As the site is in Flood Zone 1, as defined by the Environment Agency, no additional measures are required to mitigate flood risk.

8. Off Site Impacts

8.1 No offsite impacts are envisaged as a result of this development as no structural measures are required to defend the site against flooding. The development does not lead to displacement of potential floodwaters through the provision of physical barriers and therefore does not require compensatory storage to mitigate off-site flood risk.

8.2 Run-off from the proposed development is managed, therefore off-site impacts are mitigated by the redevelopment of the site.

9. Residual Risks

9.1 No residual flood risks are anticipated for the site following development.

10. Conclusion

10.1 The site-specific flood risk assessment for the development shows that the proposed development site is located within Zone 1 and is at low risk of flooding.

10.2 Based on this evaluation the development satisfies the requirements of the NPPF and has addressed the flood risk posed to and stemming from the development.

10.3 Discharge rates must be managed to comply, as close as reasonably practical, with those in Table 1 to satisfy the requirements of the SFRA.

10.4 Infiltration is deemed unsuitable due to the presence of made ground and clay sub-soils.

10.5 Flood risk from surface water, ground water and infrastructure failure can be considered low.

10.6 The site is at low risk of flooding and incorporation of runoff management within the proposed drainage system will alleviate any off-site risk that may have been associated with the development.

10.7 The proposed drainage layout complies with the requirements of the NPPF by mitigating flood risk and managing surface discharge from the site in line with the discharge hierarchy.

11. Appendices

11.1. Appendix A

Drawings:

Site Layout

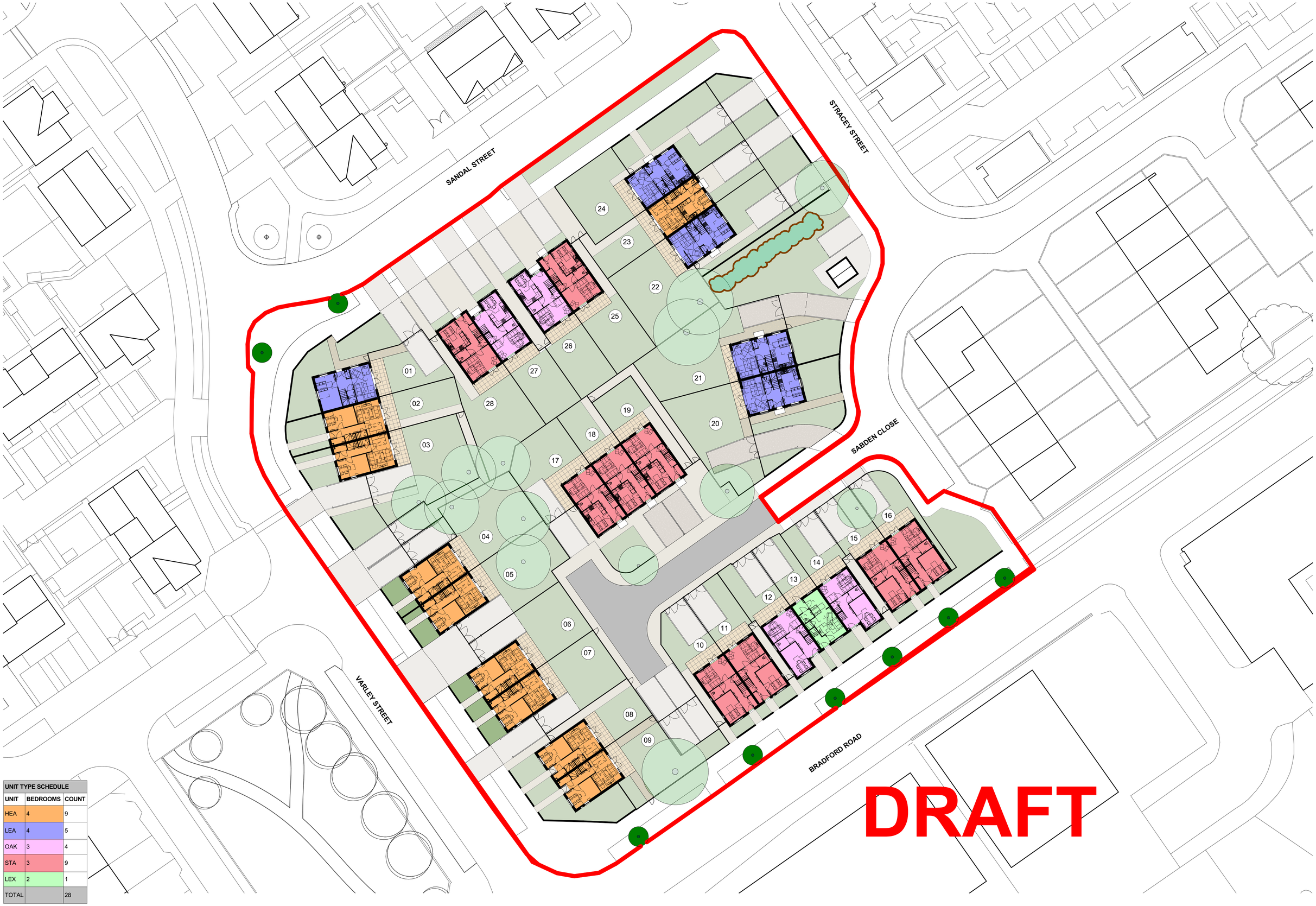
Existing Areas (Including Topographic Survey)

Proposed Areas

Flood Routing Plan

Drainage Strategy

United Utilities Sewer Records



UNIT TYPE SCHEDULE		
UNIT	BEDROOMS	COUNT
HEA	4	9
LEA	4	5
OAK	3	4
STA	3	9
LEX	2	1
TOTAL		28

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Designed with reference to the surveys, information and reports listed: Xxxxxxxxxxxxx Xxxxxxxxxxxxx, Xxxxxxxxxxxx Xxxxxxxxxx, Xxxxxxxxxxxx Xxxxxxxxxxx, Xxxxxxxxxxxx Xxxxxxxxxxx, Xxxxxxxxxxx Xxxxxxxxxx.

0m 5m 10m 15m 20m

Rev	Date	Description	Dwn	Ckd
01	01.04.22	Pre-App	LE	JK
02	25.04.22	Site plan and dwelling mix updated to incorporate comments	LE	JK
03	13.05.22	Site plan updated to incorporate Pre-App comments	LE	JK
04	xx.xx.xx	Site Plan updated to incorporate Pre-App comments	LE	JK

Drawn LE
Checked JK
Date 01/04/22
Scale @ A1 1 : 250

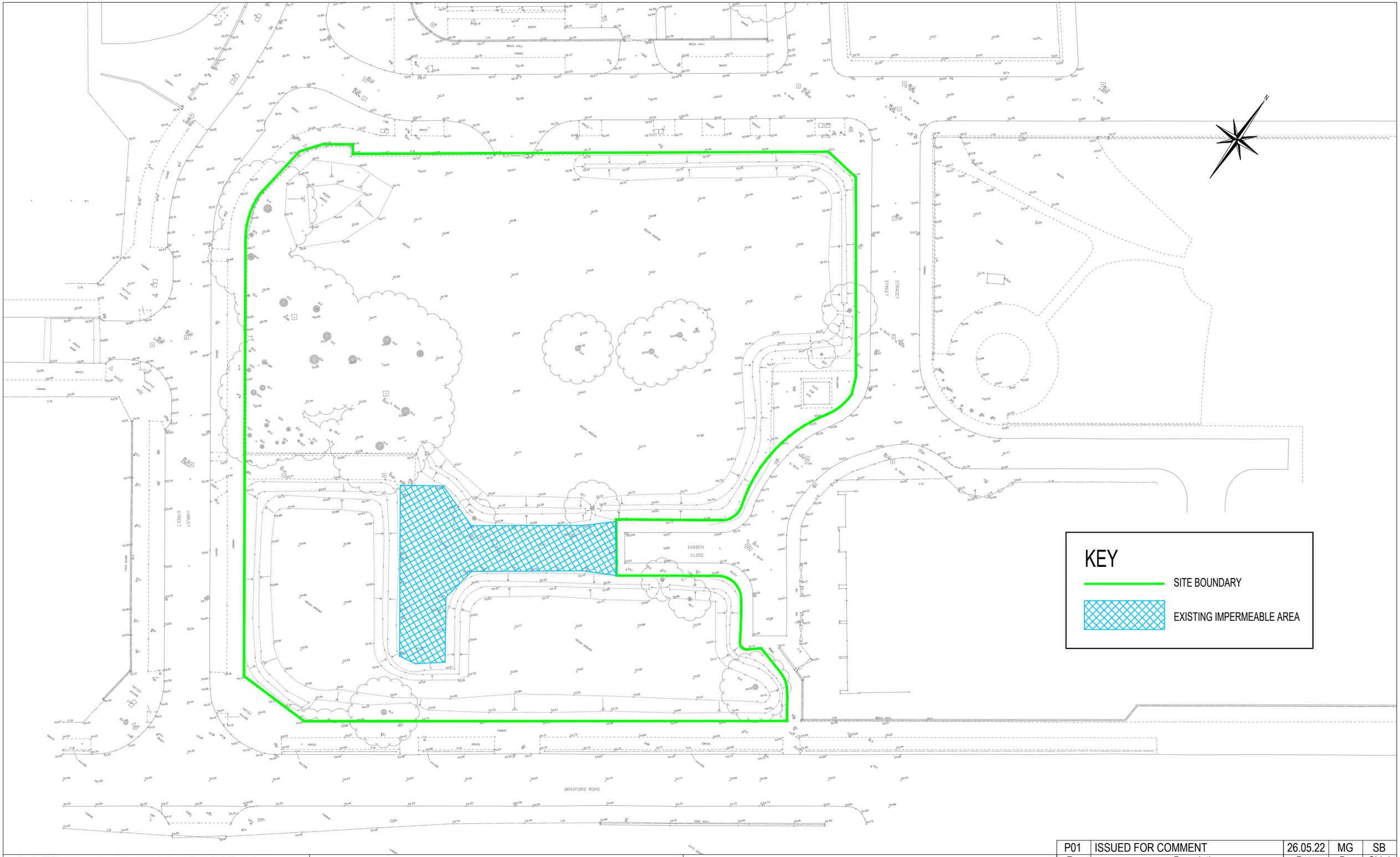
Miles Platting Cell 7.5

Proposed Type Plan - Option B

BA9882-2005
REV 04

SK

PRP



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P01	ISSUED FOR COMMENT	26.05.22	MG	SB

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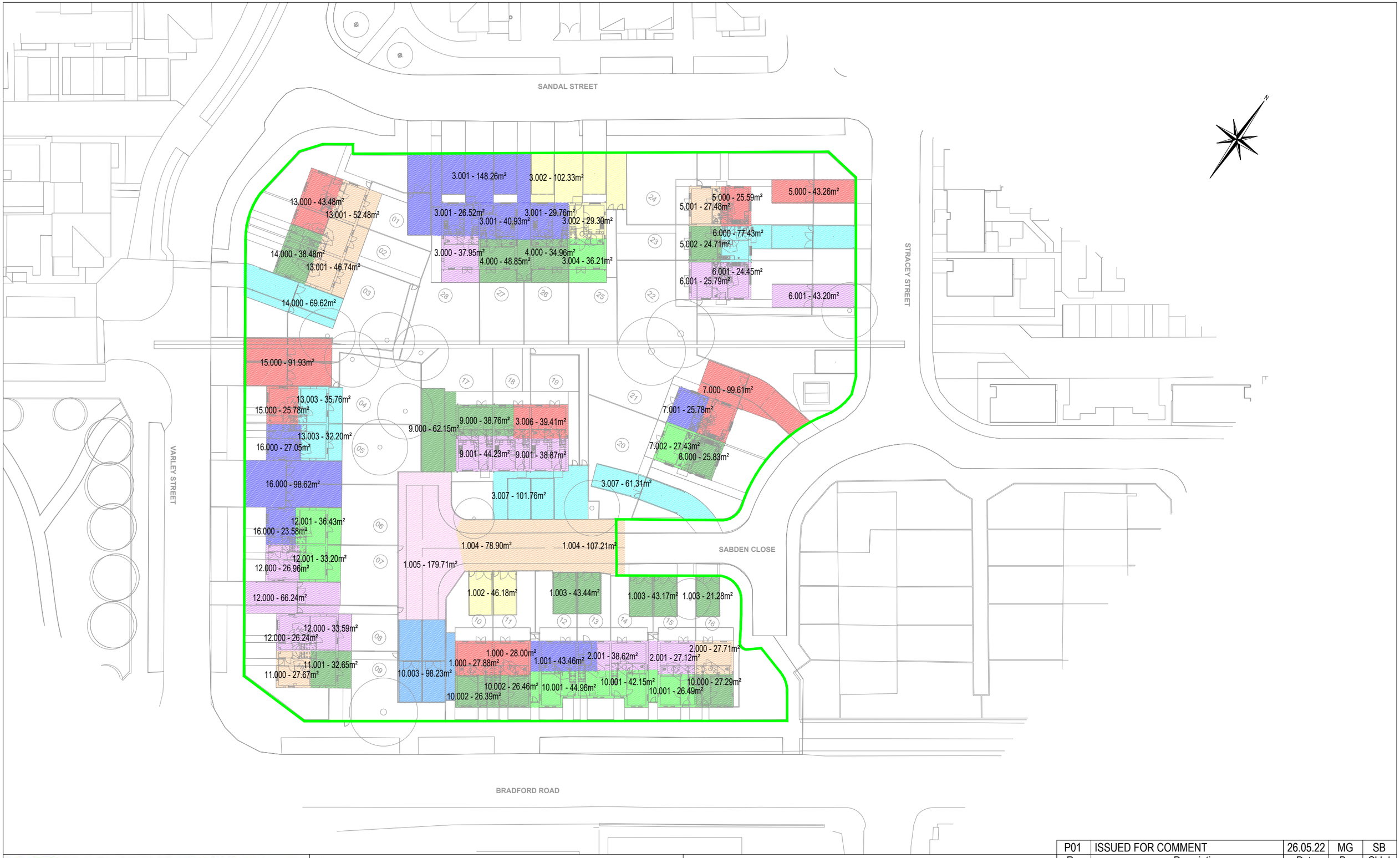

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FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

EXISTING SITE CONDITIONS

THE DEVELOPER SHALL NOT COMMENCE ANY WORK WHICH AFFECTS THE PUBLIC HIGHWAY UNTIL ALL THE APPROVED TRAFFIC SAFETY AND MANAGEMENT MEASURES NECESSITATED BY THE WORKS ARE IN PLACE.

