



ARMSTRONG STOKES & CLAYTON LIMITED

Civil & Structural Engineering Consultants

Mr R Burns
Urbanwave 122 Limited
19 Cave Road
Brough
HU15 1HA

Our Ref: JS/URBWA100/002

Date: 18th June 2024

Dear Richard

PROPOSED ASSISTED LIVING DEVELOPMENT AT No. 7 STARKEY STREET, HEYWOOD, ROCHDALE 22/00253/FUL – CONDITION 6

Further to our recent discussions we would like to take this opportunity to confirm the drainage design strategy for the aforementioned scheme, which we trust will assist in your deliberations with the local planning authority and the discharge of condition 6 of planning approval 22/00253/FUL.

The on-site drainage design will include for separate foul and surface water drainage systems, coming together at the site boundary prior to an outfall to the public sewer. Appended to this correspondence is an engineering drawing with supportive information, which illustrates the drainage design for the proposed development. Details include:

- URBWA100/100B/P - General Arrangement
- Geotechnical Assessment Executive Summary from Phase 2 SI
- Hydraulic Calculations
- SuDS Maintenance Statement

Foul Drainage

Based on a proposed residential development of 20 units @ 4000 l/unit/day, the maximum peak foul discharge rate will be 0.93 l/s.

The foul water run-off generated by the development will be discharged unrestricted to the public combined sewer within Starkey Street.

With consideration of the low flow rate generated by the development proposals, and the removal of the flow from the former building, the existing network will be able to accommodate the proposed discharge.

A gravity outfall to the public sewer will be available.

The connection to the public sewer will require approval at the detailed design stage by United Utilities in accordance with a Section 106 of the Water Industry Act 1991.

Regus House, Herald Way, Pegasus Business Park,
Castle Donington, Derbyshire, DE74 2TZ
Tel: 01159 417 893

It is expected that the main on-site foul drainage system will not be promoted for adoption under Section 104 of the Water Industry Act 1991, and thus will remain private, within the control of the Title Holder, with all on-site drainage in accordance with Part H of the current Building Regulations.

Surface Water Drainage

A sustainable surface water drainage strategy that does not increase discharge rates and therefore does not increase the risk of flooding to other areas should be provided in accordance with the National Planning Policy Framework document and the local Strategic Flood Risk Assessment. Furthermore, the surface water drainage strategy should actively seek to reduce positive discharge levels via the use of SuDS wherever possible.

To establish the surface water strategy for the development the following assessment of outfall options, in order of priority, should be considered in accordance with the CIRIA C753 SuDS Manual:

- Into the Ground (Infiltration)
- to a Surface Water Body
- to a Surface Water Sewer, Highway Drain, or another Drainage System
- to a Combined Sewer.

Into the Ground (Infiltration) – A Phase 2 Geo-Environmental Assessment has been undertaken by Geomatters Limited, which confirms that infiltration will not be feasible at this location due to the cohesive nature of the formation and shallow depth of groundwater. An extract of the Geo. Env. Executive Summary is appended to this statement.

To a Surface Water Body – There is no surface water body within the vicinity of the application site.

To a Surface Water Sewer, Highway Drain, or another Drainage System – There is no surface water sewer or drain within the locality.

To a Combined Sewer – There is a combined sewer network present, which drained surface water run-off from the site's former use.

Whilst a discharge to the combined sewer is not the preferred option, with no other outfall option available in accordance with the SuDS hierarchy, a limited surface water discharge to the combined sewer network is to be promoted.

Whilst there is run-off from the existing property to be removed from the network, the proposed limited discharge from the new development will equate to a pre-developed QBAR Greenfield run-off.

To assess the pre-developed QBAR run-off, the ICP SuDS Mean Annual Flood method has been used. This results in a QBAR Greenfield discharge rate for a 0.306 ha site area of 2.3 l/s. A copy of the ICP SuDS Mean Annual Flood calculation is appended to this correspondence.

The remaining flows generated by the proposals in excess of 2.3 l/s, will be attenuated within the development for the 100 year climate change event.

Prior to discharge the development surface water run-off will be attenuated within a cellular attenuation structure with a plan area of 90.0m² and a crate structure depth of 1.0m, providing a storage volume of 83.6m³. The crate structure will be situated below the development access road and will include a hydrobrake control device at the outlet to limit flows to 2.3 l/s to the public combined sewer network within Starkey Street.

A copy of the attenuation calculation output, along with an analysis of the supportive network sewers, is appended to this correspondence.

All surface water drainage is designed to not surface flood for events up to and including the 100 year, plus a 40% allowance for climate change. Any exceedance flows are to be contained within the site boundary, without flooding new properties, and directed towards the attenuation or landscaped areas.

A gravity outfall to the public sewer will be available.

The connection to the public sewer will require approval at the detailed design stage by United Utilities in accordance with a Section 106 of the Water Industry Act 1991.

It is expected that the main on-site surface water drainage system will not be promoted for adoption under Section 104 of the Water Industry Act 1991, and thus will remain private, within the control of the Title Holder, with all on-site drainage in accordance with Part H of the current Building Regulations, with the cellular crate structure constructed in accordance with CIRIA C753 SuDS Manual.

The long-term management of the surface water drainage network is highlighted within the attached *SuDS Maintenance Statement* and will be the responsibility of the approved appointed management company for the lifetime of the development.

We trust the enclosed is of assistance in your deliberations and will allow the LPA to discharge planning condition 6.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'JS'.

Jon Stokes
Armstrong Stokes & Clayton Limited

enc

Armstrong
Stokes &
Clayton Limited

Banford Road

Blind
Centre

Starkey Street



NOTES

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED/VERIFIED ON SITE

ALL DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH PART H OF THE CURRENT BUILDING REGULATIONS.

ALL SEWERS 100 DIA. UNLESS OTHERWISE STATED.

SEWERS TO BE LAID WITH LEVEL SOFFITS UNLESS OTHERWISE STATED.

ARCHITECT TO FINALISE FOUL & RWP CONNECTIONS FROM UNITS. POSITIONS SHOWN ARE INDICATIVE ONLY.

COVER & EXTERNAL LEVELS TO BE FINALISED WITH CLIENT & ARCHITECT.

MANHOLE COVERS IN VEHICULAR AREAS TO BE CLASS D400, WITH A15 COVERS USED IN PEDESTRIAN AREAS. ALL TO BS EN 124.

ALL HARD PAVED EXTERNAL AREAS TO FALL TOWARDS GULLIES OR CHANNEL DRAINS.

OFF-LINE INSPECTION CHAMBERS TO BE AT SUFFICIENT DEPTH TO ALLOW DRAINS TO PASS BENEATH FOUNDATION SLAB.

LEGEND:

- FOUL WATER SEWER
- SURFACE WATER SEWER
- COMBINED WATER SEWER
- ROAD GULLY (TRAPPED) WITH 150MM DIA. CONNECTION
- YARD GULLY (TRAPPED) WITH 100MM DIA. CONNECTION
- RODDING EYE
- CELLULAR CRATE
ED = EFFECTIVE DEPTH OF STRUCTURE
- ACO
ACO CHANNEL DRAIN OR SIMILAR
- SU
TRAPPED SUMP UNIT
- MAC
MINI ACCESS CHAMBER
MAX. DEPTH 0.6m
- PPIC
POLYPROPYLENE INSPECTION CHAMBER.
MAX. DEPTH 1.2m
- IC
PCC INSPECTION CHAMBER.
MAX. DEPTH 1.5m
- TTPIC
TELESCOPIC POLYPROPYLENE INSPECTION CHAMBER
- PCCMH
1200Ø PRECAST CONCRETE MANHOLE
- TBC
TO BE CONFIRMED

B Block paving removed.
A Attenuation size adjusted.

June 2024
May 2024

Armstrong Stokes & Clayton Limited

Civil & Structural Engineering Consultants
Regus House, Herald Way, Pegasus Business Park, Castle Donington, Derbyshire, DE74 2TZ
Tel: 01159 417 893
Client:

Urbanwave 122 Ltd

Job Title:

Proposed Assisted Living Development
7 Starkey Street
Heywood

Drawing Title:

General Arrangement

Drawing number:

URBWA100/100B/P

Drawn: JS
Date: April 2024
Scale: 1:200

A1

Preliminary ☒ Detailed ☐ Tender ☐ As Built ☐

Executive Summary

This presents the salient points of the report and should not be referred to in isolation. The conclusions and recommendations presented below are considered reasonable based on the findings of the site investigation. However, these cannot be guaranteed to gain regulatory approval and therefore copies of this report should be sent to the appropriate Regulatory Authorities and / or other organisations (as appropriate) by the Client for their comments and approval prior to undertaking any irrecoverable works associated with the subject site.

Enabling / Earthworks	Significant building footprint occupies the site which will require demolition prior to redevelopment. It may be possible to crush and re-use demolition materials although potential asbestos containing materials were noted to some of the building roofs. Specific testing (e.g. waste acceptance criteria testing) may be required at the discretion of the Client's designated waste handler if the off-site movement / disposal of soils is undertaken. Where applicable, such requirements must be verified directly with them by the Client. Additionally, where soils are imported there will be the necessity to ensure compliance with all regulatory licensing procedures (i.e. U1, MMP etc) and also to validate the soils prior to importation, subject to the approval of the Local Authority. A number of geotechnical hazards have been identified and highlighted earlier in this report that should be taken into consideration.
Foundations	At this stage traditional foundations may not be appropriate for the proposed care home bungalows due to the strength / groundwater encountered unless foundations are able to be constructed outside the influence of groundwater. It is recommended that all foundations must be deepened through any made ground and locally soft shallow natural soils to terminate within the underlying competent natural soils across the site at a minimum depth of 0.90m below although soft soils and water seepages may mean that deeper foundations will be required in areas. It is anticipated that a minimum nett allowable bearing pressure of 80kN/m² should be available for a foundation solution within the underlying stratum at the founding depth above, although the encountered ground water depth may affect what foundation solutions are available. These recommendations should also be confirmed / designed by your Structural Engineer. As outlined previously; due to the identified soft soils and water seepages; an alternative single foundation solution may be required such as pile or raft etc, in this instance early discussion with your structural engineer and specialist contractor should be sought in order to design the most suitable solution for the site.
Floor Slabs	At this stage ground bearing floor slabs should be appropriate where <u>less</u> than 0.60m of unsuitable soils are encountered (e.g. made ground). Where this is not the case a suspended floor would be a viable alternative, with a clear void if deepening beyond 1.5m due to trees.
Building Near Trees	Cohesive soils were recorded across the site; therefore, foundation designs may need to be adjusted locally in accordance with NHBC Standards (Chapter 4.2). Soils of medium volume change potential should be assumed across the site when calculating foundation depths for such assessments.
Drainage	The site is not considered to be suitable for the use of in situ drainage soakaways due to some cohesive soils encountered around the site and depth to groundwater. The look-and-see initial infiltration rate testing indicated the soils not to be suitable for soakaways, although if soakaways are to be proposed however, then <i>in situ</i> testing in accordance to BRE Digest 365 will need to be undertaken. All soakaway designs should be approved by the relevant statutory authority prior to implementation and must adhere to the standard design and ground setting requirements, upon which your appointed drainage design engineers should advise you. All drainage proposals are subject to <i>in situ</i> testing and should be agreed with the Local Authority prior to finalising designs.

Road Construction	As a standard / generic approach, CBR values of less than 2% can usually be anticipated in made ground, CBR values of between 2% and 5% can be anticipated in natural cohesive soils and values of between 5% and 10% in natural granular soils respectively based on general road construction guidance literature. However, <i>in situ</i> CBR tests should be considered to confirm specific conditions in the areas of proposed road construction. All road construction proposals should be agreed with the Local Authority prior to finalising designs.
Groundwater	Groundwater was encountered within the exploratory investigation works at the site between 1.80 – 3.70m begl, however, the investigation techniques used were rapid and may have masked additional seepages. In view of this dewatering is unlikely to be required at the site at the founding depth, subject to prevailing weather conditions.
Excavations	Generally good stability was noted in the exploratory locations completed across the site for the short time they remained open. The strata should be assumed to be unstable as a precautionary measure. No man entry into unsupported excavations should therefore be allowed without an appropriate risk assessment by the Client and / or their appointed site contractors. Reference to CIRIA report 97 (1983) should be made to establish a suitable means of support or battering of excavation sides.
Sulphate Classification	In accordance with BRE Guidance Special Digest 1 (2005) the characteristic values of water soluble sulphate concentration and pH for soils indicates a site wide Design Sulphate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2z at founding depth, although DS1 – AC3z conditions were noted in deeper soils in parts of the site. Minimum concrete specification should be in accordance with NHBC Standards, Section 3.1.
Contamination	Chemical analysis results have been compared with current relevant guidance and site-specific screening values which indicates that there are localised elevated levels of lead in two locations and asbestos in a single location present in the made ground soils.
Remediation	Remediation works to protect human health are considered necessary for the identified elevated lead and asbestos requiring a remedial strategy to the approval of the Local Authority / NHBC.
Ground Gas and Radon	The confirmatory gas monitoring programme undertaken did not reveal and significantly elevated gas readings, therefore no ground gas precautions will be required at the site. The property is not located in a Radon Affected Area therefore no radon protection measures are required subject to regulatory Authority approval.
Topsoil	Topsoil was encountered during the recent intrusive works, additional topsoil importation may be required for the proposed redevelopment of care home bungalows with private gardens. It is reiterated that the movement, importation and / or exportation of all soils must be undertaken in full compliance with all regulatory licensing procedures (i.e. U1, MMP etc), and validation of soils prior to any importation will be required, subject to the approval of the Local Authority / NHBC.
Further Works	• The Client will need to liaise with appropriately licensed waste management contractors to determine requirements for additional analysis etc. should materials be considered for off-site removal / disposal; • Remedial Strategy to inform the measures required to address the lead and asbestos contamination within the natural soils; • Re-use / importation of soils will need to be covered through a CL:AIRE DoWCoP (MMP).

The executive summary given above is an overview of the key findings and conclusions of the report. There may be other information contained in the body of the report which puts into context the findings of the executive summary. No reliance should be placed on the executive summary until the whole report has been read in full.

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood, Rochdale Urbanwave																									
Date 21/02/2024 File	Designed by JS Checked by																									
Micro Drainage Source Control 2020.1.3																										
<u>ICP SUDS Mean Annual Flood</u> Input <table><tr><td>Return Period (years)</td><td>2</td><td>Soil</td><td>0.450</td></tr><tr><td>Area (ha)</td><td>0.306</td><td>Urban</td><td>0.000</td></tr><tr><td>SAAR (mm)</td><td>1100</td><td>Region Number</td><td>Region 10</td></tr></table> Results 1/s <table><tr><td>QBAR Rural</td><td>2.3</td></tr><tr><td>QBAR Urban</td><td>2.3</td></tr><tr><td>Q2 years</td><td>2.1</td></tr><tr><td>Q1 year</td><td>2.0</td></tr><tr><td>Q30 years</td><td>3.9</td></tr><tr><td>Q100 years</td><td>4.7</td></tr></table>			Return Period (years)	2	Soil	0.450	Area (ha)	0.306	Urban	0.000	SAAR (mm)	1100	Region Number	Region 10	QBAR Rural	2.3	QBAR Urban	2.3	Q2 years	2.1	Q1 year	2.0	Q30 years	3.9	Q100 years	4.7
Return Period (years)	2	Soil	0.450																							
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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...			7 Starkey Street Heywood, Rochdale Urbanwave				
Date 21/03/2024 File Pond revA.SRCX			Designed by JS Checked by				
Micro Drainage			Source Control 2020.1.3				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 313 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	109.868	0.368	0.0	2.3	2.3	31.5	O K
30 min Summer	110.004	0.504	0.0	2.3	2.3	43.1	O K
60 min Summer	110.150	0.650	0.0	2.3	2.3	55.6	O K
120 min Summer	110.280	0.780	0.0	2.3	2.3	66.7	O K
180 min Summer	110.328	0.828	0.0	2.3	2.3	70.8	O K
240 min Summer	110.342	0.842	0.0	2.3	2.3	72.0	O K
360 min Summer	110.346	0.846	0.0	2.3	2.3	72.3	O K
480 min Summer	110.338	0.838	0.0	2.3	2.3	71.6	O K
600 min Summer	110.325	0.825	0.0	2.3	2.3	70.5	O K
720 min Summer	110.309	0.809	0.0	2.3	2.3	69.2	O K
960 min Summer	110.272	0.772	0.0	2.3	2.3	66.0	O K
1440 min Summer	110.190	0.690	0.0	2.3	2.3	59.0	O K
2160 min Summer	110.038	0.538	0.0	2.3	2.3	46.0	O K
2880 min Summer	109.911	0.411	0.0	2.3	2.3	35.2	O K
4320 min Summer	109.747	0.247	0.0	2.3	2.3	21.1	O K
5760 min Summer	109.660	0.160	0.0	2.1	2.1	13.7	O K
7200 min Summer	109.615	0.115	0.0	2.0	2.0	9.9	O K
8640 min Summer	109.593	0.093	0.0	1.8	1.8	8.0	O K
10080 min Summer	109.583	0.083	0.0	1.7	1.7	7.1	O K
15 min Winter	109.914	0.414	0.0	2.3	2.3	35.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	116.548	0.0	33.2	20			
30 min Summer	80.946	0.0	46.2	34			
60 min Summer	53.779	0.0	61.6	64			
120 min Summer	34.414	0.0	78.9	122			
180 min Summer	26.013	0.0	89.4	182			
240 min Summer	21.168	0.0	97.0	240			
360 min Summer	15.844	0.0	109.0	302			
480 min Summer	12.874	0.0	118.1	366			
600 min Summer	10.947	0.0	125.5	434			
720 min Summer	9.582	0.0	131.8	502			
960 min Summer	7.756	0.0	142.2	644			
1440 min Summer	5.742	0.0	158.0	924			
2160 min Summer	4.239	0.0	175.0	1300			
2880 min Summer	3.411	0.0	187.8	1668			
4320 min Summer	2.511	0.0	207.3	2336			
5760 min Summer	2.022	0.0	222.7	3008			
7200 min Summer	1.711	0.0	235.5	3680			
8640 min Summer	1.492	0.0	246.5	4408			
10080 min Summer	1.330	0.0	256.3	5136			
15 min Winter	116.548	0.0	37.2	20			
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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...			7 Starkey Street Heywood, Rochdale Urbanwave				
Date 21/03/2024			Designed by JS				
File Pond revA.SRCX			Checked by				
Micro Drainage			Source Control 2020.1.3				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	110.069	0.569	0.0	2.3	2.3	48.6	O K
60 min Winter	110.236	0.736	0.0	2.3	2.3	62.9	O K
120 min Winter	110.387	0.887	0.0	2.3	2.3	75.8	O K
180 min Winter	110.448	0.948	0.0	2.3	2.3	81.0	O K
240 min Winter	110.471	0.971	0.0	2.3	2.3	83.0	O K
360 min Winter	110.478	0.978	0.0	2.3	2.3	83.6	O K
480 min Winter	110.465	0.965	0.0	2.3	2.3	82.5	O K
600 min Winter	110.447	0.947	0.0	2.3	2.3	81.0	O K
720 min Winter	110.423	0.923	0.0	2.3	2.3	78.9	O K
960 min Winter	110.366	0.866	0.0	2.3	2.3	74.1	O K
1440 min Winter	110.238	0.738	0.0	2.3	2.3	63.1	O K
2160 min Winter	109.996	0.496	0.0	2.3	2.3	42.4	O K
2880 min Winter	109.819	0.319	0.0	2.3	2.3	27.3	O K
4320 min Winter	109.646	0.146	0.0	2.1	2.1	12.5	O K
5760 min Winter	109.592	0.092	0.0	1.8	1.8	7.9	O K
7200 min Winter	109.577	0.077	0.0	1.5	1.5	6.5	O K
8640 min Winter	109.567	0.067	0.0	1.3	1.3	5.7	O K
10080 min Winter	109.561	0.061	0.0	1.2	1.2	5.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	80.946	0.0	51.8	34			
60 min Winter	53.779	0.0	69.0	62			
120 min Winter	34.414	0.0	88.3	120			
180 min Winter	26.013	0.0	100.2	178			
240 min Winter	21.168	0.0	108.7	232			
360 min Winter	15.844	0.0	122.1	338			
480 min Winter	12.874	0.0	132.2	384			
600 min Winter	10.947	0.0	140.5	460			
720 min Winter	9.582	0.0	147.6	540			
960 min Winter	7.756	0.0	159.3	694			
1440 min Winter	5.742	0.0	176.9	998			
2160 min Winter	4.239	0.0	196.1	1384			
2880 min Winter	3.411	0.0	210.4	1708			
4320 min Winter	2.511	0.0	232.2	2336			
5760 min Winter	2.022	0.0	249.5	2944			
7200 min Winter	1.711	0.0	263.8	3672			
8640 min Winter	1.492	0.0	276.1	4400			
10080 min Winter	1.330	0.0	287.1	5120			
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Regus House, Herald Way	7 Starkey Street	
Pegasus Business Park	Heywood, Rochdale	
Castle Donington, Derbyshir...	Urbanwave	
Date 21/03/2024	Designed by JS	
File Pond revA.SRCX	Checked by	
Micro Drainage		Source Control 2020.1.3

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.289	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.153

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.123	4	8	0.030

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood, Rochdale Urbanwave	
Date 21/03/2024 File Pond revA.SRCX	Designed by JS Checked by	
Micro Drainage Source Control 2020.1.3		

Model Details

Storage is Online Cover Level (m) 111.200

Cellular Storage Structure

Invert Level (m) 109.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	90.0	90.0	1.100	0.0	156.0
1.000	90.0	156.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	109.500
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3
Flush-Flo™	0.307	2.3
Kick-Flo®	0.625	1.9
Mean Flow over Head Range	-	2.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

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)	1	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.289	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
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	0.123	4-8	0.030

Total Area Contributing (ha) = 0.153

Total Pipe Volume (m³) = 93.712

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	34.000	0.230	147.8	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	12.700	0.090	141.1	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	18.300	0.130	140.8	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	4.500	0.030	150.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	24.500	0.195	125.6	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	25.300	0.170	148.8	0.011	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	41.96	5.69	111.750	0.013	0.0	0.0	0.0	0.82	14.6	1.5
1.001	41.22	5.94	111.520	0.016	0.0	0.0	0.0	0.84	14.9	1.8
1.002	40.21	6.30	111.430	0.024	0.0	0.0	0.0	0.84	14.9	2.6
1.003	39.96	6.39	111.300	0.030	0.0	0.0	0.0	0.82	14.5	3.2
1.004	38.78	6.85	111.270	0.042	0.0	0.0	0.0	0.90	15.8	4.4
2.000	42.49	5.51	111.750	0.011	0.0	0.0	0.0	0.82	14.5	1.3

Armstrong Stokes & Clayton Ltd		Page 3
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

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)
1	112.450	0.700	Open Manhole	480	1.000	111.750	150				
2	112.450	0.930	Open Manhole	480	1.001	111.520	150	1.000	111.520	150	
3	112.450	1.020	Open Manhole	480	1.002	111.430	150	1.001	111.430	150	
4	112.450	1.150	Open Manhole	480	1.003	111.300	150	1.002	111.300	150	
5	112.450	1.180	Open Manhole	480	1.004	111.270	150	1.003	111.270	150	
6	112.450	0.700	Open Manhole	480	2.000	111.750	150				
7	112.450	0.870	Open Manhole	480	2.001	111.580	150	2.000	111.580	150	
8	112.300	0.800	Open Manhole	480	2.002	111.500	150	2.001	111.500	150	
9	112.300	1.300	Open Manhole	1200	1.005	111.000	225	1.004	111.075	150	
								2.002	111.075	150	
10	112.300	1.600	Open Manhole	1200	1.006	110.700	225	1.005	110.700	225	
11	112.400	2.800	Open Manhole	1200	1.007	109.600	-8	1.006	110.375	225	
12	112.250	0.750	Open Manhole	480	3.000	111.500	100				
13	112.250	0.900	Open Manhole	480	3.001	111.350	150	3.000	111.400	100	
14	112.250	1.750	Open Manhole	480	3.002	110.500	150	3.001	110.500	150	
15	111.200	1.700	Open Manhole	1200	1.008	109.500	150	1.007	109.500	-8	
								3.002	110.350	150	850
C1	111.050	1.650	Open Manhole	1200		OUTFALL		1.008	109.400	150	

No coordinates have been specified, layout information cannot be produced.

