

**Willow Tree Way,
Swallowfield**
SuDS Management Plan

On behalf of



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For and on behalf of Peter Brett Associates LLP				

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0	09/09/15	Draft for Comment	LAD	-	-
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1 Introduction

- 1.1.1 The Willow Tree Way surface water drainage has been designed using a combination of Sustainable Drainage Systems (SuDS). These have taken the form of lined permeable paving, filter drains (perforated pipe within a granular bed) flow control chambers, ditches, a swale with a perforated pipe and granular base and a balancing pond to attenuate and convey surface water from the development to the outfall as well as and improve water quality. Onsite attenuation is provided up to and including the 1 in 100 year + 30% (allowance for climate change) rainfall event within the curtilage of the development of which Microdrainage calculations are shown Appendix B. Surface water is conveyed outside of the boundary via headwall from the storage pond and drainage ditch into the existing highway drainage ditch located in Swallowfield Street. Discharge is restricted by flow control chambers using orifices of various sizes to restrict flow.
- 1.1.2 As with any drainage system, SuDS require regular inspection and maintenance to ensure that they continue to operate as designed, both in terms of hydraulic capacity and potential pollutant removal.
- 1.1.3 This report sets out the inspection and maintenance requirements for long term management of the development's surface water drainage system in accordance with The SuDS Manual, CIRIA C753, and also identifies the various bodies responsible for ownership and maintenance of different elements of the system.

2 Health, Safety & Welfare

- 2.1.1 SuDS by their very nature minimise the need for deep excavations, and smooth transitions in depth are utilised to reduce turbulence in flows while reducing depth uncertainty for maintenance operatives. The swale will be formed from shallow side slopes with no greater than a 1:3 in gradient to reduce risk of falling when undertaking maintenance.
- 2.1.2 All those responsible for maintenance should take appropriate health, safety and welfare precautions for all if relevant, and risk assessments should always be undertaken. The site's infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.
- 2.1.3 The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on to maintenance operatives through task specific risk assessments.

3 Maintenance Bodies

- 3.1.1 The long term maintenance of the SuDS that are utilised within the surface water drainage system in communal areas and both existing drainage ditches on the Eastern boundary and Northern section of the site are to be undertaken by a management company as appointed by Bellway Homes. All SuDS have been designed to be accessed with minimum disruption to residents, of which residents will be responsible for all SuDS devices which fall within their property. The extent of each individual plot can be obtained by the respective plots conveyance plan.
- 3.1.2 Plots 35-38 have a filter drain within their private garden which runs parallel to adjacent land and provides storage and reduces the effects of any overflow during extreme rainfall events. The operation and maintenance of filter drains are detailed in section 4.2 and the maintenance requirements associated with these are detailed in Table 2. These operation and maintenance requirements will be outlined within a covenant that will form part of the deeds to each plot. This is to ensure that these SuDS features are retained, maintained and operate as intended.

4 Operation and Maintenance

- 4.1.1 The SuDS Manual, CIRIA C753, lists three types of maintenance activities associated with SuDS:
- 4.1.2 Regular Maintenance – ‘basic tasks undertaken on a frequent and predictable schedule’ including vegetation management, litter and debris removal, and inspections.’
- 4.1.3 Occasional Maintenance – ‘tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).’
- 4.1.4 Remedial Maintenance – ‘intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.’
- 4.1.5 In accordance with The SuDS Manual, CIRIA C753, specific maintenance needs should be monitored and maintenance schedules adjusted to suit a SuDS components particular requirements and location.
- 4.1.6 Table 1, overleaf, defines the type of maintenance required by each of the SuDS utilised as part of the surface water drainage system. Further details outlining the frequency of specific maintenance works should be undertaken are provided in Sections 4.1 – 4.6.

O&M Activity	Suds Component					
	Piped Network	Filter drain (Refer to Section 4.1)	Pervious pavement (Refer to Section 4.2)	Swale (Refer to Section 4.3)	Ditch (Refer to Section 4.4)	Pond (Refer to Section 4.5)
<u>Regular Maintenance</u>						
Inspection	■	■	■	■	■	■
Litter / debris removal	■	■	■	■	■	■
Grass Cutting		■	□	■		■
Weed / invasive plant control		□	□	□	□	□
Shrub management			□	□	□	□
Shoreline vegetation management						■
Aquatic vegetation management						■
<u>Occasional Maintenance</u>						
Sediment management	■	■	■	■	■	■
Vegetation / plant replacement				□		□
Vacuum sweeping and brushing			■			
<u>Remedial Maintenance</u>						
Structure rehabilitation / repair	□	□	□	□	□	□
Infiltration surface reconditioning		□	□	□		
■ Will be required □ May be required						

Table 1: Extract from The SuDS Manual Table 32.1: Typical key SuDS components operation and maintenance activities.

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

4.2 Filter Drain

- 4.2.1 Filter drains comprise geotextile lined trenches filled with granular material and a perforated pipe at the base. Conveyance and storage of water is accommodated within the perforated pipe and voids between the granular material. The most significant maintenance activity is the removal of silt from the filter drain. The granular material should also be kept clear of litter and vegetation and will require replacing typically every 10-15 years due to clogging. Surrounding ground should be kept clear of silt to prevent it washing into the filter drain, and thus reduce the requirement for this work as much as possible. Required maintenance activities are shown in Table 2.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required
Remedial Maintenance	Rehabilitate infiltration or filtration surfaces.	As required
	Replace geotextiles and clean and replace filter media if clogging occurs.	As required
	Excavate trench walls to expose clean soils if filtration performance reduces to unacceptable levels.	As required
	Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	Monthly
Monitoring	Inspect pre-treatment systems, inlets, trench surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly

Table 2 contains extracts from the SuDS Manual Table 16.1: Operation and maintenance requirements for filter drains.

4.3 Pervious Pavements

- 4.3.1 The principal requirements related to permeable pavements involve surface cleaning at least three times a year. Additionally, litter and vegetation should be removed on a regular basis. Note that the use of grit and salt may adversely affect the treatment and drainage potential of permeable surfaces, and the use of weed killers can disrupt the biological breakdown of contaminants that would otherwise occur in the sub-base. An alternative de-icing agent such as wet gritting which does not contain the chlorides and contaminants found in road salt should be used. A summary of required maintenance activities is shown in Table 3.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations– pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate and landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replaced lost jointing material.	As required
	Rehabilitation of surface and upper structure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration and filtration performance is reduced as a result of significant clogging)
Monitoring	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	Three-monthly, forty-eight hours after large rainfall events
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers.	Annually

Table 3 contains extracts from the SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements.

4.4 Swale

- 4.4.1 Swales are grass channels and one of the most regular activities required is the cutting (and removal) of the grass, and removal of any accumulated silt.
- 4.4.2 The swale within this development conveys runoff from the permeable paving and 450mm diameter surface water pipe via headwalls as shown in Appendix A.
- 4.4.3 Discharge into the swale is controlled by flow control orifice chambers which will require routine inspection for maintenance **and are to be inspected monthly for the first year from first occupation of the development**. This applies to all orifice flow control manholes across the site. The trash screens at headwalls should also be checked regularly to ensure that they do not become blocked by litter or vegetation.
- 4.4.4 A summary of the required maintenance activities for the swale is set out in Table 4.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter and debris removal.	Monthly, (or as required)
	Grass cutting – to retain grass height within specified design range.	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration and filtration surfaces for ponding, compaction and silt accumulation. Record areas where water is ponding for >48hours.	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Half yearly
Occasional Maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or re-seeding.	As required
	Re-level uneven surfaces and reinstate design levels.	As required
	Scarify and spike topsoil layer to break up silt deposits and prevent compaction of the soil surface.	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	Monthly

Table 4 contains extracts from the SuDS Manual Table 17.1: Operation and maintenance requirements for swales.

4.5 Ditches

4.5.1 Ditches require regular vegetation management to ensure that vegetation build up does not affect their efficiency. Headwalls should be checked on a regular basis to ensure that they are free from litter/obstructions and operating correctly.

4.5.2 A summary of the required maintenance activities is set out in Table 5.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter and debris removal.	Monthly (or as required)
	Manage vegetation and remove nuisance plants.	Monthly (at start, then as required)
Occasional Maintenance	Inspect gabion baskets and fill / replace missing stones as necessary.	Half yearly
	Check for poor vegetation growth or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
Remedial Actions	Repair erosion or other damage	As required
	Re-level uneven surfaces and reinstate design levels.	As required
	Remove build-up of sediment on upstream devices.	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	Monthly
Monitoring	Inspect inlets, outlets, headwalls for blockages, and clear if required.	Monthly and after every rainfall event
	Inspect infiltration and filtration surfaces for ponding, compaction and silt accumulation. Record areas where water is ponding for >48hours.	Monthly, or when required
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly

Table 5: Ditch operation and maintenance requirements.

4.6 Pond

- 4.6.1 The balancing pond lies entirely within the development and conveys flow to the highway ditch located in Swallowfield Street. It will also enhance the biodiversity of the green chain and highway ditch and provide a habitat for local wildlife. The pond will be lined with a bentonite material so it will not be affected by groundwater levels, this also protects the pond in case of puncturing of the lining.
- 4.6.2 The outfall headwall will also require checking to ensure that it doesn't become blocked either by litter or vegetation. Sediment removal and hydraulic control maintenance should also be undertaken. A summary of the required maintenance activities is set out in Table 6.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter, debris and surface scum removal.	Monthly (or as required)
	Grass cutting – public areas	Monthly (during growing season)
	Grass cutting – meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect vegetation to pond edge and remove nuisance plants (for first three years).	Monthly (at start, then as required)
	Inspect outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage.	Monthly
	Inspect water body for signs of poor water quality.	Monthly (May-October)
	Inspect silt accumulation rates in any forbay and in main body of the pond to establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options.	Half Yearly
	Check any mechanical devices e.g. penstocks	Half Yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond bas; include max 25% of pond surface).	Annually
	Remove 25% of bank vegetation from waters edge to a minimum 1m above water level.	Annually
	Tidy all dead growth (scrub clearance) before the start of growing season.	Annually
	Remove sediment any forebay	Every 1-5 five years, or as required
Occasional Maintenance	Remove sediment from the main body of pond when its volume is reduced by 20%.	>25 years (usually)
Remedial Actions	Repair erosion or other damage.	As required
	Aerate pond when signs of eutrophication are detected.	As required
	Repair/rehabilitation inlets, outlets and overflows.	As required
	Replant where necessary.	As required
	Realign rip-rap or other repair other damage.	As required
Monitoring	Inspect structures for evidence of poor operation.	Monthly / after large rainfall events
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly / after large rainfall events
	Inspect waterbody for signs of eutrophication	Monthly (May-October)

Table 6 contains extracts from the SuDS Manual Table 23.1: Operation and maintenance requirements for ponds and wetlands.

Appendix A Proposed Foul & Surface Water Drainage Layout drawing 31445/003 Revision C4

Appendix B Micro Drainage Calculations

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1 Introduction

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- 2.1.1 SuDS by their very nature minimise the need for deep excavations, and smooth transitions in depth are utilised to reduce turbulence in flows while reducing depth uncertainty for maintenance operatives. The swale will be formed from shallow side slopes with no greater than a 1:3 in gradient to reduce risk of falling when undertaking maintenance.
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- 3.1.2 Plots 35-38 have a filter drain within their private garden which runs parallel to adjacent land and provides storage and reduces the effects of any overflow during extreme rainfall events. The operation and maintenance of filter drains are detailed in section 4.2 and the maintenance requirements associated with these are detailed in Table 2. These operation and maintenance requirements will be outlined within a covenant that will form part of the deeds to each plot. This is to ensure that these SuDS features are retained, maintained and operate as intended.

4 Operation and Maintenance

- 4.1.1 The SuDS Manual, CIRIA C753, lists three types of maintenance activities associated with SuDS:
- 4.1.2 Regular Maintenance – ‘basic tasks undertaken on a frequent and predictable schedule’ including vegetation management, litter and debris removal, and inspections.’
- 4.1.3 Occasional Maintenance – ‘tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).’
- 4.1.4 Remedial Maintenance – ‘intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.’
- 4.1.5 In accordance with The SuDS Manual, CIRIA C753, specific maintenance needs should be monitored and maintenance schedules adjusted to suit a SuDS components particular requirements and location.
- 4.1.6 Table 1, overleaf, defines the type of maintenance required by each of the SuDS utilised as part of the surface water drainage system. Further details outlining the frequency of specific maintenance works should be undertaken are provided in Sections 4.1 – 4.6.

