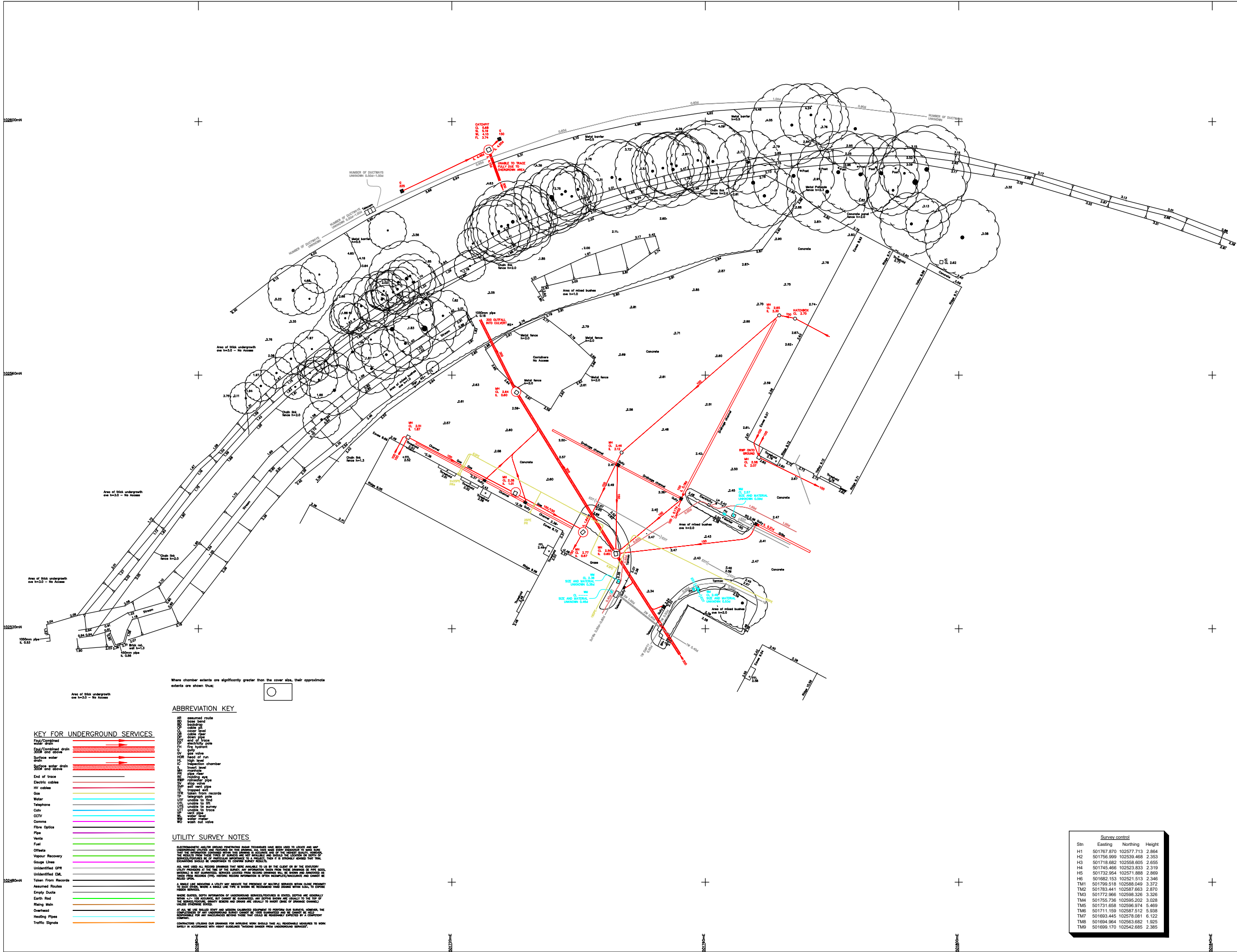




Hook Survey Legend

Hedge	Telephone line
Undergrowth	Power line
Tree	Banking
Bush	Contour line 64
Building	Survey Station
Glass Building	Gate
Open Building	Level
Ordnance Survey Benchmark	
Foul Drainage	
Storm Drainage	

Abbreviations

Animal Set	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Road	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	TS
Tril Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Data added and shown in half-tone, per colour 134.

HOOK SURVEY PARTNERSHIP
Land & Building Surveyors
www.hooksurvey.com

Project:
Riverside Industrial Estate, Bridge Road, Wick, Littlehampton, BN17 5DF

Client:
L&C Commercial Limited

Drawing title:
Topographical Survey

Job No.:	Dwg No.:	Revision:
5187471	5187471/01	
Scale:	Date:	Drawn by:
1:200	February 2020	D.S.

Grid & Levels related to
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

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Warwickshire
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Tel > 01608 553116

www.hooksurvey.com

KEY FOR UNDERGROUND SERVICES

Foul/Combined water and storm	
Surface water	
Surface water drain	
End of trace	
Electric cables	
HV cables	
Gas	
Water	
Telephone	
Cable	
CCTV	
Comms	
Pipe Optics	
Pipe	
Vents	
Fuel	
Offsets	
Vapour Recovery	
Gauge Lines	
Unidentified GPR	
Unidentified EML	
Taken From Records	
Assumed Routes	
Empty Ducts	
Earth Road	
Rising Main	
Overhead	
Heating Pipes	
Traffic Signals	

ABBREVIATION KEY

AB	Assumed route
AV	Air Valve
BH	Borehole
BS	Bus Stop
CL	Cover Level
ER	Earth Road
EP	Electricity Pole
FH	Fire Hydrant
IC	Inspection Cover
IL	Invert Level
LP	Lamp Post
MH	Manhole
MK	Marker
RNP	Name Plate
PP	Power Pole
RWP	Rain water Pipe
RS	Road Sign
RE	Rodding Eye
RSJ	Reinforced Steel Joint
SVP	Soil Vent Pipe
SV	Stop Valve
STN	Survey Station
TP	Telegraph Pole
TS	Tree Stump
TH	Tril Hole
UTL	Unable To Lift
VP	Vent Pipe
WV	Water Valve
W	Wash out Valve

UTILITY SURVEY NOTES

ELECTROMAGNETIC AND/OR GROUND PENETRATING RADAR TECHNIQUES HAVE BEEN USED TO LOCATE AND MAP UNDERGROUND SERVICES AND FEATURES IN THE ABOVE AREAS. THE DATA OBTAINED IS INDICATIVE ONLY. THE DATA IS PROVIDED AS A GUIDE ONLY AND SHOULD NOT BE USED AS A BASIS FOR DESIGN OR CONSTRUCTION. THE DATA IS PROVIDED AS A GUIDE ONLY AND SHOULD NOT BE USED AS A BASIS FOR DESIGN OR CONSTRUCTION.

ALL DATA HAS BEEN OBTAINED FROM RECORDS AND IS NOT A BASIS FOR DESIGN OR CONSTRUCTION. THE DATA IS PROVIDED AS A GUIDE ONLY AND SHOULD NOT BE USED AS A BASIS FOR DESIGN OR CONSTRUCTION.

WHERE DOUBT, VERIFY INFORMATION OF UNDERGROUND SERVICES/FEATURES IN SITU. DEPTH ARE APPROXIMATE. WHERE DOUBT, VERIFY INFORMATION OF UNDERGROUND SERVICES/FEATURES IN SITU. DEPTH ARE APPROXIMATE.

AT ALL TIMES, THE SURVEYOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE DATA OBTAINED. THE SURVEYOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE DATA OBTAINED.

CONTRACTOR/CLIENTS ARE ADVISED THAT THE DATA OBTAINED IS INDICATIVE ONLY. THE DATA OBTAINED IS INDICATIVE ONLY.

