Samlesbury Aerospace Enterprise Zone

Masterplan Drainage Report

Lancashire County Council

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Executive Summary

Lancashire County Council (LCC) are continuing to develop the Samlesbury Aerospace Enterprise Zone (SAEZ) that has been undergoing development since 2016. The next phase of development relates to the plot preparation works for the development plots for the south and west of the SAEZ. To allow the plot preparation, the primary drainage infrastructure requires installing.

This report describes the basis of design that will be followed and how it relates to the established sustainable Drainage Strategy published in 2016. This report will describe the design calculations and modelling undertaken and report the results. Also, the ongoing maintenance obligations will be set-out and a method of execution established for the contractor so that pollution and silts are controlled.

There are no public sewers to discharge either the surface or foul water into. Therefore, Huntley Brook will be used for both surface water discharge and treated foul water discharge. Two primary SuDS Attenuation Basins will be used to provide flood resilience for the development. The first of which was constructed in 2016 located in the centre of SAEZ. The second will be constructed in the upcoming phase of works in the west of the SAEZ where Huntley Brook exits the SAEZ.

Huntley Brook transverse the site and was previously entirely culverted. The works undertaken in 2016 included opening of the Huntley Brook culvert in the eastern area of the SAEZ. The strategy is to continue with the opening of the existing culvert in the western area to provide flood resilience and a sustainable drainage system as well as suitable points of connection for the future development plots.

The surface water passing through the SAEZ will be managed using SuDS principles with a regional approach, by managing the flows passing through the site in Huntley Brook, managing a portion of the surface water generated by development within the plots and management of the remainder of the surface water generated in the primary SuDS basins. The entire development surface water discharge will be restricted to greenfield runoff rates accounting for the pass through flow of the brook. A manhole downstream of both basins will be the location of the flow management devices.

The surface water generated by the development plots will be restricted. When the plot developments are completed, each plot will be restricted to a surface water discharge rate equivalent to 1.5 time the greenfield runoff rate applied to 85% of the plot area.

The foul water strategy is to provide a managed foul treatment system located in the west of the site. The strategy is to provide the treatment system managed by an Ofwat Licenced NAV or United Utilities. The foul water treatment system is subject to approval by the EA. Consultation with the EA is ongoing, so construction of the treatment system will not be included in this package of works. However, the primary foul water collection and conveyance will be required and will be efficiently installed alongside the Huntley Brook works, and so this will be included in the works. The drain will be installed at a level that will allow future connection of the development plots and sized to collect free discharge of foul waters from the future developments based on United Utilities standards, the Sewer Sector Guidance and established related industry guidance.

The proposed strategy will provide a sustainable method for the surface water generated by the proposed development as well as increasing flood resilience in the site, for the neighbouring site and downstream. The drainage solution introduces sustainable measure that will increase the water quality. The construction strategy will control silt and pollution. The foul water conveyance will allow collection of foul water from the development plots to a location where appropriate treatment can be carried out or removed from the SAEZ.

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1.0

Introduction

1.0 Introduction

1.1 Purpose of Report

This report has been prepared on behalf of Lancashire County Council (LCC) for the proposed development of the Samlesbury Aerospace Enterprise Zone (SAEZ). The Enterprise Zone (EZ) is being brought forward under a Local Development Order (LDO) that was granted in 2015. The LDO allows the development to be brought forward in a phased manner over the period that the LDO applies.

The previous phases of works included the primary access road, primary utility corridors, diversion of the eastern section of Huntley Brook, the BAE buildings in the north and east of the EZ, and the AMRC development in the south. Each phase of works has been brought forward under an appropriate Prior Notification of Development (PND) under the LDO.

This report relates to the next planned phase of works which includes earthworks and drainage infrastructure for the development plots in the west and south of the EZ, the completion of the Huntley Brook diversion, and installation of foul water conveyance infrastructure. This report will address the drainage aspects of this phase of works and will be provided to the relevant local authorities, contractors and the stakeholders of the EZ development.

1.2 Site Description

The EZ development is located off Preston New Road, Samlesbury, PR5 0UP and is centred approximately at eastings and northings 362819, 430939.

The site is a dis-used aerodrome. There are large areas of hardsurfacing that were used as the aerodrome runways and aprons, and large areas of undeveloped vegetated areas. The development works to-date have resulted in an area that has been re-worked in the past few years and has spoil heaps.

A drawing showing the plot locations across the EZ development can be found in Appendix A.

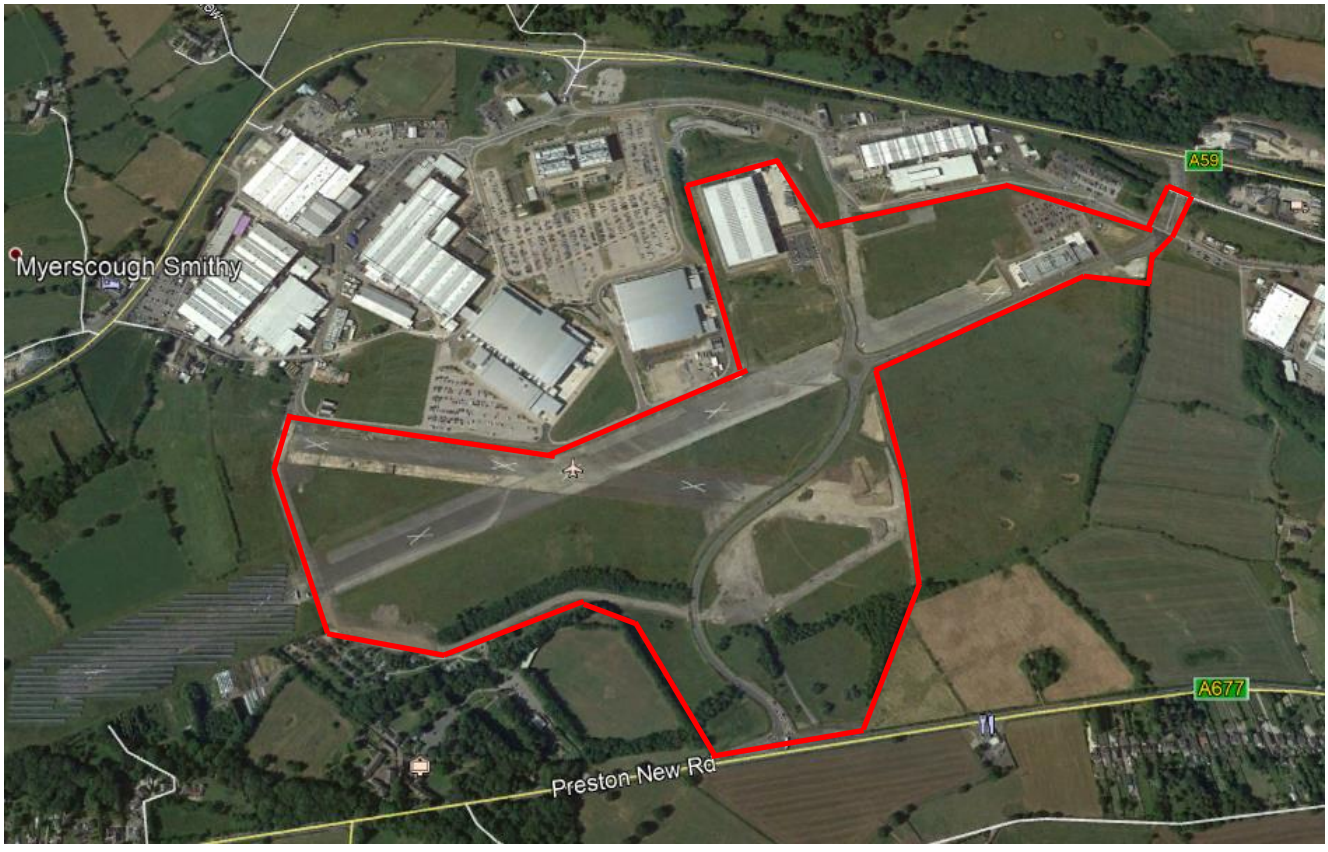

Figure 1-1 Site Location Plan (SAEZ Boundary in red)

1.3 Proposed Development Work

These drainage works include:

- The excavation of the new watercourse of the proposed diverted Huntley Brook
- Diversion of the existing culvert and drains into the new watercourse
- Removal or blocking up of the existing culvert and existing drainage infrastructure
- Diversion of the highway drains that currently bypass the culvert into the proposed drainage system
- Excavation of the proposed second SuDS attenuation basin
- Provision of outlet connection points for the future development plots into the watercourse
- Provision of temporary drainage for the earthwork and plot platform preformation
- Provision of flow control and connection to the downstream Huntley Brook as it leaves the EZ
- Installation of foul water conveyance system alongside the proposed watercourse
- Upgrade works for the existing SuDS attenuation basin

2.0

Huntley Brook Works & Surface Water Drainage

2.0 Huntley Brook Works & Surface Water Drainage

2.1 Established Drainage Philosophy

During the commencement of the LDO in 2016, the drainage philosophy was established for the SAEZ. The drainage philosophy was published in Cundall report 1012080-RPT-002. The established drainage philosophy will be required to be followed for all phases of the development of the SAEZ.

The key aspects for the philosophy are as follows:

- The EZ drainage system will be separate from the BAE Systems surface water drainage systems. Provide no increase in surface water discharge to the BAE drainage networks.
- The culverted Huntley Brook will be redirected to free up development space and reformed as an open channel located in the EZ site.
- The individual development plots will control surface water within their curtilage with a restricted discharge, in accordance with current SuDS practices and regulation. The rate of discharge from each plot will not be limited to the greenfield runoff rate but at a higher restricted rate as the EZ will have regional control.
- The EZ will be restricted to an equivalent greenfield runoff rate for surface water generated by the development area but with consideration of the pass through flow from Huntley Brook. The existing hardsurfacing and roads have a high rate of surface water discharge and the development will seek to reduce this to mimic the greenfield condition.
- Hydrocarbon and silt reduction techniques are to be used.
- A phased approach to the development of the proposed attenuation basins will be taken. The first basin was constructed in 2016 and the second basin will be constructed prior to the commencement of development for the western area of the site.
- The existing drainage of the old runway will be diverted into the new watercourse and culvert, with the old drainage systems being grubbed up and abandoned.

2.2 Huntley Brook Works

2.2.1 Existing Huntley Brook

2.2.1.1 Current Arrangement

Huntley Brook enters the EZ from the south-east as an open channel watercourse. The works completed in 2016 diverted the brook from its previous position through the centre of the site to a new line that follows the south-eastern boundary northwards and re-connecting to the culvert at the northern boundary. From that position, the culvert follows the boundary to the west before leaving the site into the BAE site to the north. The culvert remains in the BAE site for over a kilometre but does re-enter the EZ near the north-western corner. It crosses this corner for approximately 50m before exiting to the west and away from the site.

The open channel of the brook outside the site to the east is generally a natural form with some potential minor alterations in the past.

The open channel within the EZ site is a manmade ‘swale’ with shallow sloping banks. This section passes through a SuDS basin in the centre of the EZ which was designed to provide attenuation for the EZ development and flood resilience for the wider area.

The culverted sections consist of 450mm diameter pipe for the first 400m, before upsizing to a 700mm diameter which continues until it leaves the site.

A flow control was installed in 2016 located on the 450mm diameter section of the culvert. The flow control is in place as a temporary measure until a large percentage of the EZ is constructed and will be removed once the final sections of the proposed drainage of the EZ system is complete.

2.2.1.2 Flow entering the site

In 2016, the existing catchment and flow through Huntley Brook was modelled with the findings reported in Cundall report 1012080-RPT-0003. The culvert currently collects water from a number of sources, including:

- runoff from agricultural land and natural landscape
- a section of the A677 highway drainage
- existing land drains of the EZ site
- the existing roads of the EZ
- the AMRC development in the south of the EZ (controlled to greenfield runoff rates)
- the AMF development near the centre of the site (controlled to greenfield runoff rates)
- and the BAE Systems site to the north.

The flow entering the site at the boundary of the EZ has been modelled as being 41.9 l/s

The two catchments that interact with the EZ were found to have a Qbar of 520.7 l/s and 623.3 l/s.

The flows estimated to be generated by the AMRC development is restricted to 5.5 l/s up to the 1 in 100 year storm.

The greenfield runoff flow estimated to be present in the existing culvert as it leaves the EZ is 510.3 l/s.

2.2.1.3 Existing concerns

The existing watercourse, culvert and drainage system of the EZ has been modelled to understand if there are any existing issues. Also, intrusive investigations and surveys have been undertaken to capture any missing information and records.

The topographical survey of the SuDS basin constructed in 2016 was undertaken. The volume provided by the existing basin is 5,000m^3. This is circa a third smaller than the originally designed basin. This will need addressing in the proposed works.

The existing piped drainage was surveyed by CCTV. A section of the road constructed in 2016 was found to be discharging surface water to the old runway drainage system. As the old runways drainage system will be removed during the development works, the surface water drainage will need to be diverted into the proposed EZ drainage system, which is the nearby culvert.

HEC-RAS Modelling of the existing catchment, including the form of the existing SuDS basin and watercourses, was undertaken. The modelling demonstrated that flooding could become apparent immediately east of the roundabout for the 1 in 100 storm event plus a climate change factor. The flooding volume would seem to move towards the AMF building. With this predicted before much of the development works has taken place, remedial works will be required to improve the flow of water and retention of flood volumes within the proposed drainage system to reduce the flood risk.

The section of road in the south of the site, plus some of the southern plots do not currently connect to the proposed drainage systems. Instead, they discharge into a section of the old Huntley Brook culvert pipe. This section of pipe will be required to be maintained in the development of the EZ. However, the pipe transverses the proposed plot development space, which could constrain the opportunities for development.

2.2.2 Remedial Works to Existing Drainage

2.2.2.1 Existing SuDS Basin

As the existing basin is smaller than the originally designed basin, it is proposed to carry out works to re-shape the basin. As area is now restricted from other development works, this may be limited in scope.

Remedial works will include:

- Re-shaping of the Huntley Brook low flow channel to improve flow through the basin.

- Re-shaping the base of the basin to enhance the draining down of the basin after a storm event. In addition, this will allow a more attractive basin finish that will be more accommodating to planting.
- Re-forming of the inlet and flow channel in the north of the basin which comes from the drain east of the roundabout. This will relieve the current flood risk associated with the drainage from the east of the roundabout.
- Excavation and re-shaping the basin embankments to increase the volume.
- Creation of a suitable ramp into the basin to enhance maintenance access.
- Increase of the proposed second basin to accommodate the remaining storm water attenuation volumes.

2.2.2.2 Modelled Flooding issue

As discussed in 2.2.1.3, there is a flooding potential originating from the drainage east of the roundabout. The drainage in this area consists of:

- road gullies,
- a connection provision for the undeveloped plot to the north,
- a drainage ditch between the road and the site boundary, which receives surface water from the road and land drainage from the land to the south.
- a headwall and pipe which directs these flows into the SuDS basin located 40m to the south.

The modelling indicates that water backs up through the pipe connecting the drainage ditch to the SuDS basin, suggesting that this outlet is not functioning as required. It seems to relate to a combination of the orientation and position of the pipe connection into the basin and the pipe size.

To remove the flood risk, it is proposed to remove the headwall and pipe section and convert it to an open channel in the same form as the drainage ditch. This will allow water to freely move into the SuDS basin, avoid the throttling effect of the pipework outlet from the channel, and also provide additional volume for storm water to occupy.

2.2.2.3 Existing Highway Drains

The section of highway drainage near the roundabout that currently bypasses the main EZ drainage will be disconnected from the old runway drains and diverted to connection directly to the nearby Huntley Brook.

The old section of culvert that remains in use by highway drainage and plots in the south of the EZ will remain in use. However, to accommodate the proposed development plan, this will be diverted from its current position to a new alignment that facilitates the development of the plots. This is not intended to be undertaken in this package of works but will be addressed once the development plots are being brought forward.

2.2.3 Opening of Huntley Brook

It is intended to separate the drainage systems of the EZ and BAE Systems. Both sites currently discharge to the existing culverted Huntley Brook.

To separate the sites, the discharge from the EZ needs to be intercepted before it exits into the BAE Systems site. Furthermore, the development of the EZ will increase the hardsurfacing that will be contributing to the existing culvert, which could increase the flooding potential. To provide for the interception of all drainage pipes and to provide sufficient capacity for the development, an open channel watercourse is proposed. This has the additional benefit of restoring Huntley Brook as an open watercourse, restoring the natural drainage regime and enhancing the biodiversity potential of the site. Moreover, an open channel drainage system is a sustainable drainage system and provides reduction and control of the potential for flood volume passing downstream.

The culverted section of the brook will be opened from the point it aligns with the northern boundary of the EZ site. From here the open channel watercourse will run adjacent the southern boundary to the BAE Systems site flowing west. The open channel will terminate at the western site boundary where it will re-connect with the existing culvert and the section that will continue to serve the BAE Systems site. Huntley Brook will continue unchanged downstream of the site.

