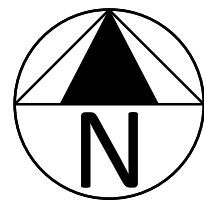


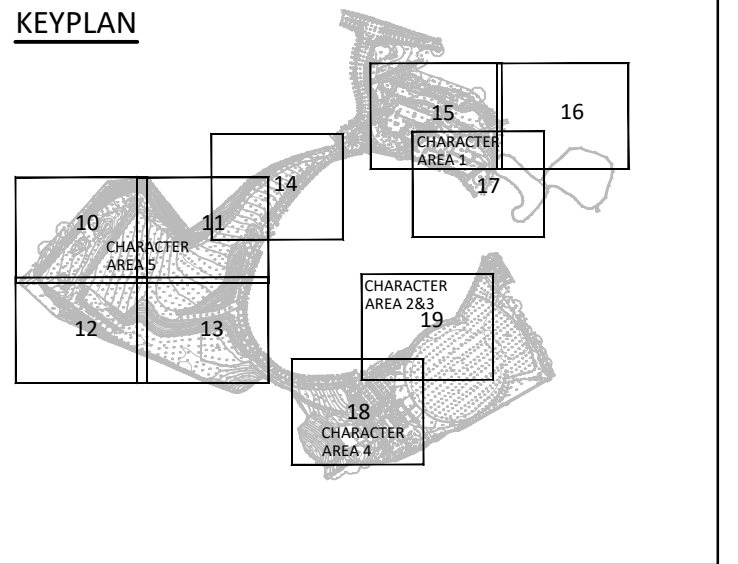
Appendix F

Drainage strategy



- KEY
- EXISTING DRAINAGE
- EXISTING SURFACE WATER
 - EXISTING FOUL WATER SEWER
 - PRIVATE SW DRAIN
 - EXISTING DRAINAGE TO BE ABANDONED
- PROPOSED PRIVATE DRAINAGE
- SURFACE WATER DRAIN/SEWER
 - SURFACE WATER CHAMBER
 - DIVERTED CULVERTED WATERCOURSE
 - DIVERTED WATERCOURSE INSPECTION CHAMBER
 - PERMEABLE PAVING
 - EARTHWORKS
 - FOUL WATER DRAIN/SEWER
 - FOUL WATER CHAMBER
 - CELLWEB CONSTRUCTION
 - GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
 - GREEN ROOF

- NOTES:
1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
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B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE

REV. DESCRIPTION Date BY CHR

DESIGN BY:



CLIENT: LDA/HCCC

andy clay consulting
flood risk and drainage

DRAWING STATUS: PLANNING APPLICATION

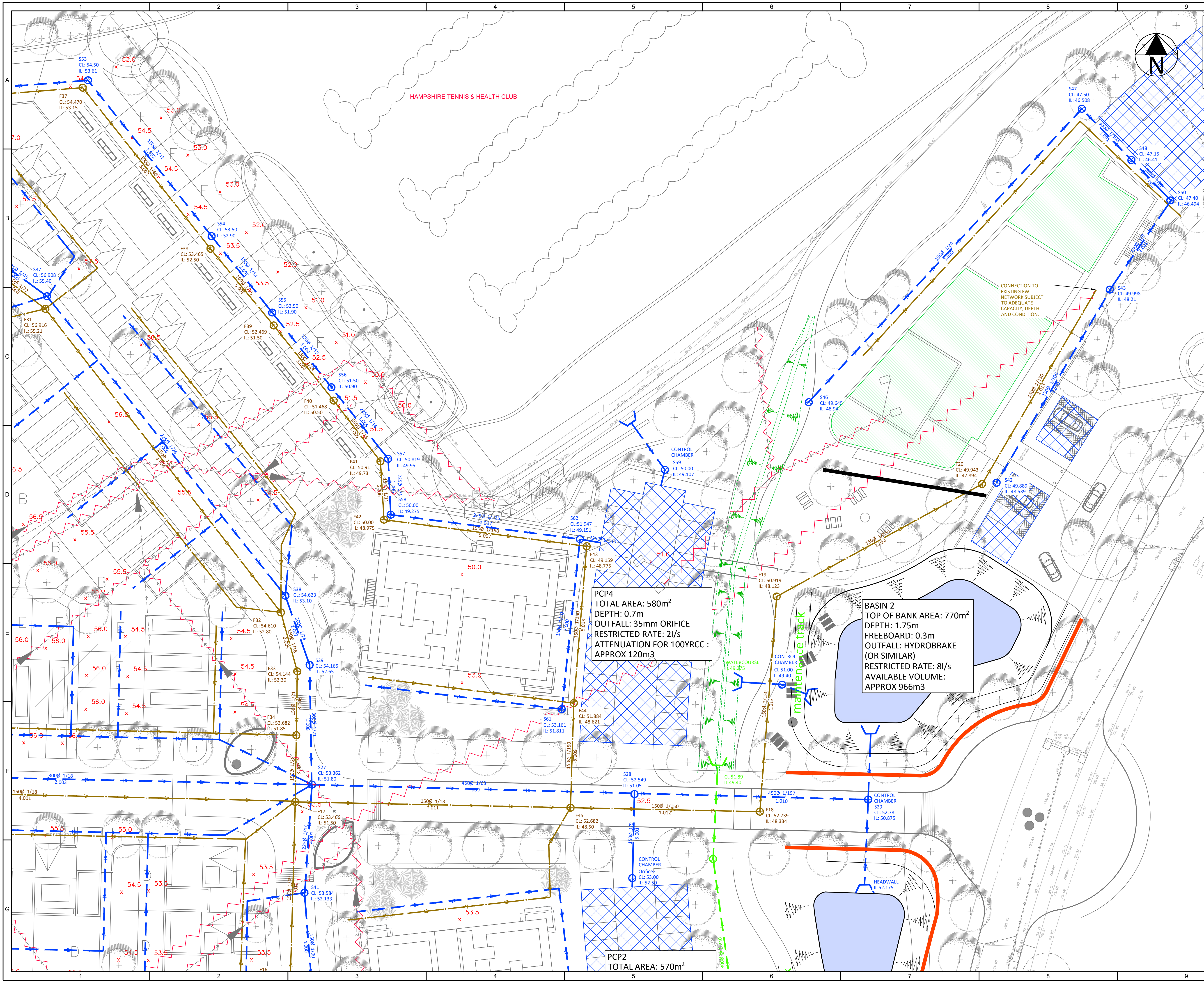
SCALE @ A1: 0 1:250 12.5 metres

PROJECT: AGEAS BOWL, SOUTHAMPTON

TITLE: DRAINAGE STRATEGY SHEET 1

PROJECT No: 19320 DRAWING No: D10 REV: B

PCP1
TOTAL AREA: 1360m²
DEPTH: 0.5M
OUTFALL: 40mm ORIFICE
ATTENUATION FOR 100YRCC :
APPROX 204m³



KEY

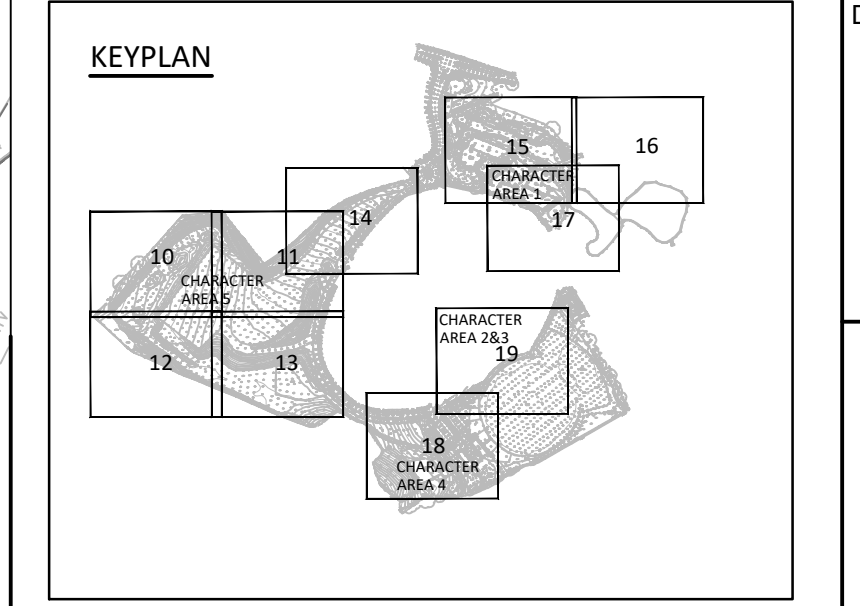
EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER
- PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- ⊕ SURFACE WATER CHAMBER
- DIVERTED CULVERTED WATERCOURSE
- ⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER
- PERMEABLE PAVING
- EARTHWORKS
- FOUL WATER DRAIN/SEWER
- ⊕ FOUL WATER CHAMBER
- CELLWEB CONSTRUCTION
- GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
- GREEN ROOF

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A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

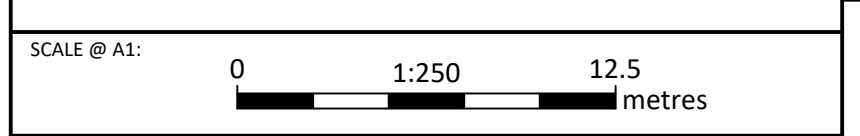
DESIGN BY:



CLIENT:
LDA/HCCC



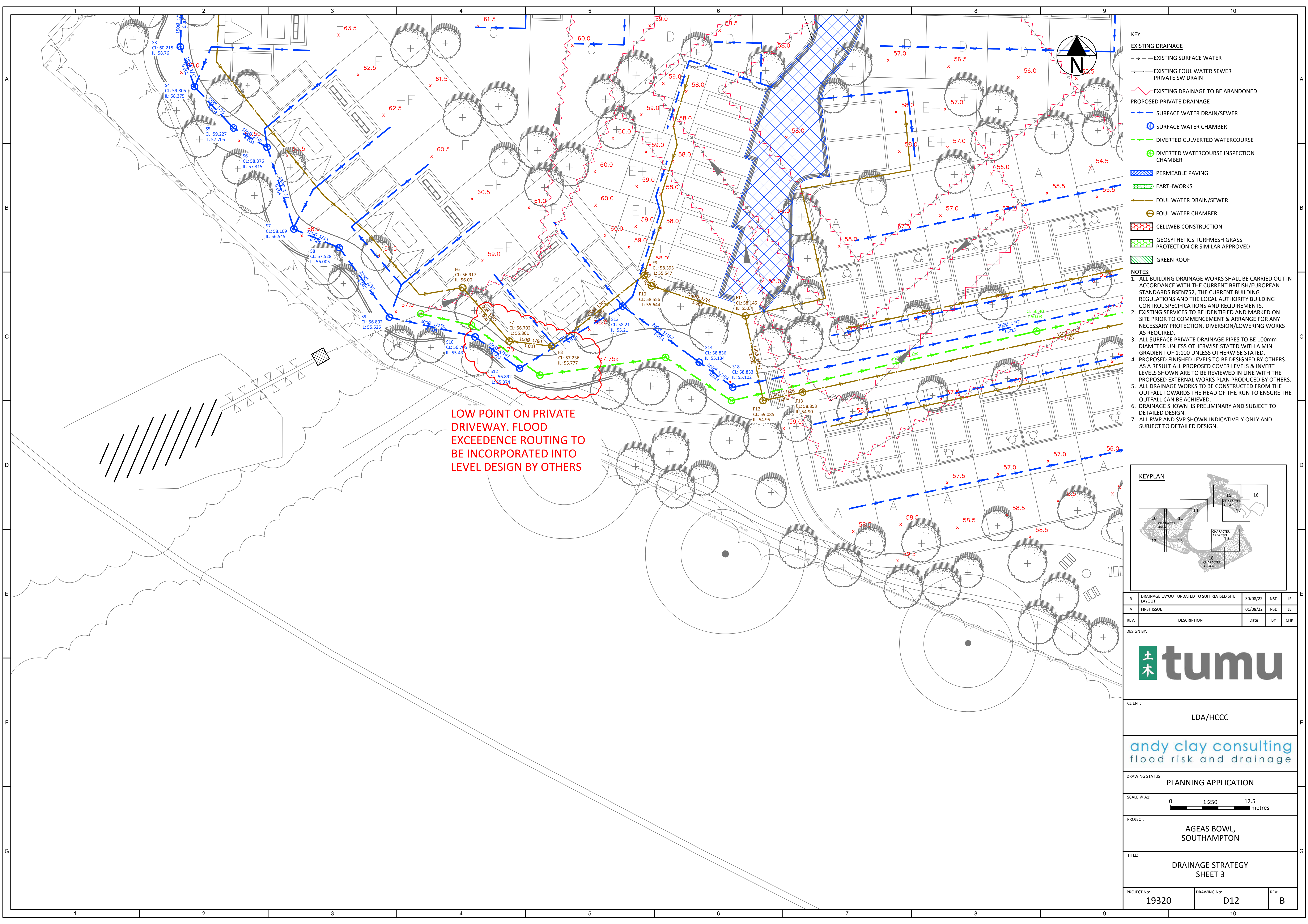
DRAWING STATUS:
PLANNING APPLICATION



PROJECT:
AGEAS BOWL,
SOUTHAMPTON

TITLE:
DRAINAGE STRATEGY
SHEET 2

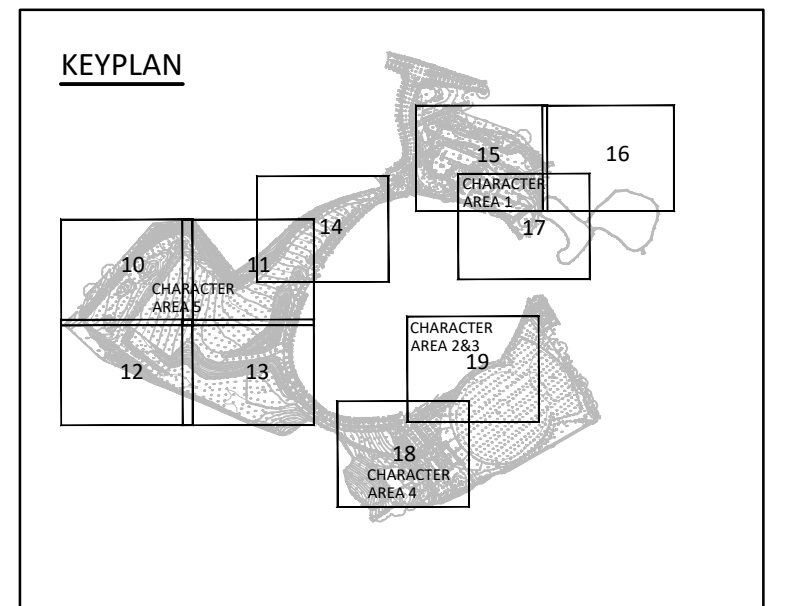
PROJECT No:	DRAWING No:	REV:
19320	D11	B