Survey control

Stn	Easting	Northing	Height
H1	501767.870	102577.713	2.894
H2	501756.669	102539.468	2.353
H3	501718.682	102558.605	2.655
H4	501745.466	102523.833	2.319
H5	501732.954	102571.888	2.869
H6	501682.153	102521.513	2.346
TM1	501769.518	102589.649	3.372
TM2	501753.441	102587.653	2.870
TM3	501772.966	102598.326	3.326
TM4	501755.736	102595.202	3.028
TM5	501731.658	102596.374	5.469
TM6	501711.159	102587.512	5.938
TM7	501693.445	102578.051	6.122
TM8	501694.964	102563.682	1.925
TM9	501699.170	102542.685	2.385

Appendix D – Southern Water Sewer Records



(c) Crown copyright and database rights 2020 Ordnance Survey 100031673 Date: 01/09/20 Scale: 1:1250 Map Centre: 501766,102497 Data updated: 18/08/20 Our Ref: 432188 - 1 Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2020 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

cnewlands@rsk.co.uk
Riverside



Appendix E – Offsite Surface Water Flows Calculations

Pre Development Offsite Flows

Impermeable area = 1,407 m²

Micro Drainage Rainfall Profiles

1:1 year, 15 minute storm	28.110	mmhr ⁻¹
1:30 year, 15 minute storm	68.836	mmhr ⁻¹
1:100 year, 15 minute storm	89.024	mmhr ⁻¹

Offsite Flow Rates

1:1 year, 15 minute storm	11.0	ls ⁻¹
1:30 year, 15 minute storm	26.9	ls ⁻¹
1:100 year, 15 minute storm	34.8	ls ⁻¹

Greenfield Runoff Rates

IH 124 gives greenfield runoff rates for a 50ha site, guidance for sites smaller than this is to linearly interpolate down to the site size (1,140m² drained area), greenfield rates calculated using Micro Drainage.

	1 year	30 year	100 year
IH 124 (50ha)	152.8 ls-1	407.5 ls-1	573.6 ls-1
Site Specific (6990m ²)	0.3 ls-1	0.9 ls-1	1.3 ls-1

Post Development Offsite Flows

Micro Drainage Model Results

Impermeable area = 1,140 m²

1:1 year event	1.8	ls ⁻¹
1:30 year event	1.9	ls ⁻¹
1:100 +40% allowance for c.c.	1.9	ls ⁻¹

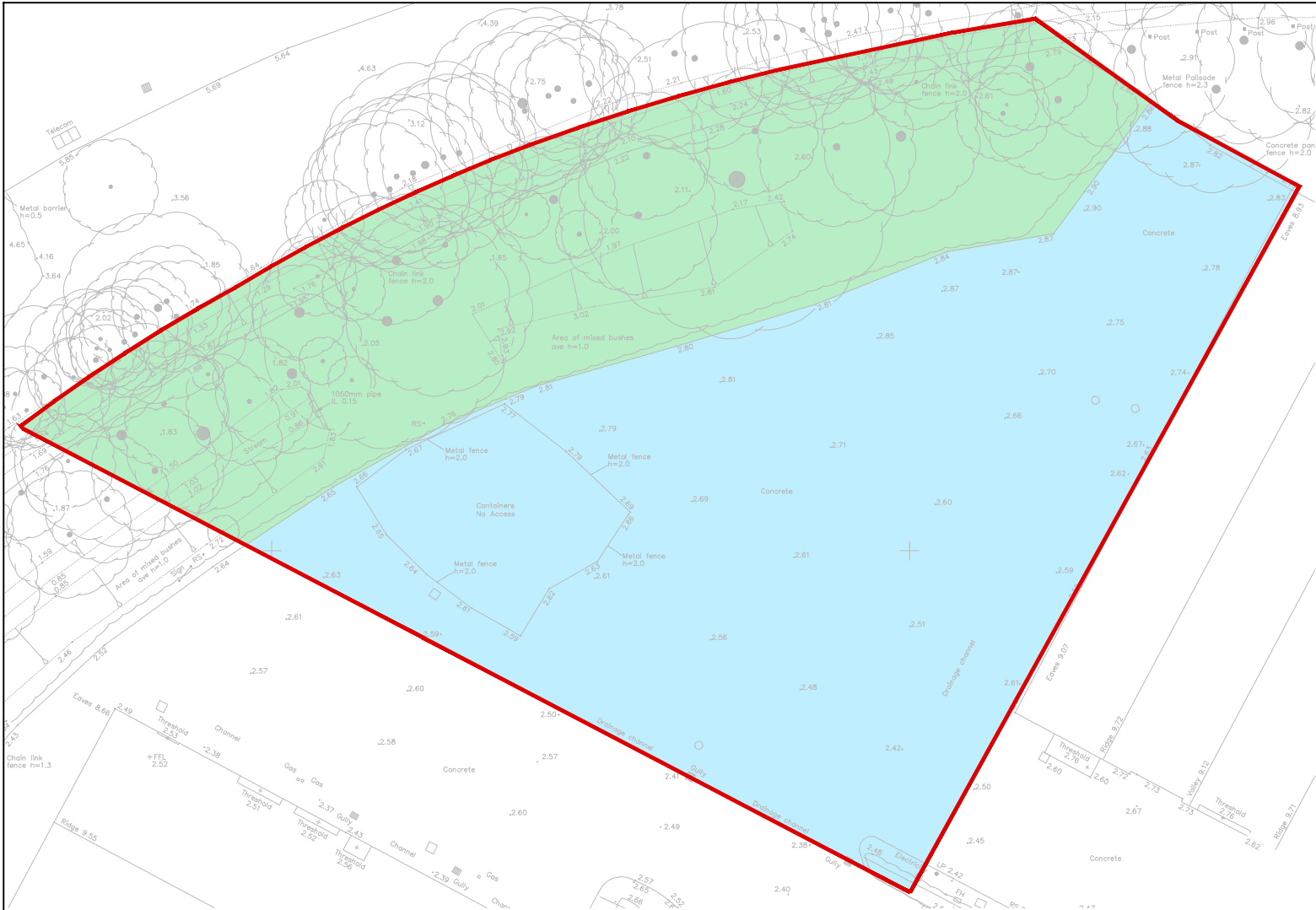
Remaining Uncontrolled Paths

Impermeable area = 143 m²

1:1 year, 15 minute storm	1.1	ls ⁻¹
1:30 year, 15 minute storm	2.7	ls ⁻¹
1:100 year, 15 minute storm +40%	5.0	ls ⁻¹