Armstrong Stokes & Clayton Ltd		Page 4
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	112.450	111.750	0.550	Open Manhole	480
1.001	o	150	2	112.450	111.520	0.780	Open Manhole	480
1.002	o	150	3	112.450	111.430	0.870	Open Manhole	480
1.003	o	150	4	112.450	111.300	1.000	Open Manhole	480
1.004	o	150	5	112.450	111.270	1.030	Open Manhole	480
2.000	o	150	6	112.450	111.750	0.550	Open Manhole	480
2.001	o	150	7	112.450	111.580	0.720	Open Manhole	480
2.002	o	150	8	112.300	111.500	0.650	Open Manhole	480
1.005	o	225	9	112.300	111.000	1.075	Open Manhole	1200
1.006	o	225	10	112.300	110.700	1.375	Open Manhole	1200
1.007	[]	-8	11	112.400	109.600	1.800	Open Manhole	1200
3.000	o	100	12	112.250	111.500	0.650	Open Manhole	480
3.001	o	150	13	112.250	111.350	0.750	Open Manhole	480
3.002	o	150	14	112.250	110.500	1.600	Open Manhole	480
1.008	o	150	15	111.200	109.500	1.550	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	34.000	147.8	2	112.450	111.520	0.780	Open Manhole	480
1.001	12.700	141.1	3	112.450	111.430	0.870	Open Manhole	480
1.002	18.300	140.8	4	112.450	111.300	1.000	Open Manhole	480
1.003	4.500	150.0	5	112.450	111.270	1.030	Open Manhole	480
1.004	24.500	125.6	9	112.300	111.075	1.075	Open Manhole	1200
2.000	25.300	148.8	7	112.450	111.580	0.720	Open Manhole	480
2.001	7.500	93.8	8	112.300	111.500	0.650	Open Manhole	480
2.002	9.250	21.8	9	112.300	111.075	1.075	Open Manhole	1200
1.005	14.300	47.7	10	112.300	110.700	1.375	Open Manhole	1200
1.006	2.000	6.2	11	112.400	110.375	1.800	Open Manhole	1200
1.007	30.000	300.0	15	111.200	109.500	0.700	Open Manhole	1200
3.000	9.500	95.0	13	112.250	111.400	0.750	Open Manhole	480
3.001	24.000	28.2	14	112.250	110.500	1.600	Open Manhole	480
3.002	6.800	45.3	15	111.200	110.350	0.700	Open Manhole	1200
1.008	2.300	23.0	C1	111.050	109.400	1.500	Open Manhole	1200

Armstrong Stokes & Clayton Ltd		Page 5
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

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)
1.008	C1	111.050	109.400	0.000	1200	0

Armstrong Stokes & Clayton Ltd										Page 1
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					
<u>Existing Network Details for Storm</u>										
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type	
1.000	34.000	0.230	147.8	0.013	5.00	0.600	o	150	Pipe/Conduit	
1.001	12.700	0.090	141.1	0.003	0.00	0.600	o	150	Pipe/Conduit	
1.002	18.300	0.130	140.8	0.008	0.00	0.600	o	150	Pipe/Conduit	
1.003	4.500	0.030	150.0	0.006	0.00	0.600	o	150	Pipe/Conduit	
1.004	24.500	0.195	125.6	0.012	0.00	0.600	o	150	Pipe/Conduit	
2.000	25.300	0.170	148.8	0.011	5.00	0.600	o	150	Pipe/Conduit	
2.001	7.500	0.080	93.8	0.002	0.00	0.600	o	150	Pipe/Conduit	
2.002	9.250	0.425	21.8	0.008	0.00	0.600	o	150	Pipe/Conduit	
1.005	14.300	0.300	47.7	0.009	0.00	0.600	o	225	Pipe/Conduit	
1.006	2.000	0.325	6.2	0.000	0.00	0.600	o	225	Pipe/Conduit	
1.007	30.000	0.100	300.0	0.057	0.00	0.600	[]	-8	Pipe/Conduit	
3.000	9.500	0.100	95.0	0.013	5.00	0.600	o	100	Pipe/Conduit	
3.001	24.000	0.850	28.2	0.006	0.00	0.600	o	150	Pipe/Conduit	
3.002	6.800	0.150	45.3	0.005	0.00	0.600	o	150	Pipe/Conduit	
1.008	2.300	0.100	23.0	0.000	0.00	0.600	o	150	Pipe/Conduit	
PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)	
1.000	1	112.450	111.750	0.550	112.450	111.520	0.780		480	
1.001	2	112.450	111.520	0.780	112.450	111.430	0.870		480	
1.002	3	112.450	111.430	0.870	112.450	111.300	1.000		480	
1.003	4	112.450	111.300	1.000	112.450	111.270	1.030		480	
1.004	5	112.450	111.270	1.030	112.300	111.075	1.075		480	
2.000	6	112.450	111.750	0.550	112.450	111.580	0.720		480	
2.001	7	112.450	111.580	0.720	112.300	111.500	0.650		480	
2.002	8	112.300	111.500	0.650	112.300	111.075	1.075		480	
1.005	9	112.300	111.000	1.075	112.300	110.700	1.375		1200	
1.006	10	112.300	110.700	1.375	112.400	110.375	1.800		1200	
1.007	11	112.400	109.600	1.800	111.200	109.500	0.700		1200	
3.000	12	112.250	111.500	0.650	112.250	111.400	0.750		480	
3.001	13	112.250	111.350	0.750	112.250	110.500	1.600		480	
3.002	14	112.250	110.500	1.600	111.200	110.350	0.700		480	
1.008	15	111.200	109.500	1.550	111.050	109.400	1.500	Hydro-Brake®	1200	
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Armstrong Stokes & Clayton Ltd		Page 2
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \ / open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m ²)
-8	[]	3000	1000	90.0		1.500	3.000

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Armstrong Stokes & Clayton Ltd		Page 3
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

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)
1	112.450	0.700	Open Manhole	480	1.000	111.750	150				
2	112.450	0.930	Open Manhole	480	1.001	111.520	150	1.000	111.520	150	
3	112.450	1.020	Open Manhole	480	1.002	111.430	150	1.001	111.430	150	
4	112.450	1.150	Open Manhole	480	1.003	111.300	150	1.002	111.300	150	
5	112.450	1.180	Open Manhole	480	1.004	111.270	150	1.003	111.270	150	
6	112.450	0.700	Open Manhole	480	2.000	111.750	150				
7	112.450	0.870	Open Manhole	480	2.001	111.580	150	2.000	111.580	150	
8	112.300	0.800	Open Manhole	480	2.002	111.500	150	2.001	111.500	150	
9	112.300	1.300	Open Manhole	1200	1.005	111.000	225	1.004	111.075	150	
								2.002	111.075	150	
10	112.300	1.600	Open Manhole	1200	1.006	110.700	225	1.005	110.700	225	
11	112.400	2.800	Open Manhole	1200	1.007	109.600	-8	1.006	110.375	225	
12	112.250	0.750	Open Manhole	480	3.000	111.500	100				
13	112.250	0.900	Open Manhole	480	3.001	111.350	150	3.000	111.400	100	
14	112.250	1.750	Open Manhole	480	3.002	110.500	150	3.001	110.500	150	
15	111.200	1.700	Open Manhole	1200	1.008	109.500	150	1.007	109.500	-8	
								3.002	110.350	150	850
C1	111.050	1.650	Open Manhole	1200		OUTFALL		1.008	109.400	150	

No coordinates have been specified, layout information cannot be produced.

Armstrong Stokes & Clayton Ltd		Page 4
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Network 2020.1.3

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	112.450	111.750	0.550	Open Manhole	480
1.001	o	150	2	112.450	111.520	0.780	Open Manhole	480
1.002	o	150	3	112.450	111.430	0.870	Open Manhole	480
1.003	o	150	4	112.450	111.300	1.000	Open Manhole	480
1.004	o	150	5	112.450	111.270	1.030	Open Manhole	480
2.000	o	150	6	112.450	111.750	0.550	Open Manhole	480
2.001	o	150	7	112.450	111.580	0.720	Open Manhole	480
2.002	o	150	8	112.300	111.500	0.650	Open Manhole	480
1.005	o	225	9	112.300	111.000	1.075	Open Manhole	1200
1.006	o	225	10	112.300	110.700	1.375	Open Manhole	1200
1.007	[]	-8	11	112.400	109.600	1.800	Open Manhole	1200
3.000	o	100	12	112.250	111.500	0.650	Open Manhole	480
3.001	o	150	13	112.250	111.350	0.750	Open Manhole	480
3.002	o	150	14	112.250	110.500	1.600	Open Manhole	480
1.008	o	150	15	111.200	109.500	1.550	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	34.000	147.8	2	112.450	111.520	0.780	Open Manhole	480
1.001	12.700	141.1	3	112.450	111.430	0.870	Open Manhole	480
1.002	18.300	140.8	4	112.450	111.300	1.000	Open Manhole	480
1.003	4.500	150.0	5	112.450	111.270	1.030	Open Manhole	480
1.004	24.500	125.6	9	112.300	111.075	1.075	Open Manhole	1200
2.000	25.300	148.8	7	112.450	111.580	0.720	Open Manhole	480
2.001	7.500	93.8	8	112.300	111.500	0.650	Open Manhole	480
2.002	9.250	21.8	9	112.300	111.075	1.075	Open Manhole	1200
1.005	14.300	47.7	10	112.300	110.700	1.375	Open Manhole	1200
1.006	2.000	6.2	11	112.400	110.375	1.800	Open Manhole	1200
1.007	30.000	300.0	15	111.200	109.500	0.700	Open Manhole	1200
3.000	9.500	95.0	13	112.250	111.400	0.750	Open Manhole	480
3.001	24.000	28.2	14	112.250	110.500	1.600	Open Manhole	480
3.002	6.800	45.3	15	111.200	110.350	0.700	Open Manhole	1200
1.008	2.300	23.0	C1	111.050	109.400	1.500	Open Manhole	1200

Armstrong Stokes & Clayton Ltd		Page 5
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	C1 111.050	109.400	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 * 10m ³ /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	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	0.289		

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Armstrong Stokes & Clayton Ltd		Page 6
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 15, DS/PN: 1.008, Volume (m³): 88.4

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	109.500
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3
Flush-Flo™	0.307	2.3
Kick-Flo®	0.625	1.9
Mean Flow over Head Range	-	2.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Armstrong Stokes & Clayton Ltd		Page 7
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Manhole Headloss for Storm

PN	US/MH	US/MH
	Name	Headloss
1.000	1	0.500
1.001	2	0.500
1.002	3	0.500
1.003	4	0.500
1.004	5	0.500
2.000	6	0.500
2.001	7	0.500
2.002	8	0.500
1.005	9	0.500
1.006	10	0.500
1.007	11	0.500
3.000	12	0.500
3.001	13	0.500
3.002	14	0.500
1.008	15	0.500

Armstrong Stokes & Clayton Ltd		Page 10
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.000 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 11
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.001 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 12
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.002 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 13
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.003 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 14
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.004 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 15
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 2.000 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 16
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 2.001 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 17
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 2.002 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 18
Regus House, Herald Way	7 Starkey Street	
Pegasus Business Park	Heywood	
Castle Donington, Derbyshir...	Rochdale	
Date 16/04/2024	Designed by JS	
File Storm revA.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.005 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd		Page 19
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 1.006 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd				Page 20	
Regus House, Herald Way		7 Starkey Street			
Pegasus Business Park		Heywood			
Castle Donington, Derbyshir...		Rochdale			
Date 16/04/2024		Designed by JS			
File Storm revA.MDX		Checked by			
Micro Drainage		Network 2020.1.3			

Rainfall Hyetograph for 240 minute 100 year Winter I+40%
for Pipe 1.007 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
4	1.505	52	10.510	100	40.578	148	36.828	196	9.886
8	4.326	56	11.359	104	43.772	152	33.463	200	9.578
12	6.398	60	12.487	108	46.750	156	30.149	204	9.435
16	7.929	64	14.143	112	49.674	160	26.573	208	9.413
20	8.741	68	15.967	116	51.748	164	23.599	212	9.433
24	9.203	72	18.089	120	53.244	168	20.848	216	9.408
28	9.408	76	20.848	124	53.244	172	18.089	220	9.203
32	9.433	80	23.599	128	51.748	176	15.967	224	8.741
36	9.413	84	26.573	132	49.674	180	14.143	228	7.929
40	9.435	88	30.149	136	46.750	184	12.487	232	6.398
44	9.578	92	33.463	140	43.772	188	11.359	236	4.326
48	9.886	96	36.828	144	40.578	192	10.510	240	1.505

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Armstrong Stokes & Clayton Ltd				Page 21	
Regus House, Herald Way		7 Starkey Street			
Pegasus Business Park		Heywood			
Castle Donington, Derbyshir...		Rochdale			
Date 16/04/2024		Designed by JS			
File Storm revA.MDX		Checked by			
Micro Drainage		Network 2020.1.3			

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 3.000 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

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Armstrong Stokes & Clayton Ltd		Page 22
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage	Network 2020.1.3	

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 3.001 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

Armstrong Stokes & Clayton Ltd				Page 23	
Regus House, Herald Way		7 Starkey Street			
Pegasus Business Park		Heywood			
Castle Donington, Derbyshir...		Rochdale			
Date 16/04/2024		Designed by JS			
File Storm revA.MDX		Checked by			
Micro Drainage		Network 2020.1.3			

Rainfall Hyetograph for 30 minute 100 year Summer I+40%
for Pipe 3.002 (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	26.550	7	38.854	13	155.902	19	108.711	25	35.454
2	27.926	8	43.063	14	212.726	20	77.546	26	32.783
3	29.302	9	48.972	15	286.063	21	59.738	27	30.597
4	30.598	10	59.738	16	286.063	22	48.973	28	29.303
5	32.783	11	77.546	17	212.726	23	43.063	29	27.926
6	35.454	12	108.711	18	155.902	24	38.854	30	26.550

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Regus House, Herald Way		7 Starkey Street																																																																																																																																					
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<u>Rainfall Hyetograph for 240 minute 100 year Winter I+40%</u> <u>for Pipe 1.008 (Storm)</u> <table><tr><th>Time (mins)</th><th>Rain (mm/hr)</th><th>Time (mins)</th><th>Rain (mm/hr)</th><th>Time (mins)</th><th>Rain (mm/hr)</th><th>Time (mins)</th><th>Rain (mm/hr)</th><th>Time (mins)</th><th>Rain (mm/hr)</th></tr><tr><td>4</td><td>1.505</td><td>52</td><td>10.510</td><td>100</td><td>40.578</td><td>148</td><td>36.828</td><td>196</td><td>9.886</td></tr><tr><td>8</td><td>4.326</td><td>56</td><td>11.359</td><td>104</td><td>43.772</td><td>152</td><td>33.463</td><td>200</td><td>9.578</td></tr><tr><td>12</td><td>6.398</td><td>60</td><td>12.487</td><td>108</td><td>46.750</td><td>156</td><td>30.149</td><td>204</td><td>9.435</td></tr><tr><td>16</td><td>7.929</td><td>64</td><td>14.143</td><td>112</td><td>49.674</td><td>160</td><td>26.573</td><td>208</td><td>9.413</td></tr><tr><td>20</td><td>8.741</td><td>68</td><td>15.967</td><td>116</td><td>51.748</td><td>164</td><td>23.599</td><td>212</td><td>9.433</td></tr><tr><td>24</td><td>9.203</td><td>72</td><td>18.089</td><td>120</td><td>53.244</td><td>168</td><td>20.848</td><td>216</td><td>9.408</td></tr><tr><td>28</td><td>9.408</td><td>76</td><td>20.848</td><td>124</td><td>53.244</td><td>172</td><td>18.089</td><td>220</td><td>9.203</td></tr><tr><td>32</td><td>9.433</td><td>80</td><td>23.599</td><td>128</td><td>51.748</td><td>176</td><td>15.967</td><td>224</td><td>8.741</td></tr><tr><td>36</td><td>9.413</td><td>84</td><td>26.573</td><td>132</td><td>49.674</td><td>180</td><td>14.143</td><td>228</td><td>7.929</td></tr><tr><td>40</td><td>9.435</td><td>88</td><td>30.149</td><td>136</td><td>46.750</td><td>184</td><td>12.487</td><td>232</td><td>6.398</td></tr><tr><td>44</td><td>9.578</td><td>92</td><td>33.463</td><td>140</td><td>43.772</td><td>188</td><td>11.359</td><td>236</td><td>4.326</td></tr><tr><td>48</td><td>9.886</td><td>96</td><td>36.828</td><td>144</td><td>40.578</td><td>192</td><td>10.510</td><td>240</td><td>1.505</td></tr></table>						Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	4	1.505	52	10.510	100	40.578	148	36.828	196	9.886	8	4.326	56	11.359	104	43.772	152	33.463	200	9.578	12	6.398	60	12.487	108	46.750	156	30.149	204	9.435	16	7.929	64	14.143	112	49.674	160	26.573	208	9.413	20	8.741	68	15.967	116	51.748	164	23.599	212	9.433	24	9.203	72	18.089	120	53.244	168	20.848	216	9.408	28	9.408	76	20.848	124	53.244	172	18.089	220	9.203	32	9.433	80	23.599	128	51.748	176	15.967	224	8.741	36	9.413	84	26.573	132	49.674	180	14.143	228	7.929	40	9.435	88	30.149	136	46.750	184	12.487	232	6.398	44	9.578	92	33.463	140	43.772	188	11.359	236	4.326	48	9.886	96	36.828	144	40.578	192	10.510	240	1.505
Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)																																																																																																																														
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Armstrong Stokes & Clayton Ltd		Page 1
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
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	0
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	0.289		

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Armstrong Stokes & Clayton Ltd							Page 2																																																																																																																																																																										
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale																																																																																																																																																																												
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Climate Change (%)		0, 0, 0, 40																																																																																																																																																																															
<table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Storm Rank</th> <th>Water</th> <th>Surcharged</th> <th>Flooded</th> <th colspan="2">Half Drain</th> <th>Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Volume (m³)</th> <th>Flow / Cap.</th> <th>Overflow (l/s)</th> <th>Time (mins)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>1</td><td>22</td><td>111.781</td><td>-0.119</td><td>0.000</td><td>0.10</td><td></td><td>1.4</td><td>OK</td></tr> <tr><td>1.001</td><td>2</td><td>22</td><td>111.555</td><td>-0.115</td><td>0.000</td><td>0.12</td><td></td><td>1.6</td><td>OK</td></tr> <tr><td>1.002</td><td>3</td><td>23</td><td>111.471</td><td>-0.109</td><td>0.000</td><td>0.17</td><td></td><td>2.4</td><td>OK</td></tr> <tr><td>1.003</td><td>4</td><td>23</td><td>111.353</td><td>-0.097</td><td>0.000</td><td>0.27</td><td></td><td>2.9</td><td>OK</td></tr> <tr><td>1.004</td><td>5</td><td>23</td><td>111.322</td><td>-0.098</td><td>0.000</td><td>0.26</td><td></td><td>4.0</td><td>OK</td></tr> <tr><td>2.000</td><td>6</td><td>22</td><td>111.779</td><td>-0.121</td><td>0.000</td><td>0.08</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>2.001</td><td>7</td><td>22</td><td>111.610</td><td>-0.120</td><td>0.000</td><td>0.08</td><td></td><td>1.3</td><td>OK</td></tr> <tr><td>2.002</td><td>8</td><td>23</td><td>111.524</td><td>-0.126</td><td>0.000</td><td>0.06</td><td></td><td>2.1</td><td>OK</td></tr> <tr><td>1.005</td><td>9</td><td>23</td><td>111.048</td><td>-0.177</td><td>0.000</td><td>0.10</td><td></td><td>6.8</td><td>OK</td></tr> <tr><td>1.006</td><td>10</td><td>23</td><td>110.744</td><td>-0.181</td><td>0.000</td><td>0.08</td><td></td><td>6.8</td><td>OK</td></tr> <tr><td>1.007</td><td>11</td><td>76</td><td>109.684</td><td>-0.916</td><td>0.000</td><td>0.00</td><td></td><td>11.7</td><td>OK</td></tr> <tr><td>3.000</td><td>12</td><td>22</td><td>111.533</td><td>-0.067</td><td>0.000</td><td>0.24</td><td></td><td>1.4</td><td>OK</td></tr> <tr><td>3.001</td><td>13</td><td>22</td><td>111.374</td><td>-0.126</td><td>0.000</td><td>0.06</td><td></td><td>2.0</td><td>OK</td></tr> <tr><td>3.002</td><td>14</td><td>23</td><td>110.533</td><td>-0.117</td><td>0.000</td><td>0.11</td><td></td><td>2.4</td><td>OK</td></tr> <tr><td>1.008</td><td>15</td><td>76</td><td>109.684</td><td>0.034</td><td>0.000</td><td>0.11</td><td></td><td>2.2</td><td>SURCHARGED</td></tr> </tbody> </table>											PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	1.000	1	22	111.781	-0.119	0.000	0.10		1.4	OK	1.001	2	22	111.555	-0.115	0.000	0.12		1.6	OK	1.002	3	23	111.471	-0.109	0.000	0.17		2.4	OK	1.003	4	23	111.353	-0.097	0.000	0.27		2.9	OK	1.004	5	23	111.322	-0.098	0.000	0.26		4.0	OK	2.000	6	22	111.779	-0.121	0.000	0.08		1.2	OK	2.001	7	22	111.610	-0.120	0.000	0.08		1.3	OK	2.002	8	23	111.524	-0.126	0.000	0.06		2.1	OK	1.005	9	23	111.048	-0.177	0.000	0.10		6.8	OK	1.006	10	23	110.744	-0.181	0.000	0.08		6.8	OK	1.007	11	76	109.684	-0.916	0.000	0.00		11.7	OK	3.000	12	22	111.533	-0.067	0.000	0.24		1.4	OK	3.001	13	22	111.374	-0.126	0.000	0.06		2.0	OK	3.002	14	23	110.533	-0.117	0.000	0.11		2.4	OK	1.008	15	76	109.684	0.034	0.000	0.11		2.2	SURCHARGED
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Armstrong Stokes & Clayton Ltd							Page 3			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 60 minute 1 year Summer I+0% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	29	111.778	-0.122	0.000	0.08		1.1	OK
1.001	2	30	111.551	-0.119	0.000	0.10		1.3	OK
1.002	3	30	111.467	-0.113	0.000	0.14		1.9	OK
1.003	4	30	111.347	-0.103	0.000	0.22		2.4	OK
1.004	5	30	111.318	-0.102	0.000	0.22		3.3	OK
2.000	6	29	111.775	-0.125	0.000	0.06		0.9	OK
2.001	7	30	111.606	-0.124	0.000	0.07		1.1	OK
2.002	8	30	111.522	-0.128	0.000	0.05		1.7	OK
1.005	9	30	111.044	-0.181	0.000	0.09		5.7	OK
1.006	10	30	110.739	-0.186	0.000	0.07		5.6	OK
1.007	11	72	109.699	-0.901	0.000	0.00		9.9	OK
3.000	12	29	111.529	-0.071	0.000	0.19		1.1	OK
3.001	13	30	111.371	-0.129	0.000	0.05		1.5	OK
3.002	14	30	110.530	-0.120	0.000	0.09		1.9	OK
1.008	15	72	109.700	0.050	0.000	0.11		2.2	SURCHARGED

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Page 4

Regus House, Herald Way

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Micro Drainage

Network 2020.1.3

Summary Wizard of 120 minute 1 year Summer I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Cap.	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)	(l/s)	(mins)	(l/s)	
1.000	1	40	111.772	-0.128	0.000	0.05		0.8	OK
1.001	2	40	111.546	-0.124	0.000	0.07		0.9	OK
1.002	3	40	111.462	-0.118	0.000	0.10		1.4	OK
1.003	4	40	111.340	-0.110	0.000	0.16		1.7	OK
1.004	5	40	111.310	-0.110	0.000	0.16		2.4	OK
2.000	6	40	111.771	-0.129	0.000	0.05		0.6	OK
2.001	7	40	111.601	-0.129	0.000	0.05		0.8	OK
2.002	8	40	111.518	-0.132	0.000	0.04		1.2	OK
1.005	9	40	111.037	-0.188	0.000	0.06		4.1	OK
1.006	10	40	110.733	-0.192	0.000	0.05		4.1	OK
1.007	11	66	109.706	-0.894	0.000	0.00		7.3	OK
3.000	12	40	111.524	-0.076	0.000	0.13		0.8	OK
3.001	13	40	111.368	-0.132	0.000	0.03		1.1	OK
3.002	14	40	110.524	-0.126	0.000	0.06		1.4	OK
1.008	15	66	109.706	0.056	0.000	0.11		2.2	SURCHARGED

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Page 5



Summary Wizard of 180 minute 1 year Summer I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	46	111.770	-0.130	0.000	0.04		0.6	OK
1.001	2	46	111.543	-0.127	0.000	0.06		0.8	OK
1.002	3	46	111.459	-0.121	0.000	0.08		1.1	OK
1.003	4	46	111.336	-0.114	0.000	0.13		1.4	OK
1.004	5	47	111.306	-0.114	0.000	0.13		2.0	OK
2.000	6	46	111.769	-0.131	0.000	0.04		0.5	OK
2.001	7	46	111.599	-0.131	0.000	0.04		0.6	OK
2.002	8	46	111.517	-0.133	0.000	0.03		1.0	OK
1.005	9	47	111.033	-0.192	0.000	0.05		3.4	OK
1.006	10	47	110.730	-0.195	0.000	0.04		3.4	OK
1.007	11	69	109.705	-0.895	0.000	0.00		6.0	OK
3.000	12	46	111.522	-0.078	0.000	0.11		0.6	OK
3.001	13	46	111.367	-0.133	0.000	0.03		0.9	OK
3.002	14	46	110.522	-0.128	0.000	0.05		1.2	OK
1.008	15	68	109.705	0.055	0.000	0.11		2.2	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 6			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
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Micro Drainage				Network 2020.1.3						

Summary Wizard of 240 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	54	111.769	-0.131	0.000	0.04		0.5	OK
1.001	2	54	111.541	-0.129	0.000	0.05		0.7	OK
1.002	3	54	111.456	-0.124	0.000	0.07		1.0	OK
1.003	4	54	111.334	-0.116	0.000	0.11		1.2	OK
1.004	5	54	111.304	-0.116	0.000	0.11		1.7	OK
2.000	6	54	111.768	-0.132	0.000	0.03		0.5	OK
2.001	7	54	111.598	-0.132	0.000	0.03		0.5	OK
2.002	8	54	111.516	-0.134	0.000	0.03		0.9	OK
1.005	9	54	111.030	-0.195	0.000	0.04		2.9	OK
1.006	10	54	110.728	-0.197	0.000	0.04		2.9	OK
1.007	11	70	109.701	-0.899	0.000	0.00		5.2	OK
3.000	12	54	111.520	-0.080	0.000	0.09		0.5	OK
3.001	13	54	111.366	-0.134	0.000	0.02		0.8	OK
3.002	14	54	110.520	-0.130	0.000	0.04		1.0	OK
1.008	15	70	109.701	0.051	0.000	0.11		2.2	SURCHARGED

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Summary Wizard of 360 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	63	111.767	-0.133	0.000	0.03		0.4	OK
1.001	2	63	111.539	-0.131	0.000	0.04		0.5	OK
1.002	3	63	111.453	-0.127	0.000	0.05		0.8	OK
1.003	4	63	111.330	-0.120	0.000	0.09		1.0	OK
1.004	5	63	111.300	-0.120	0.000	0.09		1.3	OK
2.000	6	63	111.766	-0.134	0.000	0.03		0.4	OK
2.001	7	63	111.596	-0.134	0.000	0.03		0.4	OK
2.002	8	63	111.514	-0.136	0.000	0.02		0.7	OK
1.005	9	63	111.027	-0.198	0.000	0.03		2.3	OK
1.006	10	63	110.725	-0.200	0.000	0.03		2.3	OK
1.007	11	75	109.686	-0.914	0.000	0.00		4.1	OK
3.000	12	63	111.518	-0.082	0.000	0.07		0.4	OK
3.001	13	63	111.364	-0.136	0.000	0.02		0.6	OK
3.002	14	63	110.518	-0.132	0.000	0.03		0.8	OK
1.008	15	75	109.686	0.036	0.000	0.11		2.2	SURCHARGED

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Page 8

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Castle Donington, Derbyshire...