LOW POINT ON PRIVATE
DRIVEWAY. FLOOD
EXCEEDENCE ROUTING TO
BE INCORPORATED INTO
LEVEL DESIGN BY OTHERS

- KEY**
- EXISTING DRAINAGE**
- EXISTING SURFACE WATER
 - EXISTING FOUL WATER SEWER PRIVATE SW DRAIN
 - EXISTING DRAINAGE TO BE ABANDONED
- PROPOSED PRIVATE DRAINAGE**
- SURFACE WATER DRAIN/SEWER
 - ⊕ SURFACE WATER CHAMBER
 - DIVERTED CULVERTED WATERCOURSE
 - ⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER
 - ▨ PERMEABLE PAVING
 - ▨ EARTHWORKS
 - FOUL WATER DRAIN/SEWER
 - ⊕ FOUL WATER CHAMBER
 - ▨ CELLWEB CONSTRUCTION
 - ▨ GEOSYNTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
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A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:



CLIENT:

LDA/HCCC


flood risk and drainage

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

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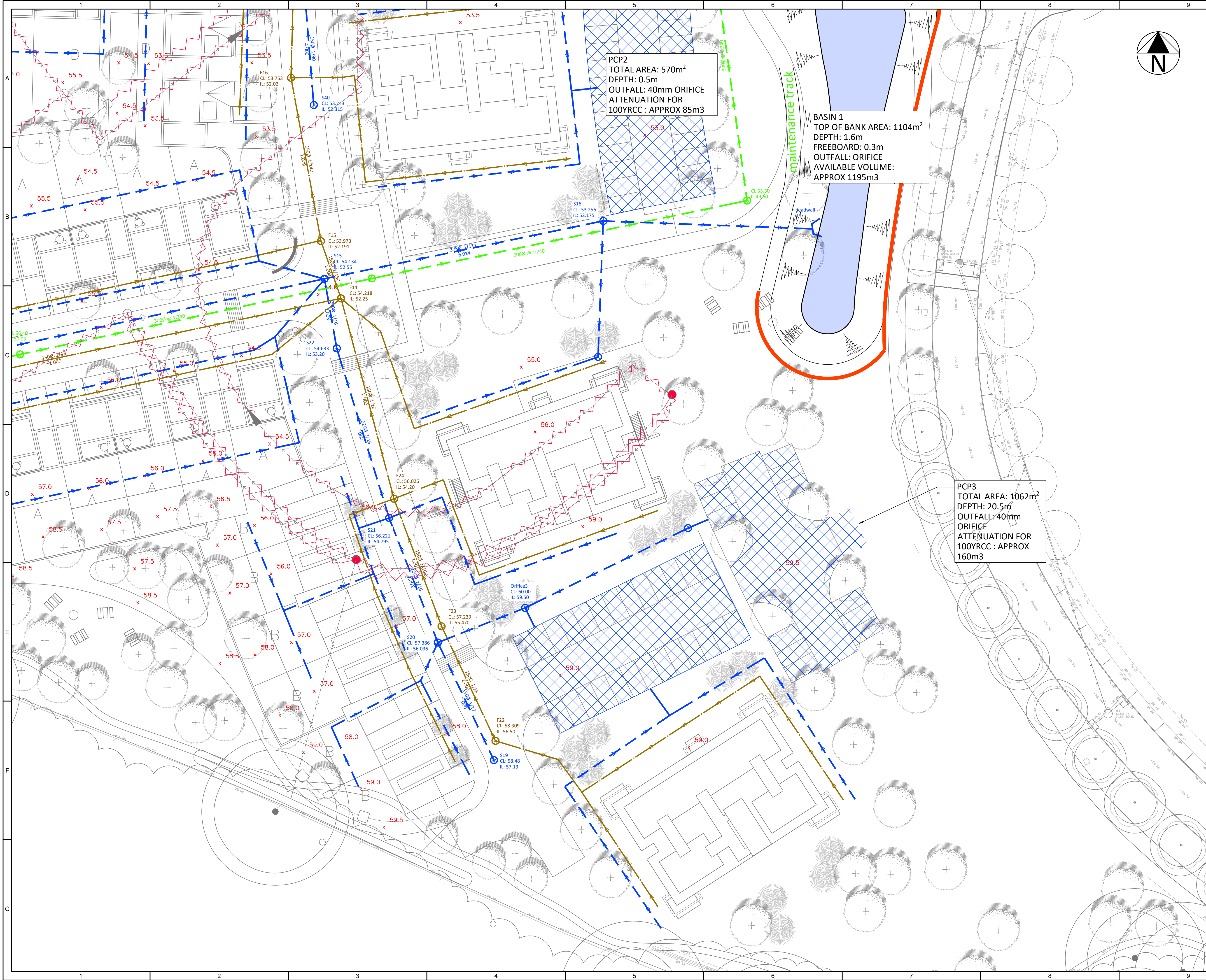
PROJECT:

AGEAS BOWL,
SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY
SHEET 3

PROJECT No:	DRAWING No:	REV:
19320	D12	B



KEY

EXISTING DRAINAGE

- EXISTING SURFACE WATER
- EXISTING FOUL WATER SEWER PRIVATE SW DRAIN
- EXISTING DRAINAGE TO BE ABANDONED

PROPOSED PRIVATE DRAINAGE

- SURFACE WATER DRAIN/SEWER
- SURFACE WATER CHAMBER
- DIVERTED CULVERTED WATERCOURSE
- DIVERTED WATERCOURSE INSPECTION CHAMBER
- PERMEABLE PAVING
- EARTHWORKS
- FOUL WATER DRAIN/SEWER
- FOUL WATER CHAMBER
- CELLWEB CONSTRUCTION
- GEOSYTHETICS TURFMESH GRASS PROTECTION OR SIMILAR APPROVED
- GREEN ROOF

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KEYPLAN

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B	DRAINAGE LAYOUT UPDATED TO SUIT REVISED SITE LAYOUT	30/08/22	NSD	JE
A	FIRST ISSUE	01/08/22	NSD	JE

DESIGN BY:

CLIENT:

LDA/HCCC

andy clay consulting
flood risk and drainage

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

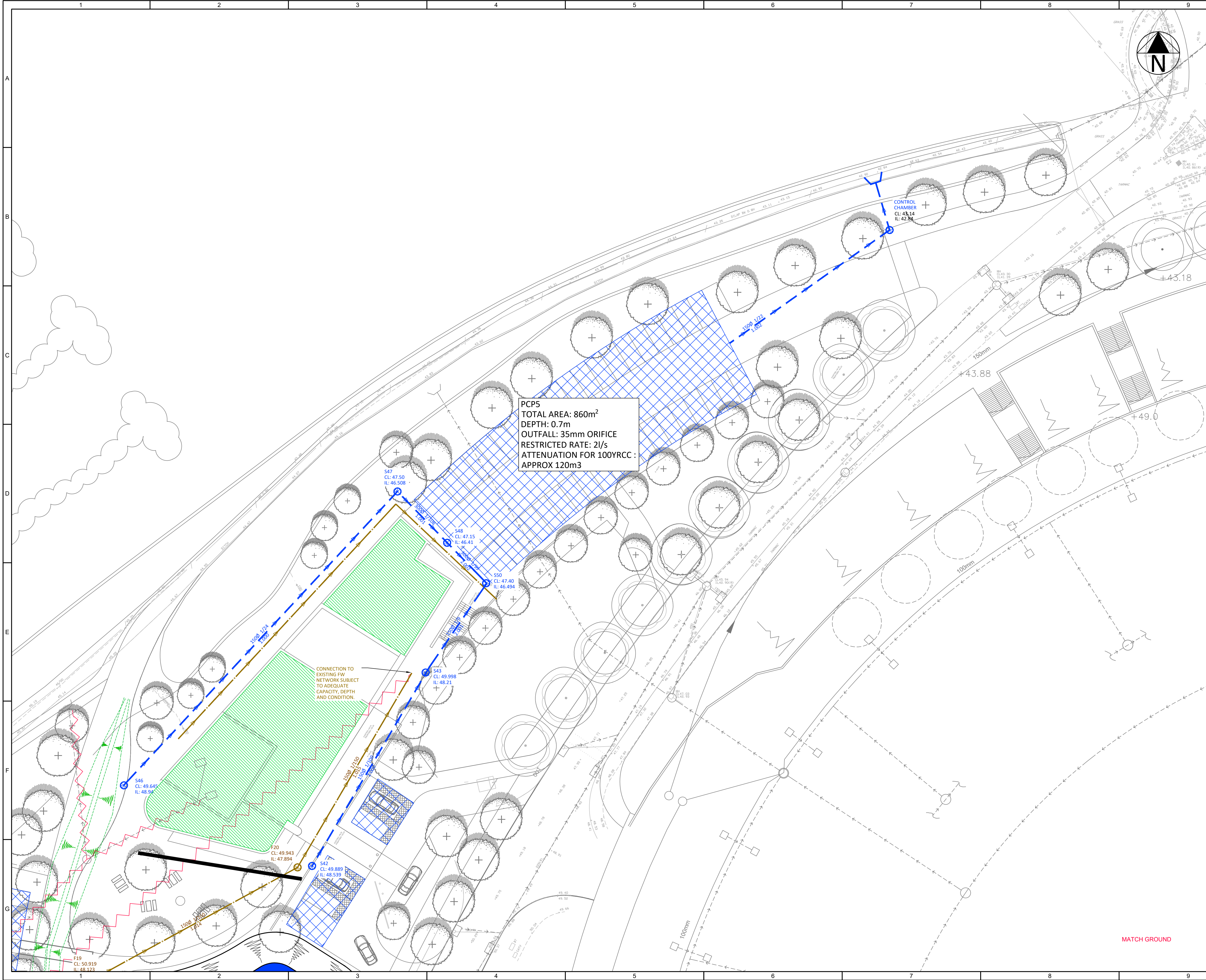
PROJECT:

AGEAS BOWL, SOUTHAMPTON

TITLE:

DRAINAGE STRATEGY SHEET 4

PROJECT No:	DRAWING No:	REV:
19320	D13	B



KEY

EXISTING DRAINAGE

→ → → EXISTING SURFACE WATER

→ → → EXISTING FOUL WATER SEWER

→ → → PRIVATE SW DRAIN

EXISTING DRAINAGE TO BE ABANDONED

PROPOSED PRIVATE DRAINAGE

— — — SURFACE WATER DRAIN/SEWER

⊕ SURFACE WATER CHAMBER

— — — DIVERTED CULVERTED WATERCOURSE

⊕ DIVERTED WATERCOURSE INSPECTION CHAMBER

PERMEABLE PAVING

EARTHWORKS

FOUL WATER DRAIN/SEWER

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GREEN ROOF

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REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

CLIENT:

LDA/HCCC

andy clay consulting

flood risk and drainage

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

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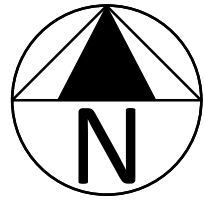
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AGEAS BOWL,
SOUTHAMPTON

TITLE:

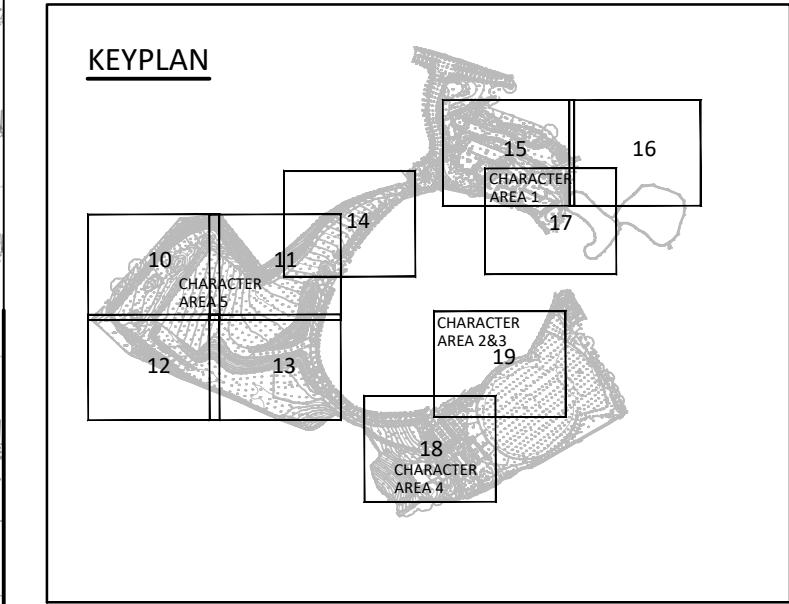
DRAINAGE STRATEGY
SHEET 5

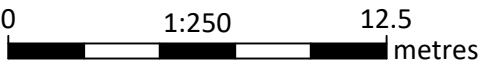
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19320	D14	A

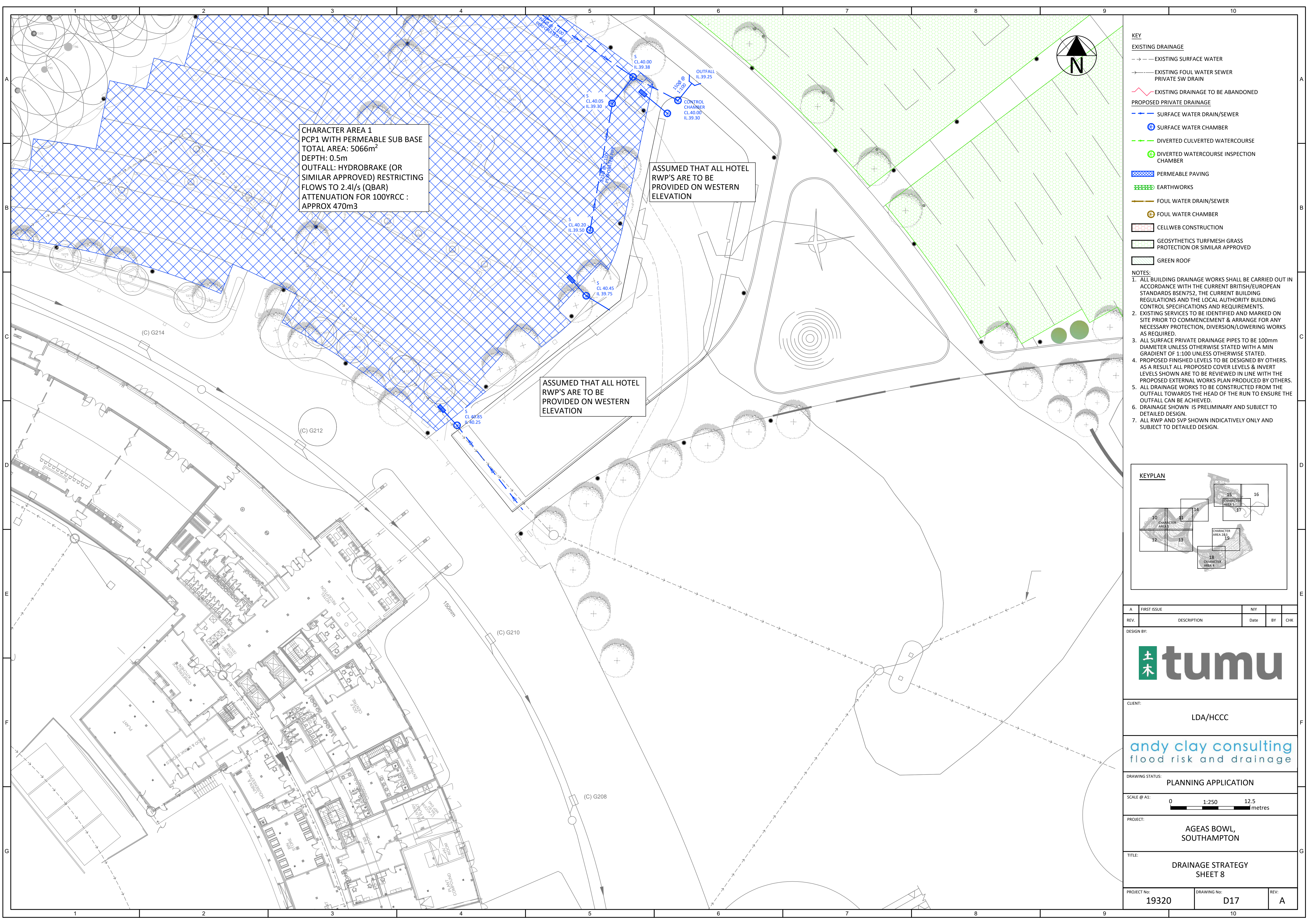


- KEY
- EXISTING DRAINAGE
- → → EXISTING SURFACE WATER
 - → → EXISTING FOUL WATER SEWER
 - → → EXISTING FOUL WATER SEWER PRIVATE SW DRAIN
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REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
				
CLIENT:				
LDA/HCCC				
 flood risk and drainage				
DRAWING STATUS:				
PLANNING APPLICATION				
SCALE @ A1:				
				
PROJECT:				
AGEAS BOWL, SOUTHAMPTON				
TITLE:				
DRAINAGE STRATEGY SHEET 7				
PROJECT No:		DRAWING No:		REV:
19320		D16		A

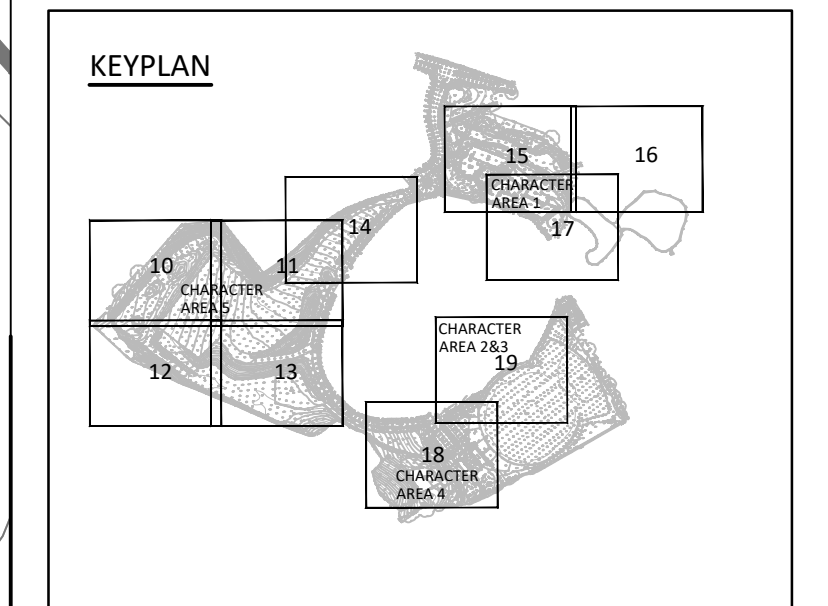


CHARACTER AREA 1
PCP1 WITH PERMEABLE SUB BASE
TOTAL AREA: 5066m²
DEPTH: 0.5m
OUTFALL: HYDROBRAKE (OR
SIMILAR APPROVED) RESTRICTING
FLOWS TO 2.4l/s (QBAR)
ATTENUATION FOR 100YRCC :
APPROX 470m³

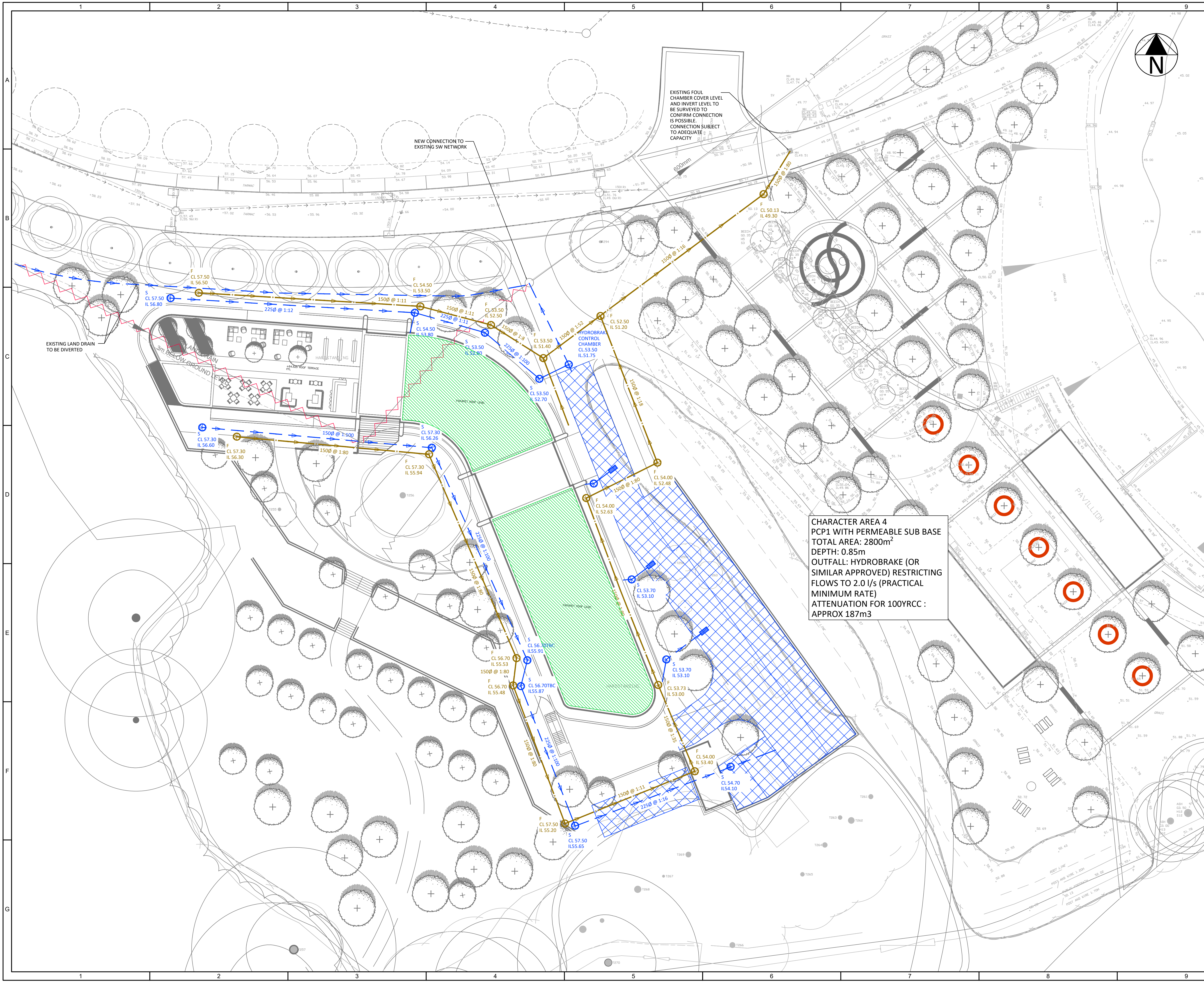
ASSUMED THAT ALL HOTEL
RWP'S ARE TO BE
PROVIDED ON WESTERN
ELEVATION

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RWP'S ARE TO BE
PROVIDED ON WESTERN
ELEVATION

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- EXISTING SURFACE WATER
 - EXISTING FOUL WATER SEWER
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REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
CLIENT:				
LDA/HCCC				
DRAWING STATUS:				
PLANNING APPLICATION				
SCALE @ A1:				
0 1:250 12.5 metres				
PROJECT:				
AGEAS BOWL, SOUTHAMPTON				
TITLE:				
DRAINAGE STRATEGY SHEET 8				
PROJECT No:		DRAWING No:		REV:
19320		D17		A



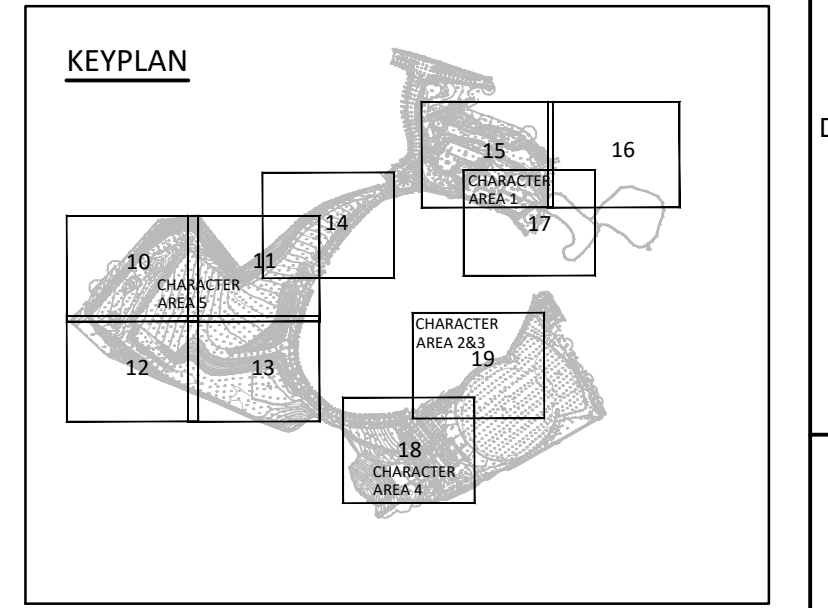
EXISTING FOUL CHAMBER COVER LEVEL AND INVERT LEVEL TO BE SURVEYED TO CONFIRM CONNECTION IS POSSIBLE. CONNECTION SUBJECT TO ADEQUATE CAPACITY

