

SURFACE WATER DRAINAGE REALIGNMENT TECHNICAL NOTE

Project name **High Bay Warehouse, Middle Road**
 Project no. **1620010941**
 Client **Kronospan**
 Memo no. **RAM-XX-XX-TN-D-00001**
 Version **P01**

Prepared by **Terry McCormick**
 Checked by **Lee Fletcher**
 Approved by **Lisa Sawyer**

Revision	Date	Prepared by	Checked by	Approved by	Description
P01	18/02/2021	T. McCormick	L. Fletcher	L. Sawyer	For Planning

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1 Background

Ramboll have been instructed to carry out a design for the realignment of a section of private surface water drainage running beneath Middle Road, located within the Kronospan site at Chirk. The private surface water drainage realignment is required due to the proposed partial demolition of existing structures within the site, and construction of a new building within the boundaries of the existing brownfield site in their place.

As a result of the site redevelopment, the surface water drainage realignment is required where the route of the existing main drains within Middle Road will be within the immediate vicinity of the foundations for the proposed new building.

No changes to the existing drained impermeable areas are proposed, and as such no additional surface water volumes will be discharged into the existing wider surface water drainage system. Above ground roof drainage design and associated rainwater downpipe locations is to be undertaken by others.

2 Site Appraisal

2.1 Existing Site

The site is entirely brownfield, with the wider site being bounded by urban residential buildings to the east, and agricultural land to the west.

The site has a history of industrial use and contains structures, parking, and access roads within its extents. The area in the immediate vicinity of the proposed surface water drainage realignment consists of the following:

- Building structures to the north and south
- A private access road (Middle Road) running in between the structures
- A canopy which spans between the structures, covering the eastern part of Middle Road.

The catchment area of which the surface water drainage realignment is being carried out is considered as 100% impermeable. An aerial view of the site and its surroundings is shown below in Figure 1.



Figure 1 – Area of Drainage Realignment at the Kronospan Site (Image ©Google)

2.2 Flood Risk

A high level summary assessment has been carried out in order to determine any factors which may be of immediate concern regarding the surface water drainage realignment. The following high level summary assessment does not constitute or attempt to substitute a full flood risk statement, however, it is included as evidence that due diligence has been observed in consideration of all reasonably known factors which may impact the drainage realignment within the site.

The nearest water body to the proposed works is the Shropshire Union Canal (Llangollen Branch) which is situated approximately 500m to the west. The River Ceiriog is situated approximately 1.2km to the south. Neither of these watercourses are considered as presenting a flood risk to the site, as such shall have no relevant implications on the surface water drainage realignment.

The Natural Resources Wales Flood Risk Assessment Map (see Figure 2 below) does not identify any specific flood risk to the site from rivers or the sea. However, a variable risk of surface water flooding is identified around the buildings within the site which is likely due to existing localised low spots within the site. Although it is not within the scope of Ramboll's drainage realignment design to assess surface water flow paths, this high level review considers that a simple drainage realignment within the area shown will have no impact on existing surface water flood risk.



Figure 2 - Surface Water Flood Risk (Extract from NRW Flood Risk Assessment Wales Map)

At the time of writing, Ramboll have not been made aware of any site-specific flood risk considerations that are required in relation to the surface water drainage realignment.

No changes to the impermeable area within the site are proposed.

The risk of flooding to the site, and from the site, shall not be increased by the surface water drainage realignment.

The drainage realignment shall be on a 'like-for-like' basis, and a hydraulic assessment shall be carried out on the proposed drainage design to ensure that the proposed surface water drainage realignment does not surcharge for the 1:2 year event, flood during the 1:30 & 1:100 (+Climate Change) year event.

