Appendices

- *A: Proposed Architectural Layout*
- *B: Flood Maps For Planning*
- *C: BGS Mapping Extracts*
- *D: DEFRA Magic Map Extracts*
- *E: Gov.uk Long Term Flood Risk Extracts*
- *F: Severn Trent Sewer Records*
- *G: Main Rivers Map Extracts*
- *H: Drainage Strategy Drawings – Main Site & Outfall*
- *I: Drainage Calculations*

Appendix A

Proposed Residential Develoment @ *Shilton Road Barwell*

Proposed Site Layout

Job No	23-115	PL03	Site	Shilton Road, Barwell	
Client	D&T Developers		Date	22.01.25	
Gross Area	1.3 ha				

Total Houses	28

Private Sale				Area		total	
Ref	No	Beds	Storeys	(m²)	(ft²)	(m²)	(ft²)
2 Bed	7	2	2	79	850	553	5,950
3 Bed	10	3	2	93	1,000	930	10,000
4 Bed	5	4	2	119	1,277	595	6,385
Total	22				Total	2,078	22,335

Affordable	[20%]			Area		total	
Ref	No	Beds	Storeys	(m²)	(ft²)	(m²)	(ft²)
Maisonette	2	1	1	50	538	100	1,076
2 Bed	2	2	2	79	850	158	1,700
3 Bed	2	3	2	93	1,000	186	2,000
Total	6				Total	444	4,776

- Planning Application Boundary
- Demolished Dwelling
- Existing Trees Retained
- Existing Trees Removed
- Illustrative Trees
- Existing PROW line
- Block Paving
- Affordable Dwelling

SHILTON ROAD

LEICESTER ROAD

LEAP 111m²

Balancing Pond Area (Indicative)

15.9m

north

0 5 10 20 30 40 50

Metres at scale 1:500

hayward ARCHITECTS LTD

19 Station Rd
Hinckley
Leicestershire
LE10 1AW

Tel: 01455 635665
Fax: 01455 618971

www.hayward-architects.co.uk

Drawing No: 23-115-PL03

Drawing Stage: Planning Application

Scale: 1:500@A2

Date: 22.01.25

Drawn By: JET

Rev	Date	By	Description

Appendix B

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**445378/297007**	**9 Oct 2024 15:57**

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

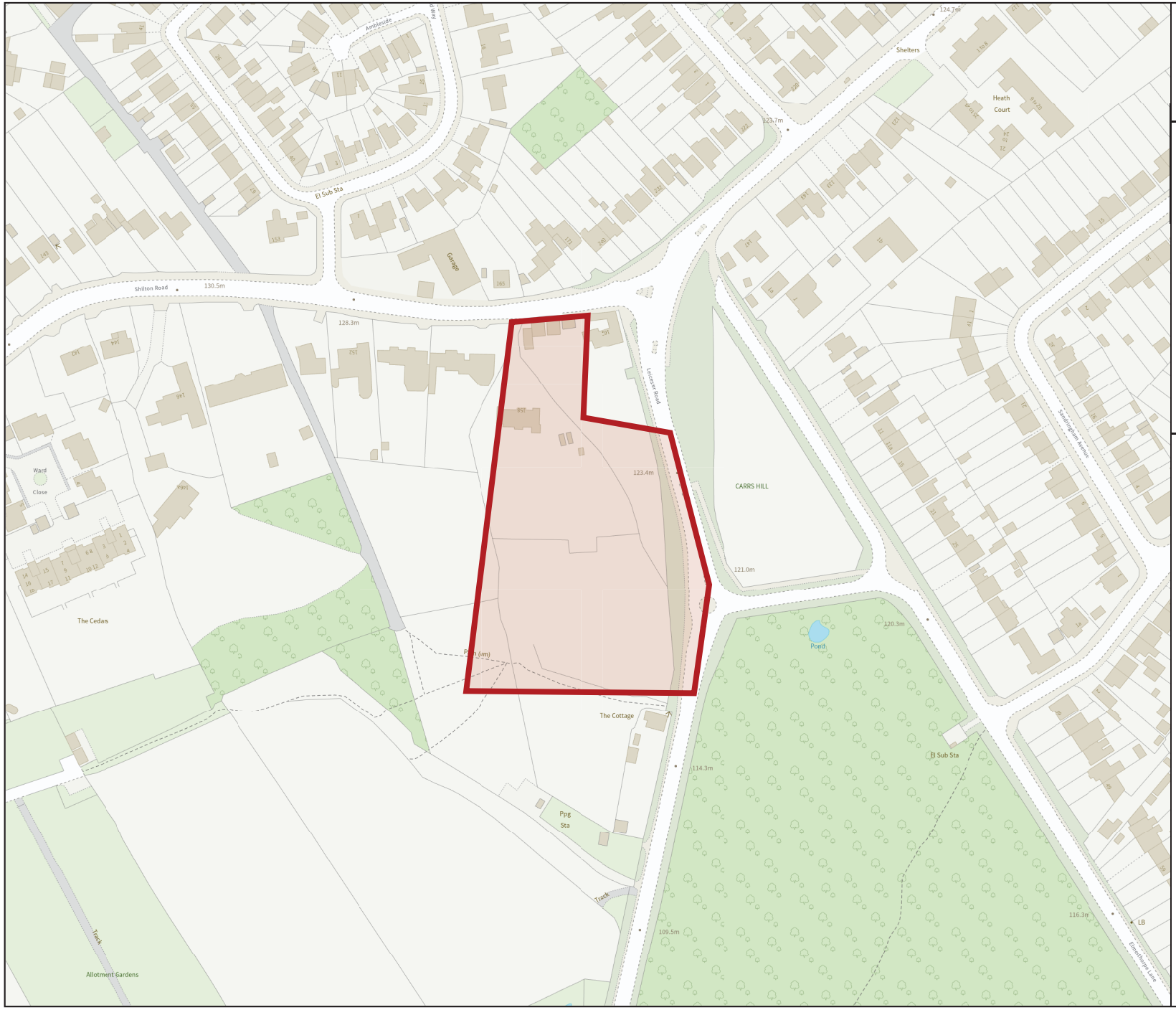
You will need to do a flood risk assessment if your site is **any of the following:**

- 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.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
445378/297007

Scale
1:2500

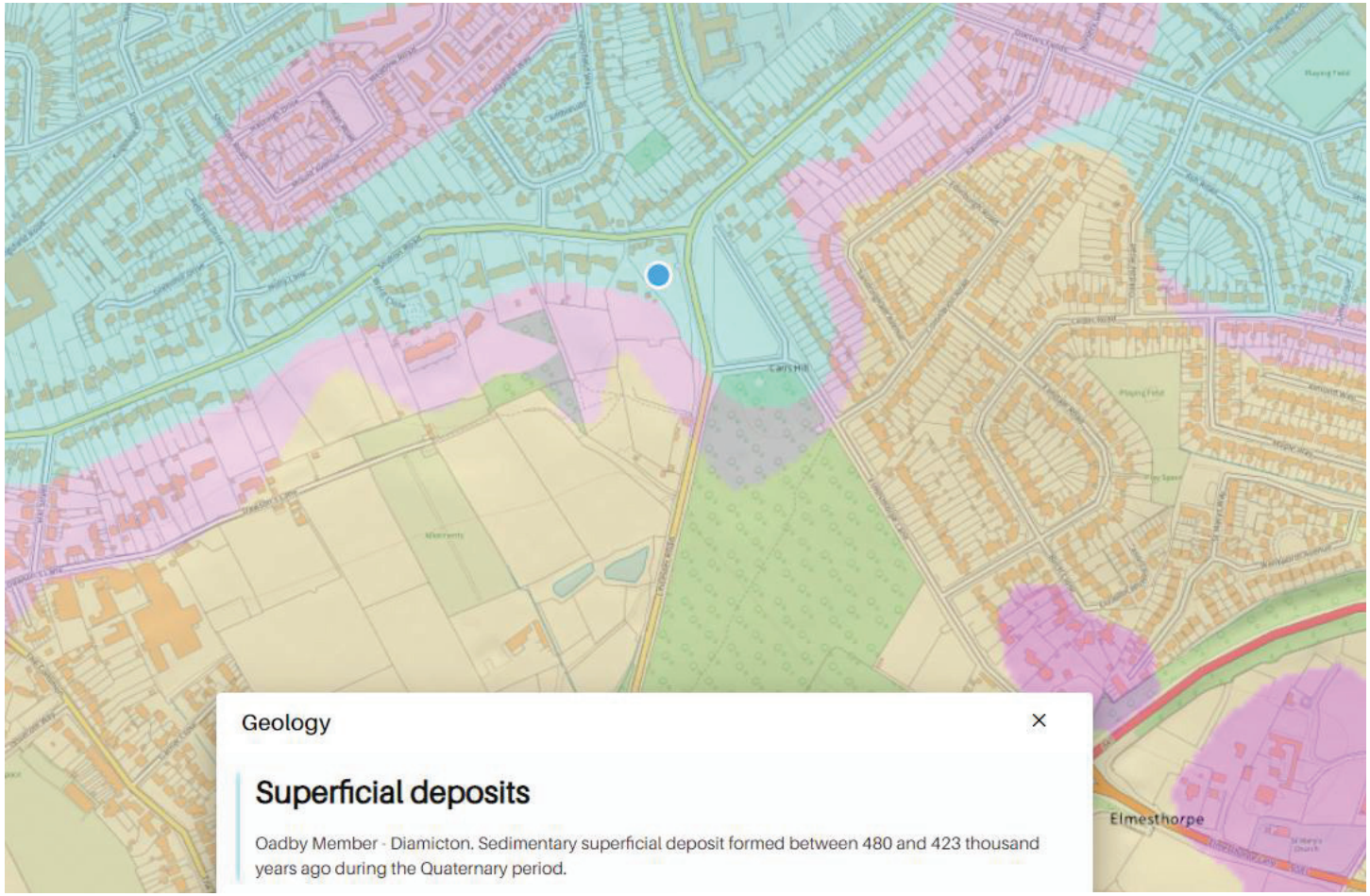
Created
9 Oct 2024 15:57

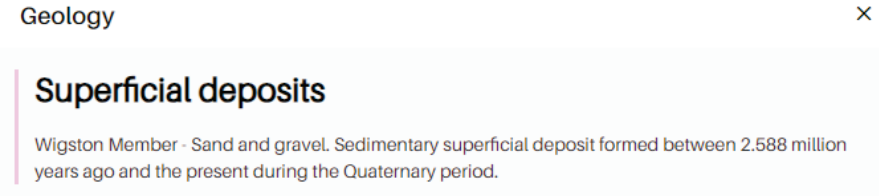
- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

