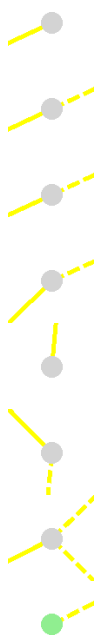


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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1-1	80.560	1.415	Open Manhole	1200	1.000	79.145	225				
S1-2	80.740	1.698	Open Manhole	1200	1.001	79.042	225	1.000	79.042	225	
S1-3	79.120	1.425	Open Manhole	1200	1.002	77.695	225	1.001	77.695	225	
S1-4	76.410	1.425	Open Manhole	1200	1.003	74.985	225	1.002	74.985	225	
S1-5	76.600	1.350	Open Manhole	1200	2.000	75.250	150				
S1-6	76.150	1.350	Open Manhole	1200	2.001	74.800	150	2.000	74.800	150	
S1-7	76.100	1.500	Open Manhole	1200	1.004	74.600	300	1.003	74.675	225	
								2.001	74.750	150	
OUTFALL 1-1	75.500	1.995	Open Manhole	0		OUTFALL		1.004	73.505	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1-1	523465.418	135315.701	523465.418	135315.701	Required	
S1-2	523449.656	135308.372	523449.656	135308.372	Required	
S1-3	523406.647	135288.144	523406.647	135288.144	Required	
S1-4	523354.893	135264.293	523354.893	135264.293	Required	
S1-5	523347.993	135224.884	523347.993	135224.884	Required	
S1-6	523350.497	135251.815	523350.497	135251.815	Required	
S1-7	523346.374	135255.974	523346.374	135255.974	Required	
OUTFALL 1-1	523331.209	135248.215			No Entry	

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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)
1.004	OUTFALL 1-1	75.500	73.505	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.350		

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Micro Drainage

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 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 Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 0

Number of Storage Structures 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.350

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

DVD Status OFF

Analysis Timestep Fine

Inertia Status OFF

DTS 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.

Water Level (m)

1.000

S1-1

15 Winter

1

+0%

100/15 Summer

79.214

1.001

S1-2

15 Winter

1

+0%

100/15 Summer

79.116

1.002

S1-3

15 Winter

1

+0%

100/15 Summer

77.773

1.003

S1-4

15 Winter

1

+0%

30/15 Summer

75.102

2.000

S1-5

15 Winter

1

+0%

75.282

2.001

S1-6

15 Winter

1

+0%

30/15 Summer

74.866

1.004

S1-7

15 Winter

1

+0%

74.685

PN

US/MH Name

Depth (m)

Volume (m³)

Flow / Cap.

Overflow (l/s)

Half Drain Time (mins)

Pipe Flow (l/s)

Level Exceeded

1.000

S1-1

-0.156

0.000

0.20

7.1

OK

1.001

S1-2

-0.151

0.000

0.23

19.5

OK

1.002

S1-3

-0.147

0.000

0.26

28.5

OK

1.003

S1-4

-0.108

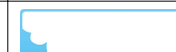
0.000

0.53

38.0

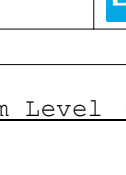
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	Time (mins)	Flow (l/s)		
2.000	S1-5	-0.118	0.000	0.10			2.2	OK	
2.001	S1-6	-0.084	0.000	0.40			5.4	OK	
1.004	S1-7	-0.215	0.000	0.18			43.2	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 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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS 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.	Water Level (m)
1.000	S1-1	15 Winter	30	+0%	100/15 Summer				79.258
1.001	S1-2	15 Winter	30	+0%	100/15 Summer				79.177
1.002	S1-3	15 Winter	30	+0%	100/15 Summer				77.843
1.003	S1-4	15 Winter	30	+0%	30/15 Summer				75.615
2.000	S1-5	15 Winter	30	+0%					75.301
2.001	S1-6	15 Winter	30	+0%	30/15 Summer				74.956
1.004	S1-7	15 Winter	30	+0%					74.753

PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1-1	-0.112	0.000	0.49		17.4	OK	
1.001	S1-2	-0.090	0.000	0.65		54.9	OK	
1.002	S1-3	-0.077	0.000	0.74		81.7	OK	
1.003	S1-4	0.405	0.000	1.52		109.0	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 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS 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.	Water Level (m)
1.000	S1-1	15 Winter	100	+40%	100/15 Summer				80.109
1.001	S1-2	15 Winter	100	+40%	100/15 Summer				80.062
1.002	S1-3	15 Winter	100	+40%	100/15 Summer				78.989
1.003	S1-4	15 Winter	100	+40%	30/15 Summer				76.308
2.000	S1-5	15 Winter	100	+40%					75.322
2.001	S1-6	15 Winter	100	+40%	30/15 Summer				75.097
1.004	S1-7	15 Winter	100	+40%					74.794

Surcharged Flooded

Half Drain Pipe

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	S1-1	0.739	0.000	0.81		28.8	SURCHARGED	
1.001	S1-2	0.795	0.000	0.90		75.9	SURCHARGED	
1.002	S1-3	1.069	0.000	1.00		110.3	FLOOD RISK	
1.003	S1-4	1.098	0.000	2.13		153.3	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)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.000
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	0.229	4-8	0.130

Total Area Contributing (ha) = 0.359

Total Pipe Volume (m³) = 8.597

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	40.076	0.237	169.1	0.070	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	32.183	0.456	70.6	0.053	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	22.106	0.221	100.0	0.055	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	5.67	79.260	0.070	0.0	0.0	0.0	1.00	39.9	9.5
1.001	50.00	6.01	79.023	0.123	0.0	0.0	0.0	1.56	62.0	16.7
2.000	50.00	5.37	79.410	0.055	0.0	0.0	0.0	1.00	17.8	7.4

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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)
1.004	6	80.480	76.998	0.000	1200	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.350		

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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 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 Offline Controls 0 Number of Time/Area Diagrams 0			
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0			
Synthetic Rainfall Details			
Rainfall Model FSR Ratio R 0.350			
Region England and Wales Cv (Summer) 0.750			
M5-60 (mm) 20.000 Cv (Winter) 0.840			
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF			
Analysis Timestep Fine Inertia Status OFF			
DTS 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			

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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

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coeffiecient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 0

Number of Storage Structures 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 20.000

Ratio R 0.350

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep Fine Inertia

DTS Status ON

DVD Status OFF

Status OFF

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

Summer and Winter

US/MH

PN

Name

Storm

Return Period

Climate Change

First (X) Surge

First (Y) Flood

First (Z) Overflow

Overflow Act.

Water Level (m)

1.000

1

15 Winter

30

+0%

100/15 Summer

100/15 Winter

79.387

1.001

2

15 Winter

30

+0%

100/15 Summer

79.228

2.000

3

15 Winter

30

+0%

30/15 Winter

79.570

2.001

4

15 Winter

30

+0%

100/15 Summer

79.211

1.002

3

15 Winter

30

+0%

30/15 Summer

100/15 Winter

79.086

1.003

4

15 Winter

30

+0%

30/15 Summer

100/15 Summer

78.647

1.004

5

15 Winter

30

+0%

30/15 Summer

77.571

Surcharged Flooded

Half Drain Pipe

US/MH

PN

Name

Depth (m)

Volume (m³)

Flow / Cap.

Overflooded (l/s)

Time (mins)

Flow (l/s)

Status

Level Exceeded

1.000

1

-0.098

0.000

0.59

22.3

OK

1

1.001

2

-0.020

0.000

0.65

37.7

OK

2.000

3

0.010

0.000

1.03

17.3

SURCHARGED

2.001

4

-0.146

0.000

0.27

22.6

OK

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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

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coeffiecient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 0

Number of Storage Structures 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

Region England and Wales Cv (Summer)

M5-60 (mm)

FSR

20.000 Cv (Winter)

Ratio R 0.350

0.750

0.840

Margin for Flood Risk Warning (mm)

Analysis Timestep

DTS Status

300.0

Fine

ON

DVD Status OFF

Inertia Status OFF

Profile(s)

Duration(s) (mins)

Return Period(s) (years)

Climate Change (%)

Summer and Winter

15, 30, 60, 120, 240, 360, 480, 960, 1440

1, 30, 100

0, 0, 40

US/MH

PN

Name

Storm

Return Period

Climate Change

First (X)
Surcharge

First (Y)
Flood

First (Z)
Overflow

Overflow
Act.