THE DEVELOPER SHALL MAINTAIN ACCESS TO AND ALONG ALL EXISTING FOOTWAYS, PRIVATE ACCESSES, PUBLIC RIGHTS OF WAY AND PROPOSED CROSSINGS OF THE WORKS THROUGHOUT THE CONSTRUCTION PHASE.

THE CONTRACTOR IS TO CONFIRM EXISTING ROAD LEVELS AT ALL PROPOSED JUNCTIONS BETWEEN NEW AND EXISTING ROAD CONSTRUCTION PRIOR TO COMMENCEMENT OF WORKS.

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ALL HIGHWAY WORKS TO BE DESIGNED AND CONSTRUCTED TO THE APPROVAL OF THE LOCAL AUTHORITY HIGHWAYS DEPARTMENT.

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REFER TO SEPARATE DRAWINGS FOR ALL KERB / ROAD / FOOTPATHS NOTES AND DETAILS. REFER TO DRAWING ISSUE SHEET FOR A FULL LIST OF DRAWINGS.

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ALL EXISTING TREES, BUSHES SHALL BE UP ROOTED OR CUT DOWN AS NEAR TO GROUND LEVEL AS POSSIBLE. ALL FELLED TIMBER TO BE DISPOSED OF BY THE CONTRACTOR.

STUMPS AND ROOTS FROM FELLED TREES, BUSHES AND HEDGES SHALL BE GRUBBED UP AND DISPOSED OF BY THE CONTRACTOR. HOLES LEFT FROM STUMPS AND ROOTS SHALL BE FILLED WITH ACCEPTABLE MATERIAL AND COMPACTED.

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KEY PLAN

+52.000m	PROPOSED LEVELS
+52.73	EXISTING LEVELS
FFL 52.150	FINISHED FLOOR LEVELS
2C	TANKING / DOUBLE DPC 2C = 2 COURES ABOVE STANDARD DPC LEVEL (DOUBLE DPC REQUIRED) OVER 2C (TANKING REQUIRED)
4C	UNDERBUILD BRICKWORK 4C = 4 COURSES BELOW STANDARD (IE 6 COURSES BELOW FFL)
RTW750	RETAINING FEATURE RTW750 = RETAINING WALL 750mm DIFFERENCE IN LEVEL
52.000m	MAJOR CONTOUR
51.900m	MINOR CONTOUR

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P03	AMENDED TO LATEST SITE LAYOUT	26.05.22	AJB	SB
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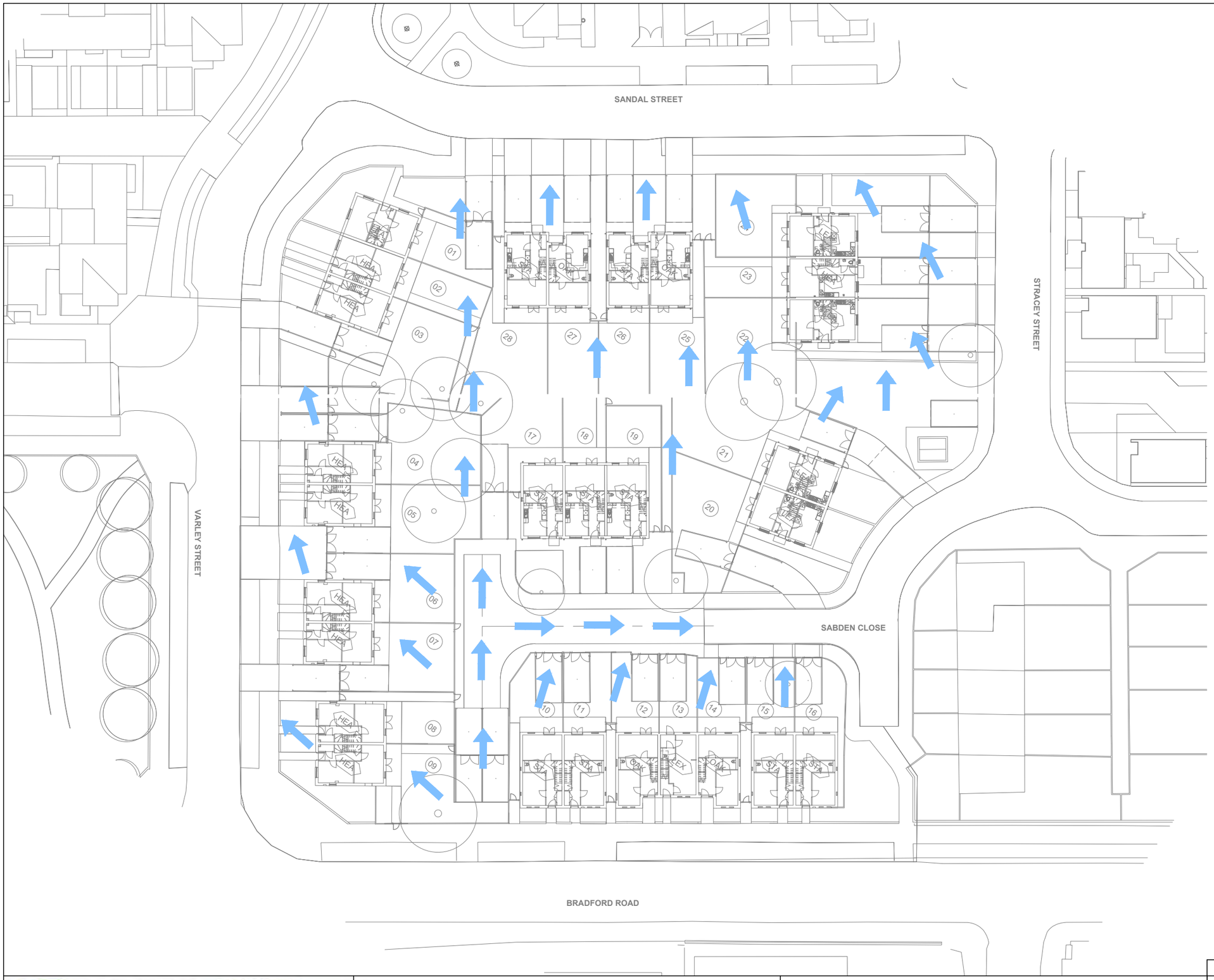

KEY

SITE BOUNDARY

EXCEEDANCE FLOOD ROUTE ARROW

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FLOOD FLOW ROUTE

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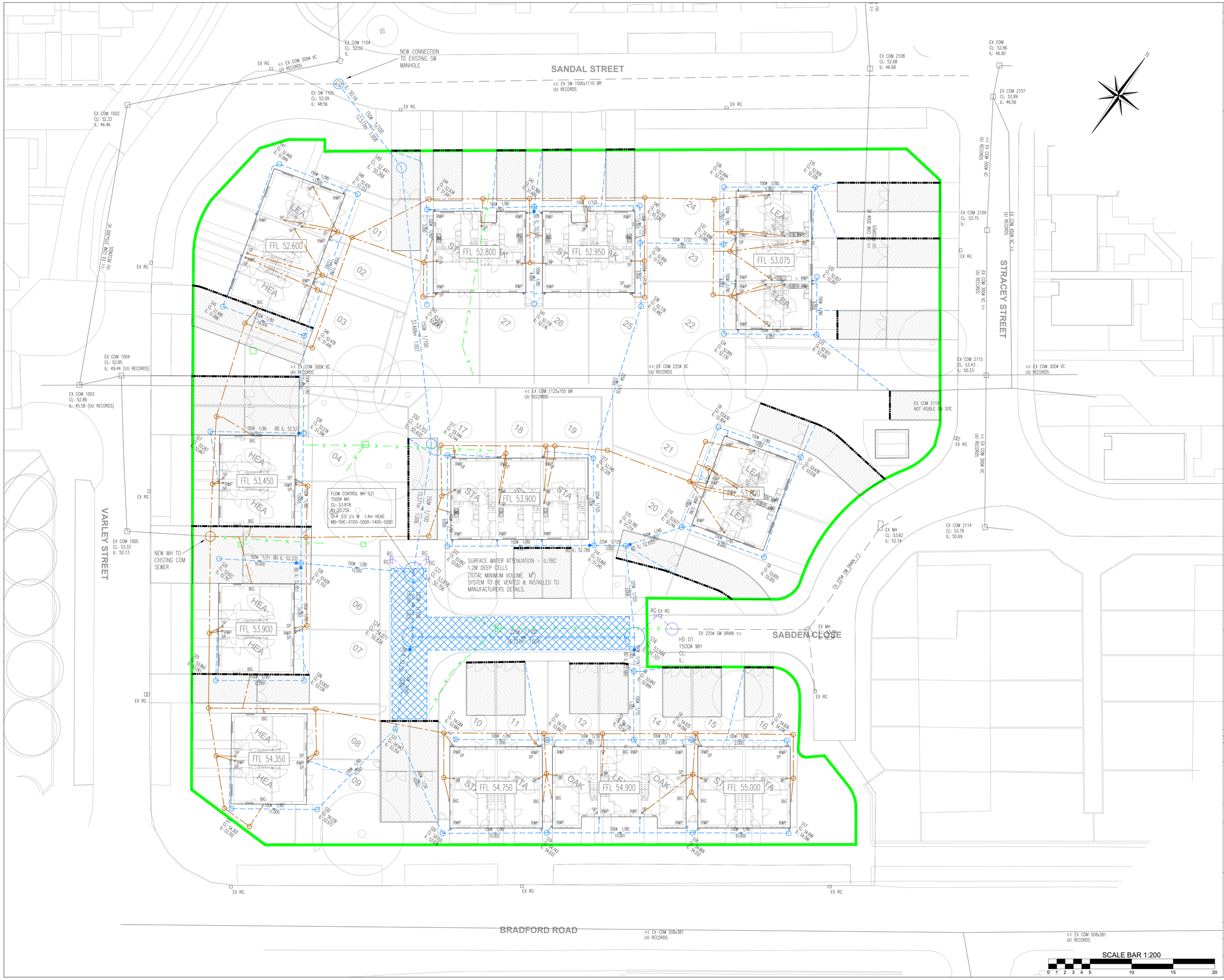

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DO NOT SCALE OFF THIS DRAWING

THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D.M. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

ALL FLOOR LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION

ALL COVER LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION

ALL DRAINAGE PENETRATING THOUGH FLOOR SLABS AND RAINWATER PIPE LOCATIONS TAKEN FROM ARCHITECTS DRAWINGS. ARCHITECT TO CONFIRM LOCATIONS PRIOR TO CONSTRUCTION.

EXISTING SERVICES

ROAD SIGNS AND LAMP COLUMNS ON THE SITE PERIPHERY TO BE RE-SITED IF REQUIRED BY, AND TO THE APPROVAL OF, THE LOCAL AUTHORITY.

CONTRACTOR TO SATISFY THEMSELVES THAT EXISTING AND PROPOSED SERVICES DO NOT CLASH WITH PROPOSED DRAINAGE

KNOWN EXISTING SERVICES ARE INDICATED ON THE PLAN WHERE THEY CROSS THE PROPOSED DRAINAGE. THE EXACT TYPE AND LOCATION SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO START OF WORKS TO ENSURE THAT PROPOSED DRAINAGE LEVELS DO NOT INTERFERE WITH SERVICES. ALL DISCREPANCIES SHALL BE REPORTED TO ENGINEER IMMEDIATELY.

THE CONTRACTOR SHALL CHECK ALL EXISTING COVER / INVERT LEVELS AND PIPE / SEWER SIZES ON SITE PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE CAN BE CONSTRUCTED AS INDICATED ON THE DRAWING. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

ALL REDUNDANT DRAINAGE WITHIN SITE TO BE GRUBBED UP, CHASED AND SEALED TO APPROVAL OF LOCAL AUTHORITY

PROPOSED DRAINAGE

OUTSIDE EDGE OF ADOPTED SEWER SHALL NOT ENCROACH WITHIN 1M OF KERB FACE. OUTSIDE EDGE OF ADOPTED MANHOLES SHALL NOT ENCROACH WITHIN 0.5M OF KERB FACE.

ALL DRAINAGE IN HIGHWAYS/CAR PARKING AREAS/DRIVEWAYS LESS THAN 1.2M DEEP TO BE CONCRETE ENCASED.

ALL PPIC'S GREATER THAN 1.2M DEEP TO HAVE REDUCED ACCESS COVERS TO PREVENT MAN ENTRY.

