Submitted to

Barratt West Midlands

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Longford Park, Banbury
Development Parcel E

Flood Risk Assessment
Supplementary Report

March 2015

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Technical Director

Approved by: Mike Wells
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Rev No	Comments	Checked by	Approved by	Date
1	Initial Issue	C O'Connor	M Wells	20/03/15

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Job No 47074043
Reference Longford Park/FRA
Date Created 20/03/15

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0 Introduction and Brief

0.1 Background to Report

AECOM were commissioned in March 2015 by Barratt Homes West Midlands to prepare a Flood Risk Assessment (FRA) Supplementary Report in accordance with the National Planning Policy Framework (NPPF) to support a full planning application for Parcel E at the proposed Longford Park residential development near Banbury, Oxfordshire.

The purpose of the report is to confirm the flood risk status of the development and to provide an outline of the surface and foul water drainage strategy and how this interacts within the Masterplan/Design Code document and approved Flood Risk Assessment.

0.2 Site Location

The site under consideration is Parcel E, at the Longford Park development, east of Bodicote, Banbury, Oxfordshire at Ordnance Survey co-ordinates 446329,238547. Parcel E covers a gross area of approximately 3.26Ha. The site location is shown in Figures 0-1 and 0-2 below.

Figure 0-1. Site Location

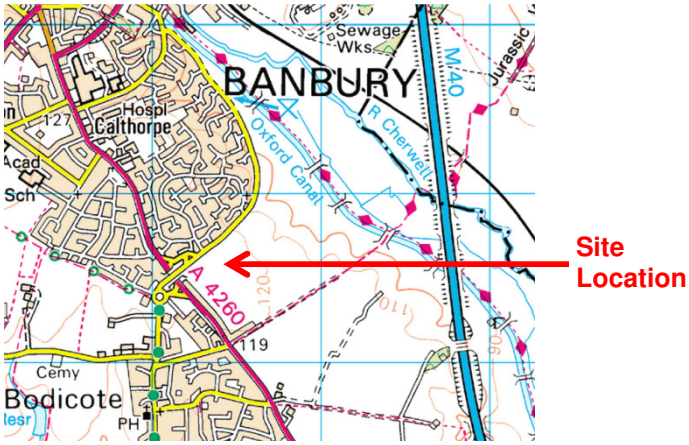
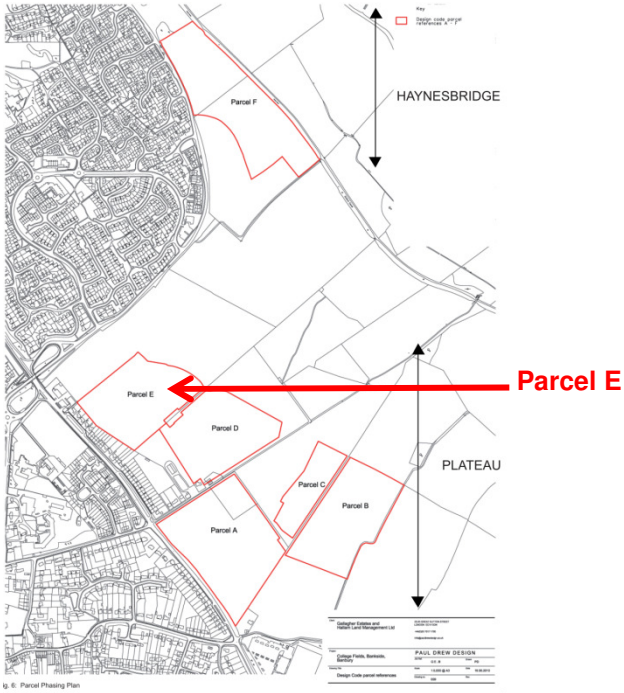