Total Offsite Flow Rates

2.9	ls ⁻¹
4.6	ls ⁻¹
6.9	ls ⁻¹

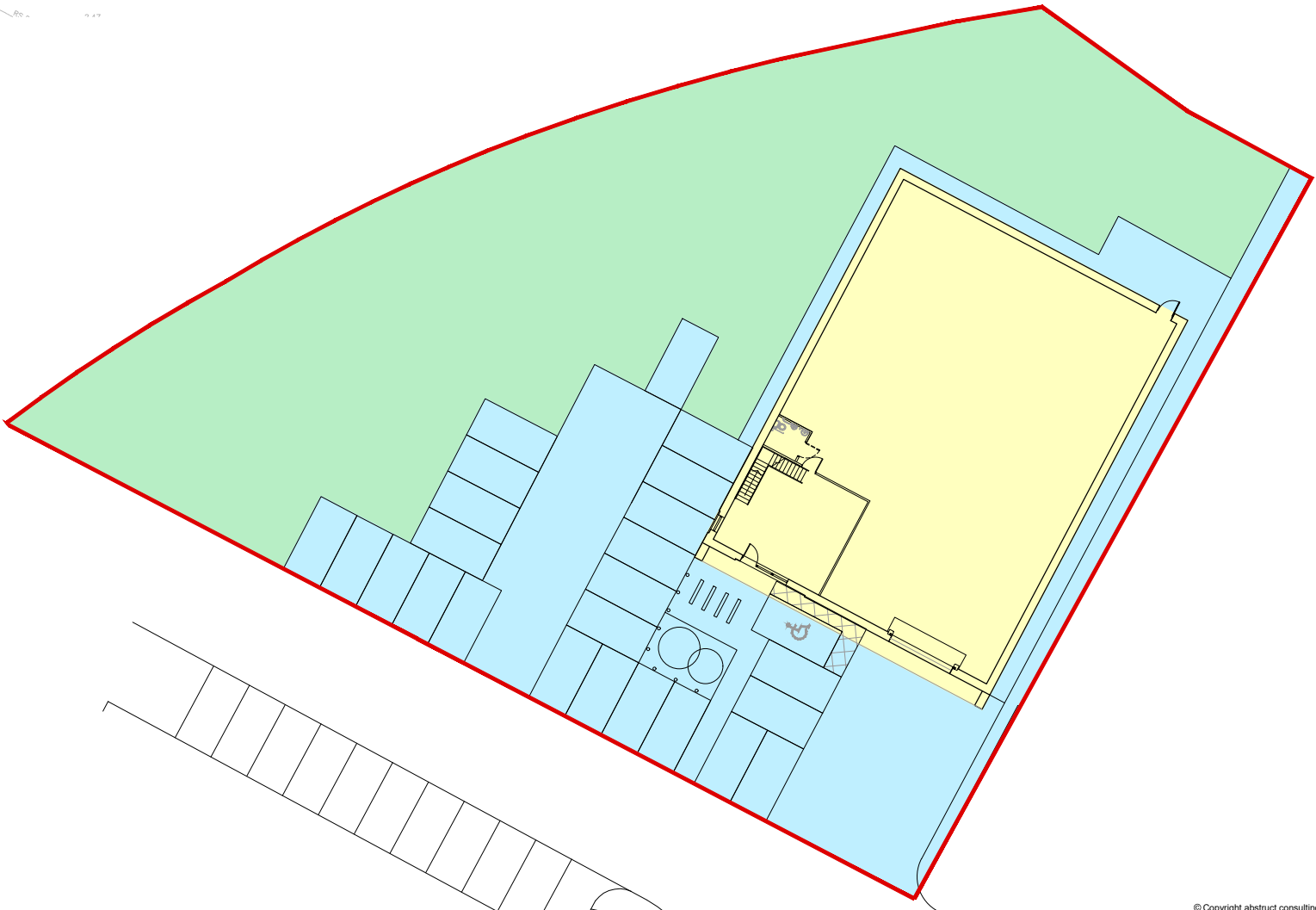


PRE DEVELOPMENT AREAS

- SOFT LANDSCAPING AREA = 928m²
- HARDSTANDING AREA = 1,407m²
- BUILDING ROOF AREA = 0m²
- TOTAL IMPERMEABLE AREA = 1,407m²
- TOTAL AREA = 2,335m²

POST DEVELOPMENT AREAS

- SOFT LANDSCAPING AREA = 1,052m²
- HARDSTANDING AREA = 742m²
- BUILDING ROOF AREA = 541m²
- TOTAL IMPERMEABLE AREA = 1,283m²
- TOTAL AREA = 2,335m²



NOTES

- DO NOT SCALE THIS DRAWING.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.

PRELIMINARY ISSUE

P1	04/11/2020	MH	MH	PRELIMINARY ISSUE.
Rev	Date	By	Chkd.	Revision notes

abstract
consulting
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Job Title
**RIVERSIDE INDUSTRIAL
ESTATE, LITTLEHAMPTON,
BN17 5DF.**

Drawing Title
MEASURED AREAS LAYOUT.

Client
LONDON & CAMBRIDGE PROPERTIES

Scale at A1: 1:200	Drawn: MH Date: NOV'2020	Checked: MH Date: NOV'2020
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Drawing No.: AC19021-SK-C-005	Revision: P1
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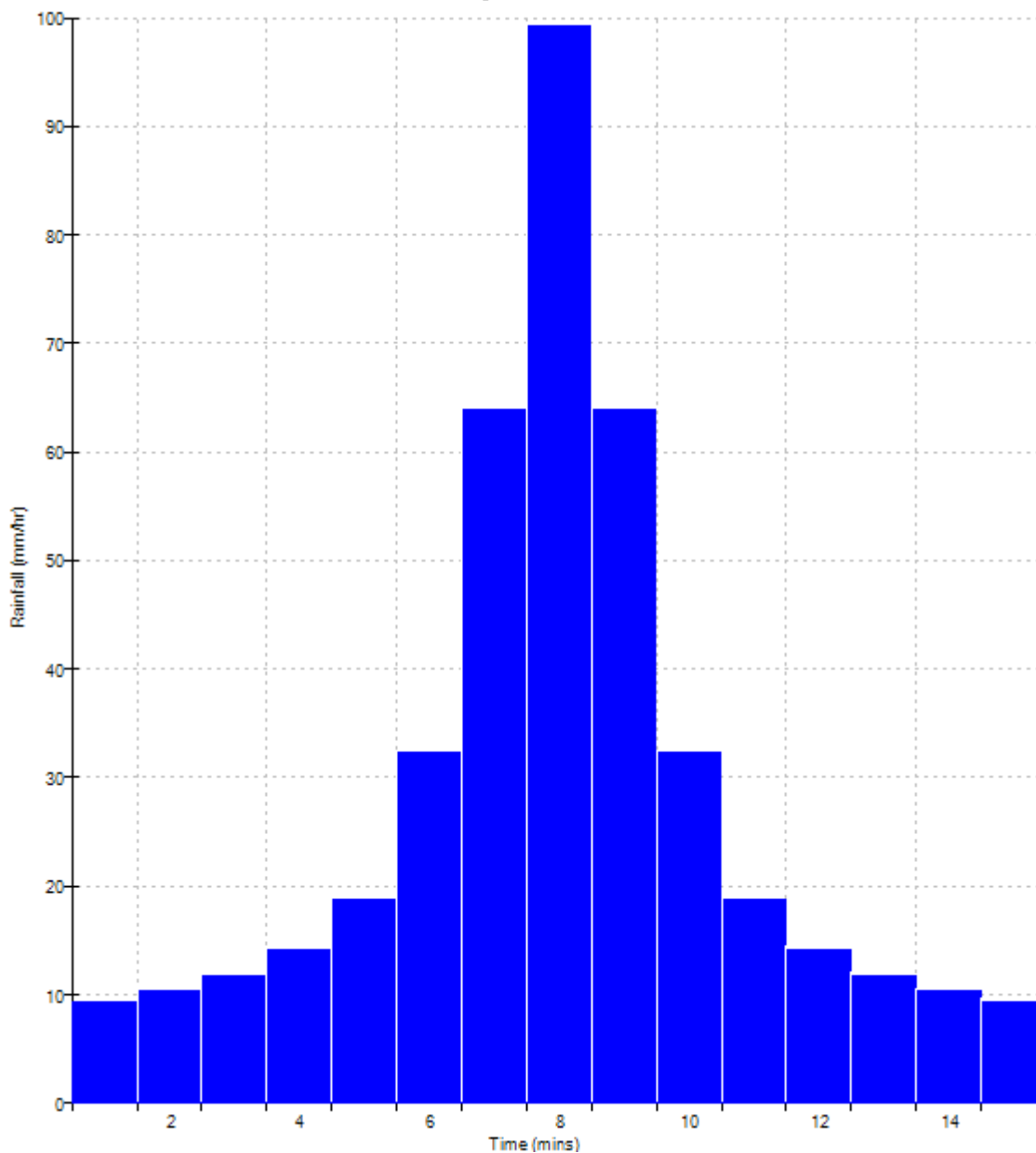
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The Highland Suite Great Hollanden Business Centre Sevenoaks Kent TN15 0SQ		
Date 04/11/2020 10:04 File	Designed by Martinhowell Checked by	
Causeway		Source Control 2020.1
<u>IH 124 Mean Annual Flood</u> Input Return Period (years) 1 Soil 0.400 Area (ha) 50.000 Urban 0.000 SAAR (mm) 734 Region Number Region 7 Results l/s QBAR Rural 179.8 QBAR Urban 179.8 Q1 year 152.8 Q1 year 152.8 Q2 years 158.4 Q5 years 230.2 Q10 years 291.3 Q20 years 360.2 Q25 years 386.3 Q30 years 407.5 Q50 years 471.1 Q100 years 573.6 Q200 years 674.3 Q250 years 706.7 Q1000 years 927.9		
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The Highland Suite Great Hollanden Business Centre Sevenoaks Kent TN15 0SQ		
Date 04/11/2020 09:33 File	Designed by Martinhowell Checked by	
Causeway		
Source Control 2020.1		

Rainfall profile

Storm duration (mins) 15

FSR Data
Region England and Wales
M5-60 (mm) 19.000
Ratio R 0.350
Peak Intensity (mm/hr) 99.342
Ave. Intensity (mm/hr) 28.110
Return Period (years) 1.0