SURFACE WATER DRAINAGE:
ALL PRIVATE SURFACE WATER DRAINAGE TO BE 100MM ø AT 1:80 GRADIENT UNLESS NOTED OTHERWISE.
ALLOWANCE TO BE MADE FOR DRIVEWAY GULLIES AND ASSOCIATED DRAIN RUNS WHERE APPLICABLE

FOUL WATER / COMBINED DRAINAGE:
ALL UNDERSLAB FOUL WATER DRAINAGE TO BE 100MM ø AT 1:40 GRADIENT UNLESS NOTED OTHERWISE ALL OTHER PRIVATE FOUL WATER DRAINAGE TO BE 100MM ø AT 1:80 GRADIENT UNLESS NOTED OTHERWISE
INTERNAL VENTING OF DRAINAGE SYSTEM TO ARCHITECTS DETAILS
ALL INTERNAL SP/SVP POSITIONS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION OF GROUND FLOOR SLAB

DRAINAGE KEY

	New combined drain / sewer
EX COM >	Existing combined drain / sewer
	New surface water drain / sewer
EX SW >	Existing surface water drain / sewer
	New foul water drain / sewer
EX FW >	Existing foul water drain / sewer
	Extg drainage to be abandoned to U.U./L.A. approval
	New manhole – refer to plan for size
	New polypropylene inspection chamber (PPIC)
	New mini access chamber
EXTG MH CL: XXX IL: XXX	Existing manhole / access chamber
RWP	Rainwater pipe location
SP	Soil pipe location
BIG	Back inlet gulley
EX RG	Existing Road gulley
RG	New road gulley
DG	New driveway gulley
	Permeable driveway

NOTE: ALL RWP/SP/BIG POSITIONS TO BE CONFIRMED BY ARCHITECT PRIOR TO START OF WORKS ON SITE

Rev	Description	Date	By	Chkd
P01	ISSUED FOR COMMENT	26.05.22	AJB	SB

Drawing Status
PRELIMINARY DRAWING

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LOVELL

Project
MILES PLATTING 7.5B
MANCHESTER

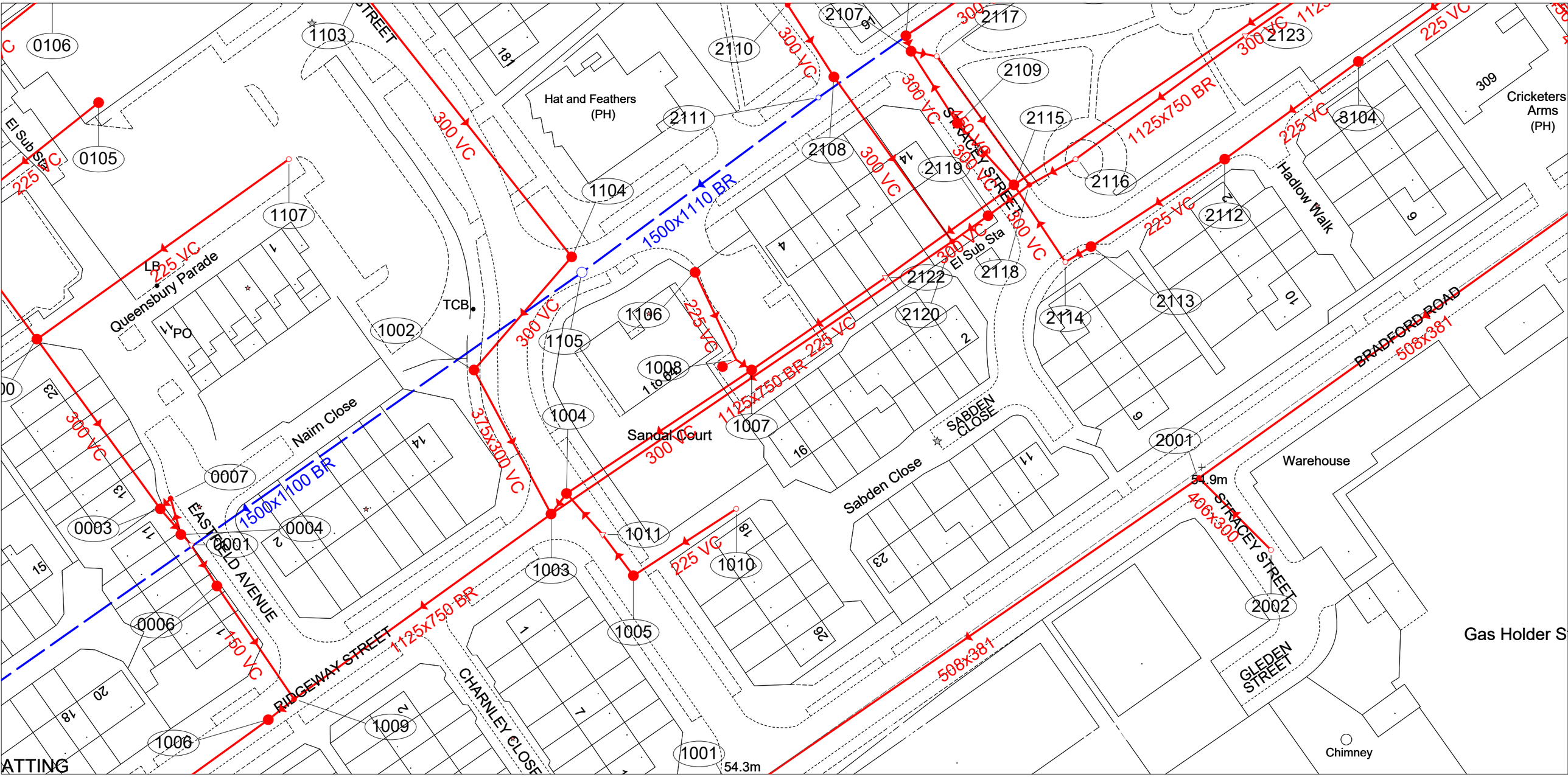
Drawing Title
PROPOSED DRAINAGE STRATEGY

Date	Drawn By	Checked By
MAY 2022	AJB	SB

Scale at A1	Project Number
1:200	32455

Sheet Number	Revision
32455-SUT-ZZ-XX-DR-C-6200	P01

SCALE BAR 1:200
0 1 2 3 4 5 10 15 20


Hat and Feathers (PH)
Cricketers Arms (PH)
Queensbury Parade
Nairn Close
Sandal Court
Sabden Close
SABDEN CLOSE
EASTFIELD AVENUE
RIDGEWAY STREET
CHARNLEY CLOSE
STRACEY STREET
GLEDEN STREET
BRADFORD ROAD
Hadlow Walk
Warehouse
Chimney
Gas Holder S
ATTING
El Sub Sta
El Sub Sta
LB
PO
TCB
54.9m
54.3m
1500x1110 BR
1500x1100 BR
1125x750 BR
1125x750 BR
1125x750 BR
1125x750 BR
1125x750 BR
1125x750 BR
508x381
508x381
406x300
375x300 VC
300 VC
225 VC
150 VC
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11.2. Appendix B

Calculations

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Simon Brady
Site name:	Miles Platting 7.5b
Site location:	Miles Platting

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.

Site Details

Latitude:	53.48823° N
Longitude:	2.20925° W
Reference:	2362805798
Date:	May 24 2022 23:49

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.6673

Methodology

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

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

Hydrological characteristics	Default	Edited
SAAR (mm):	916	916
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

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.

(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.

(3) Is SPR/SPRHOST ≤ 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):	4.41	4.41
1 in 1 year (l/s):	3.84	3.84
1 in 30 years (l/s):	7.5	7.5
1 in 100 year (l/s):	9.18	9.18
1 in 200 years (l/s):	10.46	10.46

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.

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	18.100	Add Flow / Climate Change (%)	0
Ratio R	0.355	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	400

Designed with Level Soffits

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	10.944	0.137	79.9	0.006	6.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	10.462	0.347	30.1	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	11.426	0.143	80.0	0.003	6.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	6.960	0.594	11.7	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	8.261	0.551	15.0	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.003	4.069	0.219	18.6	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	11.435	0.143	80.0	0.004	6.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	12.870	0.161	79.9	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.21	53.984	0.006	0.0	0.0	0.0	0.86	6.8	0.8
1.001	50.00	6.34	53.847	0.010	0.0	0.0	0.0	1.41	11.1	1.3
2.000	50.00	6.22	54.237	0.003	0.0	0.0	0.0	0.86	6.8	0.4
2.001	50.00	6.27	54.094	0.009	0.0	0.0	0.0	2.27	17.8	1.3
1.002	50.00	6.40	53.500	0.024	0.0	0.0	0.0	2.00	15.7	3.2
1.003	50.00	6.43	52.899	0.035	0.0	0.0	0.0	2.35	41.5	4.7
3.000	50.00	6.17	52.034	0.004	0.0	0.0	0.0	1.13	19.9	0.5
3.001	50.00	6.32	51.841	0.026	0.0	0.0	0.0	1.46	58.2	3.5

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	11.659	0.146	80.0	0.008	6.00	0.0	0.600	o	100	Pipe/Conduit	
3.002	12.719	0.102	124.7	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	4.471	0.036	124.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	10.994	0.137	80.2	0.007	6.00	0.0	0.600	o	100	Pipe/Conduit	
5.001	6.872	0.086	80.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
6.000	6.977	0.087	80.2	0.008	6.00	0.0	0.600	o	100	Pipe/Conduit	
6.001	11.145	0.139	80.0	0.009	0.00	0.0	0.600	o	100	Pipe/Conduit	
6.002	10.774	0.135	80.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
5.002	10.018	0.453	22.1	0.002	0.00	0.0	0.600	o	100	Pipe/Conduit	
3.004	7.607	0.061	124.7	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.005	19.183	0.153	125.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.006	10.453	0.084	124.4	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	10.942	0.137	80.0	0.010	6.00	0.0	0.600	o	100	Pipe/Conduit	
7.001	17.682	0.221	80.0	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	6.23	52.176	0.008	0.0	0.0	0.0	0.86	6.8	1.1
3.002	50.00	6.50	51.680	0.047	0.0	0.0	0.0	1.17	46.5	6.4
3.003	50.00	6.56	51.578	0.047	0.0	0.0	0.0	1.17	46.6	6.4
5.000	50.00	6.21	52.328	0.007	0.0	0.0	0.0	0.86	6.8	0.9
5.001	50.00	6.35	52.191	0.010	0.0	0.0	0.0	0.86	6.8	1.3
6.000	50.00	6.14	52.357	0.008	0.0	0.0	0.0	0.86	6.8	1.0
6.001	50.00	6.35	52.269	0.017	0.0	0.0	0.0	0.86	6.8	2.3
6.002	50.00	6.56	52.130	0.017	0.0	0.0	0.0	0.86	6.8	2.3
5.002	50.00	6.66	51.996	0.029	0.0	0.0	0.0	1.65	12.9	4.0
3.004	50.00	6.77	51.543	0.080	0.0	0.0	0.0	1.17	46.5	10.8
3.005	50.00	7.04	51.482	0.080	0.0	0.0	0.0	1.17	46.4	10.8
3.006	50.00	7.19	51.328	0.084	0.0	0.0	0.0	1.17	46.5	11.4
7.000	50.00	6.21	53.144	0.010	0.0	0.0	0.0	0.86	6.8	1.4
7.001	50.00	6.55	53.007	0.018	0.0	0.0	0.0	0.86	6.8	2.5

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.007	3.780	0.030	126.0	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	10.542	0.132	80.0	0.010	6.00	0.0	0.600	o	100	Pipe/Conduit	
8.001	12.816	0.160	80.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
9.000	10.524	0.132	80.0	0.003	6.00	0.0	0.600	o	100	Pipe/Conduit	
8.002	7.096	0.089	80.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
3.008	11.055	0.088	125.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	26.727	0.267	100.1	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	11.508	0.144	80.0	0.003	6.00	0.0	0.600	o	100	Pipe/Conduit	
10.001	17.560	0.220	80.0	0.011	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.002	12.534	0.157	80.0	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.003	13.816	0.522	26.5	0.010	0.00	0.0	0.600	o	100	Pipe/Conduit	
11.000	10.320	0.129	80.0	0.003	6.00	0.0	0.600	o	100	Pipe/Conduit	
11.001	13.521	0.169	80.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.004	11.178	0.124	90.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.007	50.00	7.25	51.245	0.119	0.0	0.0	0.0	1.16	46.3	16.1
8.000	50.00	6.20	53.036	0.010	0.0	0.0	0.0	0.86	6.8	1.3
8.001	50.00	6.45	52.904	0.013	0.0	0.0	0.0	0.86	6.8	1.7
9.000	50.00	6.20	53.055	0.003	0.0	0.0	0.0	0.86	6.8	0.3
8.002	50.00	6.59	52.744	0.018	0.0	0.0	0.0	0.86	6.8	2.4
3.008	50.00	7.40	51.214	0.137	0.0	0.0	0.0	1.17	46.3	18.5
1.004	50.00	7.75	51.101	0.190	0.0	0.0	0.0	1.31	52.0	25.7
10.000	50.00	6.22	54.396	0.003	0.0	0.0	0.0	0.86	6.8	0.4
10.001	50.00	6.56	54.252	0.014	0.0	0.0	0.0	0.86	6.8	1.9
10.002	50.00	6.81	54.033	0.019	0.0	0.0	0.0	0.86	6.8	2.6
10.003	50.00	6.96	53.876	0.029	0.0	0.0	0.0	1.51	11.8	4.0
11.000	50.00	6.20	53.702	0.003	0.0	0.0	0.0	0.86	6.8	0.4
11.001	50.00	6.46	53.573	0.006	0.0	0.0	0.0	0.86	6.8	0.8
10.004	50.00	7.09	53.354	0.035	0.0	0.0	0.0	1.38	54.8	4.8