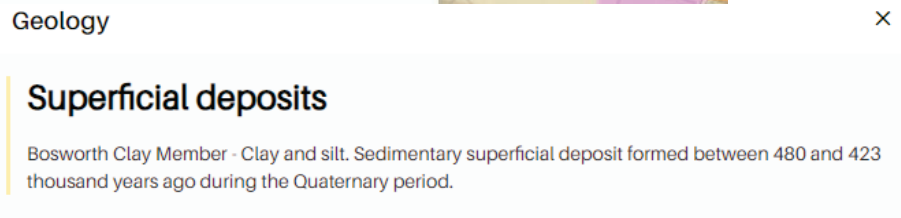
0 20 40 60m

Appendix C

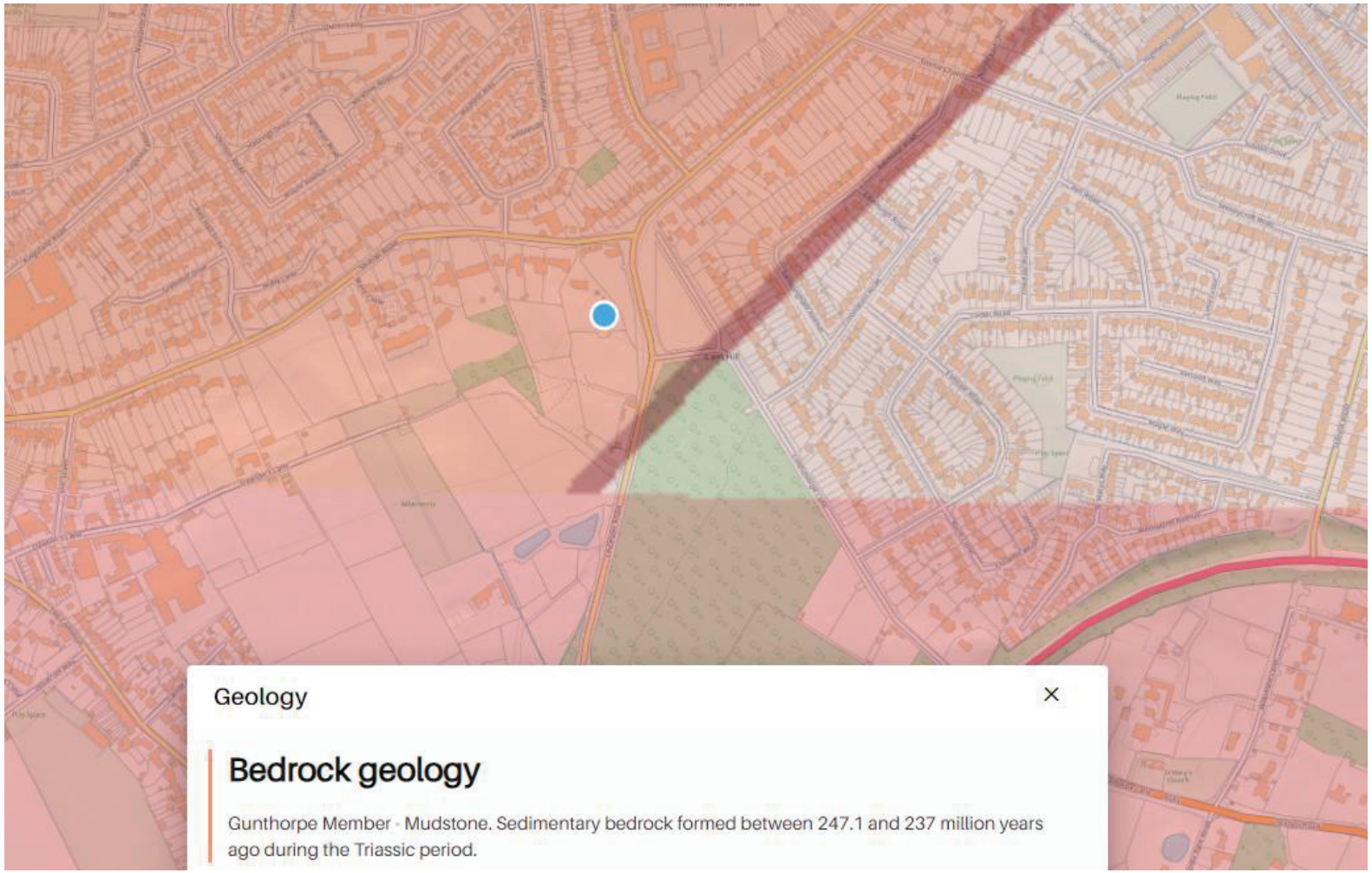
BGS Geology of Britain Map Extract – Showing the superficial





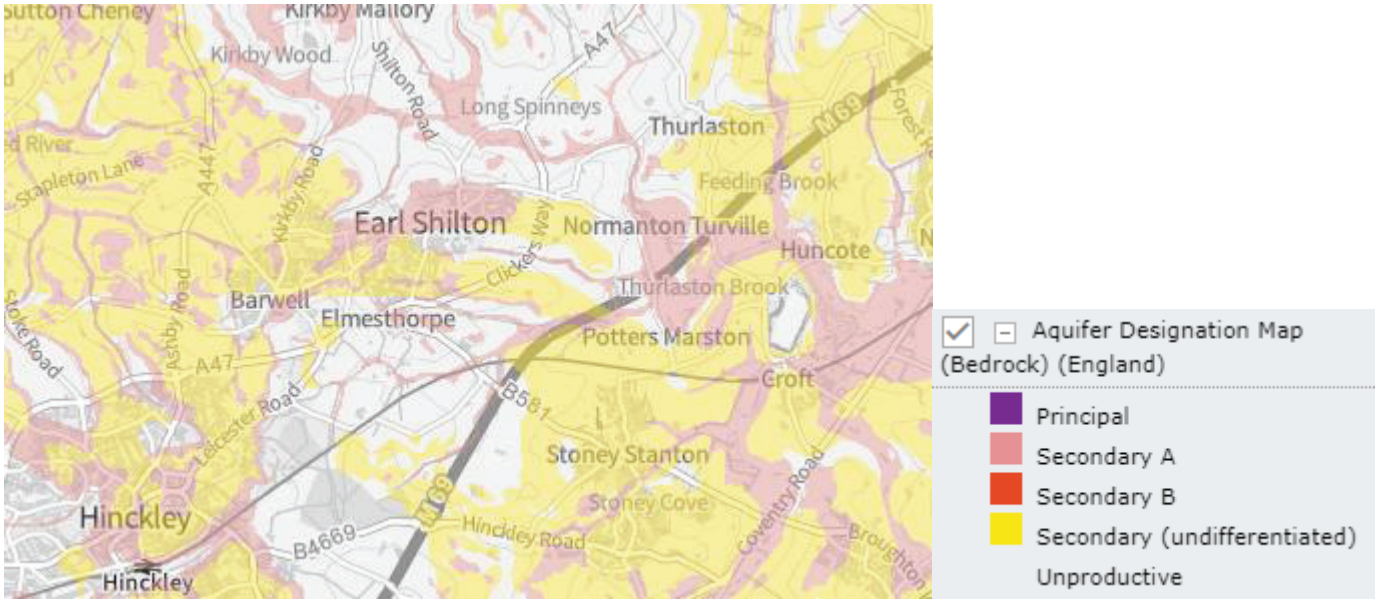


BGS Geology of Britain Map Extract – Showing the bedrock

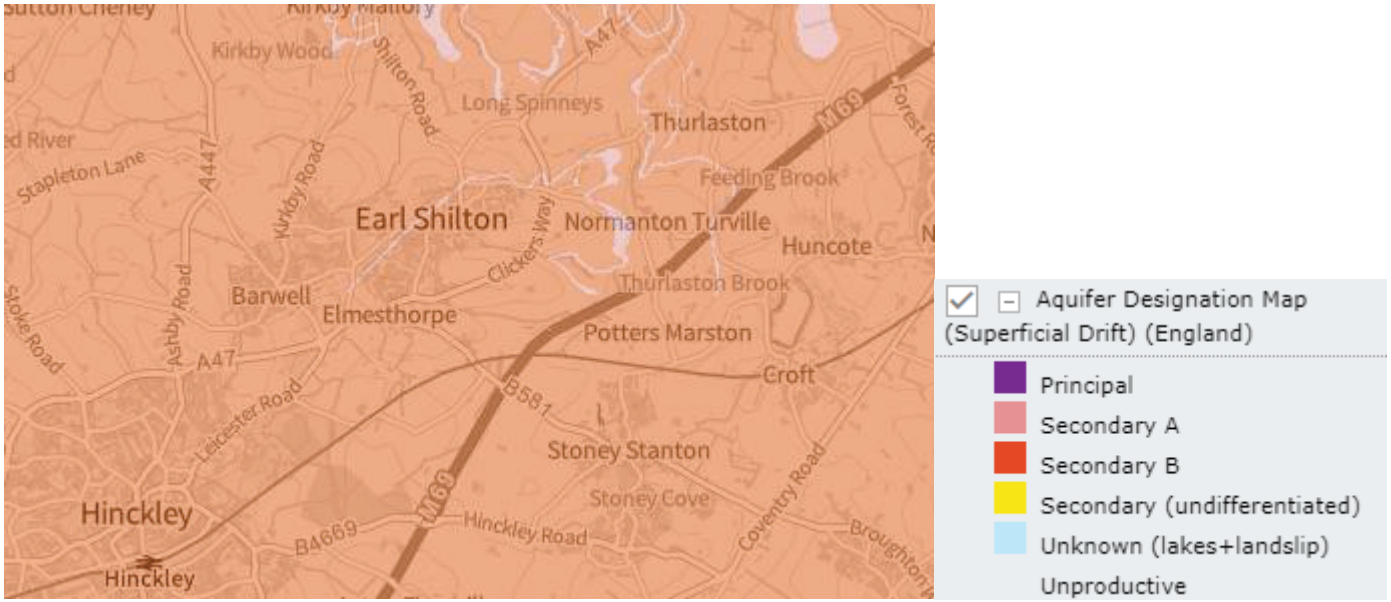


Appendix D

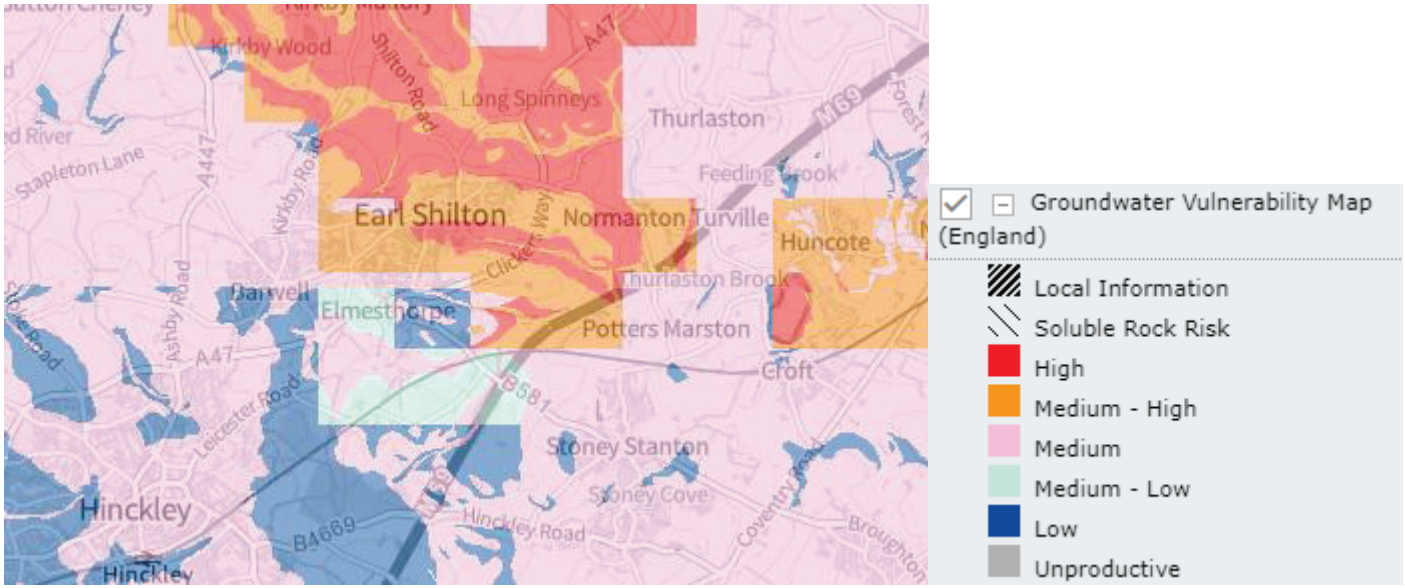
DEFRA Magic Map Extract – showing superficial deposits designations