3 Existing Drainage

The following documents / drawings have been reviewed in order to assess the existing drainage within the site:

- Historical Records: Drainage Layout Drawing 5103 Rev E, dated October 1979, by Building Partnership;
- CCTV Drainage Survey, dated November 2020, by Drainrite Environmental Services Ltd;
- Services Plan: Kronospan Chirk Site Drawing 8000/44 Rev J, dated April 2019, including the following information:
 - Manhole Survey Information
 - Buildings, Drains & Roads Site Plan Drawing 7000/183 (Reviewed October 2020)
- Topographical Data: High Bay Warehouse – High Bay Building Footprint on Survey, Drawing Number 7000/635 dated December 2020 (Preliminary) by Kronospan, including the following information:
 - Kronospan Layout Drawing 7000/626
 - Powers & Tiltman Survey Drawing (Kronospan Ref 12381 dated November 2020)
 - Jungheinrich Drawing LS170690-02-01 dated November 2020

Further information has also been supplied by Kronospan following queries from Ramboll where any clarifications on the above documents / drawings has been required.

3.1 Existing Public Sewers

There are no known public sewer assets within the vicinity of the proposed works.

3.2 Existing Foul Drainage

No existing foul drains are to be affected by the proposed surface water drainage realignment.

3.3 Existing Underground Surface Water Drainage

Analysis of the above information has allowed a model of the existing drainage to be produced in the vicinity of the proposed surface water sewer realignment, which is summarised below:

- There are 2 No. surface water drains (North Drain and South Drain), flowing approximately in an east to west direction, located within the north side and the south side of Middle Road.
- NORTH DRAIN: The head of the run is located adjacent to the south-eastern corner of the existing northern structure of Middle Road. 2 No. gullies (covered by an existing roof area) discharge into a manhole, surface water is then conveyed in a westerly direction via a 225mm diameter drain which runs parallel to the existing northern structure. At approximately 2/3 of the structure length, the 225mm pipe increases in size to a 300mm diameter and discharges into a manhole adjacent to the south-west corner of the existing northern structure.
- SOUTH DRAIN: The head of the run is located adjacent to the north-eastern corner of the existing south structure of Middle Road. 2 No. gullies (covered by an existing roof area) drain into a manhole at this location, from which point surface water drainage is conveyed in a westerly direction via a 225mm diameter drain which runs parallel to the building line and parallel to the northern sewer. At approximately 2/3 of the northern structure length, the drainage line changes direction approximately 45 degrees to the north-west, via a manhole, and increases in size to a 300mm diameter, before changing direction approximately 45 degrees via a bend in the pipe to continue flowing in a westerly direction.
- Both of these existing surface water drainage lines are fed by gullies and rainwater pipes along their length, with existing manholes along the way. The two drains combine approximately 40m west of the north structure, before discharging to the wider site surface water drainage network.

4 Proposed Drainage

4.1 Proposed Drainage Philosophy

- The existing 'live' drainage is to be maintained, except for where the proposed new building will require the existing drainage to be realigned.
- Existing flow rates are to be maintained, and it is assumed that the proposed roof drainage shall remain as a gravity system in keeping with the existing arrangement.
- No change to the existing fundamental drainage principles are proposed.
- Where the existing surface water drains increase in diameter, this shall be reflected in the proposed realignment at suitable locations to ensure that existing flows are not restricted by the realignment, and the robustness of the design confirmed by the MicroDrainage hydraulic model (enclosed in Appendix 2).

4.2 Proposed Drainage Route

The route of the proposed drainage realignment is shown on the following drawing, which is enclosed in Appendix 1:

- Proposed Drainage Realignment Layout, drawing RAM-XX-XX-DR-D-00100 Rev P01

A description of the realignment proposals is given in the following sections.

4.2.1 North Drain

The existing surface water drain is to be removed entirely, from the head of the run up to and including the manhole adjacent to the south-west corner of the new building.

A new surface water drain will be installed parallel to the new building line, offset appropriately to ensure adequate distance between the new pipework and the foundations associated with the new building line.

A new manhole will be provided at the head of the run, and a new manhole adjacent to the south-west corner of the new building line. An intermediate manhole will be provided mid-way along the new run, to allow for adequate maintenance of the length of the drainage.