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.005	7.810	0.078	100.1	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit	
12.000	10.621	0.133	80.0	0.015	6.00	0.0	0.600	o	100	Pipe/Conduit	
12.001	14.112	0.176	80.0	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	
13.000	10.103	0.126	80.0	0.004	6.00	0.0	0.600	o	150	Pipe/Conduit	
13.001	18.218	0.228	79.9	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
14.000	10.351	0.129	80.0	0.011	6.00	0.0	0.600	o	150	Pipe/Conduit	
13.002	11.724	0.147	79.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
15.000	11.204	0.140	80.0	0.012	6.00	0.0	0.600	o	100	Pipe/Conduit	
13.003	15.632	0.195	80.2	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
16.000	9.839	0.465	21.2	0.015	6.00	0.0	0.600	o	100	Pipe/Conduit	
12.002	13.603	0.170	80.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	15.571	0.156	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	50.00	7.84	50.834	0.243	0.0	0.0	0.0	1.31	52.0	32.9
12.000	50.00	6.21	53.261	0.015	0.0	0.0	0.0	0.86	6.8	2.1
12.001	50.00	6.48	53.128	0.022	0.0	0.0	0.0	0.86	6.8	3.0
13.000	50.00	6.15	51.849	0.004	0.0	0.0	0.0	1.12	19.9	0.6
13.001	50.00	6.42	51.723	0.014	0.0	0.0	0.0	1.13	19.9	1.9
14.000	50.00	6.15	51.886	0.011	0.0	0.0	0.0	1.12	19.9	1.5
13.002	50.00	6.59	51.495	0.025	0.0	0.0	0.0	1.13	19.9	3.4
15.000	50.00	6.22	52.667	0.012	0.0	0.0	0.0	0.86	6.8	1.6
13.003	50.00	6.82	51.348	0.044	0.0	0.0	0.0	1.12	19.9	5.9
16.000	50.00	6.10	52.797	0.015	0.0	0.0	0.0	1.69	13.2	2.0
12.002	50.00	7.03	51.103	0.081	0.0	0.0	0.0	1.12	19.9	10.9
1.006	50.00	8.10	50.756	0.324	0.0	0.0	0.0	1.00	17.8«	43.9

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.007	33.544	0.335	100.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	12.542	0.126	99.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.007	50.00	8.66	50.600	0.324	0.0	0.0	0.0	1.00	17.7«	43.9
1.008	50.00	8.87	50.266	0.324	0.0	0.0	0.0	1.01	17.8«	43.9

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	SEX 1105	52.090	50.140	0.000	1200	0

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.100	Storm Duration (mins)	30
Ratio R	0.355		

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S31, DS/PN: 1.006, Volume (m³): 14.3

Unit Reference	MD-SHE-0100-5000-1400-5000
Design Head (m)	1.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	50.756
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.400	5.0
Flush-Flo™	0.416	5.0
Kick-Flo®	0.855	4.0
Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	3.3	1.200	4.7	3.000	7.1	7.000	10.7
0.200	4.6	1.400	5.0	3.500	7.7	7.500	11.0
0.300	4.9	1.600	5.3	4.000	8.2	8.000	11.4
0.400	5.0	1.800	5.6	4.500	8.6	8.500	11.7
0.500	5.0	2.000	5.9	5.000	9.1	9.000	12.0
0.600	4.9	2.200	6.2	5.500	9.5	9.500	12.3
0.800	4.3	2.400	6.4	6.000	9.9		
1.000	4.3	2.600	6.7	6.500	10.3		

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Storage Structures for Surface Network 1

Cellular Storage Manhole: S31, DS/PN: 1.006

Invert Level (m) 50.756 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	175.5	175.5	1.201	0.0	239.1
1.200	175.5	239.1			

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Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	S1	0.170	0.086	0.000	0.256
1.001	S2	0.251	0.082	0.000	0.333
2.000	S3	0.170	0.090	0.000	0.259
2.001	S4	0.210	0.055	0.000	0.264
1.002	S5	0.349	0.065	0.000	0.414
1.003	S6	0.268	0.072	0.000	0.339
3.000	S43	0.170	0.202	0.000	0.372
3.001	S44	0.224	0.512	0.000	0.736
4.000	S41	0.170	0.092	0.000	0.261
3.002	S42	0.314	0.506	0.000	0.819
3.003	S40	0.344	0.178	0.000	0.521
5.000	S35	0.170	0.086	0.000	0.256
5.001	S36	0.199	0.054	0.000	0.253
6.000	S32	0.170	0.055	0.000	0.224
6.001	S33	0.187	0.088	0.000	0.275
6.002	S34	0.216	0.085	0.000	0.301
5.002	S37	0.255	0.079	0.000	0.334
3.004	S39	0.357	0.302	0.000	0.660
3.005	S38	0.366	0.763	0.000	1.129
3.006	S13	0.682	0.416	0.000	1.098
7.000	S11	0.170	0.086	0.000	0.256
7.001	S12	0.250	0.139	0.000	0.389
3.007	S14	0.741	0.150	0.000	0.891
8.000	S7	0.170	0.083	0.000	0.252
8.001	S8	0.205	0.101	0.000	0.306
9.000	S9	0.170	0.083	0.000	0.252
8.002	S10	0.250	0.056	0.000	0.306
3.008	S15	0.726	0.440	0.000	1.165
1.004	S16	11.278	1.063	0.000	12.341
10.000	S17	0.170	0.090	0.000	0.260
10.001	S18	0.174	0.138	0.000	0.312
10.002	S19	0.201	0.098	0.000	0.299
10.003	S20	0.248	0.109	0.000	0.357
11.000	S21	0.170	0.081	0.000	0.251
11.001	S22	0.188	0.106	0.000	0.294
10.004	S23	0.308	0.444	0.000	0.752
1.005	S24	14.644	0.311	0.000	14.954
12.000	S25	0.170	0.083	0.000	0.253
12.001	S26	0.196	0.111	0.000	0.307
13.000	S47	0.170	0.179	0.000	0.348
13.001	S48	0.197	0.322	0.000	0.519
14.000	S45	0.170	0.183	0.000	0.353
13.002	S46	0.278	0.207	0.000	0.485
15.000	S27	0.170	0.088	0.000	0.258
13.003	S28	0.546	0.276	0.000	0.822
16.000	S29	0.233	0.077	0.000	0.311
12.002	S30	0.714	0.240	0.000	0.954
1.006	S31	13.853	0.275	200.126	214.253

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Volume Summary (Static)

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.007	S50	3.509	0.593	0.000	4.101
1.008	S49	9.840	0.222	0.000	10.062
Total		65.344	10.298	200.126	275.768

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Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	S1	0.170	0.081	0.000	0.251
1.001	S2	0.251	0.077	0.000	0.329
2.000	S3	0.170	0.085	0.000	0.255
2.001	S4	0.210	0.050	0.000	0.260
1.002	S5	0.349	0.060	0.000	0.409
1.003	S6	0.268	0.045	0.000	0.313
3.000	S43	0.170	0.191	0.000	0.361
3.001	S44	0.224	0.488	0.000	0.712
4.000	S41	0.170	0.087	0.000	0.256
3.002	S42	0.314	0.482	0.000	0.795
3.003	S40	0.344	0.154	0.000	0.497
5.000	S35	0.170	0.082	0.000	0.251
5.001	S36	0.199	0.049	0.000	0.248
6.000	S32	0.170	0.050	0.000	0.220
6.001	S33	0.187	0.083	0.000	0.270
6.002	S34	0.216	0.080	0.000	0.296
5.002	S37	0.255	0.074	0.000	0.329
3.004	S39	0.357	0.279	0.000	0.636
3.005	S38	0.366	0.739	0.000	1.105
3.006	S13	0.682	0.392	0.000	1.074
7.000	S11	0.170	0.081	0.000	0.251
7.001	S12	0.250	0.134	0.000	0.384
3.007	S14	0.741	0.126	0.000	0.867
8.000	S7	0.170	0.078	0.000	0.248
8.001	S8	0.205	0.096	0.000	0.301
9.000	S9	0.170	0.078	0.000	0.248
8.002	S10	0.250	0.051	0.000	0.301
3.008	S15	0.726	0.380	0.000	1.105
1.004	S16	11.278	0.967	0.000	12.245
10.000	S17	0.170	0.086	0.000	0.255
10.001	S18	0.174	0.133	0.000	0.308
10.002	S19	0.201	0.094	0.000	0.294
10.003	S20	0.248	0.104	0.000	0.352
11.000	S21	0.170	0.076	0.000	0.246
11.001	S22	0.188	0.101	0.000	0.289
10.004	S23	0.308	0.385	0.000	0.693
1.005	S24	14.644	0.215	0.000	14.859
12.000	S25	0.170	0.079	0.000	0.248
12.001	S26	0.196	0.106	0.000	0.302
13.000	S47	0.170	0.168	0.000	0.338
13.001	S48	0.197	0.311	0.000	0.508
14.000	S45	0.170	0.172	0.000	0.342
13.002	S46	0.278	0.197	0.000	0.475
15.000	S27	0.170	0.083	0.000	0.253
13.003	S28	0.546	0.266	0.000	0.811
16.000	S29	0.233	0.073	0.000	0.306
12.002	S30	0.714	0.214	0.000	0.928
1.006	S31	13.853	0.243	200.126	214.222

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Volume Summary (Static)

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.007	S50	3.509	0.561	0.000	4.070
1.008	S49	9.840	0.190	0.000	10.030
Total		65.344	9.477	200.126	274.947

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	1	+0%					54.005
1.001	S2	15 Winter	1	+0%					53.869
2.000	S3	15 Winter	1	+0%					54.251
2.001	S4	15 Winter	1	+0%					54.110
1.002	S5	15 Winter	1	+0%					53.528
1.003	S6	15 Winter	1	+0%					52.934
3.000	S43	15 Winter	1	+0%	100/15 Summer				52.050
3.001	S44	15 Winter	1	+0%	100/15 Summer				51.874
4.000	S41	15 Winter	1	+0%	100/15 Winter				52.201
3.002	S42	15 Winter	1	+0%	100/15 Summer				51.732
3.003	S40	15 Winter	1	+0%	100/15 Summer				51.639
5.000	S35	15 Winter	1	+0%	100/15 Summer				52.351
5.001	S36	15 Winter	1	+0%	100/15 Summer				52.219
6.000	S32	15 Winter	1	+0%	100/15 Summer				52.382
6.001	S33	15 Winter	1	+0%	100/15 Summer				52.306
6.002	S34	15 Winter	1	+0%	100/15 Summer				52.167
5.002	S37	15 Winter	1	+0%	100/15 Summer				52.030
3.004	S39	15 Winter	1	+0%	100/15 Summer				51.617
3.005	S38	15 Winter	1	+0%	100/15 Summer				51.550

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.079	0.000	0.10			0.6	OK	
1.001	S2	-0.079	0.000	0.10			1.1	OK	
2.000	S3	-0.086	0.000	0.05			0.3	OK	
2.001	S4	-0.084	0.000	0.06			1.0	OK	
1.002	S5	-0.072	0.000	0.17			2.5	OK	
1.003	S6	-0.115	0.000	0.12			3.6	OK	
3.000	S43	-0.134	0.000	0.02			0.4	OK	
3.001	S44	-0.192	0.000	0.05			2.6	OK	
4.000	S41	-0.075	0.000	0.15			0.9	OK	
3.002	S42	-0.173	0.000	0.12			4.9	OK	
3.003	S40	-0.164	0.000	0.16			4.9	OK	
5.000	S35	-0.077	0.000	0.12			0.8	OK	
5.001	S36	-0.072	0.000	0.17			1.0	OK	
6.000	S32	-0.075	0.000	0.14			0.9	OK	
6.001	S33	-0.064	0.000	0.28			1.8	OK	
6.002	S34	-0.064	0.000	0.29			1.8	OK	
5.002	S37	-0.066	0.000	0.26			3.1	OK	
3.004	S39	-0.151	0.000	0.24			8.3	OK	
3.005	S38	-0.157	0.000	0.20			8.3	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.006	S13	15 Winter	1	+0%	100/15 Summer				51.400
7.000	S11	15 Winter	1	+0%	100/15 Summer				53.172
7.001	S12	15 Winter	1	+0%	100/15 Summer				53.045
3.007	S14	15 Winter	1	+0%	30/15 Summer				51.345
8.000	S7	15 Winter	1	+0%					53.064
8.001	S8	15 Winter	1	+0%	100/15 Summer				52.935
9.000	S9	15 Winter	1	+0%					53.069
8.002	S10	15 Winter	1	+0%	100/15 Summer				52.782
3.008	S15	15 Winter	1	+0%	30/15 Summer				51.307
1.004	S16	15 Winter	1	+0%	30/15 Summer				51.199
10.000	S17	15 Winter	1	+0%	100/15 Summer				54.410
10.001	S18	15 Winter	1	+0%	100/15 Summer				54.284
10.002	S19	15 Winter	1	+0%	100/15 Summer				54.071
10.003	S20	15 Winter	1	+0%	100/15 Summer				53.911
11.000	S21	15 Winter	1	+0%					53.716
11.001	S22	15 Winter	1	+0%					53.594
10.004	S23	15 Winter	1	+0%					53.395
1.005	S24	15 Winter	1	+0%	30/15 Summer				50.962
12.000	S25	15 Winter	1	+0%	100/15 Summer				53.296
12.001	S26	15 Winter	1	+0%	100/15 Summer				53.170
13.000	S47	15 Winter	1	+0%					51.865
13.001	S48	15 Winter	1	+0%	100/15 Summer				51.751
14.000	S45	15 Winter	1	+0%					51.912
13.002	S46	15 Winter	1	+0%	100/15 Summer				51.534
15.000	S27	15 Winter	1	+0%					52.698
13.003	S28	15 Winter	1	+0%	100/15 Summer				51.399
16.000	S29	15 Winter	1	+0%					52.821
12.002	S30	15 Winter	1	+0%	30/15 Summer				51.176
1.006	S31	120 Winter	1	+0%	30/15 Summer				50.902
1.007	S50	120 Winter	1	+0%					50.651
1.008	S49	120 Winter	1	+0%					50.317