DEFRA Magic Map Extract – showing bedrock designations

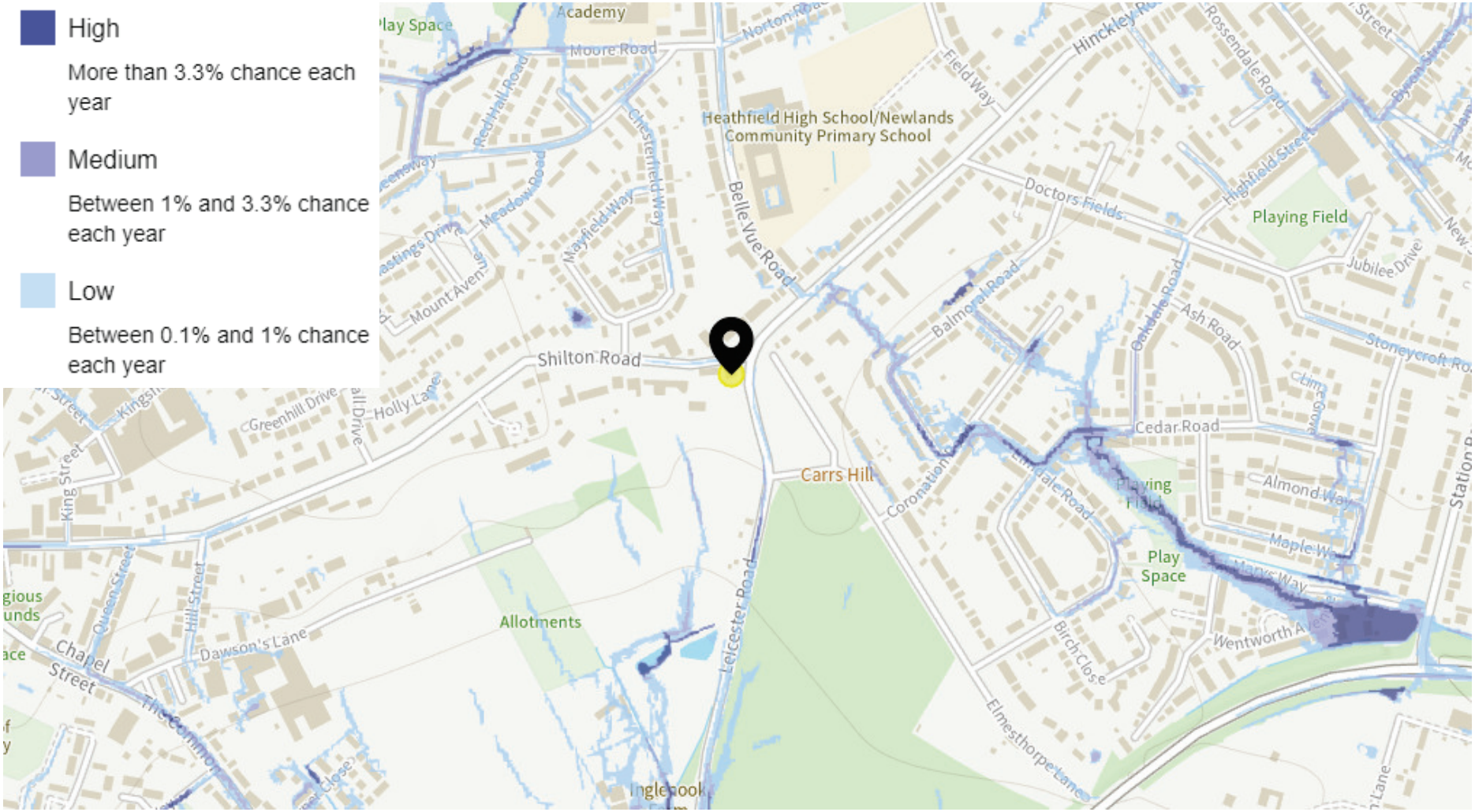


DEFRA Magic Map Extract – showing groundwater vulnerabilities

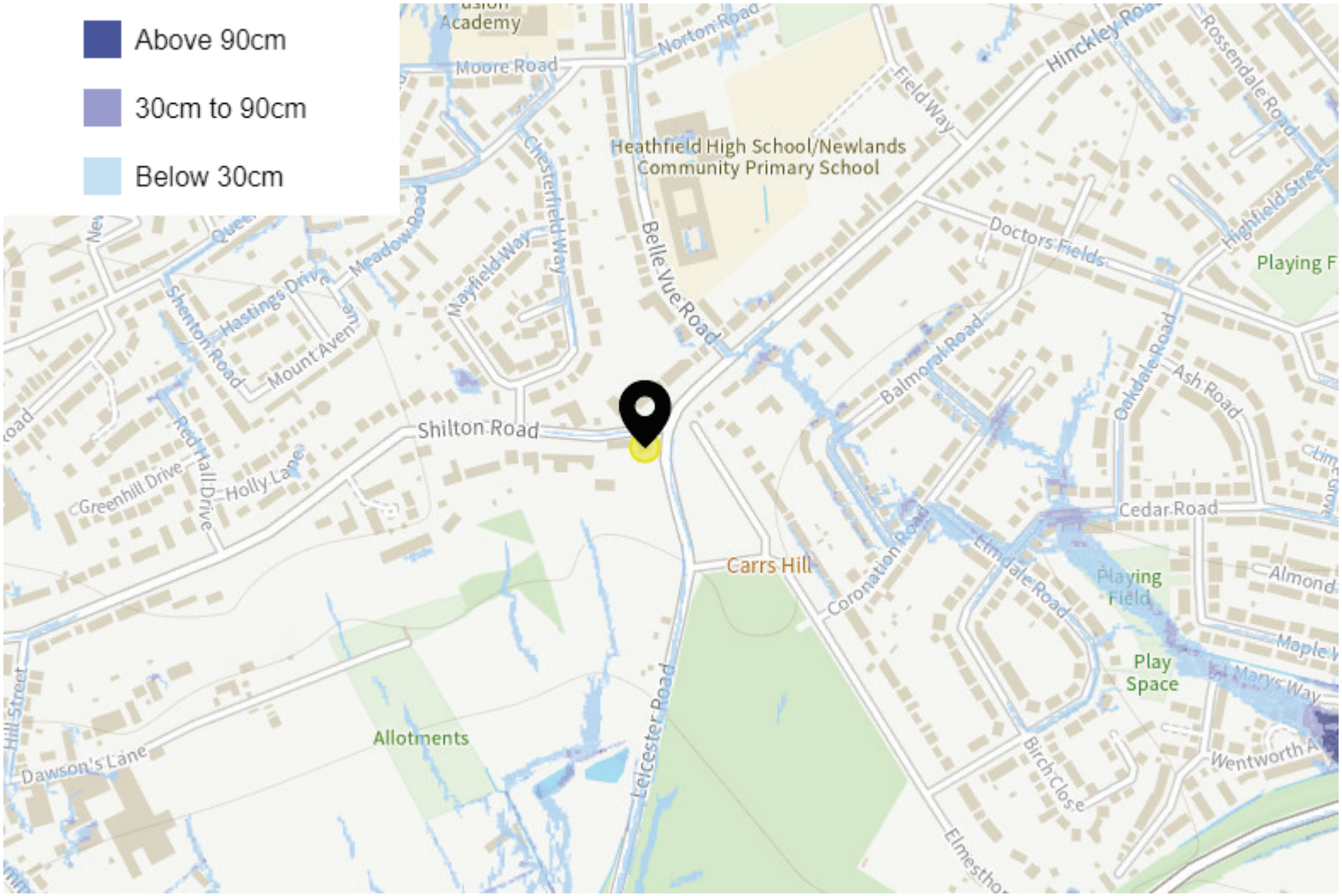


Appendix E

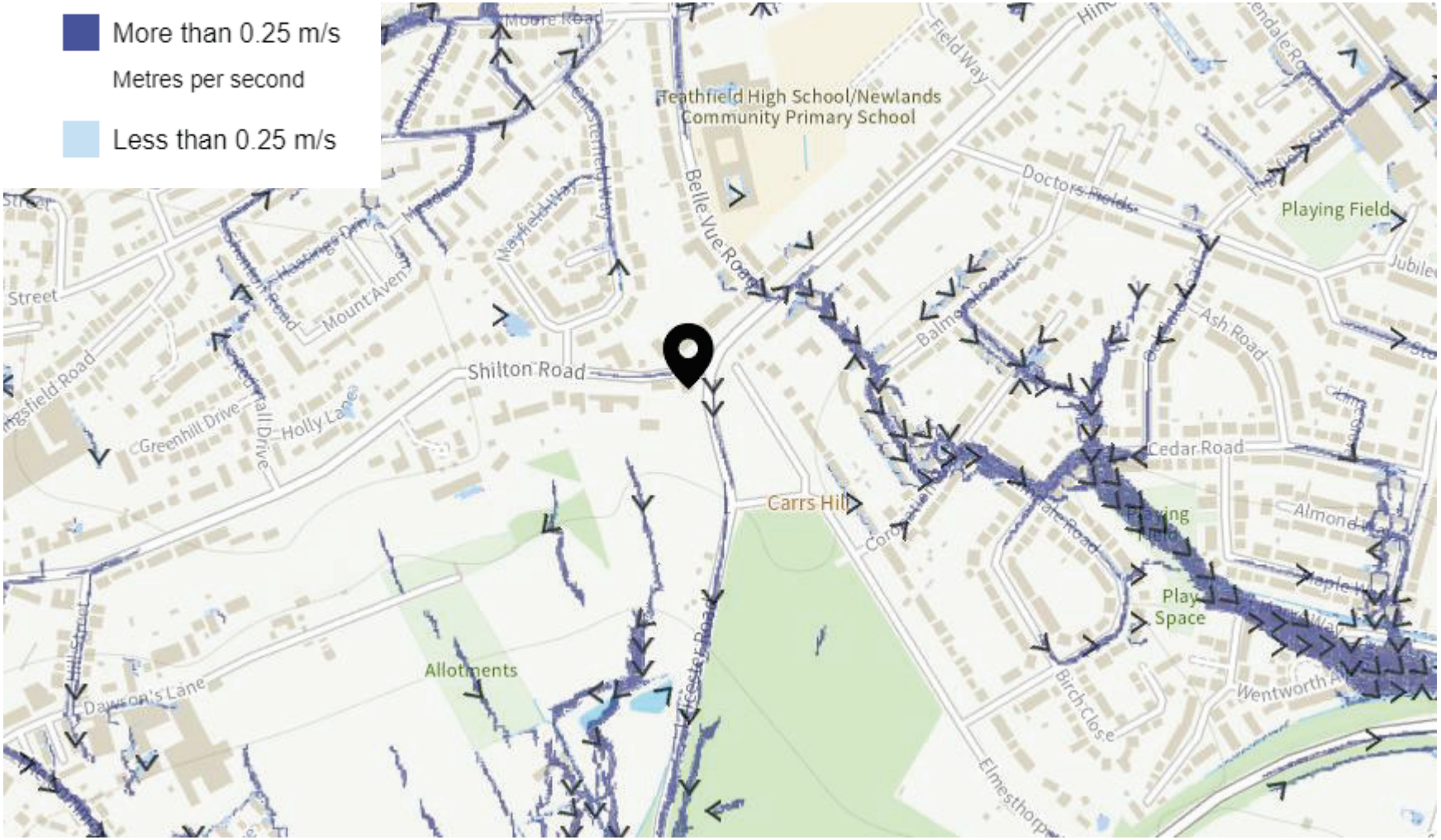
Gov.uk Long Term Flood Risk Map Extract showing extent of surface water flooding



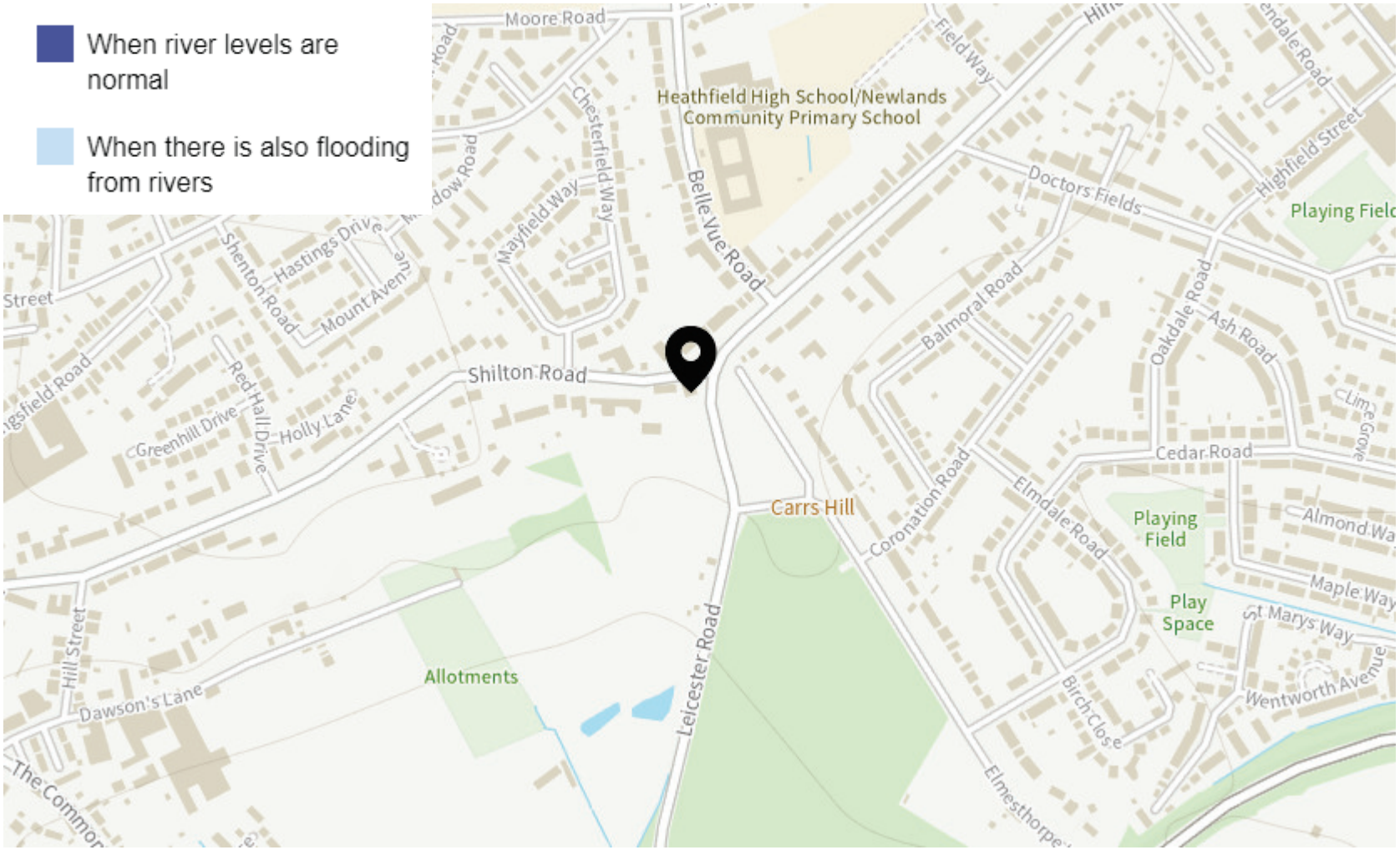
Gov.uk Long Term Flood Risk Map Extract showing surface water flooding depth in the low risk scenario