Any live gullies / rainwater pipe connections affected by the realignment will also be replaced on site by the contractor ensuring any low spots / existing connections are picked up.

4.2.2 South Drain

The existing surface water drain is to be diverted from a point approximately half way along its run upstream of the existing 45 degrees bend north-west.

The route of the diverted drain will follow a similar alignment to the existing route but shifted approximately 23m upstream.

New manholes will be installed at changes in direction/size of the diverted drain, and the realignment will be re-connected to the existing drain in the vicinity of the existing bend to the west.

Any live gullies / rainwater pipe connections affected by the realignment will also be replaced on site by the contractor ensuring any low spots / existing connections are picked up.

5 Hydraulic Assessment

An assessment of the proposed drainage realignments has been carried out using MicroDrainage.

The impermeable areas draining into the surface water drainage system has been based on the following:

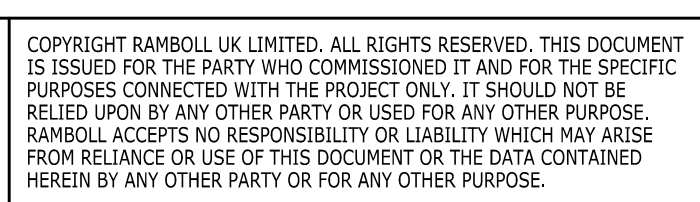
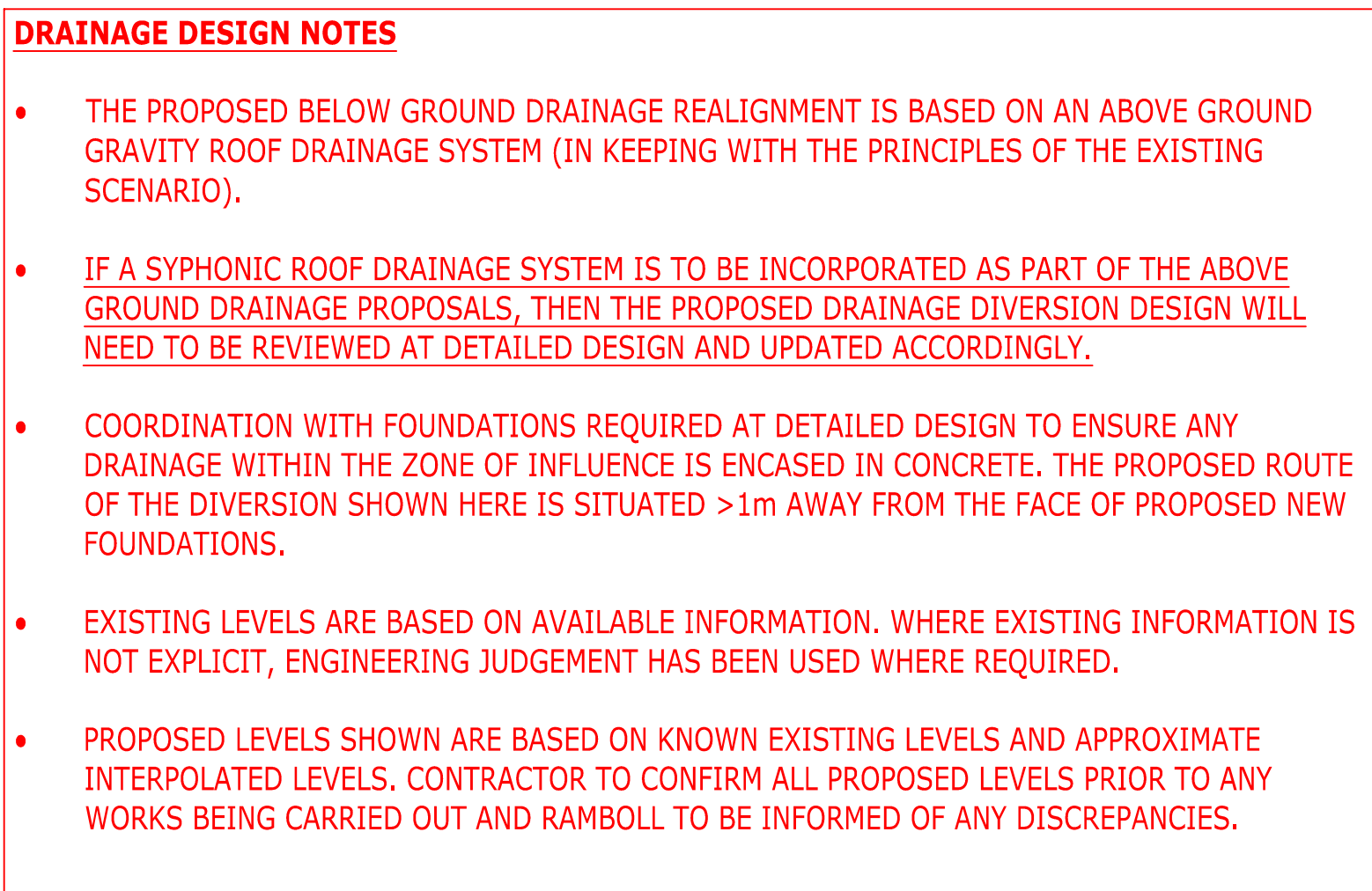
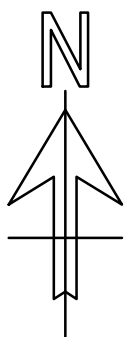
- Roof areas which have been confirmed by Kronospan
- Impermeable surfaces as indicated by the extents of the topographic survey
- Information supplied by Kronospan