O&M Activity	Suds Component					
	Piped Network	Filter drain (Refer to Section 4.1)	Pervious pavement (Refer to Section 4.2)	Swale (Refer to Section 4.3)	Ditch (Refer to Section 4.4)	Pond (Refer to Section 4.5)
<u>Regular Maintenance</u>						
Inspection	■	■	■	■	■	■
Litter / debris removal	■	■	■	■	■	■
Grass Cutting		■	□	■		■
Weed / invasive plant control		□	□	□	□	□
Shrub management			□	□	□	□
Shoreline vegetation management						■
Aquatic vegetation management						■
<u>Occasional Maintenance</u>						
Sediment management	■	■	■	■	■	■
Vegetation / plant replacement				□		□
Vacuum sweeping and brushing			■			
<u>Remedial Maintenance</u>						
Structure rehabilitation / repair	□	□	□	□	□	□
Infiltration surface reconditioning		□	□	□		
■ Will be required □ May be required						

Table 1: Extract from The SuDS Manual Table 32.1: Typical key SuDS components operation and maintenance activities.

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

4.2 Filter Drain

- 4.2.1 Filter drains comprise geotextile lined trenches filled with granular material and a perforated pipe at the base. Conveyance and storage of water is accommodated within the perforated pipe and voids between the granular material. The most significant maintenance activity is the removal of silt from the filter drain. The granular material should also be kept clear of litter and vegetation and will require replacing typically every 10-15 years due to clogging. Surrounding ground should be kept clear of silt to prevent it washing into the filter drain, and thus reduce the requirement for this work as much as possible. Required maintenance activities are shown in Table 2.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required
Remedial Maintenance	Rehabilitate infiltration or filtration surfaces.	As required
	Replace geotextiles and clean and replace filter media if clogging occurs.	As required
	Excavate trench walls to expose clean soils if filtration performance reduces to unacceptable levels.	As required
	Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	Monthly
Monitoring	Inspect pre-treatment systems, inlets, trench surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly

Table 2 contains extracts from the SuDS Manual Table 16.1: Operation and maintenance requirements for filter drains.

4.3 Pervious Pavements

- 4.3.1 The principal requirements related to permeable pavements involve surface cleaning at least three times a year. Additionally, litter and vegetation should be removed on a regular basis. Note that the use of grit and salt may adversely affect the treatment and drainage potential of permeable surfaces, and the use of weed killers can disrupt the biological breakdown of contaminants that would otherwise occur in the sub-base. An alternative de-icing agent such as wet gritting which does not contain the chlorides and contaminants found in road salt should be used. A summary of required maintenance activities is shown in Table 3.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations– pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate and landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replaced lost jointing material.	As required
	Rehabilitation of surface and upper structure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration and filtration performance is reduced as a result of significant clogging)
Monitoring	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	Three-monthly, forty-eight hours after large rainfall events
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers.	Annually

Table 3 contains extracts from the SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements.

4.4 Swale

- 4.4.1 Swales are grass channels and one of the most regular activities required is the cutting (and removal) of the grass, and removal of any accumulated silt.
- 4.4.2 The swale within this development conveys runoff from the permeable paving and 450mm diameter surface water pipe via headwalls as shown in Appendix A.
- 4.4.3 Discharge into the swale is controlled by flow control orifice chambers which will require routine inspection for maintenance **and are to be inspected monthly for the first year from first occupation of the development**. This applies to all orifice flow control manholes across the site. The trash screens at headwalls should also be checked regularly to ensure that they do not become blocked by litter or vegetation.
- 4.4.4 A summary of the required maintenance activities for the swale is set out in Table 4.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter and debris removal.	Monthly, (or as required)
	Grass cutting – to retain grass height within specified design range.	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration and filtration surfaces for ponding, compaction and silt accumulation. Record areas where water is ponding for >48hours.	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Half yearly
Occasional Maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or re-seeding.	As required
	Re-level uneven surfaces and reinstate design levels.	As required
	Scarify and spike topsoil layer to break up silt deposits and prevent compaction of the soil surface.	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	Monthly

Table 4 contains extracts from the SuDS Manual Table 17.1: Operation and maintenance requirements for swales.

4.5 Ditches

4.5.1 Ditches require regular vegetation management to ensure that vegetation build up does not affect their efficiency. Headwalls should be checked on a regular basis to ensure that they are free from litter/obstructions and operating correctly.

4.5.2 A summary of the required maintenance activities is set out in Table 5.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter and debris removal.	Monthly (or as required)
	Manage vegetation and remove nuisance plants.	Monthly (at start, then as required)
Occasional Maintenance	Inspect gabion baskets and fill / replace missing stones as necessary.	Half yearly
	Check for poor vegetation growth or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
Remedial Actions	Repair erosion or other damage	As required
	Re-level uneven surfaces and reinstate design levels.	As required
	Remove build-up of sediment on upstream devices.	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	Monthly
Monitoring	Inspect inlets, outlets, headwalls for blockages, and clear if required.	Monthly and after every rainfall event
	Inspect infiltration and filtration surfaces for ponding, compaction and silt accumulation. Record areas where water is ponding for >48hours.	Monthly, or when required
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly

Table 5: Ditch operation and maintenance requirements.

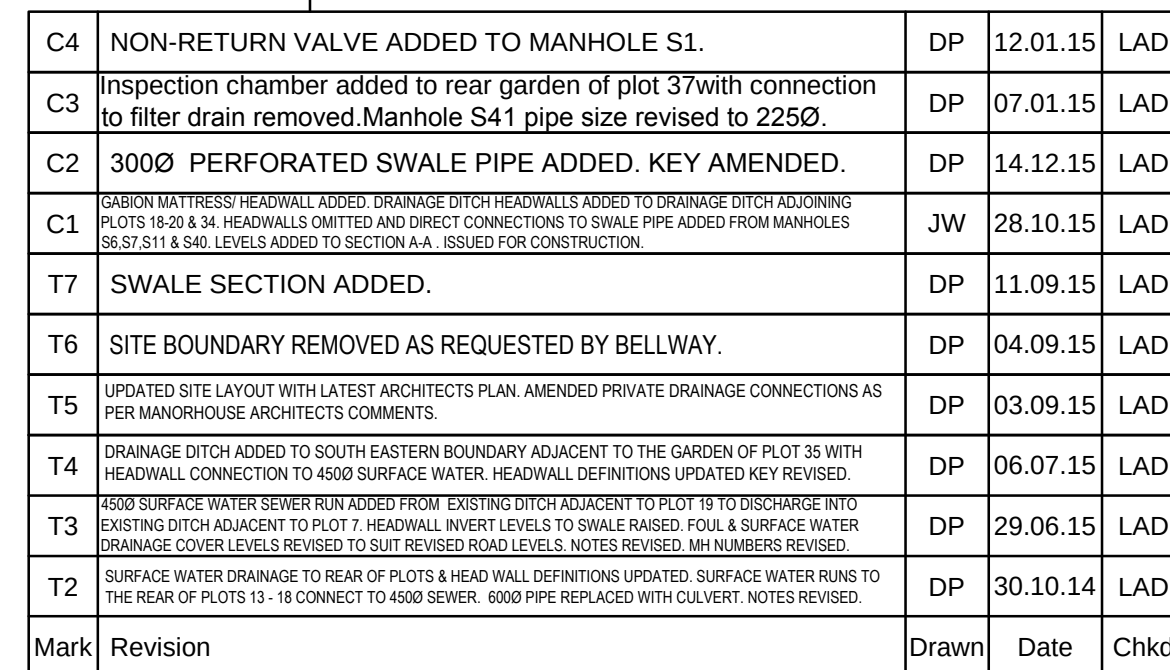
4.6 Pond

- 4.6.1 The balancing pond lies entirely within the development and conveys flow to the highway ditch located in Swallowfield Street. It will also enhance the biodiversity of the green chain and highway ditch and provide a habitat for local wildlife. The pond will be lined with a bentonite material so it will not be affected by groundwater levels, this also protects the pond in case of puncturing of the lining.
- 4.6.2 The outfall headwall will also require checking to ensure that it doesn't become blocked either by litter or vegetation. Sediment removal and hydraulic control maintenance should also be undertaken. A summary of the required maintenance activities is set out in Table 6.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter, debris and surface scum removal.	Monthly (or as required)
	Grass cutting – public areas	Monthly (during growing season)
	Grass cutting – meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect vegetation to pond edge and remove nuisance plants (for first three years).	Monthly (at start, then as required)
	Inspect outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage.	Monthly
	Inspect water body for signs of poor water quality.	Monthly (May-October)
	Inspect silt accumulation rates in any forbay and in main body of the pond to establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options.	Half Yearly
	Check any mechanical devices e.g. penstocks	Half Yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond bas; include max 25% of pond surface).	Annually
	Remove 25% of bank vegetation from waters edge to a minimum 1m above water level.	Annually
	Tidy all dead growth (scrub clearance) before the start of growing season.	Annually
	Remove sediment any forebay	Every 1-5 five years, or as required
Occasional Maintenance	Remove sediment from the main body of pond when its volume is reduced by 20%.	>25 years (usually)
Remedial Actions	Repair erosion or other damage.	As required
	Aerate pond when signs of eutrophication are detected.	As required
	Repair/rehabilitation inlets, outlets and overflows.	As required
	Replant where necessary.	As required
	Realign rip-rap or other repair other damage.	As required
Monitoring	Inspect structures for evidence of poor operation.	Monthly / after large rainfall events
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly / after large rainfall events
	Inspect waterbody for signs of eutrophication	Monthly (May-October)

Table 6 contains extracts from the SuDS Manual Table 23.1: Operation and maintenance requirements for ponds and wetlands.

Appendix A Proposed Foul & Surface Water Drainage Layout drawing 31445/003 Revision C4



Drawing Issue Status	CONSTRUCTION
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Client			
Date of last issue 08.10.14	Drawn by MM		
AS Scale 1:250	Checked by LD	Offices throughout the UK and Europe www.peterbrett.com © Peter Brett Associates LLP READING Tel: 0118 950 0761	
Drawing Number 31445/003	Revision C4		