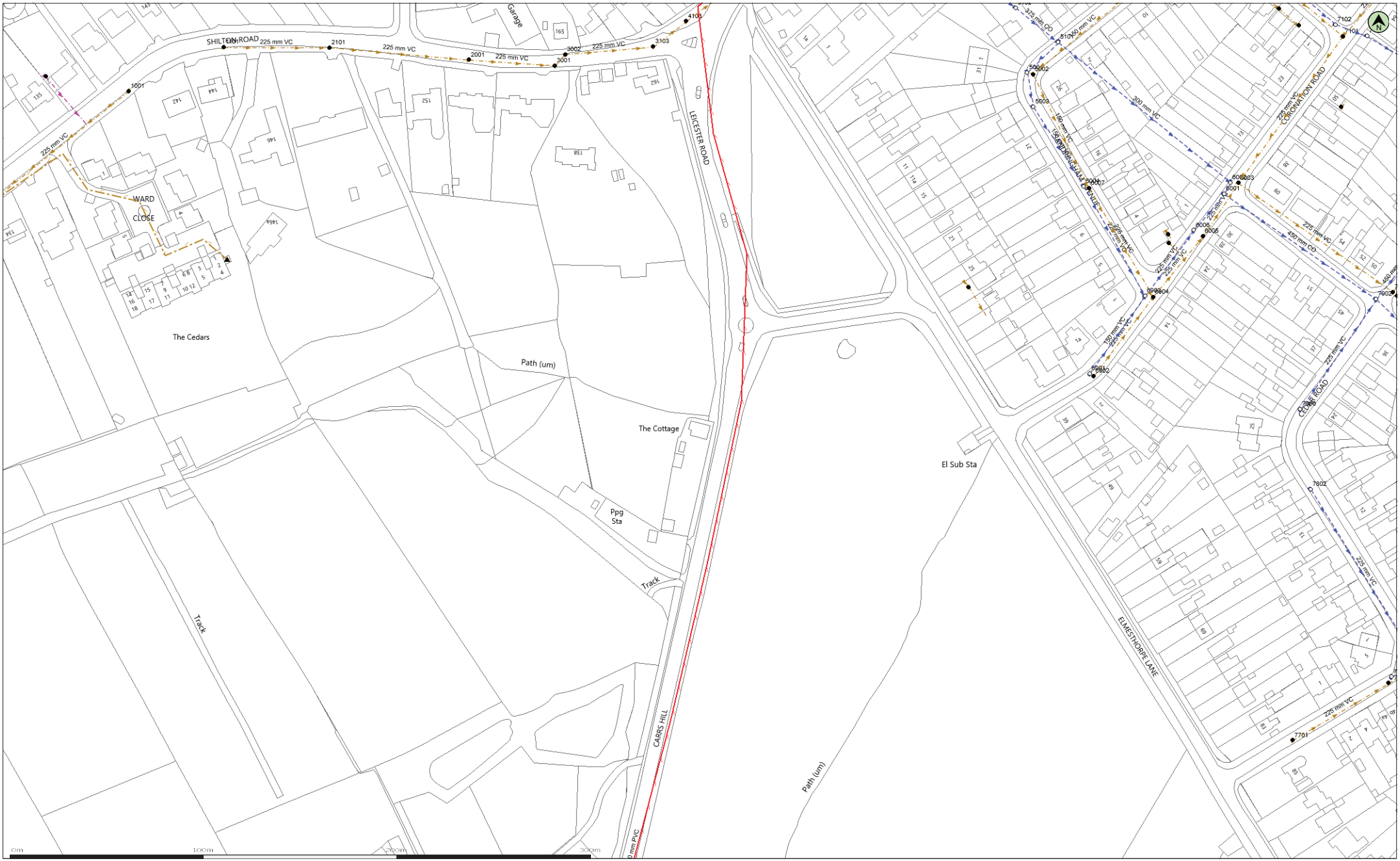
Gov.uk Long Term Flood Risk Map Extract showing surface water flooding velocity in the low risk scenario



Gov.uk Long Term Flood Risk Map Extract showing Reservoirs flooding risk



Appendix F



(c) Crown copyright and database rights 2024 Ordnance Survey 100031673 | Date: 23/07/24 | Scale: 1:1250 | Map Centre: 445410,296907 | Data updated: 14/07/24 | Our Ref: 1526891 - 1

Wastewater Plan A2
Powered by digdat

- Public Foul Gravity/Lateral Drain
- Public Combined Gravity/Lateral Drain
- Public Surface Water Gravity/Lateral Drain
- Pressure Foul
- Pressure Combined
- Pressure Surface Water
- Highway Drain
- Overflow Pipe
- Disposal Pipe
- Culverted Water Course
- Pumping Station
- Fitting
- Manhole Foul
- Manhole Surface
- Abandoned Pipe
- Chamber

Section 104 sewers are shown in green

Private sewers are shown in magenta

b.parmar@dwsltd.co.uk

24-21177

SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	F			
	F			
	F			
	F			
	F			
	F			
	F			
1001	F	131.59	130.17	1.42
1101	F	130.53	127.96	2.57
2001	F	128.19	126.01	2.18
2101	F	129.55	127.19	2.36
3001	F	127.78	125.8	1.98
3002	F	127.48	125.77	1.71
3103	F	126.9	124.96	1.94
4103	F	126.48	124.61	1.87
5002	F	116.58	114.83	1.75
6003	F	113.47	111.34	2.13
6005	F	113.1	111.65	1.45
6007	F	115.29	113.76	1.53
6902	F	116.8	115.35	1.45
6904	F	114.57	113.1	1.47
7101	F	113.55	111.97	1.58
7701	F	115.72	113.98	1.74
7703	F	113.93	112.33	1.6
7901	F	110.11	108.9	1.21
7903	F	110	108.1	1.9
5001	S	116.64	115.42	1.22
5003	S	116.33	114.92	1.41
5101	S	116.77	115.93	0.84
5102	S	118.12	116.43	1.69
6001	S	113.37	111.8	1.57
6002	S	113.43	111.94	1.49
6004	S	115.53	114.23	1.3
6006	S	113.16	112.12	1.04
6901	S	116.75	115.51	1.23
6903	S	114.75	113.46	1.29
7102	S	113.8	112.19	1.61
7103	S	112.98	111.92	1.06
7704	S	113.87	112.24	1.63
7802	S	115.12	113.66	1.46
7902	S	110.47	108.77	1.7
7906	S	113.71	112.09	1.61

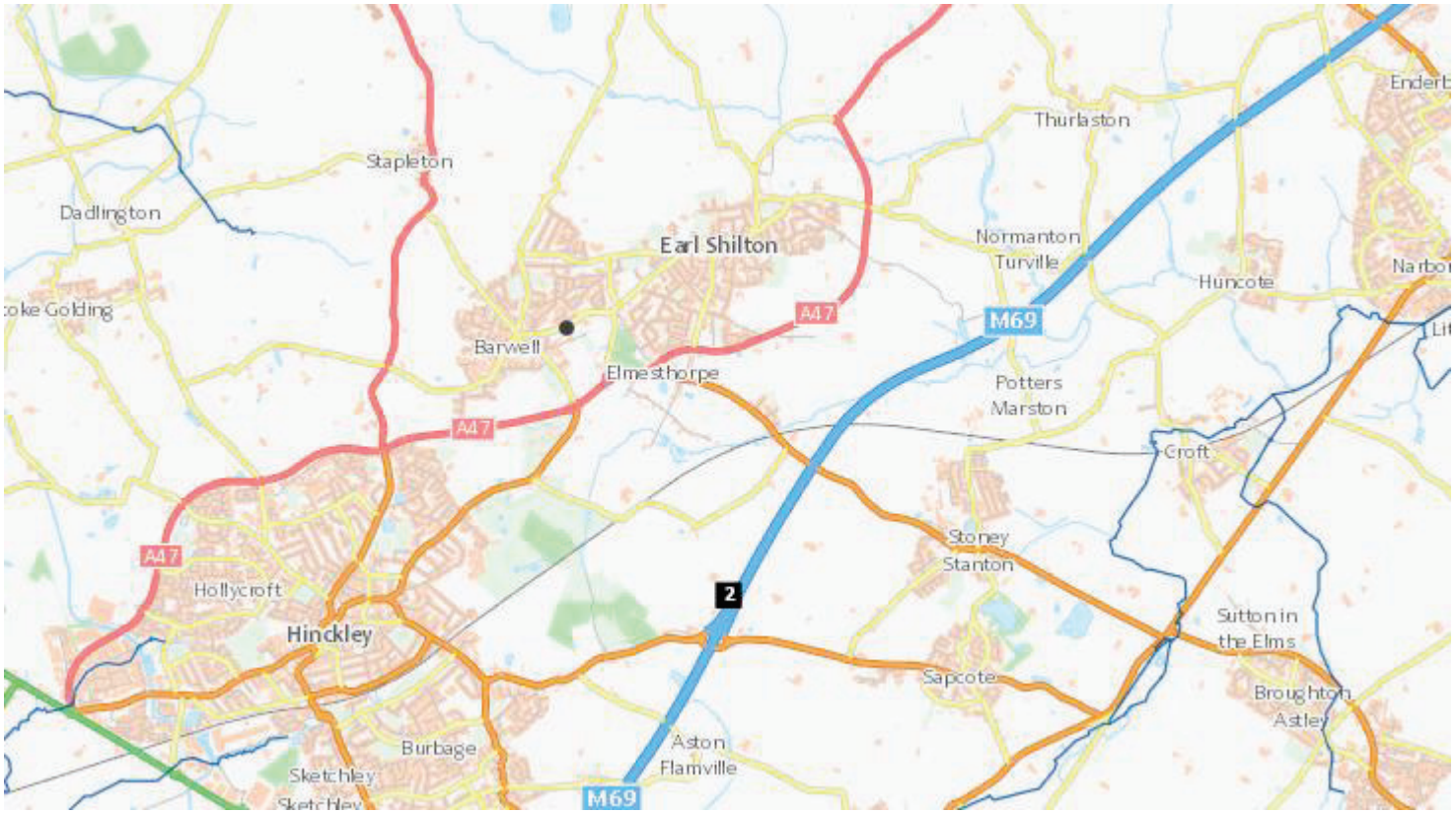
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