7 Starkey Street
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Date 16/04/2024
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Micro Drainage

Network 2020.1.3

Micro Drainage

Summary Wizard of 480 minute 1 year Summer I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

				Water	Surcharged	Flooded		Half Drain	Pipe	
	US/MH	Storm	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Rank	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
1.000	1	69	111.766	-0.134	0.000	0.02			0.3	OK
1.001	2	69	111.537	-0.133	0.000	0.03			0.4	OK
1.002	3	69	111.450	-0.130	0.000	0.05			0.6	OK
1.003	4	69	111.327	-0.123	0.000	0.07			0.8	OK
1.004	5	69	111.297	-0.123	0.000	0.07			1.1	OK
2.000	6	69	111.765	-0.135	0.000	0.02			0.3	OK
2.001	7	69	111.595	-0.135	0.000	0.02			0.3	OK
2.002	8	69	111.512	-0.138	0.000	0.02			0.6	OK
1.005	9	69	111.025	-0.200	0.000	0.03			1.9	OK
1.006	10	69	110.723	-0.202	0.000	0.02			1.9	OK
1.007	11	81	109.672	-0.928	0.000	0.00			3.4	OK
3.000	12	69	111.516	-0.084	0.000	0.06			0.3	OK
3.001	13	69	111.361	-0.139	0.000	0.02			0.5	OK
3.002	14	69	110.517	-0.133	0.000	0.03			0.6	OK
1.008	15	81	109.672	0.022	0.000	0.11			2.2	SURCHARGED

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Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
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Summary Wizard of 600 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Pipe		Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
1.000	1	76	111.765	-0.135	0.000	0.02			0.3	OK	
1.001	2	76	111.536	-0.134	0.000	0.03			0.4	OK	
1.002	3	76	111.449	-0.131	0.000	0.04			0.6	OK	
1.003	4	76	111.325	-0.125	0.000	0.06			0.7	OK	
1.004	5	76	111.295	-0.125	0.000	0.06			1.0	OK	
2.000	6	76	111.763	-0.137	0.000	0.02			0.3	OK	
2.001	7	76	111.594	-0.136	0.000	0.02			0.3	OK	
2.002	8	76	111.510	-0.140	0.000	0.01			0.5	OK	
1.005	9	76	111.024	-0.201	0.000	0.03			1.7	OK	
1.006	10	76	110.722	-0.203	0.000	0.02			1.7	OK	
1.007	11	83	109.658	-0.942	0.000	0.00			3.0	OK	
3.000	12	76	111.515	-0.085	0.000	0.05			0.3	OK	
3.001	13	76	111.360	-0.140	0.000	0.01			0.4	OK	
3.002	14	76	110.516	-0.134	0.000	0.02			0.6	OK	
1.008	15	83	109.659	0.009	0.000	0.11			2.1	SURCHARGED	

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Date 16/04/2024 File Storm revA.MDX			Designed by JS Checked by				
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Summary Wizard of 2160 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	105	111.757	-0.143	0.000	0.01		0.1	OK
1.001	2	105	111.529	-0.141	0.000	0.01		0.2	OK
1.002	3	105	111.443	-0.137	0.000	0.02		0.3	OK
1.003	4	105	111.317	-0.133	0.000	0.03		0.3	OK
1.004	5	105	111.287	-0.133	0.000	0.03		0.4	OK
2.000	6	105	111.756	-0.144	0.000	0.01		0.1	OK
2.001	7	105	111.586	-0.144	0.000	0.01		0.1	OK
2.002	8	105	111.505	-0.145	0.000	0.01		0.2	OK
1.005	9	105	111.012	-0.213	0.000	0.01		0.8	OK
1.006	10	105	110.710	-0.215	0.000	0.01		0.8	OK
1.007	11	142	109.601	-0.999	0.000	0.00		1.4	OK
3.000	12	105	111.510	-0.090	0.000	0.02		0.1	OK
3.001	13	105	111.354	-0.146	0.000	0.01		0.2	OK
3.002	14	105	110.508	-0.142	0.000	0.01		0.3	OK
1.008	15	105	109.579	-0.071	0.000	0.08		1.6	OK

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 4320 minute 1 year Summer I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	121	111.755	-0.145	0.000	0.01		0.1	OK
1.001	2	121	111.526	-0.144	0.000	0.01		0.1	OK
1.002	3	121	111.438	-0.142	0.000	0.01		0.2	OK
1.003	4	121	111.314	-0.136	0.000	0.02		0.2	OK
1.004	5	121	111.284	-0.136	0.000	0.02		0.3	OK
2.000	6	121	111.754	-0.146	0.000	0.01		0.1	OK
2.001	7	121	111.584	-0.146	0.000	0.01		0.1	OK
2.002	8	121	111.503	-0.147	0.000	0.00		0.1	OK
1.005	9	121	111.008	-0.217	0.000	0.01		0.5	OK
1.006	10	121	110.707	-0.218	0.000	0.01		0.5	OK
1.007	11	120	109.601	-0.999	0.000	0.00		0.9	OK
3.000	12	121	111.507	-0.093	0.000	0.02		0.1	OK
3.001	13	121	111.353	-0.147	0.000	0.00		0.1	OK
3.002	14	121	110.505	-0.145	0.000	0.01		0.2	OK
1.008	15	121	109.555	-0.095	0.000	0.05		1.0	OK

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
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Summary Wizard of 5760 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	126	111.754	-0.146	0.000	0.01		0.1	OK
1.001	2	126	111.525	-0.145	0.000	0.01		0.1	OK
1.002	3	126	111.437	-0.143	0.000	0.01		0.1	OK
1.003	4	126	111.311	-0.139	0.000	0.02		0.2	OK
1.004	5	126	111.281	-0.139	0.000	0.02		0.2	OK
2.000	6	126	111.753	-0.147	0.000	0.00		0.1	OK
2.001	7	126	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	126	111.503	-0.147	0.000	0.00		0.1	OK
1.005	9	126	111.007	-0.218	0.000	0.01		0.4	OK
1.006	10	126	110.705	-0.220	0.000	0.01		0.4	OK
1.007	11	140	109.601	-0.999	0.000	0.00		0.7	OK
3.000	12	126	111.506	-0.094	0.000	0.01		0.1	OK
3.001	13	126	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	126	110.504	-0.146	0.000	0.01		0.1	OK
1.008	15	126	109.549	-0.101	0.000	0.04		0.9	OK

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
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Summary Wizard of 7200 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	132	111.753	-0.147	0.000	0.00		0.1	OK
1.001	2	132	111.524	-0.146	0.000	0.01		0.1	OK
1.002	3	132	111.436	-0.144	0.000	0.01		0.1	OK
1.003	4	132	111.310	-0.140	0.000	0.01		0.1	OK
1.004	5	132	111.280	-0.140	0.000	0.01		0.2	OK
2.000	6	132	111.753	-0.147	0.000	0.00		0.1	OK
2.001	7	132	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	132	111.502	-0.148	0.000	0.00		0.1	OK
1.005	9	132	111.006	-0.219	0.000	0.01		0.4	OK
1.006	10	132	110.705	-0.220	0.000	0.00		0.4	OK
1.007	11	139	109.601	-0.999	0.000	0.00		0.6	OK
3.000	12	132	111.505	-0.095	0.000	0.01		0.1	OK
3.001	13	132	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	132	110.504	-0.146	0.000	0.01		0.1	OK
1.008	15	132	109.545	-0.105	0.000	0.04		0.8	OK

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...			7 Starkey Street Heywood Rochdale				
Date 16/04/2024 File Storm revA.MDX			Designed by JS Checked by				
Micro Drainage			Network 2020.1.3				

Summary Wizard of 8640 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080	Summer and Winter
Return Period(s) (years)	1, 2, 30, 100	
Climate Change (%)	0, 0, 0, 40	

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	136	111.753	-0.147	0.000	0.00		0.1	OK
1.001	2	136	111.524	-0.146	0.000	0.01		0.1	OK
1.002	3	136	111.435	-0.145	0.000	0.01		0.1	OK
1.003	4	136	111.309	-0.141	0.000	0.01		0.1	OK
1.004	5	136	111.279	-0.141	0.000	0.01		0.2	OK
2.000	6	136	111.752	-0.148	0.000	0.00		0.0	OK
2.001	7	136	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	136	111.502	-0.148	0.000	0.00		0.1	OK
1.005	9	136	111.005	-0.220	0.000	0.00		0.3	OK
1.006	10	136	110.704	-0.221	0.000	0.00		0.3	OK
1.007	11	138	109.601	-0.999	0.000	0.00		0.6	OK
3.000	12	136	111.505	-0.095	0.000	0.01		0.1	OK
3.001	13	136	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	136	110.503	-0.147	0.000	0.00		0.1	OK
1.008	15	136	109.542	-0.108	0.000	0.03		0.7	OK

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Armstrong Stokes & Clayton Ltd							Page 19		
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
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Micro Drainage				Network 2020.1.3					

Summary Wizard of 10080 minute 1 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	139	111.753	-0.147	0.000	0.00		0.1	OK
1.001	2	139	111.523	-0.147	0.000	0.00		0.1	OK
1.002	3	139	111.435	-0.145	0.000	0.01		0.1	OK
1.003	4	139	111.308	-0.142	0.000	0.01		0.1	OK
1.004	5	139	111.278	-0.142	0.000	0.01		0.2	OK
2.000	6	139	111.752	-0.148	0.000	0.00		0.0	OK
2.001	7	139	111.582	-0.148	0.000	0.00		0.1	OK
2.002	8	139	111.502	-0.148	0.000	0.00		0.1	OK
1.005	9	139	111.005	-0.220	0.000	0.00		0.3	OK
1.006	10	139	110.704	-0.221	0.000	0.00		0.3	OK
1.007	11	137	109.601	-0.999	0.000	0.00		0.5	OK
3.000	12	139	111.504	-0.096	0.000	0.01		0.1	OK
3.001	13	139	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	139	110.503	-0.147	0.000	0.00		0.1	OK
1.008	15	139	109.539	-0.111	0.000	0.03		0.6	OK

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Date 16/04/2024				Designed by JS						
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Summary Wizard of 30 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	14	111.785	-0.115	0.000	0.13		1.8	OK
1.001	2	15	111.560	-0.110	0.000	0.16		2.1	OK
1.002	3	15	111.478	-0.102	0.000	0.22		3.1	OK
1.003	4	15	111.361	-0.089	0.000	0.35		3.8	OK
1.004	5	17	111.331	-0.089	0.000	0.34		5.1	OK
2.000	6	14	111.783	-0.117	0.000	0.11		1.5	OK
2.001	7	15	111.613	-0.117	0.000	0.11		1.7	OK
2.002	8	15	111.528	-0.122	0.000	0.08		2.7	OK
1.005	9	17	111.055	-0.170	0.000	0.13		8.8	OK
1.006	10	17	110.749	-0.176	0.000	0.11		8.8	OK
1.007	11	62	109.719	-0.881	0.000	0.00		15.1	OK
3.000	12	14	111.538	-0.062	0.000	0.31		1.8	OK
3.001	13	15	111.378	-0.122	0.000	0.08		2.5	OK
3.002	14	15	110.537	-0.113	0.000	0.14		3.1	OK
1.008	15	62	109.719	0.069	0.000	0.11		2.3	SURCHARGED

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Summary Wizard of 60 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	21	111.781	-0.119	0.000	0.10		1.3	OK
1.001	2	21	111.555	-0.115	0.000	0.12		1.6	OK
1.002	3	21	111.472	-0.108	0.000	0.18		2.4	OK
1.003	4	22	111.354	-0.096	0.000	0.28		3.0	OK
1.004	5	22	111.324	-0.096	0.000	0.28		4.2	OK
2.000	6	21	111.779	-0.121	0.000	0.08		1.1	OK
2.001	7	21	111.610	-0.120	0.000	0.08		1.3	OK
2.002	8	21	111.525	-0.125	0.000	0.06		2.1	OK
1.005	9	22	111.049	-0.176	0.000	0.11		7.2	OK
1.006	10	22	110.745	-0.180	0.000	0.09		7.2	OK
1.007	11	56	109.736	-0.864	0.000	0.00		12.6	OK
3.000	12	21	111.533	-0.067	0.000	0.24		1.4	OK
3.001	13	21	111.374	-0.126	0.000	0.06		1.9	OK
3.002	14	21	110.533	-0.117	0.000	0.11		2.4	OK
1.008	15	57	109.736	0.086	0.000	0.11		2.3	SURCHARGED

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
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Summary Wizard of 120 minute 2 year Summer I+0% 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	0.000
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	0
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

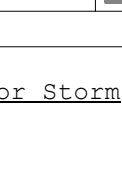
Rainfall Model	FSR	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	33	111.775	-0.125	0.000	0.07		0.9	OK
1.001	2	33	111.550	-0.120	0.000	0.08		1.2	OK
1.002	3	33	111.465	-0.115	0.000	0.12		1.7	OK
1.003	4	33	111.346	-0.104	0.000	0.20		2.2	OK
1.004	5	33	111.316	-0.104	0.000	0.20		3.0	OK
2.000	6	33	111.773	-0.127	0.000	0.06		0.8	OK
2.001	7	33	111.604	-0.126	0.000	0.06		0.9	OK
2.002	8	33	111.520	-0.130	0.000	0.05		1.5	OK
1.005	9	33	111.042	-0.183	0.000	0.08		5.2	OK
1.006	10	33	110.737	-0.188	0.000	0.06		5.1	OK
1.007	11	53	109.743	-0.857	0.000	0.00		9.1	OK
3.000	12	33	111.527	-0.073	0.000	0.17		0.9	OK
3.001	13	33	111.370	-0.130	0.000	0.04		1.4	OK
3.002	14	33	110.528	-0.122	0.000	0.08		1.7	OK
1.008	15	53	109.743	0.093	0.000	0.11		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 23
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 180 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s) Summer and Winter

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	39	111.773	-0.127	0.000	0.06			0.8	OK
1.001	2	39	111.546	-0.124	0.000	0.07			0.9	OK
1.002	3	39	111.462	-0.118	0.000	0.10			1.4	OK
1.003	4	39	111.341	-0.109	0.000	0.16			1.8	OK
1.004	5	39	111.311	-0.109	0.000	0.16			2.4	OK
2.000	6	39	111.771	-0.129	0.000	0.05			0.7	OK
2.001	7	39	111.601	-0.129	0.000	0.05			0.8	OK
2.002	8	39	111.519	-0.131	0.000	0.04			1.2	OK
1.005	9	39	111.037	-0.188	0.000	0.06			4.2	OK
1.006	10	39	110.733	-0.192	0.000	0.05			4.2	OK
1.007	11	54	109.742	-0.858	0.000	0.00			7.4	OK
3.000	12	39	111.524	-0.076	0.000	0.14			0.8	OK
3.001	13	39	111.368	-0.132	0.000	0.04			1.1	OK
3.002	14	39	110.525	-0.125	0.000	0.06			1.4	OK
1.008	15	54	109.742	0.092	0.000	0.11			2.3	SURCHARGED

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Date 16/04/2024
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Page 24



Summary Wizard of 240 minute 2 year Summer I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	45	111.771	-0.129	0.000	0.05		0.7	OK
1.001	2	45	111.544	-0.126	0.000	0.06		0.8	OK
1.002	3	45	111.460	-0.120	0.000	0.09		1.2	OK
1.003	4	45	111.337	-0.113	0.000	0.14		1.5	OK
1.004	5	45	111.307	-0.113	0.000	0.14		2.1	OK
2.000	6	45	111.769	-0.131	0.000	0.04		0.6	OK
2.001	7	45	111.600	-0.130	0.000	0.04		0.7	OK
2.002	8	45	111.517	-0.133	0.000	0.03		1.1	OK
1.005	9	45	111.034	-0.191	0.000	0.05		3.6	OK
1.006	10	45	110.731	-0.194	0.000	0.04		3.6	OK
1.007	11	55	109.737	-0.863	0.000	0.00		6.3	OK
3.000	12	45	111.522	-0.078	0.000	0.11		0.7	OK
3.001	13	45	111.367	-0.133	0.000	0.03		1.0	OK
3.002	14	45	110.522	-0.128	0.000	0.05		1.2	OK
1.008	15	55	109.738	0.088	0.000	0.11		2.3	SURCHARGED

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale																																																																																																																																																																												
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<u>Summary Wizard of 360 minute 2 year Summer I+0% 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 0.000 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 0 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																																																																																																
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Rainfall Model FSR Ratio R 0.289 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 19.000 Cv (Winter) 0.840																																																																																																																																																																																
Margin for Flood Risk Warning (mm) 0.0 DVD Status ON Analysis Timestep Fine Inertia Status OFF DTS Status ON																																																																																																																																																																																
Profile(s) Summer and Winter Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 Return Period(s) (years) 1, 2, 30, 100 Climate Change (%) 0, 0, 0, 40																																																																																																																																																																																
<table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Storm Rank</th> <th>Water</th> <th>Surcharged</th> <th>Flooded</th> <th colspan="2">Half Drain</th> <th>Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Volume (m³)</th> <th>Flow / Cap.</th> <th>Overflow (l/s)</th> <th>Time (mins)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>1</td><td>55</td><td>111.768</td><td>-0.132</td><td>0.000</td><td>0.04</td><td></td><td>0.5</td><td>OK</td></tr> <tr><td>1.001</td><td>2</td><td>55</td><td>111.540</td><td>-0.130</td><td>0.000</td><td>0.05</td><td></td><td>0.6</td><td>OK</td></tr> <tr><td>1.002</td><td>3</td><td>55</td><td>111.455</td><td>-0.125</td><td>0.000</td><td>0.07</td><td></td><td>0.9</td><td>OK</td></tr> <tr><td>1.003</td><td>4</td><td>55</td><td>111.333</td><td>-0.117</td><td>0.000</td><td>0.11</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>1.004</td><td>5</td><td>55</td><td>111.303</td><td>-0.117</td><td>0.000</td><td>0.11</td><td></td><td>1.6</td><td>OK</td></tr> <tr><td>2.000</td><td>6</td><td>55</td><td>111.767</td><td>-0.133</td><td>0.000</td><td>0.03</td><td></td><td>0.4</td><td>OK</td></tr> <tr><td>2.001</td><td>7</td><td>55</td><td>111.597</td><td>-0.133</td><td>0.000</td><td>0.03</td><td></td><td>0.5</td><td>OK</td></tr> <tr><td>2.002</td><td>8</td><td>55</td><td>111.516</td><td>-0.134</td><td>0.000</td><td>0.02</td><td></td><td>0.8</td><td>OK</td></tr> <tr><td>1.005</td><td>9</td><td>55</td><td>111.030</td><td>-0.195</td><td>0.000</td><td>0.04</td><td></td><td>2.8</td><td>OK</td></tr> <tr><td>1.006</td><td>10</td><td>55</td><td>110.727</td><td>-0.198</td><td>0.000</td><td>0.03</td><td></td><td>2.8</td><td>OK</td></tr> <tr><td>1.007</td><td>11</td><td>59</td><td>109.726</td><td>-0.874</td><td>0.000</td><td>0.00</td><td></td><td>4.9</td><td>OK</td></tr> <tr><td>3.000</td><td>12</td><td>55</td><td>111.520</td><td>-0.080</td><td>0.000</td><td>0.09</td><td></td><td>0.5</td><td>OK</td></tr> <tr><td>3.001</td><td>13</td><td>55</td><td>111.365</td><td>-0.135</td><td>0.000</td><td>0.02</td><td></td><td>0.7</td><td>OK</td></tr> <tr><td>3.002</td><td>14</td><td>55</td><td>110.519</td><td>-0.131</td><td>0.000</td><td>0.04</td><td></td><td>0.9</td><td>OK</td></tr> <tr><td>1.008</td><td>15</td><td>59</td><td>109.726</td><td>0.076</td><td>0.000</td><td>0.11</td><td></td><td>2.3</td><td>SURCHARGED</td></tr> </tbody> </table>										PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	1.000	1	55	111.768	-0.132	0.000	0.04		0.5	OK	1.001	2	55	111.540	-0.130	0.000	0.05		0.6	OK	1.002	3	55	111.455	-0.125	0.000	0.07		0.9	OK	1.003	4	55	111.333	-0.117	0.000	0.11		1.2	OK	1.004	5	55	111.303	-0.117	0.000	0.11		1.6	OK	2.000	6	55	111.767	-0.133	0.000	0.03		0.4	OK	2.001	7	55	111.597	-0.133	0.000	0.03		0.5	OK	2.002	8	55	111.516	-0.134	0.000	0.02		0.8	OK	1.005	9	55	111.030	-0.195	0.000	0.04		2.8	OK	1.006	10	55	110.727	-0.198	0.000	0.03		2.8	OK	1.007	11	59	109.726	-0.874	0.000	0.00		4.9	OK	3.000	12	55	111.520	-0.080	0.000	0.09		0.5	OK	3.001	13	55	111.365	-0.135	0.000	0.02		0.7	OK	3.002	14	55	110.519	-0.131	0.000	0.04		0.9	OK	1.008	15	59	109.726	0.076	0.000	0.11		2.3	SURCHARGED
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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 600 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	68	111.766	-0.134	0.000	0.03		0.4	OK
1.001	2	68	111.538	-0.132	0.000	0.03		0.4	OK
1.002	3	68	111.451	-0.129	0.000	0.05		0.7	OK
1.003	4	68	111.327	-0.123	0.000	0.08		0.8	OK
1.004	5	68	111.298	-0.122	0.000	0.08		1.2	OK
2.000	6	68	111.765	-0.135	0.000	0.02		0.3	OK
2.001	7	68	111.595	-0.135	0.000	0.02		0.4	OK
2.002	8	68	111.512	-0.138	0.000	0.02		0.6	OK
1.005	9	68	111.026	-0.199	0.000	0.03		2.0	OK
1.006	10	68	110.724	-0.201	0.000	0.02		2.0	OK
1.007	11	73	109.699	-0.901	0.000	0.00		3.5	OK
3.000	12	68	111.516	-0.084	0.000	0.06		0.4	OK
3.001	13	68	111.362	-0.138	0.000	0.02		0.5	OK
3.002	14	68	110.517	-0.133	0.000	0.03		0.7	OK
1.008	15	73	109.699	0.049	0.000	0.11		2.2	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 28			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
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Summary Wizard of 720 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	73	111.765	-0.135	0.000	0.02		0.3	OK
1.001	2	73	111.537	-0.133	0.000	0.03		0.4	OK
1.002	3	73	111.450	-0.130	0.000	0.04		0.6	OK
1.003	4	73	111.325	-0.125	0.000	0.07		0.7	OK
1.004	5	73	111.296	-0.124	0.000	0.07		1.0	OK
2.000	6	73	111.764	-0.136	0.000	0.02		0.3	OK
2.001	7	73	111.594	-0.136	0.000	0.02		0.3	OK
2.002	8	73	111.511	-0.139	0.000	0.02		0.5	OK
1.005	9	73	111.024	-0.201	0.000	0.03		1.8	OK
1.006	10	73	110.723	-0.202	0.000	0.02		1.8	OK
1.007	11	77	109.684	-0.916	0.000	0.00		3.1	OK
3.000	12	73	111.515	-0.085	0.000	0.06		0.3	OK
3.001	13	73	111.360	-0.140	0.000	0.01		0.5	OK
3.002	14	73	110.516	-0.134	0.000	0.03		0.6	OK
1.008	15	77	109.684	0.034	0.000	0.11		2.2	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 29
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Date 16/04/2024	Designed by JS	
File Storm revA.MDX	Checked by	
Micro Drainage		Network 2020.1.3

Summary Wizard of 960 minute 2 year Summer I+0% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	80	111.763	-0.137	0.000	0.02			0.3	OK
1.001	2	80	111.536	-0.134	0.000	0.02			0.3	OK
1.002	3	80	111.448	-0.132	0.000	0.03			0.5	OK
1.003	4	80	111.323	-0.127	0.000	0.06			0.6	OK
1.004	5	80	111.293	-0.127	0.000	0.06			0.9	OK
2.000	6	80	111.761	-0.139	0.000	0.02			0.2	OK
2.001	7	80	111.592	-0.138	0.000	0.02			0.3	OK
2.002	8	80	111.509	-0.141	0.000	0.01			0.4	OK
1.005	9	80	111.023	-0.202	0.000	0.02			1.5	OK
1.006	10	80	110.719	-0.206	0.000	0.02			1.5	OK
1.007	11	84	109.657	-0.943	0.000	0.00			2.6	OK
3.000	12	80	111.514	-0.086	0.000	0.05			0.3	OK
3.001	13	81	111.358	-0.142	0.000	0.01			0.4	OK
3.002	14	79	110.515	-0.135	0.000	0.02			0.5	OK
1.008	15	85	109.657	0.007	0.000	0.11			2.1	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 37		
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Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 10080 minute 2 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	135	111.753	-0.147	0.000	0.00		0.1	OK
1.001	2	135	111.524	-0.146	0.000	0.01		0.1	OK
1.002	3	135	111.435	-0.145	0.000	0.01		0.1	OK
1.003	4	135	111.309	-0.141	0.000	0.01		0.1	OK
1.004	5	135	111.279	-0.141	0.000	0.01		0.2	OK
2.000	6	135	111.753	-0.147	0.000	0.00		0.0	OK
2.001	7	135	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	135	111.502	-0.148	0.000	0.00		0.1	OK
1.005	9	135	111.005	-0.220	0.000	0.00		0.3	OK
1.006	10	135	110.704	-0.221	0.000	0.00		0.3	OK
1.007	11	133	109.601	-0.999	0.000	0.00		0.6	OK
3.000	12	135	111.505	-0.095	0.000	0.01		0.1	OK
3.001	13	135	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	135	110.503	-0.147	0.000	0.00		0.1	OK
1.008	15	135	109.542	-0.108	0.000	0.03		0.7	OK