Figure 0-2. Site Location

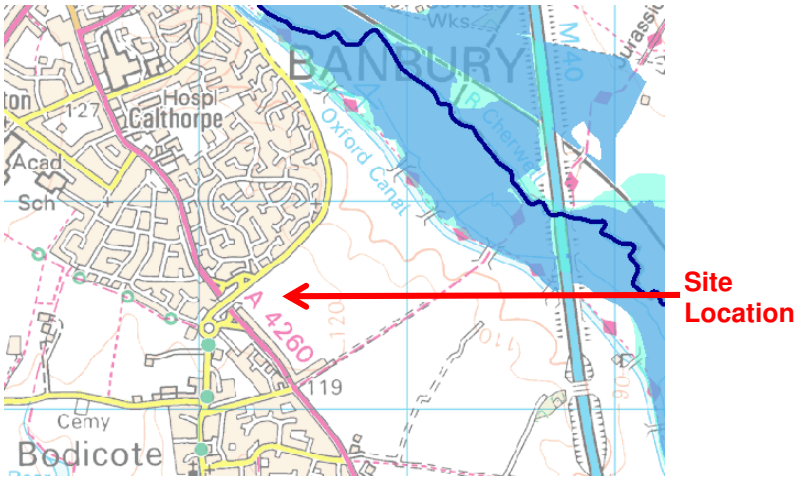


1 Flood Risk

1.1 Fluvial Flooding

The Parcel E site area, as outlined in the approved Flood Risk Assessment prepared by Brookbanks Consulting dated November 2003 (ref. 1071/DFS/01), is located in Flood Zone 1 and therefore has a flood risk of less than 1 in 1000 year annual probability of fluvial flooding from rivers. This is confirmed on the Environment Agency flood map outlined below and the land is therefore suitable for residential development.

Figure 1-1. EA Flood Map Rivers and Seas



1.2 Flooding from Other Sources

The flood maps presented on the Environment Agency's website confirm that there is no risk of flooding to the development from surface water, groundwater or reservoirs.

2 Drainage

2.1 Surface Water

2.1.1 Site Wide Drainage Strategy

Surface water run off from the development will be managed in accordance with the approved Flood Risk Assessment and Masterplan/Design Code document. Each development parcel will drain surface water run off by gravity through a piped system into a wider network of sewers and swales, flowing from the south to the north of the development and eventually outfalling into a ditch network which discharges to the River Cherwell.

To ensure that surface water flows leaving the development and entering the River Cherwell do not exceed existing greenfield runoff rates, flows will be restricted to 69.5 litres per second by means of a vortex flow control chamber prior to leaving the site beneath the Oxford Canal. This rate represents a 25% betterment over existing Greenfield run off rates from the full Longford Park development area.

In order to ensure surface water flows are attenuated, 4 new balancing ponds will be constructed in accordance with the Masterplan/Design Code document. The ponds will contain approximately 30,000m3 of surface water at their maximum design level.

All sewers will be designed in accordance with the latest Sewers for Adoption guidance and adopted by Thames Water under a Section 104 Agreement. The attenuation ponds/basins will be adopted by a suitable statutory body at the appropriate time.

The Site Wide Drainage Strategy is shown in Appendix A.

2.1.2 Parcel E Drainage Strategy

The site will be drained via two sewer networks which will collect surface water from roofs, drives and estate roads and finally connect into the main drainage network to the south and east. The hydraulic software package, MicroDrainage, was used to model these networks up to and including the 100 year return period plus 30% climate change with calculations presented in Appendix C. Dwellings and private drives which front the main spine road to the south and the mature hedge to the east will drain directly to the main site drainage network sewers.

Flow attenuation will not be required within Parcel E as flows from this site have been considered in the downstream surface water drainage system as discussed in section 2.1.1.

The Drainage strategy for Parcel E is shown in Appendix B.

2.2 Foul Water

2.2.1 Overall Site Drainage Strategy

The foul sewer network will drain by gravity to a new pumping station located to the west of the development, pumping foul flows to the Thames Water adopted gravity system at the junction of Canal Lane and Oxford Road.

2.2.2 Parcel E Drainage Strategy

As per the surface water drainage strategy, two foul water networks will serve the site, both connecting to individual foul manholes within the main spine road to the south.

The Drainage Strategy for Parcel E is shown in Appendix B.

3 Conclusion

There is minimal risk of flooding to development Parcel E from any nearby fluvial sources. There is also a minimal risk of flooding from groundwater, surface water and reservoirs.

The surface water drainage networks for Parcel E and the overall development will be designed in accordance with the approved Flood Risk Assessment, Design Code document and nationally agreed standards and will provide protection from surface flooding under the critical 100 year rainfall event including the recognised allowance for the effects of climate change. The surface and foul water drainage networks will be offered for adoption which will ensure long term maintenance throughout the life of the development.

The downstream drainage infrastructure has been designed to cater for flows from Parcel E and other surrounding parcels and will ensure that runoff from the development is reduced by 25% from existing.

It is considered that the proposed scheme is in accordance with relevant planning policy and that approval to this application should not be withheld on flooding grounds.