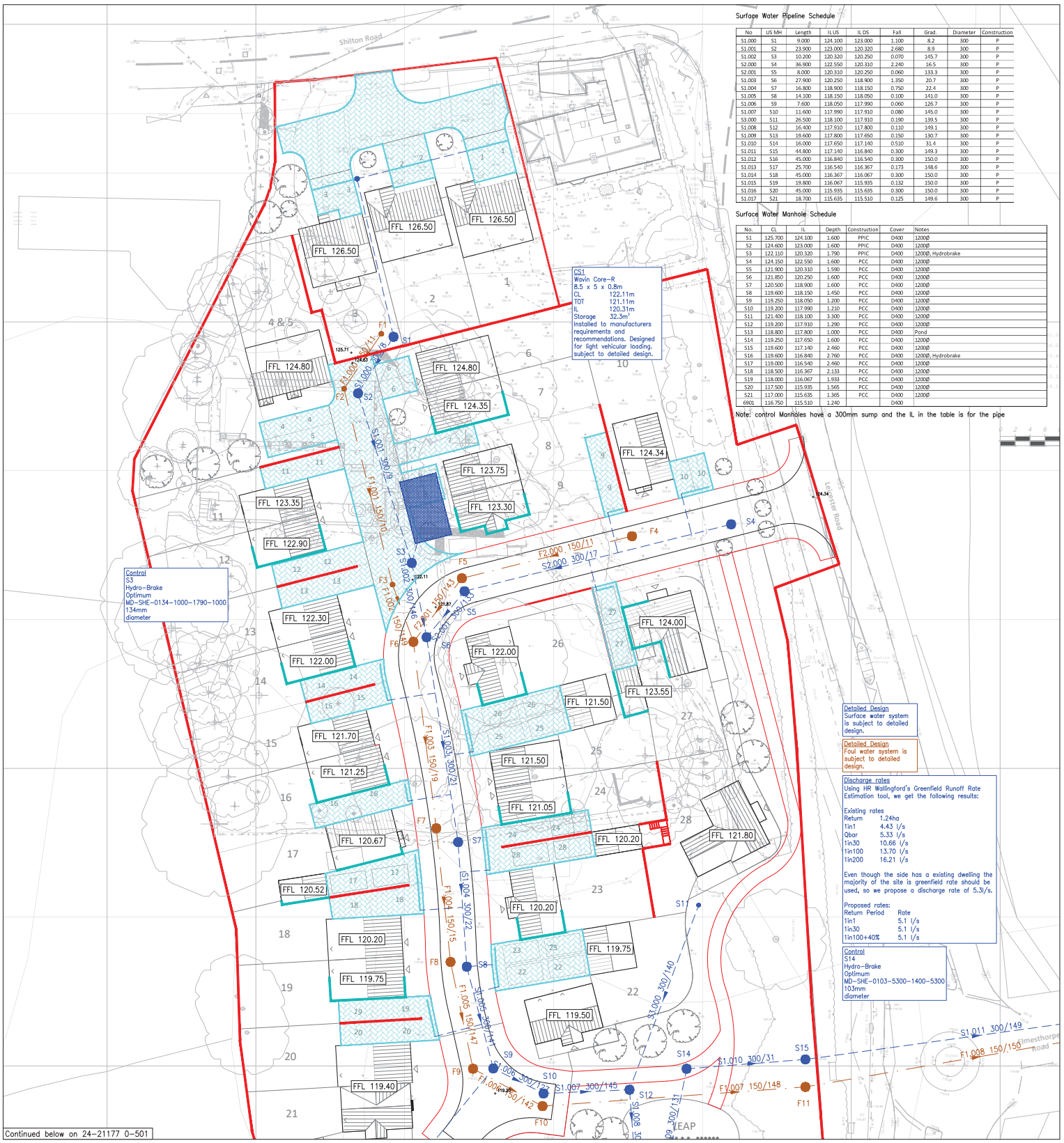
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix G

Environment Agency Main Rivers Map Extract



Appendix H



Continued below on 24-21177 0-501

Surface Water Pipeline Schedule

No	US MH	Length	IL US	IL DS	Fall	Grad.	Diameter	Construction
S1.000	S1	9.000	124.100	123.000	1.100	8.2	300	P
S1.001	S2	23.900	123.000	120.320	2.680	8.9	300	P
S1.002	S3	10.200	120.320	120.250	0.070	145.7	300	P
S2.000	S4	36.900	122.550	120.310	2.240	16.5	300	P
S2.001	S5	8.000	120.310	120.250	0.060	133.3	300	P
S1.003	S6	27.900	120.250	118.900	1.350	20.7	300	P
S1.004	S7	16.800	118.900	118.150	0.750	22.4	300	P
S1.005	S8	14.100	118.150	118.050	0.100	141.0	300	P
S1.006	S9	7.600	118.050	117.990	0.060	126.7	300	P
S1.007	S10	11.600	117.990	117.910	0.080	145.0	300	P
S3.000	S11	26.500	118.100	117.910	0.190	139.5	300	P
S1.008	S12	16.400	117.910	117.800	0.110	149.1	300	P
S1.009	S13	19.600	117.800	117.650	0.150	130.7	300	P
S1.010	S14	16.000	117.650	117.140	0.510	31.4	300	P
S1.011	S15	44.800	117.140	116.840	0.300	149.3	300	P
S1.012	S16	45.000	116.840	116.540	0.300	150.0	300	P
S1.013	S17	25.700	116.540	116.367	0.173	148.6	300	P
S1.014	S18	45.000	116.367	116.067	0.300	150.0	300	P
S1.015	S19	19.800	116.067	115.935	0.132	150.0	300	P
S1.016	S20	45.000	115.935	115.635	0.300	150.0	300	P
S1.017	S21	18.700	115.635	115.510	0.125	149.6	300	P

Surface Water Manhole Schedule

No.	CL	IL	Depth	Construction	Cover	Notes
S1	125.700	124.100	1.600	PPIC	D400	1200Ø
S2	124.600	123.000	1.600	PPIC	D400	1200Ø
S3	122.110	120.320	1.790	PPIC	D400	1200Ø, Hydrobrake
S4	124.150	122.550	1.600	PCC	D400	1200Ø
S5	121.900	120.310	1.590	PCC	D400	1200Ø
S6	121.850	120.250	1.600	PCC	D400	1200Ø
S7	120.500	118.900	1.600	PCC	D400	1200Ø
S8	119.600	118.150	1.450	PCC	D400	1200Ø
S9	119.250	118.050	1.200	PCC	D400	1200Ø
S10	119.200	117.990	1.210	PCC	D400	1200Ø
S11	121.400	118.100	3.300	PCC	D400	1200Ø
S12	119.200	117.910	1.290	PCC	D400	1200Ø
S13	118.800	117.800	1.000	PCC	D400	Pond
S14	119.250	117.650	1.600	PCC	D400	1200Ø
S15	119.600	117.140	2.460	PCC	D400	1200Ø
S16	119.600	116.840	2.760	PCC	D400	1200Ø, Hydrobrake
S17	119.000	116.540	2.460	PCC	D400	1200Ø
S18	118.500	116.367	2.133	PCC	D400	1200Ø
S19	118.000	116.067	1.933	PCC	D400	1200Ø
S20	117.500	115.935	1.565	PCC	D400	1200Ø
S21	117.000	115.635	1.365	PCC	D400	1200Ø
6901	116.750	115.510	1.240		D400	

Note: control Manholes have a 300mm sump and the IL in the table is for the pipe

Foul Water Pipeline Schedule

No	US MH	Length	IL US	IL DS	Fall	Grad.	Diameter	Construction
F1.000	F1	8.930	123.500	122.700	0.800	11.2	150	P
F1.001	F2	27.110	122.700	120.005	2.695	10.1	150	P
F1.002	F3	8.180	120.005	119.950	0.055	148.7	150	P
F2.000	F4	23.550	122.100	120.025	2.075	11.3	150	P
F2.001	F5	10.740	120.025	119.950	0.075	143.2	150	P
F1.003	F6	25.240	119.950	118.620	1.330	19.0	150	P
F1.004	F7	18.070	118.620	117.425	1.195	15.1	150	P
F1.005	F8	14.470	117.425	117.325	0.100	146.7	150	P
F1.006	F9	10.610	117.325	117.250	0.075	141.5	150	P
F1.007	F10	35.410	117.250	117.010	0.240	147.5	150	P
F1.008	F11	45.000	117.010	116.710	0.300	150.0	150	P
F1.009	F12	43.830	116.710	116.415	0.295	148.6	150	P
F1.010	F13	24.760	116.415	116.250	0.165	150.1	150	P
F1.011	F14	45.000	116.250	115.950	0.300	150.0	150	P
F1.012	F15	22.500	115.950	115.800	0.150	150.0	150	P
F1.013	F16	45.000	115.800	115.500	0.300	150.0	150	P
F1.014	F17	21.120	115.500	115.350	0.150	140.8	150	P

Foul Water Manhole Schedule

No.	CL	IL	Depth	Construction	Cover	Notes
F1	125.700	123.500	2.200	PPIC	D400	450Ø
F2	124.600	122.700	1.900	PPIC	D400	1200Ø
F3	122.110	120.005	2.105	PPIC	D400	1200Ø
F4	124.000	122.100	1.900	PPIC	D400	1200Ø
F5	121.900	120.025	1.875	PPIC	D400	1200Ø
F6	121.850	119.950	1.900	PPIC	D400	1200Ø
F7	120.520	118.620	1.900	PPIC	D400	1200Ø
F8	119.600	117.425	2.175	PPIC	D400	1200Ø
F9	119.250	117.325	1.925	PPIC	D400	1200Ø
F10	119.200	117.250	1.950	PPIC	D400	1200Ø
F11	119.600	117.010	2.590	PPIC	D400	1200Ø
F12	119.600	116.710	2.880	PPIC	D400	1200Ø
F13	119.000	116.415	2.585	PPIC	D400	1200Ø
F14	118.500	116.250	2.250	PPIC	D400	1200Ø
F15	118.000	115.950	2.050	PPIC	D400	1200Ø
F16	117.500	115.800	1.700	PPIC	D400	1200Ø
F17	117.000	115.500	1.500	PPIC	D400	1200Ø
6902	116.800	115.350	1.450	Brick		

SCALE BAR TEST
1:250 15m @ 1:250 1:250

All dimensions to be verified by accurate site measurement prior to commencing work or ordering materials.

DO NOT SCALE

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DWS DRAWINGS, CALCULATIONS, REPORTS AND SPECIFICATIONS (WHERE APPLICABLE) AND, ALL OTHER RELEVANT ENGINEERS, ARCHITECTS & SPECIALIST DESIGN DETAILS.
2. STANDARD NOTES & DETAILS:
   Refer to drawing number 0-170 onwards for standard notes – CIVIL
   Refer to drawing number 0-180 onwards for standard details – CIVIL

KEY

- Surface Water Pipe (Private)
- Surface Water Chamber (Private)
- Permeable Paving
- Attenuation Tank
- Fin Drain
- Foul Water Pipe (Private)
- Foul Water Chamber (Private)
- Existing Surface Water Sewer
- Existing Foul Water Sewer
- Site Boundary
- Retaining Structure
- Exposed Brickwork
- FFL 124.75 Finished Floor Level

DRAINAGE LAYOUT - MAIN SITE
Scale 1:250

Ref	Revision	Date	By
P2	Updated architectural layout	20.02.25	LM
P1	First issue	13.01.25	LM