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.006	S13	-0.153	0.000	0.22			8.7	OK	
7.000	S11	-0.072	0.000	0.18			1.1	OK	
7.001	S12	-0.062	0.000	0.30			2.0	OK	
3.007	S14	-0.125	0.000	0.41			12.1	OK	
8.000	S7	-0.072	0.000	0.17			1.1	OK	
8.001	S8	-0.069	0.000	0.21			1.4	OK	
9.000	S9	-0.086	0.000	0.05			0.3	OK	
8.002	S10	-0.062	0.000	0.31			1.9	OK	
3.008	S15	-0.132	0.000	0.36			14.1	OK	
1.004	S16	-0.127	0.000	0.40			19.1	OK	
10.000	S17	-0.086	0.000	0.05			0.3	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
10.001	S18	-0.068	0.000	0.22			1.4	OK	
10.002	S19	-0.062	0.000	0.31			2.0	OK	
10.003	S20	-0.065	0.000	0.26			3.0	OK	
11.000	S21	-0.086	0.000	0.05			0.3	OK	
11.001	S22	-0.079	0.000	0.10			0.6	OK	
10.004	S23	-0.184	0.000	0.08			3.6	OK	
1.005	S24	-0.097	0.000	0.61			23.9	OK	
12.000	S25	-0.065	0.000	0.27			1.7	OK	
12.001	S26	-0.058	0.000	0.37			2.4	OK	
13.000	S47	-0.134	0.000	0.03			0.5	OK	
13.001	S48	-0.122	0.000	0.08			1.5	OK	
14.000	S45	-0.125	0.000	0.07			1.2	OK	
13.002	S46	-0.111	0.000	0.15			2.7	OK	
15.000	S27	-0.069	0.000	0.21			1.3	OK	
13.003	S28	-0.099	0.000	0.25			4.7	OK	
16.000	S29	-0.076	0.000	0.13			1.7	OK	
12.002	S30	-0.077	0.000	0.48			8.7	OK	
1.006	S31	-0.004	0.000	0.26		85	4.2	OK	
1.007	S50	-0.100	0.000	0.25			4.2	OK	
1.008	S49	-0.098	0.000	0.26			4.2	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	30	+0%					54.017
1.001	S2	15 Winter	30	+0%					53.883
2.000	S3	15 Winter	30	+0%					54.259
2.001	S4	15 Winter	30	+0%					54.122
1.002	S5	15 Winter	30	+0%					53.550
1.003	S6	15 Winter	30	+0%					52.961
3.000	S43	15 Winter	30	+0%	100/15 Summer				52.057
3.001	S44	15 Winter	30	+0%	100/15 Summer				51.900
4.000	S41	15 Winter	30	+0%	100/15 Winter				52.217
3.002	S42	15 Winter	30	+0%	100/15 Summer				51.773
3.003	S40	15 Winter	30	+0%	100/15 Summer				51.692
5.000	S35	15 Winter	30	+0%	100/15 Summer				52.365
5.001	S36	15 Winter	30	+0%	100/15 Summer				52.238
6.000	S32	15 Winter	30	+0%	100/15 Summer				52.397
6.001	S33	15 Winter	30	+0%	100/15 Summer				52.337
6.002	S34	15 Winter	30	+0%	100/15 Summer				52.198
5.002	S37	15 Winter	30	+0%	100/15 Summer				52.058
3.004	S39	15 Winter	30	+0%	100/15 Summer				51.680
3.005	S38	15 Winter	30	+0%	100/15 Summer				51.603

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.067	0.000	0.24			1.5	OK	
1.001	S2	-0.064	0.000	0.27			2.8	OK	
2.000	S3	-0.077	0.000	0.12			0.8	OK	
2.001	S4	-0.072	0.000	0.17			2.8	OK	
1.002	S5	-0.050	0.000	0.49			7.0	OK	
1.003	S6	-0.088	0.000	0.35			10.4	OK	
3.000	S43	-0.127	0.000	0.06			1.0	OK	
3.001	S44	-0.166	0.000	0.16			7.9	OK	
4.000	S41	-0.059	0.000	0.36			2.3	OK	
3.002	S42	-0.132	0.000	0.35			14.2	OK	
3.003	S40	-0.111	0.000	0.47			13.9	OK	
5.000	S35	-0.063	0.000	0.30			1.9	OK	
5.001	S36	-0.053	0.000	0.43			2.6	OK	
6.000	S32	-0.060	0.000	0.34			2.1	OK	
6.001	S33	-0.032	0.000	0.78			4.9	OK	
6.002	S34	-0.032	0.000	0.77			4.9	OK	
5.002	S37	-0.038	0.000	0.69			8.3	OK	
3.004	S39	-0.088	0.000	0.67			23.4	OK	
3.005	S38	-0.104	0.000	0.56			23.5	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.006	S13	15 Winter	30	+0%	100/15 Summer				51.542
7.000	S11	15 Winter	30	+0%	100/15 Summer				53.190
7.001	S12	15 Winter	30	+0%	100/15 Summer				53.076
3.007	S14	15 Winter	30	+0%	30/15 Summer				51.511
8.000	S7	15 Winter	30	+0%					53.081
8.001	S8	15 Winter	30	+0%	100/15 Summer				52.957
9.000	S9	15 Winter	30	+0%					53.077
8.002	S10	15 Winter	30	+0%	100/15 Summer				52.814
3.008	S15	15 Winter	30	+0%	30/15 Summer				51.464
1.004	S16	15 Winter	30	+0%	30/15 Summer				51.395
10.000	S17	15 Winter	30	+0%	100/15 Summer				54.419
10.001	S18	15 Winter	30	+0%	100/15 Summer				54.312
10.002	S19	15 Winter	30	+0%	100/15 Summer				54.109
10.003	S20	15 Winter	30	+0%	100/15 Summer				53.944
11.000	S21	15 Winter	30	+0%					53.725
11.001	S22	15 Winter	30	+0%					53.609
10.004	S23	15 Winter	30	+0%					53.427
1.005	S24	240 Winter	30	+0%	30/15 Summer				51.151
12.000	S25	15 Winter	30	+0%	100/15 Summer				53.320
12.001	S26	15 Winter	30	+0%	100/15 Summer				53.207
13.000	S47	15 Winter	30	+0%					51.874
13.001	S48	15 Winter	30	+0%	100/15 Summer				51.772
14.000	S45	15 Winter	30	+0%					51.927
13.002	S46	15 Winter	30	+0%	100/15 Summer				51.561
15.000	S27	15 Winter	30	+0%					52.717
13.003	S28	15 Winter	30	+0%	100/15 Summer				51.439
16.000	S29	15 Winter	30	+0%					52.836
12.002	S30	15 Winter	30	+0%	30/15 Summer				51.331
1.006	S31	240 Winter	30	+0%	30/15 Summer				51.147
1.007	S50	240 Winter	30	+0%					50.655
1.008	S49	240 Winter	30	+0%					50.323

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.006	S13	-0.011	0.000	0.58			22.8	OK	
7.000	S11	-0.054	0.000	0.43			2.7	OK	
7.001	S12	-0.031	0.000	0.80			5.2	OK	
3.007	S14	0.041	0.000	1.02			30.5	SURCHARGED	
8.000	S7	-0.054	0.000	0.43			2.7	OK	
8.001	S8	-0.047	0.000	0.54			3.4	OK	
9.000	S9	-0.078	0.000	0.11			0.7	OK	
8.002	S10	-0.030	0.000	0.80			4.9	OK	
3.008	S15	0.025	0.000	0.89			35.0	SURCHARGED	
1.004	S16	0.069	0.000	0.96			46.4	SURCHARGED	
10.000	S17	-0.077	0.000	0.12			0.7	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
10.001	S18	-0.040	0.000	0.66			4.3	OK	
10.002	S19	-0.024	0.000	0.92			5.9	OK	
10.003	S20	-0.032	0.000	0.79			8.9	OK	
11.000	S21	-0.077	0.000	0.12			0.7	OK	
11.001	S22	-0.064	0.000	0.27			1.7	OK	
10.004	S23	-0.152	0.000	0.23			10.6	OK	
1.005	S24	0.092	0.000	0.36			14.2	SURCHARGED	
12.000	S25	-0.041	0.000	0.66			4.1	OK	
12.001	S26	-0.020	0.000	0.96			6.1	OK	
13.000	S47	-0.125	0.000	0.07			1.2	OK	
13.001	S48	-0.101	0.000	0.23			4.2	OK	
14.000	S45	-0.109	0.000	0.16			2.9	OK	
13.002	S46	-0.084	0.000	0.39			7.0	OK	
15.000	S27	-0.050	0.000	0.50			3.2	OK	
13.003	S28	-0.059	0.000	0.66			12.2	OK	
16.000	S29	-0.061	0.000	0.33			4.0	OK	
12.002	S30	0.078	0.000	1.23			22.4	SURCHARGED	
1.006	S31	0.241	0.000	0.30		163	5.0	SURCHARGED	
1.007	S50	-0.095	0.000	0.29			5.0	OK	
1.008	S49	-0.093	0.000	0.31			5.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+0%					54.022
1.001	S2	15 Winter	100	+0%					53.889
2.000	S3	15 Winter	100	+0%					54.262
2.001	S4	15 Winter	100	+0%					54.126
1.002	S5	15 Winter	100	+0%					53.558
1.003	S6	15 Winter	100	+0%					52.971
3.000	S43	15 Winter	100	+0%					52.061
3.001	S44	15 Winter	100	+0%					51.909
4.000	S41	15 Winter	100	+0%					52.224
3.002	S42	15 Winter	100	+0%					51.861
3.003	S40	15 Winter	100	+0%	100/15 Winter				51.838
5.000	S35	15 Winter	100	+0%					52.371
5.001	S36	15 Winter	100	+0%					52.246
6.000	S32	15 Winter	100	+0%					52.403
6.001	S33	15 Winter	100	+0%					52.356
6.002	S34	15 Winter	100	+0%					52.225
5.002	S37	15 Winter	100	+0%	100/15 Winter				52.112
3.004	S39	15 Winter	100	+0%	100/15 Summer				51.829
3.005	S38	15 Winter	100	+0%	100/15 Summer				51.803

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.062	0.000	0.31			2.0	OK	
1.001	S2	-0.059	0.000	0.35			3.6	OK	
2.000	S3	-0.074	0.000	0.15			1.0	OK	
2.001	S4	-0.068	0.000	0.22			3.6	OK	
1.002	S5	-0.042	0.000	0.63			9.1	OK	
1.003	S6	-0.078	0.000	0.46			13.4	OK	
3.000	S43	-0.123	0.000	0.07			1.3	OK	
3.001	S44	-0.157	0.000	0.20			10.2	OK	
4.000	S41	-0.052	0.000	0.46			2.9	OK	
3.002	S42	-0.044	0.000	0.46			18.3	OK	
3.003	S40	0.035	0.000	0.55			16.6	SURCHARGED	
5.000	S35	-0.057	0.000	0.38			2.4	OK	
5.001	S36	-0.045	0.000	0.56			3.4	OK	
6.000	S32	-0.054	0.000	0.44			2.7	OK	
6.001	S33	-0.013	0.000	1.00			6.3	OK	
6.002	S34	-0.005	0.000	0.99			6.3	OK	
5.002	S37	0.016	0.000	0.88			10.6	SURCHARGED	
3.004	S39	0.061	0.000	0.81			28.1	SURCHARGED	
3.005	S38	0.096	0.000	0.62			25.9	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.006	S13	15 Winter	100	+0%	100/15 Summer				51.757
7.000	S11	15 Winter	100	+0%					53.197
7.001	S12	15 Winter	100	+0%	100/15 Winter				53.112
3.007	S14	15 Winter	100	+0%	100/15 Summer				51.725
8.000	S7	15 Winter	100	+0%					53.089
8.001	S8	15 Winter	100	+0%					52.967
9.000	S9	15 Winter	100	+0%					53.080
8.002	S10	15 Winter	100	+0%	100/15 Winter				52.847
3.008	S15	15 Winter	100	+0%	100/15 Summer				51.665
1.004	S16	15 Winter	100	+0%	100/15 Summer				51.573
10.000	S17	15 Winter	100	+0%					54.422
10.001	S18	15 Winter	100	+0%					54.330
10.002	S19	15 Winter	100	+0%	100/15 Summer				54.180
10.003	S20	15 Winter	100	+0%					53.957
11.000	S21	15 Winter	100	+0%					53.728
11.001	S22	15 Winter	100	+0%					53.614
10.004	S23	15 Winter	100	+0%					53.437
1.005	S24	240 Winter	100	+0%	100/15 Summer				51.306
12.000	S25	15 Winter	100	+0%	100/15 Winter				53.379
12.001	S26	15 Winter	100	+0%	100/15 Summer				53.288
13.000	S47	15 Winter	100	+0%					51.878
13.001	S48	15 Winter	100	+0%					51.779
14.000	S45	15 Winter	100	+0%					51.933
13.002	S46	15 Winter	100	+0%					51.615
15.000	S27	15 Winter	100	+0%					52.726
13.003	S28	15 Winter	100	+0%	100/15 Summer				51.583
16.000	S29	15 Winter	100	+0%					52.842
12.002	S30	15 Winter	100	+0%	100/15 Summer				51.458
1.006	S31	240 Winter	100	+0%	100/15 Summer				51.302
1.007	S50	60 Winter	100	+0%					50.655
1.008	S49	480 Summer	100	+0%					50.323