Appendix A. Site Wide Drainage Strategy

This drawing is for preliminary purposes only and is subject to amendment during design development. UNDER NO CIRCUMSTANCES MUST THIS DRAWING BE USED FOR CONSTRUCTION PURPOSES

Revision Details	By / Check	Date	Suffix
ISSUED FOR COMMENT	PB/CAO	20/03/15	P1

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CONSTRUCTION RISKS	MAINTENANCE / CLEANING RISK	DEMOLITION RISKS

In addition to the hazard/risks normally associated with the types of work detailed on this drawing take note of above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: FOR INFORMATION

Client: BARRATT HOMES WEST MIDLANDS

Project Title: LONGFORD PARK PARCEL E

Drawing Title: APPENDIX A - SITE WIDE DRAINAGE STRATEGY

Designed	Drawn	Checked	Approved	Date
PB	PB	CAO	CAO	20/03/15

URS Internal Project No.: 47074043

Suitability: N/A

Scale @ A1: 1:2000

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Drawing Number: FIG-01

Rev: P1

Plot Date :
File Name : T:\470XXXXX-\LONGFORD PARK\TECHNICAL\DRAWINGS\APPENDIX A - SITE WIDE DRAINAGE STRATEGY FIG01

Appendix B. Parcel E Drainage Strategy

This drawing is for preliminary purposes only and is subject to amendment during design development. UNDER NO CIRCUMSTANCES MUST THIS DRAWING BE USED FOR CONSTRUCTION PURPOSES

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1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
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Revision Details	By / Check	Date	Suffix
ISSUED FOR COMMENT	PB/CAO	20/03/15	P1

CONSTRUCTION RISKS	MAINTENANCE / CLEANING RISK	DEMOLITION RISKS

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

Purpose of issue: FOR INFORMATION

Client: BARRATT HOMES WEST MIDLANDS

Project Title: LONGFORD PARK PARCEL E

Drawing Title: APPENDIX B - DRAINAGE STRATEGY

Designed	Drawn	Checked	Approved	Date
PB	PB	CAO	CAO	20/03/15

URS Internal Project No.: 47074043
Suitability: N/A
Scale @ A1: 1:500

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Drawing Number: FIG-02
Rev: P1

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Appendix C. MicroDrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for N1 STORM.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.700	Minimum Backdrop Height (m)	0.000
Ratio R	0.409	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for N1 STORM.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.427	4-8	0.214

Total Area Contributing (ha) = 0.641

Total Pipe Volume (m³) = 13.018

Network Design Table for N1 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	19.271	0.200	96.4	0.129	5.00	0.0	0.600	o	225	
S1.001	21.357	0.126	170.0	0.039	0.00	0.0	0.600	o	225	
S1.002	10.330	0.043	240.0	0.045	0.00	0.0	0.600	o	300	
S1.003	20.015	0.106	188.8	0.022	0.00	0.0	0.600	o	300	
S2.000	12.703	0.075	170.0	0.157	5.00	0.0	0.600	o	225	
S2.001	21.457	0.126	170.0	0.018	0.00	0.0	0.600	o	225	

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)
S1.000	50.00	5.24	121.770	0.129	0.0	0.0	1.7	1.33	53.0	19.2
S1.001	50.00	5.60	121.570	0.168	0.0	0.0	2.3	1.00	39.8	25.0
S1.002	50.00	5.77	121.369	0.213	0.0	0.0	2.9	1.01	71.4	31.7
S1.003	50.00	6.06	121.326	0.235	0.0	0.0	3.2	1.14	80.6	35.0
S2.000	50.00	5.21	121.620	0.157	0.0	0.0	2.1	1.00	39.8	23.4
S2.001	50.00	5.57	121.545	0.175	0.0	0.0	2.4	1.00	39.8	26.1

Network Design Table for N1 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S2.002	21.160	0.124	170.0	0.058	0.00	0.0	0.600	o	300	
S1.004	23.705	0.079	300.0	0.064	0.00	0.0	0.600	o	375	
S1.005	17.158	0.206	83.3	0.063	0.00	0.0	0.600	o	375	
S1.006	17.115	0.365	46.9	0.046	0.00	0.0	0.600	o	375	

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)
S2.002	50.00	5.86	121.344	0.233	0.0	0.0	3.2	1.20	85.0	34.7
S1.004	50.00	6.44	121.145	0.532	0.0	0.0	7.2	1.04	115.0	79.2
S1.005	50.00	6.58	121.066	0.595	0.0	0.0	8.1	1.99	219.4	88.6
S1.006	50.00	6.69	120.860	0.641	0.0	0.0	8.7	2.65	292.9	95.5

Area Summary for N1 STORM.SWS

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.129	0.129	0.129
1.001	-	-	100	0.039	0.039	0.039
1.002	-	-	100	0.045	0.045	0.045
1.003	-	-	100	0.022	0.022	0.022
2.000	-	-	100	0.157	0.157	0.157
2.001	-	-	100	0.018	0.018	0.018
2.002	-	-	100	0.058	0.058	0.058
1.004	-	-	100	0.064	0.064	0.064
1.005	-	-	100	0.063	0.063	0.063
1.006	-	-	100	0.046	0.046	0.046
				Total	Total	Total
				0.641	0.641	0.641