The open channel will consist of side slopes of between 1 in 1 ½ and 1 in 2. The slopes will be reinforced with erosion prevention. The side slopes will be naturally vegetated. The top of the slope will be offset a minimum of 2m from the existing BAE Systems fenceline. The top of the slope on the EZ side of the watercourse will be provided with a timber knee rail. A vegetated strip of 2 to 3 metres with a 4.5m maintenance road will be provided along the watercourse.

The existing incoming drainage pipes will be cut back to the side slope with appropriately formed headwalls. The continuation of the culvert toward the BAE Systems site will be blocked off and grouted for the redundant section, creating the separation from the EZ drainage network.

The development plots adjacent the watercourse will eventually discharge surface water it. To allow for this, numerous pre-selected discharge points will be provided. This will be in the form of an appropriate pipe and headwall. The flow restriction will be provided in plot by the future developments. Provision of these outlets will prevent future work having to affect the watercourse.

The open channel will continue through the proposed second SuDS basin. It will pass through the middle of the basin in a low flow channel that sits lower than the average base level of the basin. The brook will re-enter the culvert at the boundary of the EZ with the existing pipe acting as a simple throttle, restricting the lager flows of water and attenuating storm water volumes in the SuDS basins. This throttle effect has been modelled to be equivalent to the greenfield runoff rate for the EZ.

2.2.4 Flow Control

The EZ development will seek to control surface water discharge downstream to the equivalent greenfield runoff rates. However, the areas contributing to Huntley Brook extend past the development area so any restriction on flow will need to take account of this. Additionally, any flow control should not increase the flood risk relating to the brook upstream and downstream or cause any barrier to wildlife.

The development will be designed not to increase surface water flows above the greenfield run off rate known as Qbar.

To assist in the controlling of the flow rate, each of the development plots will provide a flow restriction and attenuation within their plot. This will not be restricted to the greenfield runoff rate as a regional approach to flow control is applied. A flow restriction of 1.5 times greenfield runoff applied to 85% of the development space will be used. This will be installed by each of the future developments as they are being constructed. The following table indicates how this could be applied if the development proceeds in line with the outline masterplan provided in the Commercial Development Framework

Plot Name	Plot Area (ha)	Flow Restriction based on 1.5 GRR x 85% area (l/s)
Plot 1	7.13	58.8
Plot 2	7.07	58.3
Plot 3	3.83	31.6
Plot 4	2.72	22.4
Plot 5	4.16	34.3
Plot 6	2.69	22.2
Plot 7	1.34	11.1
Plot 8	2.85	23.5
Plot 9	0.85	7.0

The flow leaving the EZ will not be greater than 510.3 l/s.

2.2.5 Storm Water Volumes

The flow controls throughout the proposed EZ development will generate an attenuated stormwater volume. Additionally, the development masterplan will seek to provide flood resilience and allowances for future climate change.

To provide this volume, a number of different features will be provided. Each development plot will have to provide all attenuation volume and storm resilience generated by its drainage and restricted discharge within its own plot. This will consist of a combination of SuDS features and underground storage.

The masterplan drainage system will provide this volume by the provision of 2No. SuDS basins and by a series of drainage ditches, swales and the open channel watercourse.

The volume retained by these systems provide flood resilience both for the development site and downstream of the EZ.

2.2.6 Development SuDS Considerations

The EZ development will be using a mix of SuDS features. The primary drainage networks through the site consists of the altering of a culverted watercourse into an open channel watercourse. This is complemented by a series of swales, ditches and SuDS basins. The watercourse and basin are receiving all surface water generated by the development, including highways and roads, the development plots, and the areas of landscaping.

The EZ masterplan provides a total site system of SuDS. SuDS features will have to be provided within the development plots by each individual development. These SuDS features are not discussed here but should include some of the following:

- Permeable paving
- Swales
- Rain gardens
- Green roofs
- Rainwater harvesting/water re-use

A site investigation was undertaken across the development site. The findings have been reported in Cundall report 1023121-GL-002. The report concludes that infiltration is not a viable option for disposal of the surface water. The primary impediment is the presence of fine grained glacial tills across the site. While infiltration cannot provide a suitable point of discharge, there remains a benefit of allowing surface water to soak into the soils. Therefore, the watercourses, ditches, swales and SuDS basins will not have barriers to infiltration.

There are areas of made ground across the site that the site investigation has identified. While some isolated contaminants have been identified in stockpiled materials, the soils are generally not considered to have contamination present. However, no infiltration should take place in to the made ground material to protect ground water resources.

2.2.7 MicroDrainage Results

The site was modelled through MicroDrainage with on-site areas designated as contributing surfaces and offsite area provided as input hydrographs.

The network was modelled with design storms for the 1 in 1 year, 1 in 2 year, 1 in 30 year and 1 in 100 year plus 40% for climate change. The results display that there is no flooding in the proposed system. Some flooding is displayed at the existing highway drainage system, which is not considered an issue due to the nature of highway drainage and its adoption by Lancashire County Council Highways.

3.0

Foul Water Drainage

3.0 Foul Water Drainage

3.1 Current Nearby Foul Networks

The ASK and AMF buildings have benefited from connection directly to the BAE Systems foul network. Discussions with BAE Systems have confirmed that there is no further capacity remaining in their systems to accommodate the EZ development.

The AMRC building has been provided with a private foul water treatment plant that follows the Environment Agency (EA) Standard Rules Permit with the cleaned water discharging to Huntley Brook as the AMRC falls under the 5.0m^3/day volume threshold.

The closest United Utilities (UU) sewers lie to the west of BAE Systems. This sewer serves the BAE site as well as properties and highways drainage of the A59. UU have confirmed that there is no capacity in the sewer to accommodate the development of the EZ. This sewer is located 0.6km to the west of the site.

Another UU sewer is located approximately 1.0km south of the site. To reach this sewer, it would mean crossing the A677 and traversing private agricultural land. This sewer is approximately 40m higher than the EZ.

3.2 Foul Drainage Strategy

As none of the above drainage systems can be used in their current form for the remainder of the EZ development the following options have been reviewed.

3.2.1 Options

3.2.1.1 BAE & Western UU Systems

Both the BAE Systems drainage and the UU sewer to the west cannot be used due to capacity issues. Also, the distance and third-party issues with creating new connection to these assets are significant obstacles.

3.2.1.2 Onsite Treatment

The existing foul treatment system cannot be used to a solution to the site drainage in its current form. To increase the volume of waters processed on site through treatment systems will require specific permitting by the EA. The EA have been consulted on this option and have indicated that it is a suitable options so long as certain strict conditions are met. These include:

- The foul water treatment system is managed and maintained by a licenced company or NAV Authority.
- The treatment reaches a minimum standard of quality

The volumes and minimum standard of quality place strict limits on how the EZ development can met the permit criteria. This may involve provision of elements of pre-treatment, carefully monitored primary treatment, secondary treatment units, filtration beds and willow/reed beds, before diluting through the surface water treatment system.

3.2.1.3 Southern UU System

The southern UU sewer has been indicated to have sufficient capacity for the development site. The sewer's elevation and distance prevent a gravity connection. To achieve discharge to this sewer, a significant pumping installation and possible booster stations would be required as well as agreements with third party landowners and significant cost.

3.2.2 Proposed Strategy

Each of the above options have complexities. The current preferred option is to pursue the on-site treatment under EA permitting with a NAV Authority providing maintenance.

The plots of the south eastern area of the site have been provided with a conveyance drainage pipe that can be connected to once they are constructed. This pipe drains to a treatment location located near the centre of the EZ next to Huntley Brook.

The remaining plots will be provided with a central conveyance pipe that commences near the roundabout and is directed to the west. It will lie adjacent the proposed Huntley Brook open watercourse. The pipe will fall by gravity to a discharge point located near the proposed second SuDS basin. Until the method of disposal is confirmed by granting of the EA permit or provision of a pumping station, only the conveyance pipe will be installed. It will be installed with provision for the development plots, installed to a depth that will allow suitable connection.

3.2.3 Pipe capacity

The conveyance system will be constructed for the proposed development in accordance with BS EN 752, Approved Document H and the Sewerage Sector Guidance. The drainage system will be designed to achieve a target self-cleansing velocity of 0.75m/s. The depth of flow within the foul pipes will be restricted to d/D = 0.75 to ensure proper ventilation.

The peak flow rate from the development has been calculated based on the office and warehouse floor spaces. These were calculated in the Cundall Drainage Philosophy report 1012080-RPT-0002. The following table summarises these calculations.

Plot	Number of persons	Total flow (litres/day)	Total flow (litre/second)
1	623	31150	0.361
2	304	15200	0.176
3	359	17950	0.208
4	691	34550	0.400
5	1172	58600	0.678
6	906	45300	0.524
7	1266	63300	0.733
8	1514	75700	0.876
9	588	29400	0.3402
10	307	15350	0.178
Total			4.473

To accommodate the estimated flow and provide future proofing for the EZ, a 225mm diameter pipe will be provided laid at a 1 in 100 slope.

4.0

Construction Work Considerations

4.0 Construction Works Considerations

The works to construct the drainage will result in increased pollution risk to waters. The executor of the works will provide a method of pollution control to limit and mitigate the risks. The flowing discusses the risk and the measures that will be enacted.

4.1 Potential Impacts

The following are potential pollution risks from the construction of the drainage system.

- Hydrocarbons leaking from vehicles and escaping into drainage systems
- Slits and debris generated from excavations entering waters
- Blocking of existing drains causing flooding and bypassing controls
- Uncontrolled surface water runoff from surfaces surrounding the works discharging to drainage systems

4.2 Mitigation measures

To mitigate against the potential for pollution, the contractor should enact controls and approach the works in phased manner. This is expected to include the following:

- Provide adequate maintenance and regular inspections of plant and equipment
- Segregate all fuels away from working areas with suitable bunding, filling protocols, spill prevention and spill capture kits being provided
- Planning of the works to limit the areas being overran by construction vehicles to limit areas being contaminated by wheel mud and such
- Wheel washing and silt collection facilities should be provided; however these should be no closer than 30m to watercourses
- Sequencing of the excavation works to prevent the excessive build-up of surface water in excavations, including
  - Commencing excavation works at the basin and use the basin as an area to store construction generated water. The basin will allow settling of silts and debris. A controlled pump which can be provided to discharge water to the existing culvert at a controlled rate in accordance with the EA Standard Rules discharge permit.
  - Leaving a bund to act as a weir between the basin and watercourse channel to limit and slow any excavation runoff
  - Excavating the watercourse channel in sections to limit the lengths that would generate contaminated waters
  - The channel finishes and erosion controls should be completed prior to connection of the main incoming waters
  - Leaving the connection to the receiving culvert until all other channel works are complete, except for the breaking through of the existing drains and culvert
  - Maintaining the integrity of existing drains and culvert so that waters bypass the works, leaving the re-connection works until the watercourse can provide a continuous flow channel
  - Where headwalls and such are to be constructed on live drains, they should be temporarily bunded upstream during periods of low flow or provided with over pumping, so that silts and concrete works are not washed downstream.
  - All existing drains discovered should be diverted into the watercourse and provided with a suitable headwall and erosions prevention
  - All redundant sections of existing drains should be blocked and grouted up, as appropriate.
- The EA Standard Rules and Pollution Prevention Guidance should be followed for all waters intended to be discharged during construction works

- The excavated surfaces are to be sealed or finished as soon as possible. All loose soils in the base of the excavations are to be removed.
- Prior to making the watercourse live, all silt build-up and debris in the channel and basin is to be removed

5.0

Maintenance Strategy

5.0 Maintenance Strategy

5.1 Maintenance Responsibility

LCC will be responsible for the provision and maintenance of the road drainage, watercourses, SuDS basins, culvert, flow controls and other conveyance pipes in the EZ, except for those provided in the individual plots. LCC are responsible for providing and maintaining headwalls at all outfalls to the brook and SuDS basins.

The development plots will continue to be in the control of LCC for a time, until individual developers take responsibility. Until this time, LCC will be responsible for all drainage infrastructure in the plots.

Following the disconnection of the Huntley Brook from contributing to the BAE Systems site infrastructure, BAE Systems will have responsibility for the sections of old culvert outside the EZ.

LCC will be responsible for appointing a qualified maintenance company to undertake the maintenance and inspection of drainage system as a whole.

5.2 Maintenance Schedule

This maintenance schedule covers all drainage items within the sitewide designed drainage. AMRC will need to have their own maintenance schedule in place to cover any additional drainage features within the red line boundary of the AMRC. This may include attenuation features; SuDS features and flow control devices.

	Maintenance Activity	Frequency of activity (months)				
		1	3	6	12	A/R
	Manholes (General)					
1	Check cover is not damaged and fits securely			X		
2	Check inlet and outlet are free flowing and not obstructed			X		
3	Check security of fitting for all manhole ironmongery			X		
4	Check benching for scour or build-up of debris			X		
5	Check joints in construction for damage or inflow				X	
6	Record maintenance inspection in log book			X		
	Gullies & drainage channels					
7	Check grating is undamaged and fits securely	X				
8	Inspect internal gully/sump chamber, remove debris from traps and check outfall is clear and free flowing			X		
9	Record maintenance inspection in log book	X				
	Conveyance Pipes					
10	Carry out flow test between manholes to ensure free flow of system				X	
11	Jetting and clearance of blockages, debris or silt					X
12	Inspection by CCTV – should problem arise as a result of the flow test					X
13	Cutting of growth into pipe					X
14	Record maintenance inspection in log book				X	
	Inlets/Outlets					
15	Inspect inlets and outlets for blockages and clear if required	X				

16	Remove litter, debris and growth	X				
17	Repair/rehabilitation inlet/outlet					X
18	Record maintenance inspection in log book	X				
	Headwalls					
19	Inspect inlets and outlets for blockages and clear if required	X				
20	Remove litter, debris and growth	X				
21	Repair/rehabilitation inlet/outlet					X
22	Record maintenance inspection in log book	X				
	Watercourses					
23	Remove litter, debris and overgrown plant life					X
24	Record maintenance inspection in log book					X
	Culverts					
25	Inspect culverts for blockages and clear if required	X				
26	Remove litter, debris and growth	X				
27	Repair/rehabilitation culvert					X
28	Record maintenance inspection in log book	X				
	Grassed Attenuation Ponds and Basins					
29	Remove litter and debris	X				
30	Cut grass – for access	X				
31	Inspect inlets and outlets for blockages and clear if required	X				
32	Inspect banksides, structures, pipework etc for evidence of physical damage	X				X
33	Inspect inlets and surface for silt accumulation, establish appropriate silt removal frequencies		X			X
34	Manage other vegetation and remove nuisance plants - Monthly for 6 months, quarterly for 2 years, then half yearly	X	X	X		
35	Tidy all dead growth before start of growing season				X	
36	Remove sediments from inlets, outlets and forebay				X	X
37	Re-seed areas of poor vegetation growth					X
38	Repair of erosion or other damage by re-seeding or re-turfing					X
39	Realignment of energy dissipation elements					X
40	Repair/rehabilitation of inlet and outlet					X
41	Relevel uneven surfaces and reinstate design levels					X
42	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates					X
43	Record maintenance inspection in log book	X				

Appendices

Appendix A – Site Layout

	Gross building footprint ft²	Office area uplift on Gross floor print ft²
footprint		**Units - 50% upper floors**
B2		
7	37,680	56,520
8	37,680	56,520
AMRC	37,680	56,520
footprint		**Units - 10% upper floors**
B2		
1	56,708	62,378
2	37,470	41,218
3	30,000	33,000
4	59,080	64,988
5	54,536	59,990
6	50,022	55,024
9	19,322	21,300
10	19,322	21,300
B8		
1	181,820	200,002
2	170,000	187,000
3	70,000	77,000
4	85,000	93,500
footprint		**2 stories**
Hub	12,124	24,248
footprint		**3 stories**
HQ Office	12,124	36,373
Total Gross	**970,568**	**1,146,881**

Alternative option with B2 office area @50%
Units - 50% upper floors
B2
169,560
Alternative 50% office
B2
85,062
56,205
45,000
88,620
81,804
75,033
28,983
28,983
B8
557,502
2 stories
24,248
3 stories
36,373
1,277,373

Parking required	Parking drawn	+ / -
1 space per 700sqft with 50% uplift		
81	80	-1
81	80	-1
81	96	15
1 space per 700sqft with 10% uplift		
89	84	-5
59	62	3
47	50	3
93	96	3
86	88	2
79	84	5
30	44	14
30	44	14
1 space per 1000sqft with 10% uplift		
200	212	12
187	187	0
77	82	5
94	111	18
1 space per 300sqft @ 2 floors		
81	84	3
1 space per 300sqft @ 3 floors		
121	115	-6
1,515	**1,599**	**84**

1023121	A0

Based on:

Architects Drg No.	Rev
Structural Drg No.	Rev
Survey Drg No.	Rev
Other Drg No.	Rev
Other Drg No.	Rev