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.006	S13	0.204	0.000	0.68			26.5	SURCHARGED	
7.000	S11	-0.047	0.000	0.56			3.5	OK	
7.001	S12	0.005	0.000	1.01			6.6	SURCHARGED	
3.007	S14	0.255	0.000	1.17			34.9	SURCHARGED	
8.000	S7	-0.047	0.000	0.55			3.5	OK	
8.001	S8	-0.037	0.000	0.69			4.4	OK	
9.000	S9	-0.075	0.000	0.14			0.9	OK	
8.002	S10	0.003	0.000	1.03			6.3	SURCHARGED	
3.008	S15	0.226	0.000	1.04			40.6	SURCHARGED	
1.004	S16	0.247	0.000	1.14			55.0	SURCHARGED	
10.000	S17	-0.074	0.000	0.15			1.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
10.001	S18	-0.022	0.000	0.84			5.4	OK	
10.002	S19	0.047	0.000	1.14			7.3	SURCHARGED	
10.003	S20	-0.019	0.000	0.97			10.9	OK	
11.000	S21	-0.074	0.000	0.15			1.0	OK	
11.001	S22	-0.059	0.000	0.35			2.3	OK	
10.004	S23	-0.142	0.000	0.28			13.1	OK	
1.005	S24	0.247	0.000	0.47			18.5	SURCHARGED	
12.000	S25	0.018	0.000	0.83			5.2	SURCHARGED	
12.001	S26	0.060	0.000	1.16			7.4	SURCHARGED	
13.000	S47	-0.121	0.000	0.09			1.5	OK	
13.001	S48	-0.094	0.000	0.29			5.5	OK	
14.000	S45	-0.103	0.000	0.21			3.8	OK	
13.002	S46	-0.030	0.000	0.50			9.0	OK	
15.000	S27	-0.041	0.000	0.65			4.1	OK	
13.003	S28	0.085	0.000	0.79			14.5	SURCHARGED	
16.000	S29	-0.055	0.000	0.42			5.2	OK	
12.002	S30	0.205	0.000	1.49			27.1	SURCHARGED	
1.006	S31	0.396	0.000	0.30		208	5.0	SURCHARGED	
1.007	S50	-0.095	0.000	0.29			5.0	OK	
1.008	S49	-0.093	0.000	0.31			5.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+20%					54.026
1.001	S2	15 Winter	100	+20%					53.893
2.000	S3	15 Winter	100	+20%					54.265
2.001	S4	15 Winter	100	+20%					54.129
1.002	S5	15 Winter	100	+20%					53.566
1.003	S6	15 Winter	100	+20%					52.979
3.000	S43	15 Winter	100	+20%					52.088
3.001	S44	15 Winter	100	+20%	100/15 Winter				52.083
4.000	S41	15 Winter	100	+20%					52.229
3.002	S42	15 Winter	100	+20%	100/15 Summer				52.070
3.003	S40	15 Winter	100	+20%	100/15 Summer				52.046
5.000	S35	15 Winter	100	+20%					52.375
5.001	S36	15 Winter	100	+20%	100/15 Winter				52.321
6.000	S32	15 Winter	100	+20%	100/15 Summer				52.518
6.001	S33	15 Winter	100	+20%	100/15 Summer				52.499
6.002	S34	15 Winter	100	+20%	100/15 Summer				52.395
5.002	S37	15 Winter	100	+20%	100/15 Summer				52.297
3.004	S39	15 Winter	100	+20%	100/15 Summer				52.036
3.005	S38	15 Winter	100	+20%	100/15 Summer				52.009

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.058	0.000	0.37			2.3	OK	
1.001	S2	-0.054	0.000	0.42			4.4	OK	
2.000	S3	-0.071	0.000	0.18			1.2	OK	
2.001	S4	-0.065	0.000	0.27			4.3	OK	
1.002	S5	-0.034	0.000	0.75			10.9	OK	
1.003	S6	-0.070	0.000	0.55			16.1	OK	
3.000	S43	-0.096	0.000	0.09			1.6	OK	
3.001	S44	0.017	0.000	0.23			11.7	SURCHARGED	
4.000	S41	-0.047	0.000	0.55			3.5	OK	
3.002	S42	0.165	0.000	0.50			20.2	SURCHARGED	
3.003	S40	0.243	0.000	0.61			18.3	SURCHARGED	
5.000	S35	-0.053	0.000	0.46			2.9	OK	
5.001	S36	0.030	0.000	0.67			4.1	SURCHARGED	
6.000	S32	0.061	0.000	0.47			2.8	SURCHARGED	
6.001	S33	0.129	0.000	1.07			6.8	SURCHARGED	
6.002	S34	0.165	0.000	0.99			6.3	SURCHARGED	
5.002	S37	0.202	0.000	0.89			10.7	SURCHARGED	
3.004	S39	0.268	0.000	0.85			29.6	SURCHARGED	
3.005	S38	0.302	0.000	0.65			27.3	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.006	S13	15 Winter	100	+20%	100/15 Summer				51.957
7.000	S11	15 Winter	100	+20%					53.242
7.001	S12	15 Winter	100	+20%	100/15 Summer				53.182
3.007	S14	15 Winter	100	+20%	100/15 Summer				51.921
8.000	S7	15 Winter	100	+20%					53.095
8.001	S8	15 Winter	100	+20%					52.992
9.000	S9	15 Winter	100	+20%					53.083
8.002	S10	15 Winter	100	+20%	100/15 Summer				52.883
3.008	S15	15 Winter	100	+20%	100/15 Summer				51.849
1.004	S16	15 Winter	100	+20%	100/15 Summer				51.735
10.000	S17	15 Winter	100	+20%					54.436
10.001	S18	15 Winter	100	+20%	100/15 Summer				54.426
10.002	S19	15 Winter	100	+20%	100/15 Summer				54.260
10.003	S20	15 Winter	100	+20%	100/15 Summer				54.028
11.000	S21	15 Winter	100	+20%					53.731
11.001	S22	15 Winter	100	+20%					53.619
10.004	S23	15 Winter	100	+20%					53.440
1.005	S24	240 Winter	100	+20%	100/15 Summer				51.456
12.000	S25	15 Winter	100	+20%	100/15 Summer				53.494
12.001	S26	15 Winter	100	+20%	100/15 Summer				53.373
13.000	S47	15 Winter	100	+20%					51.881
13.001	S48	15 Winter	100	+20%					51.809
14.000	S45	15 Winter	100	+20%					51.938
13.002	S46	15 Winter	100	+20%	100/15 Summer				51.784
15.000	S27	15 Winter	100	+20%					52.734
13.003	S28	15 Winter	100	+20%	100/15 Summer				51.746
16.000	S29	15 Winter	100	+20%					52.847
12.002	S30	15 Winter	100	+20%	100/15 Summer				51.585
1.006	S31	240 Winter	100	+20%	100/15 Summer				51.452
1.007	S50	960 Summer	100	+20%					50.655
1.008	S49	960 Winter	100	+20%					50.323

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.006	S13	0.404	0.000	0.74			29.1	SURCHARGED	
7.000	S11	-0.002	0.000	0.67			4.3	OK	
7.001	S12	0.075	0.000	1.16			7.5	SURCHARGED	
3.007	S14	0.451	0.000	1.24			37.1	SURCHARGED	
8.000	S7	-0.041	0.000	0.66			4.2	OK	
8.001	S8	-0.012	0.000	0.82			5.3	OK	
9.000	S9	-0.072	0.000	0.17			1.1	OK	
8.002	S10	0.039	0.000	1.22			7.5	SURCHARGED	
3.008	S15	0.410	0.000	1.13			44.4	SURCHARGED	
1.004	S16	0.409	0.000	1.27			61.3	SURCHARGED	
10.000	S17	-0.060	0.000	0.18			1.1	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
10.001	S18	0.074	0.000	0.87			5.7	SURCHARGED	
10.002	S19	0.127	0.000	1.23			7.8	SURCHARGED	
10.003	S20	0.052	0.000	1.05			11.8	SURCHARGED	
11.000	S21	-0.071	0.000	0.18			1.2	OK	
11.001	S22	-0.054	0.000	0.42			2.7	OK	
10.004	S23	-0.139	0.000	0.31			14.4	OK	
1.005	S24	0.397	0.000	0.56			22.1	SURCHARGED	
12.000	S25	0.134	0.000	0.98			6.2	SURCHARGED	
12.001	S26	0.145	0.000	1.33			8.6	SURCHARGED	
13.000	S47	-0.118	0.000	0.10			1.8	OK	
13.001	S48	-0.064	0.000	0.35			6.6	OK	
14.000	S45	-0.099	0.000	0.26			4.5	OK	
13.002	S46	0.139	0.000	0.57			10.2	SURCHARGED	
15.000	S27	-0.033	0.000	0.78			4.9	OK	
13.003	S28	0.248	0.000	0.90			16.6	SURCHARGED	
16.000	S29	-0.049	0.000	0.51			6.3	OK	
12.002	S30	0.332	0.000	1.71			31.2	SURCHARGED	
1.006	S31	0.546	0.000	0.30		232	5.0	SURCHARGED	
1.007	S50	-0.095	0.000	0.29			5.0	OK	
1.008	S49	-0.093	0.000	0.31			5.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+30%					54.028
1.001	S2	15 Winter	100	+30%					53.895
2.000	S3	15 Winter	100	+30%					54.267
2.001	S4	15 Winter	100	+30%					54.131
1.002	S5	15 Winter	100	+30%					53.570
1.003	S6	15 Winter	100	+30%					52.983
3.000	S43	15 Winter	100	+30%	100/15 Winter				52.202
3.001	S44	15 Winter	100	+30%	100/15 Summer				52.197
4.000	S41	15 Winter	100	+30%					52.232
3.002	S42	15 Winter	100	+30%	100/15 Summer				52.183
3.003	S40	15 Winter	100	+30%	100/15 Summer				52.157
5.000	S35	15 Winter	100	+30%	100/15 Winter				52.447
5.001	S36	15 Winter	100	+30%	100/15 Summer				52.426
6.000	S32	15 Winter	100	+30%	100/15 Summer				52.631
6.001	S33	15 Winter	100	+30%	100/15 Summer				52.611
6.002	S34	15 Winter	100	+30%	100/15 Summer				52.503
5.002	S37	15 Winter	100	+30%	100/15 Summer				52.404
3.004	S39	15 Winter	100	+30%	100/15 Summer				52.146
3.005	S38	15 Winter	100	+30%	100/15 Summer				52.117
3.006	S13	15 Winter	100	+30%	100/15 Summer				52.061

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.056	0.000	0.40			2.5	OK	
1.001	S2	-0.052	0.000	0.46			4.7	OK	
2.000	S3	-0.070	0.000	0.20			1.3	OK	
2.001	S4	-0.063	0.000	0.29			4.7	OK	
1.002	S5	-0.030	0.000	0.82			11.8	OK	
1.003	S6	-0.066	0.000	0.59			17.4	OK	
3.000	S43	0.018	0.000	0.09			1.7	SURCHARGED	
3.001	S44	0.131	0.000	0.25			12.7	SURCHARGED	
4.000	S41	-0.044	0.000	0.60			3.8	OK	
3.002	S42	0.278	0.000	0.52			21.0	SURCHARGED	
3.003	S40	0.354	0.000	0.59			17.6	SURCHARGED	
5.000	S35	0.019	0.000	0.48			3.1	SURCHARGED	
5.001	S36	0.135	0.000	0.70			4.3	SURCHARGED	
6.000	S32	0.174	0.000	0.48			3.0	SURCHARGED	
6.001	S33	0.242	0.000	1.08			6.9	SURCHARGED	
6.002	S34	0.273	0.000	0.99			6.3	SURCHARGED	
5.002	S37	0.308	0.000	0.89			10.8	SURCHARGED	
3.004	S39	0.378	0.000	0.84			29.2	SURCHARGED	
3.005	S38	0.410	0.000	0.67			27.9	SURCHARGED	
3.006	S13	0.508	0.000	0.75			29.3	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
7.000	S11	15 Winter	100	+30%	100/15 Summer				53.291
7.001	S12	15 Winter	100	+30%	100/15 Summer				53.224
3.007	S14	15 Winter	100	+30%	100/15 Summer				52.023
8.000	S7	15 Winter	100	+30%					53.099
8.001	S8	15 Winter	100	+30%	100/15 Summer				53.027
9.000	S9	15 Winter	100	+30%					53.084
8.002	S10	15 Winter	100	+30%	100/15 Summer				52.902
3.008	S15	15 Winter	100	+30%	100/15 Summer				51.945
1.004	S16	15 Winter	100	+30%	100/15 Summer				51.819
10.000	S17	15 Winter	100	+30%	100/15 Winter				54.502
10.001	S18	15 Winter	100	+30%	100/15 Summer				54.493
10.002	S19	15 Winter	100	+30%	100/15 Summer				54.313
10.003	S20	15 Winter	100	+30%	100/15 Summer				54.068
11.000	S21	15 Winter	100	+30%					53.732
11.001	S22	15 Winter	100	+30%					53.621
10.004	S23	15 Winter	100	+30%					53.442
1.005	S24	240 Winter	100	+30%	100/15 Summer				51.534
12.000	S25	15 Winter	100	+30%	100/15 Summer				53.560
12.001	S26	15 Winter	100	+30%	100/15 Summer				53.420
13.000	S47	15 Winter	100	+30%					51.890
13.001	S48	15 Winter	100	+30%	100/15 Winter				51.879
14.000	S45	15 Winter	100	+30%					51.940
13.002	S46	15 Winter	100	+30%	100/15 Summer				51.855
15.000	S27	15 Winter	100	+30%					52.738
13.003	S28	15 Winter	100	+30%	100/15 Summer				51.816
16.000	S29	15 Winter	100	+30%					52.850
12.002	S30	15 Winter	100	+30%	100/15 Summer				51.642
1.006	S31	240 Winter	100	+30%	100/15 Summer				51.531
1.007	S50	1440 Winter	100	+30%					50.655
1.008	S49	1440 Summer	100	+30%					50.323