Issue: PRELIMINARY

NOT FOR CONSTRUCTION

DWS Consulting Engineers
Diamond Wood & Shaw Limited

Project Title
LEICESTER ROAD
BARWELL

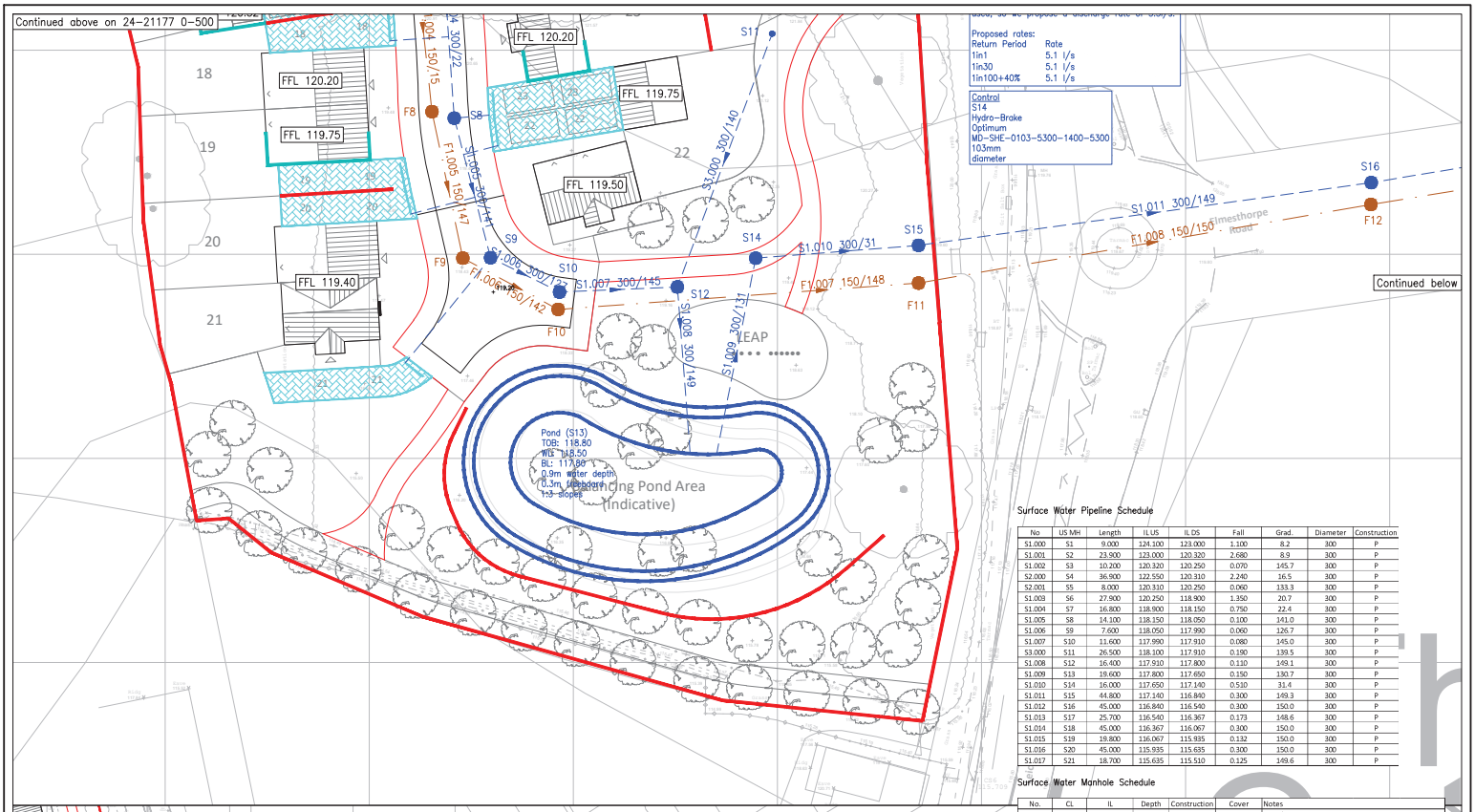
Drawn	Engineer	Checked
LM	LM	BP

Scale	Date
1:250 @ A1	JAN 2025

Drawing Title
DRAINAGE LAYOUT - MAIN SITE

Project No.	Drawing No.	Revision
24-21177	0-500	P2

BIM Code



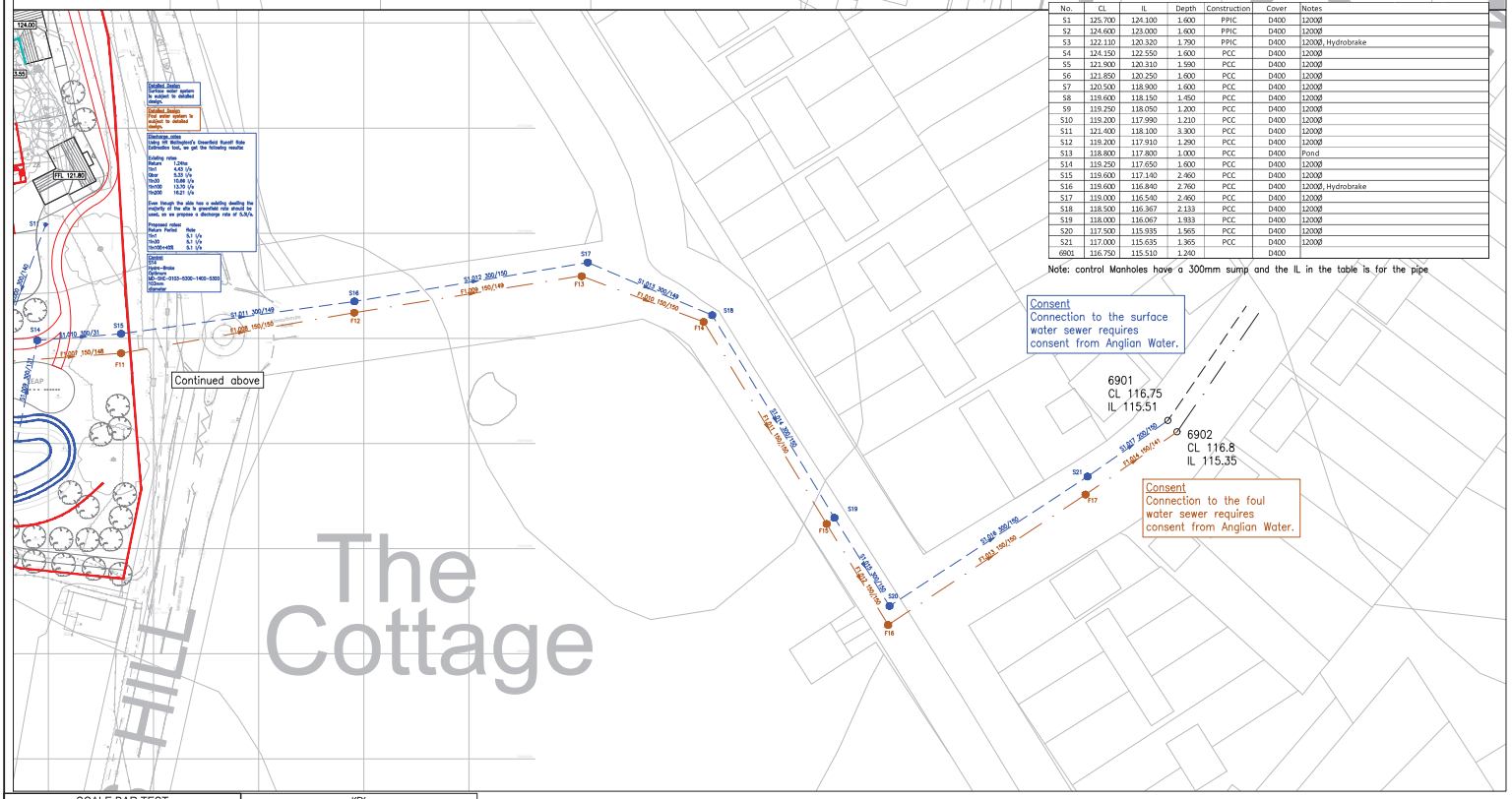
Surface Water Pipeline Schedule

No	US MH	Length	IL US	IL DS	Fall	Grad.	Diameter	Construction
S1.000	S1	9.000	124.100	123.000	1.100	8.2	300	P
S1.001	S2	23.900	123.000	120.320	2.680	8.9	300	P
S1.002	S3	10.200	120.320	120.250	0.070	145.7	300	P
S2.000	S4	36.900	122.550	120.310	2.240	16.5	300	P
S2.001	S5	8.000	120.310	120.250	0.060	133.3	300	P
S1.003	S6	27.900	120.250	118.900	1.350	20.7	300	P
S1.004	S7	16.800	118.900	118.150	0.750	22.4	300	P
S1.005	S8	14.100	118.150	118.050	0.100	141.0	300	P
S1.006	S9	7.600	118.050	117.990	0.060	126.7	300	P
S1.007	S10	11.600	117.990	117.910	0.080	145.0	300	P
S3.000	S11	26.500	118.100	117.910	0.190	139.5	300	P
S1.008	S12	16.400	117.910	117.800	0.110	149.1	300	P
S1.009	S13	19.600	117.800	117.650	0.150	130.7	300	P
S1.010	S14	16.000	117.650	117.140	0.510	31.4	300	P
S1.011	S15	44.800	117.140	116.840	0.300	149.3	300	P
S1.012	S16	45.000	116.840	116.540	0.300	150.0	300	P
S1.013	S17	25.700	116.540	116.367	0.173	148.6	300	P
S1.014	S18	45.000	116.367	116.067	0.300	150.0	300	P
S1.015	S19	19.800	116.067	115.935	0.132	150.0	300	P
S1.016	S20	45.000	115.935	115.635	0.300	150.0	300	P
S1.017	S21	18.700	115.635	115.510	0.125	149.6	300	P

Surface Water Manhole Schedule

No.	CL	IL	Depth	Construction	Cover	Notes
S1	125.700	124.100	1.600	PPIC	D400	1200Ø
S2	124.600	123.000	1.600	PPIC	D400	1200Ø
S3	122.110	120.320	1.790	PPIC	D400	1200Ø, Hydrobrake
S4	124.150	122.550	1.600	PCC	D400	1200Ø
S5	121.900	120.310	1.590	PCC	D400	1200Ø
S6	121.850	120.250	1.600	PCC	D400	1200Ø
S7	120.500	118.900	1.600	PCC	D400	1200Ø
S8	119.600	118.150	1.450	PCC	D400	1200Ø
S9	119.250	118.050	1.200	PCC	D400	1200Ø
S10	119.200	117.990	1.210	PCC	D400	1200Ø
S11	121.400	118.100	3.300	PCC	D400	1200Ø
S12	119.200	117.910	1.290	PCC	D400	1200Ø
S13	118.800	117.800	1.000	PCC	D400	Pond
S14	119.250	117.650	1.600	PCC	D400	1200Ø
S15	119.600	117.140	2.460	PCC	D400	1200Ø
S16	119.600	116.840	2.760	PCC	D400	1200Ø, Hydrobrake
S17	119.000	116.540	2.460	PCC	D400	1200Ø
S18	118.500	116.367	2.133	PCC	D400	1200Ø
S19	118.000	116.067	1.933	PCC	D400	1200Ø
S20	117.500	115.935	1.565	PCC	D400	1200Ø
S21	117.000	115.635	1.365	PCC	D400	1200Ø
6901	116.750	115.510	1.240		D400	

Note: control Manholes have a 300mm sump and the IL in the table is for the pipe



SCALE BAR TEST
1:250 — 15m @ 1:250 — 1:250
All dimensions to be verified by accurate site measurement prior to commencing work or ordering materials.

SCALE BAR TEST
1:500 — 30m @ 1:500 — 1:500
All dimensions to be verified by accurate site measurement prior to commencing work or ordering materials.