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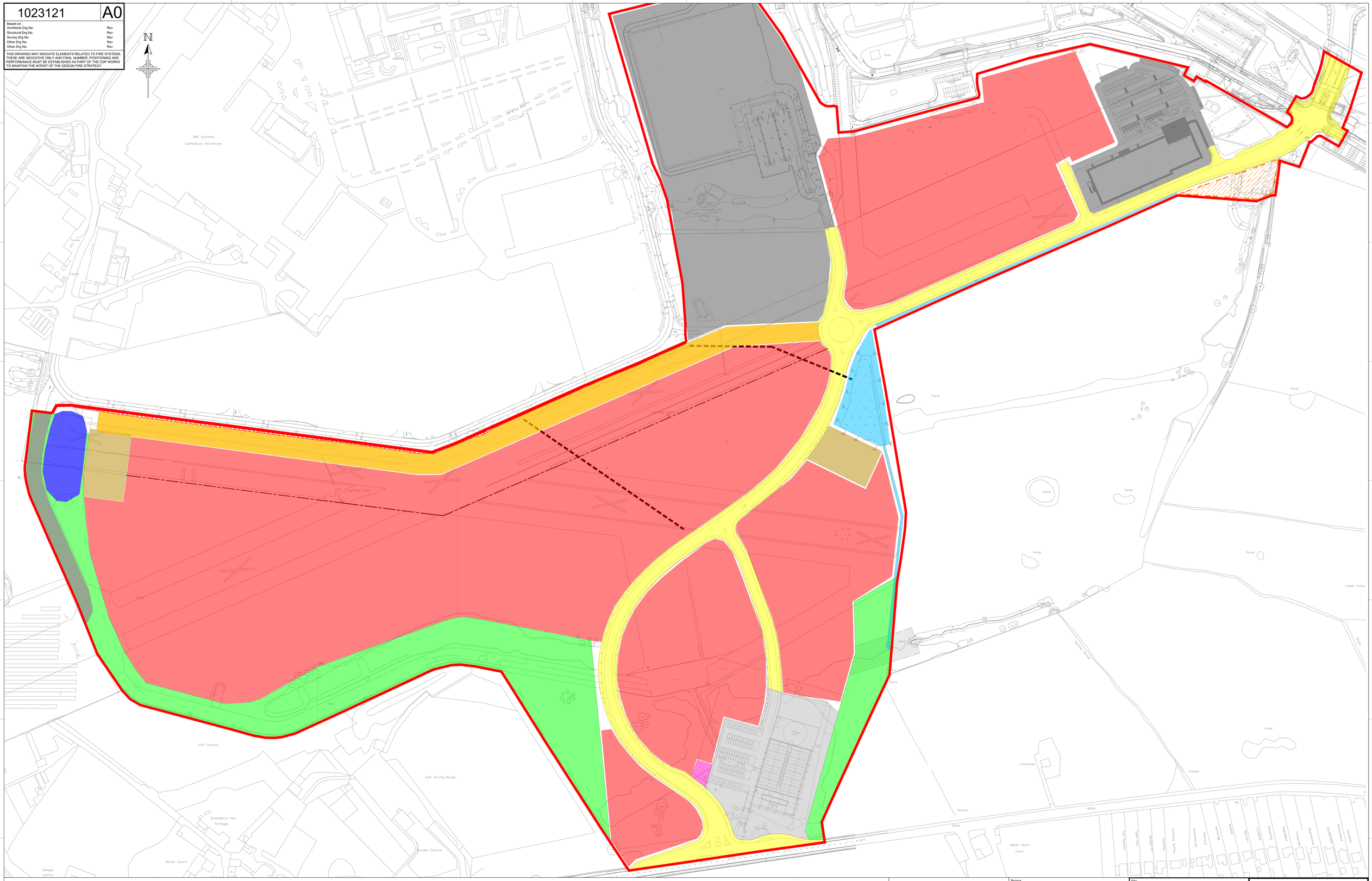


NOTES:

- CARRIAGEWAY
- FOUL TREATMENT PLANT
- GAS GOVERNOR
- BAT MITIGATION AREA
- 3M FENCE EASEMENT
- BAE SAMSOUNDED ACCESS TRACK
- EXISTING POND AND DITCH
- AREA OF PROPOSED SLIDE BASIN
- EXISTING CULVERT
- PROPOSED PRIMARY SUB STATION
- AMC SITE AREA
- EXISTING BAE BUILDINGS
- AREA OF EARTHWORKS AND PLOT FORMATION
- AREA OF PROPOSED CARRIAGEWAY AND SWALE

Issue	Date	Description	By	Chkd	Verfd
P2	11.09.20	DEVELOPMENT ZONES	LK	MH	MH
P1	26.08.20	FIRST ISSUE	JW	MH	MH

Project: SAMLESBURY ENTERPRISE ZONE

Client: LANCASHIRE COUNTY COUNCIL

Drawing Status: ISSUED FOR INFORMATION

Title: CONSTRAINTS PLAN

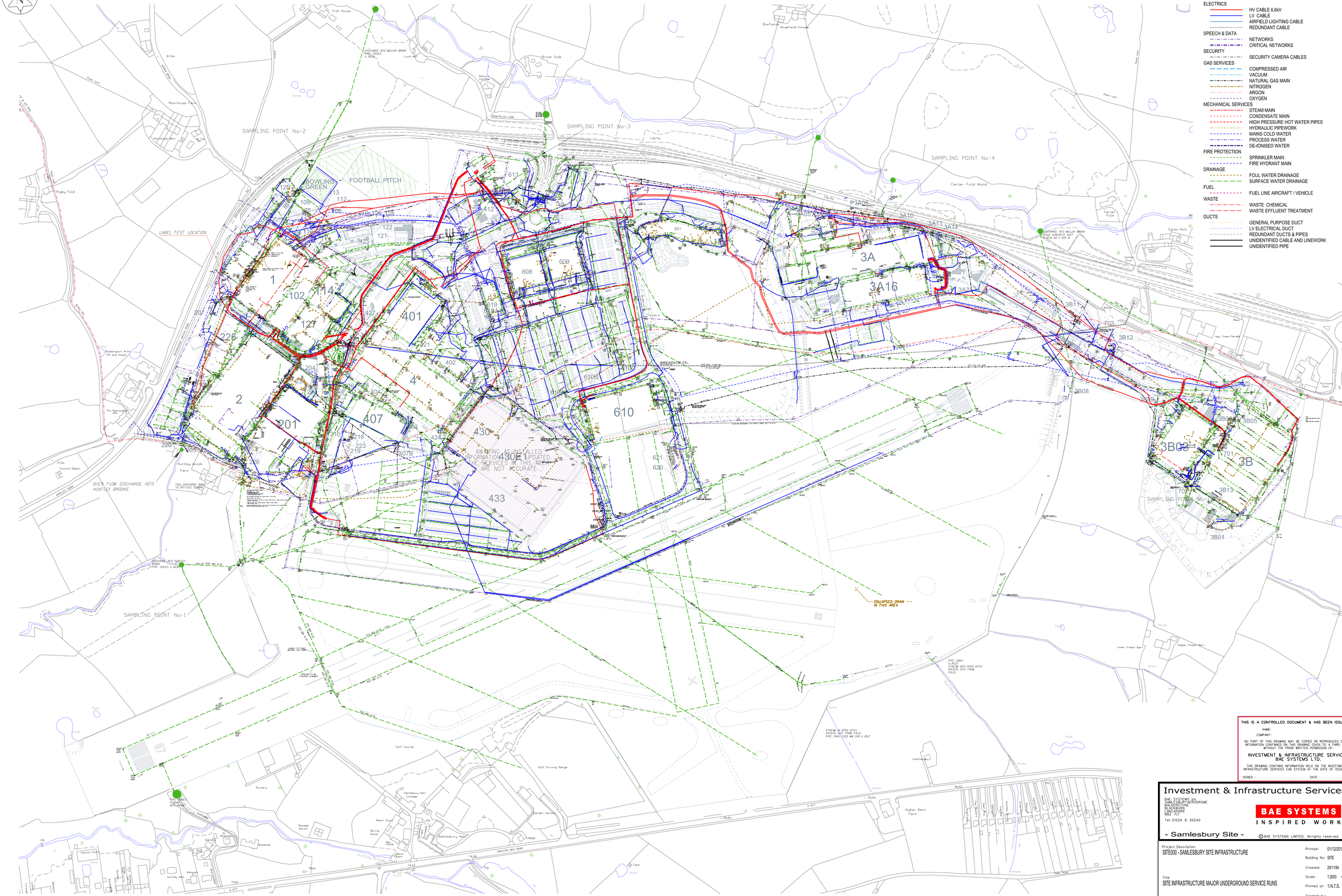
Project No.: 1023121

Scale: 1:1250

Drawing No.: SEZ-CDL-XX-00-DR-C-0604

CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3AH
Tel: +44 (0)161 244 5660
Website: www.cundall.com

True scale at 1:1



SITE UTILITIES LEGEND

ELECTRICS
- HV CABLE 6.6kV
- LV CABLE
- AIRFIELD LIGHTING CABLE
- REDUNDANT CABLE

SPEECH & DATA
- NETWORKS
- CRITICAL NETWORKS

SECURITY
- SECURITY CAMERA CABLES

GAS SERVICES
- COMPRESSED AIR
- VACUUM
- NATURAL GAS MAIN
- NITROGEN
- ARGON
- OXYGEN

MECHANICAL SERVICES
- STEAM MAIN
- CONDENSATE MAIN
- HIGH PRESSURE HOT WATER PIPES
- HYDRAULIC PIPEWORK
- MAINS COLD WATER
- PROCESS WATER
- DE-IONISED WATER

FIRE PROTECTION
- SPRINKLER MAIN
- FIRE HYDRANT MAIN

DRAINAGE
- FOUL WATER DRAINAGE
- SURFACE WATER DRAINAGE

FUEL
- FUEL LINE AIRCRAFT / VEHICLE

WASTE
- WASTE CHEMICAL
- WASTE EFFLUENT TREATMENT

DUCTS
- GENERAL PURPOSE DUCT
- LV ELECTRICAL DUCT
- REDUNDANT DUCTS & PIPES
- UNIDENTIFIED CABLE AND LINEWORK
- UNIDENTIFIED PIPE

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BLACKBURN
LANCASHIRE
BB2 7LP
Tel: 01254 8 35240

BAE SYSTEMS
INSPIRED WORK

- Samlesbury Site -

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Project Description
SITE000 - SAMLESBURY SITE INFRASTRUCTURE

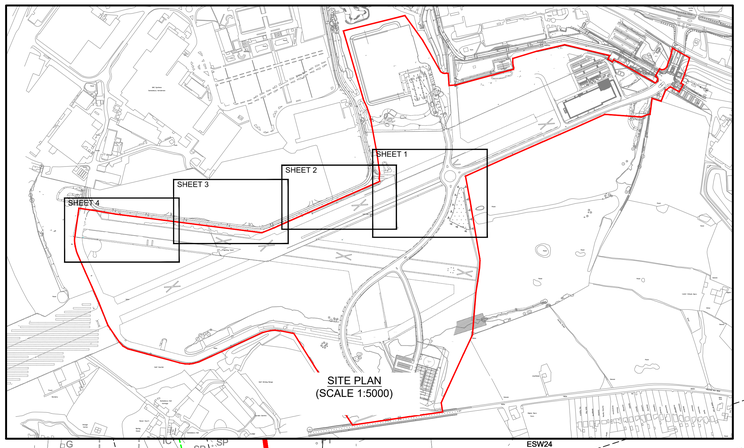
Title
SITE INFRASTRUCTURE MAJOR UNDERGROUND SERVICE RUNS

Printed: 01/12/2014
Building No: SITE
Created: 29/11/94
Scale: 1:2000 @ A0
Printed at: 1:N.T.S.
Created by: J.S TAYLOR

Project No. SITE000 / 010

Issue IBD

Appendix B – Drainage Drawings



SITE PLAN
(SCALE 1:5000)

N

KEY

- EXISTING SURFACE WATER DRAINAGE
- EXISTING SURFACE WATER DRAINAGE ABANDONED
- EXISTING FLOW CONTROL
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED HEAD WALL
- PROPOSED FOUL WATER DRAINAGE
- SITE BOUNDARY
- PROPOSED WATER COURSE
- PROPOSED ATTENUATION BASIN
- 2m UTILITIES VERGE
- 4.5m ACCESS ROAD
- PROPOSED LEVEL
- PROPOSED KNEE RAIL

ESW24
CL 78.13
MH

FW11
CL 78.30
IL 76.270

FW10
CL 79.00
IL 76.695

Ø225mm @ 1:100

Ø450mm

EXSW
CL 77.80
IL 74.28

Ø750mm

EXSW (HYDROBRAKE)
CL 77.95
IL 76.285
SUMP 74.700

HW01
IL 74.250

FW12
CL 77.85
IL 75.660

Ø225mm @ 1:100

Ø450mm

SW02
CL 78.76
IL TO MATCH
Ø450mm CULVERT

RUN TO BE CONNECTED
TO Ø450mm CULVERT AT
NEW MANHOLE SW02

Ø300mm

ESW22
CL 78.52
IL 77.070
MH

ESW23
CL 78.85
IL 77.330

CCTV
ER
CB
EXSW
CL 77.97

EH39
CL 80.29

FW07
CL 80.20
IL 77.690

Ø150mm @ 1:60

FW06
CL 80.10
IL 78.370

PLOT DRAINAGE
CONNECTION POINT

SW01
CL 80.25
IL TO BE CONFIRMED

Ø225mm @ 1:100

EH38
CL 80.15

ESW51
CL 80.50
IL 78.850

SW01A
CL 80.35
IL TO MATCH EXISTING PIPE
TO BE CONFIRMED

FW08
CL 80.05
IL 77.375

Ø150mm @ 1:60

EH36
CL 80.06
IL 78.660

FW09
CL 79.70
IL 77.070

ESW21
CL 79.86
IL 77.920

EH37
CL 79.92
IL 78.47

ESW50
CL 80.44
IL 79.72

HW
IL 79.72

HW
IL 79.37

EXSW
Ex 80.57
IL 78.47

Ø150mm @ 1:95

EH35
CL 80.17
IL 78.33

EH34
CL 80.18

FW05
CL 80.50
IL 77.235

Ø150mm @ 1:95

EH33
CL 80.26
IL 78.320

MODIFICATIONS TO
EXISTING ATTENUATION
BASIN IN ABEYANCE

300@1:110

FW04
CL 80.00
IL 77.420

EXSW
CL 79.92
IL 76.28 (APPROX.)

Ø450mm

HW
IL 78.28

HW
IL 78.080

Ø150mm @ 1:95

Ø150mm

FW03
CL 80.50
IL 77.730

EH32
CL 80.60
IL 79.000

OPTIONAL FOUL WATER
DRAINAGE FOR FUTURE PLOT
CONNECTIONS

Ø150mm @ 1:95

Ø150mm

OPEN CHANNEL
IL 78.13

FW02
CL 80.50
IL 78.075

Ø150mm @ 1:95

EH31
CL 81.00
IL 79.730

EH26
CL 80.97
IL 79.390

FW01
CL 80.00
IL 78.413

HW01
IL 78.52

EXSW97
CL 81.00
IL 78.612

225@1:200

150@1:80

EXSW
CL 80.30
IL 79.075

300mm BUND

OPEN CHANNEL
IL 79.00

EXSW96
CL 81.14
IL 78.75

EXSW11
CL 81.23
IL 81.03

150@1:80

HW02
IL 79.89

150@1:80

EXSW08
CL 81.27
IL 81.08

EX EF
CL 80.73
IL 79.68

EX PUMP ST
CL 80.02
IL 77.87

1:200

SHEET 1 PLAN
(SCALE 1:250)

True scale at 1:1

1023121	A0

Based on.

Architects Drg No.	X	Rev X
Structural Drg No.	X	Rev X
Survey Drg No.	X	Rev X
Other Drg No.	X	Rev X
Other Drg No.	X	Rev X

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   - 1.2m IN ROADS/SERVICE AREAS
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10. TREE PLANTING IS NOT TO OCCUR WITHIN A MIN OF 3-12m, DEPENDING ON TREE SPECIES, OF THE ADOPTABLE SEWER, IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION. REFER TO SEWERS FOR ADOPTION 6TH EDITION, FIGURE 2.3 FOR DETAILS IN RELATION TO TREE SPECIES AND CORRESPONDING MIN DISTANCES FROM THE ADOPTABLE SEWER.