NEW CONNECTION TO EXISTING SW NETWORK

CHARACTER AREA 4
PCP1 WITH PERMEABLE SUB BASE
TOTAL AREA: 2800m²
DEPTH: 0.85m
OUTFALL: HYDROBRAKE (OR
SIMILAR APPROVED) RESTRICTING
FLOWS TO 2.0 l/s (PRACTICAL
MINIMUM RATE)
ATTENUATION FOR 100YRCC :
APPROX 187m³

- KEY**
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 - → → EXISTING SURFACE WATER
 - → → EXISTING FOUL WATER SEWER
 - → → PRIVATE SW DRAIN
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A	FIRST ISSUE	01/08/22	NSD	JE
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT:

LDA/HCCC

andy clay consulting
flood risk and drainage

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A1:

0 1:250 12.5 metres

PROJECT:

AGEAS BOWL,
SOUTHAMPTON

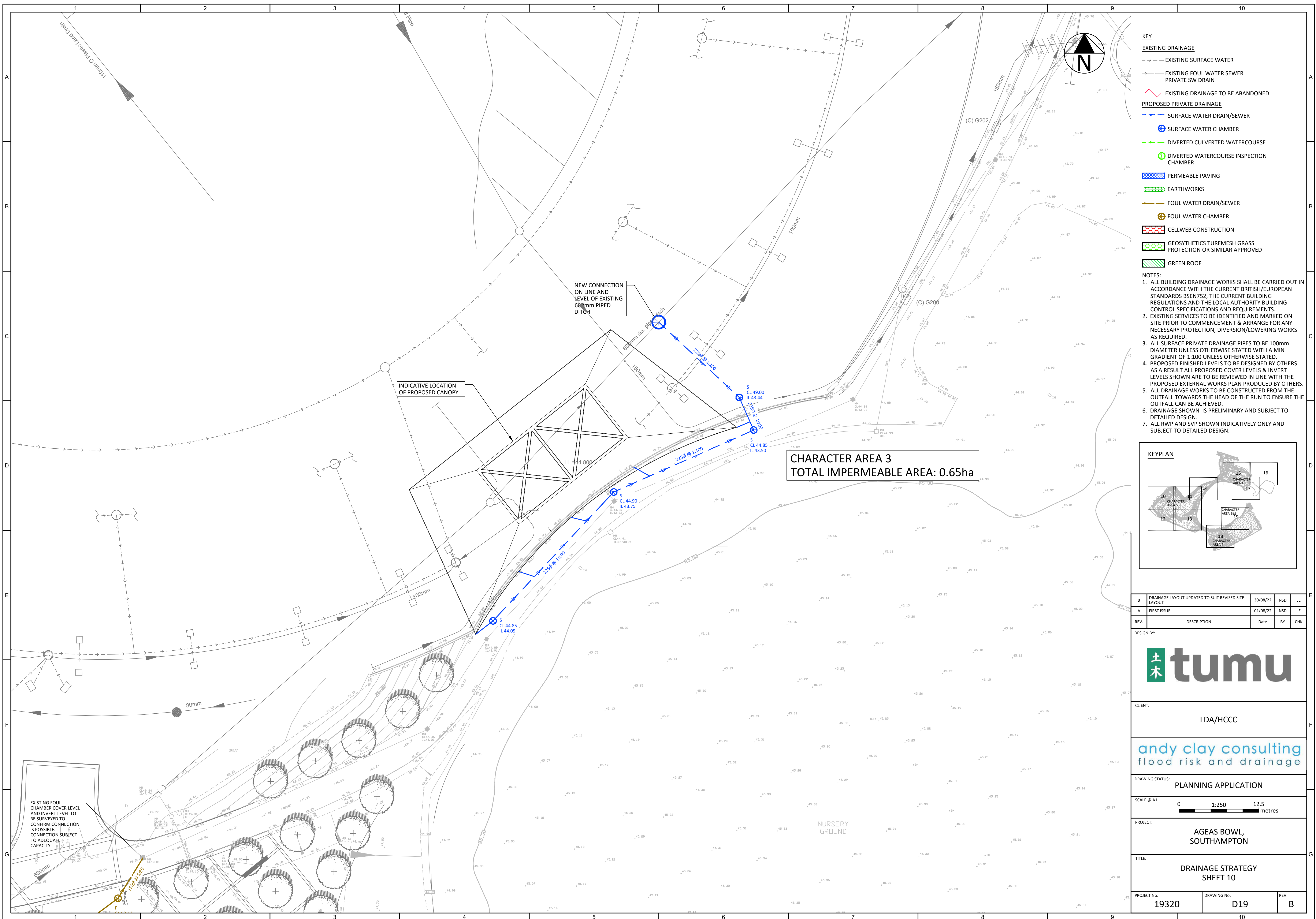
TITLE:

DRAINAGE STRATEGY
SHEET 9

PROJECT No: 19320

DRAWING No: D18

REV: B



Tumu Consulting		Page 1
20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Ageas Bowl Southampton Character Area 1	
Date 01/08/2022 File 19320 CHARACTER AREA 1 PCP.SRCX	Designed by JE Checked by AC	
Micro Drainage		Source Control 2018.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1626 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	39.580	0.080	0.0	1.9	1.9	120.7	O K
30 min Summer	39.612	0.112	0.0	2.4	2.4	169.7	O K
60 min Summer	39.647	0.147	0.0	2.4	2.4	222.6	O K
120 min Summer	39.683	0.183	0.0	2.4	2.4	276.7	O K
180 min Summer	39.702	0.202	0.0	2.4	2.4	306.6	O K
240 min Summer	39.715	0.215	0.0	2.4	2.4	325.9	O K
360 min Summer	39.733	0.233	0.0	2.4	2.4	353.3	O K
480 min Summer	39.745	0.245	0.0	2.4	2.4	370.9	O K
600 min Summer	39.753	0.253	0.0	2.4	2.4	382.9	O K
720 min Summer	39.758	0.258	0.0	2.4	2.4	391.2	O K
960 min Summer	39.764	0.264	0.0	2.4	2.4	400.5	O K
1440 min Summer	39.766	0.266	0.0	2.4	2.4	403.5	O K
2160 min Summer	39.764	0.264	0.0	2.4	2.4	400.1	O K
2880 min Summer	39.759	0.259	0.0	2.4	2.4	392.1	O K
4320 min Summer	39.743	0.243	0.0	2.4	2.4	368.6	O K
5760 min Summer	39.725	0.225	0.0	2.4	2.4	341.3	O K
7200 min Summer	39.707	0.207	0.0	2.4	2.4	313.9	O K
8640 min Summer	39.690	0.190	0.0	2.4	2.4	288.0	O K
10080 min Summer	39.674	0.174	0.0	2.4	2.4	263.8	O K
15 min Winter	39.591	0.091	0.0	2.2	2.2	138.2	O K
30 min Winter	39.628	0.128	0.0	2.4	2.4	193.4	O K
60 min Winter	39.667	0.167	0.0	2.4	2.4	252.9	O K
120 min Winter	39.707	0.207	0.0	2.4	2.4	314.0	O K
180 min Winter	39.730	0.230	0.0	2.4	2.4	348.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	131.128	0.0	79.4	27
30 min Summer	88.088	0.0	119.6	41
60 min Summer	56.422	0.0	196.3	70
120 min Summer	34.839	0.0	248.8	130
180 min Summer	25.861	0.0	278.2	190
240 min Summer	20.787	0.0	297.6	248
360 min Summer	15.300	0.0	324.8	368
480 min Summer	12.289	0.0	341.4	486
600 min Summer	10.359	0.0	351.1	604
720 min Summer	9.004	0.0	355.7	724
960 min Summer	7.211	0.0	353.6	962
1440 min Summer	5.263	0.0	330.0	1286
2160 min Summer	3.833	0.0	536.5	1644
2880 min Summer	3.056	0.0	558.3	2024
4320 min Summer	2.218	0.0	566.7	2852
5760 min Summer	1.764	0.0	663.0	3640
7200 min Summer	1.478	0.0	681.7	4408
8640 min Summer	1.279	0.0	694.1	5192
10080 min Summer	1.133	0.0	699.5	5952
15 min Winter	131.128	0.0	93.7	26
30 min Winter	88.088	0.0	137.4	41
60 min Winter	56.422	0.0	223.9	70
120 min Winter	34.839	0.0	281.1	128
180 min Winter	25.861	0.0	312.3	186

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Ageas Bowl Southampton Character Area 1	
Date 01/08/2022 File 19320 CHARACTER AREA 1 PCP.SRCX	Designed by JE Checked by AC	
Micro Drainage	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	39.744	0.244	0.0	2.4	2.4	370.2	O K
360 min Winter	39.765	0.265	0.0	2.4	2.4	401.9	O K
480 min Winter	39.779	0.279	0.0	2.4	2.4	422.8	O K
600 min Winter	39.789	0.289	0.0	2.4	2.4	437.4	O K
720 min Winter	39.796	0.296	0.0	2.4	2.4	447.8	O K
960 min Winter	39.804	0.304	0.0	2.4	2.4	460.7	O K
1440 min Winter	39.809	0.309	0.0	2.4	2.4	468.2	O K
2160 min Winter	39.802	0.302	0.0	2.4	2.4	457.7	O K
2880 min Winter	39.793	0.293	0.0	2.4	2.4	444.6	O K
4320 min Winter	39.769	0.269	0.0	2.4	2.4	407.2	O K
5760 min Winter	39.740	0.240	0.0	2.4	2.4	363.9	O K
7200 min Winter	39.712	0.212	0.0	2.4	2.4	321.1	O K
8640 min Winter	39.686	0.186	0.0	2.4	2.4	281.1	O K
10080 min Winter	39.662	0.162	0.0	2.4	2.4	245.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	20.787	0.0	332.1	244
360 min Winter	15.300	0.0	357.2	362
480 min Winter	12.289	0.0	368.9	478
600 min Winter	10.359	0.0	371.8	594
720 min Winter	9.004	0.0	369.0	708
960 min Winter	7.211	0.0	356.9	938
1440 min Winter	5.263	0.0	332.3	1380
2160 min Winter	3.833	0.0	601.3	1800
2880 min Winter	3.056	0.0	621.7	2204
4320 min Winter	2.218	0.0	611.5	3112
5760 min Winter	1.764	0.0	754.1	3976
7200 min Winter	1.478	0.0	777.4	4760
8640 min Winter	1.279	0.0	794.1	5536
10080 min Winter	1.133	0.0	803.2	6256

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Ageas Bowl Southampton Character Area 1	
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Micro Drainage		Source Control 2018.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.600

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.200	4 8	0.200	8 12	0.200

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20 East Sands	Ageas Bowl	
Burbage Marlborough	Southampton	
Wiltshire SN8 3AN	Character Area 1	
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Micro Drainage	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 40.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	50.0
Membrane Percolation (mm/hr)	1000	Length (m)	101.0
Max Percolation (l/s)	1402.8	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	39.500	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0081-2400-0500-2400
Design Head (m)	0.500
Design Flow (l/s)	2.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	81
Invert Level (m)	39.500
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.4	Kick-Flo®	0.349	2.0
Flush-Flo™	0.151	2.4	Mean Flow over Head Range	-	2.0

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)	Depth (m)	Flow (l/s)
0.100	2.3	0.800	3.0	2.000	4.5	4.000	6.3	7.000	8.3
0.200	2.4	1.000	3.3	2.200	4.8	4.500	6.7	7.500	8.5
0.300	2.2	1.200	3.6	2.400	4.9	5.000	7.0	8.000	8.8
0.400	2.2	1.400	3.9	2.600	5.1	5.500	7.3	8.500	9.1
0.500	2.4	1.600	4.1	3.000	5.5	6.000	7.6	9.000	9.4
0.600	2.6	1.800	4.3	3.500	5.9	6.500	7.9	9.500	9.6