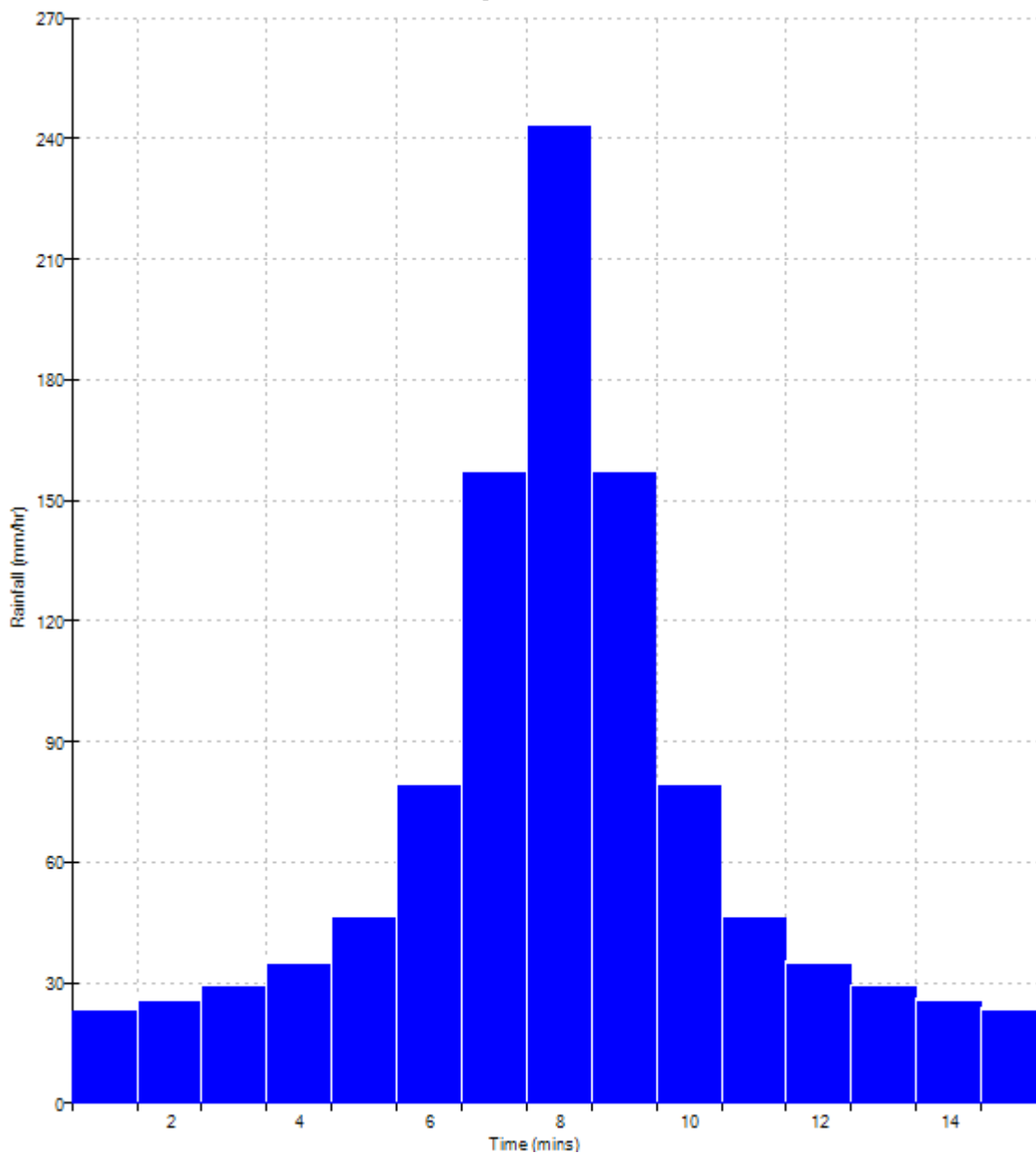
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Abstrcut Consulting Ltd		Page 1
The Highland Suite Great Hollenden Business Centre Sevenoaks Kent TN15 0SQ		
Date 04/11/2020 09:34 File	Designed by Martinhowell Checked by	
Causeway		
Source Control 2020.1		

Rainfall profile

Storm duration (mins) 15

FSR Data
Region England and Wales
M5-60 (mm) 19.000
Ratio R 0.350
Peak Intensity (mm/hr) 243.268
Ave. Intensity (mm/hr) 68.836
Return Period (years) 30.0



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The Highland Suite Great Hollenden Business Centre Sevenoaks Kent TN15 0SQ		
Date 04/11/2020 09:34 File	Designed by Martinhowell Checked by	
Causeway		
Source Control 2020.1		