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
7.000	S11	0.047	0.000	0.72			4.6	SURCHARGED	
7.001	S12	0.117	0.000	1.23			8.0	SURCHARGED	
3.007	S14	0.553	0.000	1.29			38.7	SURCHARGED	
8.000	S7	-0.037	0.000	0.72			4.5	OK	
8.001	S8	0.023	0.000	0.88			5.6	SURCHARGED	
9.000	S9	-0.071	0.000	0.19			1.2	OK	
8.002	S10	0.058	0.000	1.30			8.0	SURCHARGED	
3.008	S15	0.506	0.000	1.19			46.5	SURCHARGED	
1.004	S16	0.493	0.000	1.34			64.5	SURCHARGED	
10.000	S17	0.006	0.000	0.22			1.4	SURCHARGED	
10.001	S18	0.140	0.000	0.89			5.8	SURCHARGED	
10.002	S19	0.180	0.000	1.26			8.0	SURCHARGED	
10.003	S20	0.092	0.000	1.08			12.2	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
11.000	S21	-0.070	0.000	0.20			1.3	OK	
11.001	S22	-0.052	0.000	0.46			2.9	OK	
10.004	S23	-0.137	0.000	0.32			15.0	OK	
1.005	S24	0.475	0.000	0.59			23.3	SURCHARGED	
12.000	S25	0.199	0.000	1.05			6.6	SURCHARGED	
12.001	S26	0.192	0.000	1.43			9.2	SURCHARGED	
13.000	S47	-0.109	0.000	0.11			1.9	OK	
13.001	S48	0.006	0.000	0.36			6.7	SURCHARGED	
14.000	S45	-0.097	0.000	0.28			4.9	OK	
13.002	S46	0.210	0.000	0.61			11.0	SURCHARGED	
15.000	S27	-0.029	0.000	0.84			5.4	OK	
13.003	S28	0.318	0.000	0.94			17.3	SURCHARGED	
16.000	S29	-0.047	0.000	0.55			6.8	OK	
12.002	S30	0.389	0.000	1.81			33.0	SURCHARGED	
1.006	S31	0.625	0.000	0.30		262	5.0	SURCHARGED	
1.007	S50	-0.095	0.000	0.29			5.0	OK	
1.008	S49	-0.093	0.000	0.31			5.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.354
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+40%					54.030
1.001	S2	15 Winter	100	+40%					53.897
2.000	S3	15 Winter	100	+40%					54.268
2.001	S4	15 Winter	100	+40%					54.132
1.002	S5	15 Winter	100	+40%					53.574
1.003	S6	15 Winter	100	+40%					52.988
3.000	S43	15 Winter	100	+40%	100/15 Summer				52.320
3.001	S44	15 Winter	100	+40%	100/15 Summer				52.314
4.000	S41	15 Winter	100	+40%	100/15 Winter				52.343
3.002	S42	15 Winter	100	+40%	100/15 Summer				52.300
3.003	S40	15 Winter	100	+40%	100/15 Summer				52.272
5.000	S35	15 Winter	100	+40%	100/15 Summer				52.566
5.001	S36	15 Winter	100	+40%	100/15 Summer				52.543
6.000	S32	15 Winter	100	+40%	100/15 Summer				52.751
6.001	S33	15 Winter	100	+40%	100/15 Summer				52.731
6.002	S34	15 Winter	100	+40%	100/15 Summer				52.620
5.002	S37	15 Winter	100	+40%	100/15 Summer				52.520
3.004	S39	15 Winter	100	+40%	100/15 Summer				52.261
3.005	S38	15 Winter	100	+40%	100/15 Summer				52.229

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.054	0.000	0.43			2.7	OK	
1.001	S2	-0.050	0.000	0.49			5.1	OK	
2.000	S3	-0.069	0.000	0.21			1.4	OK	
2.001	S4	-0.062	0.000	0.31			5.0	OK	
1.002	S5	-0.026	0.000	0.88			12.7	OK	
1.003	S6	-0.062	0.000	0.64			18.8	OK	
3.000	S43	0.136	0.000	0.10			1.8	SURCHARGED	
3.001	S44	0.248	0.000	0.27			13.5	SURCHARGED	
4.000	S41	0.067	0.000	0.63			4.0	SURCHARGED	
3.002	S42	0.395	0.000	0.50			19.9	SURCHARGED	
3.003	S40	0.469	0.000	0.56			16.8	SURCHARGED	
5.000	S35	0.138	0.000	0.52			3.3	SURCHARGED	
5.001	S36	0.253	0.000	0.71			4.3	SURCHARGED	
6.000	S32	0.294	0.000	0.49			3.0	FLOOD RISK	
6.001	S33	0.361	0.000	1.11			7.0	FLOOD RISK	
6.002	S34	0.389	0.000	0.99			6.3	FLOOD RISK	
5.002	S37	0.425	0.000	0.89			10.8	SURCHARGED	
3.004	S39	0.493	0.000	0.79			27.5	SURCHARGED	
3.005	S38	0.522	0.000	0.67			28.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
3.006	S13	15 Winter	100	+40%	100/15 Summer				52.170
7.000	S11	15 Winter	100	+40%	100/15 Summer				53.348
7.001	S12	15 Winter	100	+40%	100/15 Summer				53.272
3.007	S14	15 Winter	100	+40%	30/15 Summer				52.130
8.000	S7	15 Winter	100	+40%					53.130
8.001	S8	15 Winter	100	+40%	100/15 Summer				53.055
9.000	S9	15 Winter	100	+40%					53.085
8.002	S10	15 Winter	100	+40%	100/15 Summer				52.918
3.008	S15	15 Winter	100	+40%	30/15 Summer				52.045
1.004	S16	15 Winter	100	+40%	30/15 Summer				51.907
10.000	S17	15 Winter	100	+40%	100/15 Summer				54.588
10.001	S18	15 Winter	100	+40%	100/15 Summer				54.578
10.002	S19	15 Winter	100	+40%	100/15 Summer				54.390
10.003	S20	15 Winter	100	+40%	100/15 Summer				54.127
11.000	S21	15 Winter	100	+40%					53.733
11.001	S22	15 Winter	100	+40%					53.623
10.004	S23	15 Winter	100	+40%					53.444
1.005	S24	240 Winter	100	+40%	30/15 Summer				51.614
12.000	S25	15 Winter	100	+40%	100/15 Summer				53.628
12.001	S26	15 Winter	100	+40%	100/15 Summer				53.470
13.000	S47	15 Winter	100	+40%					51.960
13.001	S48	15 Winter	100	+40%	100/15 Summer				51.954
14.000	S45	15 Winter	100	+40%					51.947
13.002	S46	15 Winter	100	+40%	100/15 Summer				51.928
15.000	S27	15 Winter	100	+40%					52.742
13.003	S28	15 Winter	100	+40%	100/15 Summer				51.888
16.000	S29	15 Winter	100	+40%					52.852
12.002	S30	15 Winter	100	+40%	30/15 Summer				51.701
1.006	S31	240 Winter	100	+40%	30/15 Summer				51.611
1.007	S50	1440 Winter	100	+40%					50.655
1.008	S49	1440 Summer	100	+40%					50.323

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.006	S13	0.617	0.000	0.76			29.6	SURCHARGED	
7.000	S11	0.105	0.000	0.78			5.0	SURCHARGED	
7.001	S12	0.165	0.000	1.31			8.5	SURCHARGED	
3.007	S14	0.660	0.000	1.35			40.5	SURCHARGED	
8.000	S7	-0.006	0.000	0.75			4.7	OK	
8.001	S8	0.051	0.000	0.92			5.9	SURCHARGED	
9.000	S9	-0.070	0.000	0.20			1.3	OK	
8.002	S10	0.074	0.000	1.36			8.4	SURCHARGED	
3.008	S15	0.606	0.000	1.24			48.6	SURCHARGED	
1.004	S16	0.581	0.000	1.41			67.7	SURCHARGED	
10.000	S17	0.092	0.000	0.26			1.7	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
10.001	S18	0.226	0.000	0.93			6.0	FLOOD RISK	
10.002	S19	0.257	0.000	1.31			8.3	SURCHARGED	
10.003	S20	0.151	0.000	1.13			12.6	SURCHARGED	
11.000	S21	-0.069	0.000	0.21			1.4	OK	
11.001	S22	-0.050	0.000	0.49			3.2	OK	
10.004	S23	-0.135	0.000	0.34			15.6	OK	
1.005	S24	0.555	0.000	0.64			25.1	SURCHARGED	
12.000	S25	0.268	0.000	1.12			7.1	FLOOD RISK	
12.001	S26	0.243	0.000	1.52			9.8	SURCHARGED	
13.000	S47	-0.039	0.000	0.12			2.1	OK	
13.001	S48	0.081	0.000	0.39			7.2	SURCHARGED	
14.000	S45	-0.089	0.000	0.30			5.3	OK	
13.002	S46	0.283	0.000	0.67			12.1	SURCHARGED	
15.000	S27	-0.025	0.000	0.91			5.8	OK	
13.003	S28	0.390	0.000	0.98			18.1	SURCHARGED	
16.000	S29	-0.044	0.000	0.59			7.3	OK	
12.002	S30	0.448	0.000	1.91			34.7	SURCHARGED	
1.006	S31	0.705	0.000	0.30		296	5.0	SURCHARGED	
1.007	S50	-0.095	0.000	0.29			5.0	OK	
1.008	S49	-0.093	0.000	0.31			5.0	OK	

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11.3. Appendix C

Environment Agency Flood Maps

(source: https://flood-warning-information.service.gov.uk/)

Flood map for planning

Your reference	Location (easting/northing)	Created
32455	**386214/399080**	**26 May 2022 23:54**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

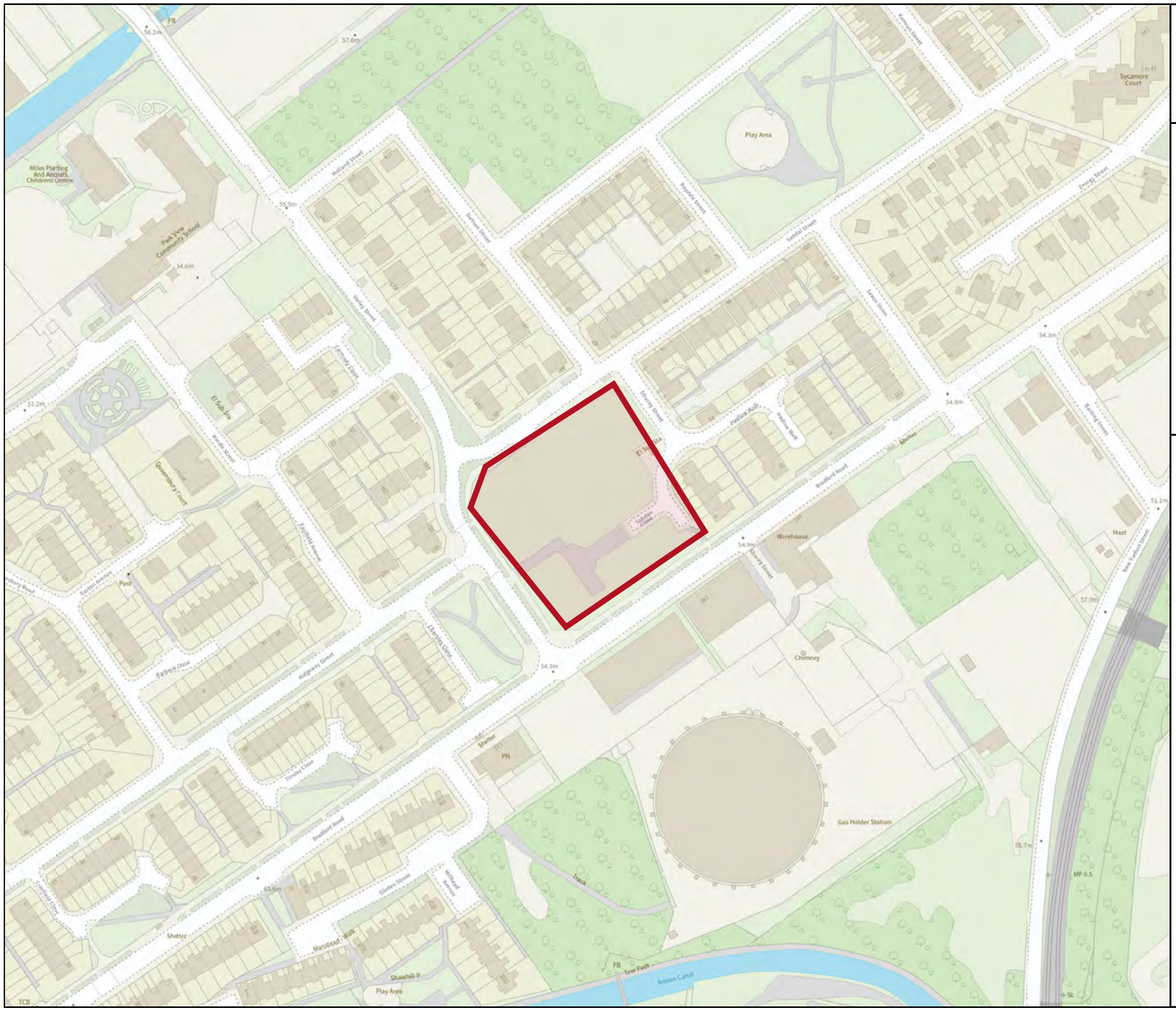
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. https://flood-map-for-planning.service.gov.uk/os-terms