The results of the MicroDrainage simulation are enclosed in Appendix 2 and summarised below:

- | | |
|----------------------------------|---|
| • For the 1:2 year storm event: | No surcharging & no flooding |
| • For the 1:30 year storm event: | No flooding |
| • For the 1:100 year + 40% CC: | Nominal flood risk within the new drainage run. |

-

APPENDIX 1
PROPOSED DRAINAGE REALIGNMENT GENERAL ARRANGEMENT



- | | |
|---|--|
| <p>THESE NOTES ARE BASED ON THE USE OF EXPERIENCED AND COMPETENT CONTRACTORS CARRYING OUT THE WORK USING AN APPROVED SAFE METHOD OF WORKING</p> | |
| <p>KEY TO HEALTH AND SAFETY SYMBOLS</p> <p> INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION</p> <p> INDICATES A RESIDUAL RISK FOR INFORMATION</p> <p> INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION</p> <p> INDICATES A RESIDUAL RISK AS A WARNING</p> | |

T01	FOR TENDER	19/02 2021	TM LF	LS
I01	FOR INFORMATION	17/12 2020	TM LF	JD
Rev	Description	Date	By 2	App

HIGH BAY WAREHOUSE
MIDDLE ROAD



PROPOSED DRAINAGE REALIGNMENT GENERAL ARRANGEMENT

Project No: 1620010941	Scale (@A1): 1:250	Drawn: TM	Date: 12/2020
Drawing No: RAM-XX-XX-DR-D-00100			Rev: T01