- NOTES:**
1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS' AND ENGINEERS' DRAWINGS AND SPECIFICATIONS.
 3. THE SPECIFICATION FOR THE WORKS SHALL BE THE DEPARTMENT OF TRANSPORT'S SPECIFICATION FOR HIGHWAYS WORKS 1996 AND INCLUDING ALL SUBSEQUENT AMENDMENTS.
 4. PEEDING BEDDING SHALL BE AS FOLLOWS:
0.02m WITH GRANULAR SURROUND WHERE COVER TO SOFFIT +1.2m UNDER CARRIAGEWAYS, AND +0.9m UNDER VERGES. CLASS OF BEDDING - TYPE 8: 14mm To 5mm grad.
-330d WITH CONCRETE SURROUND WHERE COVER TO SOFFIT +1.2m UNDER CARRIAGEWAYS AND +0.3m UNDER VERGES. CLASS OF BEDDING - TYPE 2
- TYPE 2.1 CAST CONCRETE
 5. ALL CONCRETE USED IN CONSTRUCTION OF MANHOLES AND PIPE PROTECTION MUST BE SULPHATE RESISTING UNLESS AGREED IN ADVANCE WITH UNDERTAKER.
FOR DETAILS OF MANHOLES REFER TO PBA STANDARD DETAILS 314/S450/D11 AND 314/S50/D12
 6. FOR DETAILS OF INSPECTION CHAMBERS REFER TO PBA STANDARD DETAILS 303/S - S004.
 7. FOR MANHOLE AND PIPE DODGING TYPES. REFER TO PBA STANDARD DETAILS S005.
 8. ALL PIPES TO BE 100mm UNLESS STATED OTHERWISE.
 9. ALL DRAINAGE AND SEWER PIPE TO BE 'SUPERSLEEVE' AND 'PEPSLEE' RESPECTIVELY. VITRIFIED CLAY TO B866 WITH FLEXIBLE JOINTS. SEWER PIPES TO BE EXTRA STRENGTH QUALITY.
 10. ALL DRAINAGE WORKS ARE TO COMMENCE AT THE OUTFALL AND WORK UPSTREAM.
 11. ALL ADAPTOR PIPES TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH 'SEWERS FOR ADOPTION' (8th EDITION).
 12. ALL FINAL PRIVATE DRAINAGE CONNECTIONS TO BE 150mm.
 13. THE LOCATION AND LEVELS OF THE EXISTING MANHOLES AND OUTFALLS ARE TO BE CONFIRMED ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS.
 14. THE LEVELS AND LOCATIONS OF ALL DRAIN AND SEWER CROSSINGS ARE TO BE CHECKED ON SITE BEFORE CONSTRUCTION.
 15. ALL DRAINAGE ARRANGEMENTS ARE TO BE CARRIED OUT TO THE SATISFACTION OF THE LOCAL AUTHORITY BUILDING INSPECTOR ON SITE.
 16. GRADIENTS ARE INDICATED FOR DRAINAGE PURPOSES ONLY AND SHOULD NOT BE USED FOR SETTING OUT.
 17. FOR DETAILS ON REINSTATEMENT OF HORIZONTAL CUTT TRENCHES IN CARRIAGEWAY AND FOOTWAYS REFER TO PBA STANDARD DETAIL 314/S45/D05.
 18. ALL PIPES ARE TO BE INSTALLED WITH LEVEL SOFFITS UNLESS STATED OTHERWISE.
 19. MANHOLE COVERED IN CARRIAGEWAY TO BE D400 GRADE. B125 IN FOOTWAY AND PAVED/STRAIR AREAS.
 20. NO PRIVATE SEWERS ARE ALLOWED TO RUN ON TO THE PROPOSED PUBLICLY MAINTAINABLE HIGHWAY AND VICE VERSA.
 21. FOR DETAILS OF FILTER DRAIN REFER TO PBA STANDARD DETAIL S010.
 22. ALL 1500 PIPES IN CARRIAGEWAY TO BE VITRIFIED CLAY.
 23. PIPES IN CARRIAGEWAY WITH +1.2m COVER TO HAVE PIPE PROTECTION. SEE PBA STANDARD DETAIL DRAWING S0017.
 24. NO PAVEMENTS ARE TO BE LIFTED OR RUN ON TO THE DITCHES ON SOUTHEASTERN BOUNDARY TO BE ALTHO SVALE INLET HEADWALLS OR ALTHO 160C AS INDICATED BY PLAN OR EQUIVALENT. SEE PBA STANDARD DETAIL 314/S45/D012 & 314/S45/D013.
 25. TO BE READ IN CONJUNCTION WITH PBA DRAWING MANHOLE SCHEDULE 314/S45/D01.
 26. FILTER DRAINS TO RUN INTO CONVENTIONAL PIPE SYSTEM AT 150.
 27. ALL INSPECTION CHAMBERS DEPTHS TO INVERT TO BE MINIMUM 600mm FOL WATER AND 450mm SURFACE WATER UNLESS OTHERWISE STATED.
 28. WHERE PIPE COVER IS LESS THAN MINIMUM PIPE PROTECTION SHALL BE USED - REFER TO PBA STANDARD DETAIL S0107.
 29. FILTER CHAMBERS TO BE 450mm DEEP FROM FINISHED LEVEL INVERT OF CHAMBER TO BE 50mm ABOVE INVERT. SEE SUB BASE. REFER TO PBA STANDARD DETAIL S0115.
 30. HOUSE TYPES A & B TO HAVE CARPPED FLOOR JOISTS WITH OWN DRAINAGE TO THE SEWER. ALL FLUTE LIFETIME HOMES USE.

Appendix B Micro Drainage Calculations

Peter Brett Associates LLP		Page 1
Caversham Bridge House Waterman Place Reading Berkshire RG1 8DN	Willow Tree Way Swallowfield SW Drainage	
Date Sept 2009	Designed by ijf	
File 12 jan sw export.mdx	Checked by	
Micro Drainage		Network 2015.1

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)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.300	Minimum Backdrop Height (m)	1.500
Ratio R	0.400	Maximum Backdrop Height (m)	1.700
Maximum Rainfall (mm/hr)	200	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	10.546	0.026	410.0	0.187	4.00	0.0	0.600	o	450	
S1.001	10.602	0.026	407.8	0.000	0.00	0.0	0.600	o	450	
S1.002	9.054	0.022	411.5	0.000	0.00	0.0	0.600	o	450	
S1.003	24.403	0.060	406.7	0.000	0.00	0.0	0.600	o	450	
S1.004	29.008	0.071	408.6	0.000	0.00	0.0	0.600	o	450	
S2.000	14.024	0.093	150.8	0.000	4.00	0.0	0.600	o	150	
S2.001	8.842	0.059	149.9	0.002	0.00	0.0	0.600	o	150	
S2.002	2.250	0.015	150.0	0.000	0.00	0.0	0.600	o	150	
S2.003	5.902	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S2.004	6.167	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	69.16	4.18	42.870	0.187	0.0	0.0	0.0	1.00	158.7	35.1
S1.001	68.04	4.35	42.844	0.187	0.0	0.0	0.0	1.00	159.1	35.1
S1.002	67.12	4.50	42.818	0.187	0.0	0.0	0.0	1.00	158.4	35.1
S1.003	64.78	4.91	42.796	0.187	0.0	0.0	0.0	1.00	159.3	35.1
S1.004	62.22	5.39	42.736	0.187	0.0	0.0	0.0	1.00	159.0	35.1
S2.000	68.45	4.29	43.464	0.000	0.0	0.0	0.0	0.82	14.4	0.0
S2.001	67.34	4.47	43.371	0.002	0.0	0.0	0.0	0.82	14.5	0.3
S2.002	67.07	4.51	43.312	0.002	0.0	0.0	0.0	0.82	14.5	0.3
S2.003	64.68	4.93	42.650	0.002	0.0	0.0	0.0	0.24	463.6	0.3
S2.004	62.38	5.36	42.650	0.002	0.0	0.0	0.0	0.24	463.6	0.3

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Caversham Bridge House Waterman Place Reading Berkshire RG1 8DN	Willow Tree Way Swallowfield SW Drainage	
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Micro Drainage Network 2015.1		

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)	Auto Design
S2.005	4.878	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S3.000	17.671	0.088	200.8	0.057	4.00	0.0	0.600	o	225	
S4.000	9.913	0.120	82.6	0.023	4.00	0.0	0.600	o	225	
S5.000	10.031	0.020	501.6	0.009	4.00	0.0	0.600	o	225	
S3.001	20.726	0.042	493.5	0.028	0.00	0.0	0.600	o	225	
S3.002	16.525	0.033	507.1	0.023	0.00	0.0	0.600	o	225	
S6.000	2.484	0.005	500.0	0.019	4.00	0.0	0.600	o	225	
S6.001	6.066	0.240	25.3	0.000	0.00	0.0	0.600	o	225	
S3.003	3.298	0.007	500.0	0.023	0.00	0.0	0.600	o	225	
S3.004	2.271	0.005	500.0	0.000	0.00	0.0	0.600	o	225	
S2.006	13.151	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.005	57.275	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S7.000	2.426	0.025	97.0	0.027	4.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.005	60.70	5.71	42.650	0.002	0.0	0.0	0.0	0.24	463.6	0.3
S3.000	68.24	4.32	43.575	0.057	0.0	0.0	0.0	0.92	36.5	10.5
S4.000	69.55	4.11	43.575	0.023	0.0	0.0	0.0	1.44	57.2	4.3
S5.000	68.43	4.29	43.475	0.009	0.0	0.0	0.0	0.58	22.9	1.7
S3.001	64.76	4.91	43.455	0.117	0.0	0.0	0.0	0.58	23.1	20.5
S3.002	62.22	5.39	43.413	0.140	0.0	0.0	0.0	0.57	22.8«	23.6
S6.000	69.84	4.07	43.625	0.019	0.0	0.0	0.0	0.58	23.0	3.7
S6.001	69.58	4.11	43.620	0.019	0.0	0.0	0.0	2.61	103.8	3.7
S3.003	61.75	5.49	43.380	0.183	0.0	0.0	0.0	0.58	23.0«	30.6
S3.004	61.43	5.55	43.373	0.183	0.0	0.0	0.0	0.58	23.0«	30.6
S2.006	56.63	6.63	42.650	0.184	0.0	0.0	0.0	0.24	463.6	30.6
S1.005	44.34	10.67	42.650	0.372	0.0	0.0	0.0	0.24	463.6	44.6
S7.000	70.11	4.03	43.775	0.027	0.0	0.0	0.0	1.33	52.8	5.2

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Caversham Bridge House Waterman Place Reading Berkshire RG1 8DN	Willow Tree Way Swallowfield SW Drainage	
Date Sept 2009 File 12 jan sw export.mdx	Designed by ijf Checked by	
Micro Drainage Network 2015.1		

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)	Auto Design
S7.001	5.626	0.100	56.3	0.000	0.00	0.0	0.600	o	225	
S7.002	14.409	0.100	144.1	0.016	0.00	0.0	0.600	o	225	
S8.000	1.589	0.003	500.0	0.014	4.00	0.0	0.600	o	225	
S8.001	5.040	0.117	43.1	0.000	0.00	0.0	0.600	o	225	
S7.003	9.500	0.050	190.0	0.013	0.00	0.0	0.600	o	225	
S9.000	1.971	0.004	500.0	0.030	4.00	0.0	0.600	o	225	
S9.001	7.180	0.141	50.9	0.000	0.00	0.0	0.600	o	225	
S7.004	3.902	0.008	500.0	0.019	0.00	0.0	0.600	o	225	
S7.005	2.174	0.004	543.5	0.000	0.00	0.0	0.600	o	150	
S1.006	32.985	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.007	12.647	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.008	10.426	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S10.000	2.256	0.005	500.0	0.022	4.00	0.0	0.600	o	225	
S10.001	7.246	0.165	43.8	0.000	0.00	0.0	0.600	o	225	
S10.002	23.042	0.075	307.2	0.000	0.00	0.0	0.600	o	225	
S10.003	3.459	0.007	500.0	0.032	0.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S7.001	69.75	4.08	43.750	0.027	0.0	0.0	0.0	1.75	69.5	5.2
S7.002	68.34	4.31	43.650	0.043	0.0	0.0	0.0	1.09	43.2	8.0
S8.000	70.01	4.05	43.670	0.014	0.0	0.0	0.0	0.58	23.0	2.7
S8.001	69.73	4.09	43.667	0.014	0.0	0.0	0.0	2.00	79.4	2.7
S7.003	67.31	4.47	43.550	0.070	0.0	0.0	0.0	0.95	37.6	12.7
S9.000	69.93	4.06	43.645	0.030	0.0	0.0	0.0	0.58	23.0	5.7
S9.001	69.51	4.12	43.641	0.030	0.0	0.0	0.0	1.84	73.1	5.7
S7.004	66.64	4.59	43.500	0.119	0.0	0.0	0.0	0.58	23.0	21.6
S7.005	66.14	4.67	43.492	0.119	0.0	0.0	0.0	0.42	7.5«	21.6
S1.006	39.74	12.99	42.650	0.491	0.0	0.0	0.0	0.24	463.6	52.9
S1.007	38.25	13.88	42.650	0.491	0.0	0.0	0.0	0.24	463.6	52.9
S1.008	37.12	14.61	42.650	0.491	0.0	0.0	0.0	0.24	463.6	52.9
S10.000	69.88	4.07	43.645	0.022	0.0	0.0	0.0	0.58	23.0	4.1
S10.001	69.48	4.13	43.640	0.022	0.0	0.0	0.0	1.98	78.8	4.1
S10.002	66.29	4.64	43.475	0.022	0.0	0.0	0.0	0.74	29.4	4.1
S10.003	65.71	4.74	43.400	0.054	0.0	0.0	0.0	0.58	23.0	9.6

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Date Sept 2009	Designed by ijf		
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Micro Drainage	Network 2015.1		