Issue	Date	Description	By	Chkd	Verfd
P2	25/01/21	LAYOUT REVISED	LK	MH	MH
P1	25/11/20	FIRST ISSUE	LK	JH	BW

Project
SAMLESBURY ENTERPRISE ZONE

Client
LANCASHIRE COUNTY COUNCIL

Title
PROPOSED DRAINAGE AND WATER COURSE LAYOUT & SECTIONS SHEET 1 OF 4

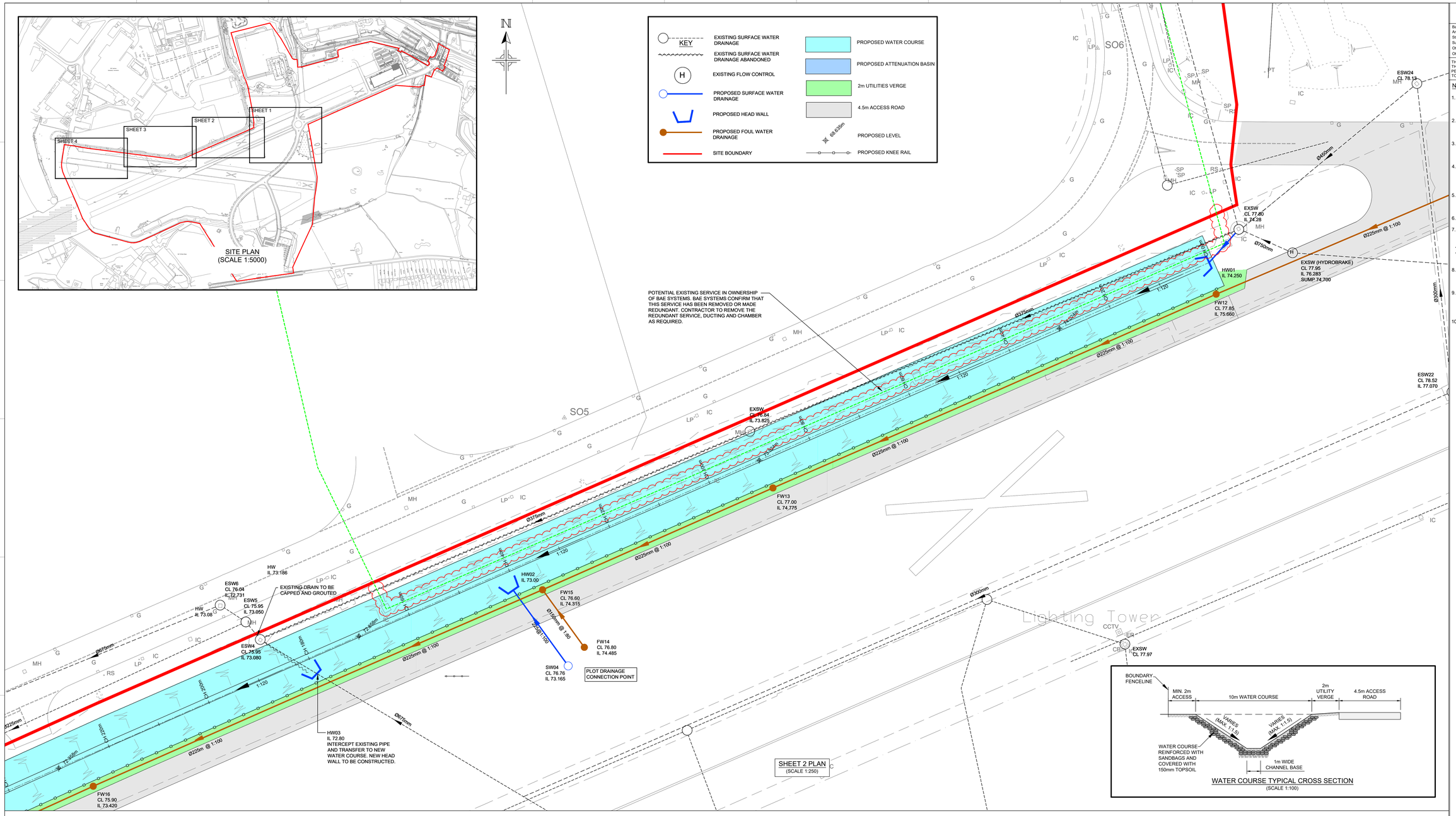
Drawing Status
FOR APPROVAL

Project No.
1023121

Scale
AS SHOWN

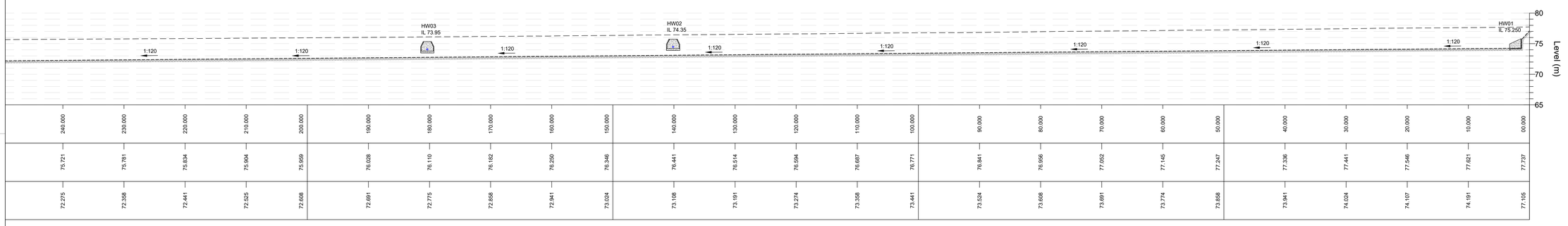
CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3LD
Tel: +44 (0)161 244 5660
Website: www.cundall.com

Drawing No.
SEZ-CDL-SW-XX-DR-C-15011



SHEET 2 PLAN
(SCALE 1:250)

WATER COURSE TYPICAL CROSS SECTION
(SCALE 1:100)



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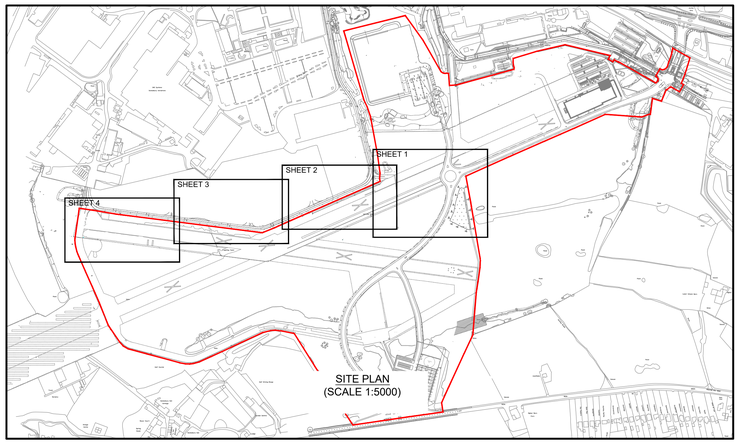
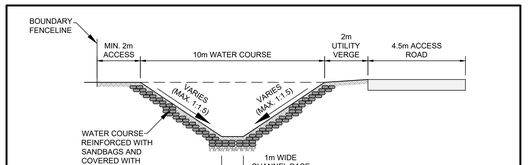


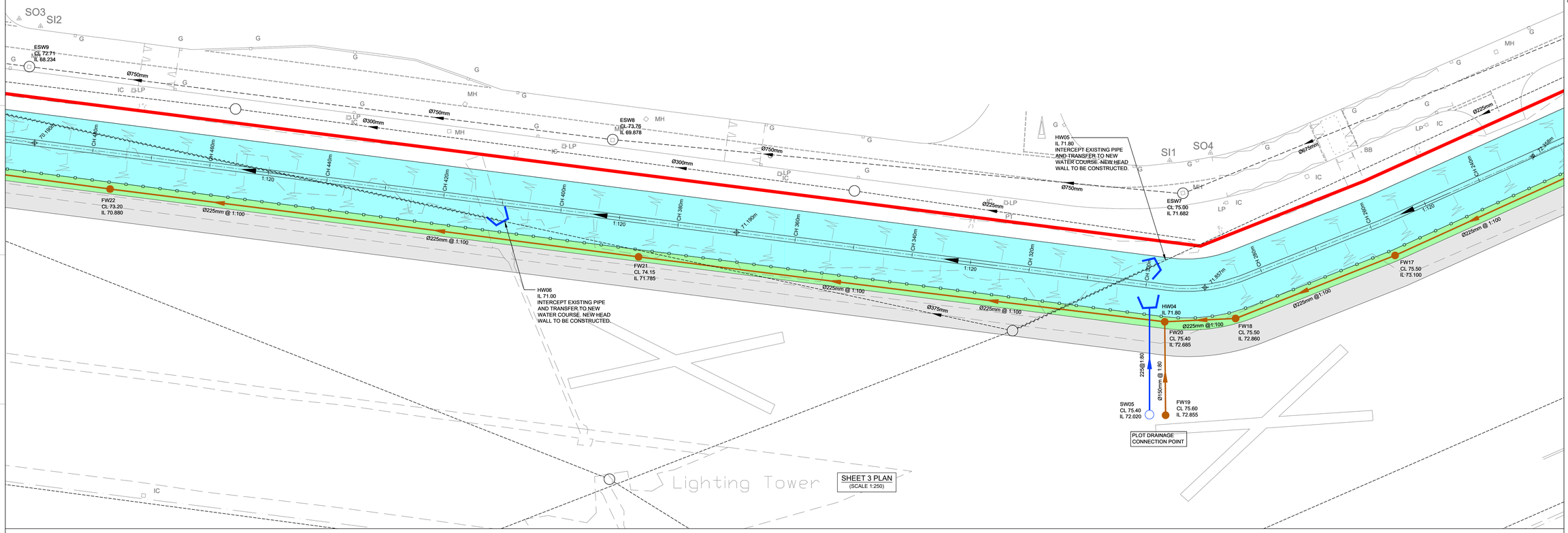
SITE PLAN
(SCALE 1:5000)



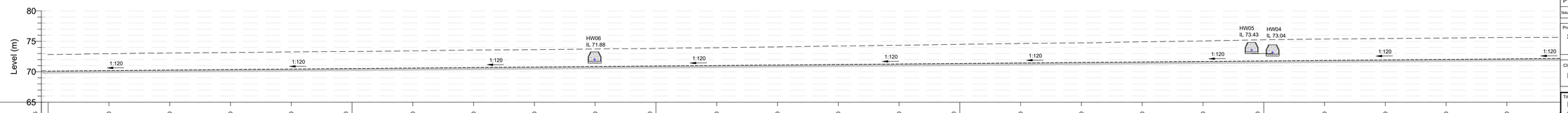
WATER COURSE TYPICAL CROSS SECTION
(SCALE 1:100)

KEY

- EXISTING SURFACE WATER DRAINAGE
- EXISTING SURFACE WATER DRAINAGE ABANDONED
- EXISTING FLOW CONTROL
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED HEAD WALL
- PROPOSED FOUL WATER DRAINAGE
- SITE BOUNDARY
- PROPOSED WATER COURSE
- PROPOSED ATTENUATION BASIN
- 2m UTILITIES VERGE
- 4.5m ACCESS ROAD
- PROPOSED LEVEL (e.g. 69.65m)
- PROPOSED KNEE RAIL



SHEET 3 PLAN
(SCALE 1:250)



Chainage	727.235	490.000	480.000	470.000	460.000	450.000	440.000	430.000	420.000	410.000	400.000	390.000	380.000	370.000	360.000	350.000	340.000	330.000	320.000	310.000	300.000	290.000	280.000	270.000	260.000
Existing Levels	70.167	72.957	73.083	73.152	73.256	73.331	73.431	73.569	73.631	73.743	73.837	73.958	74.082	74.229	74.354	74.507	74.644	74.748	74.919	75.062	75.254	75.376	75.462	75.545	75.625
Proposed Levels		70.190	70.273	70.357	70.440	70.523	70.606	70.690	70.773	70.856	70.940	71.023	71.106	71.190	71.273	71.356	71.440	71.523	71.606	71.689	71.773	71.857	71.941	72.025	72.108

WATERCOURSE LONG SECTION
SCALE: H 1:250,V 1:250. DATUM: 65.000

True scale at 1:1

1023121 A0

Based on.

Architects Drg No.	X	Rev	X
Structural Drg No.	X	Rev	X
Survey Drg No.	X	Rev	X
Other Drg No.	X	Rev	X
Other Drg No.	X	Rev	X

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Issue	Date	Description	By	Chkd	Verfd
P1	25/01/21	FIRST ISSUE	LK	MH	BW

Project
SAMLESBURY ENTERPRISE ZONE

Client
LANCASHIRE COUNTY COUNCIL

Title
PROPOSED DRAINAGE AND WATER COURSE LAYOUT & SECTIONS SHEET 3 OF 4

Drawing Status
FOR APPROVAL

Project No.
1023121

Scale
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CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3LD
Tel: +44 (0)161 244 5660
Website: www.cundall.com

Drawing No.
SEZ-CDL-SW-XX-DR-C-15011

1023121 A0

Based on.
Architects Drg No. X Rev X
Structural Drg No. X Rev X
Survey Drg No. X Rev X
Other Drg No. X Rev X
Other Drg No. X Rev X

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8. ALL PROPOSED DRAINAGE IS SUBJECT TO CONFIRMATION OF LEVELS OF EXISTING DRAINAGE AT PROPOSED CONNECTION POINTS.
9. ALL ADOPTABLE DRAINAGE IS TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH 'SEWERS FOR ADOPTION 7TH EDITION' AND UNITED UTILITIES STANDARD DETAILS.
10. TREE PLANTING IS NOT TO OCCUR WITHIN A MIN OF 3-12m, DEPENDING ON TREE SPECIES, OF THE ADOPTABLE SEWER, IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION. REFER TO SEWERS FOR ADOPTION 6TH EDITION, FIGURE 2.3 FOR DETAILS IN RELATION TO TREE SPECIES AND CORRESPONDING MIN DISTANCES FROM THE ADOPTABLE SEWER.

Chainage	727.235	720.000	710.000	700.000	690.000	680.000	670.000	660.000	650.000
Existing Levels	70.167	70.294	70.472	70.516	70.587	70.512	70.577	70.642	70.745
Proposed Levels		68.223	68.359	68.447	68.530	68.612	68.693	68.776	68.859

Chainage	640.000	630.000	620.000	610.000	600.000	590.000	580.000	570.000
Existing Levels	70.767	70.874	71.069	71.219	71.356	71.485	71.612	71.763
Proposed Levels	68.941	69.024	69.107	69.190	69.274	69.357	69.440	69.524

Chainage	560.000	550.000	540.000	530.000	520.000	510.000	500.000	490.000
Existing Levels	71.933	72.105	72.265	72.419	72.567	72.699	72.825	72.957
Proposed Levels	69.607	69.690	69.773	69.857	69.940	70.023	70.107	70.190

WATERCOURSE LONG SECTION
SCALE: H 1:250,V 1:250. DATUM: 65.000

True scale at 1:1

Issue	Date	Description	By	Chkd	Verfd
P1	25/01/21	FIRST ISSUE	LK	MH	BW

Project
SAMLESBURY ENTERPRISE ZONE

Client
LANCASHIRE COUNTY COUNCIL

Title
PROPOSED DRAINAGE AND WATER COURSE LAYOUT & SECTIONS SHEET 4 OF 4

Drawing Status
FOR APPROVAL

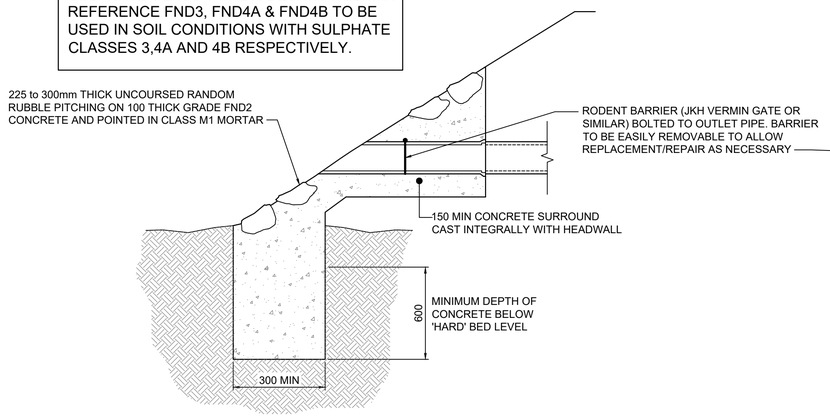
Project No.
1023121

Scale
AS SHOWN

CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3LD
Tel: +44 (0)161 244 5660
Website: www.cundall.com

Drawing No.
SEZ-CDL-SW-XX-DR-C-15011

NOTE
FND2 TO BE USED FOR SOIL CONDITIONS SULPHATE CLASS 1 ONLY. DESIGNATED MIX REFERENCE FND3, FND4A & FND4B TO BE USED IN SOIL CONDITIONS WITH SULPHATE CLASSES 3,4A AND 4B RESPECTIVELY.