Free Flowing Outfall Details for N1 STORM.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S11	122.070	120.495	0.000	1200	0

Simulation Criteria for N1 STORM.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			3
S1.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			2
S1.002	15 Winter	100	+30%	100/15 Summer				
S1.003	15 Winter	100	+30%	100/15 Summer				
S2.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			4
S2.001	15 Winter	100	+30%	100/15 Summer				
S2.002	15 Winter	100	+30%	100/15 Summer				
S1.004	15 Winter	100	+30%	100/15 Summer				
S1.005	15 Winter	100	+30%	100/15 Summer				
S1.006	15 Winter	100	+30%	100/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	123.203	1.208	3.452	1.38	0.0	65.9	FLOOD
S1.001	S2	123.001	1.206	0.557	2.15	0.0	77.7	FLOOD
S1.002	S3	122.639	0.970	0.000	1.60	0.0	90.0	SURCHARGED
S1.003	S4	122.516	0.890	0.000	1.43	0.0	100.5	SURCHARGED
S2.000	S5	123.055	1.210	5.334	2.28	0.0	78.2	FLOOD
S2.001	S6	122.882	1.112	0.000	2.22	0.0	80.5	FLOOD RISK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S2.002	S7	122.505	0.861	0.000	1.32	0.0	98.5	SURCHARGED
S1.004	S8	122.300	0.781	0.000	2.32	0.0	229.4	SURCHARGED
S1.005	S9	121.864	0.424	0.000	1.47	0.0	261.0	SURCHARGED
S1.006	S10	121.402	0.167	0.000	1.20	0.0	284.5	SURCHARGED

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for N1 STORM.SWS

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M5-60 (mm)	19.700	Minimum Backdrop Height (m)	0.000
Ratio R	0.409	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for N1 STORM.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.427	4-8	0.214

Total Area Contributing (ha) = 0.641

Total Pipe Volume (m³) = 13.018

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	19.271	0.200	96.4	0.129	5.00	0.0	0.600	o	225	
S1.001	21.357	0.126	170.0	0.039	0.00	0.0	0.600	o	225	
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S1.001	50.00	5.60	121.570	0.168	0.0	0.0	2.3	1.00	39.8	25.0
S1.002	50.00	5.77	121.369	0.213	0.0	0.0	2.9	1.01	71.4	31.7
S1.003	50.00	6.06	121.326	0.235	0.0	0.0	3.2	1.14	80.6	35.0
S2.000	50.00	5.21	121.620	0.157	0.0	0.0	2.1	1.00	39.8	23.4
S2.001	50.00	5.57	121.545	0.175	0.0	0.0	2.4	1.00	39.8	26.1

Network Design Table for N1 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S2.002	21.160	0.124	170.0	0.058	0.00	0.0	0.600	o	300	
S1.004	23.705	0.079	300.0	0.064	0.00	0.0	0.600	o	375	
S1.005	17.158	0.206	83.3	0.063	0.00	0.0	0.600	o	375	
S1.006	17.115	0.365	46.9	0.046	0.00	0.0	0.600	o	375	

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)
S2.002	50.00	5.86	121.344	0.233	0.0	0.0	3.2	1.20	85.0	34.7
S1.004	50.00	6.44	121.145	0.532	0.0	0.0	7.2	1.04	115.0	79.2
S1.005	50.00	6.58	121.066	0.595	0.0	0.0	8.1	1.99	219.4	88.6
S1.006	50.00	6.69	120.860	0.641	0.0	0.0	8.7	2.65	292.9	95.5

Area Summary for N1 STORM.SWS

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.129	0.129	0.129
1.001	-	-	100	0.039	0.039	0.039
1.002	-	-	100	0.045	0.045	0.045
1.003	-	-	100	0.022	0.022	0.022
2.000	-	-	100	0.157	0.157	0.157
2.001	-	-	100	0.018	0.018	0.018
2.002	-	-	100	0.058	0.058	0.058
1.004	-	-	100	0.064	0.064	0.064
1.005	-	-	100	0.063	0.063	0.063
1.006	-	-	100	0.046	0.046	0.046
				Total	Total	Total
				0.641	0.641	0.641

Free Flowing Outfall Details for N1 STORM.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S11	122.070	120.495	0.000	1200	0