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Ageas Bowl Southampton Character Area 4	
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Micro Drainage		Source Control 2018.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 803 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	53.931	0.281	0.0	2.0	2.0	63.3	O K
30 min Summer	54.031	0.381	0.0	2.0	2.0	85.8	O K
60 min Summer	54.137	0.487	0.0	2.0	2.0	109.6	O K
120 min Summer	54.241	0.591	0.0	2.0	2.0	133.1	O K
180 min Summer	54.294	0.644	0.0	2.0	2.0	144.8	O K
240 min Summer	54.323	0.673	0.0	2.0	2.0	151.3	O K
360 min Summer	54.357	0.707	0.0	2.0	2.0	159.1	O K
480 min Summer	54.371	0.721	0.0	2.0	2.0	162.3	O K
600 min Summer	54.374	0.724	0.0	2.0	2.0	162.9	O K
720 min Summer	54.370	0.720	0.0	2.0	2.0	162.0	O K
960 min Summer	54.359	0.709	0.0	2.0	2.0	159.6	O K
1440 min Summer	54.330	0.680	0.0	2.0	2.0	153.1	O K
2160 min Summer	54.279	0.629	0.0	2.0	2.0	141.6	O K
2880 min Summer	54.225	0.575	0.0	2.0	2.0	129.4	O K
4320 min Summer	54.105	0.455	0.0	2.0	2.0	102.3	O K
5760 min Summer	54.008	0.358	0.0	2.0	2.0	80.5	O K
7200 min Summer	53.932	0.282	0.0	2.0	2.0	63.5	O K
8640 min Summer	53.875	0.225	0.0	2.0	2.0	50.7	O K
10080 min Summer	53.834	0.184	0.0	1.9	1.9	41.3	O K
15 min Winter	53.968	0.318	0.0	2.0	2.0	71.5	O K
30 min Winter	54.081	0.431	0.0	2.0	2.0	96.9	O K
60 min Winter	54.201	0.551	0.0	2.0	2.0	123.9	O K
120 min Winter	54.318	0.668	0.0	2.0	2.0	150.3	O K
180 min Winter	54.378	0.728	0.0	2.0	2.0	163.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	130.405	0.0	61.2	26
30 min Summer	87.611	0.0	84.5	41
60 min Summer	56.129	0.0	111.7	70
120 min Summer	34.675	0.0	139.5	128
180 min Summer	25.749	0.0	155.9	188
240 min Summer	20.687	0.0	167.4	246
360 min Summer	15.234	0.0	185.3	364
480 min Summer	12.237	0.0	198.7	482
600 min Summer	10.316	0.0	209.4	600
720 min Summer	8.967	0.0	218.4	676
960 min Summer	7.182	0.0	232.9	788
1440 min Summer	5.242	0.0	253.1	1044
2160 min Summer	3.818	0.0	280.7	1460
2880 min Summer	3.045	0.0	297.9	1880
4320 min Summer	2.209	0.0	322.6	2640
5760 min Summer	1.757	0.0	341.5	3352
7200 min Summer	1.472	0.0	356.0	4040
8640 min Summer	1.274	0.0	368.1	4752
10080 min Summer	1.128	0.0	378.2	5440
15 min Winter	130.405	0.0	69.3	26
30 min Winter	87.611	0.0	95.3	40
60 min Winter	56.129	0.0	125.9	70
120 min Winter	34.675	0.0	156.9	126
180 min Winter	25.749	0.0	175.4	184

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Date 01/08/2022 File 19320 CHARACTER AREA 4 PCP.SRCX	Designed by JE Checked by AC	
Micro Drainage		Source Control 2018.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	54.412	0.762	0.0	2.0	2.0	171.5	O K
360 min Winter	54.455	0.805	0.0	2.0	2.0	181.1	O K
480 min Winter	54.475	0.825	0.0	2.0	2.0	185.6	O K
600 min Winter	54.482	0.832	0.0	2.0	2.0	187.2	O K
720 min Winter	54.481	0.831	0.0	2.0	2.0	187.0	O K
960 min Winter	54.466	0.816	0.0	2.0	2.0	183.6	O K
1440 min Winter	54.427	0.777	0.0	2.0	2.0	174.9	O K
2160 min Winter	54.356	0.706	0.0	2.0	2.0	158.9	O K
2880 min Winter	54.278	0.628	0.0	2.0	2.0	141.2	O K
4320 min Winter	54.093	0.443	0.0	2.0	2.0	99.7	O K
5760 min Winter	53.952	0.302	0.0	2.0	2.0	67.9	O K
7200 min Winter	53.857	0.207	0.0	2.0	2.0	46.6	O K
8640 min Winter	53.799	0.149	0.0	1.9	1.9	33.6	O K
10080 min Winter	53.764	0.114	0.0	1.8	1.8	25.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	20.687	0.0	188.2	242
360 min Winter	15.234	0.0	208.3	358
480 min Winter	12.237	0.0	223.2	470
600 min Winter	10.316	0.0	235.2	582
720 min Winter	8.967	0.0	245.1	690
960 min Winter	7.182	0.0	261.0	892
1440 min Winter	5.242	0.0	280.4	1112
2160 min Winter	3.818	0.0	315.5	1580
2880 min Winter	3.045	0.0	334.9	2044
4320 min Winter	2.209	0.0	362.9	2816
5760 min Winter	1.757	0.0	384.4	3520
7200 min Winter	1.472	0.0	400.8	4176
8640 min Winter	1.274	0.0	414.7	4760
10080 min Winter	1.128	0.0	426.4	5352

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Micro Drainage		Source Control 2018.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.800	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.282

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.094	4	8	0.094
				8	12
					0.094

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20 East Sands	Ageas Bowl	
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Micro Drainage	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 54.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	15.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	208.3	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	53.650	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0069-2000-0850-2000
Design Head (m)	0.850
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	53.660
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.850	2.0	Kick-Flo®	0.535	1.6
Flush-Flo™	0.257	2.0	Mean Flow over Head Range	-	1.8

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)	Depth (m)	Flow (l/s)
0.100	1.7	0.800	1.9	2.000	3.0	4.000	4.1	7.000	5.3
0.200	2.0	1.000	2.2	2.200	3.1	4.500	4.3	7.500	5.5
0.300	2.0	1.200	2.3	2.400	3.2	5.000	4.5	8.000	5.7
0.400	1.9	1.400	2.5	2.600	3.3	5.500	4.7	8.500	5.8
0.500	1.7	1.600	2.7	3.000	3.6	6.000	4.9	9.000	6.0
0.600	1.7	1.800	2.8	3.500	3.8	6.500	5.1	9.500	6.1

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20 East Sands	Character Area 5	
Burbage Marlborough	Ageas Bowl	
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Micro Drainage	Network 2018.1	

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)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.350	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.889	4-8	0.711	8-12	0.305	12-16	0.070

Total Area Contributing (ha) = 1.976

Total Pipe Volume (m³) = 69.715

Network Design Table for Storm

- Indicates pipe length does not match coordinates

« - 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	27.020	1.510	17.9	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	17.123	0.830	20.6	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	21.106	0.890	23.7	0.045	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	17.554	1.010	17.4	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	10.425	0.400	26.1	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	11.314	0.250	45.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	56.145	2.300	24.4	0.127	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	10.706	0.450	23.8	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	17.632	0.850	20.7	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	5.19	60.290	0.012	0.0	0.0	0.0	2.39	42.3	1.6
1.001	50.00	5.32	58.780	0.021	0.0	0.0	0.0	2.23	39.4	2.8
1.002	50.00	5.49	57.950	0.066	0.0	0.0	0.0	2.08	36.7	8.9
1.003	50.00	5.58	57.060	0.078	0.0	0.0	0.0	3.15	125.4	10.6
1.004	50.00	5.65	56.050	0.115	0.0	0.0	0.0	2.57	102.3	15.6
1.005	50.00	5.74	55.650	0.115	0.0	0.0	0.0	1.95	77.5	15.6
1.006	50.00	6.09	55.400	0.242	0.0	0.0	0.0	2.66	105.7	32.8
1.007	50.00	6.15	53.100	0.274	0.0	0.0	0.0	3.24	228.8	37.1
1.008	50.00	6.23	52.650	0.274	0.0	0.0	0.0	3.47	245.1	37.1

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Burbage Marlborough	Ageas Bowl	
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Micro Drainage	Network 2018.1	

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
2.000	8.991	0.230	39.1	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	17.382	0.700	24.8	0.049	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	64.631	3.720	17.4	0.110	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	40.000	0.000	0.0	0.231	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	5.000	3.526	1.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.003	73.723	4.050	18.2	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	16.442	0.182	90.3	0.033	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	15.544	0.333	46.7	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	47.496	0.750	63.3	0.187	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	16.960	0.000	0.0	0.103	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	13.094	1.450	9.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	34.431	0.175	196.7	0.041	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.000	13.189	0.400	33.0	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	8.416	0.590	14.3	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	6.582	0.385	17.1	0.023	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.003	8.637	0.595	14.5	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.004	6.318	0.390	16.2	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.005	13.347	0.770	17.3	0.018	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)
2.000	50.00	5.09	60.500	0.018	0.0	0.0	0.0	1.61	28.5	2.4
2.001	50.00	5.24	60.270	0.067	0.0	0.0	0.0	2.03	35.9	9.1
2.002	50.00	5.52	59.570	0.177	0.0	0.0	0.0	3.79	267.9	24.0
3.000	50.00	12.19	59.570	0.231	0.0	0.0	0.0	0.09	1.6«	31.3
3.001	50.00	12.20	59.570	0.231	0.0	0.0	0.0	8.53	150.8	31.3
2.003	50.00	12.53	55.850	0.492	0.0	0.0	0.0	3.70	261.7	66.6
4.000	50.00	5.26	52.315	0.033	0.0	0.0	0.0	1.06	18.7	4.5
4.001	50.00	5.39	52.133	0.069	0.0	0.0	0.0	1.92	76.3	9.3
1.009	50.00	12.84	51.800	1.022	0.0	0.0	0.0	2.56	406.9	138.4
5.000	50.00	8.05	52.500	0.103	0.0	0.0	0.0	0.09	1.6«	13.9
5.001	50.00	8.11	52.500	0.103	0.0	0.0	0.0	3.37	59.6	13.9
1.010	50.00	13.24	51.050	1.166	0.0	0.0	0.0	1.45	230.0	157.9
6.000	50.00	5.12	59.750	0.013	0.0	0.0	0.0	1.76	31.1	1.8
6.001	50.00	5.18	59.350	0.017	0.0	0.0	0.0	2.68	47.4	2.3
6.002	50.00	5.22	58.760	0.040	0.0	0.0	0.0	2.45	43.3	5.4
6.003	50.00	5.28	58.375	0.043	0.0	0.0	0.0	2.66	47.0	5.8
6.004	50.00	5.32	57.705	0.054	0.0	0.0	0.0	2.52	44.4	7.3
6.005	50.00	5.41	57.315	0.072	0.0	0.0	0.0	2.43	43.0	9.7

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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
6.006	7.769	0.540	14.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.007	13.505	0.405	33.3	0.046	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.008	13.813	0.092	150.1	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.009	8.552	0.058	147.4	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.010	18.977	0.164	115.7	0.016	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.011	21.529#	0.076	283.3	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.012	9.485#	0.032	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.013	87.461	2.552	34.3	0.162	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.000	19.126	1.094	17.5	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	28.840	0.000	0.0	0.178	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.001	14.074	3.464	4.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	19.584	1.241	15.8	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.002	26.058	1.595	16.3	0.093	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.003	10.395	0.650	16.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.014	41.685	0.375	111.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.015	62.286	1.300	47.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	57.564	1.600	36.0	0.081	0.00	0.0	0.600	o	450	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)
6.006	50.00	5.46	56.545	0.072	0.0	0.0	0.0	2.67	47.2	9.7
6.007	50.00	5.56	56.005	0.118	0.0	0.0	0.0	2.27	90.4	16.0
6.008	50.00	5.74	55.525	0.148	0.0	0.0	0.0	1.28	90.5	20.0
6.009	50.00	5.85	55.433	0.194	0.0	0.0	0.0	1.29	91.4	26.3
6.010	50.00	6.06	55.374	0.210	0.0	0.0	0.0	1.46	103.3	28.4
6.011	50.00	6.45	55.210	0.244	0.0	0.0	0.0	0.93	65.7	33.0
6.012	50.00	6.62	55.134	0.244	0.0	0.0	0.0	0.90	63.8	33.0
6.013	50.00	7.17	55.102	0.406	0.0	0.0	0.0	2.69	190.5	55.0
7.000	50.00	5.13	57.130	0.018	0.0	0.0	0.0	2.42	42.8	2.4
8.000	50.00	10.19	59.500	0.178	0.0	0.0	0.0	0.09	1.6«	24.1
8.001	50.00	10.23	59.500	0.178	0.0	0.0	0.0	5.04	89.0	24.1
7.001	50.00	10.33	56.036	0.230	0.0	0.0	0.0	3.31	131.6	31.1
7.002	50.00	10.46	54.795	0.323	0.0	0.0	0.0	3.25	129.4	43.7
7.003	50.00	10.51	53.200	0.323	0.0	0.0	0.0	3.95	279.3	43.7
6.014	50.00	10.91	52.550	0.729	0.0	0.0	0.0	1.72	189.7	98.7
6.015	50.00	11.31	52.175	0.729	0.0	0.0	0.0	2.62	289.7	98.7
1.011	50.00	13.52	50.875	1.976	0.0	0.0	0.0	3.40	540.5	267.6