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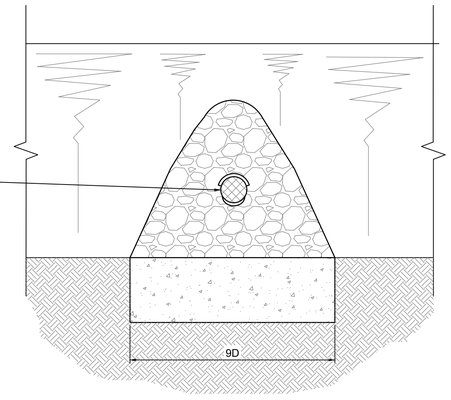
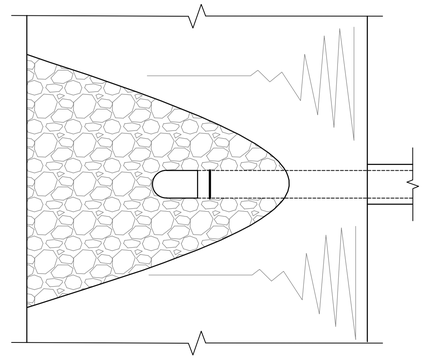
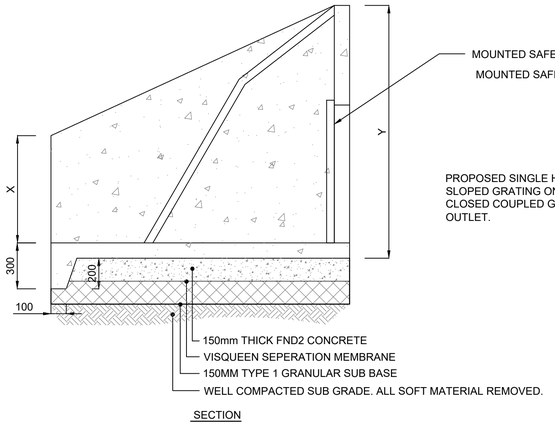


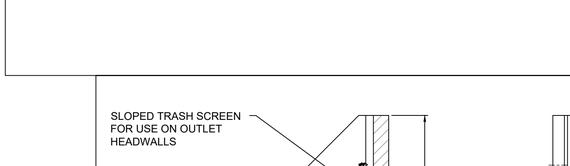
TYPICAL SECTION



PLAN

TYPICAL STONE HEADWALL - 150mm PIPES OR LESS
SCALE 1:20





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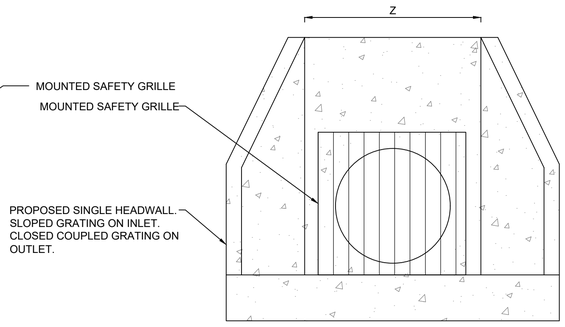

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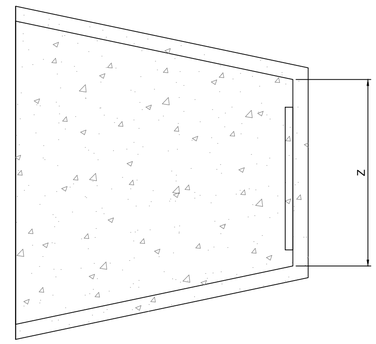
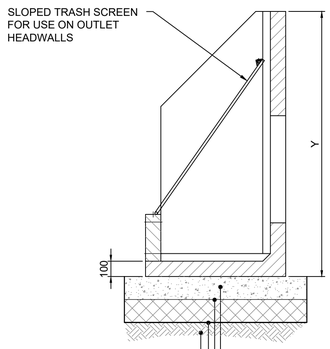


PLAN

TYPICAL PRE-CAST HEADWALL - PIPE > 150mm
SCALE 1:20

NOTE
FOR HEADWALL DIMENSIONS AND SCREEN TYPE REFER TO HEADWALL SCHEDULE DRG. No. SEZ-CDL-SW-XX-SH-C-04011



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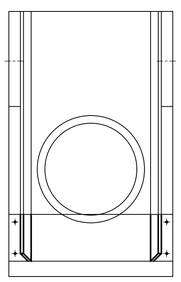

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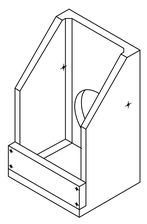
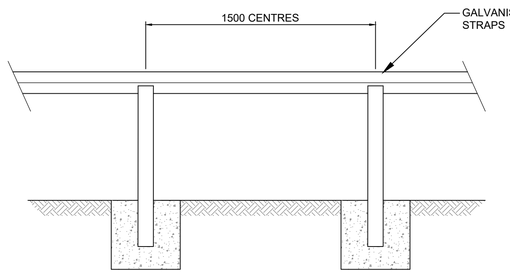


3D

TYPICAL SUMP PRE-CAST HEADWALL
SCALE 1:20



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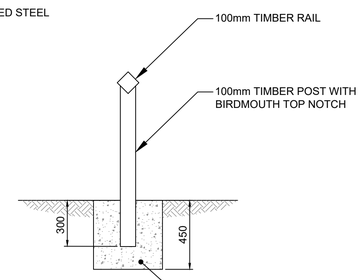


SECTION

KNEE RAIL CONSTRUCTION DETAIL
SCALE 1:20

True scale at 1:1

1023121 | A1

Based on.

Architects Drg No.	X	Rev	X
Structural Drg No.	X	Rev	X
Survey Drg No.	X	Rev	X
Other Drg No.	X	Rev	X
Other Drg No.	X	Rev	X

NOTES:

1. TO BE READ IN CONJUNCTION WILL ALL RELEVANT CUNDALL DRAWINGS

Issue	Date	Description	By	Chkd	Verfd
P1	25/01/21	FIRST ISSUE	LK	MH	BW

Project
SAMLESBURY ENTERPRISE ZONE

Client
LANCASHIRE COUNTY COUNCIL

Title
TYPICAL DRAINAGE & HEADWALL DETAILS

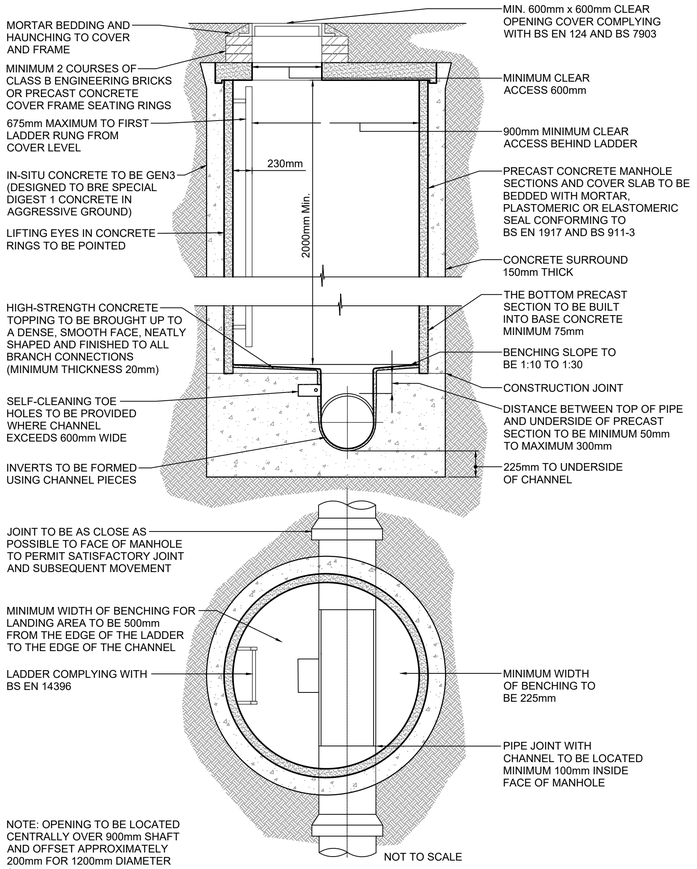
Drawing Status
FOR APPROVAL

Project No.
1023121

Scale
AS SHOWN

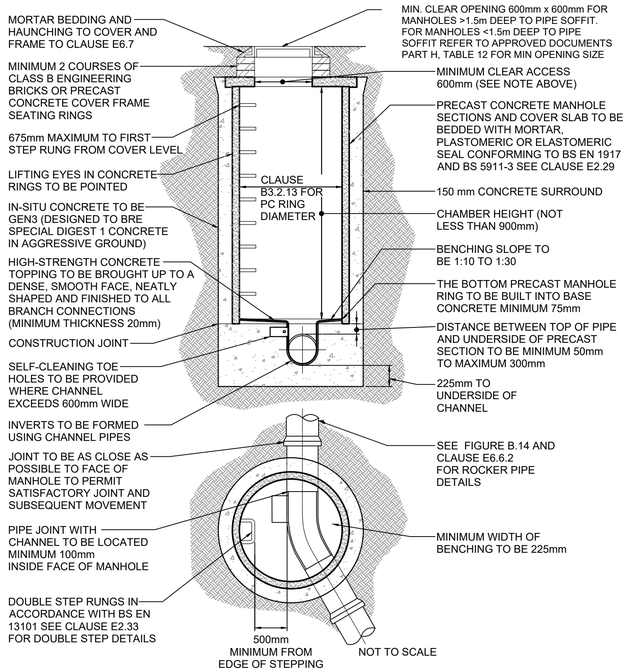
CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3AH
Tel: +44 (0)161 244 5660
Website: www.cundall.com

Drawing No.
SEZ-CDL-SW-XX-DR-C-16001



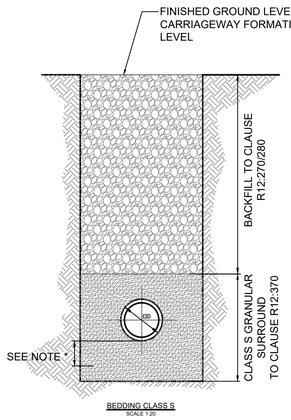
TYPICAL MANHOLE DETAIL - TYPE 1B

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m



TYPICAL MANHOLE DETAIL - TYPE 2

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m



BEDDING CLASS S
SCALE 1:20

NOTE *
150mm OR 1/4 OF THE O.D. (OUTSIDE DIAMETER) WHICH EVER IS GREATER. FOR CONCRETE PIPEWORK 200mm OR 1/4 OF O.D. WHICH EVER IS GREATER.

R12:270 BACKFILLING TO PIPELINES GENERALLY:
UNLESS SPECIFIED OTHERWISE, BACKFILL FROM TOP OF SPECIFIED SURROUND OR PROTECTIVE CUSHION WITH MATERIAL EXCAVATED FROM THE TRENCH, COMPACTED IN LAYERS NOT EXCEEDING 300mm THICK. DO NOT USE HEAVY COMPACTORS BEFORE THERE IS 600mm OF MATERIAL OVER PIPES.

R12:280 BACKFILLING UNDER ROADS, PAVINGS & BUILDING FOOTPRINT:
BACKFILL FROM TOP OF SPECIFIED SURROUND OR PROTECTIVE CUSHION UP TO FORMATION LEVEL WITH GRANULAR SUB BASE MATERIAL TYPE 1 TO DOT SPECIFICATION FOR HIGHWAYS WORKS, CLAUSE 803, LAID AND COMPACTED IN 150mm LAYERS.

R12:370 CLASS S GRANULAR SURROUND
LOWER PART OF TRENCH WIDTH TO BE AS CLAUSE 667 GRANULAR MATERIAL:NATURAL

PIPE SIZES DN 100 & DN 150: SIZE 4/10.

PIPE SIZES DN 225 & DN 300: SIZE 4/10, 10/20 OR 4/20.
PIPE SIZES DN 375-500: SIZE 10/20 OR 4/20.
PIPE SIZES DN 600 AND ABOVE: SIZE 10/20, 20/40, 4/20 OR 4/40.

LAY AND COMPACT TO A THICKNESS NOT LESS THAN 50mm FOR SLEEVE JOINTED PIPES, 100mm FOR SOCKET JOINTED PIPES, OVER FULL WIDTH OF TRENCH, WHERE TRENCH BOTTOM IS UNEVEN DUE TO HARD SPOTS OR OTHER REASON, INCREASE DEPTH BY 100mm. SCOOP OUT LOCALLY AT COUPLINGS/SOCKETS AND LAY PIPES DIGGING SLIGHTLY INTO BED AND RESTING UNIFORMLY ON THEIR BARRELS. ADJUST TO LINE AND GRADIENT.

AFTER INITIAL TESTING, LAY AND COMPACT MORE GRANULAR MATERIAL IN 100MM LAYERS TO 150mm (250mm FOR ADOPTED SEWERS) ABOVE CROWN OF PIPE.

LOWER PART OF TRENCH:
WHERE BEDDING CLASS S IS SPECIFIED TRENCH WIDTH TO BE NOT MORE THAN THE FOLLOWING, REGARDLESS OF DEPTH OF COVER:

Nominal Pipe Size (DN)	100	150	225	300
Max. Trench Width (mm)	600	700	800	900

True scale at 1:1

1023121 A1

Based on.

Architects Drg No.	X	Rev	X
Structural Drg No.	X	Rev	X
Survey Drg No.	X	Rev	X
Other Drg No.	X	Rev	X
Other Drg No.	X	Rev	X

NOTES:

1. TO BE READ IN CONJUNCTION WILL ALL RELEVANT CUNDALL DRAWINGS

Issue	Date	Description	By	Chkd	Verfd
P1	25/01/21	FIRST ISSUE	LK	MH	BW

Project
SAMLESBURY ENTERPRISE ZONE

Client
LANCASHIRE COUNTY COUNCIL

Title
TYPICAL MANHOLE AND PIPE BEDDING DETAILS

Drawing Status
FOR APPROVAL

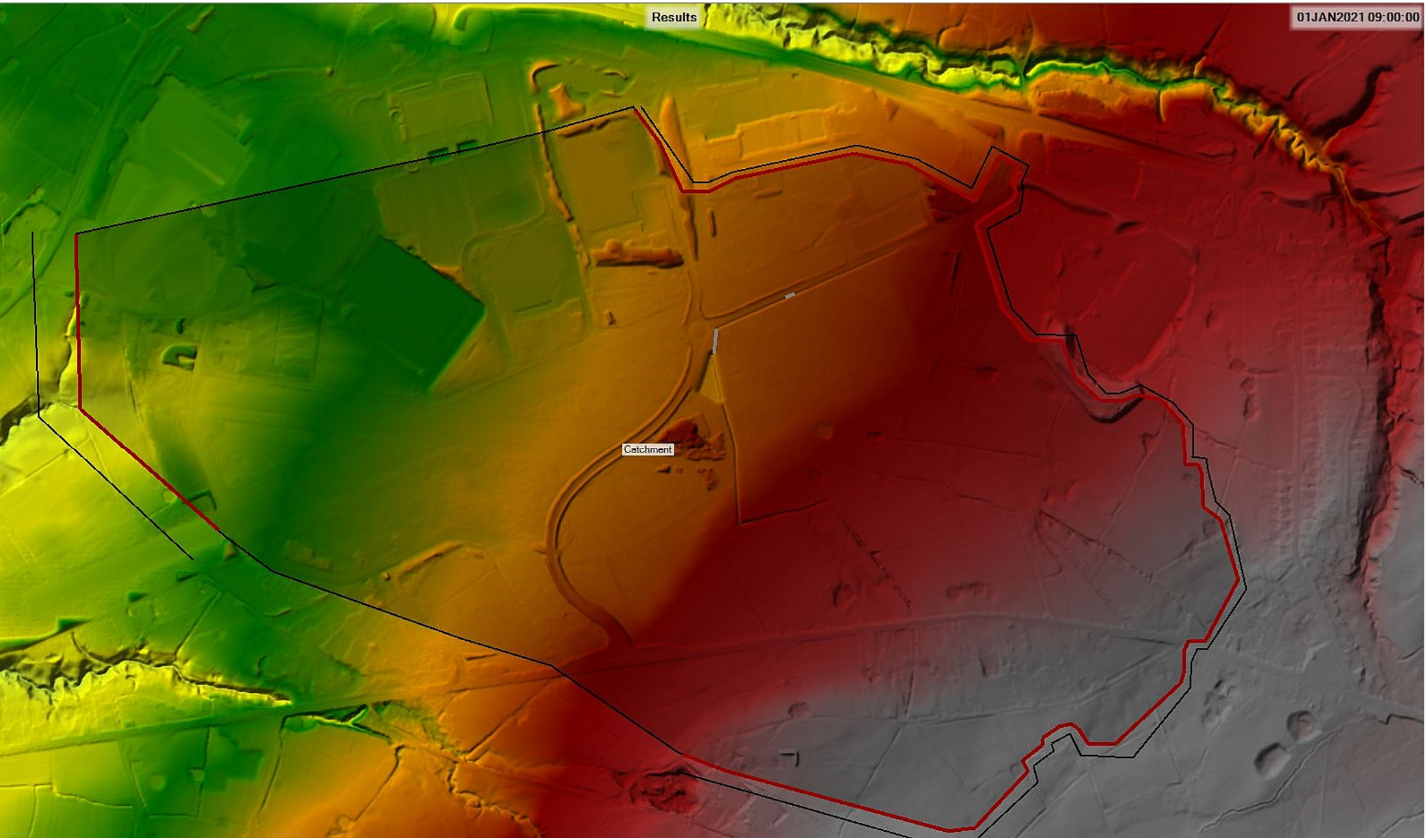
Project No.
1023121

Scale
AS SHOWN

CUNDALL
10th Floor, Manchester One
53 Portland Street
Manchester, M1 3AH
Tel: +44 (0)161 244 5660
Website: www.cundall.com