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)	Auto Design
S10.004	2.217	0.004	500.0	0.000	0.00	0.0	0.600	o	225	
S1.009	13.804	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S11.000	5.109	0.150	34.1	0.036	4.00	0.0	0.600	o	225	
S11.001	18.262	0.037	493.6	0.002	0.00	0.0	0.600	o	225	
S11.002	12.903	0.113	114.2	0.041	0.00	0.0	0.600	o	225	
S11.003	4.844	0.010	500.0	0.016	0.00	0.0	0.600	o	225	
S11.004	11.048	0.084	131.4	0.000	0.00	0.0	0.600	o	225	
S12.000	15.312	0.031	500.0	0.032	4.00	0.0	0.600	o	225	
S12.001	6.579	0.013	500.0	0.005	0.00	0.0	0.600	o	225	
S13.000	4.223	0.008	500.0	0.025	4.00	0.0	0.600	o	225	
S13.001	7.020	0.085	82.3	0.000	0.00	0.0	0.600	o	225	
S11.005	13.852	0.028	500.1	0.000	0.00	0.0	0.600	o	225	
S11.006	9.753	0.024	401.9	0.029	0.00	0.0	0.600	o	225	
S14.000	5.800	0.012	500.0	0.008	4.00	0.0	0.600	o	225	
S14.001	9.159	0.067	136.3	0.003	0.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.004	65.35	4.81	43.393	0.054	0.0	0.0	0.0	0.58	23.0	9.6
S1.009	35.74	15.59	42.650	0.545	0.0	0.0	0.0	0.24	463.6	52.9
S11.000	70.06	4.04	43.475	0.036	0.0	0.0	0.0	2.25	89.4	6.8
S11.001	66.78	4.56	43.325	0.038	0.0	0.0	0.0	0.58	23.1	6.8
S11.002	65.75	4.74	43.288	0.078	0.0	0.0	0.0	1.22	48.6	13.9
S11.003	64.97	4.88	43.175	0.094	0.0	0.0	0.0	0.58	23.0	16.6
S11.004	64.08	5.04	43.165	0.094	0.0	0.0	0.0	1.14	45.3	16.6
S12.000	67.50	4.44	43.125	0.032	0.0	0.0	0.0	0.58	23.0	5.8
S12.001	66.37	4.63	43.094	0.037	0.0	0.0	0.0	0.58	23.0	6.7
S13.000	69.51	4.12	43.175	0.025	0.0	0.0	0.0	0.58	23.0	4.7
S13.001	68.98	4.20	43.167	0.025	0.0	0.0	0.0	1.44	57.4	4.7
S11.005	62.01	5.44	43.081	0.157	0.0	0.0	0.0	0.58	23.0«	26.3
S11.006	60.78	5.69	43.054	0.186	0.0	0.0	0.0	0.65	25.7«	30.6
S14.000	69.21	4.17	43.125	0.008	0.0	0.0	0.0	0.58	23.0	1.4
S14.001	68.35	4.30	43.113	0.011	0.0	0.0	0.0	1.12	44.5	2.0

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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)	Auto Design
S15.000	7.459	0.015	500.0	0.010	4.00	0.0	0.600	o	225	
S15.001	6.943	0.014	500.0	0.012	0.00	0.0	0.600	o	225	
S14.002	8.473	0.017	500.0	0.000	0.00	0.0	0.600	o	225	
S11.007	5.957	0.008	734.1	0.030	0.00	0.0	0.600	o	225	
S11.008	9.515	0.023	405.5	0.000	0.00	0.0	0.600	o	225	
S11.009	13.512	0.027	500.0	0.000	0.00	0.0	0.600	o	225	
S16.000	5.283	0.304	17.4	0.016	4.00	0.0	0.600	o	225	
S11.010	18.780	0.038	500.0	0.000	0.00	0.0	0.600	o	225	
S11.011	7.824	0.016	500.0	0.040	0.00	0.0	0.600	o	225	
S11.012	3.197	0.013	242.2	0.000	0.00	0.0	0.600	o	300	
S11.013	2.127	0.009	242.2	0.000	0.00	0.0	0.600	o	300	
S1.010	7.227	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.011	10.780	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.012	9.874	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S17.000	8.635	0.017	500.0	0.023	4.00	0.0	0.600	o	225	
S17.001	4.931	0.336	14.7	0.007	0.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S15.000	68.91	4.22	43.075	0.010	0.0	0.0	0.0	0.58	23.0	1.9
S15.001	67.66	4.42	43.060	0.022	0.0	0.0	0.0	0.58	23.0	4.1
S14.002	66.20	4.66	43.046	0.033	0.0	0.0	0.0	0.58	23.0	5.9
S11.007	59.80	5.90	43.029	0.249	0.0	0.0	0.0	0.48	18.9«	40.4
S11.008	58.69	6.14	43.021	0.249	0.0	0.0	0.0	0.64	25.6«	40.4
S11.009	57.03	6.53	42.998	0.249	0.0	0.0	0.0	0.58	23.0«	40.4
S16.000	70.13	4.03	43.275	0.016	0.0	0.0	0.0	3.16	125.5	3.0
S11.010	54.90	7.08	42.971	0.265	0.0	0.0	0.0	0.58	23.0«	40.4
S11.011	54.06	7.30	42.933	0.305	0.0	0.0	0.0	0.58	23.0«	44.7
S11.012	53.87	7.35	42.842	0.305	0.0	0.0	0.0	1.01	71.1	44.7
S11.013	53.74	7.39	42.829	0.305	0.0	0.0	0.0	1.01	71.1	44.7
S1.010	35.06	16.09	42.650	0.850	0.0	0.0	0.0	0.24	463.6	80.7
S1.011	34.10	16.85	42.650	0.850	0.0	0.0	0.0	0.24	463.6	80.7
S1.012	33.28	17.55	42.650	0.850	0.0	0.0	0.0	0.24	463.6	80.7
S17.000	68.69	4.25	43.255	0.023	0.0	0.0	0.0	0.58	23.0	4.2
S17.001	68.54	4.27	43.238	0.029	0.0	0.0	0.0	3.43	136.5	5.5

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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)	Auto Design
S17.002	21.400	0.043	500.0	0.000	0.00	0.0	0.600	o	225	
S17.003	7.698	0.015	500.0	0.025	0.00	0.0	0.600	o	225	
S1.013	9.520	0.000	0.0	0.000	0.00	0.0	1.500	U	-1	
S1.014	3.906	0.050	78.1	0.000	0.00	0.0	0.600	o	450	
S1.015	13.552	0.000	0.0	0.000	0.00	0.0	0.600	✓	30	
S1.016	10.018	0.000	0.0	0.000	0.00	0.0	0.600	✓	30	
S18.000	20.606	0.223	92.4	0.000	4.00	0.0	0.600	o	225	
S19.000	11.438	0.023	500.0	0.000	4.00	0.0	0.600	o	225	
S18.001	9.239	0.019	485.6	0.049	0.00	0.0	0.600	o	225	
S18.002	3.501	0.158	22.2	0.000	0.00	0.0	0.600	o	225	
S1.017	6.105	0.000	0.0	0.000	0.00	0.0	0.600	o	300	
S1.018	12.876	0.001	12876.4	0.000	0.00	0.0	0.600	o	300	
S20.000	13.218	0.203	65.0	0.000	4.00	0.0	0.600	✓	28	
S1.019	2.424	0.037	65.5	0.000	0.00	0.0	0.600	✓	28	
S1.020	17.557	0.030	585.2	0.000	0.00	0.0	0.600	U	-1	

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)
S17.002	64.89	4.89	42.902	0.029	0.0	0.0	0.0	0.58	23.0	5.5
S17.003	63.68	5.11	42.859	0.055	0.0	0.0	0.0	0.58	23.0	9.4
S1.013	32.53	18.22	42.650	0.905	0.0	0.0	0.0	0.24	463.6	80.7
S1.014	32.49	18.25	42.650	0.905	0.0	0.0	0.0	2.30	366.1	80.7
S1.015	32.00	18.71	42.600	0.905	0.0	0.0	0.0	0.49	840.1	80.7
S1.016	31.65	19.04	42.600	0.905	0.0	0.0	0.0	0.49	840.1	80.7
S18.000	68.67	4.25	43.075	0.000	0.0	0.0	0.0	1.36	54.1	0.0
S19.000	68.18	4.33	42.875	0.000	0.0	0.0	0.0	0.58	23.0	0.0
S18.001	66.59	4.59	42.852	0.049	0.0	0.0	0.0	0.59	23.3	8.9
S18.002	66.47	4.61	42.833	0.049	0.0	0.0	0.0	2.79	111.0	8.9
S1.017	30.97	19.73	42.600	0.954	0.0	0.0	0.0	0.15	10.5«	80.7
S1.018	29.45	21.38	42.600	0.954	0.0	0.0	0.0	0.13	9.2«	80.7
S20.000	69.98	4.05	42.670	0.000	0.0	0.0	0.0	4.37	2353.7	0.0
S1.019	29.44	21.39	42.467	0.954	0.0	0.0	0.0	4.35	2344.4	80.7
S1.020	29.21	21.66	42.430	0.954	0.0	0.0	0.0	1.10	2161.1	80.7

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Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.300	Storm Duration (mins)	120
Ratio R	0.400		

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<u>Online Controls for Storm</u> <u>Orifice Manhole: S14, DS/PN: S3.001, Volume (m³): 2.3</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.455 <u>Orifice Manhole: Sx, DS/PN: S3.003, Volume (m³): 1.8</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.380 <u>Orifice Manhole: S46, DS/PN: S7.001, Volume (m³): 0.6</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.750 <u>Orifice Manhole: S45, DS/PN: S8.001, Volume (m³): 0.6</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.667 <u>Orifice Manhole: S43, DS/PN: S9.001, Volume (m³): 0.6</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.641 <u>Orifice Manhole: S44, DS/PN: S7.005, Volume (m³): 0.9</u> Diameter (m) 0.060 Discharge Coefficient 0.600 Invert Level (m) 43.492 <u>Orifice Manhole: S42, DS/PN: S10.001, Volume (m³): 0.6</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.640 <u>Orifice Manhole: S41, DS/PN: S10.004, Volume (m³): 0.7</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.393 <u>Orifice Manhole: S47, DS/PN: S11.001, Volume (m³): 0.3</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.325 <u>Orifice Manhole: S48, DS/PN: S11.004, Volume (m³): 0.3</u> Diameter (m) 0.070 Discharge Coefficient 0.600 Invert Level (m) 43.165 <u>Orifice Manhole: S49, DS/PN: S11.006, Volume (m³): 1.1</u> Diameter (m) 0.090 Discharge Coefficient 0.600 Invert Level (m) 43.054		
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<u>Orifice Manhole: S50, DS/PN: S11.009, Volume (m³): 1.0</u> Diameter (m) 0.110 Discharge Coefficient 0.600 Invert Level (m) 42.998 <u>Orifice Manhole: S40, DS/PN: S11.013, Volume (m³): 0.8</u> Diameter (m) 0.130 Discharge Coefficient 0.600 Invert Level (m) 42.829 <u>Orifice Manhole: S39, DS/PN: S17.001, Volume (m³): 0.9</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.238 <u>Orifice Manhole: S38, DS/PN: S17.003, Volume (m³): 1.7</u> Diameter (m) 0.150 Discharge Coefficient 0.600 Invert Level (m) 42.859 <u>Orifice Manhole: S35, DS/PN: S18.001, Volume (m³): 1.9</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 42.852 <u>Orifice Manhole: S52, DS/PN: S22.001, Volume (m³): 0.3</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 42.775 <u>Orifice Manhole: S51, DS/PN: S23.001, Volume (m³): 0.2</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 42.956 <u>Orifice Manhole: S95, DS/PN: S24.001, Volume (m³): 0.7</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 43.145		
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Storage Structures for Storm

Porous Car Park Manhole: S14, DS/PN: S3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	21.4
Membrane Percolation (mm/hr)	1000	Length (m)	21.4
Max Percolation (l/s)	127.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.700	Cap Volume Depth (m)	0.275

Porous Car Park Manhole: Sx, DS/PN: S3.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.4
Max Percolation (l/s)	118.9	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.600	Cap Volume Depth (m)	0.275

Porous Car Park Manhole: S46, DS/PN: S7.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.0
Max Percolation (l/s)	13.6	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.775	Cap Volume Depth (m)	0.275

Porous Car Park Manhole: S45, DS/PN: S8.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.0
Max Percolation (l/s)	13.6	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.695	Cap Volume Depth (m)	0.275

Porous Car Park Manhole: S43, DS/PN: S9.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.0
Max Percolation (l/s)	33.6	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	43.675	Cap Volume Depth (m)	0.275

Porous Car Park Manhole: S44, DS/PN: S7.005

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	110.0
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