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.012	0.012	0.012
1.001	-	-	100	0.009	0.009	0.009
1.002	-	-	100	0.045	0.045	0.045
1.003	-	-	100	0.012	0.012	0.012
1.004	-	-	100	0.037	0.037	0.037
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.127	0.127	0.127
1.007	-	-	100	0.032	0.032	0.032
1.008	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.018	0.018	0.018
2.001	-	-	100	0.049	0.049	0.049
2.002	-	-	100	0.110	0.110	0.110
3.000	-	-	100	0.231	0.231	0.231
3.001	-	-	100	0.000	0.000	0.000
2.003	-	-	100	0.084	0.084	0.084
4.000	-	-	100	0.033	0.033	0.033
4.001	-	-	100	0.036	0.036	0.036
1.009	-	-	100	0.187	0.187	0.187
5.000	-	-	100	0.103	0.103	0.103
5.001	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.041	0.041	0.041
6.000	-	-	100	0.013	0.013	0.013
6.001	-	-	100	0.004	0.004	0.004
6.002	-	-	100	0.023	0.023	0.023
6.003	-	-	100	0.003	0.003	0.003
6.004	-	-	100	0.011	0.011	0.011
6.005	-	-	100	0.018	0.018	0.018
6.006	-	-	100	0.000	0.000	0.000
6.007	-	-	100	0.046	0.046	0.046
6.008	-	-	100	0.030	0.030	0.030
6.009	-	-	100	0.046	0.046	0.046
6.010	-	-	100	0.016	0.016	0.016
6.011	-	-	100	0.034	0.034	0.034
6.012	-	-	100	0.000	0.000	0.000
6.013	-	-	100	0.162	0.162	0.162
7.000	-	-	100	0.018	0.018	0.018
8.000	-	-	100	0.178	0.178	0.178
8.001	-	-	100	0.000	0.000	0.000
7.001	-	-	100	0.034	0.034	0.034
7.002	-	-	100	0.093	0.093	0.093
7.003	-	-	100	0.000	0.000	0.000
6.014	-	-	100	0.000	0.000	0.000
6.015	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.081	0.081	0.081
				Total	Total	Total
				1.976	1.976	1.976

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)
1.011		51.530	49.275	0.000	0	0

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Online Controls for Storm

Orifice Manhole: Orifice1, DS/PN: 3.001, Volume (m³): 2.3

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 59.570

Orifice Manhole: Orifice2, DS/PN: 5.001, Volume (m³): 0.8

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 52.500

Orifice Manhole: Orifice3, DS/PN: 8.001, Volume (m³): 1.1

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 59.500

Orifice Manhole: S16, DS/PN: 6.015, Volume (m³): 6.0

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 52.175

Hydro-Brake® Optimum Manhole: S29, DS/PN: 1.011, Volume (m³): 14.7

Unit Reference	MD-SHE-0118-8000-1905-8000
Design Head (m)	1.905
Design Flow (l/s)	8.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	118
Invert Level (m)	50.875
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.905	8.0	Kick-Flo®	1.053	6.1
Flush-Flo™	0.512	7.7	Mean Flow over Head Range	-	6.8

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)	Depth (m)	Flow (l/s)
0.100	4.2	0.800	7.3	2.000	8.2	4.000	11.4	7.000	14.8
0.200	6.6	1.000	6.5	2.200	8.6	4.500	12.0	7.500	15.3
0.300	7.3	1.200	6.4	2.400	8.9	5.000	12.6	8.000	15.8
0.400	7.6	1.400	6.9	2.600	9.3	5.500	13.2	8.500	16.3
0.500	7.7	1.600	7.4	3.000	9.9	6.000	13.8	9.000	16.7
0.600	7.6	1.800	7.8	3.500	10.7	6.500	14.3	9.500	17.2

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Storage Structures for Storm

Porous Car Park Manhole: PCP1, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	34.0
Membrane Percolation (mm/hr)	1000	Length (m)	40.0
Max Percolation (l/s)	377.8	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	57.000	Membrane Depth (mm)	0

Porous Car Park Manhole: PCP2, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	19.0
Membrane Percolation (mm/hr)	1000	Length (m)	30.0
Max Percolation (l/s)	158.3	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	52.500	Membrane Depth (mm)	0

Porous Car Park Manhole: PCP3, DS/PN: 8.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	26.0
Membrane Percolation (mm/hr)	1000	Length (m)	41.0
Max Percolation (l/s)	296.1	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	59.500	Membrane Depth (mm)	0

Tank or Pond Manhole: S16, DS/PN: 6.015

Invert Level (m) 52.175

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	440.0	1.081	1104.0

Tank or Pond Manhole: S29, DS/PN: 1.011

Invert Level (m) 50.875

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	360.0	1.905	770.0

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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	S31	1.529	0.456	0.000	1.985
1.001	S32	1.621	0.281	0.000	1.902
1.002	S33	1.629	0.352	0.000	1.980
1.003	S34	1.701	0.650	0.000	2.351
1.004	S35	1.729	0.367	0.000	2.096
1.005	S36	1.711	0.402	0.000	2.113
1.006	S37	1.706	2.185	0.000	3.890
1.007	S38	1.722	0.672	0.000	2.394
1.008	S39	1.713	1.156	0.000	2.870
2.000	S23	1.608	0.138	0.000	1.746
2.001	S24	1.612	0.286	0.000	1.898
2.002	S25	1.647	4.484	0.000	6.130
3.000	PCP1	1.647	0.686	1642.608	1644.940
3.001	Orifice1	1.647	0.067	0.000	1.714
2.003	S26	1.729	5.121	0.000	6.850
4.000	S40	1.615	0.269	0.000	1.884
4.001	S41	1.641	0.567	0.000	2.208
1.009	S27	2.236	7.339	0.000	9.575
5.000	PCP2	0.565	0.279	85.500	86.344
5.001	Orifice2	0.565	0.209	0.000	0.774
1.010	S28	2.146	5.261	0.000	7.407
6.000	S1	1.868	0.212	0.000	2.080
6.001	S2	1.530	0.128	0.000	1.658
6.002	S3	1.646	0.095	0.000	1.741
6.003	S4	1.617	0.131	0.000	1.749
6.004	S5	1.721	0.090	0.000	1.812
6.005	S6	1.765	0.215	0.000	1.980
6.006	S7	1.769	0.116	0.000	1.885
6.007	S8	1.722	0.489	0.000	2.212
6.008	S9	1.444	0.892	0.000	2.336
6.009	S10	1.439	0.520	0.000	1.958
6.010	S12	1.717	1.257	0.000	2.973
6.011	S13	3.393	1.437	0.000	4.830
6.012	S14	4.187	0.586	0.000	4.772
6.013	S18	4.220	6.092	0.000	10.312
7.000	S19	1.527	0.317	0.000	1.844
8.000	PCP3	0.565	0.488	159.900	160.954
8.001	Orifice3	0.565	0.228	0.000	0.793
7.001	S20	1.527	0.731	0.000	2.258
7.002	S21	1.613	0.988	0.000	2.601
7.003	S22	1.621	0.645	0.000	2.265
6.014	S15	2.267	4.455	0.000	6.722
6.015	S16	1.547	6.730	807.494	815.772
1.011	S29	2.727	9.048	1051.876	1063.651
Total		77.717	67.116	3747.378	3892.211

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1 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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

									Water	Surcharged
US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Level	Depth	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)
1.000	S31	15 Winter	1	+0%					60.309	-0.131
1.001	S32	15 Winter	1	+0%					58.806	-0.124
1.002	S33	15 Winter	1	+0%	100/15 Summer				57.998	-0.102
1.003	S34	15 Winter	1	+0%					57.102	-0.183
1.004	S35	15 Winter	1	+0%	100/15 Summer				56.109	-0.166
1.005	S36	15 Winter	1	+0%	100/15 Summer				55.718	-0.157
1.006	S37	15 Winter	1	+0%	100/15 Summer				55.479	-0.146
1.007	S38	15 Winter	1	+0%	100/15 Summer				53.186	-0.214
1.008	S39	15 Winter	1	+0%	100/15 Summer				52.726	-0.224
2.000	S23	15 Winter	1	+0%					60.531	-0.119
2.001	S24	15 Winter	1	+0%	100/15 Summer				60.319	-0.101
2.002	S25	15 Winter	1	+0%					59.626	-0.244
3.000	PCP1	1440 Winter	1	+0%					57.152	-2.568
3.001	Orifice1	960 Summer	1	+0%					59.570	-0.150
2.003	S26	15 Winter	1	+0%					55.918	-0.232
4.000	S40	15 Winter	1	+0%	100/15 Summer				52.366	-0.099
4.001	S41	15 Winter	1	+0%	100/15 Summer				52.186	-0.172
1.009	S27	15 Winter	1	+0%	100/15 Summer				51.949	-0.301
5.000	PCP2	480 Winter	1	+0%	30/240 Winter				52.567	-0.083
5.001	Orifice2	480 Winter	1	+0%	30/360 Winter				52.563	-0.087
1.010	S28	15 Winter	1	+0%	30/15 Summer				51.265	-0.235
6.000	S1	15 Winter	1	+0%					59.774	-0.126
6.001	S2	15 Winter	1	+0%					59.372	-0.128
6.002	S3	15 Winter	1	+0%					58.796	-0.114
6.003	S4	15 Winter	1	+0%					58.410	-0.115
6.004	S5	15 Winter	1	+0%	100/15 Summer				57.746	-0.109
6.005	S6	15 Winter	1	+0%	100/15 Summer				57.362	-0.103
6.006	S7	15 Winter	1	+0%	100/15 Summer				56.591	-0.104
6.007	S8	15 Winter	1	+0%	100/15 Summer				56.067	-0.163
6.008	S9	15 Winter	1	+0%	100/15 Summer				55.620	-0.205
6.009	S10	15 Winter	1	+0%	100/15 Summer				55.556	-0.177

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Micro Drainage	Network 2018.1	

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

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)	Status	
1.000	S31	0.000	0.04	1.6	OK	
1.001	S32	0.000	0.07	2.6	OK	
1.002	S33	0.000	0.22	7.6	OK	
1.003	S34	0.000	0.08	8.9	OK	
1.004	S35	0.000	0.15	13.1	OK	
1.005	S36	0.000	0.20	13.1	OK	
1.006	S37	0.000	0.27	27.1	OK	
1.007	S38	0.000	0.18	30.6	OK	
1.008	S39	0.000	0.15	30.5	OK	
2.000	S23	0.000	0.09	2.4	OK	
2.001	S24	0.000	0.23	7.8	OK	
2.002	S25	0.000	0.08	20.0	OK	
3.000	PCP1	0.000	0.00	0.0	OK	
3.001	Orifice1	0.000	0.00	0.0	OK	
2.003	S26	0.000	0.12	29.4	OK	
4.000	S40	0.000	0.25	4.3	OK	
4.001	S41	0.000	0.12	8.3	OK	
1.009	S27	0.000	0.24	88.3	OK	
5.000	PCP2	0.000	0.16	0.7	OK	
5.001	Orifice2	0.000	0.01	0.7	OK	
1.010	S28	0.000	0.46	92.1	OK	
6.000	S1	0.000	0.06	1.7	OK	
6.001	S2	0.000	0.05	2.1	OK	
6.002	S3	0.000	0.13	4.7	OK	
6.003	S4	0.000	0.12	5.1	OK	
6.004	S5	0.000	0.17	6.3	OK	
6.005	S6	0.000	0.21	8.3	OK	
6.006	S7	0.000	0.20	8.3	OK	
6.007	S8	0.000	0.17	13.3	OK	
6.008	S9	0.000	0.22	16.6	OK	
6.009	S10	0.000	0.35	21.5	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (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	Surcharged
									Level (m)	Depth (m)
6.010	S12	15 Winter	1	+0%	30/15 Winter				55.478	-0.196
6.011	S13	15 Winter	1	+0%	30/15 Summer				55.354	-0.156
6.012	S14	15 Winter	1	+0%	30/15 Summer				55.291	-0.143
6.013	S18	15 Winter	1	+0%	100/15 Summer				55.200	-0.202
7.000	S19	15 Winter	1	+0%					57.154	-0.126
8.000	PCP3	960 Winter	1	+0%	30/240 Winter				59.577	-0.073
8.001	Orifice3	960 Winter	1	+0%	30/240 Winter				59.572	-0.078
7.001	S20	15 Winter	1	+0%					56.069	-0.192
7.002	S21	15 Winter	1	+0%					54.851	-0.169
7.003	S22	15 Winter	1	+0%					53.258	-0.242
6.014	S15	15 Winter	1	+0%	100/15 Summer				52.698	-0.227
6.015	S16	1440 Winter	1	+0%	30/360 Winter				52.376	-0.174
1.011	S29	480 Winter	1	+0%	30/60 Summer				51.167	-0.158