DO NOT SCALE

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- Surface Water Pipe (Private)
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- Attenuation Tank
- Fin Drain
- Foul Water Pipe (Private)
- Foul Water Chamber (Private)
- Existing Surface Water Sewer
- Existing Foul Water Sewer
- Site Boundary
- Retaining Structure
- Exposed Brickwork
- FFL 124.75 Finished Floor Level

Foul Water Pipeline Schedule

No	US MH	Length	IL US	IL DS	Fall	Grad.	Diameter	Construction
F1.000	F1	8.930	123.500	122.700	0.800	11.2	150	P
F1.001	F2	27.110	122.700	120.005	2.695	10.1	150	P
F1.002	F3	8.180	120.005	119.950	0.055	148.7	150	P
F2.000	F4	23.550	122.100	120.025	2.075	11.3	150	P
F2.001	F5	10.740	120.025	119.950	0.075	143.2	150	P
F1.003	F6	25.240	119.950	118.620	1.330	19.0	150	P
F1.004	F7	18.070	118.620	117.425	1.195	15.1	150	P
F1.005	F8	14.670	117.425	117.325	0.100	146.7	150	P
F1.006	F9	10.610	117.325	117.250	0.075	141.5	150	P
F1.007	F10	35.410	117.250	117.010	0.240	147.5	150	P
F1.008	F11	45.000	117.010	116.710	0.300	150.0	150	P
F1.009	F12	43.830	116.710	116.415	0.295	148.6	150	P
F1.010	F13	24.760	116.415	116.250	0.165	150.1	150	P
F1.011	F14	45.000	116.250	115.950	0.300	150.0	150	P
F1.012	F15	22.500	115.950	115.800	0.150	150.0	150	P
F1.013	F16	45.000	115.800	115.500	0.300	150.0	150	P
F1.014	F17	21.120	115.500	115.350	0.150	140.8	150	P

Foul Water Manhole Schedule

No.	CL	IL	Depth	Construction	Cover	Notes
F1	125.700	123.500	2.200	PPIC	D400	450Ø
F2	124.600	122.700	1.900	PPIC	D400	1200Ø
F3	122.110	120.005	2.105	PPIC	D400	1200Ø
F4	124.000	122.100	1.900	PPIC	D400	1200Ø
F5	121.900	120.025	1.875	PPIC	D400	1200Ø
F6	121.850	119.950	1.900	PPIC	D400	1200Ø
F7	120.520	118.620	1.900	PPIC	D400	1200Ø
F8	119.600	117.425	2.175	PPIC	D400	1200Ø
F9	119.250	117.325	1.925	PPIC	D400	1200Ø
F10	119.200	117.250	1.950	PPIC	D400	1200Ø
F11	119.600	117.010	2.590	PPIC	D400	1200Ø
F12	119.600	116.710	2.890	PPIC	D400	1200Ø
F13	119.000	116.415	2.585	PPIC	D400	1200Ø
F14	118.500	116.250	2.250	PPIC	D400	1200Ø
F15	118.000	115.950	2.050	PPIC	D400	1200Ø
F16	117.500	115.800	1.700	PPIC	D400	1200Ø
F17	117.000	115.500	1.500	PPIC	D400	1200Ø
6902	116.800	115.350	1.450	Brick		

DRAINAGE LAYOUT - OUTFALL
Scale 1:250, 1:500

Ref	Revision	Date	By
P2	Updated architectural layout	20.02.25	LM
P1	First issue	13.01.25	LM

NOT FOR CONSTRUCTION

Issue: PRELIMINARY

DWS Consulting Engineers
Diamond Wood & Shaw Limited

Project Title
LEICESTER ROAD
BARWELL

Drawn	Engineer	Checked
LM	LM	BP

Scale	Date
1:250, 1:500 @ A1	JAN 2025

Drawing Title
DRAINAGE LAYOUT - OUTFALL

Project No.	Drawing No.	Revision
24-21177	0-501	P2

BIM Code

Appendix I

Diamond Wood & Shaw Limited
The Old School · Blaby Road · Enderby · Leicester · LE19 4AR
Tel: 0116 284 8989 · Email: mail@dwsltd.co.uk

Surface Water Drainage Calculations

Client:	DT Developers
Architect:	Hayward Architects Ltd
Project:	Leicester Road, Barwell
Project No:	24-21177
Document No:	0-010
Issue:	Rev P1: January 2025 RevP2: February 2025
Status:	Preliminary
Date:	20th February 2025
Engineer:	LM

Issue Status:
A=Approval
B=Building Regulations
C=Construction
D=Draft
P=Preliminary
R=Review
T=Tender
Z=Final Construction

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Leigh Middleton
Site name:	Leicester Road, Barwell
Site location:	

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:	52.56923° N
Longitude:	1.33196° W
Reference:	3674547351
Date:	Jan 14 2025 09:46

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	1.24

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):	634	634
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

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):	5.33	5.33
1 in 1 year (l/s):	4.43	4.43
1 in 30 years (l/s):	10.66	10.66
1 in 100 year (l/s):	13.7	13.7
1 in 200 years (l/s):	16.21	16.21

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.700	Add Flow / Climate Change (%)	0
Ratio R	0.404	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)	500

Designed with Level Soffits

Network Design Table for Storm

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	9.000	1.100	8.2	0.057	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	23.900	2.680	8.9	0.077	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	10.200	0.090	113.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	36.900	2.240	16.5	0.072	4.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	8.000	0.060	133.3	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	27.900	1.350	20.7	0.090	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	16.800	0.750	22.4	0.044	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	14.100	0.100	141.0	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	7.600	0.060	126.7	0.038	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	11.600	0.080	145.0	0.000	0.00	0.0	0.600	o	300	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	4.03	124.100	0.057	0.0	0.0	0.0	5.53	390.8	7.7
1.001	50.00	4.10	123.000	0.134	0.0	0.0	0.0	5.30	374.3	18.1
1.002	50.00	4.22	120.320	0.134	0.0	0.0	0.0	1.48	104.3	18.1
2.000	50.00	4.16	122.550	0.072	0.0	0.0	0.0	3.89	275.2	9.7
2.001	50.00	4.26	120.310	0.080	0.0	0.0	0.0	1.36	96.1	10.8
1.003	50.00	4.39	120.250	0.304	0.0	0.0	0.0	3.47	245.6	41.2
1.004	50.00	4.47	118.900	0.348	0.0	0.0	0.0	3.34	235.8	47.1
1.005	50.00	4.65	118.150	0.394	0.0	0.0	0.0	1.32	93.5	53.4
1.006	50.00	4.74	118.050	0.432	0.0	0.0	0.0	1.40	98.6	58.5
1.007	50.00	4.89	117.990	0.432	0.0	0.0	0.0	1.30	92.1	58.5

Network Design Table for Storm

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
3.000	26.500	0.190	139.5	0.008	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	16.400	0.110	149.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	19.600	0.150	130.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	16.000	0.510	31.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.011	44.800	0.300	149.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.012	45.000	0.300	150.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.013	25.700	0.173	148.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	45.000	0.300	150.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.015	19.800	0.132	150.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.016	45.000	0.300	150.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.017	18.700	0.125	149.6	0.000	0.00	0.0	0.600	o	300	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)
3.000	50.00	4.33	118.100	0.008	0.0	0.0	0.0	1.33	94.0	1.1
1.008	50.00	5.10	117.910	0.440	0.0	0.0	0.0	1.29	90.9	59.6
1.009	50.00	5.34	117.800	0.440	0.0	0.0	0.0	1.37	97.1	59.6
1.010	50.00	5.44	117.650	0.440	0.0	0.0	0.0	2.82	199.1	59.6
1.011	50.00	6.02	117.140	0.440	0.0	0.0	0.0	1.28	90.8	59.6
1.012	50.00	6.60	116.840	0.440	0.0	0.0	0.0	1.28	90.6	59.6
1.013	50.00	6.93	116.540	0.440	0.0	0.0	0.0	1.29	91.0	59.6
1.014	50.00	7.52	116.367	0.440	0.0	0.0	0.0	1.28	90.6	59.6
1.015	50.00	7.78	116.067	0.440	0.0	0.0	0.0	1.28	90.6	59.6
1.016	50.00	8.36	115.935	0.440	0.0	0.0	0.0	1.28	90.6	59.6
1.017	50.00	8.61	115.635	0.440	0.0	0.0	0.0	1.28	90.7	59.6

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	125.700	1.600	Open Manhole	1200	1.000	124.100	300				
S2	124.600	1.600	Open Manhole	1200	1.001	123.000	300	1.000	123.000	300	
S3	122.110	1.790	Open Manhole	1200	1.002	120.320	300	1.001	120.320	300	
S4	124.150	1.600	Open Manhole	1200	2.000	122.550	300				
S5	121.900	1.590	Open Manhole	1200	2.001	120.310	300	2.000	120.310	300	
S6	121.850	1.620	Open Manhole	1200	1.003	120.250	300	1.002	120.230	300	
								2.001	120.250	300	
S7	120.500	1.600	Open Manhole	1200	1.004	118.900	300	1.003	118.900	300	
S8	119.600	1.450	Open Manhole	1200	1.005	118.150	300	1.004	118.150	300	
S9	119.250	1.200	Open Manhole	1200	1.006	118.050	300	1.005	118.050	300	
S10	119.200	1.210	Open Manhole	1200	1.007	117.990	300	1.006	117.990	300	
S11	121.400	3.300	Open Manhole	1200	3.000	118.100	300				
S12	119.200	1.290	Open Manhole	1200	1.008	117.910	300	1.007	117.910	300	
								3.000	117.910	300	
S13	119.000	1.200	Junction		1.009	117.800	300	1.008	117.800	300	
S14	119.250	1.600	Open Manhole	1200	1.010	117.650	300	1.009	117.650	300	
S15	119.600	2.460	Open Manhole	1200	1.011	117.140	300	1.010	117.140	300	
S16	119.600	2.760	Open Manhole	1200	1.012	116.840	300	1.011	116.840	300	
S17	119.000	2.460	Open Manhole	1200	1.013	116.540	300	1.012	116.540	300	
S18	118.500	2.133	Open Manhole	1200	1.014	116.367	300	1.013	116.367	300	
S19	118.000	1.933	Open Manhole	1200	1.015	116.067	300	1.014	116.067	300	
S10	117.500	1.565	Open Manhole	1200	1.016	115.935	300	1.015	115.935	300	
S21	117.000	1.365	Open Manhole	1200	1.017	115.635	300	1.016	115.635	300	
6901	116.750	1.240	Open Manhole	0		OUTFALL		1.017	115.510	300	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S1	125.700	124.100	1.300	Open Manhole	1200
1.001	o	300	S2	124.600	123.000	1.300	Open Manhole	1200
1.002	o	300	S3	122.110	120.320	1.490	Open Manhole	1200
2.000	o	300	S4	124.150	122.550	1.300	Open Manhole	1200
2.001	o	300	S5	121.900	120.310	1.290	Open Manhole	1200
1.003	o	300	S6	121.850	120.250	1.300	Open Manhole	1200
1.004	o	300	S7	120.500	118.900	1.300	Open Manhole	1200
1.005	o	300	S8	119.600	118.150	1.150	Open Manhole	1200
1.006	o	300	S9	119.250	118.050	0.900	Open Manhole	1200
1.007	o	300	S10	119.200	117.990	0.910	Open Manhole	1200
3.000	o	300	S11	121.400	118.100	3.000	Open Manhole	1200
1.008	o	300	S12	119.200	117.910	0.990	Open Manhole	1200
1.009	o	300	S13	119.000	117.800	0.900	Junction	
1.010	o	300	S14	119.250	117.650	1.300	Open Manhole	1200
1.011	o	300	S15	119.600	117.140	2.160	Open Manhole	1200
1.012	o	300	S16	119.600	116.840	2.460	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	9.000	8.2	S2	124.600	123.000	1.300	Open Manhole	1200
1.001	23.900	8.9	S3	122.110	120.320	1.490	Open Manhole	1200
1.002	10.200	113.3	S6	121.850	120.230	1.320	Open Manhole	1200
2.000	36.900	16.5	S5	121.900	120.310	1.290	Open Manhole	1200
2.001	8.000	133.3	S6	121.850	120.250	1.300	Open Manhole	1200
1.003	27.900	20.7	S7	120.500	118.900	1.300	Open Manhole	1200
1.004	16.800	22.4	S8	119.600	118.150	1.150	Open Manhole	1200
1.005	14.100	141.0	S9	119.250	118.050	0.900	Open Manhole	1200
1.006	7.600	126.7	S10	119.200	117.990	0.910	Open Manhole	1200
1.007	11.600	145.0	S12	119.200	117.910	0.990	Open Manhole	1200
3.000	26.500	139.5	S12	119.200	117.910	0.990	Open Manhole	1200
1.008	16.400	149.1	S13	119.000	117.800	0.900	Junction	
1.009	19.600	130.7	S14	119.250	117.650	1.300	Open Manhole	1200
1.010	16.000	31.4	S15	119.600	117.140	2.160	Open Manhole	1200
1.011	44.800	149.3	S16	119.600	116.840	2.460	Open Manhole	1200
1.012	45.000	150.0	S17	119.000	116.540	2.160	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	o	300	S17	119.000	116.540	2.160	Open Manhole	1200
1.014	o	300	S18	118.500	116.367	1.833	Open Manhole	1200
1.015	o	300	S19	118.000	116.067	1.633	Open Manhole	1200
1.016	o	300	S10	117.500	115.935	1.265	Open Manhole	1200
1.017	o	300	S21	117.000	115.635	1.065	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	25.700	148.6	S18	118.500	116.367	1.833	Open Manhole	1200
1.014	45.000	150.0	S19	118.000	116.067	1.633	Open Manhole	1200
1.015	19.800	150.0	S10	117.500	115.935	1.265	Open Manhole	1200
1.016	45.000	150.0	S21	117.000	115.635	1.065	Open Manhole	1200
1.017	18.700	149.6	6901	116.750	115.510	0.940	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.017	6901	116.750	115.510	0.000	0	0