Water
Level
(m)

1.000

1 15 Winter

100

+40%

100/15 Summer

100/15 Winter

80.810

1.001

2 15 Winter

100

+40%

100/15 Summer

80.677

2.000

3 15 Winter

100

+40%

30/15 Winter

80.834

2.001

4 15 Winter

100

+40%

100/15 Summer

80.386

1.002

3 15 Winter

100

+40%

30/15 Summer

100/15 Winter

80.341

1.003

4 15 Winter

100

+40%

30/15 Summer

100/15 Summer

79.571

1.004

5 15 Winter

100

+40%

30/15 Summer

77.839

Surcharged Flooded

US/MH

Depth

Volume

Flow / Overflow

Half Drain

Pipe

PN

Name

(m)

(m³)

Cap.

(l/s)

(mins)

Flow
(l/s)

Status

Level
Exceeded

1.000

1

1.325

0.224

0.80

30.3

FLOOD

1

1.001

2

1.429

0.000

0.83

48.1

SURCHARGED

2.000

3

1.274

0.000

1.37

23.0

FLOOD RISK

2.001

4

1.029

0.000

0.33

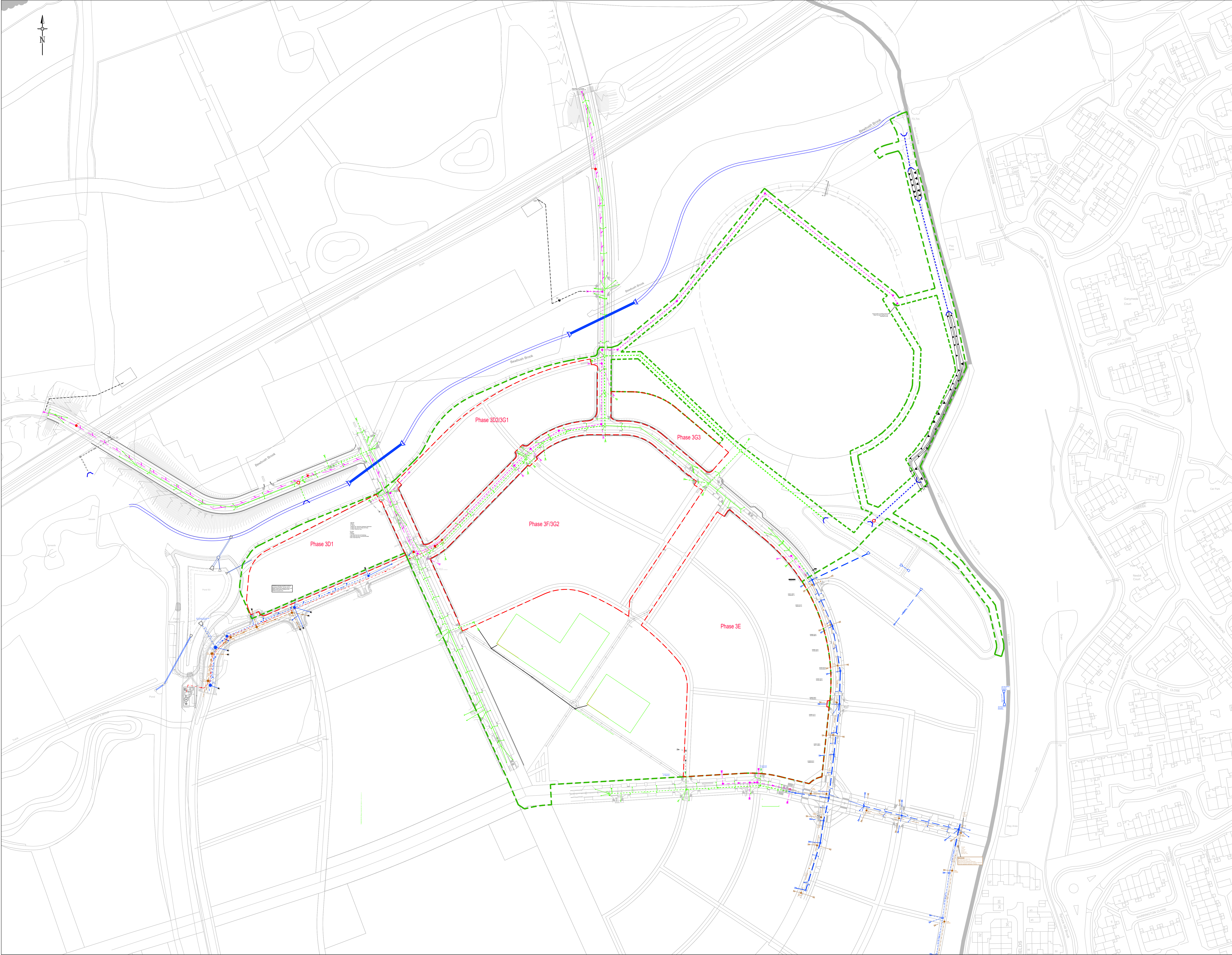
28.2

FLOOD RISK

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Appendix C

Overall Drainage Constraints Plan



1 DO NOT SCALE THIS DRAWING ON PRINT OR ELECTRONICALLY. WORK FROM FIGURED DIMENSIONS ONLY.

2 No deviation from the details shown on this drawing is allowed without CampbellReith's prior permission in writing.

3 Read this drawing with all Architects, Service Engineers and CampbellReith's relevant details and drawings. NB. Set-out dimensions as per the Architects' drawings take precedence.

4 All work is to be in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory requirements and the Contract Documents.

5 DRAWING STATUS

P - PRELIMINARY - Evolving drawings for approvals, Tenders, Billings, etc.

C - CONSTRUCTION - Fully developed drawings issued under instruction for construction.

ONLY STATUS C DRAWINGS TO BE USED FOR CONSTRUCTION.

6 SUITABILITY CODE

WORK IN PROGRESS