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.010	S12	0.000	0.26		23.1	OK	
6.011	S13	0.000	0.46		26.6	OK	
6.012	S14	0.000	0.53		26.3	OK	
6.013	S18	0.000	0.23		41.7	OK	
7.000	S19	0.000	0.06		2.4	OK	
8.000	PCP3	0.000	0.16		0.8	OK	
8.001	Orifice3	0.000	0.01		0.8	OK	
7.001	S20	0.000	0.05		6.1	OK	
7.002	S21	0.000	0.14		16.5	OK	
7.003	S22	0.000	0.08		16.5	OK	
6.014	S15	0.000	0.33		57.0	OK	
6.015	S16	0.000	0.01		2.2	OK	
1.011	S29	0.000	0.01		7.3	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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	Surcharged
									Level (m)	Depth (m)
1.000	S31	15 Winter	30	+0%					60.321	-0.119
1.001	S32	15 Winter	30	+0%					58.824	-0.106
1.002	S33	15 Winter	30	+0%	100/15 Summer				58.039	-0.061
1.003	S34	15 Winter	30	+0%					57.134	-0.151
1.004	S35	15 Winter	30	+0%	100/15 Summer				56.157	-0.118
1.005	S36	15 Winter	30	+0%	100/15 Summer				55.776	-0.099
1.006	S37	15 Winter	30	+0%	100/15 Summer				55.555	-0.070
1.007	S38	15 Winter	30	+0%	100/15 Summer				53.261	-0.139
1.008	S39	15 Winter	30	+0%	100/15 Summer				52.790	-0.160
2.000	S23	15 Winter	30	+0%					60.549	-0.101
2.001	S24	15 Winter	30	+0%	100/15 Summer				60.361	-0.059
2.002	S25	15 Winter	30	+0%					59.669	-0.201
3.000	PCP1	1440 Winter	30	+0%					57.321	-2.399
3.001	Orifice1	30 Summer	30	+0%					59.570	-0.150
2.003	S26	15 Winter	30	+0%					55.974	-0.176
4.000	S40	15 Winter	30	+0%	100/15 Summer				52.401	-0.064
4.001	S41	15 Winter	30	+0%	100/15 Summer				52.224	-0.134
1.009	S27	15 Winter	30	+0%	100/15 Summer				52.088	-0.162
5.000	PCP2	480 Winter	30	+0%	30/240 Winter				52.658	0.008
5.001	Orifice2	480 Winter	30	+0%	30/360 Winter				52.653	0.003
1.010	S28	15 Winter	30	+0%	30/15 Summer				51.626	0.126
6.000	S1	15 Winter	30	+0%					59.788	-0.112
6.001	S2	15 Winter	30	+0%					59.387	-0.113
6.002	S3	15 Winter	30	+0%					58.823	-0.087
6.003	S4	15 Winter	30	+0%					58.437	-0.088
6.004	S5	15 Winter	30	+0%	100/15 Summer				57.779	-0.076
6.005	S6	15 Winter	30	+0%	100/15 Summer				57.401	-0.064
6.006	S7	15 Winter	30	+0%	100/15 Summer				56.629	-0.066
6.007	S8	15 Winter	30	+0%	100/15 Summer				56.120	-0.110
6.008	S9	15 Winter	30	+0%	100/15 Summer				55.764	-0.061
6.009	S10	15 Winter	30	+0%	100/15 Summer				55.725	-0.008

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Micro Drainage	Network 2018.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	S31	0.000	0.10		3.9	OK	
1.001	S32	0.000	0.19		6.9	OK	
1.002	S33	0.000	0.65		22.5	OK	
1.003	S34	0.000	0.24		26.6	OK	
1.004	S35	0.000	0.46		39.3	OK	
1.005	S36	0.000	0.60		39.1	OK	
1.006	S37	0.000	0.80		81.8	OK	
1.007	S38	0.000	0.55		92.0	OK	
1.008	S39	0.000	0.43		91.3	OK	
2.000	S23	0.000	0.23		5.8	OK	
2.001	S24	0.000	0.68		22.7	OK	
2.002	S25	0.000	0.24		60.6	OK	
3.000	PCP1	0.000	0.00		0.0	OK	
3.001	Orifice1	0.000	0.00		0.0	OK	
2.003	S26	0.000	0.35		88.9	OK	
4.000	S40	0.000	0.61		10.5	OK	
4.001	S41	0.000	0.34		22.8	OK	
1.009	S27	0.000	0.71		261.4	OK	
5.000	PCP2	0.000	0.38		1.7	SURCHARGED	
5.001	Orifice2	0.000	0.02		1.2	SURCHARGED	
1.010	S28	0.000	1.34		269.9	SURCHARGED	
6.000	S1	0.000	0.15		4.2	OK	
6.001	S2	0.000	0.13		5.5	OK	
6.002	S3	0.000	0.37		13.4	OK	
6.003	S4	0.000	0.35		14.4	OK	
6.004	S5	0.000	0.49		18.1	OK	
6.005	S6	0.000	0.62		24.2	OK	
6.006	S7	0.000	0.59		24.0	OK	
6.007	S8	0.000	0.50		39.5	OK	
6.008	S9	0.000	0.64		48.1	OK	
6.009	S10	0.000	0.99		60.5	OK	

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Micro Drainage	Network 2018.1	

30 year Return Period Summary of Critical Results by Maximum Level (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	Surcharged
									Level (m)	Depth (m)
6.010	S12	15 Winter	30	+0%	30/15 Winter				55.682	0.008
6.011	S13	15 Winter	30	+0%	30/15 Summer				55.598	0.088
6.012	S14	15 Winter	30	+0%	30/15 Summer				55.474	0.040
6.013	S18	15 Winter	30	+0%	100/15 Summer				55.282	-0.120
7.000	S19	15 Winter	30	+0%					57.168	-0.112
8.000	PCP3	960 Winter	30	+0%	30/240 Winter				59.674	0.024
8.001	Orifice3	960 Winter	30	+0%	30/240 Winter				59.666	0.016
7.001	S20	15 Winter	30	+0%					56.093	-0.168
7.002	S21	15 Winter	30	+0%					54.896	-0.124
7.003	S22	15 Winter	30	+0%					53.301	-0.199
6.014	S15	15 Winter	30	+0%	100/15 Summer				52.836	-0.089
6.015	S16	960 Winter	30	+0%	30/360 Winter				52.585	0.035
1.011	S29	480 Winter	30	+0%	30/60 Summer				51.611	0.286

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.010	S12	0.000	0.72		64.1	SURCHARGED	
6.011	S13	0.000	1.26		72.6	SURCHARGED	
6.012	S14	0.000	1.48		73.0	SURCHARGED	
6.013	S18	0.000	0.64		117.1	OK	
7.000	S19	0.000	0.14		5.8	OK	
8.000	PCP3	0.000	0.31		1.5	SURCHARGED	
8.001	Orifice3	0.000	0.02		1.3	SURCHARGED	
7.001	S20	0.000	0.15		17.5	OK	
7.002	S21	0.000	0.42		49.6	OK	
7.003	S22	0.000	0.25		49.6	OK	
6.014	S15	0.000	0.93		160.5	OK	
6.015	S16	0.000	0.01		3.2	SURCHARGED	
1.011	S29	0.000	0.02		7.7	SURCHARGED	

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Micro Drainage	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 5 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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	Surcharged
									Level (m)	Depth (m)
1.000	S31	15 Winter	100	+40%					60.332	-0.108
1.001	S32	15 Winter	100	+40%					58.841	-0.089
1.002	S33	15 Winter	100	+40%	100/15 Summer				58.290	0.190
1.003	S34	15 Winter	100	+40%					57.159	-0.126
1.004	S35	15 Winter	100	+40%	100/15 Summer				56.855	0.580
1.005	S36	15 Winter	100	+40%	100/15 Summer				56.670	0.795
1.006	S37	15 Winter	100	+40%	100/15 Summer				56.491	0.866
1.007	S38	15 Winter	100	+40%	100/15 Summer				53.539	0.139
1.008	S39	15 Winter	100	+40%	100/15 Summer				53.272	0.322
2.000	S23	15 Winter	100	+40%					60.647	-0.003
2.001	S24	15 Winter	100	+40%	100/15 Summer				60.616	0.196
2.002	S25	15 Winter	100	+40%					59.705	-0.165
3.000	PCP1	1440 Winter	100	+40%					57.578	-2.142
3.001	Orifice1	960 Winter	100	+40%					59.571	-0.149
2.003	S26	15 Winter	100	+40%					56.023	-0.127
4.000	S40	15 Winter	100	+40%	100/15 Summer				53.200	0.735
4.001	S41	15 Winter	100	+40%	100/15 Summer				53.040	0.682
1.009	S27	15 Winter	100	+40%	100/15 Summer				52.956	0.706
5.000	PCP2	480 Winter	100	+40%	30/240 Winter				52.811	0.161
5.001	Orifice2	480 Winter	100	+40%	30/360 Winter				52.805	0.155
1.010	S28	1440 Winter	100	+40%	30/15 Summer				52.348	0.848
6.000	S1	15 Winter	100	+40%					59.803	-0.097
6.001	S2	15 Winter	100	+40%					59.400	-0.100
6.002	S3	15 Winter	100	+40%					58.851	-0.059
6.003	S4	15 Winter	100	+40%					58.463	-0.062
6.004	S5	15 Winter	100	+40%	100/15 Summer				58.001	0.146
6.005	S6	15 Winter	100	+40%	100/15 Summer				57.798	0.333
6.006	S7	15 Winter	100	+40%	100/15 Summer				57.219	0.524
6.007	S8	15 Winter	100	+40%	100/15 Summer				56.872	0.642
6.008	S9	15 Winter	100	+40%	100/15 Summer				56.692	0.867
6.009	S10	15 Winter	100	+40%	100/15 Summer				56.624	0.891

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	S31	0.000	0.17		7.0	OK	
1.001	S32	0.000	0.34		12.6	OK	
1.002	S33	0.000	1.10		38.0	SURCHARGED	
1.003	S34	0.000	0.40		44.6	OK	
1.004	S35	0.000	0.69		58.9	SURCHARGED	
1.005	S36	0.000	0.95		62.4	SURCHARGED	
1.006	S37	0.000	1.13		114.9	SURCHARGED	
1.007	S38	0.000	0.78		131.0	SURCHARGED	
1.008	S39	0.000	0.67		141.5	SURCHARGED	
2.000	S23	0.000	0.41		10.4	OK	
2.001	S24	0.000	1.13		37.6	SURCHARGED	
2.002	S25	0.000	0.41		105.2	OK	
3.000	PCP1	0.000	0.00		0.0	OK	
3.001	Orifice1	0.000	0.00		0.0	OK	
2.003	S26	0.000	0.62		156.5	OK	
4.000	S40	0.000	1.09		18.8	SURCHARGED	
4.001	S41	0.000	0.54		36.2	SURCHARGED	
1.009	S27	0.000	1.08		398.7	SURCHARGED	
5.000	PCP2	0.000	0.41		1.8	FLOOD RISK	
5.001	Orifice2	0.000	0.03		1.8	FLOOD RISK	
1.010	S28	0.000	0.13		26.5	FLOOD RISK	
6.000	S1	0.000	0.27		7.6	OK	
6.001	S2	0.000	0.24		10.0	OK	
6.002	S3	0.000	0.67		24.4	OK	
6.003	S4	0.000	0.64		26.2	OK	
6.004	S5	0.000	0.83		30.9	SURCHARGED	
6.005	S6	0.000	0.97		38.1	SURCHARGED	
6.006	S7	0.000	0.93		37.9	SURCHARGED	
6.007	S8	0.000	0.73		57.0	SURCHARGED	
6.008	S9	0.000	0.94		70.6	FLOOD RISK	
6.009	S10	0.000	1.48		90.7	FLOOD RISK	

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Micro Drainage	Network 2018.1	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
6.010	S12	15 Winter	100	+40%	30/15 Winter				56.511	0.837
6.011	S13	15 Winter	100	+40%	30/15 Summer				56.345	0.835
6.012	S14	15 Winter	100	+40%	30/15 Summer				56.096	0.662
6.013	S18	15 Winter	100	+40%	100/15 Summer				55.933	0.531
7.000	S19	15 Winter	100	+40%					57.182	-0.098
8.000	PCP3	960 Winter	100	+40%	30/240 Winter				59.836	0.186
8.001	Orifice3	960 Winter	100	+40%	30/240 Winter				59.825	0.175
7.001	S20	15 Winter	100	+40%					56.115	-0.146
7.002	S21	15 Winter	100	+40%					54.942	-0.078
7.003	S22	15 Winter	100	+40%					53.498	-0.002
6.014	S15	15 Winter	100	+40%	100/15 Summer				53.392	0.467
6.015	S16	1440 Winter	100	+40%	30/360 Winter				52.876	0.326
1.011	S29	1440 Winter	100	+40%	30/60 Summer				52.346	1.021

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.010	S12	0.000	1.12		100.3	SURCHARGED	
6.011	S13	0.000	1.97		114.0	SURCHARGED	
6.012	S14	0.000	2.40		118.5	SURCHARGED	
6.013	S18	0.000	0.98		181.0	SURCHARGED	
7.000	S19	0.000	0.26		10.5	OK	
8.000	PCP3	0.000	0.48		2.3	FLOOD RISK	
8.001	Orifice3	0.000	0.02		1.8	FLOOD RISK	
7.001	S20	0.000	0.27		31.8	OK	
7.002	S21	0.000	0.75		90.1	OK	
7.003	S22	0.000	0.43		86.3	OK	
6.014	S15	0.000	1.51		260.5	SURCHARGED	
6.015	S16	0.000	0.02		4.2	SURCHARGED	
1.011	S29	0.000	0.02		7.7	SURCHARGED	

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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)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.350	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.141	4-8	0.054