Simulation Criteria for N1 STORM.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	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)	2, 30
Climate Change (%)	0, 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	2	0%	30/15 Summer				
S1.001	15 Winter	2	0%	30/15 Summer				
S1.002	15 Winter	2	0%	30/15 Summer				
S1.003	15 Winter	2	0%	30/15 Summer				
S2.000	15 Winter	2	0%	30/15 Summer				
S2.001	15 Winter	2	0%	30/15 Summer				
S2.002	15 Winter	2	0%	30/15 Summer				
S1.004	15 Winter	2	0%	30/15 Summer				
S1.005	15 Winter	2	0%	30/15 Summer				
S1.006	15 Winter	2	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	121.887	-0.108	0.000	0.53	0.0	25.3	OK
S1.001	S2	121.735	-0.060	0.000	0.87	0.0	31.5	OK
S1.002	S3	121.554	-0.115	0.000	0.69	0.0	39.0	OK
S1.003	S4	121.496	-0.131	0.000	0.60	0.0	41.9	OK
S2.000	S5	121.788	-0.057	0.000	0.90	0.0	30.7	OK
S2.001	S6	121.718	-0.053	0.000	0.93	0.0	33.5	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S2.002	S7	121.508	-0.136	0.000	0.58	0.0	42.9	OK
S1.004	S8	121.436	-0.084	0.000	0.95	0.0	93.8	OK
S1.005	S9	121.271	-0.170	0.000	0.58	0.0	102.7	OK
S1.006	S10	121.039	-0.195	0.000	0.46	0.0	108.9	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	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)	2, 30
Climate Change (%)	0, 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%	30/15 Summer				
S1.001	15 Winter	30	0%	30/15 Summer				
S1.002	15 Winter	30	0%	30/15 Summer				
S1.003	15 Winter	30	0%	30/15 Summer				
S2.000	15 Winter	30	0%	30/15 Summer				
S2.001	15 Winter	30	0%	30/15 Summer				
S2.002	15 Winter	30	0%	30/15 Summer				
S1.004	15 Winter	30	0%	30/15 Summer				
S1.005	15 Winter	30	0%	30/15 Summer				
S1.006	15 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	122.410	0.415	0.000	0.94	0.0	44.7	SURCHARGED
S1.001	S2	122.238	0.443	0.000	1.56	0.0	56.4	SURCHARGED
S1.002	S3	121.931	0.261	0.000	1.26	0.0	70.6	SURCHARGED
S1.003	S4	121.850	0.223	0.000	1.09	0.0	76.7	SURCHARGED
S2.000	S5	122.391	0.546	0.000	1.60	0.0	55.0	SURCHARGED
S2.001	S6	122.203	0.433	0.000	1.65	0.0	59.9	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N1 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S2.002	S7	121.860	0.216	0.000	1.05	0.0	78.4	SURCHARGED
S1.004	S8	121.720	0.201	0.000	1.75	0.0	173.0	SURCHARGED
S1.005	S9	121.468	0.028	0.000	1.08	0.0	192.2	SURCHARGED
S1.006	S10	121.132	-0.102	0.000	0.87	0.0	204.6	OK

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for N2 STORM.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.700	Minimum Backdrop Height (m)	0.000
Ratio R	0.409	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for N2 STORM.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.516	4-8	0.253

Total Area Contributing (ha) = 0.769

Total Pipe Volume (m³) = 18.889

Network Design Table for N2 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	18.250	0.107	170.0	0.080	5.00	0.0	0.600	o	225	
S1.001	11.860	0.090	131.8	0.054	0.00	0.0	0.600	o	225	
S1.002	26.312	0.200	131.6	0.041	0.00	0.0	0.600	o	225	
S1.003	21.652	0.524	41.3	0.077	0.00	0.0	0.600	o	225	
S2.000	19.883	0.117	170.0	0.093	5.00	0.0	0.600	o	225	
S2.001	30.731	0.181	170.0	0.011	0.00	0.0	0.600	o	225	

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)
S1.000	50.00	5.30	121.220	0.080	0.0	0.0	1.1	1.00	39.8	11.9
S1.001	50.00	5.48	121.113	0.134	0.0	0.0	1.8	1.14	45.2	20.0
S1.002	50.00	5.86	121.023	0.175	0.0	0.0	2.4	1.14	45.3	26.1
S1.003	50.00	6.04	120.823	0.252	0.0	0.0	3.4	2.04	81.2	37.5
S2.000	50.00	5.33	120.670	0.093	0.0	0.0	1.3	1.00	39.8	13.9
S2.001	50.00	5.84	120.553	0.104	0.0	0.0	1.4	1.00	39.8	15.5