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Armstrong Stokes & Clayton Ltd		Page 38	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire		7 Starkey Street Heywood Rochdale	
Date 16/04/2024		Designed by JS	
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Summary Wizard of 30 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)		Time (mins)	Flow (l/s)	
1.000	1	5	111.800	-0.100	0.000	0.24		3.4	OK
1.001	2	5	111.577	-0.093	0.000	0.30		4.1	OK
1.002	3	5	111.501	-0.079	0.000	0.44		6.2	OK
1.003	4	5	111.395	-0.055	0.000	0.72		7.8	OK
1.004	5	5	111.366	-0.054	0.000	0.72		10.9	OK
2.000	6	5	111.796	-0.104	0.000	0.21		2.9	OK
2.001	7	5	111.627	-0.103	0.000	0.22		3.4	OK
2.002	8	5	111.541	-0.109	0.000	0.16		5.6	OK
1.005	9	5	111.082	-0.143	0.000	0.29		18.8	OK
1.006	10	5	110.774	-0.151	0.000	0.23		18.7	OK
1.007	11	43	109.849	-0.751	0.000	0.01		33.4	OK
3.000	12	5	111.556	-0.044	0.000	0.59		3.4	OK
3.001	13	5	111.390	-0.110	0.000	0.16		5.0	OK
3.002	14	5	110.555	-0.095	0.000	0.29		6.4	OK
1.008	15	43	109.849	0.199	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 39		
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 60 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	9	111.794	-0.106	0.000	0.18		2.6	OK
1.001	2	9	111.570	-0.100	0.000	0.23		3.1	OK
1.002	3	8	111.492	-0.088	0.000	0.34		4.7	OK
1.003	4	8	111.382	-0.068	0.000	0.55		5.9	OK
1.004	5	8	111.352	-0.068	0.000	0.55		8.3	OK
2.000	6	9	111.790	-0.110	0.000	0.16		2.2	OK
2.001	7	8	111.621	-0.109	0.000	0.16		2.6	OK
2.002	8	8	111.536	-0.114	0.000	0.12		4.2	OK
1.005	9	8	111.072	-0.153	0.000	0.22		14.3	OK
1.006	10	8	110.765	-0.160	0.000	0.18		14.4	OK
1.007	11	38	109.902	-0.698	0.000	0.01		25.2	OK
3.000	12	9	111.548	-0.052	0.000	0.45		2.6	OK
3.001	13	8	111.385	-0.115	0.000	0.12		3.9	OK
3.002	14	8	110.548	-0.102	0.000	0.22		4.9	OK
1.008	15	38	109.902	0.252	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 40			
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Summary Wizard of 120 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	15	111.785	-0.115	0.000	0.13		1.8	OK
1.001	2	14	111.560	-0.110	0.000	0.16		2.2	OK
1.002	3	14	111.479	-0.101	0.000	0.23		3.3	OK
1.003	4	14	111.364	-0.086	0.000	0.38		4.1	OK
1.004	5	14	111.334	-0.086	0.000	0.38		5.7	OK
2.000	6	15	111.783	-0.117	0.000	0.11		1.5	OK
2.001	7	14	111.613	-0.117	0.000	0.11		1.8	OK
2.002	8	14	111.529	-0.121	0.000	0.08		2.9	OK
1.005	9	14	111.058	-0.167	0.000	0.15		9.8	OK
1.006	10	14	110.752	-0.173	0.000	0.12		9.8	OK
1.007	11	33	109.932	-0.668	0.000	0.00		17.4	OK
3.000	12	15	111.538	-0.062	0.000	0.31		1.8	OK
3.001	13	14	111.379	-0.121	0.000	0.08		2.6	OK
3.002	14	14	110.538	-0.112	0.000	0.15		3.3	OK
1.008	15	33	109.932	0.282	0.000	0.12		2.3	SURCHARGED

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Network 2020.1.3

Page 44



Summary Wizard of 480 minute 30 year Summer I+0% 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 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 1

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 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine Inertia

Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	42	111.772	-0.128	0.000	0.05		0.7	OK
1.001	2	42	111.545	-0.125	0.000	0.07		0.9	OK
1.002	3	42	111.461	-0.119	0.000	0.10		1.4	OK
1.003	4	42	111.339	-0.111	0.000	0.16		1.7	OK
1.004	5	42	111.310	-0.110	0.000	0.16		2.4	OK
2.000	6	42	111.770	-0.130	0.000	0.04		0.6	OK
2.001	7	42	111.601	-0.129	0.000	0.05		0.7	OK
2.002	8	42	111.518	-0.132	0.000	0.04		1.2	OK
1.005	9	42	111.036	-0.189	0.000	0.06		4.1	OK
1.006	10	42	110.732	-0.193	0.000	0.05		4.1	OK
1.007	11	37	109.903	-0.697	0.000	0.00		7.2	OK
3.000	12	42	111.524	-0.076	0.000	0.13		0.7	OK
3.001	13	42	111.368	-0.132	0.000	0.03		1.1	OK
3.002	14	42	110.524	-0.126	0.000	0.06		1.4	OK
1.008	15	37	109.903	0.253	0.000	0.12		2.3	SURCHARGED

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<table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Storm Rank</th> <th>Water</th> <th>Surcharged</th> <th>Flooded</th> <th colspan="2">Half Drain</th> <th>Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Volume (m³)</th> <th>Flow / Cap.</th> <th>Overflow (l/s)</th> <th>Time (mins)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>1</td><td>47</td><td>111.770</td><td>-0.130</td><td>0.000</td><td>0.04</td><td></td><td>0.6</td><td>OK</td></tr> <tr><td>1.001</td><td>2</td><td>47</td><td>111.543</td><td>-0.127</td><td>0.000</td><td>0.06</td><td></td><td>0.8</td><td>OK</td></tr> <tr><td>1.002</td><td>3</td><td>47</td><td>111.459</td><td>-0.121</td><td>0.000</td><td>0.08</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>1.003</td><td>4</td><td>47</td><td>111.336</td><td>-0.114</td><td>0.000</td><td>0.13</td><td></td><td>1.4</td><td>OK</td></tr> <tr><td>1.004</td><td>5</td><td>46</td><td>111.306</td><td>-0.114</td><td>0.000</td><td>0.13</td><td></td><td>2.0</td><td>OK</td></tr> <tr><td>2.000</td><td>6</td><td>47</td><td>111.769</td><td>-0.131</td><td>0.000</td><td>0.04</td><td></td><td>0.5</td><td>OK</td></tr> <tr><td>2.001</td><td>7</td><td>47</td><td>111.599</td><td>-0.131</td><td>0.000</td><td>0.04</td><td></td><td>0.6</td><td>OK</td></tr> <tr><td>2.002</td><td>8</td><td>47</td><td>111.517</td><td>-0.133</td><td>0.000</td><td>0.03</td><td></td><td>1.0</td><td>OK</td></tr> <tr><td>1.005</td><td>9</td><td>46</td><td>111.033</td><td>-0.192</td><td>0.000</td><td>0.05</td><td></td><td>3.5</td><td>OK</td></tr> <tr><td>1.006</td><td>10</td><td>46</td><td>110.730</td><td>-0.195</td><td>0.000</td><td>0.04</td><td></td><td>3.5</td><td>OK</td></tr> <tr><td>1.007</td><td>11</td><td>39</td><td>109.885</td><td>-0.715</td><td>0.000</td><td>0.00</td><td></td><td>6.2</td><td>OK</td></tr> <tr><td>3.000</td><td>12</td><td>47</td><td>111.522</td><td>-0.078</td><td>0.000</td><td>0.11</td><td></td><td>0.6</td><td>OK</td></tr> <tr><td>3.001</td><td>13</td><td>47</td><td>111.367</td><td>-0.133</td><td>0.000</td><td>0.03</td><td></td><td>0.9</td><td>OK</td></tr> <tr><td>3.002</td><td>14</td><td>47</td><td>110.522</td><td>-0.128</td><td>0.000</td><td>0.05</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>1.008</td><td>15</td><td>39</td><td>109.886</td><td>0.236</td><td>0.000</td><td>0.12</td><td></td><td>2.3</td><td>SURCHARGED</td></tr> </tbody> </table>										PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	1.000	1	47	111.770	-0.130	0.000	0.04		0.6	OK	1.001	2	47	111.543	-0.127	0.000	0.06		0.8	OK	1.002	3	47	111.459	-0.121	0.000	0.08		1.2	OK	1.003	4	47	111.336	-0.114	0.000	0.13		1.4	OK	1.004	5	46	111.306	-0.114	0.000	0.13		2.0	OK	2.000	6	47	111.769	-0.131	0.000	0.04		0.5	OK	2.001	7	47	111.599	-0.131	0.000	0.04		0.6	OK	2.002	8	47	111.517	-0.133	0.000	0.03		1.0	OK	1.005	9	46	111.033	-0.192	0.000	0.05		3.5	OK	1.006	10	46	110.730	-0.195	0.000	0.04		3.5	OK	1.007	11	39	109.885	-0.715	0.000	0.00		6.2	OK	3.000	12	47	111.522	-0.078	0.000	0.11		0.6	OK	3.001	13	47	111.367	-0.133	0.000	0.03		0.9	OK	3.002	14	47	110.522	-0.128	0.000	0.05		1.2	OK	1.008	15	39	109.886	0.236	0.000	0.12		2.3	SURCHARGED
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Page 46

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Micro Drainage

Network 2020.1.3

Micro Drainage

Summary Wizard of 720 minute 30 year Summer I+0% 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 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 1

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 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine Inertia

Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	
1.000	1	52	111.769	-0.131	0.000	0.04		0.6	OK
1.001	2	52	111.541	-0.129	0.000	0.05		0.7	OK
1.002	3	52	111.457	-0.123	0.000	0.07		1.0	OK
1.003	4	52	111.334	-0.116	0.000	0.12		1.3	OK
1.004	5	52	111.304	-0.116	0.000	0.12		1.8	OK
2.000	6	52	111.768	-0.132	0.000	0.03		0.5	OK
2.001	7	52	111.598	-0.132	0.000	0.03		0.6	OK
2.002	8	52	111.516	-0.134	0.000	0.03		0.9	OK
1.005	9	52	111.031	-0.194	0.000	0.05		3.1	OK
1.006	10	52	110.728	-0.197	0.000	0.04		3.1	OK
1.007	11	42	109.866	-0.734	0.000	0.00		5.4	OK
3.000	12	52	111.521	-0.079	0.000	0.10		0.6	OK
3.001	13	52	111.366	-0.134	0.000	0.03		0.8	OK
3.002	14	52	110.520	-0.130	0.000	0.05		1.0	OK
1.008	15	42	109.866	0.216	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 47			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
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Micro Drainage					Network 2020.1.3					

Summary Wizard of 960 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	59	111.767	-0.133	0.000	0.03		0.5	OK
1.001	2	59	111.539	-0.131	0.000	0.04		0.6	OK
1.002	3	59	111.454	-0.126	0.000	0.06		0.8	OK
1.003	4	59	111.331	-0.119	0.000	0.10		1.0	OK
1.004	5	59	111.301	-0.119	0.000	0.10		1.5	OK
2.000	6	59	111.766	-0.134	0.000	0.03		0.4	OK
2.001	7	59	111.597	-0.133	0.000	0.03		0.5	OK
2.002	8	59	111.515	-0.135	0.000	0.02		0.7	OK
1.005	9	59	111.028	-0.197	0.000	0.04		2.5	OK
1.006	10	59	110.726	-0.199	0.000	0.03		2.5	OK
1.007	11	45	109.830	-0.770	0.000	0.00		4.4	OK
3.000	12	59	111.518	-0.082	0.000	0.08		0.5	OK
3.001	13	59	111.365	-0.135	0.000	0.02		0.7	OK
3.002	14	59	110.519	-0.131	0.000	0.04		0.8	OK
1.008	15	45	109.830	0.180	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 48			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 1440 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	70	111.766	-0.134	0.000	0.02		0.3	OK
1.001	2	70	111.537	-0.133	0.000	0.03		0.4	OK
1.002	3	70	111.450	-0.130	0.000	0.04		0.6	OK
1.003	4	70	111.326	-0.124	0.000	0.07		0.8	OK
1.004	5	70	111.296	-0.124	0.000	0.07		1.1	OK
2.000	6	71	111.764	-0.136	0.000	0.02		0.3	OK
2.001	7	70	111.595	-0.135	0.000	0.02		0.3	OK
2.002	8	70	111.511	-0.139	0.000	0.02		0.5	OK
1.005	9	70	111.025	-0.200	0.000	0.03		1.9	OK
1.006	10	70	110.723	-0.202	0.000	0.02		1.9	OK
1.007	11	48	109.765	-0.835	0.000	0.00		3.3	OK
3.000	12	70	111.516	-0.084	0.000	0.06		0.3	OK
3.001	13	70	111.361	-0.139	0.000	0.02		0.5	OK
3.002	14	71	110.516	-0.134	0.000	0.03		0.6	OK
1.008	15	48	109.765	0.115	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 49			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 2160 minute 30 year Summer I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain		Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)				
1.000	1	82	111.763	-0.137	0.000	0.02				0.3	OK	
1.001	2	82	111.536	-0.134	0.000	0.02				0.3	OK	
1.002	3	82	111.448	-0.132	0.000	0.03				0.5	OK	
1.003	4	82	111.323	-0.127	0.000	0.05				0.6	OK	
1.004	5	82	111.293	-0.127	0.000	0.06				0.8	OK	
2.000	6	82	111.761	-0.139	0.000	0.02				0.2	OK	
2.001	7	82	111.592	-0.138	0.000	0.02				0.3	OK	
2.002	8	82	111.509	-0.141	0.000	0.01				0.4	OK	
1.005	9	82	111.023	-0.202	0.000	0.02				1.4	OK	
1.006	10	82	110.719	-0.206	0.000	0.02				1.4	OK	
1.007	11	74	109.693	-0.907	0.000	0.00				2.5	OK	
3.000	12	82	111.514	-0.086	0.000	0.04				0.3	OK	
3.001	13	79	111.358	-0.142	0.000	0.01				0.4	OK	
3.002	14	82	110.515	-0.135	0.000	0.02				0.5	OK	
1.008	15	74	109.693	0.043	0.000	0.11				2.2	SURCHARGED	

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<table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Storm Rank</th> <th>Water</th> <th>Surcharged</th> <th>Flooded</th> <th colspan="2">Half Drain</th> <th>Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Volume (m³)</th> <th>Flow / Cap.</th> <th>Overflow (l/s)</th> <th>Time (mins)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>1</td><td>89</td><td>111.761</td><td>-0.139</td><td>0.000</td><td>0.02</td><td></td><td>0.2</td><td>OK</td></tr> <tr><td>1.001</td><td>2</td><td>89</td><td>111.534</td><td>-0.136</td><td>0.000</td><td>0.02</td><td></td><td>0.3</td><td>OK</td></tr> <tr><td>1.002</td><td>3</td><td>89</td><td>111.447</td><td>-0.133</td><td>0.000</td><td>0.03</td><td></td><td>0.4</td><td>OK</td></tr> <tr><td>1.003</td><td>4</td><td>89</td><td>111.320</td><td>-0.130</td><td>0.000</td><td>0.05</td><td></td><td>0.5</td><td>OK</td></tr> <tr><td>1.004</td><td>5</td><td>89</td><td>111.290</td><td>-0.130</td><td>0.000</td><td>0.05</td><td></td><td>0.7</td><td>OK</td></tr> <tr><td>2.000</td><td>6</td><td>89</td><td>111.759</td><td>-0.141</td><td>0.000</td><td>0.01</td><td></td><td>0.2</td><td>OK</td></tr> <tr><td>2.001</td><td>7</td><td>89</td><td>111.589</td><td>-0.141</td><td>0.000</td><td>0.01</td><td></td><td>0.2</td><td>OK</td></tr> <tr><td>2.002</td><td>8</td><td>89</td><td>111.507</td><td>-0.143</td><td>0.000</td><td>0.01</td><td></td><td>0.3</td><td>OK</td></tr> <tr><td>1.005</td><td>9</td><td>89</td><td>111.019</td><td>-0.206</td><td>0.000</td><td>0.02</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>1.006</td><td>10</td><td>89</td><td>110.715</td><td>-0.210</td><td>0.000</td><td>0.01</td><td></td><td>1.2</td><td>OK</td></tr> <tr><td>1.007</td><td>11</td><td>88</td><td>109.642</td><td>-0.958</td><td>0.000</td><td>0.00</td><td></td><td>2.1</td><td>OK</td></tr> <tr><td>3.000</td><td>12</td><td>89</td><td>111.512</td><td>-0.088</td><td>0.000</td><td>0.04</td><td></td><td>0.2</td><td>OK</td></tr> <tr><td>3.001</td><td>13</td><td>89</td><td>111.357</td><td>-0.143</td><td>0.000</td><td>0.01</td><td></td><td>0.3</td><td>OK</td></tr> <tr><td>3.002</td><td>14</td><td>89</td><td>110.512</td><td>-0.138</td><td>0.000</td><td>0.02</td><td></td><td>0.4</td><td>OK</td></tr> <tr><td>1.008</td><td>15</td><td>88</td><td>109.642</td><td>-0.008</td><td>0.000</td><td>0.11</td><td></td><td>2.1</td><td>OK</td></tr> </tbody> </table>										PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	1.000	1	89	111.761	-0.139	0.000	0.02		0.2	OK	1.001	2	89	111.534	-0.136	0.000	0.02		0.3	OK	1.002	3	89	111.447	-0.133	0.000	0.03		0.4	OK	1.003	4	89	111.320	-0.130	0.000	0.05		0.5	OK	1.004	5	89	111.290	-0.130	0.000	0.05		0.7	OK	2.000	6	89	111.759	-0.141	0.000	0.01		0.2	OK	2.001	7	89	111.589	-0.141	0.000	0.01		0.2	OK	2.002	8	89	111.507	-0.143	0.000	0.01		0.3	OK	1.005	9	89	111.019	-0.206	0.000	0.02		1.2	OK	1.006	10	89	110.715	-0.210	0.000	0.01		1.2	OK	1.007	11	88	109.642	-0.958	0.000	0.00		2.1	OK	3.000	12	89	111.512	-0.088	0.000	0.04		0.2	OK	3.001	13	89	111.357	-0.143	0.000	0.01		0.3	OK	3.002	14	89	110.512	-0.138	0.000	0.02		0.4	OK	1.008	15	88	109.642	-0.008	0.000	0.11		2.1	OK
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Armstrong Stokes & Clayton Ltd		Page 52
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Summary Wizard of 5760 minute 30 year Summer I+0% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	109	111.756	-0.144	0.000	0.01		0.1		OK
1.001	2	109	111.528	-0.142	0.000	0.01		0.2		OK
1.002	3	109	111.442	-0.138	0.000	0.02		0.2		OK
1.003	4	109	111.316	-0.134	0.000	0.03		0.3		OK
1.004	5	109	111.286	-0.134	0.000	0.03		0.4		OK
2.000	6	109	111.756	-0.144	0.000	0.01		0.1		OK
2.001	7	109	111.586	-0.144	0.000	0.01		0.1		OK
2.002	8	109	111.504	-0.146	0.000	0.01		0.2		OK
1.005	9	109	111.011	-0.214	0.000	0.01		0.7		OK
1.006	10	109	110.709	-0.216	0.000	0.01		0.7		OK
1.007	11	144	109.601	-0.999	0.000	0.00		1.3		OK
3.000	12	108	111.510	-0.090	0.000	0.02		0.1		OK
3.001	13	108	111.354	-0.146	0.000	0.01		0.2		OK
3.002	14	109	110.507	-0.143	0.000	0.01		0.2		OK
1.008	15	108	109.575	-0.075	0.000	0.08		1.5		OK

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Armstrong Stokes & Clayton Ltd		Page 55
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 10080 minute 30 year Summer I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	122	111.754	-0.146	0.000	0.01		0.1	OK
1.001	2	122	111.526	-0.144	0.000	0.01		0.1	OK
1.002	3	122	111.438	-0.142	0.000	0.01		0.2	OK
1.003	4	122	111.313	-0.137	0.000	0.02		0.2	OK
1.004	5	122	111.283	-0.137	0.000	0.02		0.3	OK
2.000	6	122	111.754	-0.146	0.000	0.01		0.1	OK
2.001	7	122	111.584	-0.146	0.000	0.01		0.1	OK
2.002	8	122	111.503	-0.147	0.000	0.00		0.1	OK
1.005	9	122	111.008	-0.217	0.000	0.01		0.5	OK
1.006	10	122	110.706	-0.219	0.000	0.01		0.5	OK
1.007	11	121	109.601	-0.999	0.000	0.00		0.9	OK
3.000	12	122	111.507	-0.093	0.000	0.01		0.1	OK
3.001	13	122	111.353	-0.147	0.000	0.00		0.1	OK
3.002	14	122	110.505	-0.145	0.000	0.01		0.2	OK
1.008	15	122	109.554	-0.096	0.000	0.05		1.0	OK

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Armstrong Stokes & Clayton Ltd		Page 57	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire		7 Starkey Street Heywood Rochdale	
Date 16/04/2024	Designed by JS		
File Storm revA.MDX	Checked by		
Micro Drainage		Network 2020.1.3	

Summary Wizard of 60 minute 100 year Summer I+40% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	3	111.811	-0.089	0.000	0.34			4.7	OK
1.001	2	3	111.590	-0.080	0.000	0.43			5.8	OK
1.002	3	3	111.519	-0.061	0.000	0.62			8.7	OK
1.003	4	3	111.443	-0.007	0.000	1.00			10.8	OK
1.004	5	3	111.417	-0.003	0.000	1.00			15.0	OK
2.000	6	3	111.806	-0.094	0.000	0.29			4.0	OK
2.001	7	3	111.637	-0.093	0.000	0.30			4.7	OK
2.002	8	3	111.549	-0.101	0.000	0.23			7.7	OK
1.005	9	3	111.099	-0.126	0.000	0.39			25.8	OK
1.006	10	3	110.789	-0.136	0.000	0.32			25.9	OK
1.007	11	19	110.218	-0.382	0.000	0.01			46.4	OK
3.000	12	3	111.571	-0.029	0.000	0.84			4.8	OK
3.001	13	3	111.398	-0.102	0.000	0.22			7.1	OK
3.002	14	3	110.567	-0.083	0.000	0.40			8.9	OK
1.008	15	19	110.218	0.568	0.000	0.12			2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 58
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Summary Wizard of 120 minute 100 year Summer I+40% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	6	111.799	-0.101	0.000	0.23		3.3	OK
1.001	2	6	111.576	-0.094	0.000	0.30		4.0	OK
1.002	3	6	111.499	-0.081	0.000	0.43		6.0	OK
1.003	4	6	111.393	-0.057	0.000	0.69		7.5	OK
1.004	5	6	111.363	-0.057	0.000	0.70		10.5	OK
2.000	6	6	111.795	-0.105	0.000	0.20		2.8	OK
2.001	7	6	111.626	-0.104	0.000	0.21		3.3	OK
2.002	8	6	111.540	-0.110	0.000	0.16		5.3	OK
1.005	9	6	111.080	-0.145	0.000	0.27		18.1	OK
1.006	10	6	110.772	-0.153	0.000	0.23		18.1	OK
1.007	11	14	110.331	-0.269	0.000	0.01		32.0	OK
3.000	12	6	111.554	-0.046	0.000	0.57		3.3	OK
3.001	13	6	111.389	-0.111	0.000	0.15		4.8	OK
3.002	14	6	110.553	-0.097	0.000	0.27		6.1	OK
1.008	15	14	110.331	0.681	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 59		
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 180 minute 100 year Summer I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain		Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)				
1.000	1	8	111.794	-0.106	0.000	0.19				2.6	OK	
1.001	2	8	111.570	-0.100	0.000	0.24				3.2	OK	
1.002	3	9	111.491	-0.089	0.000	0.35				4.8	OK	
1.003	4	9	111.381	-0.069	0.000	0.55				6.0	OK	
1.004	5	9	111.351	-0.069	0.000	0.56				8.4	OK	
2.000	6	8	111.790	-0.110	0.000	0.16				2.2	OK	
2.001	7	9	111.621	-0.109	0.000	0.17				2.6	OK	
2.002	8	9	111.535	-0.115	0.000	0.13				4.2	OK	
1.005	9	9	111.072	-0.153	0.000	0.22				14.4	OK	
1.006	10	9	110.765	-0.160	0.000	0.18				14.4	OK	
1.007	11	10	110.369	-0.231	0.000	0.01				25.5	OK	
3.000	12	8	111.548	-0.052	0.000	0.46				2.6	OK	
3.001	13	9	111.385	-0.115	0.000	0.12				3.9	OK	
3.002	14	9	110.547	-0.103	0.000	0.22				4.9	OK	
1.008	15	10	110.369	0.719	0.000	0.12				2.3	SURCHARGED	