Rainfall profile

Storm duration (mins) 15

FSR Data

Region England and Wales

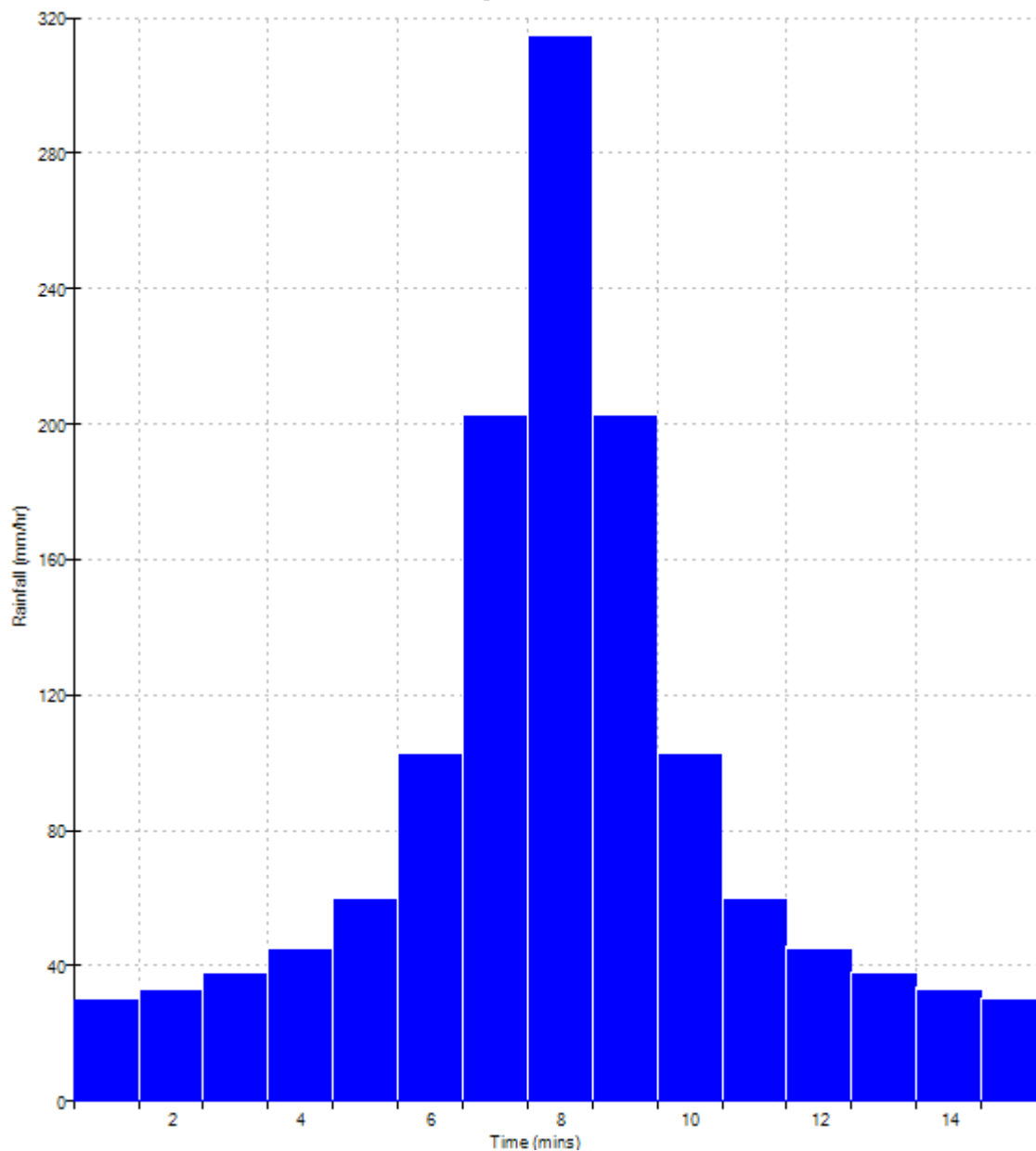
M5-60 (mm) 19.000

Ratio R 0.350

Peak Intensity (mm/hr) 314.610

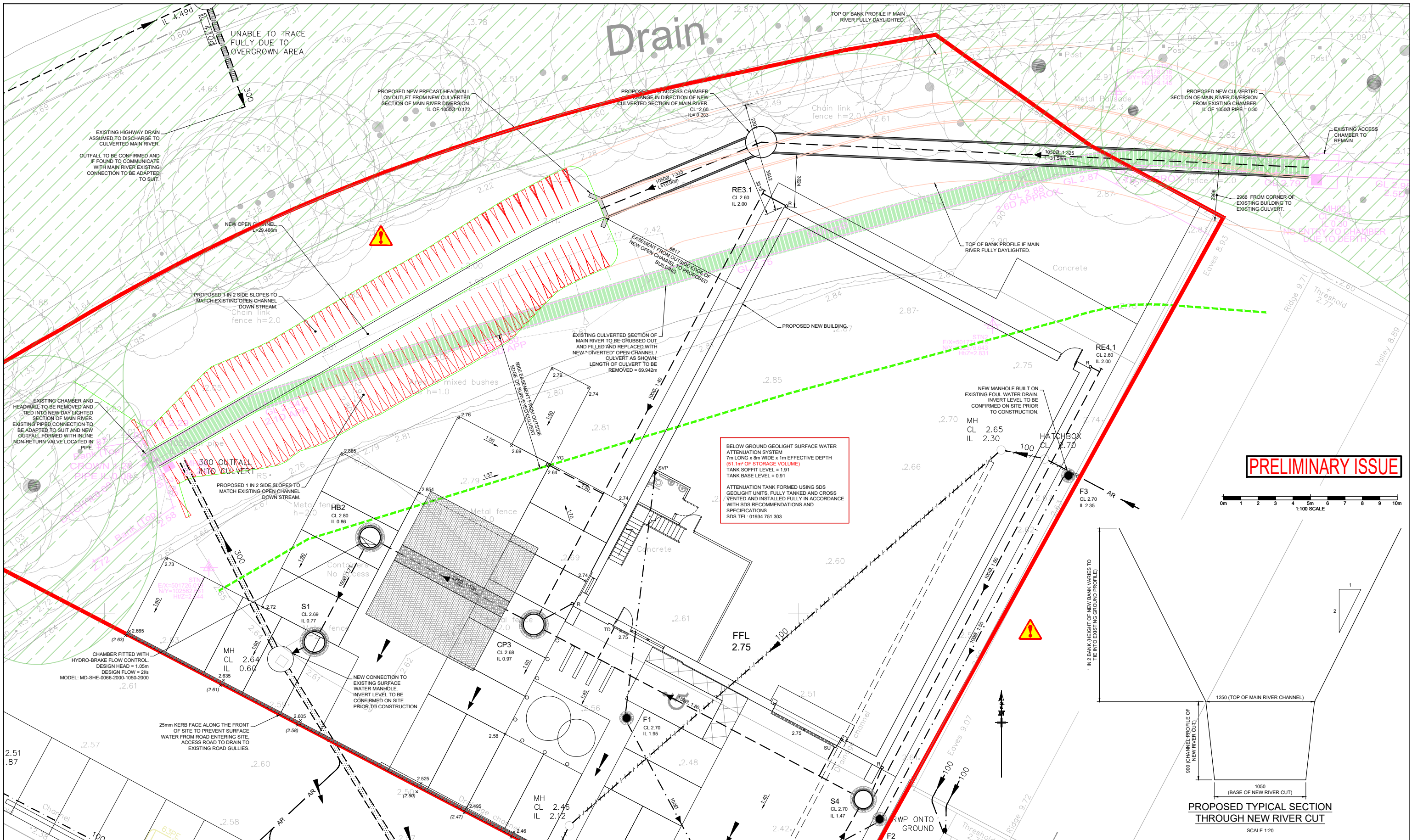
Ave. Intensity (mm/hr) 89.024

Return Period (years) 100.0



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Appendix F – Proposed Drainage Layout



PRELIMINARY ISSUE

0m 1 2 3 4 5m 6 7 8 9 10m
1:100 SCALE

PROPOSED TYPICAL SECTION
THROUGH NEW RIVER CUT

SCALE 1:20

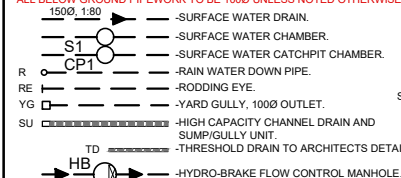
NOTES

- DO NOT SCALE THIS DRAWING.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS AND SPECIFICATIONS.
- BASE DRAWING INFORMATION IS TAKEN FROM THE FOLLOWING:
 - HOOK SURVEY PARTNERSHIP, TOPOGRAPHICAL SURVEY, S197471, REV.
 - GDM ARCHITECTS, PROPOSED SITE PLAN, 4076/p002b, SEPT 2020
 - SDS SURVEY DESIGN SERVICES / SWEETECH PIPELINE TRACE DRAWING No. SDS 207324.01 REV. DATED JUNE 2020.

KEY:

PRIVATE DRAINAGE

ALL BELOW GROUND PIPEWORK TO BE 1000 UNLESS NOTED OTHERWISE

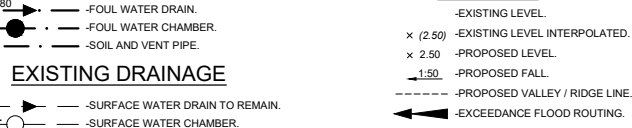


EXISTING DRAINAGE

— BELOW GROUND GEOLIGHT SURFACE WATER ATTENUATION STORAGE SYSTEM BY SDS (TEL: 01934 751 303).

— CLASS 1 BY-PASS SEPARATOR BY SPEL PRODUCTS (TEL: 01743 445 200).

GENERAL



CDM REGULATIONS 2015 RESIDUAL HAZARDS

RESIDUAL HAZARDS IDENTIFIED

CONSTRUCTION

- WORKING ON / OVER AND ADJACENT TO WATER.
- DRAINAGE ALONG EDGE OF EXISTING BUILDING TO BE INSTALLED IN SECTIONS TO AVOID UNDERMINING OF FOUNDATIONS.

FUTURE DEMOLITION

- A. NO SIGNIFICANT RESIDUAL HAZARDS BEYOND THOSE KNOWN TO AN EXPERIENCED CONTRACTOR.

THIS REGISTER IS A NON-EXHAUSTIVE LIST OF RESIDUAL HAZARDS RELATING TO THE WORKS SHOWN ON THIS DRAWING THAT HAVE BEEN IDENTIFIED DURING THE DESIGN STAGE.

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Rev	Date	By	Chkd.	Revision notes
P2	23/11/2020	MH	MH	ROOT PROTECTION ZONE ADDED.
P1	24/11/2020	AJ	MRW	ISSUE FOR INFORMATION.

Job Title
**RIVERSIDE INDUSTRIAL
ESTATE, LITTLEHAMPTON,
BN17 5DF.**

Drawing Title
**DRAINAGE STRATEGY SKETCH
SHEET 1 OF 2.**

Scale at A1:
1:100, 1:20

abstract
consulting
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Mill Lane, Undermire, Sevenoaks, Kent TN15 0SQ
T: 01732 838050 E: info@abstract-consult.com www.abstract-consult.com