Network Design Table for N2 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S2.002	12.516	0.074	170.0	0.051	0.00	0.0	0.600	o	225	
S1.004	16.116	0.103	156.5	0.106	0.00	0.0	0.600	o	375	
S3.000	22.476	0.132	170.0	0.075	5.00	0.0	0.600	o	225	
S3.001	10.264	0.060	170.0	0.027	0.00	0.0	0.600	o	225	
S3.002	9.333	0.055	170.0	0.031	0.00	0.0	0.600	o	225	
S3.003	12.857	0.076	170.0	0.003	0.00	0.0	0.600	o	225	
S3.004	20.556	0.121	170.0	0.041	0.00	0.0	0.600	o	225	
S1.005	22.152	0.055	400.0	0.024	0.00	0.0	0.600	o	450	
S1.006	31.248	0.973	32.1	0.055	0.00	0.0	0.600	o	450	

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)
S2.002	50.00	6.05	120.372	0.155	0.0	0.0	2.1	1.00	39.8	23.1
S1.004	50.00	6.24	120.149	0.513	0.0	0.0	6.9	1.45	159.7	76.4
S3.000	50.00	5.37	120.640	0.075	0.0	0.0	1.0	1.00	39.8	11.2
S3.001	50.00	5.55	120.508	0.102	0.0	0.0	1.4	1.00	39.8	15.2
S3.002	50.00	5.70	120.447	0.133	0.0	0.0	1.8	1.00	39.8	19.8
S3.003	50.00	5.92	120.393	0.136	0.0	0.0	1.8	1.00	39.8	20.3
S3.004	50.00	6.26	120.317	0.177	0.0	0.0	2.4	1.00	39.8	26.4
S1.005	50.00	6.62	119.971	0.714	0.0	0.0	9.7	1.01	160.7	106.4
S1.006	50.00	6.77	119.915	0.769	0.0	0.0	10.4	3.60	572.2	114.5

Area Summary for N2 STORM.SWS

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.080	0.080	0.080
1.001	-	-	100	0.054	0.054	0.054
1.002	-	-	100	0.041	0.041	0.041
1.003	-	-	100	0.077	0.077	0.077
2.000	-	-	100	0.093	0.093	0.093
2.001	-	-	100	0.011	0.011	0.011
2.002	-	-	100	0.051	0.051	0.051
1.004	-	-	100	0.106	0.106	0.106
3.000	-	-	100	0.075	0.075	0.075
3.001	-	-	100	0.027	0.027	0.027
3.002	-	-	100	0.031	0.031	0.031
3.003	-	-	100	0.003	0.003	0.003
3.004	-	-	100	0.041	0.041	0.041
1.005	-	-	100	0.024	0.024	0.024
1.006	-	-	100	0.055	0.055	0.055
				Total	Total	Total
				0.769	0.769	0.769

Free Flowing Outfall Details for N2 STORM.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S104	121.882	118.942	0.000	1800	0

Simulation Criteria for N2 STORM.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.409
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			3
S1.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			3
S1.002	15 Winter	100	+30%	100/15 Summer	100/15 Summer			2
S1.003	15 Winter	100	+30%	100/15 Summer				
S2.000	15 Winter	100	+30%	100/15 Summer				
S2.001	15 Winter	100	+30%	100/15 Summer				
S2.002	15 Winter	100	+30%	100/15 Summer				
S1.004	15 Winter	100	+30%	100/15 Summer				
S3.000	15 Winter	100	+30%	100/15 Summer				
S3.001	15 Winter	100	+30%	100/15 Summer				
S3.002	15 Winter	100	+30%	100/15 Summer				
S3.003	15 Winter	100	+30%	100/15 Summer				
S3.004	15 Winter	100	+30%	100/15 Summer				
S1.005	15 Winter	100	+30%	100/15 Summer				
S1.006	15 Winter	100	+30%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S11	122.652	1.207	1.607	0.96	0.0	34.3	FLOOD

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.001	S12	122.553	1.215	3.315	1.84	0.0	71.1	FLOOD
S1.002	S13	122.451	1.203	0.720	1.84	0.0	77.1	FLOOD
S1.003	S14	122.088	1.040	0.000	1.40	0.0	103.4	FLOOD RISK
S2.000	S15	122.024	1.129	0.000	1.37	0.0	49.2	FLOOD RISK
S2.001	S16	121.801	1.023	0.000	1.48	0.0	55.0	FLOOD RISK
S2.002	S17	121.439	0.842	0.000	2.26	0.0	77.2	SURCHARGED
S1.004	S18	121.062	0.539	0.000	1.89	0.0	237.3	SURCHARGED
S3.000	S19	122.030	1.165	0.000	1.04	0.0	37.7	FLOOD RISK
S3.001	S20	121.884	1.151	0.000	1.48	0.0	49.2	FLOOD RISK
S3.002	S21	121.752	1.080	0.000	1.90	0.0	62.3	FLOOD RISK
S3.003	S22	121.552	0.934	0.000	1.89	0.0	64.9	SURCHARGED
S3.004	S23	121.309	0.767	0.000	2.24	0.0	80.9	SURCHARGED
S1.005	S24	120.690	0.270	0.000	2.46	0.0	325.1	SURCHARGED
S1.006	S25	120.201	-0.164	0.000	0.71	0.0	351.8	OK