APPENDIX 2

PROPOSED DRAINAGE REALIGNMENT – HYDRAULIC MODEL

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
S1.001	8.430	0.040	210.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		
S1.002	24.261	0.130	186.6	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit		
S1.003	38.054	0.290	131.2	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.004	48.383	0.370	130.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.005	11.474	0.090	127.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S2.000	85.143	0.540	157.7	0.118	4.00	0.0	0.600	o	225	Pipe/Conduit		
S2.001	55.152	0.360	153.2	0.101	0.00	0.0	0.600	o	300	Pipe/Conduit		
S2.002	5.197	0.030	173.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S2.003	35.920	0.300	119.7	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	53.72	5.20	99.170	0.118	0.0	0.0	0.0	0.90	35.7	17.4
S1.002	52.09	5.62	99.130	0.176	0.0	0.0	0.0	0.95	37.9	24.9
S1.003	50.44	6.08	99.000	0.236	0.0	0.0	0.0	1.37	96.9	32.2
S1.004	48.52	6.67	98.710	0.236	0.0	0.0	0.0	1.37	97.1	32.2
S1.005	48.09	6.81	98.340	0.236	0.0	0.0	0.0	1.39	98.3	32.2
S2.000	53.05	5.37	99.480	0.118	0.0	0.0	0.0	1.04	41.3	16.9
S2.001	50.41	6.09	98.940	0.219	0.0	0.0	0.0	1.27	89.6	29.8
S2.002	50.16	6.16	98.580	0.219	0.0	0.0	0.0	1.19	84.2	29.8
S2.003	48.80	6.58	98.550	0.243	0.0	0.0	0.0	1.44	101.5	32.1

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Micro Drainage	Network 2020.1	

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)
SWEX01	100.790	1.290	Open Manhole	1200	S1.000	99.500	225				
SW03	100.740	1.570	Open Manhole	1200	S1.001	99.170	225	S1.000	99.170	225	
SW04	100.170	1.040	Open Manhole	1200	S1.002	99.130	225	S1.001	99.130	225	
SWEX02	100.750	1.750	Open Manhole	1200	S1.003	99.000	300	S1.002	99.000	225	
S5	100.760	2.050	Junction		S1.004	98.710	300	S1.003	98.710	300	
SWEX03	100.880	2.540	Open Manhole	1200	S1.005	98.340	300	S1.004	98.340	300	
SW01	100.740	1.260	Open Manhole	1200	S2.000	99.480	225				
SW02	100.820	1.880	Open Manhole	1200	S2.001	98.940	300	S2.000	98.940	225	
SW05	100.870	2.290	Open Manhole	1200	S2.002	98.580	300	S2.001	98.580	300	
SW06	100.800	2.250	Open Manhole	1200	S2.003	98.550	300	S2.002	98.550	300	
SWEX04	100.910	2.660	Open Manhole	1500	S1.006	98.250	600	S1.005	98.250	300	
								S2.003	98.250	300	
SWEX05	101.125	2.895	Open Manhole	1500	S1.007	98.230	600	S1.006	98.230	600	
S	100.990	2.805	Open Manhole	0		OUTFALL		S1.007	98.185	600	

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<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.840 Manhole Headloss Coeff (Global) 0.500 Inlet Coefficient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 4320 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 2.000 Output Interval (mins) 24 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 <u>Synthetic Rainfall Details</u> Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.840 Return Period (years) 100 Ratio R 0.300 Cv (Winter) 0.840 Region England and Wales Profile Type Winter Storm Duration (mins) 2160		
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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 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 M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
 Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880,
 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)
S1.000	SWEX01	15 Winter	2	+0%	100/15 Summer				99.613	-0.112	0.000	0.47	
S1.001	SW03	15 Winter	2	+0%	30/15 Summer				99.296	-0.099	0.000	0.60	