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Armstrong Stokes & Clayton Ltd							Page 60			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 240 minute 100 year Summer I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	11	111.789	-0.111	0.000	0.15		2.2	OK
1.001	2	11	111.565	-0.105	0.000	0.20		2.7	OK
1.002	3	12	111.485	-0.095	0.000	0.29		4.0	OK
1.003	4	12	111.371	-0.079	0.000	0.46		5.0	OK
1.004	5	12	111.342	-0.078	0.000	0.46		7.0	OK
2.000	6	11	111.786	-0.114	0.000	0.13		1.8	OK
2.001	7	11	111.617	-0.113	0.000	0.14		2.2	OK
2.002	8	12	111.532	-0.118	0.000	0.10		3.5	OK
1.005	9	12	111.064	-0.161	0.000	0.18		12.0	OK
1.006	10	11	110.758	-0.167	0.000	0.15		12.0	OK
1.007	11	9	110.375	-0.225	0.000	0.00		21.1	OK
3.000	12	11	111.542	-0.058	0.000	0.38		2.2	OK
3.001	13	12	111.381	-0.119	0.000	0.10		3.2	OK
3.002	14	12	110.542	-0.108	0.000	0.18		4.0	OK
1.008	15	9	110.375	0.725	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 61			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 360 minute 100 year Summer I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	17	111.784	-0.116	0.000	0.12		1.6	OK
1.001	2	16	111.558	-0.112	0.000	0.15		2.0	OK
1.002	3	16	111.477	-0.103	0.000	0.21		3.0	OK
1.003	4	16	111.361	-0.089	0.000	0.35		3.7	OK
1.004	5	15	111.331	-0.089	0.000	0.35		5.2	OK
2.000	6	17	111.782	-0.118	0.000	0.10		1.4	OK
2.001	7	16	111.612	-0.118	0.000	0.10		1.6	OK
2.002	8	16	111.528	-0.122	0.000	0.08		2.6	OK
1.005	9	15	111.055	-0.170	0.000	0.14		9.0	OK
1.006	10	15	110.750	-0.175	0.000	0.11		9.0	OK
1.007	11	11	110.366	-0.234	0.000	0.00		15.9	OK
3.000	12	17	111.536	-0.064	0.000	0.28		1.6	OK
3.001	13	16	111.377	-0.123	0.000	0.07		2.4	OK
3.002	14	16	110.536	-0.114	0.000	0.13		3.0	OK
1.008	15	11	110.366	0.716	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 62			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 480 minute 100 year Summer I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	23	111.781	-0.119	0.000	0.09		1.3	OK
1.001	2	23	111.554	-0.116	0.000	0.12		1.6	OK
1.002	3	22	111.472	-0.108	0.000	0.17		2.4	OK
1.003	4	21	111.354	-0.096	0.000	0.28		3.0	OK
1.004	5	21	111.324	-0.096	0.000	0.28		4.3	OK
2.000	6	23	111.778	-0.122	0.000	0.08		1.1	OK
2.001	7	23	111.609	-0.121	0.000	0.08		1.3	OK
2.002	8	22	111.524	-0.126	0.000	0.06		2.1	OK
1.005	9	21	111.050	-0.175	0.000	0.11		7.3	OK
1.006	10	21	110.746	-0.179	0.000	0.09		7.3	OK
1.007	11	12	110.351	-0.249	0.000	0.00		12.9	OK
3.000	12	23	111.532	-0.068	0.000	0.23		1.3	OK
3.001	13	23	111.374	-0.126	0.000	0.06		1.9	OK
3.002	14	22	110.533	-0.117	0.000	0.11		2.4	OK
1.008	15	12	110.351	0.701	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 63																																																																																																																																																																										
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale																																																																																																																																																																													
Date 16/04/2024				Designed by JS																																																																																																																																																																													
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Micro Drainage				Network 2020.1.3																																																																																																																																																																													
<u>Summary Wizard of 600 minute 100 year Summer I+40% 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		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		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		0.289																																																																																																																																																																											
Region England and Wales Cv (Summer)		0.750																																																																																																																																																																															
M5-60 (mm)		19.000		Cv (Winter)		0.840																																																																																																																																																																											
Margin for Flood Risk Warning (mm)		0.0		DVD Status		ON																																																																																																																																																																											
Analysis Timestep		Fine		Inertia Status		OFF																																																																																																																																																																											
DTS Status		ON																																																																																																																																																																															
Profile(s)				Summer and Winter																																																																																																																																																																													
Duration(s) (mins)		30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080																																																																																																																																																																															
Return Period(s) (years)		1, 2, 30, 100																																																																																																																																																																															
Climate Change (%)		0, 0, 0, 40																																																																																																																																																																															
<table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Storm Rank</th> <th>Water</th> <th>Surcharged</th> <th>Flooded</th> <th colspan="2">Half Drain</th> <th>Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Volume (m³)</th> <th>Flow / Cap.</th> <th>Overflow (l/s)</th> <th>Time (mins)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>1</td><td>28</td><td>111.778</td><td>-0.122</td><td>0.000</td><td>0.08</td><td></td><td>1.1</td><td>OK</td></tr> <tr><td>1.001</td><td>2</td><td>28</td><td>111.552</td><td>-0.118</td><td>0.000</td><td>0.10</td><td></td><td>1.4</td><td>OK</td></tr> <tr><td>1.002</td><td>3</td><td>27</td><td>111.468</td><td>-0.112</td><td>0.000</td><td>0.15</td><td></td><td>2.1</td><td>OK</td></tr> <tr><td>1.003</td><td>4</td><td>27</td><td>111.349</td><td>-0.101</td><td>0.000</td><td>0.24</td><td></td><td>2.6</td><td>OK</td></tr> <tr><td>1.004</td><td>5</td><td>27</td><td>111.320</td><td>-0.100</td><td>0.000</td><td>0.24</td><td></td><td>3.6</td><td>OK</td></tr> <tr><td>2.000</td><td>6</td><td>28</td><td>111.776</td><td>-0.124</td><td>0.000</td><td>0.07</td><td></td><td>0.9</td><td>OK</td></tr> <tr><td>2.001</td><td>7</td><td>28</td><td>111.606</td><td>-0.124</td><td>0.000</td><td>0.07</td><td></td><td>1.1</td><td>OK</td></tr> <tr><td>2.002</td><td>8</td><td>27</td><td>111.522</td><td>-0.128</td><td>0.000</td><td>0.05</td><td></td><td>1.8</td><td>OK</td></tr> <tr><td>1.005</td><td>9</td><td>27</td><td>111.046</td><td>-0.179</td><td>0.000</td><td>0.09</td><td></td><td>6.2</td><td>OK</td></tr> <tr><td>1.006</td><td>10</td><td>27</td><td>110.741</td><td>-0.184</td><td>0.000</td><td>0.08</td><td></td><td>6.2</td><td>OK</td></tr> <tr><td>1.007</td><td>11</td><td>13</td><td>110.338</td><td>-0.262</td><td>0.000</td><td>0.00</td><td></td><td>11.0</td><td>OK</td></tr> <tr><td>3.000</td><td>12</td><td>28</td><td>111.530</td><td>-0.070</td><td>0.000</td><td>0.20</td><td></td><td>1.1</td><td>OK</td></tr> <tr><td>3.001</td><td>13</td><td>28</td><td>111.372</td><td>-0.128</td><td>0.000</td><td>0.05</td><td></td><td>1.6</td><td>OK</td></tr> <tr><td>3.002</td><td>14</td><td>27</td><td>110.530</td><td>-0.120</td><td>0.000</td><td>0.09</td><td></td><td>2.1</td><td>OK</td></tr> <tr><td>1.008</td><td>15</td><td>13</td><td>110.338</td><td>0.688</td><td>0.000</td><td>0.12</td><td></td><td>2.3</td><td>SURCHARGED</td></tr> </tbody> </table>											PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	1.000	1	28	111.778	-0.122	0.000	0.08		1.1	OK	1.001	2	28	111.552	-0.118	0.000	0.10		1.4	OK	1.002	3	27	111.468	-0.112	0.000	0.15		2.1	OK	1.003	4	27	111.349	-0.101	0.000	0.24		2.6	OK	1.004	5	27	111.320	-0.100	0.000	0.24		3.6	OK	2.000	6	28	111.776	-0.124	0.000	0.07		0.9	OK	2.001	7	28	111.606	-0.124	0.000	0.07		1.1	OK	2.002	8	27	111.522	-0.128	0.000	0.05		1.8	OK	1.005	9	27	111.046	-0.179	0.000	0.09		6.2	OK	1.006	10	27	110.741	-0.184	0.000	0.08		6.2	OK	1.007	11	13	110.338	-0.262	0.000	0.00		11.0	OK	3.000	12	28	111.530	-0.070	0.000	0.20		1.1	OK	3.001	13	28	111.372	-0.128	0.000	0.05		1.6	OK	3.002	14	27	110.530	-0.120	0.000	0.09		2.1	OK	1.008	15	13	110.338	0.688	0.000	0.12		2.3	SURCHARGED
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Armstrong Stokes & Clayton Ltd							Page 64			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 720 minute 100 year Summer I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	32	111.776	-0.124	0.000	0.07		1.0	OK
1.001	2	32	111.550	-0.120	0.000	0.09		1.2	OK
1.002	3	32	111.466	-0.114	0.000	0.13		1.8	OK
1.003	4	32	111.346	-0.104	0.000	0.21		2.3	OK
1.004	5	32	111.316	-0.104	0.000	0.21		3.2	OK
2.000	6	32	111.774	-0.126	0.000	0.06		0.8	OK
2.001	7	32	111.604	-0.126	0.000	0.06		1.0	OK
2.002	8	32	111.521	-0.129	0.000	0.05		1.6	OK
1.005	9	32	111.043	-0.182	0.000	0.08		5.4	OK
1.006	10	32	110.738	-0.187	0.000	0.07		5.4	OK
1.007	11	15	110.322	-0.278	0.000	0.00		9.6	OK
3.000	12	32	111.528	-0.072	0.000	0.17		1.0	OK
3.001	13	32	111.370	-0.130	0.000	0.04		1.4	OK
3.002	14	32	110.528	-0.122	0.000	0.08		1.8	OK
1.008	15	15	110.321	0.671	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 65			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 960 minute 100 year Summer I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	38	111.773	-0.127	0.000	0.06		0.8	OK
1.001	2	38	111.546	-0.124	0.000	0.07		1.0	OK
1.002	3	38	111.462	-0.118	0.000	0.11		1.5	OK
1.003	4	38	111.341	-0.109	0.000	0.17		1.8	OK
1.004	5	38	111.311	-0.109	0.000	0.17		2.6	OK
2.000	6	38	111.771	-0.129	0.000	0.05		0.7	OK
2.001	7	38	111.601	-0.129	0.000	0.05		0.8	OK
2.002	8	38	111.519	-0.131	0.000	0.04		1.3	OK
1.005	9	38	111.038	-0.187	0.000	0.07		4.4	OK
1.006	10	38	110.734	-0.191	0.000	0.05		4.4	OK
1.007	11	17	110.284	-0.316	0.000	0.00		7.8	OK
3.000	12	38	111.525	-0.075	0.000	0.14		0.8	OK
3.001	13	38	111.368	-0.132	0.000	0.04		1.2	OK
3.002	14	38	110.525	-0.125	0.000	0.07		1.5	OK
1.008	15	17	110.284	0.634	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 66	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire		7 Starkey Street Heywood Rochdale	
Date 16/04/2024		Designed by JS	
File Storm revA.MDX		Checked by	
Micro Drainage		Network 2020.1.3	

Summary Wizard of 1440 minute 100 year Summer I+40% 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 0.000
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 0
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

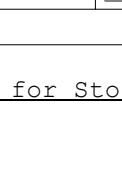
Rainfall Model FSR Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	50	111.770	-0.130	0.000	0.04		0.6		OK
1.001	2	50	111.542	-0.128	0.000	0.05		0.7		OK
1.002	3	50	111.458	-0.122	0.000	0.08		1.1		OK
1.003	4	50	111.335	-0.115	0.000	0.13		1.4		OK
1.004	5	50	111.305	-0.115	0.000	0.13		1.9		OK
2.000	6	50	111.768	-0.132	0.000	0.04		0.5		OK
2.001	7	50	111.599	-0.131	0.000	0.04		0.6		OK
2.002	8	50	111.517	-0.133	0.000	0.03		1.0		OK
1.005	9	50	111.032	-0.193	0.000	0.05		3.3		OK
1.006	10	50	110.729	-0.196	0.000	0.04		3.3		OK
1.007	11	20	110.206	-0.394	0.000	0.00		5.8		OK
3.000	12	50	111.521	-0.079	0.000	0.10		0.6		OK
3.001	13	50	111.366	-0.134	0.000	0.03		0.9		OK
3.002	14	50	110.521	-0.129	0.000	0.05		1.1		OK
1.008	15	20	110.206	0.556	0.000	0.12		2.3	SURCHARGED	

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Armstrong Stokes & Clayton Ltd		Page 67
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 2160 minute 100 year Summer I+40% 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	0.000
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	0
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

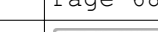
Rainfall Model	FSR	Ratio R	0.289
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	60	111.767	-0.133	0.000	0.03		0.4	OK
1.001	2	60	111.539	-0.131	0.000	0.04		0.5	OK
1.002	3	60	111.453	-0.127	0.000	0.06		0.8	OK
1.003	4	60	111.331	-0.119	0.000	0.09		1.0	OK
1.004	5	60	111.301	-0.119	0.000	0.10		1.4	OK
2.000	6	60	111.766	-0.134	0.000	0.03		0.4	OK
2.001	7	60	111.597	-0.133	0.000	0.03		0.4	OK
2.002	8	60	111.515	-0.135	0.000	0.02		0.7	OK
1.005	9	60	111.028	-0.197	0.000	0.04		2.5	OK
1.006	10	60	110.726	-0.199	0.000	0.03		2.5	OK
1.007	11	23	110.068	-0.532	0.000	0.00		4.4	OK
3.000	12	60	111.518	-0.082	0.000	0.08		0.4	OK
3.001	13	60	111.364	-0.136	0.000	0.02		0.7	OK
3.002	14	60	110.518	-0.132	0.000	0.04		0.8	OK
1.008	15	23	110.068	0.418	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 68
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 2880 minute 100 year Summer I+40% for Storm

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Rainfall Model	FSR	Ratio R	0.289
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

Armstrong Stokes & Clayton Ltd						Page 69	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire				7 Starkey Street Heywood Rochdale			
Date 16/04/2024				Designed by JS			
File Storm revA.MDX				Checked by			
Micro Drainage				Network 2020.1.3			

Summary Wizard of 4320 minute 100 year Summer I+40% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.		Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	79	111.763	-0.137	0.000	0.02			0.3	OK
1.001	2	79	111.536	-0.134	0.000	0.02			0.3	OK
1.002	3	79	111.448	-0.132	0.000	0.04			0.5	OK
1.003	4	79	111.323	-0.127	0.000	0.06			0.6	OK
1.004	5	79	111.293	-0.127	0.000	0.06			0.9	OK
2.000	6	79	111.762	-0.138	0.000	0.02			0.2	OK
2.001	7	79	111.592	-0.138	0.000	0.02			0.3	OK
2.002	8	79	111.509	-0.141	0.000	0.01			0.4	OK
1.005	9	79	111.023	-0.202	0.000	0.02			1.5	OK
1.006	10	79	110.720	-0.205	0.000	0.02			1.5	OK
1.007	11	47	109.767	-0.833	0.000	0.00			2.6	OK
3.000	12	79	111.514	-0.086	0.000	0.05			0.3	OK
3.001	13	82	111.358	-0.142	0.000	0.01			0.4	OK
3.002	14	80	110.515	-0.135	0.000	0.02			0.5	OK
1.008	15	47	109.767	0.117	0.000	0.12			2.3	SURCHARGED

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Micro Drainage

7 Starkey Street
Heywood
Rochdale

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Page 70



Summary Wizard of 5760 minute 100 year Summer I+40% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	88	111.761	-0.139	0.000	0.02		0.2	OK
1.001	2	88	111.534	-0.136	0.000	0.02		0.3	OK
1.002	3	88	111.447	-0.133	0.000	0.03		0.4	OK
1.003	4	88	111.320	-0.130	0.000	0.05		0.5	OK
1.004	5	88	111.291	-0.129	0.000	0.05		0.7	OK
2.000	6	88	111.759	-0.141	0.000	0.01		0.2	OK
2.001	7	88	111.590	-0.140	0.000	0.01		0.2	OK
2.002	8	88	111.507	-0.143	0.000	0.01		0.3	OK
1.005	9	88	111.019	-0.206	0.000	0.02		1.2	OK
1.006	10	88	110.716	-0.209	0.000	0.01		1.2	OK
1.007	11	80	109.677	-0.923	0.000	0.00		2.1	OK
3.000	12	88	111.512	-0.088	0.000	0.04		0.2	OK
3.001	13	88	111.357	-0.143	0.000	0.01		0.3	OK
3.002	14	88	110.513	-0.137	0.000	0.02		0.4	OK
1.008	15	80	109.677	0.027	0.000	0.11		2.2	SURCHARGED

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Micro Drainage				Network 2020.1.3					
<u>Summary Wizard of 10080 minute 100 year Summer I+40% 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		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		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		0.289			
Region England and Wales Cv (Summer)		0.750							
M5-60 (mm)		19.000		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)		0.0		DVD Status		ON			
Analysis Timestep		Fine		Inertia Status		OFF			
DTS Status		ON							
Profile(s)				Summer and Winter					
Duration(s) (mins)		30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080							
Return Period(s) (years)		1, 2, 30, 100							
Climate Change (%)		0, 0, 0, 40							

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Summary Wizard of 30 minute 1 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	24	111.780	-0.120	0.000	0.09		1.2	OK
1.001	2	24	111.553	-0.117	0.000	0.11		1.5	OK
1.002	3	25	111.470	-0.110	0.000	0.16		2.2	OK
1.003	4	25	111.351	-0.099	0.000	0.25		2.7	OK
1.004	5	26	111.321	-0.099	0.000	0.25		3.8	OK
2.000	6	24	111.777	-0.123	0.000	0.08		1.1	OK
2.001	7	24	111.608	-0.122	0.000	0.08		1.2	OK
2.002	8	24	111.523	-0.127	0.000	0.06		1.9	OK
1.005	9	26	111.047	-0.178	0.000	0.10		6.5	OK
1.006	10	26	110.743	-0.182	0.000	0.08		6.5	OK
1.007	11	71	109.700	-0.900	0.000	0.00		11.3	OK
3.000	12	24	111.532	-0.068	0.000	0.22		1.3	OK
3.001	13	24	111.373	-0.127	0.000	0.06		1.8	OK
3.002	14	24	110.532	-0.118	0.000	0.10		2.2	OK
1.008	15	71	109.700	0.050	0.000	0.11		2.2	SURCHARGED

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Summary Wizard of 60 minute 1 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	35	111.774	-0.126	0.000	0.06		0.9	OK
1.001	2	36	111.548	-0.122	0.000	0.08		1.1	OK
1.002	3	36	111.464	-0.116	0.000	0.12		1.6	OK
1.003	4	36	111.344	-0.106	0.000	0.19		2.0	OK
1.004	5	36	111.314	-0.106	0.000	0.19		2.8	OK
2.000	6	35	111.772	-0.128	0.000	0.05		0.7	OK
2.001	7	35	111.603	-0.127	0.000	0.06		0.9	OK
2.002	8	36	111.520	-0.130	0.000	0.04		1.4	OK
1.005	9	36	111.040	-0.185	0.000	0.07		4.8	OK
1.006	10	36	110.736	-0.189	0.000	0.06		4.8	OK
1.007	11	63	109.715	-0.885	0.000	0.00		8.5	OK
3.000	12	35	111.526	-0.074	0.000	0.15		0.9	OK
3.001	13	36	111.369	-0.131	0.000	0.04		1.3	OK
3.002	14	36	110.526	-0.124	0.000	0.07		1.6	OK
1.008	15	63	109.715	0.065	0.000	0.11		2.2	SURCHARGED

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Page 76

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Micro Drainage

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Summary Wizard of 120 minute 1 year Winter I+0% 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 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 1

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 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

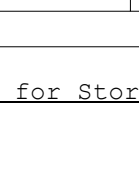
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)		Overflow (l/s)	Time (mins)	
1.000	1	48	111.770	-0.130	0.000	0.04		0.6	OK
1.001	2	48	111.542	-0.128	0.000	0.05		0.7	OK
1.002	3	48	111.458	-0.122	0.000	0.08		1.1	OK
1.003	4	48	111.335	-0.115	0.000	0.13		1.4	OK
1.004	5	48	111.306	-0.114	0.000	0.13		1.9	OK
2.000	6	48	111.768	-0.132	0.000	0.04		0.5	OK
2.001	7	48	111.599	-0.131	0.000	0.04		0.6	OK
2.002	8	48	111.517	-0.133	0.000	0.03		1.0	OK
1.005	9	48	111.032	-0.193	0.000	0.05		3.3	OK
1.006	10	48	110.729	-0.196	0.000	0.04		3.3	OK
1.007	11	61	109.719	-0.881	0.000	0.00		5.8	OK
3.000	12	48	111.521	-0.079	0.000	0.10		0.6	OK
3.001	13	48	111.366	-0.134	0.000	0.03		0.9	OK
3.002	14	48	110.521	-0.129	0.000	0.05		1.1	OK
1.008	15	61	109.719	0.069	0.000	0.11		2.3	SURCHARGED

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Micro Drainage Network 2020.1.3		

Summary Wizard of 180 minute 1 year Winter I+0% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	57	111.768	-0.132	0.000	0.03		0.5		OK
1.001	2	57	111.540	-0.130	0.000	0.04		0.6		OK
1.002	3	57	111.454	-0.126	0.000	0.06		0.9		OK
1.003	4	57	111.332	-0.118	0.000	0.10		1.1		OK
1.004	5	57	111.302	-0.118	0.000	0.10		1.5		OK
2.000	6	57	111.767	-0.133	0.000	0.03		0.4		OK
2.001	7	57	111.597	-0.133	0.000	0.03		0.5		OK
2.002	8	57	111.515	-0.135	0.000	0.02		0.8		OK
1.005	9	57	111.029	-0.196	0.000	0.04		2.6		OK
1.006	10	57	110.726	-0.199	0.000	0.03		2.6		OK
1.007	11	64	109.714	-0.886	0.000	0.00		4.6		OK
3.000	12	57	111.519	-0.081	0.000	0.08		0.5		OK
3.001	13	57	111.365	-0.135	0.000	0.02		0.7		OK
3.002	14	57	110.519	-0.131	0.000	0.04		0.9		OK
1.008	15	64	109.714	0.064	0.000	0.11		2.2	SURCHARGED	

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Micro Drainage		Network 2020.1.3	

Summary Wizard of 240 minute 1 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)		Time (mins)	Flow (l/s)	
1.000	1	65	111.767	-0.133	0.000	0.03		0.4	OK
1.001	2	65	111.538	-0.132	0.000	0.04		0.5	OK
1.002	3	65	111.452	-0.128	0.000	0.05		0.7	OK
1.003	4	65	111.329	-0.121	0.000	0.08		0.9	OK
1.004	5	65	111.299	-0.121	0.000	0.09		1.3	OK
2.000	6	65	111.766	-0.134	0.000	0.02		0.3	OK
2.001	7	65	111.596	-0.134	0.000	0.03		0.4	OK
2.002	8	65	111.514	-0.136	0.000	0.02		0.6	OK
1.005	9	65	111.027	-0.198	0.000	0.03		2.2	OK
1.006	10	65	110.725	-0.200	0.000	0.03		2.2	OK
1.007	11	68	109.705	-0.895	0.000	0.00		3.9	OK
3.000	12	65	111.517	-0.083	0.000	0.07		0.4	OK
3.001	13	65	111.363	-0.137	0.000	0.02		0.6	OK
3.002	14	65	110.518	-0.132	0.000	0.03		0.7	OK
1.008	15	69	109.705	0.055	0.000	0.11		2.2	SURCHARGED

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Page 80

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Date 16/04/2024

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Micro Drainage

Summary Wizard of 480 minute 1 year Winter I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales

Cv (Summer) 0.750

M5-60 (mm)

19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s)

Summer and Winter

Duration(s) (mins)

30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years)

1, 2, 30, 100

Climate Change (%)

0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level	Surcharged Depth	Flooded Volume	Flow / Cap.	Overflow	Half Drain Time	Pipe Flow	Status
			(m)	(m)	(m³)		(l/s)	(mins)	(l/s)	
1.000	1	83	111.763	-0.137	0.000	0.02			0.3	OK
1.001	2	83	111.535	-0.135	0.000	0.02			0.3	OK
1.002	3	83	111.448	-0.132	0.000	0.03			0.5	OK
1.003	4	83	111.323	-0.127	0.000	0.05			0.6	OK
1.004	5	83	111.293	-0.127	0.000	0.06			0.8	OK
2.000	6	83	111.761	-0.139	0.000	0.02			0.2	OK
2.001	7	83	111.592	-0.138	0.000	0.02			0.3	OK
2.002	8	83	111.509	-0.141	0.000	0.01			0.4	OK
1.005	9	83	111.023	-0.202	0.000	0.02			1.4	OK
1.006	10	83	110.719	-0.206	0.000	0.02			1.4	OK
1.007	11	85	109.657	-0.943	0.000	0.00			2.5	OK
3.000	12	83	111.514	-0.086	0.000	0.04			0.3	OK
3.001	13	80	111.358	-0.142	0.000	0.01			0.4	OK
3.002	14	83	110.515	-0.135	0.000	0.02			0.5	OK
1.008	15	84	109.658	0.008	0.000	0.11			2.1	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 85		
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 2160 minute 1 year Winter I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	117	111.755	-0.145	0.000	0.01		0.1	OK
1.001	2	117	111.526	-0.144	0.000	0.01		0.1	OK
1.002	3	117	111.439	-0.141	0.000	0.01		0.2	OK
1.003	4	117	111.315	-0.135	0.000	0.02		0.2	OK
1.004	5	117	111.285	-0.135	0.000	0.02		0.3	OK
2.000	6	117	111.754	-0.146	0.000	0.01		0.1	OK
2.001	7	117	111.584	-0.146	0.000	0.01		0.1	OK
2.002	8	117	111.503	-0.147	0.000	0.00		0.2	OK
1.005	9	117	111.009	-0.216	0.000	0.01		0.6	OK
1.006	10	117	110.707	-0.218	0.000	0.01		0.6	OK
1.007	11	130	109.601	-0.999	0.000	0.00		1.0	OK
3.000	12	117	111.508	-0.092	0.000	0.02		0.1	OK
3.001	13	117	111.353	-0.147	0.000	0.00		0.1	OK
3.002	14	117	110.506	-0.144	0.000	0.01		0.2	OK
1.008	15	117	109.560	-0.090	0.000	0.06		1.2	OK

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Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 30 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	16	111.784	-0.116	0.000	0.11		1.6	OK
1.001	2	18	111.558	-0.112	0.000	0.14		2.0	OK
1.002	3	18	111.476	-0.104	0.000	0.21		2.9	OK
1.003	4	18	111.359	-0.091	0.000	0.33		3.6	OK
1.004	5	18	111.329	-0.091	0.000	0.33		4.9	OK
2.000	6	16	111.782	-0.118	0.000	0.10		1.4	OK
2.001	7	18	111.612	-0.118	0.000	0.10		1.6	OK
2.002	8	18	111.527	-0.123	0.000	0.07		2.5	OK
1.005	9	18	111.053	-0.172	0.000	0.13		8.4	OK
1.006	10	18	110.748	-0.177	0.000	0.10		8.4	OK
1.007	11	57	109.736	-0.864	0.000	0.00		14.6	OK
3.000	12	16	111.536	-0.064	0.000	0.28		1.6	OK
3.001	13	18	111.376	-0.124	0.000	0.07		2.3	OK
3.002	14	18	110.536	-0.114	0.000	0.13		2.9	OK
1.008	15	56	109.736	0.086	0.000	0.11		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 93			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 60 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