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for N2 STORM.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.700	Minimum Backdrop Height (m)	0.000
Ratio R	0.409	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for N2 STORM.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.516	4-8	0.253

Total Area Contributing (ha) = 0.769

Total Pipe Volume (m³) = 18.889

Network Design Table for N2 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	18.250	0.107	170.0	0.080	5.00	0.0	0.600	o	225	
S1.001	11.860	0.090	131.8	0.054	0.00	0.0	0.600	o	225	
S1.002	26.312	0.200	131.6	0.041	0.00	0.0	0.600	o	225	
S1.003	21.652	0.524	41.3	0.077	0.00	0.0	0.600	o	225	
S2.000	19.883	0.117	170.0	0.093	5.00	0.0	0.600	o	225	
S2.001	30.731	0.181	170.0	0.011	0.00	0.0	0.600	o	225	

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)
S1.000	50.00	5.30	121.220	0.080	0.0	0.0	1.1	1.00	39.8	11.9
S1.001	50.00	5.48	121.113	0.134	0.0	0.0	1.8	1.14	45.2	20.0
S1.002	50.00	5.86	121.023	0.175	0.0	0.0	2.4	1.14	45.3	26.1
S1.003	50.00	6.04	120.823	0.252	0.0	0.0	3.4	2.04	81.2	37.5
S2.000	50.00	5.33	120.670	0.093	0.0	0.0	1.3	1.00	39.8	13.9
S2.001	50.00	5.84	120.553	0.104	0.0	0.0	1.4	1.00	39.8	15.5

Network Design Table for N2 STORM.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S2.002	12.516	0.074	170.0	0.051	0.00	0.0	0.600	o	225	
S1.004	16.116	0.103	156.5	0.106	0.00	0.0	0.600	o	375	
S3.000	22.476	0.132	170.0	0.075	5.00	0.0	0.600	o	225	
S3.001	10.264	0.060	170.0	0.027	0.00	0.0	0.600	o	225	
S3.002	9.333	0.055	170.0	0.031	0.00	0.0	0.600	o	225	
S3.003	12.857	0.076	170.0	0.003	0.00	0.0	0.600	o	225	
S3.004	20.556	0.121	170.0	0.041	0.00	0.0	0.600	o	225	
S1.005	22.152	0.055	400.0	0.024	0.00	0.0	0.600	o	450	
S1.006	31.248	0.973	32.1	0.055	0.00	0.0	0.600	o	450	

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)
S2.002	50.00	6.05	120.372	0.155	0.0	0.0	2.1	1.00	39.8	23.1
S1.004	50.00	6.24	120.149	0.513	0.0	0.0	6.9	1.45	159.7	76.4
S3.000	50.00	5.37	120.640	0.075	0.0	0.0	1.0	1.00	39.8	11.2
S3.001	50.00	5.55	120.508	0.102	0.0	0.0	1.4	1.00	39.8	15.2
S3.002	50.00	5.70	120.447	0.133	0.0	0.0	1.8	1.00	39.8	19.8
S3.003	50.00	5.92	120.393	0.136	0.0	0.0	1.8	1.00	39.8	20.3
S3.004	50.00	6.26	120.317	0.177	0.0	0.0	2.4	1.00	39.8	26.4
S1.005	50.00	6.62	119.971	0.714	0.0	0.0	9.7	1.01	160.7	106.4
S1.006	50.00	6.77	119.915	0.769	0.0	0.0	10.4	3.60	572.2	114.5

Area Summary for N2 STORM.SWS

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.080	0.080	0.080
1.001	-	-	100	0.054	0.054	0.054
1.002	-	-	100	0.041	0.041	0.041
1.003	-	-	100	0.077	0.077	0.077
2.000	-	-	100	0.093	0.093	0.093
2.001	-	-	100	0.011	0.011	0.011
2.002	-	-	100	0.051	0.051	0.051
1.004	-	-	100	0.106	0.106	0.106
3.000	-	-	100	0.075	0.075	0.075
3.001	-	-	100	0.027	0.027	0.027
3.002	-	-	100	0.031	0.031	0.031
3.003	-	-	100	0.003	0.003	0.003
3.004	-	-	100	0.041	0.041	0.041
1.005	-	-	100	0.024	0.024	0.024
1.006	-	-	100	0.055	0.055	0.055
				Total	Total	Total
				0.769	0.769	0.769

Free Flowing Outfall Details for N2 STORM.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S104	121.882	118.942	0.000	1800	0