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<u>Porous Car Park Manhole: S44, DS/PN: S7.005</u> <table><tr><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Invert Level (m)</td><td>43.525</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Width (m)</td><td>18.0</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Length (m)</td><td>22.0</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Infiltration Trench Manhole: Sx, DS/PN: S1.007</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00040</td><td>Trench Width (m)</td><td>0.5</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00040</td><td>Trench Length (m)</td><td>200.0</td></tr><tr><td>Safety Factor</td><td>1.0</td><td>Slope (1:X)</td><td>1000.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Cap Volume Depth (m)</td><td>0.000</td></tr><tr><td>Invert Level (m)</td><td>42.650</td><td>Cap Infiltration Depth (m)</td><td>0.000</td></tr></table> <u>Porous Car Park Manhole: S42, DS/PN: S10.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>8.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>8.0</td></tr><tr><td>Max Percolation (l/s)</td><td>17.8</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.675</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S41, DS/PN: S10.004</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>16.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>18.0</td></tr><tr><td>Max Percolation (l/s)</td><td>80.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.470</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S47, DS/PN: S11.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>11.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>12.0</td></tr><tr><td>Max Percolation (l/s)</td><td>36.7</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.350</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S48, DS/PN: S11.004</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>17.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>15.0</td></tr><tr><td>Max Percolation (l/s)</td><td>70.8</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.280</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table>			Porosity	0.30	Slope (1:X)	500.0	Invert Level (m)	43.525	Depression Storage (mm)	5	Width (m)	18.0	Evaporation (mm/day)	3	Length (m)	22.0	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00040	Trench Width (m)	0.5	Infiltration Coefficient Side (m/hr)	0.00040	Trench Length (m)	200.0	Safety Factor	1.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	0.000	Invert Level (m)	42.650	Cap Infiltration Depth (m)	0.000	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0	Membrane Percolation (mm/hr)	1000	Length (m)	8.0	Max Percolation (l/s)	17.8	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.675	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0	Membrane Percolation (mm/hr)	1000	Length (m)	18.0	Max Percolation (l/s)	80.0	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.470	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0	Membrane Percolation (mm/hr)	1000	Length (m)	12.0	Max Percolation (l/s)	36.7	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.350	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	17.0	Membrane Percolation (mm/hr)	1000	Length (m)	15.0	Max Percolation (l/s)	70.8	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.280	Cap Volume Depth (m)	0.275
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<u>Porous Car Park Manhole: S49, DS/PN: S11.006</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>23.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>24.0</td></tr><tr><td>Max Percolation (l/s)</td><td>153.3</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.120</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S50, DS/PN: S11.009</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>20.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>18.0</td></tr><tr><td>Max Percolation (l/s)</td><td>100.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.050</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S40, DS/PN: S11.013</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>20.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>20.0</td></tr><tr><td>Max Percolation (l/s)</td><td>111.1</td><td>Slope (1:X)</td><td>1000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>42.829</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S39, DS/PN: S17.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>8.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>9.0</td></tr><tr><td>Max Percolation (l/s)</td><td>20.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.300</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S38, DS/PN: S17.003</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>16.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>14.0</td></tr><tr><td>Max Percolation (l/s)</td><td>62.2</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.175</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S35, DS/PN: S18.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Invert Level (m)</td><td>42.975</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Width (m)</td><td>18.0</td></tr><tr><td>Max Percolation (l/s)</td><td>110.0</td><td>Length (m)</td><td>22.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Depression Storage (mm)</td><td>5</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	23.0	Membrane Percolation (mm/hr)	1000	Length (m)	24.0	Max Percolation (l/s)	153.3	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.120	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0	Membrane Percolation (mm/hr)	1000	Length (m)	18.0	Max Percolation (l/s)	100.0	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.050	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0	Membrane Percolation (mm/hr)	1000	Length (m)	20.0	Max Percolation (l/s)	111.1	Slope (1:X)	1000.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	42.829	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0	Membrane Percolation (mm/hr)	1000	Length (m)	9.0	Max Percolation (l/s)	20.0	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.300	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0	Membrane Percolation (mm/hr)	1000	Length (m)	14.0	Max Percolation (l/s)	62.2	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.175	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	42.975	Membrane Percolation (mm/hr)	1000	Width (m)	18.0	Max Percolation (l/s)	110.0	Length (m)	22.0	Safety Factor	2.0	Slope (1:X)	500.0	Porosity	0.30	Depression Storage (mm)	5
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<u>Porous Car Park Manhole: S35, DS/PN: S18.001</u> Evaporation (mm/day) 3 Cap Volume Depth (m) 0.275 <u>Tank or Pond Manhole: Sx, DS/PN: S1.017</u> Invert Level (m) 42.600 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>247.0</td><td>0.700</td><td>377.9</td><td>1.400</td><td>536.4</td><td>2.100</td><td>722.7</td></tr><tr><td>0.100</td><td>264.0</td><td>0.800</td><td>398.8</td><td>1.500</td><td>561.3</td><td>2.200</td><td>751.6</td></tr><tr><td>0.200</td><td>281.6</td><td>0.900</td><td>420.3</td><td>1.600</td><td>586.8</td><td>2.300</td><td>781.0</td></tr><tr><td>0.300</td><td>299.7</td><td>1.000</td><td>442.4</td><td>1.700</td><td>612.8</td><td>2.400</td><td>811.0</td></tr><tr><td>0.400</td><td>318.4</td><td>1.100</td><td>465.1</td><td>1.800</td><td>639.5</td><td>2.500</td><td>841.6</td></tr><tr><td>0.500</td><td>337.6</td><td>1.200</td><td>488.3</td><td>1.900</td><td>666.6</td><td></td><td></td></tr><tr><td>0.600</td><td>357.5</td><td>1.300</td><td>512.1</td><td>2.000</td><td>694.4</td><td></td><td></td></tr></table> <u>Porous Car Park Manhole: S52, DS/PN: S22.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>11.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>12.0</td></tr><tr><td>Max Percolation (l/s)</td><td>36.7</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>42.800</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: S51, DS/PN: S23.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>11.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>12.0</td></tr><tr><td>Max Percolation (l/s)</td><td>36.7</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>42.956</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table> <u>Porous Car Park Manhole: Sx, DS/PN: S24.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>8.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>8.0</td></tr><tr><td>Max Percolation (l/s)</td><td>17.8</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>43.150</td><td>Cap Volume Depth (m)</td><td>0.275</td></tr></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	247.0	0.700	377.9	1.400	536.4	2.100	722.7	0.100	264.0	0.800	398.8	1.500	561.3	2.200	751.6	0.200	281.6	0.900	420.3	1.600	586.8	2.300	781.0	0.300	299.7	1.000	442.4	1.700	612.8	2.400	811.0	0.400	318.4	1.100	465.1	1.800	639.5	2.500	841.6	0.500	337.6	1.200	488.3	1.900	666.6			0.600	357.5	1.300	512.1	2.000	694.4			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0	Membrane Percolation (mm/hr)	1000	Length (m)	12.0	Max Percolation (l/s)	36.7	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	42.800	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0	Membrane Percolation (mm/hr)	1000	Length (m)	12.0	Max Percolation (l/s)	36.7	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	42.956	Cap Volume Depth (m)	0.275	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0	Membrane Percolation (mm/hr)	1000	Length (m)	8.0	Max Percolation (l/s)	17.8	Slope (1:X)	500.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	43.150	Cap Volume Depth (m)	0.275
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	43.036	-0.284	0.000	0.26		25.1	OK	
S1.001	S2	43.007	-0.287	0.000	0.25		24.6	OK	
S1.002	S3	42.977	-0.291	0.000	0.27		24.7	OK	
S1.003	S4	42.935	-0.311	0.000	0.18		23.9	OK	
S1.004	S5	42.888	-0.298	0.000	0.12		16.7	OK	
S2.000	Sx	43.464	-0.150	0.000	0.00		0.0	OK	
S2.001	S10	43.380	-0.141	0.000	0.01		0.2	OK	
S2.002	S11	43.322	-0.140	0.000	0.01		0.2	OK	
S2.003	S12 HW	42.877	-1.439	0.000	0.00		0.1	OK	
S2.004	Sx	42.877	-1.439	0.000	0.00		0.2	OK	
S2.005	Sx	42.877	-1.439	0.000	0.00		0.4	OK	
S3.000	Sx	43.743	-0.057	0.000	0.07		2.3	OK	
S4.000	Sx	43.742	-0.058	0.000	0.02		0.9	OK	
S5.000	Sx	43.742	0.042	0.000	0.02		0.3	SURCHARGED	
S3.001	S14	43.742	0.062	0.000	0.07		1.5	SURCHARGED	
S3.002	Sx	43.660	0.022	0.000	0.12		2.0	SURCHARGED	
S6.000	Sx	43.671	-0.179	0.000	0.09		2.6	OK	
S6.001	S13	43.658	-0.187	0.000	0.01		0.6	OK	
S3.003	Sx	43.658	0.053	0.000	0.08		2.1	SURCHARGED	