S0 - Work in progress

SHARED (NON-CONTRACTUAL)

S1 - For coordination. S2 - For information. S3 - For internal review and comment. S4 - For construction approval.

DOCUMENTATION (FOR CONTRACTOR PURPOSES)

D1 - For costing. D2 - For Tender. D3 - For contractor design. D4 - For manufacturer's procurement.

CONSTRUCTION

A - For construction. B - For construction but with comments (i.e. areas in abeyance). C - Comprehensive revisions required.

7

8 For further details for individual land parcels refer to drawings 11950-3D2G1-CD100, 11950-3E-CD100, 11950-3F/3G2-CD100, 11950-3D1-CD100 and 11950-3G3-CD100.

Legend

Land Parcel Development Boundary

Planning Boundary

Surface Water Drainage to be constructed by Crest South

Surface Water Highway Drainage to be constructed by Crest South

Foul Water Drainage to be constructed by Crest South

Foul Water Rising Main to be constructed by Crest South

Indicative Surface Water Drainage to be constructed by Phase 3DEFG developer/s

Indicative Foul Water Drainage to be constructed by Phase 3DEFG developer/s

Existing Surface Water Drainage

Existing Foul Water Drainage

Existing Foul Water Rising Main

85.000

Contour Label (Bulk Earthworks)

P1	ISSUED FOR INFORMATION	16.11.21	CL
Drawn by	Description	Date	By

CampbellReith

consulting engineers

LONDON 020 7340 1700

SURREY 01737 784 500

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www.campbellreith.com

Job Title

KILNWOOD VALE, CRAWLEY

Client

CREST NICHOLSON

PHASE 3DEFG
OVERALL DRAINAGE
CONSTRAINTS PLAN

drawn	date	scale @ A0	C1 checked	CR Project No.
CL	15.11.21	1:1000	-	11950

Dwg No.	11950-3DEFG-CD100	Security	S2	Drawn/Checked	P1
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