Simulation Criteria for N2 STORM.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.409
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	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)	2, 30
Climate Change (%)	0, 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	2	0%	30/15 Summer				
S1.001	15 Winter	2	0%	30/15 Summer				
S1.002	15 Winter	2	0%	30/15 Summer				
S1.003	15 Winter	2	0%	30/15 Summer				
S2.000	15 Winter	2	0%	30/15 Summer				
S2.001	15 Winter	2	0%	30/15 Summer				
S2.002	15 Winter	2	0%	30/15 Summer				
S1.004	15 Winter	2	0%	30/15 Summer				
S3.000	15 Winter	2	0%	30/15 Summer				
S3.001	15 Winter	2	0%	30/15 Summer				
S3.002	15 Winter	2	0%	30/15 Summer				
S3.003	15 Winter	2	0%	30/15 Summer				
S3.004	15 Winter	2	0%	30/15 Summer				
S1.005	15 Winter	2	0%	30/15 Summer				
S1.006	15 Winter	2	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S11	121.325	-0.120	0.000	0.43	0.0	15.5	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.001	S12	121.244	-0.093	0.000	0.64	0.0	24.6	OK
S1.002	S13	121.169	-0.079	0.000	0.74	0.0	31.2	OK
S1.003	S14	120.947	-0.100	0.000	0.59	0.0	43.6	OK
S2.000	S15	120.784	-0.111	0.000	0.50	0.0	18.0	OK
S2.001	S16	120.671	-0.107	0.000	0.53	0.0	19.7	OK
S2.002	S17	120.528	-0.069	0.000	0.81	0.0	27.5	OK
S1.004	S18	120.383	-0.141	0.000	0.70	0.0	87.7	OK
S3.000	S19	120.740	-0.125	0.000	0.40	0.0	14.4	OK
S3.001	S20	120.631	-0.102	0.000	0.57	0.0	19.1	OK
S3.002	S21	120.591	-0.081	0.000	0.74	0.0	24.1	OK
S3.003	S22	120.534	-0.083	0.000	0.71	0.0	24.4	OK
S3.004	S23	120.479	-0.063	0.000	0.86	0.0	30.9	OK
S1.005	S24	120.310	-0.110	0.000	0.92	0.0	121.4	OK
S1.006	S25	120.071	-0.294	0.000	0.26	0.0	128.7	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.409
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	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)	2, 30
Climate Change (%)	0, 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%	30/15 Summer				
S1.001	15 Winter	30	0%	30/15 Summer				
S1.002	15 Winter	30	0%	30/15 Summer				
S1.003	15 Winter	30	0%	30/15 Summer				
S2.000	15 Winter	30	0%	30/15 Summer				
S2.001	15 Winter	30	0%	30/15 Summer				
S2.002	15 Winter	30	0%	30/15 Summer				
S1.004	15 Winter	30	0%	30/15 Summer				
S3.000	15 Winter	30	0%	30/15 Summer				
S3.001	15 Winter	30	0%	30/15 Summer				
S3.002	15 Winter	30	0%	30/15 Summer				
S3.003	15 Winter	30	0%	30/15 Summer				
S3.004	15 Winter	30	0%	30/15 Summer				
S1.005	15 Winter	30	0%	30/15 Summer				
S1.006	15 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S11	121.858	0.413	0.000	0.76	0.0	27.0	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for N2 STORM.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.001	S12	121.797	0.460	0.000	1.13	0.0	43.6	SURCHARGED
S1.002	S13	121.681	0.433	0.000	1.35	0.0	56.5	SURCHARGED
S1.003	S14	121.319	0.271	0.000	1.08	0.0	79.9	SURCHARGED
S2.000	S15	121.110	0.215	0.000	0.88	0.0	31.8	SURCHARGED
S2.001	S16	121.017	0.239	0.000	0.94	0.0	35.1	SURCHARGED
S2.002	S17	120.856	0.259	0.000	1.45	0.0	49.6	SURCHARGED
S1.004	S18	120.691	0.167	0.000	1.31	0.0	164.1	SURCHARGED
S3.000	S19	121.143	0.278	0.000	0.69	0.0	24.9	SURCHARGED
S3.001	S20	121.078	0.345	0.000	0.99	0.0	32.8	SURCHARGED
S3.002	S21	121.016	0.344	0.000	1.28	0.0	42.0	SURCHARGED
S3.003	S22	120.921	0.304	0.000	1.27	0.0	43.7	SURCHARGED
S3.004	S23	120.802	0.260	0.000	1.53	0.0	55.1	SURCHARGED
S1.005	S24	120.509	0.088	0.000	1.70	0.0	224.3	SURCHARGED
S1.006	S25	120.139	-0.226	0.000	0.49	0.0	240.1	OK

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