Total Area Contributing (ha) = 0.195

Total Pipe Volume (m³) = 5.353

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	12.510	1.001	12.5	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	28.466	0.290	98.2	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	29.029	0.710	40.9	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	14.390	1.000	14.4	0.028	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	14.656	1.000	14.7	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	13.325	0.950	14.0	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	8.310	0.675	12.3	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	27.902	0.124	225.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	28.999	2.660	10.9	0.023	5.00	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)
1.000	50.00	5.07	54.900	0.000	0.0	0.0	0.0	2.87	50.6	0.0
1.001	50.00	5.54	53.900	0.011	0.0	0.0	0.0	1.01	17.9	1.5
1.002	50.00	5.85	53.610	0.022	0.0	0.0	0.0	1.58	27.9	3.0
1.003	50.00	5.94	52.900	0.050	0.0	0.0	0.0	2.67	47.2	6.8
1.004	50.00	6.03	51.900	0.064	0.0	0.0	0.0	2.65	46.7	8.7
1.005	50.00	6.09	50.900	0.078	0.0	0.0	0.0	3.51	139.7	10.6
1.006	50.00	6.13	49.950	0.092	0.0	0.0	0.0	3.75	149.1	12.5
1.007	50.00	6.67	49.275	0.092	0.0	0.0	0.0	0.87	34.5	12.5
2.000	50.00	5.16	51.811	0.023	0.0	0.0	0.0	3.07	54.2	3.1

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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
1.008	25.089	0.044	570.2	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	3.083	0.018	171.3	0.057	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)
1.008	50.00	7.44	49.151	0.138	0.0	0.0	0.0	0.54	21.5	18.7
1.009	50.00	7.49	49.107	0.195	0.0	0.0	0.0	1.00	39.6	26.4

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.011	0.011	0.011
1.002	-	-	100	0.011	0.011	0.011
1.003	-	-	100	0.028	0.028	0.028
1.004	-	-	100	0.014	0.014	0.014
1.005	-	-	100	0.014	0.014	0.014
1.006	-	-	100	0.014	0.014	0.014
1.007	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.023	0.023	0.023
1.008	-	-	100	0.023	0.023	0.023
1.009	-	-	100	0.057	0.057	0.057
				Total	Total	Total
				0.195	0.195	0.195

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)
1.009		51.530	49.089	0.000	0	0

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Online Controls for Storm

Orifice Manhole: S59, DS/PN: 1.009, Volume (m³): 2.0

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 49.107

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Storage Structures for Storm

Porous Car Park Manhole: S59, DS/PN: 1.009

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	19.3
Membrane Percolation (mm/hr)	1000	Length (m)	30.0
Max Percolation (l/s)	160.8	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	49.107	Membrane Depth (mm)	0

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	S51	0.679	0.200	0.000	0.878
1.001	S52	0.679	0.482	0.000	1.160
1.002	S53	1.007	0.492	0.000	1.498
1.003	S54	0.679	0.233	0.000	0.912
1.004	S55	0.679	0.238	0.000	0.916
1.005	S56	0.679	0.482	0.000	1.161
1.006	S57	0.983	0.283	0.000	1.266
1.007	S58	0.820	1.062	0.000	1.882
2.000	S61	1.527	0.491	0.000	2.018
1.008	S62	3.162	0.950	0.000	4.112
1.009	S59	1.010	0.099	155.114	156.223
Total		11.901	5.011	155.114	172.026

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1 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S51	60 Winter	1	+0%					54.900	-0.150	0.000
1.001	S52	15 Winter	1	+0%					53.926	-0.124	0.000
1.002	S53	15 Winter	1	+0%					53.640	-0.120	0.000
1.003	S54	15 Winter	1	+0%					52.935	-0.115	0.000
1.004	S55	15 Winter	1	+0%					51.941	-0.109	0.000
1.005	S56	15 Winter	1	+0%					50.939	-0.186	0.000
1.006	S57	15 Winter	1	+0%					49.995	-0.180	0.000
1.007	S58	15 Winter	1	+0%	30/15 Summer				49.362	-0.138	0.000
2.000	S61	15 Winter	1	+0%					51.834	-0.127	0.000
1.008	S62	15 Winter	1	+0%	30/15 Summer				49.301	-0.075	0.000
1.009	S59	960 Winter	1	+0%	30/60 Winter				49.260	-0.072	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	S51	0.00		0.0	OK	
1.001	S52	0.07		1.2	OK	
1.002	S53	0.09		2.4	OK	
1.003	S54	0.13		5.5	OK	
1.004	S55	0.16		7.1	OK	
1.005	S56	0.07		8.6	OK	
1.006	S57	0.09		10.1	OK	
1.007	S58	0.31		10.0	OK	
2.000	S61	0.06		3.0	OK	
1.008	S62	0.77		14.6	OK	
1.009	S59	0.03		0.9	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S51	60 Winter	30	+0%					54.900	-0.150	0.000
1.001	S52	15 Winter	30	+0%					53.948	-0.102	0.000
1.002	S53	15 Winter	30	+0%					53.664	-0.096	0.000
1.003	S54	15 Winter	30	+0%					52.966	-0.084	0.000
1.004	S55	15 Winter	30	+0%					51.976	-0.074	0.000
1.005	S56	15 Winter	30	+0%					50.972	-0.153	0.000
1.006	S57	15 Winter	30	+0%					50.030	-0.145	0.000
1.007	S58	15 Winter	30	+0%	30/15 Summer				49.643	0.143	0.000
2.000	S61	15 Winter	30	+0%					51.849	-0.112	0.000
1.008	S62	15 Winter	30	+0%	30/15 Summer				49.537	0.161	0.000
1.009	S59	960 Winter	30	+0%	30/60 Winter				49.486	0.154	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	S51	0.00		0.0	OK	
1.001	S52	0.22		3.8	OK	
1.002	S53	0.28		7.5	OK	
1.003	S54	0.39		17.1	OK	
1.004	S55	0.51		21.8	OK	
1.005	S56	0.22		26.5	OK	
1.006	S57	0.27		31.1	OK	
1.007	S58	0.93		29.9	SURCHARGED	
2.000	S61	0.14		7.4	OK	
1.008	S62	2.25		42.6	SURCHARGED	
1.009	S59	0.04		1.2	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	S51	60 Winter	100	+40%					54.900	-0.150	0.000
1.001	S52	15 Winter	100	+40%					53.966	-0.084	0.000
1.002	S53	15 Winter	100	+40%					53.686	-0.074	0.000
1.003	S54	15 Winter	100	+40%					52.995	-0.055	0.000
1.004	S55	15 Winter	100	+40%					52.014	-0.036	0.000
1.005	S56	15 Winter	100	+40%					50.999	-0.126	0.000
1.006	S57	15 Winter	100	+40%					50.163	-0.012	0.000
1.007	S58	15 Winter	100	+40%	30/15 Summer				49.999	0.499	0.000
2.000	S61	15 Winter	100	+40%					51.863	-0.098	0.000
1.008	S62	15 Summer	100	+40%	30/15 Summer				49.820	0.444	0.000
1.009	S59	960 Winter	100	+40%	30/60 Winter				49.815	0.483	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	S51	0.00		0.0	OK	
1.001	S52	0.40		6.8	OK	
1.002	S53	0.51		13.6	OK	
1.003	S54	0.71		31.0	OK	
1.004	S55	0.92		39.6	OK	
1.005	S56	0.40		48.1	OK	
1.006	S57	0.48		55.6	OK	
1.007	S58	1.50		48.0	FLOOD RISK	
2.000	S61	0.26		13.5	OK	
1.008	S62	3.43		65.0	SURCHARGED	
1.009	S59	0.07		1.8	FLOOD RISK	

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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)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.350	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.183	4-8	0.084

Total Area Contributing (ha) = 0.267

Total Pipe Volume (m³) = 4.573

Network Design Table for Storm

- Indicates pipe length does not match coordinates

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	57.948	2.432	23.8	0.083	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.600	0.098	108.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	32.851	0.329	99.9	0.050	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	13.222#	1.691	7.8	0.081	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	8.318	0.084	99.0	0.053	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	79.114	3.570	22.2	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)
1.000	50.00	5.45	48.940	0.083	0.0	0.0	0.0	2.09	37.0	11.2
1.001	50.00	5.57	46.508	0.083	0.0	0.0	0.0	1.51	106.8	11.2
2.000	50.00	5.54	48.539	0.050	0.0	0.0	0.0	1.01	17.8	6.8
2.001	50.00	5.61	48.210	0.131	0.0	0.0	0.0	3.63	64.1	17.7
2.002	50.00	5.69	46.494	0.184	0.0	0.0	0.0	1.58	111.7	24.9
1.002	50.00	6.31	46.410	0.267	0.0	0.0	0.0	2.15	38.0	36.2

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.083	0.083	0.083
1.001	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.050	0.050	0.050
2.001	-	-	100	0.081	0.081	0.081
2.002	-	-	100	0.053	0.053	0.053
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.267	0.267	0.267

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)
1.002		43.140	42.840	0.000	0	0

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S48, DS/PN: 1.002, Volume (m³): 2.0

Unit Reference	MD-SHE-0071-2000-0740-2000
Design Head (m)	0.740
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	71
Invert Level (m)	46.410
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.740	2.0	Kick-Flo®	0.471	1.6
Flush-Flo™	0.220	2.0	Mean Flow over Head Range	-	1.7

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)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.7
0.200	2.0	1.000	2.3	2.200	3.3	4.500	4.6	7.500	5.8
0.300	2.0	1.200	2.5	2.400	3.4	5.000	4.8	8.000	6.0
0.400	1.8	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.2
0.500	1.7	1.600	2.8	3.000	3.8	6.000	5.3	9.000	6.4
0.600	1.8	1.800	3.0	3.500	4.1	6.500	5.5	9.500	6.6

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Storage Structures for Storm

Porous Car Park Manhole: S48, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	23.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	319.4	Slope (1:X)	0.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	46.410	Membrane Depth (mm)	0

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	S46	0.797	1.003	0.000	1.800
1.001	S47	1.122	0.664	0.000	1.786
2.000	S42	1.527	0.559	0.000	2.086
2.001	S43	2.022	0.212	0.000	2.235
2.002	S50	1.025	0.503	0.000	1.528
1.002	S48	0.837	1.387	255.300	257.524
Total		7.330	4.330	255.300	266.959

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1 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Overflow	Water Level	Surcharged Depth
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.			(m)	(m)
1.000	S46	15 Winter	1	+0%	100/15 Summer						48.997	-0.093
1.001	S47	15 Winter	1	+0%	100/120 Winter						46.582	-0.226
2.000	S42	15 Winter	1	+0%	100/15 Summer						48.604	-0.085
2.001	S43	15 Winter	1	+0%	100/15 Summer						48.263	-0.097
2.002	S50	15 Winter	1	+0%	100/15 Summer						46.605	-0.189
1.002	S48	480 Winter	1	+0%	30/60 Summer						46.509	-0.051

Flooded			Pipe			Level	
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded
1.000	S46	0.000	0.30		10.8	OK	
1.001	S47	0.000	0.14		10.8	OK	
2.000	S42	0.000	0.38		6.5	OK	
2.001	S43	0.000	0.26		15.4	OK	
2.002	S50	0.000	0.29		21.4	OK	
1.002	S48	0.000	0.05		1.8	OK	

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Micro Drainage	Network 2018.1	

30 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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		Return Period	Climate Change	First (X)		First (Y)		First (Z)		Overflow Act.	Water Surcharged	
	Name	Storm			Surcharge	Flood	Overflow	Overflow	Act.	Level (m)	Depth (m)		
1.000	S46	15 Winter	30	+0%	100/15 Summer					49.038	-0.052		
1.001	S47	360 Winter	30	+0%	100/120 Winter					46.653	-0.155		
2.000	S42	15 Winter	30	+0%	100/15 Summer					48.655	-0.034		
2.001	S43	15 Winter	30	+0%	100/15 Summer					48.308	-0.052		
2.002	S50	15 Winter	30	+0%	100/15 Summer					46.708	-0.086		
1.002	S48	360 Winter	30	+0%	30/60 Summer					46.653	0.093		

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
1.000	S46	0.000	0.74	26.4		OK	
1.001	S47	0.000	0.05	4.1		OK	
2.000	S42	0.000	0.93	15.9		OK	
2.001	S43	0.000	0.74	43.1		OK	
2.002	S50	0.000	0.84	61.0		OK	
1.002	S48	0.000	0.05	2.0	SURCHARGED		

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Micro Drainage	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	S46	15 Winter	100	+40%	100/15 Summer				49.523	0.433
1.001	S47	480 Winter	100	+40%	100/120 Winter				46.922	0.114
2.000	S42	15 Winter	100	+40%	100/15 Summer				49.463	0.774
2.001	S43	15 Winter	100	+40%	100/15 Summer				48.844	0.484
2.002	S50	480 Winter	100	+40%	100/15 Summer				46.922	0.128
1.002	S48	480 Winter	100	+40%	30/60 Summer				46.921	0.361

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Status	
1.000	S46	0.000	1.08	38.7	FLOOD RISK	
1.001	S47	0.000	0.08	5.9	SURCHARGED	
2.000	S42	0.000	1.49	25.4	SURCHARGED	
2.001	S43	0.000	1.08	63.2	SURCHARGED	
2.002	S50	0.000	0.18	13.2	SURCHARGED	
1.002	S48	0.000	0.05	2.0	FLOOD RISK	