Drawing No.
SEZ-CDL-SW-XX-DR-C-16011

Appendix C – HEC-RAS Modelling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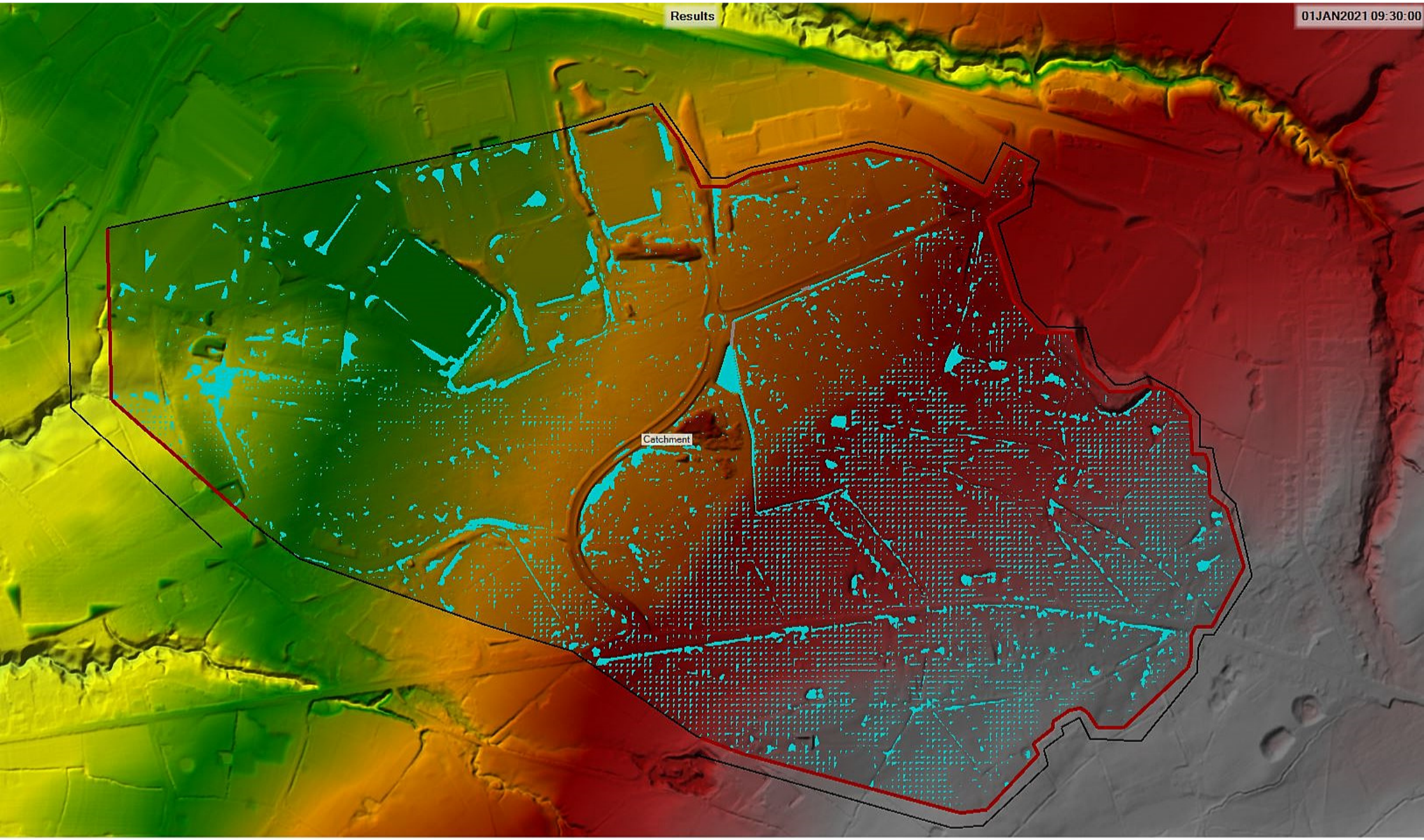
Catchment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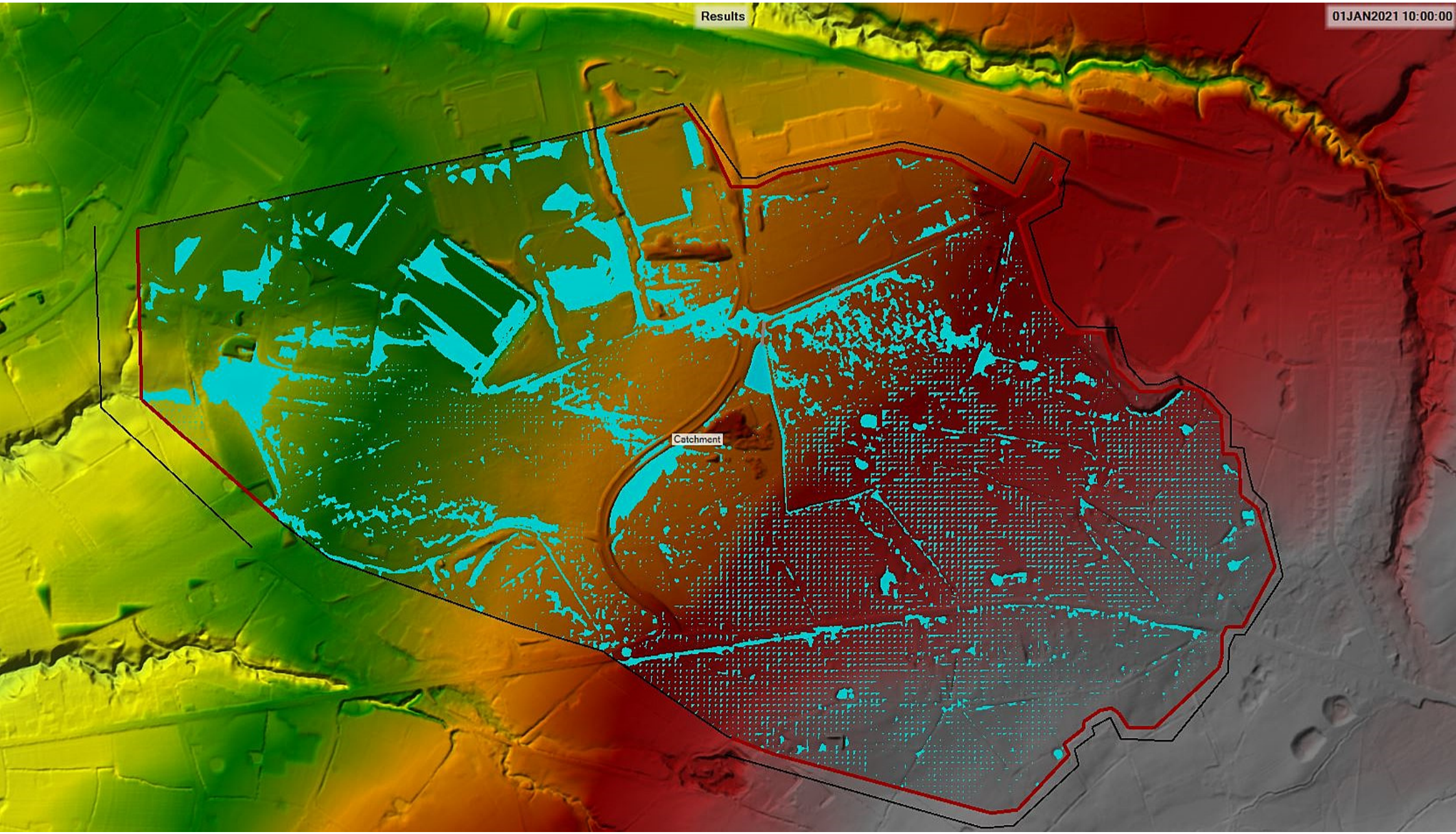
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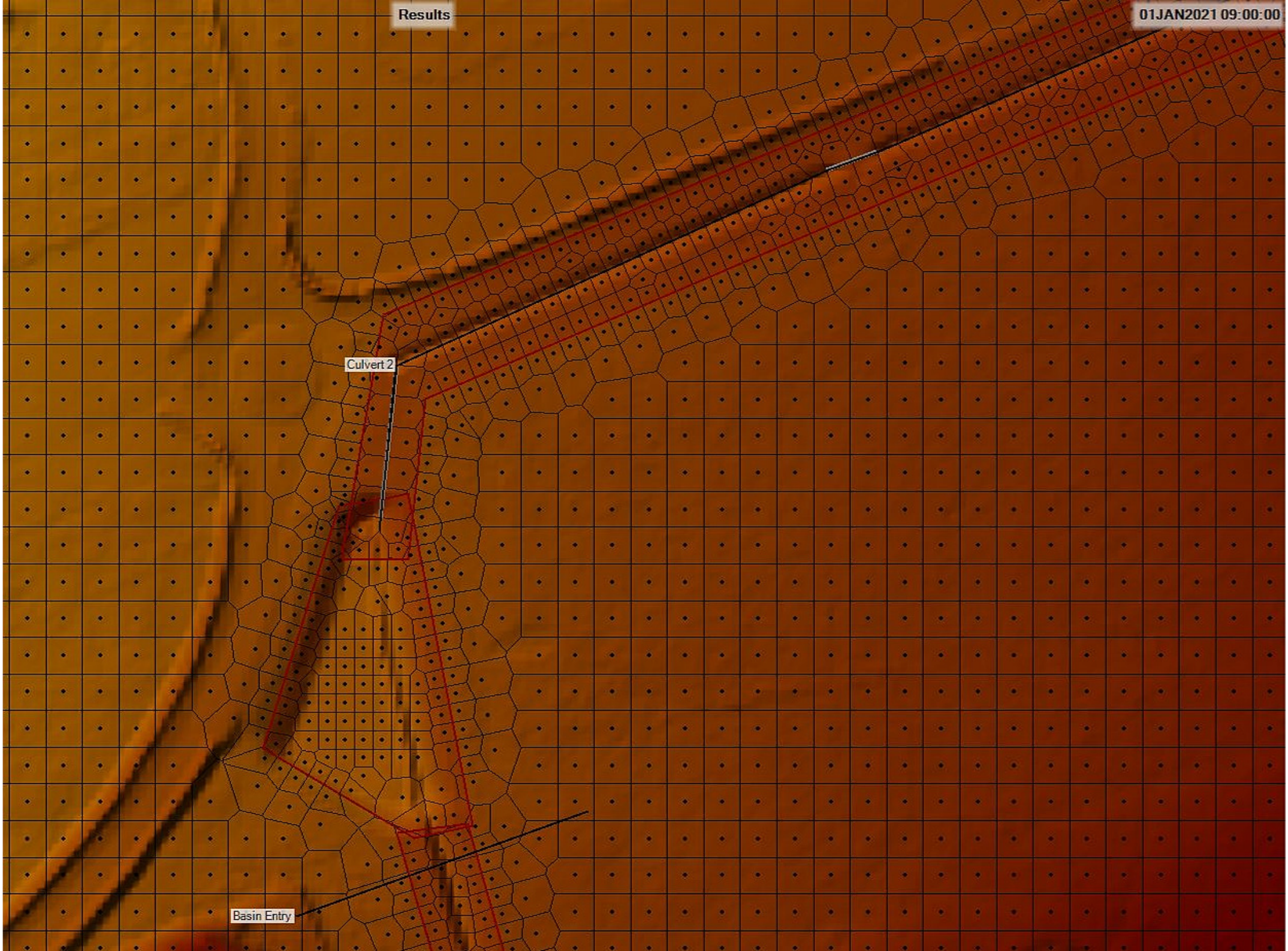
Catchment


Results
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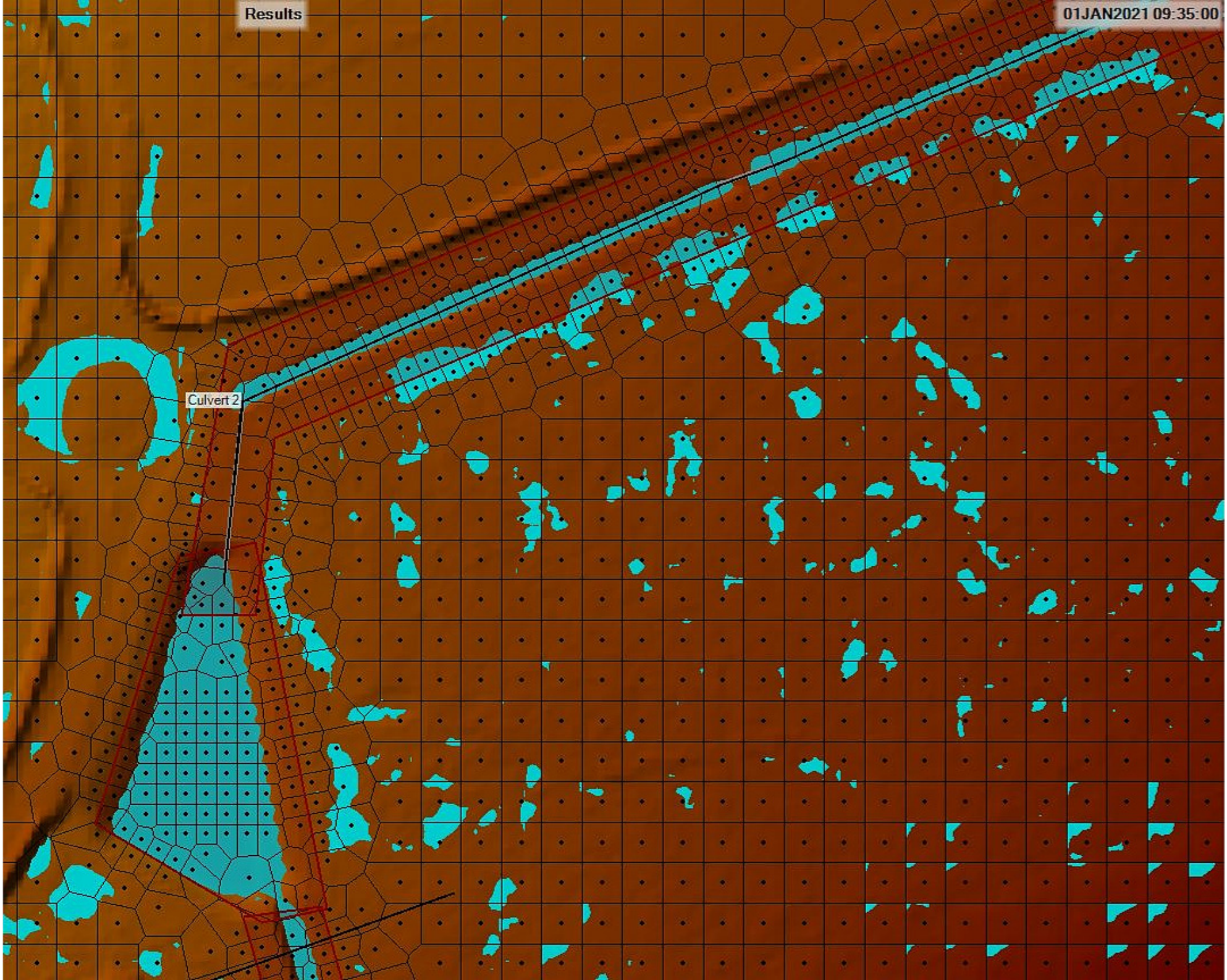
Culvert 2
Basin Entry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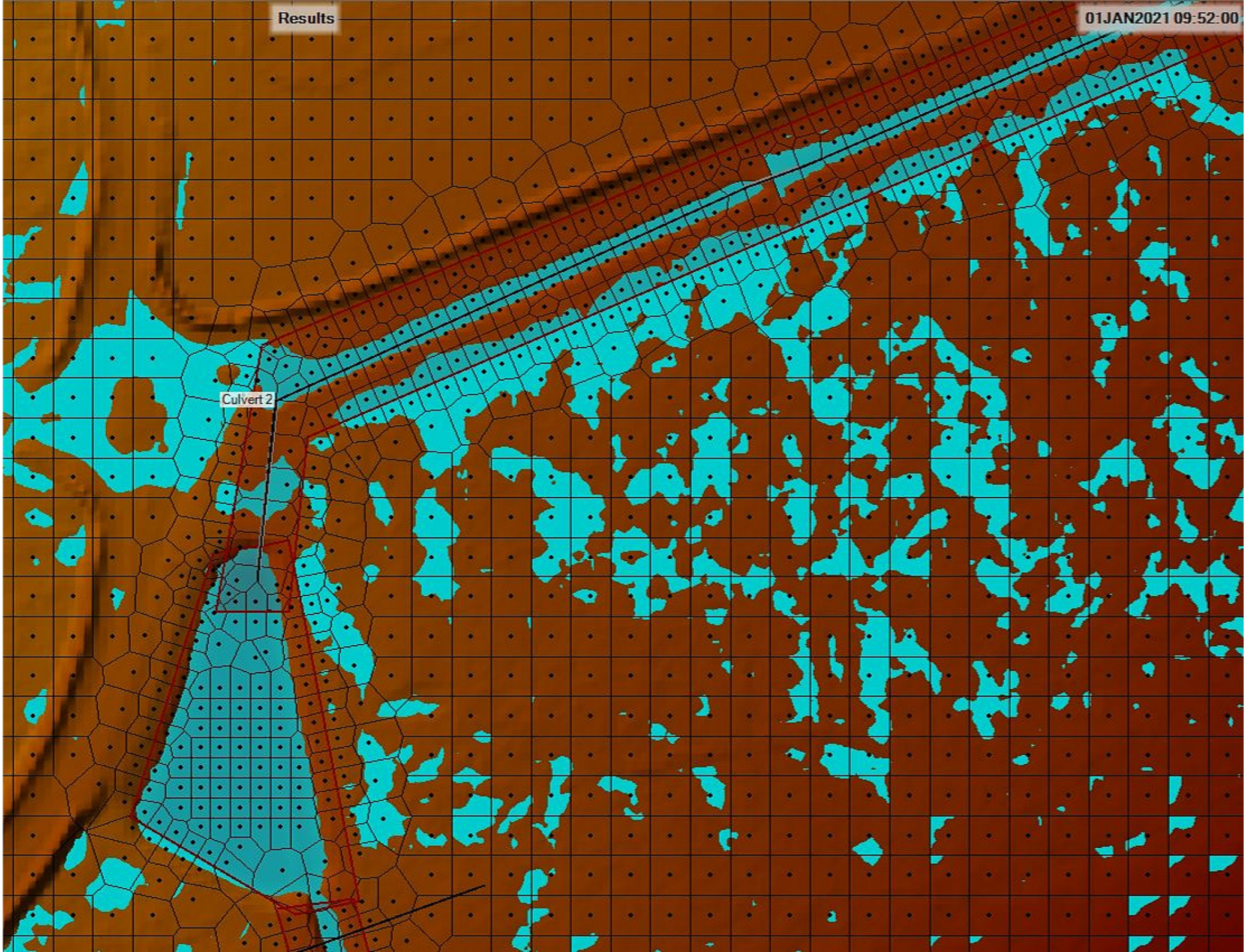
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Culvert 2