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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.004	S7	43.414	-0.184	0.000	0.08		2.1	OK	
S2.006	S8 HW	42.877	-1.439	0.000	0.00		1.3	OK	
S1.005	S6 HW	42.877	-1.439	0.000	0.01		14.2	OK	
S7.000	Sx	43.835	-0.165	0.000	0.09		2.6	OK	
S7.001	S46	43.834	-0.141	0.000	0.03		1.3	OK	
S7.002	Sx	43.690	-0.185	0.000	0.07		2.8	OK	
S8.000	Sx	43.724	-0.171	0.000	0.06		1.8	OK	
S8.001	S45	43.723	-0.169	0.000	0.02		0.8	OK	
S7.003	Sx	43.612	-0.163	0.000	0.15		4.8	OK	
S9.000	Sx	43.713	-0.157	0.000	0.10		2.9	OK	
S9.001	S43	43.713	-0.153	0.000	0.02		1.1	OK	
S7.004	Sx	43.595	-0.130	0.000	0.22		5.6	OK	
S7.005	S44	43.594	-0.048	0.000	0.19		2.0	OK	
S1.006	S27 HW	42.858	-1.458	0.000	0.01		14.3	OK	
S1.007	Sx	42.837	-1.479	0.000	0.01		10.9	OK	
S1.008	Sx	42.828	-1.488	0.000	0.01		10.8	OK	
S10.000	Sx	43.711	-0.159	0.000	0.10		2.8	OK	
S10.001	S42	43.711	-0.155	0.000	0.02		1.1	OK	
S10.002	Sx	43.515	-0.185	0.000	0.04		1.1	OK	
S10.003	Sx	43.502	-0.123	0.000	0.14		3.5	OK	
S10.004	S41	43.501	-0.117	0.000	0.05		1.5	OK	
S1.009	S28 HW	42.820	-1.496	0.000	0.02		12.3	OK	
S11.000	Sx	43.520	-0.180	0.000	0.09		4.9	OK	
S11.001	S47	43.411	-0.139	0.000	0.06		1.1	OK	
S11.002	Sx	43.340	-0.173	0.000	0.10		4.4	OK	
S11.003	Sx	43.322	-0.078	0.000	0.21		5.0	OK	
S11.004	S48	43.322	-0.069	0.000	0.03		1.2	OK	
S12.000	Sx	43.237	-0.113	0.000	0.05		0.8	OK	
S12.001	Sx	43.237	-0.082	0.000	0.04		0.9	OK	
S13.000	Sx	43.237	-0.163	0.000	0.03		0.6	OK	
S13.001	Sx	43.237	-0.155	0.000	0.02		0.6	OK	
S11.005	Sx	43.237	-0.069	0.000	0.17		2.7	OK	
S11.006	S49	43.236	-0.043	0.000	0.03		0.5	OK	
S14.000	Sx	43.159	-0.191	0.000	0.04		1.0	OK	
S14.001	Sx	43.147	-0.192	0.000	0.03		1.3	OK	
S15.000	Sx	43.142	-0.158	0.000	0.06		1.2	OK	
S15.001	Sx	43.139	-0.146	0.000	0.11		2.3	OK	
S14.002	Sx	43.135	-0.136	0.000	0.20		3.4	OK	
S11.007	Sx	43.128	-0.126	0.000	0.08		1.8	OK	
S11.008	Sx	43.127	-0.119	0.000	0.10		1.8	OK	
S11.009	S50	43.127	-0.096	0.000	0.14		2.2	OK	
S16.000	Sx	43.300	-0.200	0.000	0.03		2.1	OK	
S11.010	Sx	43.038	-0.157	0.000	0.11		2.0	OK	
S11.011	Sx	43.024	-0.134	0.000	0.34		6.2	OK	
S11.012	S72	42.912	-0.230	0.000	0.12		6.2	OK	
S11.013	S40	42.879	-0.251	0.000	0.02		1.3	OK	
S1.010	S29 HW	42.803	-1.513	0.000	0.01		13.1	OK	
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	Sx	42.793	-1.523	0.000	0.01		13.1	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.012	Sx	30 Winter	1	+0%			
S17.000	Sx	15 Winter	1	+0%	100/15 Winter		
S17.001	S39	15 Winter	1	+0%	100/15 Summer		
S17.002	Sx	30 Winter	1	+0%			
S17.003	S38	30 Winter	1	+0%			
S1.013	S30 HW	30 Winter	1	+0%			
S1.014	S31 HW	30 Winter	1	+0%			
S1.015	S32 HW	240 Winter	1	+0%			
S1.016	Spond	240 Winter	1	+0%			
S18.000	Sx	60 Winter	1	+0%			
S19.000	Sx	60 Winter	1	+0%	100/60 Winter		
S18.001	S35	60 Winter	1	+0%	100/30 Winter		
S18.002	S36 HW	240 Winter	1	+0%			
S1.017	Sx	240 Winter	1	+0%			
S1.018	S86	240 Winter	1	+0%			
S20.000	SDITCH	15 Winter	1	+0%			
S1.019	S34 HW	15 Winter	1	+0%			
S1.020	S89 EX HW	15 Winter	1	+0%			
S21.000	S90 EX	30 Winter	1	+0%	100/15 Winter		
S22.000	S52	15 Summer	1	+0%			
S22.001	S52	30 Winter	1	+0%	30/15 Summer		
S21.001	S25	30 Winter	1	+0%	100/15 Winter		
S21.002	S94 EX HW	15 Winter	1	+0%	100/30 Winter		
S23.000	Sx	15 Summer	1	+0%			
S23.001	S51	60 Winter	1	+0%	30/30 Winter		
S21.003	S26	15 Winter	1	+0%	100/15 Winter		
S24.000	Sx	60 Winter	1	+0%	100/15 Winter		
S24.001	S95	60 Winter	1	+0%	100/15 Winter		
S25.000	S3 HW	15 Winter	1	+0%		100/15 Winter	
S25.001	Sx	15 Winter	1	+0%	100/15 Winter		
S26.000	Sx	15 Winter	1	+0%	100/15 Summer		
S25.002	S16 HW	15 Winter	1	+0%	30/15 Summer		
S25.003	S17	15 Winter	1	+0%	100/15 Summer		
S25.004	S18	15 Winter	1	+0%	30/15 Summer		
S25.005	S19	15 Winter	1	+0%	100/15 Summer		
S25.006	S20	15 Winter	1	+0%	100/15 Summer		
S25.007	S21	15 Winter	1	+0%	100/15 Summer		
S24.002	S22 HW	15 Winter	1	+0%			
S24.003	S23 HW	15 Winter	1	+0%	100/30 Summer		
S21.004	S24	15 Winter	1	+0%	100/15 Summer		
S21.005	S102 EX HW	15 Winter	1	+0%			
S1.021	S103 EX	15 Winter	1	+0%	100/30 Winter		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.012	Sx		42.778	-1.538	0.000	0.01		13.1	OK
S17.000	Sx		43.332	-0.148	0.000	0.18		3.0	OK
S17.001	S39		43.325	-0.138	0.000	0.02		1.3	OK
S17.002	Sx		42.950	-0.177	0.000	0.07		1.3	OK
S17.003	S38		42.932	-0.152	0.000	0.16		2.9	OK
S1.013	S30 HW		42.763	-1.553	0.000	0.01		14.9	OK
S1.014	S31 HW		42.740	-0.360	0.000	0.09		14.9	OK
S1.015	S32 HW		42.728	-0.838	0.000	0.01		11.0	OK
S1.016	Spond		42.727	-0.839	0.000	0.00		10.8	OK
S18.000	Sx		43.075	-0.225	0.000	0.00		0.0	OK
S19.000	Sx		42.994	-0.106	0.000	0.00		0.0	OK
S18.001	S35		42.994	-0.083	0.000	0.07		1.1	OK
S18.002	S36 HW		42.856	-0.202	0.000	0.02		1.2	OK
S1.017	Sx		42.726	-0.174	0.000	0.19		8.3	OK
S1.018	S86		42.721	-0.179	0.000	0.34		8.3	OK
S20.000	SDITCH		42.674	-0.539	0.000	0.00		0.0	OK
S1.019	S34 HW		42.674	-0.336	0.000	0.00		3.0	OK
S1.020	S89 EX HW		42.674	-1.422	0.000	0.00		3.0	OK
S21.000	S90 EX		42.744	-0.221	0.000	0.00		0.0	OK
S22.000	S52		42.984	-0.186	0.000	0.07		4.2	OK
S22.001	S52		42.844	-0.031	0.000	0.24		1.1	OK
S21.001	S25		42.745	-0.190	0.000	0.06		1.1	OK
S21.002	S94 EX HW		42.696	-0.291	0.000	0.01		1.1	OK
S23.000	Sx		43.022	-0.168	0.000	0.15		3.7	OK
S23.001	S51		43.006	-0.050	0.000	0.15		0.7	OK
S21.003	S26		42.696	-0.248	0.000	0.03		3.6	OK
S24.000	Sx		43.195	-0.105	0.000	0.06		0.6	OK
S24.001	S95		43.194	-0.101	0.000	0.06		0.6	OK
S25.000	S3 HW		43.123	-0.602	0.000	0.04		53.0	OK
S25.001	Sx		43.120	-0.529	0.000	0.04		53.3	OK
S26.000	Sx		43.116	-0.427	0.000	0.00		0.3	OK
S25.002	S16 HW		43.116	-0.204	0.000	0.58		53.9	OK
S25.003	S17		43.082	-0.223	0.000	0.41		51.6	OK
S25.004	S18		43.023	-0.200	0.000	0.57		48.6	OK
S25.005	S19		42.998	-0.207	0.000	0.42		47.8	OK
S25.006	S20		42.956	-0.203	0.000	0.58		46.8	OK
S25.007	S21		42.870	-0.262	0.000	0.36		45.6	OK
S24.002	S22 HW		42.761	-0.342	0.000	0.15		44.0	OK
S24.003	S23 HW		42.733	-0.267	0.000	0.35		43.6	OK
S21.004	S24		42.695	-0.220	0.000	0.33		40.6	OK
S21.005	S102 EX HW		42.680	-1.406	0.000	0.03		39.9	OK
S1.021	S103 EX		42.674	-0.221	0.000	0.36		38.2	OK

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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>		
PN	US/MH Name	Level Exceeded
S1.012	Sx	
S17.000	Sx	
S17.001	S39	
S17.002	Sx	
S17.003	S38	
S1.013	S30 HW	
S1.014	S31 HW	
S1.015	S32 HW	
S1.016	Spond	
S18.000	Sx	
S19.000	Sx	
S18.001	S35	
S18.002	S36 HW	
S1.017	Sx	
S1.018	S86	
S20.000	SDITCH	
S1.019	S34 HW	
S1.020	S89 EX HW	
S21.000	S90 EX	
S22.000	S52	
S22.001	S52	
S21.001	S25	
S21.002	S94 EX HW	
S23.000	Sx	
S23.001	S51	
S21.003	S26	
S24.000	Sx	
S24.001	S95	
S25.000	S3 HW	1
S25.001	Sx	
S26.000	Sx	
S25.002	S16 HW	
S25.003	S17	
S25.004	S18	
S25.005	S19	
S25.006	S20	
S25.007	S21	
S24.002	S22 HW	
S24.003	S23 HW	
S21.004	S24	
S21.005	S102 EX HW	
S1.021	S103 EX	
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**30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm**

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	43.149	-0.171	0.000	0.64		61.7	OK	
S1.001	S2	43.119	-0.175	0.000	0.63		60.7	OK	
S1.002	S3	43.088	-0.180	0.000	0.66		60.4	OK	
S1.003	S4	43.059	-0.187	0.000	0.33		44.3	OK	
S1.004	S5	43.032	-0.154	0.000	0.29		40.1	OK	
S2.000	Sx	43.464	-0.150	0.000	0.00		0.0	OK	
S2.001	S10	43.390	-0.131	0.000	0.04		0.5	OK	
S2.002	S11	43.332	-0.130	0.000	0.05		0.5	OK	
S2.003	S12 HW	42.995	-1.321	0.000	0.00		0.2	OK	
S2.004	Sx	42.995	-1.321	0.000	0.00		0.5	OK	
S2.005	Sx	42.995	-1.321	0.000	0.00		0.8	OK	
S3.000	Sx	43.855	0.055	0.000	0.17		5.5	SURCHARGED	
S4.000	Sx	43.853	0.053	0.000	0.05		2.2	SURCHARGED	
S5.000	Sx	43.853	0.153	0.000	0.06		0.8	SURCHARGED	
S3.001	S14	43.853	0.173	0.000	0.09		1.7	SURCHARGED	
S3.002	Sx	43.742	0.104	0.000	0.17		2.8	SURCHARGED	
S6.000	Sx	43.739	-0.111	0.000	0.04		1.1	OK	
S6.001	S13	43.739	-0.106	0.000	0.02		1.1	OK	
S3.003	Sx	43.739	0.134	0.000	0.08		2.1	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.004	S7	180 Winter	30	+0%				
S2.006	S8 HW	30 Winter	30	+0%				
S1.005	S6 HW	30 Winter	30	+0%				
S7.000	Sx	30 Winter	30	+0%	100/15 Summer			
S7.001	S46	30 Winter	30	+0%	100/15 Summer			
S7.002	Sx	15 Winter	30	+0%				
S8.000	Sx	30 Winter	30	+0%				
S8.001	S45	30 Winter	30	+0%				
S7.003	Sx	120 Winter	30	+0%	100/120 Winter			
S9.000	Sx	30 Winter	30	+0%	100/60 Winter			
S9.001	S43	30 Winter	30	+0%	100/60 Winter			
S7.004	Sx	120 Winter	30	+0%	100/15 Winter			
S7.005	S44	120 Winter	30	+0%	30/30 Winter			
S1.006	S27 HW	30 Winter	30	+0%				
S1.007	Sx	30 Winter	30	+0%				
S1.008	Sx	30 Winter	30	+0%				
S10.000	Sx	30 Winter	30	+0%	100/30 Winter			
S10.001	S42	30 Winter	30	+0%	100/30 Winter			
S10.002	Sx	60 Winter	30	+0%				
S10.003	Sx	60 Winter	30	+0%				
S10.004	S41	60 Winter	30	+0%				
S1.009	S28 HW	30 Winter	30	+0%				
S11.000	Sx	15 Winter	30	+0%	100/120 Winter			
S11.001	S47	120 Winter	30	+0%	100/15 Winter			
S11.002	Sx	60 Winter	30	+0%	100/120 Winter			
S11.003	Sx	60 Winter	30	+0%	100/15 Summer			
S11.004	S48	60 Winter	30	+0%	30/60 Winter			
S12.000	Sx	15 Winter	30	+0%	100/15 Summer			
S12.001	Sx	15 Winter	30	+0%	100/15 Summer			
S13.000	Sx	15 Winter	30	+0%				
S13.001	Sx	15 Winter	30	+0%	100/180 Winter			
S11.005	Sx	240 Winter	30	+0%	100/15 Summer			
S11.006	S49	240 Winter	30	+0%	30/120 Summer			
S14.000	Sx	240 Winter	30	+0%				
S14.001	Sx	240 Winter	30	+0%				
S15.000	Sx	240 Winter	30	+0%	100/15 Summer			
S15.001	Sx	240 Winter	30	+0%	100/15 Summer			
S14.002	Sx	240 Winter	30	+0%	100/15 Summer			
S11.007	Sx	240 Winter	30	+0%	100/15 Summer			
S11.008	Sx	240 Winter	30	+0%	100/15 Winter			
S11.009	S50	240 Winter	30	+0%	30/180 Winter			
S16.000	Sx	15 Summer	30	+0%				
S11.010	Sx	15 Winter	30	+0%	100/15 Summer			
S11.011	Sx	15 Winter	30	+0%	100/15 Summer			
S11.012	S72	240 Winter	30	+0%	100/120 Winter			
S11.013	S40	240 Winter	30	+0%	100/120 Winter			
S1.010	S29 HW	30 Winter	30	+0%				
S1.011	Sx	30 Winter	30	+0%				