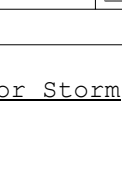
Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	27	111.778	-0.122	0.000	0.08		1.1	OK
1.001	2	27	111.552	-0.118	0.000	0.10		1.4	OK
1.002	3	28	111.468	-0.112	0.000	0.15		2.1	OK
1.003	4	28	111.349	-0.101	0.000	0.24		2.6	OK
1.004	5	28	111.319	-0.101	0.000	0.24		3.6	OK
2.000	6	27	111.776	-0.124	0.000	0.07		0.9	OK
2.001	7	27	111.606	-0.124	0.000	0.07		1.1	OK
2.002	8	28	111.522	-0.128	0.000	0.05		1.8	OK
1.005	9	28	111.046	-0.179	0.000	0.09		6.1	OK
1.006	10	28	110.741	-0.184	0.000	0.08		6.1	OK
1.007	11	51	109.756	-0.844	0.000	0.00		10.8	OK
3.000	12	27	111.530	-0.070	0.000	0.20		1.1	OK
3.001	13	27	111.372	-0.128	0.000	0.05		1.6	OK
3.002	14	28	110.530	-0.120	0.000	0.09		2.1	OK
1.008	15	51	109.756	0.106	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd								Page 95	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024 File Storm revA.MDX				Designed by JS Checked by					
Micro Drainage				Network 2020.1.3					
<u>Summary Wizard of 180 minute 2 year Winter I+0% 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		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		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		0.289			
Region England and Wales Cv (Summer)		0.750							
M5-60 (mm)		19.000		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)		0.0		DVD Status		ON			
Analysis Timestep		Fine		Inertia Status		OFF			
DTS Status		ON							
Profile(s)				Summer and Winter					
Duration(s) (mins)		30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080							
Return Period(s) (years)		1, 2, 30, 100							
Climate Change (%)		0, 0, 0, 40							

Armstrong Stokes & Clayton Ltd		Page 96
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 240 minute 2 year Winter I+0% 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 0.000
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 0
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	Ratio R 0.289
Region England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000 Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 0.0	DVD Status ON
Analysis Timestep	Fine Inertia Status OFF
DTS Status	ON

Profile(s) Summer and Winter

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	56	111.768	-0.132	0.000	0.03		0.5	OK
1.001	2	56	111.540	-0.130	0.000	0.04		0.6	OK
1.002	3	56	111.455	-0.125	0.000	0.06		0.9	OK
1.003	4	56	111.332	-0.118	0.000	0.10		1.1	OK
1.004	5	56	111.302	-0.118	0.000	0.10		1.6	OK
2.000	6	56	111.767	-0.133	0.000	0.03		0.4	OK
2.001	7	56	111.597	-0.133	0.000	0.03		0.5	OK
2.002	8	56	111.515	-0.135	0.000	0.02		0.8	OK
1.005	9	56	111.029	-0.196	0.000	0.04		2.7	OK
1.006	10	56	110.727	-0.198	0.000	0.03		2.7	OK
1.007	11	52	109.749	-0.851	0.000	0.00		4.8	OK
3.000	12	56	111.519	-0.081	0.000	0.08		0.5	OK
3.001	13	56	111.365	-0.135	0.000	0.02		0.7	OK
3.002	14	56	110.519	-0.131	0.000	0.04		0.9	OK
1.008	15	52	109.749	0.099	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 97	
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire		7 Starkey Street Heywood Rochdale	
Date 16/04/2024		Designed by JS	
File Storm revA.MDX		Checked by	
Micro Drainage		Network 2020.1.3	

Summary Wizard of 360 minute 2 year Winter I+0% 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 0.000

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 0

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 Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON

Analysis Timestep Fine Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	66	111.766	-0.134	0.000	0.03		0.4		OK
1.001	2	66	111.538	-0.132	0.000	0.03		0.5		OK
1.002	3	66	111.451	-0.129	0.000	0.05		0.7		OK
1.003	4	66	111.328	-0.122	0.000	0.08		0.9		OK
1.004	5	66	111.298	-0.122	0.000	0.08		1.2		OK
2.000	6	66	111.765	-0.135	0.000	0.02		0.3		OK
2.001	7	66	111.596	-0.134	0.000	0.02		0.4		OK
2.002	8	66	111.513	-0.137	0.000	0.02		0.6		OK
1.005	9	66	111.026	-0.199	0.000	0.03		2.1		OK
1.006	10	66	110.724	-0.201	0.000	0.03		2.1		OK
1.007	11	58	109.727	-0.873	0.000	0.00		3.7		OK
3.000	12	66	111.517	-0.083	0.000	0.07		0.4		OK
3.001	13	66	111.362	-0.138	0.000	0.02		0.5		OK
3.002	14	66	110.517	-0.133	0.000	0.03		0.7		OK
1.008	15	58	109.727	0.077	0.000	0.11		2.3	SURCHARGED	

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
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Summary Wizard of 720 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	85	111.762	-0.138	0.000	0.02		0.2	OK
1.001	2	85	111.535	-0.135	0.000	0.02		0.3	OK
1.002	3	85	111.447	-0.133	0.000	0.03		0.4	OK
1.003	4	85	111.322	-0.128	0.000	0.05		0.5	OK
1.004	5	85	111.292	-0.128	0.000	0.05		0.8	OK
2.000	6	85	111.760	-0.140	0.000	0.01		0.2	OK
2.001	7	85	111.591	-0.139	0.000	0.02		0.2	OK
2.002	8	85	111.508	-0.142	0.000	0.01		0.4	OK
1.005	9	85	111.021	-0.204	0.000	0.02		1.3	OK
1.006	10	85	110.717	-0.208	0.000	0.02		1.3	OK
1.007	11	82	109.659	-0.941	0.000	0.00		2.3	OK
3.000	12	85	111.513	-0.087	0.000	0.04		0.2	OK
3.001	13	85	111.358	-0.142	0.000	0.01		0.3	OK
3.002	14	85	110.514	-0.136	0.000	0.02		0.4	OK
1.008	15	82	109.659	0.009	0.000	0.11		2.1	SURCHARGED

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...			7 Starkey Street Heywood Rochdale				
Date 16/04/2024 File Storm revA.MDX			Designed by JS Checked by				
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Summary Wizard of 2160 minute 2 year Winter I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	110	111.756	-0.144	0.000	0.01		0.1	OK
1.001	2	110	111.527	-0.143	0.000	0.01		0.1	OK
1.002	3	110	111.441	-0.139	0.000	0.02		0.2	OK
1.003	4	110	111.316	-0.134	0.000	0.02		0.3	OK
1.004	5	110	111.286	-0.134	0.000	0.02		0.4	OK
2.000	6	110	111.755	-0.145	0.000	0.01		0.1	OK
2.001	7	110	111.585	-0.145	0.000	0.01		0.1	OK
2.002	8	110	111.504	-0.146	0.000	0.01		0.2	OK
1.005	9	110	111.010	-0.215	0.000	0.01		0.6	OK
1.006	10	110	110.709	-0.216	0.000	0.01		0.6	OK
1.007	11	124	109.601	-0.999	0.000	0.00		1.2	OK
3.000	12	111	111.509	-0.091	0.000	0.02		0.1	OK
3.001	13	110	111.354	-0.146	0.000	0.01		0.2	OK
3.002	14	110	110.507	-0.143	0.000	0.01		0.2	OK
1.008	15	110	109.568	-0.082	0.000	0.07		1.4	OK

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Summary Wizard of 4320 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)

Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080	Summer and Winter
Return Period(s) (years)	1, 2, 30, 100	
Climate Change (%)	0, 0, 0, 40	

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	127	111.754	-0.146	0.000	0.01		0.1	OK
1.001	2	127	111.525	-0.145	0.000	0.01		0.1	OK
1.002	3	127	111.437	-0.143	0.000	0.01		0.1	OK
1.003	4	127	111.311	-0.139	0.000	0.02		0.2	OK
1.004	5	127	111.281	-0.139	0.000	0.02		0.2	OK
2.000	6	127	111.753	-0.147	0.000	0.00		0.1	OK
2.001	7	127	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	127	111.503	-0.147	0.000	0.00		0.1	OK
1.005	9	127	111.007	-0.218	0.000	0.01		0.4	OK
1.006	10	127	110.705	-0.220	0.000	0.01		0.4	OK
1.007	11	108	109.601	-0.999	0.000	0.00		0.7	OK
3.000	12	127	111.506	-0.094	0.000	0.01		0.1	OK
3.001	13	127	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	127	110.504	-0.146	0.000	0.01		0.1	OK
1.008	15	127	109.549	-0.101	0.000	0.04		0.9	OK

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Summary Wizard of 7200 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)				
1.000	1	138	111.753	-0.147	0.000	0.00		0.1	OK		
1.001	2	138	111.523	-0.147	0.000	0.00		0.1	OK		
1.002	3	138	111.435	-0.145	0.000	0.01		0.1	OK		
1.003	4	138	111.308	-0.142	0.000	0.01		0.1	OK		
1.004	5	138	111.278	-0.142	0.000	0.01		0.2	OK		
2.000	6	138	111.752	-0.148	0.000	0.00		0.0	OK		
2.001	7	138	111.582	-0.148	0.000	0.00		0.1	OK		
2.002	8	138	111.502	-0.148	0.000	0.00		0.1	OK		
1.005	9	138	111.005	-0.220	0.000	0.00		0.3	OK		
1.006	10	138	110.704	-0.221	0.000	0.00		0.3	OK		
1.007	11	111	109.601	-0.999	0.000	0.00		0.5	OK		
3.000	12	138	111.504	-0.096	0.000	0.01		0.1	OK		
3.001	13	138	111.352	-0.148	0.000	0.00		0.1	OK		
3.002	14	138	110.503	-0.147	0.000	0.00		0.1	OK		
1.008	15	138	109.540	-0.110	0.000	0.03		0.6	OK		

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Summary Wizard of 10080 minute 2 year Winter I+0% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	142	111.752	-0.148	0.000	0.00		0.0	OK
1.001	2	142	111.523	-0.147	0.000	0.00		0.1	OK
1.002	3	142	111.434	-0.146	0.000	0.01		0.1	OK
1.003	4	142	111.306	-0.144	0.000	0.01		0.1	OK
1.004	5	142	111.276	-0.144	0.000	0.01		0.1	OK
2.000	6	142	111.752	-0.148	0.000	0.00		0.0	OK
2.001	7	142	111.582	-0.148	0.000	0.00		0.0	OK
2.002	8	142	111.501	-0.149	0.000	0.00		0.1	OK
1.005	9	142	111.004	-0.221	0.000	0.00		0.2	OK
1.006	10	142	110.703	-0.222	0.000	0.00		0.2	OK
1.007	11	127	109.601	-0.999	0.000	0.00		0.4	OK
3.000	12	142	111.503	-0.097	0.000	0.01		0.0	OK
3.001	13	142	111.351	-0.149	0.000	0.00		0.1	OK
3.002	14	142	110.502	-0.148	0.000	0.00		0.1	OK
1.008	15	142	109.535	-0.115	0.000	0.03		0.5	OK

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Page 110

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Summary Wizard of 30 minute 30 year Winter I+0% 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 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 1

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 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1	7	111.797	-0.103	0.000	0.22		3.1	OK
1.001	2	7	111.574	-0.096	0.000	0.28		3.8	OK
1.002	3	7	111.496	-0.084	0.000	0.40		5.6	OK
1.003	4	7	111.389	-0.061	0.000	0.65		7.0	OK
1.004	5	7	111.359	-0.061	0.000	0.65		9.8	OK
2.000	6	7	111.794	-0.106	0.000	0.19		2.6	OK
2.001	7	7	111.625	-0.105	0.000	0.19		3.1	OK
2.002	8	7	111.538	-0.112	0.000	0.15		5.0	OK
1.005	9	7	111.077	-0.148	0.000	0.26		16.9	OK
1.006	10	7	110.770	-0.155	0.000	0.21		16.9	OK
1.007	11	40	109.883	-0.717	0.000	0.01		29.9	OK
3.000	12	7	111.552	-0.048	0.000	0.54		3.1	OK
3.001	13	7	111.388	-0.112	0.000	0.14		4.5	OK
3.002	14	7	110.551	-0.099	0.000	0.26		5.7	OK
1.008	15	40	109.883	0.233	0.000	0.12		2.3	SURCHARGED

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Page 111



Summary Wizard of 60 minute 30 year Winter I+0% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	12	111.789	-0.111	0.000	0.15		2.1	OK
1.001	2	12	111.565	-0.105	0.000	0.19		2.6	OK
1.002	3	11	111.485	-0.095	0.000	0.28		4.0	OK
1.003	4	11	111.372	-0.078	0.000	0.46		4.9	OK
1.004	5	11	111.342	-0.078	0.000	0.46		6.9	OK
2.000	6	12	111.786	-0.114	0.000	0.13		1.8	OK
2.001	7	12	111.617	-0.113	0.000	0.14		2.1	OK
2.002	8	11	111.532	-0.118	0.000	0.10		3.5	OK
1.005	9	11	111.064	-0.161	0.000	0.18		11.9	OK
1.006	10	12	110.758	-0.167	0.000	0.15		11.9	OK
1.007	11	29	109.948	-0.652	0.000	0.00		20.9	OK
3.000	12	12	111.542	-0.058	0.000	0.37		2.2	OK
3.001	13	11	111.382	-0.118	0.000	0.10		3.2	OK
3.002	14	11	110.542	-0.108	0.000	0.18		4.0	OK
1.008	15	29	109.948	0.298	0.000	0.12		2.3	SURCHARGED

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Date 16/04/2024				Designed by JS						
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Summary Wizard of 180 minute 30 year Winter I+0% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	30	111.777	-0.123	0.000	0.08		1.1	OK
1.001	2	29	111.551	-0.119	0.000	0.10		1.3	OK
1.002	3	29	111.468	-0.112	0.000	0.14		2.0	OK
1.003	4	29	111.349	-0.101	0.000	0.23		2.5	OK
1.004	5	29	111.319	-0.101	0.000	0.23		3.5	OK
2.000	6	30	111.775	-0.125	0.000	0.07		0.9	OK
2.001	7	29	111.606	-0.124	0.000	0.07		1.1	OK
2.002	8	29	111.522	-0.128	0.000	0.05		1.7	OK
1.005	9	29	111.046	-0.179	0.000	0.09		6.0	OK
1.006	10	29	110.740	-0.185	0.000	0.07		6.0	OK
1.007	11	25	109.998	-0.602	0.000	0.00		10.6	OK
3.000	12	30	111.529	-0.071	0.000	0.19		1.1	OK
3.001	13	29	111.371	-0.129	0.000	0.05		1.6	OK
3.002	14	29	110.530	-0.120	0.000	0.09		2.0	OK
1.008	15	25	109.998	0.348	0.000	0.12		2.3	SURCHARGED

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Summary Wizard of 240 minute 30 year Winter I+0% 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 0.000

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 0

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 Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON

Analysis Timestep Fine Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	36	111.774	-0.126	0.000	0.06			0.9	OK
1.001	2	35	111.548	-0.122	0.000	0.08			1.1	OK
1.002	3	35	111.464	-0.116	0.000	0.12			1.6	OK
1.003	4	35	111.344	-0.106	0.000	0.19			2.0	OK
1.004	5	35	111.314	-0.106	0.000	0.19			2.9	OK
2.000	6	36	111.772	-0.128	0.000	0.05			0.8	OK
2.001	7	36	111.603	-0.127	0.000	0.06			0.9	OK
2.002	8	35	111.520	-0.130	0.000	0.04			1.4	OK
1.005	9	35	111.040	-0.185	0.000	0.07			4.9	OK
1.006	10	35	110.736	-0.189	0.000	0.06			4.9	OK
1.007	11	27	109.989	-0.611	0.000	0.00			8.7	OK
3.000	12	36	111.526	-0.074	0.000	0.15			0.9	OK
3.001	13	35	111.369	-0.131	0.000	0.04			1.3	OK
3.002	14	35	110.527	-0.123	0.000	0.07			1.6	OK
1.008	15	27	109.990	0.340	0.000	0.12			2.3	SURCHARGED

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Summary Wizard of 360 minute 30 year Winter I+0% 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	0.000
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	0
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

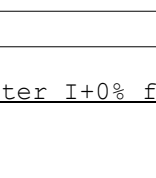
Rainfall Model	FSR	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	44	111.771	-0.129	0.000	0.05		0.7	OK
1.001	2	44	111.544	-0.126	0.000	0.06		0.8	OK
1.002	3	44	111.460	-0.120	0.000	0.09		1.2	OK
1.003	4	44	111.337	-0.113	0.000	0.14		1.5	OK
1.004	5	44	111.308	-0.112	0.000	0.14		2.2	OK
2.000	6	44	111.769	-0.131	0.000	0.04		0.6	OK
2.001	7	44	111.600	-0.130	0.000	0.04		0.7	OK
2.002	8	44	111.517	-0.133	0.000	0.03		1.1	OK
1.005	9	44	111.034	-0.191	0.000	0.06		3.7	OK
1.006	10	44	110.731	-0.194	0.000	0.05		3.7	OK
1.007	11	28	109.966	-0.634	0.000	0.00		6.6	OK
3.000	12	44	111.523	-0.077	0.000	0.12		0.7	OK
3.001	13	44	111.367	-0.133	0.000	0.03		1.0	OK
3.002	14	44	110.523	-0.127	0.000	0.05		1.2	OK
1.008	15	28	109.966	0.316	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 116
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Date 16/04/2024 File Storm revA.MDX		
Designed by JS Checked by		
Micro Drainage		Network 2020.1.3

Summary Wizard of 480 minute 30 year Winter I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	53	111.769	-0.131	0.000	0.04			0.5	OK
1.001	2	53	111.541	-0.129	0.000	0.05			0.7	OK
1.002	3	53	111.456	-0.124	0.000	0.07			1.0	OK
1.003	4	53	111.334	-0.116	0.000	0.12			1.3	OK
1.004	5	53	111.304	-0.116	0.000	0.12			1.8	OK
2.000	6	53	111.768	-0.132	0.000	0.03			0.5	OK
2.001	7	53	111.598	-0.132	0.000	0.03			0.5	OK
2.002	8	53	111.516	-0.134	0.000	0.03			0.9	OK
1.005	9	53	111.031	-0.194	0.000	0.05			3.0	OK
1.006	10	53	110.728	-0.197	0.000	0.04			3.0	OK
1.007	11	30	109.939	-0.661	0.000	0.00			5.4	OK
3.000	12	53	111.521	-0.079	0.000	0.10			0.5	OK
3.001	13	53	111.366	-0.134	0.000	0.03			0.8	OK
3.002	14	53	110.520	-0.130	0.000	0.04			1.0	OK
1.008	15	30	109.939	0.289	0.000	0.12			2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 117			
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Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 600 minute 30 year Winter I+0% 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	0.000
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	0
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

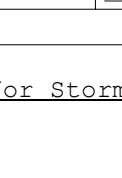
Rainfall Model	FSR	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	58	111.768	-0.132	0.000	0.03		0.5	OK
1.001	2	58	111.540	-0.130	0.000	0.04		0.6	OK
1.002	3	58	111.454	-0.126	0.000	0.06		0.9	OK
1.003	4	58	111.332	-0.118	0.000	0.10		1.1	OK
1.004	5	58	111.302	-0.118	0.000	0.10		1.5	OK
2.000	6	58	111.767	-0.133	0.000	0.03		0.4	OK
2.001	7	58	111.597	-0.133	0.000	0.03		0.5	OK
2.002	8	58	111.515	-0.135	0.000	0.02		0.8	OK
1.005	9	58	111.029	-0.196	0.000	0.04		2.6	OK
1.006	10	58	110.726	-0.199	0.000	0.03		2.6	OK
1.007	11	36	109.908	-0.692	0.000	0.00		4.6	OK
3.000	12	58	111.519	-0.081	0.000	0.08		0.5	OK
3.001	13	58	111.365	-0.135	0.000	0.02		0.7	OK
3.002	14	58	110.519	-0.131	0.000	0.04		0.9	OK
1.008	15	36	109.908	0.258	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 118
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
Micro Drainage Network 2020.1.3		

Summary Wizard of 720 minute 30 year Winter I+0% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	64	111.767	-0.133	0.000	0.03			0.4	OK
1.001	2	64	111.539	-0.131	0.000	0.04			0.5	OK
1.002	3	64	111.452	-0.128	0.000	0.05			0.8	OK
1.003	4	64	111.330	-0.120	0.000	0.09			0.9	OK
1.004	5	64	111.300	-0.120	0.000	0.09			1.3	OK
2.000	6	64	111.766	-0.134	0.000	0.03			0.3	OK
2.001	7	64	111.596	-0.134	0.000	0.03			0.4	OK
2.002	8	64	111.514	-0.136	0.000	0.02			0.7	OK
1.005	9	64	111.027	-0.198	0.000	0.03			2.3	OK
1.006	10	64	110.725	-0.200	0.000	0.03			2.3	OK
1.007	11	41	109.877	-0.723	0.000	0.00			4.0	OK
3.000	12	64	111.517	-0.083	0.000	0.07			0.4	OK
3.001	13	64	111.363	-0.137	0.000	0.02			0.6	OK
3.002	14	64	110.518	-0.132	0.000	0.03			0.8	OK
1.008	15	41	109.877	0.227	0.000	0.12			2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd		Page 120
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshire		7 Starkey Street Heywood Rochdale
Date 16/04/2024	Designed by JS	
File Storm revA.MDX	Checked by	
Micro Drainage		Network 2020.1.3

Summary Wizard of 1440 minute 30 year Winter I+0% 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 0.000
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 0
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 Ratio R 0.289
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
960, 1440, 2160, 2880, 4320, 5760, 7200,
8640, 10080
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	1	84	111.763	-0.137	0.000	0.02			0.3	OK
1.001	2	84	111.535	-0.135	0.000	0.02			0.3	OK
1.002	3	84	111.448	-0.132	0.000	0.03			0.5	OK
1.003	4	84	111.322	-0.128	0.000	0.05			0.6	OK
1.004	5	84	111.292	-0.128	0.000	0.05			0.8	OK
2.000	6	84	111.761	-0.139	0.000	0.02			0.2	OK
2.001	7	84	111.591	-0.139	0.000	0.02			0.3	OK
2.002	8	84	111.508	-0.142	0.000	0.01			0.4	OK
1.005	9	84	111.022	-0.203	0.000	0.02			1.4	OK
1.006	10	84	110.718	-0.207	0.000	0.02			1.4	OK
1.007	11	60	109.724	-0.876	0.000	0.00			2.5	OK
3.000	12	84	111.513	-0.087	0.000	0.04			0.3	OK
3.001	13	84	111.358	-0.142	0.000	0.01			0.4	OK
3.002	14	84	110.515	-0.135	0.000	0.02			0.5	OK
1.008	15	60	109.724	0.074	0.000	0.11			2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 123		
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
Micro Drainage				Network 2020.1.3					

Summary Wizard of 4320 minute 30 year Winter I+0% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	113	111.756	-0.144	0.000	0.01		0.1	OK
1.001	2	113	111.527	-0.143	0.000	0.01		0.1	OK
1.002	3	113	111.441	-0.139	0.000	0.02		0.2	OK
1.003	4	113	111.316	-0.134	0.000	0.02		0.3	OK
1.004	5	113	111.286	-0.134	0.000	0.02		0.4	OK
2.000	6	113	111.755	-0.145	0.000	0.01		0.1	OK
2.001	7	113	111.585	-0.145	0.000	0.01		0.1	OK
2.002	8	113	111.504	-0.146	0.000	0.01		0.2	OK
1.005	9	113	111.010	-0.215	0.000	0.01		0.6	OK
1.006	10	113	110.708	-0.217	0.000	0.01		0.6	OK
1.007	11	110	109.601	-0.999	0.000	0.00		1.1	OK
3.000	12	112	111.509	-0.091	0.000	0.02		0.1	OK
3.001	13	113	111.354	-0.146	0.000	0.01		0.2	OK
3.002	14	113	110.507	-0.143	0.000	0.01		0.2	OK
1.008	15	113	109.567	-0.083	0.000	0.07		1.3	OK

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Armstrong Stokes & Clayton Ltd		Page 127
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...	7 Starkey Street Heywood Rochdale	
Date 16/04/2024 File Storm revA.MDX	Designed by JS Checked by	
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Summary Wizard of 10080 minute 30 year Winter I+0% 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 0.000
 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 0
 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 Ratio R 0.289
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720,
 960, 1440, 2160, 2880, 4320, 5760, 7200,
 8640, 10080
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	133	111.753	-0.147	0.000	0.00		0.1	OK
1.001	2	133	111.524	-0.146	0.000	0.01		0.1	OK
1.002	3	133	111.436	-0.144	0.000	0.01		0.1	OK
1.003	4	133	111.309	-0.141	0.000	0.01		0.1	OK
1.004	5	133	111.279	-0.141	0.000	0.01		0.2	OK
2.000	6	133	111.753	-0.147	0.000	0.00		0.1	OK
2.001	7	133	111.583	-0.147	0.000	0.00		0.1	OK
2.002	8	133	111.502	-0.148	0.000	0.00		0.1	OK
1.005	9	133	111.006	-0.219	0.000	0.01		0.3	OK
1.006	10	133	110.705	-0.220	0.000	0.00		0.3	OK
1.007	11	103	109.601	-0.999	0.000	0.00		0.6	OK
3.000	12	133	111.505	-0.095	0.000	0.01		0.1	OK
3.001	13	133	111.352	-0.148	0.000	0.00		0.1	OK
3.002	14	133	110.504	-0.146	0.000	0.01		0.1	OK
1.008	15	133	109.544	-0.106	0.000	0.04		0.7	OK