Environment Agency

Flood map for planning

Your reference
32455

Location (easting/northing)
386214/399080

Scale
1:2500

Created
26 May 2022 23:54

- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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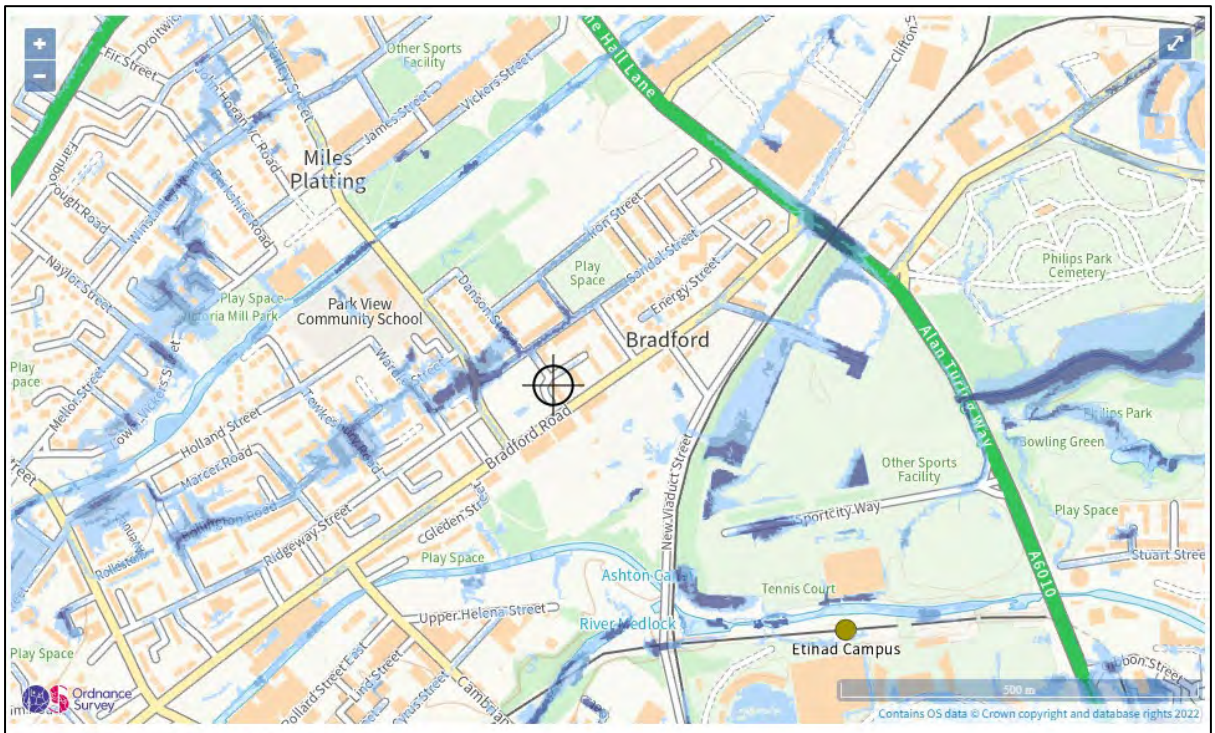
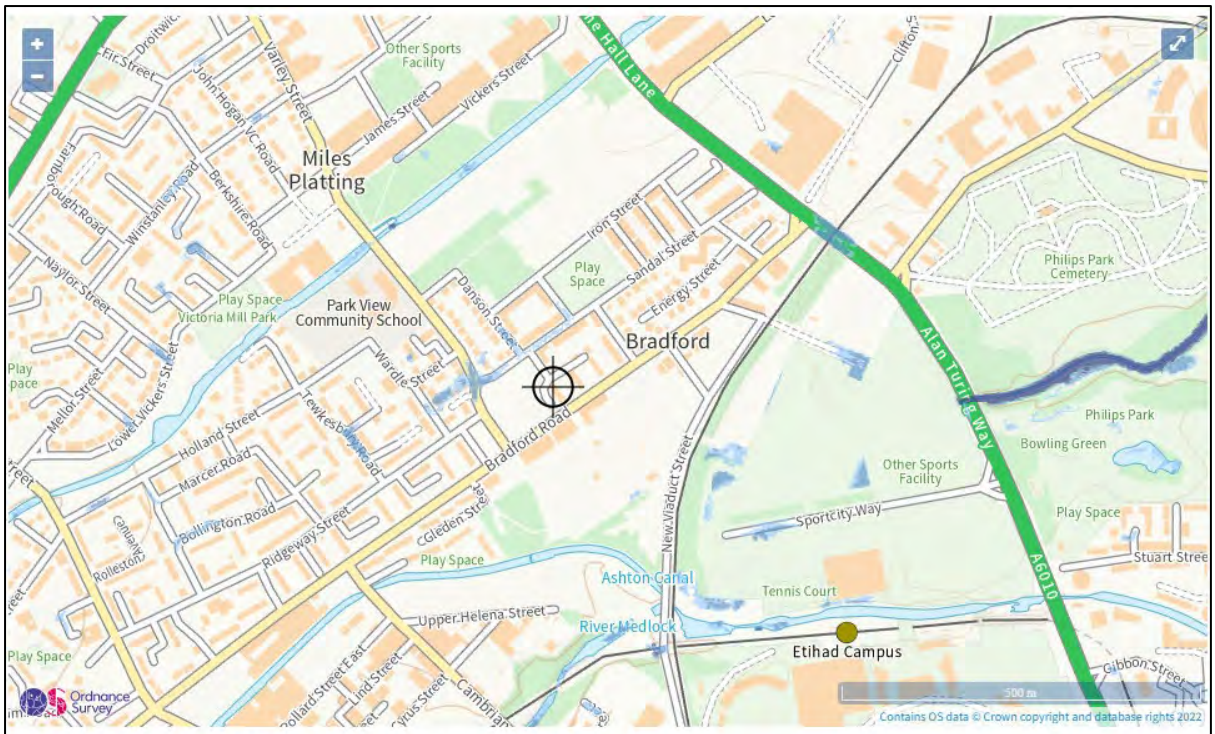
Flooding from River and Sea

Surface Water Flooding: Extent



Surface Water Flooding: High Risk Depth

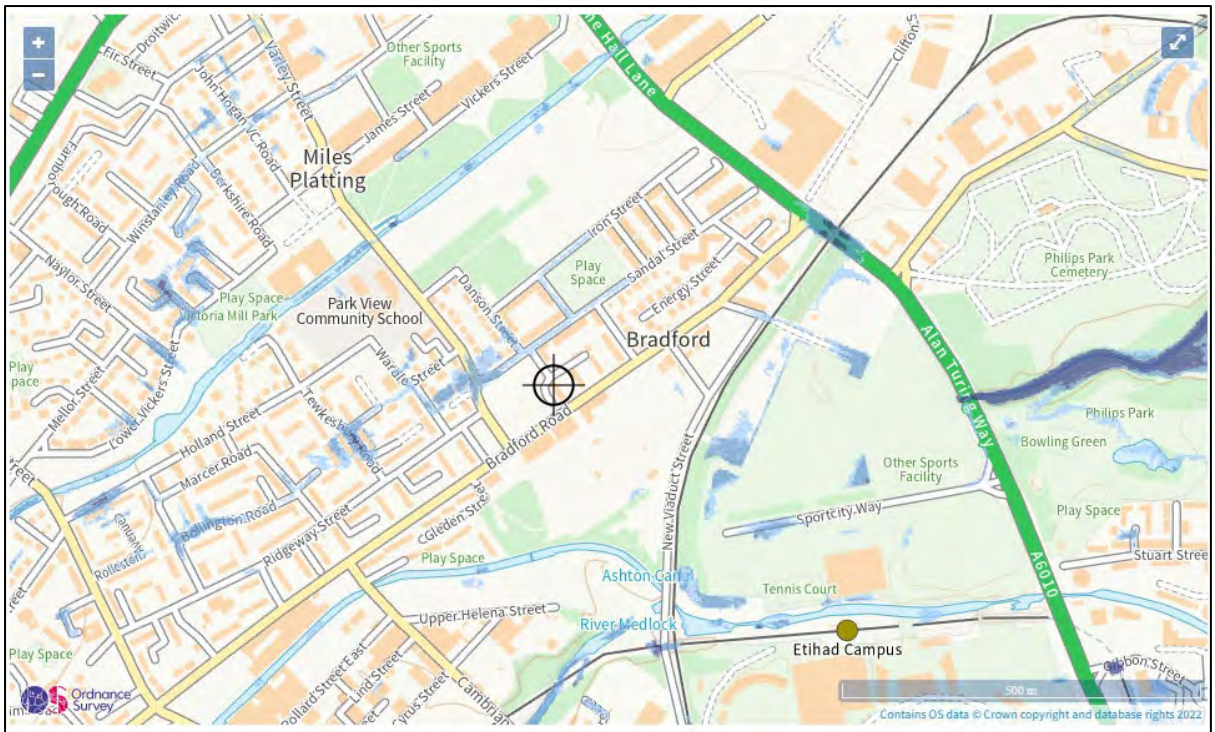


Surface water flood risk: water depth in a high risk scenario

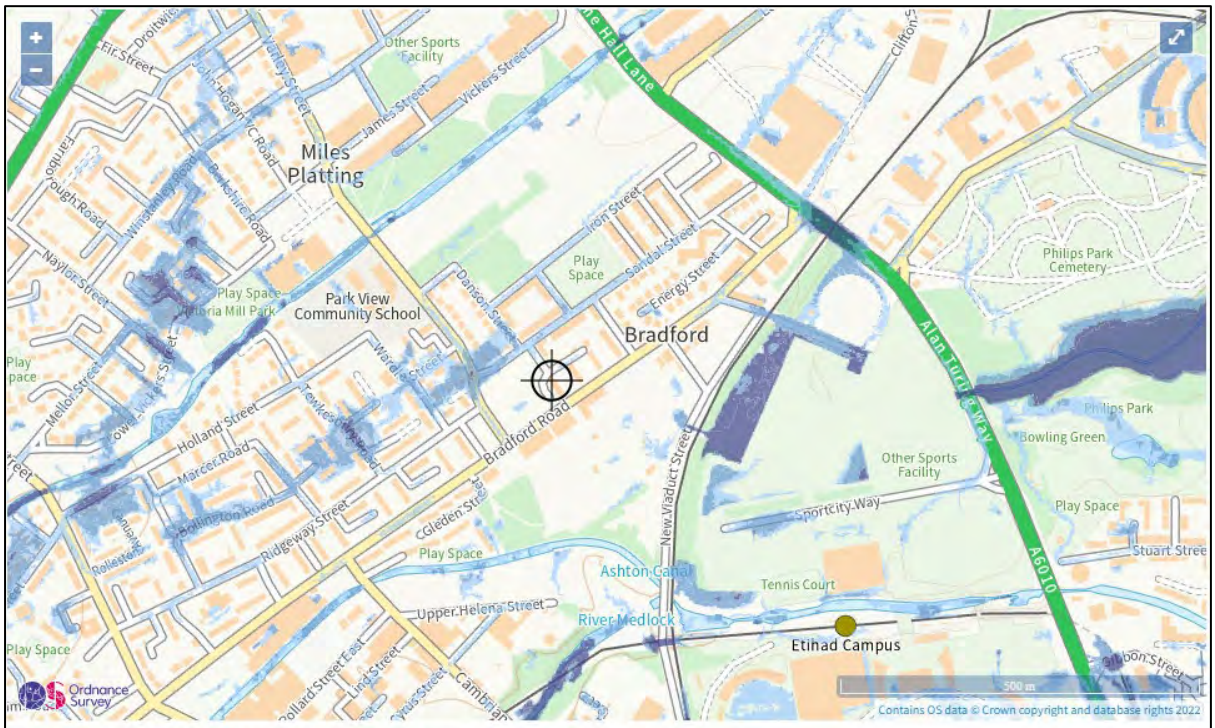
Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

Surface Water Flooding: Medium Risk Depth



Surface Water Flooding: Low Risk Depth



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

Flooding from Reservoirs

Maximum extent of flooding from reservoirs:

when river levels are normal | when there is also flooding from rivers | Location you selected