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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																						
<table><thead><tr><th colspan="2"></th><th>Pipe</th><th></th></tr><tr><th></th><th>US/MH</th><th>Flow</th><th>Level</th></tr><tr><th>PN</th><th>Name</th><th>(l/s)</th><th>Status Exceeded</th></tr></thead><tbody><tr><td>S1.000</td><td>SWEX01</td><td>17.4</td><td>OK</td></tr><tr><td>S1.001</td><td>SW03</td><td>17.3</td><td>OK</td></tr></tbody></table>					Pipe			US/MH	Flow	Level	PN	Name	(l/s)	Status Exceeded	S1.000	SWEX01	17.4	OK	S1.001	SW03	17.3	OK
		Pipe																				
	US/MH	Flow	Level																			
PN	Name	(l/s)	Status Exceeded																			
S1.000	SWEX01	17.4	OK																			
S1.001	SW03	17.3	OK																			
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Micro Drainage	Network 2020.1	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)
S1.002	SW04	15 Winter	2	+0%	30/15 Summer				99.269	-0.086	0.000	0.69	
S1.003	SWEX02	15 Winter	2	+0%	100/15 Winter				99.122	-0.178	0.000	0.34	
S1.004	S5	15 Winter	2	+0%					98.825	-0.185	0.000	0.31	
S1.005	SWEX03	15 Winter	2	+0%	100/15 Summer				98.493	-0.147	0.000	0.40	
S2.000	SW01	15 Winter	2	+0%	100/15 Summer				99.587	-0.118	0.000	0.42	
S2.001	SW02	15 Winter	2	+0%	100/15 Summer				99.061	-0.179	0.000	0.33	
S2.002	SW05	15 Winter	2	+0%	100/15 Summer				98.731	-0.149	0.000	0.50	
S2.003	SW06	15 Winter	2	+0%	100/15 Summer				98.669	-0.181	0.000	0.33	
S1.006	SWEX04	15 Winter	2	+0%					98.470	-0.380	0.000	0.29	
S1.007	SWEX05	15 Winter	2	+0%					98.421	-0.409	0.000	0.22	

		Pipe			
PN	US/MH Name	Flow (l/s)	Status	Level Exceeded	
S1.002	SW04	23.9	OK		
S1.003	SWEX02	30.6	OK		
S1.004	S5	30.2	OK*		
S1.005	SWEX03	30.0	OK		
S2.000	SW01	16.8	OK		
S2.001	SW02	28.3	OK		
S2.002	SW05	28.5	OK		
S2.003	SW06	30.6	OK		
S1.006	SWEX04	59.9	OK		

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		Pipe																				
	US/MH	Flow		Level																		
PN	Name	(l/s)	Status	Exceeded																		
S1.007	SWEX05	61.3	OK																			
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Synthetic Rainfall Details