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale					
Date 16/04/2024				Designed by JS					
File Storm revA.MDX				Checked by					
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Summary Wizard of 60 minute 100 year Winter I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	4	111.804	-0.096	0.000	0.28		3.9	OK
1.001	2	4	111.582	-0.088	0.000	0.36		4.8	OK
1.002	3	4	111.507	-0.073	0.000	0.52		7.3	OK
1.003	4	4	111.406	-0.044	0.000	0.84		9.1	OK
1.004	5	4	111.377	-0.043	0.000	0.85		12.7	OK
2.000	6	4	111.800	-0.100	0.000	0.24		3.3	OK
2.001	7	4	111.631	-0.099	0.000	0.25		3.9	OK
2.002	8	4	111.544	-0.106	0.000	0.19		6.4	OK
1.005	9	4	111.090	-0.135	0.000	0.33		21.8	OK
1.006	10	4	110.780	-0.145	0.000	0.27		21.9	OK
1.007	11	16	110.302	-0.298	0.000	0.01		38.4	OK
3.000	12	4	111.561	-0.039	0.000	0.69		4.0	OK
3.001	13	4	111.393	-0.107	0.000	0.18		5.8	OK
3.002	14	4	110.559	-0.091	0.000	0.33		7.3	OK
1.008	15	16	110.302	0.652	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 130			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
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Summary Wizard of 120 minute 100 year Winter I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	10	111.793	-0.107	0.000	0.18		2.6	OK
1.001	2	10	111.569	-0.101	0.000	0.23		3.2	OK
1.002	3	10	111.490	-0.090	0.000	0.34		4.8	OK
1.003	4	10	111.379	-0.071	0.000	0.55		6.0	OK
1.004	5	10	111.350	-0.070	0.000	0.55		8.3	OK
2.000	6	10	111.790	-0.110	0.000	0.16		2.2	OK
2.001	7	10	111.620	-0.110	0.000	0.16		2.6	OK
2.002	8	10	111.535	-0.115	0.000	0.12		4.2	OK
1.005	9	10	111.071	-0.154	0.000	0.22		14.3	OK
1.006	10	10	110.764	-0.161	0.000	0.18		14.3	OK
1.007	11	6	110.438	-0.162	0.000	0.01		25.2	OK
3.000	12	10	111.547	-0.053	0.000	0.45		2.6	OK
3.001	13	10	111.384	-0.116	0.000	0.12		3.8	OK
3.002	14	10	110.547	-0.103	0.000	0.21		4.8	OK
1.008	15	6	110.437	0.787	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 131			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 180 minute 100 year Winter I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain			Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	
1.000	1	13	111.787	-0.113	0.000	0.14			2.0	OK
1.001	2	13	111.563	-0.107	0.000	0.18			2.4	OK
1.002	3	13	111.482	-0.098	0.000	0.26			3.6	OK
1.003	4	13	111.368	-0.082	0.000	0.42			4.6	OK
1.004	5	13	111.338	-0.082	0.000	0.42			6.4	OK
2.000	6	13	111.785	-0.115	0.000	0.12			1.7	OK
2.001	7	13	111.615	-0.115	0.000	0.13			2.0	OK
2.002	8	13	111.531	-0.119	0.000	0.09			3.2	OK
1.005	9	13	111.061	-0.164	0.000	0.17			10.9	OK
1.006	10	13	110.755	-0.170	0.000	0.14			10.9	OK
1.007	11	3	110.491	-0.109	0.000	0.00			19.3	OK
3.000	12	13	111.540	-0.060	0.000	0.34			2.0	OK
3.001	13	13	111.380	-0.120	0.000	0.09			2.9	OK
3.002	14	13	110.540	-0.110	0.000	0.16			3.7	OK
1.008	15	3	110.490	0.840	0.000	0.12			2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 132			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 240 minute 100 year Winter I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	18	111.784	-0.116	0.000	0.11		1.6	OK
1.001	2	17	111.558	-0.112	0.000	0.15		2.0	OK
1.002	3	17	111.477	-0.103	0.000	0.21		3.0	OK
1.003	4	17	111.361	-0.089	0.000	0.34		3.7	OK
1.004	5	16	111.331	-0.089	0.000	0.35		5.2	OK
2.000	6	18	111.781	-0.119	0.000	0.10		1.4	OK
2.001	7	17	111.612	-0.118	0.000	0.10		1.6	OK
2.002	8	17	111.527	-0.123	0.000	0.08		2.6	OK
1.005	9	16	111.055	-0.170	0.000	0.14		8.9	OK
1.006	10	16	110.750	-0.175	0.000	0.11		8.9	OK
1.007	11	1	110.507	-0.093	0.000	0.00		15.8	OK
3.000	12	18	111.536	-0.064	0.000	0.28		1.6	OK
3.001	13	17	111.377	-0.123	0.000	0.07		2.4	OK
3.002	14	17	110.536	-0.114	0.000	0.13		3.0	OK
1.008	15	1	110.507	0.857	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 133			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 360 minute 100 year Winter I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	25	111.779	-0.121	0.000	0.09		1.2	OK
1.001	2	25	111.553	-0.117	0.000	0.11		1.5	OK
1.002	3	24	111.470	-0.110	0.000	0.16		2.2	OK
1.003	4	24	111.351	-0.099	0.000	0.26		2.8	OK
1.004	5	24	111.322	-0.098	0.000	0.26		3.9	OK
2.000	6	25	111.777	-0.123	0.000	0.07		1.0	OK
2.001	7	25	111.607	-0.123	0.000	0.08		1.2	OK
2.002	8	25	111.523	-0.127	0.000	0.06		2.0	OK
1.005	9	24	111.048	-0.177	0.000	0.10		6.7	OK
1.006	10	24	110.743	-0.182	0.000	0.08		6.7	OK
1.007	11	2	110.501	-0.099	0.000	0.00		11.8	OK
3.000	12	25	111.531	-0.069	0.000	0.21		1.2	OK
3.001	13	25	111.373	-0.127	0.000	0.06		1.8	OK
3.002	14	25	110.531	-0.119	0.000	0.10		2.2	OK
1.008	15	2	110.500	0.850	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 134			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...				7 Starkey Street Heywood Rochdale						
Date 16/04/2024				Designed by JS						
File Storm revA.MDX				Checked by						
Micro Drainage				Network 2020.1.3						

Summary Wizard of 480 minute 100 year Winter I+40% 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	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	1	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	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	
1.000	1	31	111.776	-0.124	0.000	0.07		1.0	OK
1.001	2	31	111.550	-0.120	0.000	0.09		1.2	OK
1.002	3	31	111.466	-0.114	0.000	0.13		1.8	OK
1.003	4	31	111.346	-0.104	0.000	0.21		2.3	OK
1.004	5	31	111.316	-0.104	0.000	0.21		3.2	OK
2.000	6	31	111.774	-0.126	0.000	0.06		0.8	OK
2.001	7	31	111.604	-0.126	0.000	0.06		1.0	OK
2.002	8	31	111.521	-0.129	0.000	0.05		1.6	OK
1.005	9	31	111.043	-0.182	0.000	0.08		5.4	OK
1.006	10	31	110.738	-0.187	0.000	0.07		5.4	OK
1.007	11	4	110.478	-0.122	0.000	0.00		9.6	OK
3.000	12	31	111.528	-0.072	0.000	0.17		1.0	OK
3.001	13	31	111.370	-0.130	0.000	0.04		1.4	OK
3.002	14	31	110.528	-0.122	0.000	0.08		1.8	OK
1.008	15	4	110.478	0.828	0.000	0.12		2.3	SURCHARGED

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Armstrong Stokes & Clayton Ltd							Page 135			
Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale					
Date 16/04/2024					Designed by JS					
File Storm revA.MDX					Checked by					
Micro Drainage					Network 2020.1.3					

Summary Wizard of 600 minute 100 year Winter I+40% 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	0.000
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	0
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	Ratio R	0.289
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	
1.000	1	37	111.774	-0.126	0.000	0.06		0.8	OK
1.001	2	37	111.547	-0.123	0.000	0.08		1.0	OK
1.002	3	37	111.463	-0.117	0.000	0.11		1.5	OK
1.003	4	37	111.342	-0.108	0.000	0.18		1.9	OK
1.004	5	37	111.313	-0.107	0.000	0.18		2.7	OK
2.000	6	37	111.772	-0.128	0.000	0.05		0.7	OK
2.001	7	37	111.602	-0.128	0.000	0.05		0.8	OK
2.002	8	37	111.519	-0.131	0.000	0.04		1.3	OK
1.005	9	37	111.039	-0.186	0.000	0.07		4.6	OK
1.006	10	37	110.735	-0.190	0.000	0.06		4.6	OK
1.007	11	5	110.457	-0.143	0.000	0.00		8.2	OK
3.000	12	37	111.525	-0.075	0.000	0.15		0.8	OK
3.001	13	37	111.369	-0.131	0.000	0.04		1.2	OK
3.002	14	37	110.526	-0.124	0.000	0.07		1.5	OK
1.008	15	5	110.457	0.807	0.000	0.12		2.3	SURCHARGED

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Regus House, Herald Way Pegasus Business Park Castle Donington, Derbyshir...					7 Starkey Street Heywood Rochdale																																																																																																																																																																																												
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<u>Summary Wizard of 960 minute 100 year Winter I+40% 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			0.000																																																																																																																																																																																									
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				0																																																																																																																																																																																						
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			0.289																																																																																																																																																																																									
Region England and Wales			Cv (Summer)		0.750																																																																																																																																																																																												
M5-60 (mm)			19.000		Cv (Winter)			0.840																																																																																																																																																																																									
Margin for Flood Risk Warning (mm)					0.0		DVD Status			ON																																																																																																																																																																																							
Analysis Timestep					Fine		Inertia Status			OFF																																																																																																																																																																																							
DTS Status					ON																																																																																																																																																																																												
Profile(s)					Summer and Winter																																																																																																																																																																																												
Duration(s) (mins)			30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080																																																																																																																																																																																														
Return Period(s) (years)			1, 2, 30, 100																																																																																																																																																																																														
Climate Change (%)			0, 0, 0, 40																																																																																																																																																																																														
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Armstrong Stokes & Clayton Ltd

Regus House, Herald Way
Pegasus Business Park
Castle Donington, Derbyshire...

7 Starkey Street
Heywood
Rochdale

Date 16/04/2024
File Storm revA.MDX

Designed by JS
Checked by

Micro Drainage

Network 2020.1.3

Micro Drainage

Summary Wizard of 2880 minute 100 year Winter I+40% 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 0.000

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 0

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

Ratio R 0.289

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0

DVD Status ON

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	81	111.763	-0.137	0.000	0.02			0.3	OK
1.001	2	81	111.536	-0.134	0.000	0.02			0.3	OK
1.002	3	81	111.448	-0.132	0.000	0.03			0.5	OK
1.003	4	81	111.323	-0.127	0.000	0.06			0.6	OK
1.004	5	81	111.293	-0.127	0.000	0.06			0.8	OK
2.000	6	81	111.761	-0.139	0.000	0.02			0.2	OK
2.001	7	81	111.592	-0.138	0.000	0.02			0.3	OK
2.002	8	81	111.509	-0.141	0.000	0.01			0.4	OK
1.005	9	81	111.023	-0.202	0.000	0.02			1.4	OK
1.006	10	81	110.719	-0.206	0.000	0.02			1.4	OK
1.007	11	44	109.837	-0.763	0.000	0.00			2.6	OK
3.000	12	81	111.514	-0.086	0.000	0.05			0.3	OK
3.001	13	83	111.358	-0.142	0.000	0.01			0.4	OK
3.002	14	81	110.515	-0.135	0.000	0.02			0.5	OK
1.008	15	44	109.837	0.187	0.000	0.12			2.3	SURCHARGED

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ARMSTRONG STOKES & CLAYTON LIMITED

Civil & Structural Engineering Consultants



Urbanwave 122 Limited

Assisted Living Residential

Development at

No. 7 Starkey Street

Heywood

Rochdale

SuDS Maintenance Statement

June 2024

Regus House, Herald Way, Pegasus Business Park,
Castle Donington, Derbyshire, DE74 2TZ
Tel: 01159 417 893

Registered in England No. 049600

CELLULAR SYSTEMS

The method of maintenance for these structures is to be in accordance with the CIRIA C753 SuDS MANUAL, Chapter 21 & the manufacturer's specification highlighted on the following pages.

In addition, the **HYDROBRAKE CONTROL MANHOLE** is to include: -

Inspection Frequency:

- For the first three months following commissioning, inspect the hydrobrake chamber monthly.
- Afterward, perform inspections every six months.

Cleaning:

- Hose down the chamber and remove any silt from the sump area.
- Pay special attention to the hydrobrake and keep clear of debris, check bypass door operates.
- If a blockage occurs, you can usually overcome it by operating the bypass door using the provided rope.

Heavy vibrating rollers are definitely not recommended around plastic pipes or tanks due to the high pressures that they can generate. Thin layers with smaller plant are recommended. DfT (2009) should be referred to for guidance for plant and methods for achieving compaction. The manufacturers' recommendations usually limit plant size above geocellular units to no more than 2300 kg/m width. However, the loading resulting from this will still need to be checked in the design. If such plant is to be used adjacent to the units, the resulting compaction pressures need to be checked.

Any arch or flexible pipe structures depend on the even resistance provided from soil or aggregate on both sides of the arch/pipe for their structural capacity. Even slight differences in the level of filling on each side of the arch/pipe as it progresses could potentially cause uneven deflections and increase the stress within the structure above design values. Close supervision during backfilling is therefore vital. The backfill around geocellular tanks should also be brought up evenly around all sides.

Bedding directly below a concrete pipe should have minimal compaction. The fill at the side of the pipe should be well compacted to a level 300 mm above the crown of the pipe. Only light compaction should be applied to the backfill directly over the crown of the pipe to a point 300 mm above it. With reasonable workmanship and supervision, the bedding factors used in the design should be relatively conservative.

21.12.6 Wrapping

All storage tanks should be watertight in accordance with the relevant standards. Geocellular and similar structures using geomembranes to hold water should be sealed in accordance with waterproofing standards (ie welded joints rather than adhesive taped) and the integrity of the seal checked on site through the use of non-destructive testing, to ensure that it is leak-proof. Advice on appropriate integrity and seam tests for geomembranes, that could be adapted for testing membranes around storage tanks, is provided in Mallett *et al* (2014). Care needs to be taken during installation to protect against damage of both the tank structure and the geotextile and the geomembrane wrapping. Follow-on trades can also cause damage and put the integrity and performance of the structure at risk.

21.13 OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of below-ground storage systems. Maintenance responsibility for systems should be placed with a responsible organisation. Table 21.3 provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Maintenance Plans and schedules should be developed during the design phase, and will be specific to the type of tank that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements. Further detail on the preparation of maintenance specifications and schedules of work is given in Chapter 32.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

► Generic health and safety guidance is provided in Chapter 36.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

21.14 REFERENCES

BARNES, G E (2010) *Soil mechanics: principles and practice, third edition*, Palgrave Macmillan, Hampshire, UK (ISBN: 978-0-23057-980-4)

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CPSA (2013) *Technical design guide*, Concrete Pipeline Systems Association, Leicester, UK. Go to: www.concretepipes.co.uk/page/technical-guide

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DfT (2001) *Manual of contract documents for highway works. Volume 1: Series 2500 Special structures*, HMSO, London, UK. Go to: <http://tinyurl.com/l3tap4z>

DfT (2009) *Manual of contract documents for highway works. Volume 1: Series 600 Earthworks*, HMSO, London, UK. Go to: <http://tinyurl.com/phx5yj>

OPERATION AND MAINTENANCE

This includes for general maintenance of SuDS structures. The method of maintenance for these structures is to be in accordance with the CIRIA C753 SuDS MANUAL, Chapter 32 highlighted on the following pages.

Chapter 32

Operation and maintenance

This chapter discusses general good practice for operation and maintenance activities, and the types of documents that can be developed to define the requirements at a particular site.

- ▶ Specific maintenance requirements for each type of SuDS component are listed in detail towards the end of each of the SuDS component chapters (Chapters 11–23).
- ▶ Chapter 29 provides further detail on landscape design (including planting) for ease of maintenance.
- ▶ Chapter 33 provides guidance on waste management, including waste resulting from maintenance.

32.1 INTRODUCTION

Many SuDS components are visible on the surface, form part of the overall site landscape and include a range of habitats. Depending on the design, maintenance regimes need to take account of the wider landscape context of amenity and biodiversity, as well as drainage requirements. The maintenance activities required to deliver the desired amenity, for example, may exceed those required to deliver the designed water quantity and water quality performance. In such cases, this needs to be recognised by those responsible for delivering and maintaining that functionality. Where SuDS components are hard surfaces or below ground, the maintenance will generally be based on engineering requirements.

For the purpose of this manual, maintenance refers to:

- inspections required to identify performance issues and plan appropriate maintenance needs
- operation and maintenance of the drainage system
- landscape management
- waste management associated with contaminated silt and other waste materials resulting from maintenance.

All maintenance will need to take the protection of habitats and associated ecology into account (**Chapter 6**). Maintenance regimes should be regularly assessed (eg once per year) to make sure that the approach is still meeting the drainage, landscape and any other objectives. This may result in changes to the maintenance of a feature or area. For example, more frequent vegetation management may be identified where vegetation growth is obstructing highway sight lines.

The function of the surface water management system should be understood by those responsible for maintenance, regardless of whether individual components are below ground or on the surface. When problems occur in vegetated components on the surface, they may be obvious and can be remedied using standard landscape or engineering practices. However, this is not always the case – particularly with more complex systems such as bioretention systems and pervious surfaces. If any system (whether above or below ground) is properly designed, monitored and maintained, performance deterioration can usually be minimised.

Ease of maintenance and access is therefore a necessary and important consideration of SuDS design (not least as part of CDM requirements to ensure that maintenance can be undertaken safely). Sufficient thought should be given to the likely required maintenance over the design life of the SuDS and its funding during the feasibility and planning stages of a scheme (**Chapter 35**). In particular, the following requirements should be given full consideration:

- maintenance access – ensuring appropriate and permanent access to all points in the system where future maintenance may be required
- forebays and/or appropriate pre-treatment systems to help trap sediment
- appropriate provision for temporary drainage, if required, during sediment management or other maintenance activities
- the availability of storage and disposal areas for green waste, such as grass cuttings and organic sediments.

Appropriate legal agreements between adoption and maintenance organisations that define maintenance responsibilities are presented in Shaffer *et al* (2004). Maintenance Plans will often be required as a condition of planning for the site. For example, many buildings are required to achieve a high BREEAM rating and a landscape management plan (LMP) is a mandatory requirement to achieve this. Planning authorities will include this in a planning condition.

The LMP can also form a useful tool for public or client engagement with SuDS and help them to understand the wider benefits of the system. They can include the provision for ecological re-survey, tree inspection and works and information about how the system delivers multiple benefits.

32.2 OPERATION AND MAINTENANCE MANUAL

Those responsible for SuDS within a development (owner, tenant, local authority, water company etc) should ideally be provided with an operation and maintenance manual by the designer. This could be part of the documentation provided under CDM (part of the health and safety file).

If the user of the system is not responsible for maintenance, then it is important to ensure that they know when the SuDS is not functioning correctly and who to contact if an issue arises, such as a blockage at a SuDS pond seen by a householder on a housing estate or a tenant on an industrial estate.

The operation and maintenance manual should be succinct and easy to use and should include the following:

- location of all SuDS components on the site
- brief summary of the design intent, how the SuDS components work, their purpose and potential performance risks
- depth of silt that will trigger requirement for removal
- visual indicators that will trigger maintenance
- depth of oil in separators etc that will trigger removal
- maintenance requirements (ie the Maintenance Plan) and a maintenance record pro forma
- explanation of the objectives of the maintenance proposed and potential implications of not meeting those objectives (it may be useful to split this into planted and hard elements, for clarity)
- identification of areas where certain activities are prohibited (eg stockpiling materials on pervious surfaces)
- an action plan for dealing with accidental spillages of pollutants

- advice on what to do if alterations are to be made to a development or if service companies need to undertake excavations or other similar works that could affect the SuDS
- details of whom to contact in the event that pollution is seen in the system or if it is not working correctly.

The operation and maintenance manual should also include brief details of the design concepts and performance criteria for the scheme and how the owner or operator should ensure that any works undertaken on a development do not compromise this. For example, householders should be made aware that surface water drainage is connected to soakaways, and be given full details and maintenance obligations for any rainwater harvesting systems in the property. This education is part of the wider community engagement process that is vital to the successful uptake of SuDS (**Chapter 34**). The operation and maintenance manual may also include the LMP.

It is important on industrial estates to clearly identify to everyone which areas drain to SuDS and which to foul sewer. For example, gullies and manhole covers could be colour coded or marked. Owner and tenants should be made aware of what is allowed to drain to the SuDS. Similarly, it is a good idea to use interpretation boards, for example at a pond on a housing estate, to increase householders' awareness of the purpose and benefits of the SuDS and to encourage them not to put polluting substances down the surface water drainage system (**Chapter 27**).

32.3 LEVEL OF OPERATION AND MAINTENANCE

There are many factors that will influence the type and frequency of maintenance required for a SuDS component or scheme at any particular site, including:

- the type of SuDS components
- the size of the contributing catchment in relation to the area of the SuDS components (this will affect the likely sediment loading rates and potential for erosion etc)
- the land use associated with the contributing catchment (this will affect the likely build-up of contamination)
- the level of continuing construction within the contributing catchment
- the SuDS planting scheme
- the habitat types that have been created as part of the scheme and how they are anticipated to evolve into a mature landscape
- the amenity and visual requirements of the area.

The demands on the SuDS component or scheme to perform a particular aesthetic function may be a key driver, with high frequencies of grass cutting and/or other vegetation management often being required for appearance and amenity value rather than for functional reasons. Specific habitats may dictate the time of year that is suitable for particular activities to be undertaken (eg reed cutting), and/or the extent of the system that should be subject to certain activities at any one time (eg sediment removal). Plants and trees tend to require different periodic management techniques as they mature. This is particularly relevant to coppice areas and woodland, or indeed shrub and herbaceous planting, some of which may require renewal after 10 years or so, depending on the planting and its purpose.

The maintenance regime of a site also needs to consider the response to extreme pollution events. A response action plan should be developed and communicated to all those involved in the operation of a site, so that if a spillage occurs it can be prevented from causing pollution to receiving waters.

It is recommended that SuDS are not handed over to those responsible for maintenance until upstream construction has ceased, the contributing catchment has stabilised, and any necessary rehabilitation of downstream components has been undertaken by the developer/contractor. However, if maintenance agreements have to be put in place in advance of this time, and the level of construction activity in the

contributing catchment is still high, maintenance specifications should be prepared that take account of high sediment accumulation rates and the increased risks of potential spillages.

32.4 OPERATION AND MAINTENANCE ACTIVITY CATEGORIES

Maintenance activities can be broadly defined as:

- 1 regular maintenance (including inspections) – [Section 32.6](#)
- 2 occasional maintenance – [Section 32.7](#)
- 3 remedial maintenance – [Section 32.8](#).

There may also be initial one-off requirements sometimes referred to as “establishment maintenance”, particularly for planting (eg weeding and watering). Regular maintenance consists of basic tasks carried out to a frequent and predictable schedule, including inspections/monitoring, silt or oil removal if required more frequently than once per year, vegetation management, sweeping of surfaces and litter and debris removal.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks (eg sediment removal or filter replacement). [Table 32.1](#) summarises the likely maintenance activities required for each SuDS component, and guidance on specific maintenance activities is given in the following sections.

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict. Remedial maintenance can comprise activities such as:

- inlet and outlet repairs
- erosion repairs
- reinstatement or realignment of edgings, barriers, rip-rap or other erosion control
- infiltration surface rehabilitation
- replacement of blocked filter materials/fabrics
- construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract)
- system rehabilitation immediately following a pollution event.

It is important to note that these remedial activities will not be required for all systems, but for the purpose of estimating whole life maintenance costs, a contingency sum of 15–20% should be added to the annual regular and occasional maintenance costs to cover the risk of these activities being required.

TABLE 32.1 Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

- will be required
□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

32.5 HEALTH AND SAFETY

To comply with the Construction (Design and Management) Regulations (CDM) 2015, designers must assess all foreseeable risks during construction and maintenance and the design must minimise them by the following (in order of preference):

- avoid
- reduce
- identify and mitigate residual risks.

Designers must also make contractors and others aware of risks, in the health and safety file, which is a record of the key health and safety risks that will need to be managed during future maintenance work. For example, the file for a SuDS pond should contain information on the collection of hazardous compounds in the sediment, so that maintenance contractors are aware of it and can take appropriate

precautions. During construction, the residual risks must be identified and an action plan developed to deal with them safely (the health and safety plan and site rules).

All those responsible for maintenance should take appropriate health and safety precautions for all activities (including lone working, if relevant), and risk assessments should always be undertaken. Guidance on generic health and safety principles is provided in **Chapter 36**.

32.6 REGULAR MAINTENANCE

32.6.1 Inspections and reporting

An initial pre-handover inspection of the scheme is required, to ensure that it has been constructed as designed (**Chapter 31**).

Regular inspections of SuDS will then:

- 1 help determine optimum future maintenance activities
- 2 help establish ongoing hydraulic, water quality, amenity and biodiversity performance of the system
- 3 allow identification of potential performance failures, such as blockage, reduced infiltration and poor water quality resulting from lack of maintenance.

Maintenance of SuDS is carried out by a range of people, which can include school caretakers, highway authorities, facilities management companies and landscape contractors. Pervious surfaces and proprietary systems will most likely be managed by people familiar with highway or drainage maintenance. Landscaped systems will be managed by the landscape contractor, although connecting pipework may be managed by others.

Where the maintenance of a system is carried out by those responsible for the wider landscaped area, the inspections can generally be undertaken during routine site visits (eg for grass cutting, leaf collection and/or litter collection) for little extra cost, although there may need to be dedicated visits during some winter months.

The staff doing the landscape maintenance should have appropriate experience of SuDS maintenance and should be capable of keeping sufficiently detailed records of any inspections. If staff do not have appropriate experience, then specific inspection visits will be necessary.

Those with overall responsibility for the drainage system may not be responsible for maintenance of the wider landscape and in those circumstances specific inspection visits may also be required at a suitable interval.

Specific visits will also be required if the system includes proprietary treatment systems (**Chapter 14**).

Whichever arrangements are made, the inspections should be recorded, and the records saved for future reference (**Section 32.10 and Appendix B**).

During the first year of operation of all types of SuDS, inspections should usually be carried out at least monthly (and after significant storm events) to ensure that the system is functioning as designed and that no damage is evident.

Typical routine inspection questions that will indicate when occasional or remedial maintenance activities are required for any type of system include:

- Are inlets or outlets blocked?
- Does any part of the system appear to be leaking (especially ponds and wetlands)?
- Is the vegetation healthy?

- Is there evidence of poor water quality (eg algae, oils, milky froth, odour, unusual colourings)?
- Is there evidence of sediment build-up beyond the designer's stated limits?
- Is there visual evidence of oil accumulation?
- Is there evidence of ponding above an infiltration surface?
- Is there any evidence of structural damage that requires repair?
- Are there areas of erosion or channelling over vegetated surfaces?
- Is there any visual evidence of regular or unplanned over-topping of banks?