Simulation Criteria for Storm

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	6
Number of Online Controls	2	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)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.404		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S3, DS/PN: 1.002, Volume (m³): 3.6

Unit Reference	MD-SHE-0134-1000-1790-1000
Design Head (m)	1.790
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	134
Invert Level (m)	120.320
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.790	10.0	Kick-Flo®	1.095	7.9
Flush-Flo™	0.531	10.0	Mean Flow over Head Range	-	8.8

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	4.8	1.200	8.3	3.000	12.8	7.000	19.1
0.200	8.6	1.400	8.9	3.500	13.7	7.500	19.8
0.300	9.5	1.600	9.5	4.000	14.6	8.000	20.4
0.400	9.9	1.800	10.0	4.500	15.5	8.500	21.0
0.500	10.0	2.000	10.5	5.000	16.3	9.000	21.6
0.600	10.0	2.200	11.0	5.500	17.0	9.500	22.2
0.800	9.7	2.400	11.5	6.000	17.8		
1.000	8.8	2.600	11.9	6.500	18.5		

Hydro-Brake® Optimum Manhole: S14, DS/PN: 1.010, Volume (m³): 3.2

Unit Reference	MD-SHE-0103-5300-1400-5300
Design Head (m)	1.400
Design Flow (l/s)	5.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	117.650
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S14, DS/PN: 1.010, Volume (m³): 3.2

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.3	Kick-Flo®	0.860	4.2
Flush-Flo™	0.419	5.3	Mean Flow over Head Range	-	4.6

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	3.4	1.200	4.9	3.000	7.6	7.000	11.3
0.200	4.8	1.400	5.3	3.500	8.1	7.500	11.7
0.300	5.2	1.600	5.6	4.000	8.7	8.000	12.1
0.400	5.3	1.800	6.0	4.500	9.2	8.500	12.4
0.500	5.3	2.000	6.3	5.000	9.6	9.000	12.8
0.600	5.2	2.200	6.5	5.500	10.1	9.500	13.1
0.800	4.6	2.400	6.8	6.000	10.5		
1.000	4.5	2.600	7.1	6.500	10.9		

Storage Structures for Storm

Complex Manhole: S3, DS/PN: 1.002

Cellular Storage

Invert Level (m) 120.320 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	42.5	42.5	0.801	0.0	64.1
0.800	42.5	64.1			

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.2
Membrane Percolation (mm/hr)	1000	Length (m)	65.6
Max Percolation (l/s)	131.2	Slope (1:X)	12.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	121.580	Cap Volume Depth (m)	0.400

Complex Manhole: S4, DS/PN: 2.000

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	9.2	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	123.910	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	6.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	123.910	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	9.2	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	123.430	Cap Volume Depth (m)	0.300

Complex Manhole: S7, DS/PN: 1.004

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	13.5
Max Percolation (l/s)	12.4	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.090	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	14.4
Max Percolation (l/s)	24.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.920	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.3
Max Percolation (l/s)	18.8	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	121.120	Cap Volume Depth (m)	0.300

Complex Manhole: S8, DS/PN: 1.005

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.4
Membrane Percolation (mm/hr)	1000	Length (m)	12.6
Max Percolation (l/s)	25.9	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	119.770	Cap Volume Depth (m)	0.100

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	15.4
Max Percolation (l/s)	25.7	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	119.770	Cap Volume Depth (m)	0.300

Complex Manhole: S9, DS/PN: 1.006

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	15.1
Max Percolation (l/s)	12.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	118.820	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.8
Max Percolation (l/s)	21.3	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	118.970	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	13.3
Max Percolation (l/s)	22.2	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	119.320	Cap Volume Depth (m)	0.300

Tank or Pond Manhole: S13, DS/PN: 1.009

Invert Level (m) 117.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	205.1	1.100	473.9

1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

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	6
Number of Online Controls	2	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	0.401
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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%					124.135
1.001	S2	15 Winter	1	+0%					123.044
1.002	S3	30 Winter	1	+0%	30/15 Summer				120.465
2.000	S4	15 Winter	1	+0%					122.589
2.001	S5	15 Winter	1	+0%					120.398
1.003	S6	15 Winter	1	+0%					120.318
1.004	S7	15 Winter	1	+0%	100/15 Summer				118.978
1.005	S8	15 Winter	1	+0%	30/15 Summer				118.294
1.006	S9	15 Winter	1	+0%	30/15 Summer				118.228
1.007	S10	15 Winter	1	+0%	30/15 Summer				118.153
3.000	S11	15 Winter	1	+0%	100/15 Summer				118.120
1.008	S12	15 Winter	1	+0%	30/15 Summer				118.067
1.009	S13	30 Winter	1	+0%	30/60 Summer				117.904
1.010	S14	240 Summer	1	+0%	30/15 Summer				117.913
1.011	S15	240 Summer	1	+0%					117.187
1.012	S16	240 Summer	1	+0%					116.887

1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.265	0.000	0.03			8.4	OK	
1.001	S2	-0.256	0.000	0.05			17.4	OK	
1.002	S3	-0.155	0.000	0.10		17	7.2	OK	
2.000	S4	-0.261	0.000	0.04		5	10.6	OK	
2.001	S5	-0.212	0.000	0.19			11.5	OK	
1.003	S6	-0.232	0.000	0.12			25.6	OK	
1.004	S7	-0.222	0.000	0.15		10	30.8	OK	
1.005	S8	-0.156	0.000	0.47		9	36.1	OK	
1.006	S9	-0.122	0.000	0.65		6	40.0	OK	
1.007	S10	-0.137	0.000	0.57			40.2	OK	
3.000	S11	-0.280	0.000	0.01			1.2	OK	
1.008	S12	-0.143	0.000	0.53			41.2	OK	
1.009	S13	-0.196	0.000	0.08			7.8	OK*	
1.010	S14	-0.037	0.000	0.03			5.1	OK	
1.011	S15	-0.253	0.000	0.06			5.1	OK	
1.012	S16	-0.253	0.000	0.06			5.1	OK	

1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.013	S17	240 Summer	1	+0%					116.588
1.014	S18	240 Summer	1	+0%					116.414
1.015	S19	240 Summer	1	+0%					116.116
1.016	S10	240 Summer	1	+0%					115.982
1.017	S21	240 Summer	1	+0%					115.684

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.013	S17	-0.252	0.000	0.06			5.1	OK	
1.014	S18	-0.253	0.000	0.06			5.1	OK	
1.015	S19	-0.251	0.000	0.06			5.1	OK	
1.016	S10	-0.253	0.000	0.06			5.1	OK	
1.017	S21	-0.251	0.000	0.06			5.1	OK	

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

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	6
Number of Online Controls	2	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	0.401
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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%					124.155
1.001	S2	15 Winter	30	+0%					123.076
1.002	S3	30 Winter	30	+0%	30/15 Summer				120.736
2.000	S4	15 Winter	30	+0%					122.614
2.001	S5	15 Summer	30	+0%					120.455
1.003	S6	15 Winter	30	+0%					120.365
1.004	S7	15 Winter	30	+0%	100/15 Summer				119.036
1.005	S8	15 Winter	30	+0%	30/15 Summer				118.799
1.006	S9	15 Winter	30	+0%	30/15 Summer				118.662
1.007	S10	15 Winter	30	+0%	30/15 Summer				118.486
3.000	S11	15 Winter	30	+0%	100/15 Summer				118.308
1.008	S12	15 Winter	30	+0%	30/15 Summer				118.306
1.009	S13	15 Summer	30	+0%	30/60 Summer				117.992
1.010	S14	1440 Winter	30	+0%	30/15 Summer				117.932
1.011	S15	1440 Winter	30	+0%					117.187
1.012	S16	1440 Winter	30	+0%					116.887

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.245	0.000	0.08			20.5	OK	
1.001	S2	-0.224	0.000	0.15			48.3	OK	
1.002	S3	0.116	0.000	0.13		21	9.9	SURCHARGED	
2.000	S4	-0.236	0.000	0.10		5	25.9	OK	
2.001	S5	-0.155	0.000	0.47			28.9	OK	
1.003	S6	-0.185	0.000	0.31			68.5	OK	
1.004	S7	-0.164	0.000	0.42		6	83.9	OK	
1.005	S8	0.349	0.000	1.22		3	94.6	SURCHARGED	
1.006	S9	0.312	0.000	1.72		5	105.6	SURCHARGED	
1.007	S10	0.196	0.000	1.48			104.6	SURCHARGED	
3.000	S11	-0.092	0.000	0.03			2.5	OK	
1.008	S12	0.096	0.000	1.40			108.1	SURCHARGED	
1.009	S13	-0.108	0.000	0.14			13.5	OK*	
1.010	S14	-0.018	0.000	0.03			5.1	OK	
1.011	S15	-0.253	0.000	0.06			5.1	OK	
1.012	S16	-0.253	0.000	0.06			5.1	OK	

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.013	S17	1440 Winter	30	+0%					116.588
1.014	S18	1440 Winter	30	+0%					116.414
1.015	S19	1440 Winter	30	+0%					116.116
1.016	S10	1440 Winter	30	+0%					115.982
1.017	S21	1440 Winter	30	+0%					115.684

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.013	S17	-0.252	0.000	0.06			5.1	OK	
1.014	S18	-0.253	0.000	0.06			5.1	OK	
1.015	S19	-0.251	0.000	0.06			5.1	OK	
1.016	S10	-0.253	0.000	0.06			5.1	OK	
1.017	S21	-0.251	0.000	0.06			5.1	OK	

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

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	6
Number of Online Controls	2	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	0.401
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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%					124.175
1.001	S2	15 Winter	100	+40%					123.104
1.002	S3	240 Summer	100	+40%	30/15 Summer				120.847
2.000	S4	15 Winter	100	+40%					122.637
2.001	S5	15 Summer	100	+40%					120.524
1.003	S6	15 Winter	100	+40%					120.409
1.004	S7	15 Winter	100	+40%	100/15 Summer				119.950
1.005	S8	15 Winter	100	+40%	30/15 Summer				119.579
1.006	S9	15 Winter	100	+40%	30/15 Summer				119.192
1.007	S10	15 Winter	100	+40%	30/15 Summer				118.847
3.000	S11	15 Winter	100	+40%	100/15 Summer				118.505
1.008	S12	15 Winter	100	+40%	30/15 Summer				118.501
1.009	S13	15 Winter	100	+40%	30/60 Summer				118.185
1.010	S14	4320 Summer	100	+40%	30/15 Summer				117.954
1.011	S15	2880 Winter	100	+40%					117.187
1.012	S16	2880 Winter	100	+40%					116.887

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

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	-0.225	0.000	0.14			37.3	OK	
1.001	S2	-0.196	0.000	0.26			87.7	OK	
1.002	S3	0.227	0.000	0.13		41	10.0	SURCHARGED	
2.000	S4	-0.213	0.000	0.19		5	47.1	OK	
2.001	S5	-0.086	0.000	0.85			52.4	OK	
1.003	S6	-0.141	0.000	0.55			120.8	OK	
1.004	S7	0.750	0.000	0.70		5	140.8	SURCHARGED	
1.005	S8	1.129	0.000	2.15		6	166.6	FLOOD RISK	
1.006	S9	0.842	0.000	2.38		4	146.3	FLOOD RISK	
1.007	S10	0.557	0.000	2.07			146.8	SURCHARGED	
3.000	S11	0.105	0.000	0.05			4.3	SURCHARGED	
1.008	S12	0.291	0.000	1.94			149.6	SURCHARGED	
1.009	S13	0.085	0.000	0.16			15.2	SURCHARGED*	
1.010	S14	0.004	0.000	0.03			5.1	SURCHARGED	
1.011	S15	-0.253	0.000	0.06			5.1	OK	
1.012	S16	-0.253	0.000	0.06			5.1	OK	

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.013	S17	4320 Summer	100	+40%					116.588
1.014	S18	2880 Winter	100	+40%					116.414
1.015	S19	2880 Winter	100	+40%					116.116
1.016	S10	2880 Winter	100	+40%					115.982
1.017	S21	2880 Winter	100	+40%					115.684

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.013	S17	-0.252	0.000	0.06			5.1	OK	
1.014	S18	-0.253	0.000	0.06			5.1	OK	
1.015	S19	-0.251	0.000	0.06			5.1	OK	
1.016	S10	-0.253	0.000	0.06			5.1	OK	
1.017	S21	-0.251	0.000	0.06			5.1	OK	