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**30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.004	S7	43.414	-0.184	0.000	0.07		2.1	OK	
S2.006	S8 HW	42.995	-1.321	0.000	0.00		2.7	OK	
S1.005	S6 HW	42.995	-1.321	0.000	0.02		32.2	OK	
S7.000	Sx	43.945	-0.055	0.000	0.21		6.1	OK	
S7.001	S46	43.944	-0.031	0.000	0.05		2.1	OK	
S7.002	Sx	43.715	-0.160	0.000	0.18		6.8	OK	
S8.000	Sx	43.773	-0.122	0.000	0.11		3.3	OK	
S8.001	S45	43.773	-0.119	0.000	0.03		1.5	OK	
S7.003	Sx	43.682	-0.093	0.000	0.17		5.4	OK	
S9.000	Sx	43.776	-0.094	0.000	0.25		7.1	OK	
S9.001	S43	43.776	-0.090	0.000	0.03		1.7	OK	
S7.004	Sx	43.679	-0.046	0.000	0.33		8.4	OK	
S7.005	S44	43.677	0.035	0.000	0.27		3.0	SURCHARGED	
S1.006	S27 HW	42.959	-1.357	0.000	0.03		31.0	OK	
S1.007	Sx	42.923	-1.393	0.000	0.02		26.1	OK	
S1.008	Sx	42.908	-1.408	0.000	0.02		26.0	OK	
S10.000	Sx	43.781	-0.089	0.000	0.18		5.0	OK	
S10.001	S42	43.780	-0.085	0.000	0.03		1.8	OK	
S10.002	Sx	43.553	-0.147	0.000	0.06		1.7	OK	
S10.003	Sx	43.550	-0.075	0.000	0.24		6.1	OK	
S10.004	S41	43.549	-0.070	0.000	0.07		1.9	OK	
S1.009	S28 HW	42.894	-1.422	0.000	0.03		27.7	OK	
S11.000	Sx	43.546	-0.154	0.000	0.22		11.9	OK	
S11.001	S47	43.525	-0.025	0.000	0.04		0.8	OK	
S11.002	Sx	43.400	-0.113	0.000	0.16		6.6	OK	
S11.003	Sx	43.395	-0.005	0.000	0.37		8.9	OK	
S11.004	S48	43.392	0.002	0.000	0.08		3.2	SURCHARGED	
S12.000	Sx	43.324	-0.026	0.000	0.61		10.1	OK	
S12.001	Sx	43.308	-0.011	0.000	0.48		10.2	OK	
S13.000	Sx	43.310	-0.090	0.000	0.31		7.6	OK	
S13.001	Sx	43.305	-0.086	0.000	0.17		7.0	OK	
S11.005	Sx	43.305	-0.002	0.000	0.33		5.1	OK	
S11.006	S49	43.300	0.021	0.000	0.17		3.1	SURCHARGED	
S14.000	Sx	43.233	-0.117	0.000	0.02		0.4	OK	
S14.001	Sx	43.233	-0.106	0.000	0.02		0.6	OK	
S15.000	Sx	43.233	-0.067	0.000	0.03		0.6	OK	
S15.001	Sx	43.233	-0.052	0.000	0.06		1.2	OK	
S14.002	Sx	43.232	-0.039	0.000	0.10		1.7	OK	
S11.007	Sx	43.232	-0.022	0.000	0.20		4.6	OK	
S11.008	Sx	43.228	-0.018	0.000	0.25		4.6	OK	
S11.009	S50	43.223	0.000	0.000	0.26		4.0	SURCHARGED	
S16.000	Sx	43.313	-0.187	0.000	0.07		5.2	OK	
S11.010	Sx	43.115	-0.080	0.000	0.27		5.1	OK	
S11.011	Sx	43.106	-0.052	0.000	0.93		16.9	OK	
S11.012	S72	42.981	-0.162	0.000	0.10		4.9	OK	
S11.013	S40	42.980	-0.150	0.000	0.12		6.6	OK	
S1.010	S29 HW	42.870	-1.446	0.000	0.01		28.2	OK	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	Sx	42.857	-1.459	0.000	0.02		28.2	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.012	Sx	30 Winter	30	+0%			
S17.000	Sx	30 Winter	30	+0%	100/15 Winter		
S17.001	S39	30 Winter	30	+0%	100/15 Summer		
S17.002	Sx	15 Winter	30	+0%			
S17.003	S38	15 Winter	30	+0%			
S1.013	S30 HW	30 Winter	30	+0%			
S1.014	S31 HW	120 Winter	30	+0%			
S1.015	S32 HW	120 Winter	30	+0%			
S1.016	Spond	120 Winter	30	+0%			
S18.000	Sx	60 Winter	30	+0%			
S19.000	Sx	120 Winter	30	+0%	100/60 Winter		
S18.001	S35	120 Winter	30	+0%	100/30 Winter		
S18.002	S36 HW	120 Winter	30	+0%			
S1.017	Sx	120 Winter	30	+0%			
S1.018	S86	180 Winter	30	+0%			
S20.000	SDITCH	30 Winter	30	+0%			
S1.019	S34 HW	30 Winter	30	+0%			
S1.020	S89 EX HW	30 Winter	30	+0%			
S21.000	S90 EX	30 Winter	30	+0%	100/15 Winter		
S22.000	S52	15 Winter	30	+0%			
S22.001	S52	60 Winter	30	+0%	30/15 Summer		
S21.001	S25	30 Winter	30	+0%	100/15 Winter		
S21.002	S94 EX HW	30 Winter	30	+0%	100/30 Winter		
S23.000	Sx	60 Winter	30	+0%			
S23.001	S51	60 Winter	30	+0%	30/30 Winter		
S21.003	S26	30 Winter	30	+0%	100/15 Winter		
S24.000	Sx	30 Winter	30	+0%	100/15 Winter		
S24.001	S95	30 Winter	30	+0%	100/15 Winter		
S25.000	S3 HW	15 Winter	30	+0%		100/15 Winter	
S25.001	Sx	15 Winter	30	+0%	100/15 Winter		
S26.000	Sx	15 Winter	30	+0%	100/15 Summer		
S25.002	S16 HW	15 Winter	30	+0%	30/15 Summer		
S25.003	S17	15 Winter	30	+0%	100/15 Summer		
S25.004	S18	15 Winter	30	+0%	30/15 Summer		
S25.005	S19	15 Winter	30	+0%	100/15 Summer		
S25.006	S20	15 Winter	30	+0%	100/15 Summer		
S25.007	S21	15 Winter	30	+0%	100/15 Summer		
S24.002	S22 HW	15 Winter	30	+0%			
S24.003	S23 HW	15 Winter	30	+0%	100/30 Summer		
S21.004	S24	30 Winter	30	+0%	100/15 Summer		
S21.005	S102 EX HW	30 Winter	30	+0%			
S1.021	S103 EX	30 Winter	30	+0%	100/30 Winter		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.012	Sx		42.837	-1.479	0.000	0.02		28.2	OK
S17.000	Sx		43.415	-0.065	0.000	0.31		5.2	OK
S17.001	S39		43.412	-0.050	0.000	0.02		2.0	OK
S17.002	Sx		42.998	-0.129	0.000	0.11		2.1	OK
S17.003	S38		42.994	-0.090	0.000	0.47		8.7	OK
S1.013	S30 HW		42.816	-1.500	0.000	0.03		31.4	OK
S1.014	S31 HW		42.796	-0.304	0.000	0.15		25.4	OK
S1.015	S32 HW		42.794	-0.772	0.000	0.03		25.2	OK
S1.016	Spond		42.793	-0.773	0.000	0.01		24.6	OK
S18.000	Sx		43.075	-0.225	0.000	0.00		0.0	OK
S19.000	Sx		43.047	-0.053	0.000	0.00		0.0	OK
S18.001	S35		43.047	-0.030	0.000	0.08		1.3	OK
S18.002	S36 HW		42.856	-0.202	0.000	0.02		1.3	OK
S1.017	Sx		42.792	-0.108	0.000	0.40		17.5	OK
S1.018	S86		42.796	-0.104	0.000	0.69		16.6	OK
S20.000	SDITCH		42.751	-0.462	0.000	0.00		0.1	OK
S1.019	S34 HW		42.751	-0.259	0.000	0.02		13.5	OK
S1.020	S89 EX HW		42.752	-1.344	0.000	0.01		13.8	OK
S21.000	S90 EX		42.805	-0.160	0.000	0.01		0.2	OK
S22.000	S52		43.008	-0.162	0.000	0.18		10.2	OK
S22.001	S52		42.911	0.036	0.000	0.39		1.7	SURCHARGED
S21.001	S25		42.805	-0.130	0.000	0.11		2.0	OK
S21.002	S94 EX HW		42.803	-0.184	0.000	0.02		2.5	OK
S23.000	Sx		43.062	-0.128	0.000	0.17		4.3	OK
S23.001	S51		43.061	0.005	0.000	0.34		1.5	SURCHARGED
S21.003	S26		42.803	-0.141	0.000	0.05		6.8	OK
S24.000	Sx		43.255	-0.045	0.000	0.14		1.5	OK
S24.001	S95		43.254	-0.042	0.000	0.14		1.5	OK
S25.000	S3 HW		43.348	-0.377	0.000	0.10		125.8	OK
S25.001	Sx		43.340	-0.309	0.000	0.10		125.6	OK
S26.000	Sx		43.333	-0.210	0.000	0.00		0.8	OK
S25.002	S16 HW		43.333	0.013	0.000	1.36		127.3	SURCHARGED
S25.003	S17		43.305	0.000	0.000	0.94		118.9	OK
S25.004	S18		43.228	0.005	0.000	1.36		115.9	SURCHARGED
S25.005	S19		43.206	0.000	0.000	0.95		107.8	OK
S25.006	S20		43.159	0.000	0.000	1.33		107.3	OK
S25.007	S21		42.993	-0.139	0.000	0.76		97.6	OK
S24.002	S22 HW		42.858	-0.245	0.000	0.31		89.3	OK
S24.003	S23 HW		42.828	-0.172	0.000	0.70		87.3	OK
S21.004	S24		42.803	-0.112	0.000	0.66		80.8	OK
S21.005	S102 EX HW		42.789	-1.297	0.000	0.05		80.7	OK
S1.021	S103 EX		42.754	-0.141	0.000	0.71		75.8	OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm		
PN	US/MH Name	Level Exceeded
S1.012	Sx	
S17.000	Sx	
S17.001	S39	
S17.002	Sx	
S17.003	S38	
S1.013	S30 HW	
S1.014	S31 HW	
S1.015	S32 HW	
S1.016	Spond	
S18.000	Sx	
S19.000	Sx	
S18.001	S35	
S18.002	S36 HW	
S1.017	Sx	
S1.018	S86	
S20.000	SDITCH	
S1.019	S34 HW	
S1.020	S89 EX HW	
S21.000	S90 EX	
S22.000	S52	
S22.001	S52	
S21.001	S25	
S21.002	S94 EX HW	
S23.000	Sx	
S23.001	S51	
S21.003	S26	
S24.000	Sx	
S24.001	S95	
S25.000	S3 HW	1
S25.001	Sx	
S26.000	Sx	
S25.002	S16 HW	
S25.003	S17	
S25.004	S18	
S25.005	S19	
S25.006	S20	
S25.007	S21	
S24.002	S22 HW	
S24.003	S23 HW	
S21.004	S24	
S21.005	S102 EX HW	
S1.021	S103 EX	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	43.323	0.003	0.000	1.09		104.3	SURCHARGED	
S1.001	S2	43.296	0.002	0.000	0.80		77.2	SURCHARGED	
S1.002	S3	43.273	0.005	0.000	0.84		76.7	SURCHARGED	
S1.003	S4	43.246	0.000	0.000	0.56		74.2	OK	
S1.004	S5	43.172	-0.014	0.000	0.48		65.3	OK	
S2.000	Sx	43.464	-0.150	0.000	0.00		0.0	OK	
S2.001	S10	43.396	-0.125	0.000	0.07		0.8	OK	
S2.002	S11	43.339	-0.123	0.000	0.08		0.8	OK	
S2.003	S12 HW	43.092	-1.224	0.000	0.00		0.4	OK	
S2.004	Sx	43.092	-1.224	0.000	0.00		0.8	OK	
S2.005	Sx	43.092	-1.224	0.000	0.00		1.2	OK	
S3.000	Sx	44.083	0.283	0.000	0.21		6.9	SURCHARGED	