Appendix D – MicroDrainage Modelling

AREA MODELLED AS
CONTRIBUTING AREAS IN
MICRODRAINAGE

AREA MODELLED AS CATCHMENT
INPUT HYDROGRAPH IN
MICRODRAINAGE

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	20.000
M5-60 (mm)	18.900	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	150	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.017	4-8	2.556	8-12	5.145	12-16	7.390	16-20	9.812	20-24	7.444	24-28	6.320	28-32	3.700	32-36	0.299	36-40	0.024

Total Area Contributing (ha) = 42.707

Total Pipe Volume (m³) = 29341.104

Network Design Table for Storm

« - Indicates pipe capacity < flow

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	46.822	1.530	30.6	0.000	10.00	13.1		0.045	3 \=/	1000	1:3 Swale	
S1.001	85.791	1.532	56.0	0.000	0.00	28.8		0.045	3 \=/	1000	1:3 Swale	
S2.000	16.241	0.108	150.4	2.287	8.00	0.0		0.045	o	300	Pipe/Conduit	
S2.001	11.079	0.111	99.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	40.243	0.448	89.8	0.000	0.00	0.0		0.045	3 \=/	1000	1:3 Swale	
S1.003	39.425	0.717	55.0	0.140	0.00	0.0		0.045	3 \=/	1500	1:3 Swale	
S1.004	46.649	0.718	65.0	0.000	0.00	0.0		0.045	3 \=/	1500	1:3 Swale	

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	40.64	10.84	83.530	0.000	13.1	0.0	0.0	0.93	202.5	13.1
S1.001	37.17	12.92	82.000	0.000	41.9	0.0	0.0	0.69	149.7	41.9
S2.000	44.88	8.84	80.778	2.287	0.0	0.0	0.0	0.32	22.8«	277.9
S2.001	46.70	8.12	80.670	0.000	10.0	0.0	0.0	1.57	111.2	10.0
S1.002	43.96	9.23	80.468	0.000	20.0	0.0	0.0	0.54	118.2	20.0
S1.003	42.01	10.14	80.020	0.140	20.0	0.0	0.0	0.73	212.6	36.0
S1.004	44.12	9.16	79.303	0.000	25.0	0.0	0.0	0.67	195.6	25.0

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	36.690	0.349	105.1	0.000	0.00	0.0	0.045	3	\=/	1500	1:3 Swale	
S3.000	26.792	0.400	67.0	0.518	5.00	0.1	0.045	1	_/	900	1:1 Ditch	
S3.001	49.948	0.400	124.9	0.113	0.00	0.1	0.045	1	_/	900	1:1 Ditch	
S3.002	50.394	0.499	101.0	0.072	0.00	0.1	0.045	1	_/	900	1:1 Ditch	
S3.003	56.823	0.446	127.4	0.080	0.00	0.0	0.045	1	_/	900	1:1 Ditch	
S3.004	10.146	0.060	169.1	0.000	0.00	0.0	0.030		o	600	Pipe/Conduit	
S3.005	83.118	0.489	170.0	0.130	0.00	0.0	0.030	1	_/	1500	1:1 Ditch	
S3.006	50.891	0.261	195.0	0.071	0.00	0.0	0.030	1	_/	1500	1:1 Ditch	

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)
S1.005	41.63	10.33	78.585	0.000	25.0	0.0	0.0	0.53	153.8	25.0
S3.000	55.28	5.47	82.000	0.518	0.1	0.0	0.0	0.95	340.8	77.7
S3.001	50.94	6.67	81.600	0.631	0.2	0.0	0.0	0.69	249.6	87.3
S3.002	47.66	7.76	81.200	0.703	0.3	0.0	0.0	0.77	277.6	91.1
S3.003	44.17	9.14	80.701	0.783	0.3	0.0	0.0	0.69	247.1	94.0
S3.004	43.64	9.37	80.180	0.783	0.3	0.0	0.0	0.72	204.6	94.0
S3.005	40.68	10.82	80.120	0.913	0.3	0.0	0.0	0.96	518.2	100.9
S3.006	38.99	11.77	79.631	0.984	0.3	0.0	0.0	0.90	483.8	104.2

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.000	17.619	0.104	169.4	3.549	8.00	0.0	0.600		o	300	Pipe/Conduit	
S4.001	15.190	0.089	170.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.002	5.145	0.030	171.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.007	6.870	0.095	72.3	0.000	0.00	0.0	0.600	1	_/	1500	1:1 Ditch	
S3.008	30.027	0.994	30.2	0.000	0.00	0.0	0.600	1	_/	1500	1:1 Ditch	
S3.009	8.671	0.051	170.0	0.000	0.00	0.0	0.600	1	_/	1500	1:1 Ditch	
S5.000	50.000	2.101	23.8	0.067	8.00	0.0	0.600		o	150	Pipe/Conduit	
S5.001	30.831	0.307	100.5	0.033	0.00	0.0	0.600		o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.000	46.36	8.24	79.915	0.000	40.0	0.0	0.0	1.21	85.2	40.0
S4.001	45.83	8.45	79.811	0.000	40.0	0.0	0.0	1.20	84.9	40.0
S4.002	45.65	8.53	79.722	0.000	40.0	0.0	0.0	1.20	84.7	40.0
S3.007	38.94	11.80	79.370	0.984	40.3	0.0	0.0	3.74	2017.9	144.1
S3.008	38.79	11.88	79.275	0.984	40.3	0.0	0.0	5.79	3126.1	144.1
S3.009	38.70	11.94	78.281	0.984	40.3	0.0	0.0	2.43	1313.6	144.1
S5.000	45.96	8.40	85.600	0.000	5.0	0.0	0.0	2.07	36.6	5.0
S5.001	44.70	8.91	83.499	0.033	5.0	0.0	0.0	1.00	17.7	9.0

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S5.002	19.415	0.647	30.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.003	48.127	0.241	199.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S6.000	10.920	0.073	149.6	0.000	8.00	0.0	0.600		o	150	Pipe/Conduit	
S6.001	18.599	0.124	150.0	1.168	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.004	42.550	0.113	376.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S7.000	10.068	0.096	104.9	0.000	8.00	0.0	0.600		o	225	Pipe/Conduit	
S7.001	15.344	0.192	79.9	1.074	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S5.002	44.29	9.09	82.447	0.033	5.0	0.0	0.0	1.84	32.6	9.0
S5.003	44.81	8.87	80.456	0.000	20.0	0.0	0.0	0.92	36.6	20.0
S6.000	46.42	8.22	80.500	0.000	0.0	0.0	0.0	0.82	14.5	0.0
S6.001	46.02	8.38	80.414	0.000	5.5	0.0	0.0	0.82	14.5	5.5
S5.004	42.44	9.93	80.215	0.000	25.5	0.0	0.0	0.67	26.6	25.5
S7.000	46.66	8.13	80.400	0.000	0.0	0.0	0.0	1.28	50.8	0.0
S7.001	46.54	8.17	80.300	0.000	20.0	0.0	0.0	1.46	58.2	20.0

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S5.005	26.036	0.142	184.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.006	41.757	0.169	247.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.007	38.499	0.289	133.2	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.008	32.044	0.160	200.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.009	16.217	0.056	290.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.010	27.795	0.118	235.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.011	14.892	0.106	140.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.012	34.781	0.240	145.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.013	27.158	0.075	360.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S5.005	45.83	8.45	80.102	0.000	20.0	0.0	0.0	0.96	38.2	20.0
S5.006	43.82	9.29	79.961	0.000	20.0	0.0	0.0	0.83	32.9	20.0
S5.007	42.59	9.86	79.792	0.000	20.0	0.0	0.0	1.13	45.0	20.0
S5.008	41.41	10.44	79.503	0.000	20.0	0.0	0.0	0.92	36.6	20.0
S5.009	40.73	10.79	79.343	0.000	20.0	0.0	0.0	0.76	30.3	20.0
S5.010	39.73	11.34	79.287	0.000	20.0	0.0	0.0	0.85	33.7	20.0
S5.011	39.33	11.57	79.169	0.000	20.0	0.0	0.0	1.10	43.9	20.0
S5.012	38.43	12.10	79.063	0.000	20.0	0.0	0.0	1.08	43.1	20.0
S5.013	37.39	12.76	78.823	0.000	20.0	0.0	0.0	0.68	27.2	20.0

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S5.014	19.176	0.128	150.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.015	21.694	0.099	220.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.016	62.757	0.228	275.3	0.316	0.00	0.0		0.045	3 \=/	1500	1:3 Swale	
S1.006	39.917	1.728	23.1	0.000	0.00	0.0		0.045	o	450	Pipe/Conduit	
S1.007	135.361	0.541	250.0	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
S8.000	49.041	0.729	67.3	0.057	4.00	0.0	0.600		o	150	Pipe/Conduit	
S8.001	32.946	0.531	62.0	0.049	0.00	0.0	0.600		o	150	Pipe/Conduit	
S8.002	23.733	0.399	59.5	0.210	0.00	0.0	0.600		o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S5.014	36.95	13.06	78.748	0.000	20.0	0.0	0.0	1.07	42.4	20.0
S5.015	36.37	13.48	78.620	0.000	20.0	0.0	0.0	0.88	34.9	20.0
S5.016	32.47	16.70	78.521	0.316	20.0	0.0	0.0	0.32	95.0	47.8
S1.006	45.42	8.62	78.080	0.000	50.0	0.0	0.0	1.08	171.4	50.0
S1.007	41.53	10.38	76.352	0.000	50.0	0.0	0.0	1.28	203.8	50.0
S8.000	58.75	4.67	79.730	0.057	0.0	0.0	0.0	1.23	21.7	9.0
S8.001	56.84	5.10	79.001	0.106	0.0	0.0	0.0	1.28	22.6	16.3
S8.002	56.02	5.29	78.320	0.316	0.0	0.0	0.0	2.04	144.4	47.9

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S8.003	94.186	0.628	150.0	0.110	0.00	0.0	0.600		o	300	Pipe/Conduit	
S8.004	35.021	0.233	150.3	0.106	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.008	10.786	1.079	10.0	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
S9.000	10.916	0.073	149.5	0.000	8.00	0.0	0.600		o	450	Pipe/Conduit	
S9.001	42.164	0.249	169.3	2.593	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.009	8.045	0.152	52.9	0.309	0.00	15.4	0.030		o	750	Pipe/Conduit	
S1.010	144.327	1.519	95.0	0.379	0.00	0.0	0.030	1.5	_/	700	1:1.5 Ditch	

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)
S8.003	51.47	6.51	77.921	0.426	0.0	0.0	0.0	1.28	90.6	59.4
S8.004	49.99	6.97	77.293	0.532	0.0	0.0	0.0	1.28	90.5	72.0
S1.008	41.48	10.41	75.811	0.532	50.0	0.0	0.0	6.46	1027.0	109.8
S9.000	46.72	8.11	76.250	0.000	0.0	0.0	0.0	1.66	264.1	0.0
S9.001	45.84	8.45	76.130	0.000	125.0	0.0	0.0	1.56	248.0	125.0
S1.009	41.30	10.50	74.432	0.841	190.4	0.0	0.0	1.50	663.1	284.5
S1.010	37.64	12.60	74.180	1.220	190.4	0.0	0.0	1.14	394.9	314.8

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S10.000	17.131	0.114	150.3	3.444	8.00	0.0	0.600		o	225	Pipe/Conduit	
S10.001	5.339	0.036	148.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.011	38.448	0.405	95.0	0.000	0.00	0.0	0.600		1.5 _/	700	1:1.5 Ditch	
S11.000	62.008	0.485	127.9	0.084	4.00	0.0		0.030	o	225	Pipe/Conduit	
S11.001	68.245	0.620	110.1	0.084	0.00	0.0		0.030	o	300	Pipe/Conduit	
S11.002	42.787	0.389	110.0	0.060	0.00	0.0		0.030	o	300	Pipe/Conduit	
S11.003	23.209	0.232	100.0	0.041	0.00	0.0		0.030	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.000	46.30	8.27	73.225	0.000	30.0	0.0	0.0	1.06	42.3	30.0
S10.001	46.09	8.35	73.111	0.000	30.0	0.0	0.0	1.07	42.6	30.0
S1.011	37.31	12.82	72.661	1.220	220.4	0.0	0.0	2.93	1010.8	343.7
S11.000	51.89	6.39	80.230	0.084	0.0	0.0	0.0	0.43	17.2	11.8
S11.001	45.96	8.40	79.670	0.167	0.0	0.0	0.0	0.57	39.9	20.8
S11.002	43.01	9.66	79.050	0.228	0.0	0.0	0.0	0.57	40.0	26.5
S11.003	41.66	10.32	78.661	0.269	0.0	0.0	0.0	0.59	41.9	30.4

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.000	6.113	0.041	149.1	0.000	8.00	0.0		0.030	o	225	Pipe/Conduit	
S12.001	12.833	0.128	100.3	1.356	0.00	0.0		0.030	o	225	Pipe/Conduit	
S11.004	14.523	0.290	50.0	0.000	0.00	0.0		0.030	o	450	Pipe/Conduit	
S13.000	118.776	2.969	40.0	0.129	4.00	0.0	0.600		o	150	Pipe/Conduit	
S13.001	94.012	2.350	40.0	0.085	0.00	0.0	0.600		o	150	Pipe/Conduit	
S13.002	13.176	0.203	64.9	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S13.003	9.609	0.096	100.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S12.000	46.34	8.25	77.500	0.000	0.0	0.0	0.0	0.40	15.9	0.0
S12.001	45.87	8.44	77.275	0.000	58.3	0.0	0.0	0.49	19.4«	58.3
S11.004	41.22	10.54	76.500	0.269	58.3	0.0	0.0	1.10	174.7	88.3
S13.000	56.22	5.24	88.620	0.129	0.0	0.0	0.0	1.60	28.2	19.6
S13.001	52.47	6.22	85.651	0.213	0.0	0.0	0.0	1.60	28.2«	30.3
S13.002	52.00	6.36	83.226	0.213	0.0	0.0	0.0	1.63	64.6	30.3
S13.003	51.58	6.48	83.023	0.213	0.0	0.0	0.0	1.31	52.0	30.3