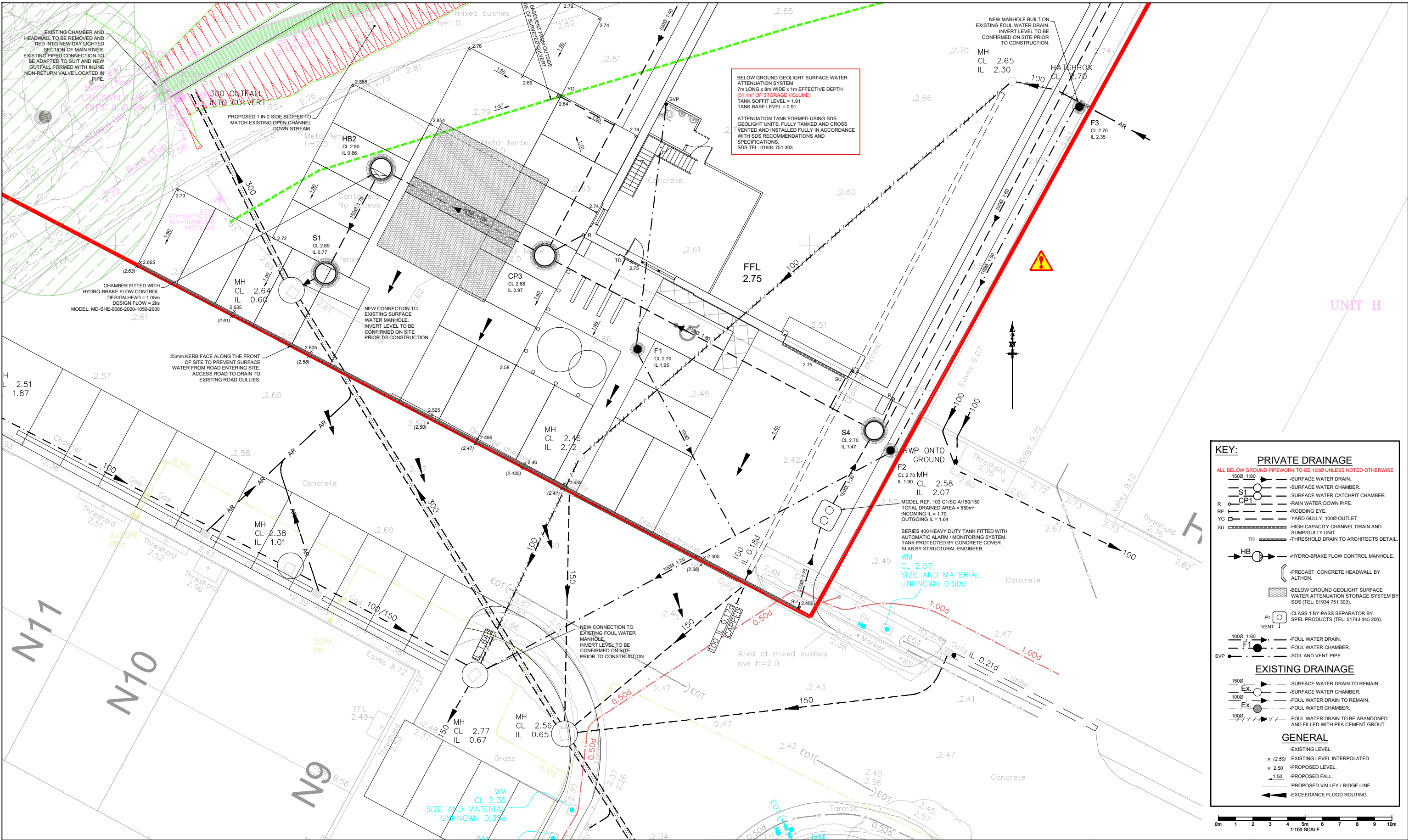
Client
LONDON & CAMBRIDGE PROPERTIES

Drawn:
AJ
Date:
NOV 2020

Checked:
MRW
Date:
NOV 2020

Drawing No.:
AC19021-SK-C-003

Revision:
P2



KEY:

PRIVATE DRAINAGE

ALL BELOW GROUND PIPEWORK TO BE 1000 UNLESS NOTED OTHERWISE

1500 1.80 — SURFACE WATER DRAIN.
S1 — SURFACE WATER CHAMBER.
CP1 — RAIN WATER DOWN PIPE.
R — RODDING EYE.
YG — YARD GULLY, 1000 OUTLET.
SU — HIGH CAPACITY CHANNEL DRAIN AND SUMP/GULLY UNIT.
TD — THRESHOLD DRAIN TO ARCHITECTS DETAIL.

HB — HYDRO-BRAKE FLOW CONTROL MANHOLE.
— PRECAST CONCRETE HEADWALL BY ALTHON.
— BELOW GROUND GEOLIGHT SURFACE WATER ATTENUATION STORAGE SYSTEM BY SDS (TEL: 01934 751 303).
PI — CLASS 1 BY-PASS SEPARATOR BY SPEL PRODUCTS (TEL: 01743 445 200).
VENT — VENT.

1000 1.80 — FOUL WATER DRAIN.
F1 — FOUL WATER CHAMBER.
SVP — SOIL AND VENT PIPE.

EXISTING DRAINAGE

1500 — SURFACE WATER DRAIN TO REMAIN.
Ex. — SURFACE WATER CHAMBER.
1000 — FOUL WATER DRAIN TO REMAIN.
Ex. — FOUL WATER CHAMBER.
1000 — FOUL WATER DRAIN TO BE ABANDONED AND FILLED WITH PFA CEMENT GROUT.

GENERAL

— EXISTING LEVEL.
x (2.50) — EXISTING LEVEL INTERPOLATED.
x 2.50 — PROPOSED LEVEL.
1.50 — PROPOSED FALL.
--- PROPOSED VALLEY / RIDGE LINE.
--- EXCEEDANCE FLOOD ROUTING.

0m 1 2 3 4 5 6 7 8 9 10m
1:100 SCALE

NOTES

- DO NOT SCALE THIS DRAWING.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
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 - HOOK SURVEY PARTNERSHIP, TOPOGRAPHICAL SURVEY, S19/7471, REV.
 - GDM ARCHITECTS, FEASIBILITY PLAN, 4076/SK02, FEB 2020
 - SDS SURVEY DESIGN SERVICES / SWEEPTCH PIPELINE TRACE DRAWING NO. SDS 207324.01 REV. DATED JUNE 2020.

CDM REGULATIONS 2015 RESIDUAL HAZARDS

RESIDUAL HAZARDS IDENTIFIED

CONSTRUCTION

- WORKING ON / OVER AND ADJACENT TO WATER.
- DRAINAGE ALONG EDGE OF EXISTING BUILDING TO BE INSTALLED IN SECTIONS TO AVOID UNDERMINING OF FOUNDATIONS.

FUTURE DEMOLITION

A. NO SIGNIFICANT RESIDUAL HAZARDS BEYOND THOSE KNOWN TO AN EXPERIENCED CONTRACTOR.

THIS REGISTER IS A NON-EXHAUSTIVE LIST OF RESIDUAL HAZARDS RELATING TO THE WORKS SHOWN ON THIS DRAWING THAT HAVE BEEN IDENTIFIED DURING THE DESIGN STAGE.

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P2	23/11/2020	MH	MH	ROOT PROTECTION ZONE ADDED.
P1	30/11/2020	AJ	MRW	ISSUE FOR INFORMATION.
Rev	Date	By	Chkd.	Revision notes

Job Title
RIVERSIDE INDUSTRIAL ESTATE, LITTLEHAMPTON, BN17 5DF.

Drawing Title
DRAINAGE STRATEGY SKETCH SHEET 2 OF 2.

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Mill Lane, Undermire, Sevenoaks, Kent TN15 0SQ
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Client
LONDON & CAMBRIDGE PROPERTIES.

Scale at A1: 1:100	Drawn: AJ Date: NOV/2020	Checked: MRW Date: NOV/2020
Drawing No.: AC19021-SK-C-004	Revision: P2	

PRELIMINARY ISSUE

Appendix G – British Geological Survey Borehole Extract

GROUND EXPLORATIONS LTD.

BOREHOLE NO. 19

TQ00SW/16

Contract Name LITTLEHAMPTON.

Report No. 4412/SJB.

Client West Sussex County Council,

Site Address

Address County Surveyor's Department,

Littlehampton,

County Hall,

West Sussex.

Chichester, Sussex.

0177 0259

Standing Water Level 6' 0"

Method of Boring Shell/auger.

Water Struck 7' 0"

Diameter 6 ins.