S4.000	Sx	44.081	0.281	0.000	0.06		2.7	SURCHARGED	
S5.000	Sx	44.081	0.381	0.000	0.07		1.0	SURCHARGED	
S3.001	S14	44.080	0.400	0.000	0.13		2.5	SURCHARGED	
S3.002	Sx	43.854	0.216	0.000	0.23		4.0	SURCHARGED	
S6.000	Sx	43.850	0.000	0.000	0.07		1.9	OK	
S6.001	S13	43.849	0.004	0.000	0.03		1.8	SURCHARGED	
S3.003	Sx	43.849	0.244	0.000	0.10		2.7	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.004	S7	240 Winter	100	+30%				
S2.006	S8	HW 30 Winter	100	+30%				
S1.005	S6	HW 30 Winter	100	+30%				
S7.000	Sx	30 Winter	100	+30%	100/15	Summer		
S7.001	S46	30 Winter	100	+30%	100/15	Summer		
S7.002	Sx	120 Winter	100	+30%				
S8.000	Sx	30 Winter	100	+30%				
S8.001	S45	30 Winter	100	+30%				
S7.003	Sx	120 Winter	100	+30%	100/120	Winter		
S9.000	Sx	60 Winter	100	+30%	100/60	Winter		
S9.001	S43	60 Winter	100	+30%	100/60	Winter		
S7.004	Sx	120 Winter	100	+30%	100/15	Winter		
S7.005	S44	120 Winter	100	+30%	30/30	Winter		
S1.006	S27	HW 30 Winter	100	+30%				
S1.007	Sx	30 Winter	100	+30%				
S1.008	Sx	30 Winter	100	+30%				
S10.000	Sx	30 Winter	100	+30%	100/30	Winter		
S10.001	S42	30 Winter	100	+30%	100/30	Winter		
S10.002	Sx	120 Winter	100	+30%				
S10.003	Sx	120 Winter	100	+30%				
S10.004	S41	120 Winter	100	+30%				
S1.009	S28	HW 30 Winter	100	+30%				
S11.000	Sx	120 Winter	100	+30%	100/120	Winter		
S11.001	S47	120 Winter	100	+30%	100/15	Winter		
S11.002	Sx	120 Winter	100	+30%	100/120	Winter		
S11.003	Sx	120 Winter	100	+30%	100/15	Summer		
S11.004	S48	120 Winter	100	+30%	30/60	Winter		
S12.000	Sx	240 Winter	100	+30%	100/15	Summer		
S12.001	Sx	240 Winter	100	+30%	100/15	Summer		
S13.000	Sx	240 Winter	100	+30%				
S13.001	Sx	240 Winter	100	+30%	100/180	Winter		
S11.005	Sx	240 Winter	100	+30%	100/15	Summer		
S11.006	S49	240 Winter	100	+30%	30/120	Summer		
S14.000	Sx	15 Winter	100	+30%				
S14.001	Sx	15 Winter	100	+30%				
S15.000	Sx	15 Winter	100	+30%	100/15	Summer		
S15.001	Sx	15 Winter	100	+30%	100/15	Summer		
S14.002	Sx	15 Winter	100	+30%	100/15	Summer		
S11.007	Sx	15 Winter	100	+30%	100/15	Summer		
S11.008	Sx	240 Winter	100	+30%	100/15	Winter		
S11.009	S50	240 Winter	100	+30%	30/180	Winter		
S16.000	Sx	15 Winter	100	+30%				
S11.010	Sx	15 Summer	100	+30%	100/15	Summer		
S11.011	Sx	15 Summer	100	+30%	100/15	Summer		
S11.012	S72	240 Winter	100	+30%	100/120	Winter		
S11.013	S40	240 Winter	100	+30%	100/120	Winter		
S1.010	S29	HW 120 Winter	100	+30%				
S1.011	Sx	120 Winter	100	+30%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.004	S7	43.420	-0.178	0.000	0.10		2.7	OK	
S2.006	S8 HW	43.092	-1.224	0.000	0.00		3.7	OK	
S1.005	S6 HW	43.092	-1.224	0.000	0.04		55.0	OK	
S7.000	Sx	44.197	0.197	0.000	0.35		10.3	SURCHARGED	
S7.001	S46	44.195	0.220	0.000	0.08		3.4	FLOOD RISK	
S7.002	Sx	43.784	-0.091	0.000	0.13		4.9	OK	
S8.000	Sx	43.851	-0.044	0.000	0.19		5.5	OK	
S8.001	S45	43.850	-0.042	0.000	0.04		2.0	OK	
S7.003	Sx	43.780	0.005	0.000	0.25		7.6	SURCHARGED	
S9.000	Sx	43.870	0.000	0.000	0.27		7.9	SURCHARGED	
S9.001	S43	43.870	0.004	0.000	0.04		1.9	SURCHARGED	
S7.004	Sx	43.776	0.051	0.000	0.48		12.2	SURCHARGED	
S7.005	S44	43.774	0.132	0.000	0.35		3.8	SURCHARGED	
S1.006	S27 HW	43.038	-1.278	0.000	0.05		50.8	OK	
S1.007	Sx	42.991	-1.325	0.000	0.03		43.8	OK	
S1.008	Sx	42.972	-1.344	0.000	0.03		43.7	OK	
S10.000	Sx	43.874	0.004	0.000	0.30		8.5	SURCHARGED	
S10.001	S42	43.873	0.008	0.000	0.04		2.4	SURCHARGED	
S10.002	Sx	43.621	-0.079	0.000	0.08		2.1	OK	
S10.003	Sx	43.618	-0.007	0.000	0.26		6.8	OK	
S10.004	S41	43.616	-0.002	0.000	0.08		2.3	OK	
S1.009	S28 HW	42.955	-1.361	0.000	0.06		45.7	OK	
S11.000	Sx	43.762	0.062	0.000	0.11		5.9	SURCHARGED	
S11.001	S47	43.760	0.210	0.000	0.14		2.5	FLOOD RISK	
S11.002	Sx	43.515	0.002	0.000	0.17		7.2	SURCHARGED	
S11.003	Sx	43.509	0.109	0.000	0.40		9.6	SURCHARGED	
S11.004	S48	43.507	0.116	0.000	0.09		3.5	SURCHARGED	
S12.000	Sx	43.400	0.050	0.000	0.19		3.2	SURCHARGED	
S12.001	Sx	43.398	0.079	0.000	0.17		3.7	SURCHARGED	
S13.000	Sx	43.398	-0.002	0.000	0.10		2.4	OK	
S13.001	Sx	43.398	0.006	0.000	0.06		2.4	SURCHARGED	
S11.005	Sx	43.397	0.091	0.000	0.56		8.8	SURCHARGED	
S11.006	S49	43.389	0.110	0.000	0.29		5.3	SURCHARGED	
S14.000	Sx	43.324	-0.026	0.000	0.15		3.5	OK	
S14.001	Sx	43.321	-0.017	0.000	0.14		5.3	OK	
S15.000	Sx	43.330	0.030	0.000	0.26		4.9	SURCHARGED	
S15.001	Sx	43.325	0.040	0.000	0.52		10.5	SURCHARGED	
S14.002	Sx	43.315	0.044	0.000	0.92		15.8	SURCHARGED	
S11.007	Sx	43.297	0.042	0.000	1.07		24.3	SURCHARGED	
S11.008	Sx	43.282	0.036	0.000	0.52		9.5	SURCHARGED	
S11.009	S50	43.274	0.051	0.000	0.50		7.7	SURCHARGED	
S16.000	Sx	43.325	-0.175	0.000	0.11		8.8	OK	
S11.010	Sx	43.200	0.004	0.000	0.49		9.0	SURCHARGED	
S11.011	Sx	43.182	0.024	0.000	1.61		29.5	SURCHARGED	
S11.012	S72	43.165	0.023	0.000	0.21		10.7	SURCHARGED	
S11.013	S40	43.163	0.034	0.000	0.17		9.4	SURCHARGED	
S1.010	S29 HW	42.927	-1.389	0.000	0.01		33.0	OK	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	Sx	42.922	-1.394	0.000	0.02		32.9	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.012	Sx	120 Winter	100	+30%			
S17.000	Sx	60 Winter	100	+30%	100/15 Winter		
S17.001	S39	60 Winter	100	+30%	100/15 Summer		
S17.002	Sx	60 Winter	100	+30%			
S17.003	S38	180 Summer	100	+30%			
S1.013	S30 HW	120 Winter	100	+30%			
S1.014	S31 HW	120 Winter	100	+30%			
S1.015	S32 HW	120 Winter	100	+30%			
S1.016	Spond	120 Winter	100	+30%			
S18.000	Sx	120 Winter	100	+30%			
S19.000	Sx	120 Winter	100	+30%	100/60 Winter		
S18.001	S35	120 Winter	100	+30%	100/30 Winter		
S18.002	S36 HW	120 Winter	100	+30%			
S1.017	Sx	120 Winter	100	+30%			
S1.018	S86	120 Winter	100	+30%			
S20.000	SDITCH	30 Winter	100	+30%			
S1.019	S34 HW	30 Winter	100	+30%			
S1.020	S89 EX HW	30 Winter	100	+30%			
S21.000	S90 EX	30 Winter	100	+30%	100/15 Winter		
S22.000	S52	15 Winter	100	+30%			
S22.001	S52	60 Winter	100	+30%	30/15 Summer		
S21.001	S25	30 Winter	100	+30%	100/15 Winter		
S21.002	S94 EX HW	30 Winter	100	+30%	100/30 Winter		
S23.000	Sx	60 Winter	100	+30%			
S23.001	S51	60 Winter	100	+30%	30/30 Winter		
S21.003	S26	30 Winter	100	+30%	100/15 Winter		
S24.000	Sx	60 Winter	100	+30%	100/15 Winter		
S24.001	S95	60 Winter	100	+30%	100/15 Winter		
S25.000	S3 HW	15 Winter	100	+30%		100/15 Winter	
S25.001	Sx	15 Winter	100	+30%	100/15 Winter		
S26.000	Sx	15 Winter	100	+30%	100/15 Summer		
S25.002	S16 HW	15 Winter	100	+30%	30/15 Summer		
S25.003	S17	15 Winter	100	+30%	100/15 Summer		
S25.004	S18	15 Winter	100	+30%	30/15 Summer		
S25.005	S19	15 Winter	100	+30%	100/15 Summer		
S25.006	S20	15 Winter	100	+30%	100/15 Summer		
S25.007	S21	15 Winter	100	+30%	100/15 Summer		
S24.002	S22 HW	30 Winter	100	+30%			
S24.003	S23 HW	30 Winter	100	+30%	100/30 Summer		
S21.004	S24	30 Winter	100	+30%	100/15 Summer		
S21.005	S102 EX HW	30 Winter	100	+30%			
S1.021	S103 EX	30 Winter	100	+30%	100/30 Winter		

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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>		
PN	US/MH Name	Level Exceeded
S1.012	Sx	
S17.000	Sx	
S17.001	S39	
S17.002	Sx	
S17.003	S38	
S1.013	S30 HW	
S1.014	S31 HW	
S1.015	S32 HW	
S1.016	Spond	
S18.000	Sx	
S19.000	Sx	
S18.001	S35	
S18.002	S36 HW	
S1.017	Sx	
S1.018	S86	
S20.000	SDITCH	
S1.019	S34 HW	
S1.020	S89 EX HW	
S21.000	S90 EX	
S22.000	S52	
S22.001	S52	
S21.001	S25	
S21.002	S94 EX HW	
S23.000	Sx	
S23.001	S51	
S21.003	S26	
S24.000	Sx	
S24.001	S95	
S25.000	S3 HW	1
S25.001	Sx	
S26.000	Sx	
S25.002	S16 HW	
S25.003	S17	
S25.004	S18	
S25.005	S19	
S25.006	S20	
S25.007	S21	
S24.002	S22 HW	
S24.003	S23 HW	
S21.004	S24	
S21.005	S102 EX HW	
S1.021	S103 EX	
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