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Margin for Flood Risk Warning (mm) 300.0 DTS Status   ON Inertia Status OFF
Analysis Timestep      Fine DVD Status OFF
```

									Water	Surcharged	Flooded	Half Drain		
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)
S1.000	SWEX01	15 Winter	30	+0%	100/15 Summer				99.697	-0.028	0.000	0.87		
S1.001	SW03	15 Winter	30	+0%	30/15 Summer				99.458	0.063	0.000	1.07		

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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																											
<table><tr><td></td><td></td><td>Pipe</td><td></td><td></td></tr><tr><td></td><td>US/MH</td><td>Flow</td><td></td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>(l/s)</td><td>Status</td><td>Exceeded</td></tr><tr><td>S1.000</td><td>SWEX01</td><td>32.2</td><td></td><td>OK</td></tr><tr><td>S1.001</td><td>SW03</td><td>31.0</td><td>SURCHARGED</td><td></td></tr></table>					Pipe				US/MH	Flow		Level	PN	Name	(l/s)	Status	Exceeded	S1.000	SWEX01	32.2		OK	S1.001	SW03	31.0	SURCHARGED	
		Pipe																									
	US/MH	Flow		Level																							
PN	Name	(l/s)	Status	Exceeded																							
S1.000	SWEX01	32.2		OK																							
S1.001	SW03	31.0	SURCHARGED																								
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Micro Drainage	Network 2020.1	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)
S1.002	SW04	15 Winter	30	+0%	30/15 Summer				99.416	0.061	0.000	1.22	
S1.003	SWEX02	15 Winter	30	+0%	100/15 Winter				99.174	-0.126	0.000	0.62	
S1.004	S5	15 Winter	30	+0%					98.873	-0.137	0.000	0.57	
S1.005	SWEX03	15 Winter	30	+0%	100/15 Summer				98.611	-0.029	0.000	0.73	
S2.000	SW01	15 Winter	30	+0%	100/15 Summer				99.642	-0.063	0.000	0.79	
S2.001	SW02	15 Winter	30	+0%	100/15 Summer				99.129	-0.111	0.000	0.68	
S2.002	SW05	15 Winter	30	+0%	100/15 Summer				98.827	-0.053	0.000	1.00	
S2.003	SW06	15 Winter	30	+0%	100/15 Summer				98.730	-0.120	0.000	0.66	
S1.006	SWEX04	15 Winter	30	+0%					98.568	-0.282	0.000	0.55	
S1.007	SWEX05	15 Winter	30	+0%					98.499	-0.331	0.000	0.42	

Pipe				
PN	US/MH Name	Flow (l/s)	Status	Level Exceeded
S1.002	SW04	42.6	SURCHARGED	
S1.003	SWEX02	55.4	OK	
S1.004	S5	55.1	OK*	
S1.005	SWEX03	54.7	OK	
S2.000	SW01	31.8	OK	
S2.001	SW02	58.1	OK	
S2.002	SW05	56.4	OK	
S2.003	SW06	61.3	OK	
S1.006	SWEX04	114.6	OK	

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		Pipe																				
	US/MH	Flow		Level																		
PN	Name	(l/s)	Status	Exceeded																		
S1.007	SWEX05	116.2	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	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	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 M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.300	Cv (Winter)
				0.840

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Margin for Flood Risk Warning (mm) 300.0 DTS Status   ON Inertia Status OFF
Analysis Timestep      Fine DVD Status OFF
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Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

									Water	Surcharged	Flooded	Half Drain		
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow / Overflow	Time	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap. (l/s)	(mins)	
S1.000	SWEX01	15 Winter	100	+40%	100/15 Summer				100.505	0.780	0.000	1.32		
S1.001	SW03	15 Winter	100	+40%	30/15 Summer				99.920	0.525	0.000	1.69		

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PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded													
S1.000	SWEX01	48.8	FLOOD RISK														
S1.001	SW03	48.7	SURCHARGED														
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)
S1.002	SW04	15 Winter	100	+40%	30/15 Summer				99.806	0.451	0.000	1.98		
S1.003	SWEX02	15 Winter	100	+40%	100/15 Winter				99.300	0.000	0.000	0.98		
S1.004	S5	15 Winter	100	+40%					99.010	0.000	0.000	0.85		
S1.005	SWEX03	15 Winter	100	+40%	100/15 Summer				98.771	0.131	0.000	1.10		
S2.000	SW01	15 Winter	100	+40%	100/15 Summer				100.311	0.606	0.000	1.25		
S2.001	SW02	15 Winter	100	+40%	100/15 Summer				99.395	0.155	0.000	1.02		
S2.002	SW05	15 Winter	100	+40%	100/15 Summer				99.042	0.162	0.000	1.48		
S2.003	SW06	15 Winter	100	+40%	100/15 Summer				98.933	0.083	0.000	0.95		
S1.006	SWEX04	15 Winter	100	+40%					98.663	-0.187	0.000	0.82		
S1.007	SWEX05	15 Winter	100	+40%					98.572	-0.258	0.000	0.62		

		Pipe		
PN	US/MH Name	Flow (l/s)	Status	Level Exceeded
S1.002	SW04	69.0	SURCHARGED	
S1.003	SWEX02	88.3	SURCHARGED	
S1.004	S5	82.9	SURCHARGED*	
S1.005	SWEX03	82.7	SURCHARGED	
S2.000	SW01	50.5	SURCHARGED	
S2.001	SW02	86.6	SURCHARGED	
S2.002	SW05	83.4	SURCHARGED	
S2.003	SW06	89.0	SURCHARGED	
S1.006	SWEX04	170.7	OK	

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		Pipe																				
	US/MH	Flow		Level																		
PN	Name	(l/s)	Status	Exceeded																		
S1.007	SWEX05	172.8	OK																			
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