For large sites, it is recommended that an annual maintenance report and record should be prepared by the maintenance contractor, which should be retained with the operation and maintenance manual (Section 32.2). The report should provide the following information:

- observations resulting from inspections
- measured sediment depths (where appropriate)
- monitoring results, if flow or water quality monitoring is undertaken
- confirmation that any penstocks or valves are free and working correctly
- maintenance and operation activities undertaken during the year
- recommendations for inspection and maintenance programme for the following year.

As with any paved area, safety inspections of pervious surfaces will be necessary for tripping hazards. If pervious surfaces are to be used in a shopping centre car park or high footfall area, these should be inspected monthly as a minimum, and repairs made as necessary through the lifetime of the surface. This would apply to any type of surface. Guidance is provided by the Road Liaison Group (2005).

32.6.2 Litter and debris removal

Litter and debris removal is an integral part of SuDS maintenance for surface features, in order to reduce the risks of inlet and outlet blockages, to retain amenity value and to minimise pollution risks. High litter removal frequencies may be required where aesthetics are a major driver, for example on residential sites or at high profile commercial or retail parks. Litter removal is less of an issue for engineered or underground systems, such as pervious surfaces, filter drains and proprietary systems and will normally form part of routine open space maintenance.

32.6.3 Grass cutting

It is recommended that the grass cutting regime around SuDS components is carefully specified to maximise the performance of the SuDS and meet visual requirements. In general, allowing grass to grow tends to enhance water quality performance. Short grass around a wet system, such as a pond or wetland, provides an ideal habitat for nuisance wildlife species such as geese, but allowing the grass to grow is an effective means of discouraging them. Grass around wet pond or wetland systems should not be cut to the edge of the permanent water in order to deter large birds and to reduce the risks of nutrients associated with grass cuttings falling into the water.

Grass cutting is an activity primarily undertaken to enhance the perceived aesthetics of the



Figure 32.1 Grass cuttings

facility. The frequency of cutting will tend to depend on surrounding land uses, and public requirements. Grass cutting should be done as infrequently as possible, recognising the aesthetic preferences of local residents and other landscape management activities required at the site. Visibility around highways also needs to be considered. Grass around inlet and outlet infrastructure should be strimmed closely to reduce risks to system performance. If a manicured, parkland effect is required, then cutting will need to be undertaken more regularly than for meadow type grass areas, the latter aiming to maximise habitat and biodiversity potential. The impact of grass cutting on soil compaction should also be considered. The landscape management plan will usually identify the mowing regimes required in different areas or zones.

Guidance on designing a site to ease maintenance, such as limiting the slope of grassed areas, is provided in **Chapter 29**.

In the past there have been recommendations that keeping grass short in filter strips and swales prevents the grass lodging over (ie being pushed over and flattened by the flow of water) and improves pollution removal. However, the risk of pollution removal being compromised is now considered to be minimal and there is no reason for a blanket requirement to keep grass short in all swales and filter strips.

32.6.4 Weed and invasive plant control

Weeds are generally defined as vegetation types that are unwanted in a particular area. For SuDS, weeds can include:

- alien or invasive species (ie plants that are particularly aggressive, non-native species), the spread of which is generally undesirable
- plants that negatively affect the technical performance or amenity/biodiversity value of the system.

In some places, weeding has to be done by hand to prevent the destruction of surrounding vegetation (hand weeding should generally only be required during the first year, during plant establishment). However, mowing can be an effective weed management measure for grassed areas. Where the use of herbicides and pesticides is permitted (**Chapter 29**), this should be limited, where possible, to the establishment period, as the benefits of rapid sward/plant cover development are likely to outweigh any potential resulting water quality deterioration. The use of fertilisers should also be limited or prohibited, to minimise nutrient loadings, which are damaging to water bodies.

Specific advice on weed control for green roofs, filter drains and pervious pavements is provided in **Chapters 12, 16 and 20** respectively.

32.6.5 Shrub management

Shrubs may be densely planted and may mature very rapidly over the first year. They are likely to require weeding at the base, especially during the first year or two, to ensure that they get enough water, and mulching to retain water in the soils where possible. Bark mulch around shrubs should not be used, as it floats and clogs outlets. Pruning shrubs can result in a denser structure and better lateral growth, which may be desirable in SuDS.

32.6.6 Aquatic and shoreline vegetation management

Aquatic plant aftercare in the first 1–3 years may be required to ensure establishment of planted vegetation and to control nuisance weeds and invasive plants. Once it is established, the build-up of dead vegetation from previous seasons should be removed at convenient intervals (eg every 3 years and at the end of landscape contract periods) in order to reduce organic silt accumulation. Emergent vegetation may need to be harvested every 2–10 years in order to maintain flood attenuation volumes, optimise water quality treatment potential and ensure fresh growth. Where the density of vegetation is high, annual removal may be required. Care should be taken to avoid disturbance to nesting birds during the breeding season and habitats of target species (eg great crested newt and water voles) at critical times. The window for carrying out maintenance to achieve this is towards the end of the growing season (typically September and October, but this will vary with species). As vegetation matures, plant height may need

to be reviewed with respect to any health and safety framework or strategy such as if it blocks necessary sightlines to an open water feature.

Where emergent vegetation is managed, up to 25% can be removed by cutting at 100 mm above soil level using shearing action machinery. Up to 25% of submerged vegetation can be cut and raked out at any one time, using approved rakes, grabs or other techniques, depending on whether clay or waterproof membranes are present. Aquatic vegetation arisings should be stacked close to the water's edge for 48 hours to de-water it and allow wildlife to return to the SuDS feature. They should then be removed to wildlife piles, compost heaps or off site before decomposition, rotting or damage to existing vegetation can occur.

Algae removal may be undertaken for aesthetic purposes during the first 3–5 years of a pond/wetland's life. The growth of algae, which is considered by some to be visually intrusive, is encouraged by nutrients introduced into the water body. This situation should settle down once upstream construction activities are complete.

32.6.7 Sweeping pervious surfaces

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Typically this will be required no more than once per year and often less, where inspections indicate that it is not required. Refer to **Chapter 20** for details of this process.

32.6.8 Oil removal and cleaning or replacing filters in proprietary systems

Oil removal from proprietary treatment systems should be undertaken at intervals recommended by the manufacturer. This will depend on the catchment characteristics. On small sites with a low pollution hazard, small amounts of oil may be removed by skimming, using small van-mounted equipment. This is relatively inexpensive. Those serving larger, more heavily polluted catchments may require tankers to remove the accumulated oil.

Where proprietary systems use filters, they should be replaced or cleaned at the intervals recommended by the manufacturer. For example, the coalescing filters in an oil separator can require cleaning every 6 months if the runoff from the catchment has a high oil load (eg from a heavily used road).

32.7 OCCASIONAL MAINTENANCE

32.7.1 Sediment removal

To ensure the long-term performance of SuDS, the sediment that accumulates in treatment components should be removed periodically (whether landscaped or proprietary systems). The required frequency of sediment removal is dependent on many factors including:

- design of upstream drainage system
- type of system
- design silt storage volume
- size of upstream catchment in relation to surface area of SuDS component
- characteristics of upstream catchment area (eg land use, level of imperviousness, upstream construction activities, erosion control management and effectiveness of upstream pre-treatment).



Figure 32.2 De-silting (courtesy Bedford Group of Drainage Boards)

Sediment accumulation will typically be rapid for the entire construction period (including during the period of building, turfing and landscaping of all upstream development plots). Once a catchment is completely developed and all vegetation is well-established, sediment mobility (erosion) and accumulation is likely to drop significantly.

Detailed information on waste management (in particular with respect to sediment removal) is provided in **Chapter 33**.

For most small features, sediment can be removed either by hand or using small excavators. For any system that has a waterproof liner, the method of sediment removal should be chosen so there is minimal risk of damaging the liner.

For proprietary treatment systems, a suction tanker will be needed to remove the sediment. The size of tanker will depend on the scale of the proprietary system and its location. For small catchments using treatment channels, silt accumulation in the channel can often be removed with hand tools or a small suction tanker.

General sediment removal considerations

Sediment removal from SuDS systems should always be carried out such that no damage is caused to the SuDS, and impacts on ecological systems and aesthetic appearance are minimised. The appropriate method of sediment removal at a particular site will depend on the size of the SuDS component, the access, whether the sediments are submerged or lying on dry ground, the sediment properties, the design characteristics of the SuDS component, visual requirements and wildlife concerns and sediment depths.

For small source-control SuDS components where sediment volumes are likely to be small, it is usually appropriate to remove sediment using hand tools and appropriate protective equipment. Where components and associated sediment volumes are larger, or where the sediment has accumulated in a permanent water body, then mechanical equipment may be required.

In particular, it is recommended to do the following:

- 1 Establish how the structure is lined and avoid damage to clay puddle layers or waterproof membranes.
- 2 Undertake work between September and March to minimise impacts on receiving water bodies (high suspended solids can cause reduced dissolved oxygen levels, which causes particular problems during elevated summer temperatures). Where required, works may be restricted to September and October, in order to protect breeding or hibernating wildlife.
- 3 Where machinery or pumping is to be used, agree the sediment removal and management plan in advance with the environmental regulator.
- 4 Where machinery is used to excavate sediment, undertake the operation in dry weather when the surrounding ground is firm, and ideally operate from a hard surface.
- 5 Use machinery with an extending arm to avoid contact with edges, banks and other features within a minimum distance of 1 m from the edge. Use a bucket without teeth to avoid puncturing clay layers or waterproof membranes.
- 6 Secure consent for any de-watering operations with the environmental regulator, if required.

Specific requirements of different SuDS components are presented in subsequent sections. Individual SuDS component chapters should be referenced for further details.

Sediment removal from retention ponds

Ponds and wetlands may eventually accumulate sufficient sediment to impact on the storage capacity of the permanent pool. This loss of capacity can affect both the appearance and the pollution removal efficiency of the pond. The rate at which this occurs will depend on allowances made during storage

capacity design. The loss in storage will occur more rapidly if the pond receives additional sediment input during the construction phase. The accumulation of sediment should be monitored and where it is significant and/or if the quality in the pond begins to deteriorate, sediment characterisation should be undertaken to establish the need and options for its removal.

The following issues should be considered:

- 1 Regular partial sediment removal is most effective, but may not be economic. However, where possible, sediment should not be removed from more than 50% of the pond or wetland area at any one time.
- 2 Appropriate bankside working areas should be selected, and wetland and bankside habitats protected.
- 3 Sufficient vegetation should be retained to ensure rapid re-colonisation of damaged areas.
- 4 Ideally, sediment removal should remove only accumulated inorganic and organic sediment, but not wetland subsoil or topsoil layers. In practice, this can be difficult to achieve.



Figure 32.3 Floating excavator working in small pond (courtesy Land & Water)

Specialist contractors should generally undertake sediment removal from ponds or wetlands. The types of machines capable of removing sediment from a pond will vary. It may be possible to drain the pond and employ a mini excavator or excavator with swamp tracks to excavate sediments from within the feature, or else an excavator may have to be deployed from the bank. Standard hydraulic excavators have limited reach, but are normally sufficient to deal with removal from small features within sites. For large ponds, a long-reach excavator may be required that can reach up to 25 m.

A further option that may occasionally be necessary is to use machinery on floating pontoons and/or barges. **Figure 32.2** shows a floating excavator working in water.

For safety reasons excavators cannot operate close to overhead power lines and they need a clear area to swing their bucket and dump spoil. This should be taken into account when assessing the access required for maintenance (eg if a pond is surrounded by trees or buildings).

If de-watering of ponds in advance of sediment extraction is feasible at a site, and assuming that the water body can be left drained for a reasonable period of time (ie a few weeks), then this can considerably reduce the volume of material to be extracted and that will require disposal, and will often allow some biodegradation of organic material.

De-watering can be undertaken by:

- 1 draining down the pond using the penstock or outlet valve (if included within the design)
- 2 pumping out the pond.

Both options require consideration of the environmental impact of the de-watering, especially with respect to downstream receiving waters, which could be a sewer, watercourse or other water body. In some cases, water pumped from ponds or settlement channels has to be tankered off site. Discharge to a watercourse or body is likely to require discharge consent from the environmental regulator. Consent from the sewerage undertaker will be required if the discharge is to a sewer, and large-scale de-watering may also require planning permission. Testing of the system water quality (for COD, BOD, suspended solids and metals – in consultation with the environmental regulator) may be required to demonstrate the likely risks to the local environment and this can be undertaken together with the sediment sampling.

The water may contain high concentrations of suspended solids that are either already in suspension or become entrained as a result of the pumping process. Adequate sediment control should therefore be provided before the pumped water is discharged. Once the pumped water is running clear then the sediment control devices may be bypassed as long as sediment is not reintroduced into the system. Appropriate sediment control systems include:

- temporary traps formed by constructing an earth embankment with a gravel filled outlet across a swale
- sediment basins (this can include the use of floodable fields)
- sumps (either constructed or mobile proprietary units)
- geotextile filters.

A dump truck with a watertight tailgate is likely to be required to remove the sediment from the site.

Sediment removal from detention basins

Dry basins accumulate sediment with time that will gradually reduce the storage capacity available and can in some cases also reduce sediment trapping efficiency. Also, sediment may tend to accumulate around the control device, which increases the risk that either the orifice may become clogged or that sediment may become re-entrained into the outflow. Where basins are amenity features, sediment accumulation is likely to be unsightly and reduce the amenity value of the component. Sediment accumulation should be monitored as part of the inspection regime for the surface water management system and appropriate frequencies determined for removal and disposal. Small volumes of sediment can usually be removed by landscape contractors using hand tools. Sediment excavation using front-end loaders or backhoes is simple, if appropriate access is available for the equipment. Sediment removal will usually damage the vegetation, and re-establishment may be required.

Sediment removal from filter strips and swales

Sediment accumulation should be monitored as part of the inspection regime for the surface water management system and appropriate frequencies determined for removal and disposal. Filter strips and swales will only accumulate very small volumes of sediment which can be removed by landscape contractors using hand tools at appropriate frequencies depending on the impact of the accumulation on the performance of the component in terms of hydraulics (eg sheet flow characteristics), water quality (eg vegetation cover) and amenity (eg visual).

Sediment removal from infiltration basins

Infiltration basins should always have source control, a pre-treatment or other sediment trapping system upstream. Even with low sediment loads, the system performance can still become significantly impaired in a relatively short space of time. The sediment deposits reduce the storage capacity and may also clog the surface soils. Dense vegetation can minimise the risk of surface clogging (**Chapter 13, Section 13.12**).

Methods of removing sediment from infiltration basins are different from detention basins. Removal should not start until the basin has dried out, at which point the top layer should then be removed using lightweight equipment, with care being taken not to unduly compact the basin surface. The remaining soil can then be scarified or tilled to restore the surface infiltration capacity (see **Chapter 13** for detail of these methods). Vegetated areas disturbed during sediment removal should be replanted or re-sown immediately to reduce the risk of erosion. Suitable erosion control should also be provided.

Sediment removal from proprietary systems

Proprietary systems should be cleaned out regularly to prevent re-entry of any residuals or pollutants into the downstream system. The frequency will depend on the site-specific pollutant load, but most suppliers/manufacturers recommend that cleaning operations should take place every 6 months. They can be cleaned by vacuum pumping which transfers a slurry of water and sediment to a tanker, or by adding chemicals to help solidify the residuals, which can then be removed using appropriate methods.

Maintenance of pervious pavement systems involves removing sediment from the pavement surface using vacuum sweeping. It is recommended that the pavement be vacuum swept once a year, and the collected sediments will require appropriate handling and disposal.

Sediment removal from filter drains

Filter drains will require occasional removal of the gravel infill which can be either cleaned and reused, or new material used as a replacement. The geotextile surrounds to the trench and to pipes may also require replacement at this time.

Small lengths would probably be cleaned using a small excavator to remove the material and replace it with clean. There are specialist companies that can clean long lengths of linear filter drain (eg alongside roads) using specialist machinery. The machinery can easily deal with single size material of 40 mm and Type B filter material (**Chapter 30**). It may require adapting, or the settings changed to deal with other infill materials. The machinery lifts the filter material from the trench, segregates and cleans it and then returns it to the trench. Typically the machines will clean the gravel to depths of 300 mm or exceptionally 600 mm.

Disposal of silt and debris that is removed is achieved via a belt which can discharge to a truck running alongside, or it can be deposited well back on the verge if permitted. The amount of spoil is usually in the order of 5–10 tonnes for every 100 m of drain cleaned to 300 mm depth.

32.7.2 Vegetation and plant replacement

Some replacement of plants may be required in the first 12 months after installation (ie the defects liability/rectification period), possibly after storm events. Dead or damaged plants should be removed and replaced, to restore the prescribed number of living plants per m². The responsibility for doing this should be made clear in the construction contract.

Inspection programmes should identify areas of filtration, or infiltration surfaces where vegetation growth is poor and likely to cause a reduced level of system performance. Such areas can then be rehabilitated, and plant growth repaired.

32.8 REMEDIAL MAINTENANCE

32.8.1 Structure rehabilitation and repair

The need for component rehabilitation (eg to remove clogged filters, geotextiles and gravels) will typically be 10–25 years, depending on the component design and factors such as the type of catchment and sediment load. The SuDS design should allow for vehicle access to undertake this work and consider how to implement such overhauls without causing major disruption to the functionality of the drainage system. For example, if geotextiles are used at a high level within a pervious surface, then reconstruction of the surface and bedding layer is all that is required if they become clogged, rather than reconstruction of the whole pavement depth.

Some form of rehabilitation is likely to be required at some point where component functionality relies on filtration through soils or aggregates. However, for many SuDS components, routine maintenance is sufficient.

Rehabilitation activities for each SuDS component are described in the individual component chapters. The requirements should be identified in the operation and maintenance manual.

32.8.2 Infiltration surface rehabilitation

Inspections should look for signs of infiltration surfaces becoming clogged, such as if water is standing for long periods on the surface or if it is flowing via an overflow channel and bypassing the basin. In the event that grassed surface permeability is unacceptably reduced, there are a number of landscape techniques that can be used to open the surface to encourage infiltration. Such activities are likely to be required in

circumstances where silt has not been effectively managed upstream, or the infiltration surface has been compacted by foot traffic (eg if a basin is also used as a recreational area).

Scarifying to remove “thatch”

Thatch is a tightly intermingled organic layer of dead and living shoots, stems and roots, developing between the zone of green vegetation and the soil surface. Scarifying with tractor-drawn or self-propelled equipment to a depth of at least 50 mm breaks up silt deposits, removes dead grass and other organic matter and relieves compaction of the soil surface.

Spiking or tining the soil, using aerating equipment to encourage water percolation

This is particularly effective where a hollow tine machine is used, and sand is dressed in, and is best undertaken when the soil is moist (note: the removal and disposal of the dried cores will be necessary). Spiking or tining with tractor-drawn or self-propelled equipment penetrates and perforates soil layers to a depth of at least 100 mm (at 100 mm centres) and allows the entry of air, water, nutrients and top dressing materials.

Air pressure treatment

If the infiltration capacity has reduced due to compaction, it may be possible to rehabilitate it using air pressure treatment. This process breaks up subsoil layers by driving probes into the ground. The probe is connected to a high pressure gas source (typically nitrogen bottles) and a high pressure stream of gas is quickly introduced into the soil. This causes the soil to rupture both vertically and horizontally.

As a last resort, it may be necessary to remove and replace the grass and topsoil by:

- removing accumulated silt and (subject to a toxicity test) applying to land or dispose off site
- removing damaged turf, which should be composted or disposed off site
- cultivating remaining topsoil to required levels
- re-turfing (using turf of a quality and appearance to match existing) or reseeded (to Clause 12.6 of BS 7370-3:1991) using seed to match existing turf) area to required levels. It may be necessary to supply and fix erosion protection to protect seeded soil. The placing or grading of turf and seeded areas should be undertaken carefully to ensure that final design levels are achieved. Watering will be required to promote successful germination and/or establishment.

32.9 FREQUENCY OF MAINTENANCE TASKS

Landscape maintenance contract periods are usually of 1–3 years in duration. The 3-year cycle is increasingly common to ensure continuity and commitment to long-term landscape care. The frequency of regular landscape maintenance tasks in a contract period can range from daily to once in the contract period. In practice, most site tasks are based on monthly or fortnightly site visits, except where grass or weed growth requires a higher frequency of work. In many cases, a performance specification is used with terms such as “beds shall be maintained weed-free” or “grass shall be cut to a height of 50 mm with a minimum height of 35 mm and a maximum height of 100 mm” to obtain the required standards.

Frequency can be specified within the schedule to include occasional items, such as “‘meadow grass’ – cut twice annually in July and September to a height of 75–100 mm (or to supplier’s recommendations), all arisings raked off and removed to wildlife features, compost facility or other recycling facility”, which provides flexibility for work that is not critical to the management of the site.

Maintenance tasks that suit a performance approach commonly include plant growth, grass cutting, pruning and tree maintenance. However, work tasks, such as sweeping paths, regular litter collection and cleaning road surfaces, will require work at an agreed frequency, with more specific timings such as weekly, monthly or annually. Where the frequency and timing of tasks is critical, a mixture of performance and frequency specification is necessary to provide effective maintenance.

SuDS maintenance generally tends towards a frequency requirement to ensure a predictable standard of care, which can be recorded on site and provides a reasonable basis for pricing work. A convenient frequency for many tasks is at a monthly inspection, as this is the usual minimum site attendance required in a landscape specification. The monthly frequency should provide for an inspection of all SuDS components and for the checking of all inlets and outlets. The inspection should be carried out by someone familiar with the operation of the specific SuDS components, and it should be recorded.

However, certain SuDS maintenance tasks fall outside this monthly cycle and need to be accommodated in the contract. The most obvious are:

- wetland vegetation maintenance
- silt management
- filter replacement in proprietary systems
- sweeping of pervious surfaces (unless loose, gravel surfaces).

There are other tasks associated with ensuring the long-term performance of the systems that may be more difficult to predict, and may even fall outside any contract period. It may, therefore, be more appropriate to review requirements, for example, for system rehabilitation at interim periods, when contracts are falling due for renewal.

The vast majority of well-designed SuDS, whether “hard” or “soft”, do not seem to suffer from problems with excessive and rapid silt accumulation, if they apply the key concepts of the SuDS philosophy: source control with a correctly designed Management Train. The frequency of sediment removal will increase as the area of the catchment increases in relation to the surface area of the SuDS where sediment accumulates (whether this is within a proprietary system or a landscape feature).

32.10 APPLYING THE PRINCIPLES OF LANDSCAPE MANAGEMENT

Typical landscape management documentation and its potential application to SuDS is summarised in the following subsections.

32.10.1 Management plan

This document should include a clear statement of design intent and an explanation of each of the SuDS components and the benefits being delivered by the SuDS for the site. The document should describe the management objectives for the site over time, and the management strategies that should be employed to realise these objectives and reconcile any potential conflicts that may arise.

Where the drainage system has an impact on the wildlife value or public use of a site, the document should explain any habitat enhancement goals, health and safety issues and long-term management implications.

For SuDS, the management plan should include a Maintenance Plan, which will be required so that maintenance aspirations can be costed, in order to secure their long-term financing. The Maintenance Plan can also establish changes in maintenance regimes that may be required to match changes in objectives such as the need to adapt operation and maintenance practices to accommodate specific wildlife habitats that may develop.

Sites with special wildlife or amenity interest may require detailed management plans that monitor habitat development, infrastructure changes or damage to sites, and ensure rapid responses to such changes, should they occur. In these cases the management plan should be prepared in collaboration with an ecologist. Ecological supervision may be required for certain works.

It is common for smaller commercial, industrial and housing sites to have a simple maintenance statement. In this case, a single page explaining the site management (including the SuDS) would be useful for all parties involved in the care of the development.

An important part of a management plan is an annual and 3–5 yearly review of the Maintenance Plan (when maintenance contracts are typically renewed). This should apply to all types of SuDS, but is particularly important for the soft landscape element, as plants and trees require different periodic management techniques as they develop. The review should involve those responsible for the maintenance and those undertaking the work.

The management plan should be a living document that is reviewed periodically with reference to changes on site, as well as changes to adjacent sites that might impact the site.

Further guidance and an example of a Maintenance Plan (in the form of a checklist) is provided in **Appendix B**.

32.10.2 Conditions of Contract

Appropriate conditions of contract will be required. Advice can be sought from the Landscape Institute which publishes specific landscape maintenance contracts. Guidance is also provided in Shaffer *et al* (2004).

32.10.3 Specification

The specification details the materials to be used and the standard of work required.

A specification, usually preceded by preliminaries, details how work shall be carried out, and contains clauses that give general instructions to the contractor. It will normally be accompanied by a schedule of work (**Section 32.10.4**). Specific SuDS maintenance clauses may be included in a general specification or as a separate “SuDS maintenance specification” section either within or referenced by the management plan (**Section 32.10.1**).

32.10.4 Schedule of work

The schedule of work itemises the tasks to be undertaken and the frequency at which they will be performed.

The tasks required to maintain the site and the frequency necessary to achieve an acceptable standard should be set out in the schedule of work.

This document (and **Section 32.10.3**) will often form the basis of a pricing framework, and can also act as a checklist to ensure that the work has been carried out satisfactorily.

For further information on the development of appropriate schedules, see HR Wallingford (2004).

32.10.5 Maintenance record

It is vital that a record is kept of the inspections and maintenance work that has been carried out. This allows the response of the system to different maintenance regimes to be assessed in future, and also provides protection against legal claims should the capacity of the system be exceeded during a rainfall event and flooding occurs elsewhere as a result.

32.11 REFERENCES

HR WALLINGFORD (2004) *The operation and maintenance of sustainable drainage systems (and associated costs)*, SR 626, HR Wallingford, UK. Go to: <http://tinyurl.com/lcot2g6>

ROAD LIASON GROUP (2005) *Well-maintained highways. Code of practice for highway maintenance management*, The Stationery Office, London, UK (ISBN: 0-11552-643-9). Go to: <http://tinyurl.com/osm2juc>

SHAFFER, P, ELLIOTT, C, REED, J, HOLMES, J and WARD, M (2004) *Model agreements for sustainable water management systems. Model agreements for SuDS*, C625, CIRIA, London, UK (ISBN: 978-0-86017-625-1). Go to: www.ciria.org