Ground Level 8.53

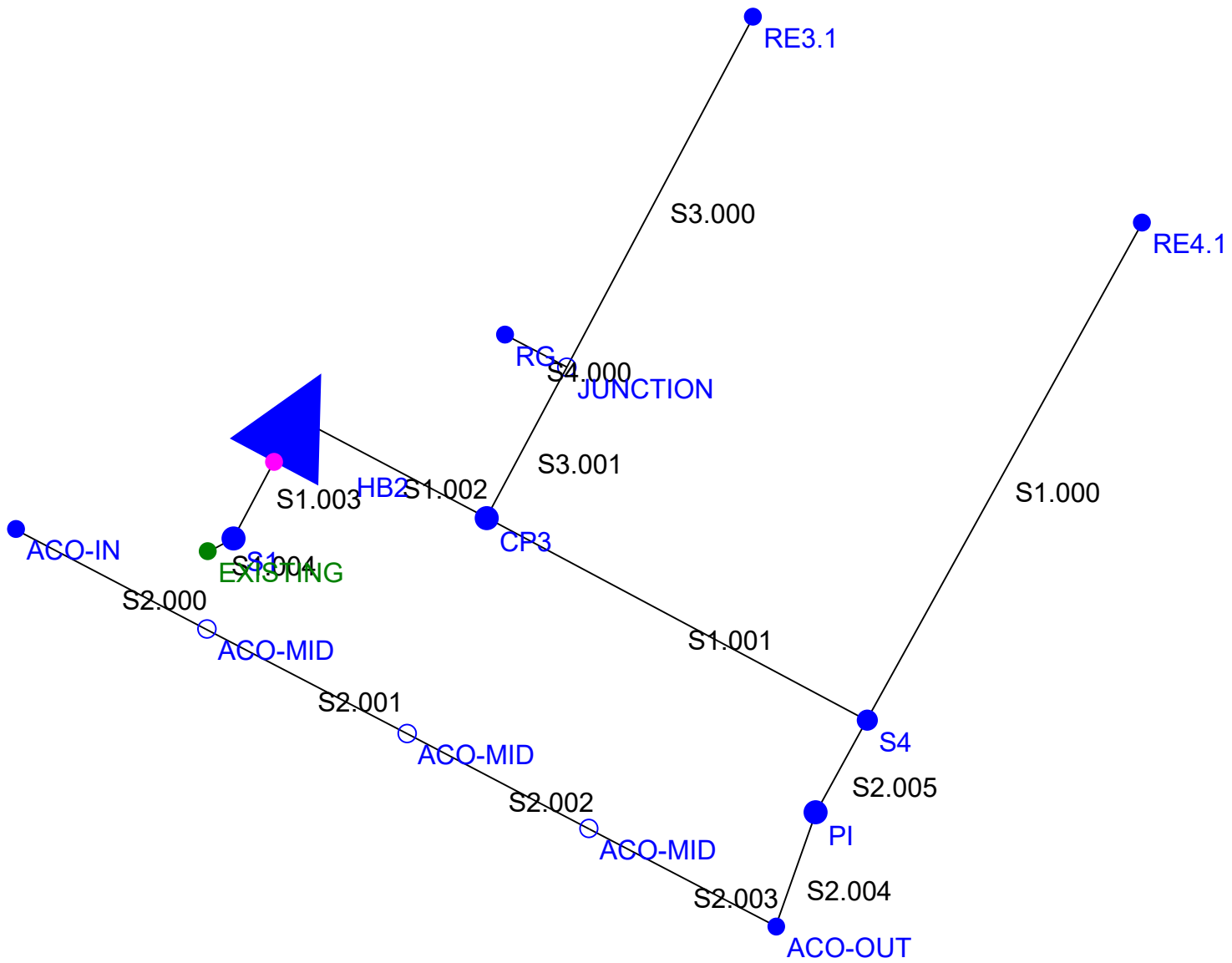
Start 19.6.68. Finish 19.6.68.

Remarks

JARS		CORES		BULK	
2552	1' 6"	2553	3' 6"		
2554	7' 0"				
2555	9' 0"				
2556	Water				
Description				Thickness	Depth
Topsoil				1' 0"	1' 0"
Brown sandy clay and flints } ? GULLEPETH				2' 0"	3' 0"
Firm brown chalky clay } COOMBE DEPOSITS				4' 6"	7' 6"
Weathered chalk				2' 6"	10' 0"
TOTALS				10' 0"	10' 0"

- Notes
1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
 2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths shown are to top of sample.

Appendix H – Surface Water Calculations



Abstruct Consulting Ltd		Page 1								
The Highland Suite Great Hollanden Business Centre Sevenoaks Kent TN15 0SQ										
Date 04/11/2020 11:28 File AC19021 - SW Calcs.MDX	Designed by Martinhowell Checked by									
Causeway		Network 2020.1								
<u>Time Area Diagram for Storm</u> <table border="1"> <thead> <tr> <th>Time (mins)</th> <th>Area (ha)</th> <th>Time (mins)</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0-4</td> <td>0.082</td> <td>4-8</td> <td>0.032</td> </tr> </tbody> </table> Total Area Contributing (ha) = 0.114 Total Pipe Volume (m³) = 3.335			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.082	4-8	0.032
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.082	4-8	0.032							
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Abstract Consulting Ltd										Page 2	
The Highland Suite Great Hollenden Business Centre Sevenoaks Kent TN15 0SQ											
Date 04/11/2020 11:28 File AC19021 - SW Calcs.MDX						Designed by Martinhowell Checked by					
Causeway						Network 2020.1					
<u>Existing Network Details for Storm</u>											
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	
S1.000	28.362	0.480	59.1	0.013	5.00	0.0	0.600	o	100	Pipe/Conduit	
S2.000	10.752	0.050	215.0	0.010	5.00	0.0	0.600	Q22	-2	Pipe/Conduit	
S2.001	11.272	0.110	102.5	0.017	0.00	0.0	0.600	Q22	-2	Pipe/Conduit	
S2.002	10.231	0.070	146.2	0.014	0.00	0.0	0.600	Q22	-2	Pipe/Conduit	
S2.003	10.552	0.020	527.6	0.014	0.00	0.0	0.600	Q22	-2	Pipe/Conduit	
S2.004	6.021	0.080	75.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.005	5.275	0.170	31.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	21.504	0.270	79.6	0.016	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	19.815	0.525	37.7	0.011	5.00	0.0	0.600	o	100	Pipe/Conduit	
S4.000	3.487	0.545	6.4	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	
S3.001	8.516	0.225	37.8	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.002	10.680	0.110	97.1	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	6.819	0.090	75.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	1.444	0.020	72.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
<u>Network Results Table</u>											
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)						
S1.000	2.000	0.013	0.0	1.00	7.9						
S2.000	2.280	0.010	0.0	0.89	35.6						
S2.001	2.230	0.027	0.0	1.30	51.8						
S2.002	2.120	0.041	0.0	1.08	43.3						
S2.003	2.050	0.055	0.0	0.56	22.6						
S2.004	1.780	0.055	0.0	1.16	20.5						
S2.005	1.640	0.055	0.0	1.81	32.1						
S1.001	1.470	0.083	0.0	1.13	19.9						
S3.000	2.000	0.011	0.0	1.26	9.9						
S4.000	2.020	0.007	0.0	3.08	24.2						
S3.001	1.475	0.017	0.0	1.26	9.9						
S1.002	0.970	0.114	0.0	1.33	52.8						
S1.003	0.860	0.114	0.0	1.16	20.4						
S1.004	0.770	0.114	0.0	1.18	20.9						
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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	User	-	100	0.013	0.013	0.013
2.000	User	-	100	0.010	0.010	0.010
2.001	User	-	100	0.017	0.017	0.017
2.002	User	-	100	0.014	0.014	0.014
2.003	User	-	100	0.014	0.014	0.014
2.004	-	-	100	0.000	0.000	0.000
2.005	-	-	100	0.000	0.000	0.000
1.001	User	-	100	0.016	0.016	0.016
3.000	User	-	100	0.011	0.011	0.011
4.000	User	-	100	0.007	0.007	0.007
3.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.013	0.013	0.013
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.114	0.114	0.114

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)
S1.004	EXISTING	2.640	0.750	0.600	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 Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: HB2, DS/PN: S1.003, Volume (m³): 2.6

Unit Reference	MD-SHE-0066-2000-1050-2000
Design Head (m)	1.050
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	66
Invert Level (m)	0.860
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	2.0
Flush-Flo™	0.292	1.9
Kick-Flo®	0.592	1.5
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)
0.100	1.6	1.200	2.1	3.000	3.2	7.000	4.8
0.200	1.9	1.400	2.3	3.500	3.5	7.500	5.0
0.300	1.9	1.600	2.4	4.000	3.7	8.000	5.1
0.400	1.9	1.800	2.6	4.500	3.9	8.500	5.3
0.500	1.8	2.000	2.7	5.000	4.1	9.000	5.4
0.600	1.6	2.200	2.8	5.500	4.3	9.500	5.6
0.800	1.8	2.400	2.9	6.000	4.5		
1.000	2.0	2.600	3.0	6.500	4.6		

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Causeway		Network 2020.1																		
<u>Storage Structures for Storm</u> <u>Cellular Storage Manhole: HB2, DS/PN: S1.003</u> Invert Level (m) 0.910 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> </tr> </thead> <tbody> <tr> <td>0.000</td> <td>53.8</td> <td>0.0</td> <td>1.001</td> <td>0.0</td> <td>0.0</td> </tr> <tr> <td>1.000</td> <td>53.8</td> <td>0.0</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	53.8	0.0	1.001	0.0	0.0	1.000	53.8	0.0			
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)															
0.000	53.8	0.0	1.001	0.0	0.0															
1.000	53.8	0.0																		
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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>								
<u>Simulation Criteria</u> 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 Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.350 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 19.000 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, 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.
S1.000	RE4.1	15 Winter	1	+0%	100/15	Summer		
S2.000	ACO-IN	15 Winter	1	+0%				
S2.001	ACO-MID	15 Winter	1	+0%				
S2.002	ACO-MID	15 Winter	1	+0%	100/15	Summer		
S2.003	ACO-MID	15 Winter	1	+0%	100/15	Summer		
S2.004	ACO-OUT	15 Winter	1	+0%	30/15	Winter		
S2.005	PI	15 Winter	1	+0%	30/15	Summer		
S1.001	S4	15 Winter	1	+0%	30/15	Summer		
S3.000	RE3.1	15 Winter	1	+0%				
S4.000	RG	15 Winter	1	+0%				
S3.001	JUNCTION	15 Winter	1	+0%				
S1.002	CP3	15 Winter	1	+0%	30/15	Winter		
S1.003	HB2	60 Winter	1	+0%	1/30	Winter		
S1.004	S1	60 Winter	1	+0%				
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Causeway				Network 2020.1					
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
		Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	RE4.1	2.031	-0.069	0.000	0.21			1.6	OK
S2.000	ACO-IN	2.309	-0.196	0.000	0.04			1.3	OK
S2.001	ACO-MID	2.265	-0.190	0.000	0.07			3.1	OK
S2.002	ACO-MID	2.167	-0.178	0.000	0.12			4.5	OK
S2.003	ACO-MID	2.129	-0.146	0.000	0.35			6.0	FLOOD RISK*
S2.004	ACO-OUT	1.841	-0.089	0.000	0.35			6.0	OK
S2.005	PI	1.689	-0.101	0.000	0.23			6.0	OK
S1.001	S4	1.544	-0.076	0.000	0.48			9.1	OK
S3.000	RE3.1	2.025	-0.075	0.000	0.14			1.3	OK
S4.000	RG	2.033	-0.087	0.000	0.04			0.8	OK
S3.001	JUNCTION	1.507	-0.068	0.000	0.22			2.2	OK*
S1.002	CP3	1.052	-0.143	0.000	0.28			12.4	OK
S1.003	HB2	1.033	0.023	0.000	0.10		43	1.8	SURCHARGED
S1.004	S1	0.811	-0.109	0.000	0.17			1.8	OK

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Causeway		Network 2020.1						
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>								
<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.350 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 19.000 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, 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.
S1.000	RE4.1	15 Winter	30	+0%	100/15	Summer		
S2.000	ACO-IN	15 Winter	30	+0%				
S2.001	ACO-MID	15 Winter	30	+0%				
S2.002	ACO-MID	15 Winter	30	+0%	100/15	Summer		
S2.003	ACO-MID	15 Winter	30	+0%	100/15	Summer		
S2.004	ACO-OUT	15 Winter	30	+0%	30/15	Winter		
S2.005	PI	15 Winter	30	+0%	30/15	Summer		
S1.001	S4	15 Winter	30	+0%	30/15	Summer		
S3.000	RE3.1	15 Winter	30	+0%				
S4.000	RG	15 Winter	30	+0%				
S3.001	JUNCTION	15 Winter	30	+0%				
S1.002	CP3	120 Winter	30	+0%	30/15	Winter		
S1.003	HB2	120 Winter	30	+0%	1/30	Winter		
S1.004	S1	480 Winter	30	+0%				
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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
		Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	RE4.1	2.052	-0.048	0.000	0.51			4.0	OK
S2.000	ACO-IN	2.325	-0.180	0.000	0.10			3.1	OK
S2.001	ACO-MID	2.292	-0.163	0.000	0.18			8.6	FLOOD RISK*
S2.002	ACO-MID	2.219	-0.126	0.000	0.34			12.9	FLOOD RISK*
S2.003	ACO-MID	2.200	-0.075	0.000	1.02			17.3	FLOOD RISK*
S2.004	ACO-OUT	1.931	0.001	0.000	1.02			17.4	SURCHARGED
S2.005	PI	1.839	0.049	0.000	0.64			16.5	SURCHARGED
S1.001	S4	1.772	0.152	0.000	1.26			23.6	SURCHARGED
S3.000	RE3.1	2.041	-0.059	0.000	0.35			3.3	OK
S4.000	RG	2.041	-0.079	0.000	0.10			2.1	OK
S3.001	JUNCTION	1.528	-0.047	0.000	0.54			5.3	OK*
S1.002	CP3	1.341	0.146	0.000	0.27			11.8	SURCHARGED
S1.003	HB2	1.338	0.328	0.000	0.11		112	1.9	SURCHARGED
S1.004	S1	0.812	-0.108	0.000	0.17			1.9	OK

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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
<u>Simulation Criteria</u>								
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000		
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000		
Hot Start Level (mm)		0		Inlet Coeffiecient		0.800		
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000		
Foul Sewage per hectare (l/s)		0.000						
Number of Input Hydrographs				0				
Number of Storage Structures				1				
Number of Online Controls				1				
Number of Time/Area Diagrams				0				
Number of Offline Controls				0				
Number of Real Time Controls				0				
<u>Synthetic Rainfall Details</u>								
Rainfall Model		FSR		Ratio R		0.350		
Region England and Wales Cv (Summer)		0.750						
M5-60 (mm)		19.000		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, 240, 360, 480, 960, 1440						
Return Period(s) (years)		1, 30, 100						
Climate Change (%)		0, 0, 40						
WARNING: Half Drain Time has not been calculated as the structure is too full.								
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	RE4.1	15 Winter	100	+40%	100/15 Summer			
S2.000	ACO-IN	15 Winter	100	+40%				
S2.001	ACO-MID	15 Winter	100	+40%				
S2.002	ACO-MID	15 Winter	100	+40%	100/15 Summer			
S2.003	ACO-MID	15 Winter	100	+40%	100/15 Summer			
S2.004	ACO-OUT	15 Winter	100	+40%	30/15 Winter			
S2.005	PI	15 Winter	100	+40%	30/15 Summer			
S1.001	S4	15 Winter	100	+40%	30/15 Summer			
S3.000	RE3.1	15 Winter	100	+40%				
S4.000	RG	15 Winter	100	+40%				
S3.001	JUNCTION	60 Summer	100	+40%				
S1.002	CP3	240 Winter	100	+40%	30/15 Winter			
S1.003	HB2	240 Winter	100	+40%	1/30 Winter			
S1.004	S1	240 Winter	100	+40%				
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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
		Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S1.000	RE4.1	2.478	0.378	0.000	0.81			6.2	FLOOD RISK
S2.000	ACO-IN	2.424	-0.081	0.000	0.18			5.4	FLOOD RISK
S2.001	ACO-MID	2.418	-0.037	0.000	0.29			13.8	FLOOD RISK*
S2.002	ACO-MID	2.405	0.060	0.000	0.51			19.0	FLOOD RISK*
S2.003	ACO-MID	2.388	0.113	0.000	1.49			25.5	FLOOD RISK*
S2.004	ACO-OUT	2.363	0.433	0.000	1.22			20.8	FLOOD RISK
S2.005	PI	2.253	0.463	0.000	0.84			21.7	FLOOD RISK
S1.001	S4	2.158	0.538	0.000	1.72			32.4	SURCHARGED
S3.000	RE3.1	2.058	-0.042	0.000	0.63			6.0	OK
S4.000	RG	2.049	-0.071	0.000	0.19			3.8	OK
S3.001	JUNCTION	1.575	0.000	0.000	0.67			6.6	SURCHARGED*
S1.002	CP3	1.856	0.661	0.000	0.29			12.8	SURCHARGED
S1.003	HB2	1.853	0.843	0.000	0.11			1.9	SURCHARGED
S1.004	S1	0.813	-0.107	0.000	0.18			1.9	OK