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S13.004	66.290	0.663	100.0	0.121	0.00	0.0	0.600		o	225	Pipe/Conduit	
S13.005	15.380	0.262	58.7	0.041	0.00	0.0	0.600		o	225	Pipe/Conduit	
S13.006	79.760	0.798	99.9	0.072	0.00	0.0	0.600		o	225	Pipe/Conduit	
S14.000	85.835	3.433	25.0	0.146	4.00	0.0	0.600		o	150	Pipe/Conduit	
S14.001	21.441	0.357	60.1	0.045	0.00	0.0	0.600		o	225	Pipe/Conduit	
S14.002	71.209	2.374	30.0	0.077	0.00	0.0	0.600		o	225	Pipe/Conduit	
S14.003	24.869	0.829	30.0	0.026	0.00	0.0	0.600		o	225	Pipe/Conduit	
S14.004	10.460	0.084	125.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S13.004	48.91	7.32	82.927	0.334	0.0	0.0	0.0	1.31	52.0	44.2
S13.005	48.47	7.47	82.264	0.375	0.0	0.0	0.0	1.71	68.0	49.3
S13.006	45.73	8.49	82.002	0.447	0.0	0.0	0.0	1.31	52.0«	55.4
S14.000	58.56	4.71	88.310	0.146	0.0	0.0	0.0	2.02	35.7	23.1
S14.001	57.61	4.92	84.802	0.191	0.0	0.0	0.0	1.69	67.2	29.8
S14.002	55.51	5.41	84.445	0.267	0.0	0.0	0.0	2.40	95.3	40.2
S14.003	54.82	5.59	82.071	0.293	0.0	0.0	0.0	2.40	95.3	43.6
S14.004	54.25	5.74	81.242	0.293	0.0	0.0	0.0	1.17	46.4	43.6

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S13.007	86.669	1.590	54.5	0.099	0.00	0.0	0.600		o	300	Pipe/Conduit	
S13.008	77.936	0.629	123.9	0.095	0.00	0.0	0.600		o	300	Pipe/Conduit	
S13.009	78.848	0.350	225.3	0.103	0.00	0.0	0.600		o	375	Pipe/Conduit	
S13.010	58.807	0.406	144.8	0.089	0.00	0.0	0.600		o	450	Pipe/Conduit	
S15.000	76.450	0.588	130.0	0.110	4.00	0.0	0.600		o	225	Pipe/Conduit	
S15.001	90.133	0.693	130.1	0.105	0.00	0.0	0.600		o	225	Pipe/Conduit	
S11.005	115.750	2.031	57.0	0.000	0.00	0.0		0.030	o	450	Pipe/Conduit	
S11.006	100.225	1.670	60.0	0.000	0.00	0.0		0.030	o	675	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S13.007	44.11	9.17	81.129	0.840	0.0	0.0	0.0	2.13	150.9	100.3
S13.008	42.11	10.09	79.539	0.935	0.0	0.0	0.0	1.41	99.8«	106.7
S13.009	40.01	11.18	78.910	1.038	0.0	0.0	0.0	1.20	132.9	112.5
S13.010	39.00	11.76	78.560	1.127	0.0	0.0	0.0	1.69	268.3	119.0
S15.000	56.76	5.11	79.390	0.110	0.0	0.0	0.0	1.15	45.5	16.9
S15.001	51.77	6.42	78.802	0.215	0.0	0.0	0.0	1.14	45.5	30.2
S11.005	42.56	9.87	76.210	0.000	100.0	0.0	0.0	1.03	163.7	100.0
S11.006	43.87	9.27	73.954	0.000	250.0	0.0	0.0	1.31	470.2	250.0

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.012	115.856	0.965	120.1	0.316	0.00	0.0	0.030	1.5	_/	500	1:1.5 Ditch	
S16.000	18.072	0.120	150.6	2.738	8.00	0.0	0.030		o	375	Pipe/Conduit	
S16.001	3.905	0.026	150.2	0.000	0.00	0.0	0.030		o	375	Pipe/Conduit	
S1.013	302.837	2.019	150.0	0.504	0.00	0.0	0.030	1.5	_/	1000	1:1.5 Ditch	
S17.000	19.731	0.132	149.5	5.566	8.00	0.0	0.030		o	375	Pipe/Conduit	
S17.001	3.549	0.024	147.9	0.000	0.00	0.0	0.030		o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.012	42.32	9.99	72.256	0.000	250.0	0.0	0.0	0.97	276.6	250.0
S16.000	45.62	8.54	73.000	0.000	25.0	0.0	0.0	0.56	61.9	25.0
S16.001	45.33	8.65	71.749	0.000	25.0	0.0	0.0	0.56	62.0	25.0
S1.013	36.66	13.27	71.291	0.000	200.0	0.0	0.0	0.96	416.9	200.0
S17.000	45.50	8.58	69.700	5.566	0.0	0.0	0.0	0.56	62.1«	685.9
S17.001	45.24	8.69	68.947	5.566	0.0	0.0	0.0	0.57	62.5«	685.9

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.014	53.773	0.358	150.2	0.055	0.00	0.0	0.030	1.5	_/	1000	1:1.5 Ditch	
S1.015	40.638	0.163	250.0	0.037	0.00	0.0	0.045	3	\=/	3100	1:3 Swale	
S18.000	13.778	0.092	149.8	1.612	8.00	0.0	0.045		o	225	Pipe/Conduit	
S18.001	14.435	0.096	150.4	0.000	0.00	0.0	0.045		o	225	Pipe/Conduit	
S18.002	132.155	1.762	75.0	0.019	0.00	0.0	0.045	3	\=/	1500	1:3 Swale	
S18.003	228.681	2.859	80.0	0.585	0.00	0.0	0.045	3	\=/	1600	1:3 Swale	
S18.004	123.111	1.539	80.0	0.561	0.00	0.0	0.045	3	\=/	1900	1:3 Swale	
S18.005	235.515	1.884	125.0	1.496	0.00	0.0	0.045	3	\=/	3200	1:3 Swale	

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)
S1.014	44.65	8.94	68.848	0.000	200.0	0.0	0.0	0.96	416.6	200.0
S1.015	42.58	9.86	68.490	0.000	200.0	0.0	0.0	0.36	193.6«	200.0
S18.000	44.83	8.86	78.000	0.000	7.0	0.0	0.0	0.27	10.6	7.0
S18.001	42.79	9.77	77.908	0.000	7.0	0.0	0.0	0.27	10.6	7.0
S18.002	36.60	13.30	76.805	0.019	7.0	0.0	0.0	0.62	182.0	8.9
S18.003	29.75	19.59	75.043	0.604	7.0	0.0	0.0	0.61	186.6	55.7
S18.004	27.24	22.91	72.184	1.165	7.0	0.0	0.0	0.62	217.5	92.9
S18.005	23.30	30.00	70.645	2.661	7.0	0.0	0.0	0.52	282.1	174.9

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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.016	21.486	0.086	250.0	0.000	0.00	0.0		0.045	3 \=/	3100	1:3 Swale	
S1.017	23.427	0.300	78.1	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
S1.018	63.111	2.949	21.4	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
S1.019	7.291	0.240	30.4	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
S1.020	24.631	0.224	110.0	0.000	0.00	0.0	0.600		o	1200	Pipe/Conduit	
S1.021	18.758	0.171	109.7	0.000	0.00	0.0	0.600		o	1200	Pipe/Conduit	
S1.022	82.992	0.754	110.0	0.000	0.00	0.0	0.600		o	1200	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.016	44.53	8.99	68.327	0.000	200.0	0.0	0.0	0.36	193.6«	200.0
S1.017	44.09	9.18	68.200	0.000	200.0	0.0	0.0	2.05	226.6	200.0
S1.018	43.64	9.37	67.900	0.000	200.0	0.0	0.0	5.28	1492.8	200.0
S1.019	43.58	9.40	64.951	0.000	200.0	0.0	0.0	4.43	1252.3	200.0
S1.020	43.33	9.52	64.111	0.000	200.0	0.0	0.0	3.57	4034.1	200.0
S1.021	43.13	9.60	63.887	0.000	200.0	0.0	0.0	3.57	4039.7	200.0
S1.022	45.99	8.39	63.716	0.000	510.0	0.0	0.0	3.57	4034.1	510.0

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-HB1	84.750	1.220	Junction		S1.000	83.530	1000				
S-HB2	83.170	1.170	Junction		S1.001	82.000	1000	S1.000	82.000	1000	
Sdummy 6	81.900	1.122	Open Manhole	1200	S2.000	80.778	300				
S-P6-1	82.500	1.830	Open Manhole	1200	S2.001	80.670	300	S2.000	80.670	300	
S-P6-0	81.440	0.972	Junction		S1.002	80.468	1000	S1.001	80.468	1000	
								S2.001	80.559	300	241
S-HB4	81.170	1.150	Junction		S1.003	80.020	1500	S1.002	80.020	1000	
S-HB5	80.950	1.647	Junction		S1.004	79.303	1500	S1.003	79.303	1500	
S-HB6	80.540	1.955	Junction		S1.005	78.585	1500	S1.004	78.585	1500	
S-D1	82.550	0.550	Junction		S3.000	82.000	900				
S-D2	82.150	0.550	Junction		S3.001	81.600	900	S3.000	81.600	900	
S-D3	81.700	0.500	Junction		S3.002	81.200	900	S3.001	81.200	900	
S-D4	81.450	0.749	Junction		S3.003	80.701	900	S3.002	80.701	900	
S-D5	81.200	1.020	Junction		S3.004	80.180	600	S3.003	80.255	900	
S-D6	81.100	0.980	Junction		S3.005	80.120	1500	S3.004	80.120	600	
S-D7	80.270	0.639	Junction		S3.006	79.631	1500	S3.005	79.631	1500	
S-P5-3	82.000	2.085	Open Manhole	1200	S4.000	79.915	300				
S-P5-2	82.000	2.189	Open Manhole	1200	S4.001	79.811	300	S4.000	79.811	300	
S-P5-1	80.600	0.878	Open Manhole	1200	S4.002	79.722	300	S4.001	79.722	300	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-D8	80.570	1.200	Junction		S3.007	79.370	1500	S3.006	79.370	1500	
								S4.002	79.692	300	322
S-D9	80.570	1.295	Junction		S3.008	79.275	1500	S3.007	79.275	1500	
S-Headwall	80.300	2.019	Junction		S3.009	78.281	1500	S3.008	78.281	1500	
S-ESW81	86.800	1.200	Open Manhole	1200	S5.000	85.600	150				
S-ESW82	84.900	1.401	Open Manhole	1200	S5.001	83.499	150	S5.000	83.499	150	
S-ESW83	84.900	2.453	Open Manhole	1200	S5.002	82.447	150	S5.001	83.192	150	745
S-ESW84	83.380	2.924	Open Manhole	1200	S5.003	80.456	225	S5.002	81.800	150	1269
Sdunny 7	83.000	2.500	Open Manhole	1200	S6.000	80.500	150				
S-P7-0	83.000	2.586	Open Manhole	1200	S6.001	80.414	150	S6.000	80.427	150	13
S-ESW85	82.570	2.355	Open Manhole	1200	S5.004	80.215	225	S5.003	80.215	225	
								S6.001	80.290	150	
Sdummy 8	81.920	1.520	Open Manhole	1200	S7.000	80.400	225				
S-ESW86	81.920	1.620	Open Manhole	1200	S7.001	80.300	225	S7.000	80.304	225	4
S-ESW87	81.900	1.798	Open Manhole	1200	S5.005	80.102	225	S5.004	80.102	225	
								S7.001	80.108	225	6
S-ESW88	81.300	1.339	Open Manhole	1200	S5.006	79.961	225	S5.005	79.961	225	
S-ESW89	81.090	1.298	Open Manhole	1200	S5.007	79.792	225	S5.006	79.792	225	
S-ESW90	80.920	1.417	Open Manhole	1200	S5.008	79.503	225	S5.007	79.503	225	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-ESW91	80.470	1.127	Open Manhole	1200	S5.009	79.343	225	S5.008	79.343	225	
S-ESW92	80.670	1.383	Open Manhole	1200	S5.010	79.287	225	S5.009	79.287	225	
S-ESW93	80.660	1.491	Open Manhole	1200	S5.011	79.169	225	S5.010	79.169	225	
S-ESW94	80.690	1.627	Open Manhole	1200	S5.012	79.063	225	S5.011	79.063	225	
S-ESW95	80.890	2.067	Open Manhole	1200	S5.013	78.823	225	S5.012	78.823	225	
S-ESW96	81.140	2.392	Open Manhole	1200	S5.014	78.748	225	S5.013	78.748	225	
S-ESW97	81.000	2.380	Open Manhole	1200	S5.015	78.620	225	S5.014	78.620	225	
S-Headwall	80.170	1.649	Junction		S5.016	78.521	1500	S5.015	78.521	225	
S-Basin	80.170	2.090	Junction		S1.006	78.080	450	S1.005	78.236	1500	
								S3.009	78.230	1500	
								S5.016	78.293	1500	
S-HB7	79.920	3.568	Open Manhole	1800	S1.007	76.352	450	S1.006	76.352	450	
S-H31	81.000	1.270	Open Manhole	1200	S8.000	79.730	150				
S-H32	80.600	1.599	Open Manhole	1200	S8.001	79.001	150	S8.000	79.001	150	
S-H33	80.260	1.940	Open Manhole	1200	S8.002	78.320	300	S8.001	78.470	150	
S-ESW21	79.860	1.939	Open Manhole	1200	S8.003	77.921	300	S8.002	77.921	300	
S-SW25	78.300	1.007	Open Manhole	1200	S8.004	77.293	300	S8.003	77.293	300	
S-HB8	77.950	2.139	Open Manhole	1350	S1.008	75.811	450	S1.007	75.811	450	
								S8.004	77.060	300	1099

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
Sdummy 4	79.000	2.750	Open Manhole	1350	S9.000	76.250	450				
S-P4-0	79.000	2.870	Junction		S9.001	76.130	450	S9.000	76.177	450	47
S-HB9	77.800	3.368	Open Manhole	1200	S1.009	74.432	750	S1.008	74.732	450	
								S9.001	75.881	450	1149
S-HW01	77.770	3.590	Junction		S1.010	74.180	700	S1.009	74.280	750	550
S-P10-2	76.760	3.535	Open Manhole	1200	S10.000	73.225	225				
S-P10-1	76.760	3.649	Junction		S10.001	73.111	225	S10.000	73.111	225	
S-P10-0	75.805	3.144	Junction		S1.011	72.661	700	S1.010	72.661	700	
								S10.001	73.075	225	339
S-EH41	82.610	2.380	Open Manhole	1200	S11.000	80.230	225				
S-EH42	81.280	1.610	Open Manhole	1200	S11.001	79.670	300	S11.000	79.745	225	
S-EH43	80.040	0.990	Open Manhole	1200	S11.002	79.050	300	S11.001	79.050	300	
S-EH44	82.610	3.949	Open Manhole	1200	S11.003	78.661	300	S11.002	78.661	300	
Sdummy 8b	79.550	2.050	Open Manhole	1200	S12.000	77.500	225				
S-P8-1	79.550	2.275	Open Manhole	1200	S12.001	77.275	225	S12.000	77.459	225	184
S-ESW1	79.500	3.000	Open Manhole	1350	S11.004	76.500	450	S11.003	78.429	300	1779
								S12.001	77.147	225	422
S-EH16	89.920	1.300	Open Manhole	1200	S13.000	88.620	150				
S-EH15	86.540	0.889	Open Manhole	1200	S13.001	85.651	150	S13.000	85.651	150	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-EH14	84.160	0.934	Open Manhole	1200	S13.002	83.226	225	S13.001	83.301	150	
S-EH13	84.200	1.177	Open Manhole	1200	S13.003	83.023	225	S13.002	83.023	225	
S--EH12	83.380	0.453	Open Manhole	1200	S13.004	82.927	225	S13.003	82.927	225	
S-EH11	85.810	3.546	Open Manhole	1200	S13.005	82.264	225	S13.004	82.264	225	
S-EH9	85.910	3.908	Open Manhole	1200	S13.006	82.002	225	S13.005	82.002	225	
S-EH1	89.610	1.300	Open Manhole	1200	S14.000	88.310	150				
S-EH2	85.770	0.968	Open Manhole	1200	S14.001	84.802	225	S14.000	84.877	150	
S-EH3	86.080	1.635	Open Manhole	1200	S14.002	84.445	225	S14.001	84.445	225	
S-EH4	83.500	1.429	Open Manhole	1200	S14.003	82.071	225	S14.002	82.071	225	
S-EH5	82.870	1.628	Open Manhole	1200	S14.004	81.242	225	S14.003	81.242	225	
S-EH8	82.840	1.711	Open Manhole	1200	S13.007	81.129	300	S13.006	81.204	225	
								S14.004	81.158	225	
S-EH21	81.340	1.801	Open Manhole	1200	S13.008	79.539	300	S13.007	79.539	300	
S-EH22	80.720	1.810	Open Manhole	1350	S13.009	78.910	375	S13.008	78.910	300	
S-EH23	80.100	1.540	Open Manhole	1350	S13.010	78.560	450	S13.009	78.560	375	
S-EH26	80.970	1.580	Open Manhole	1200	S15.000	79.390	225				
S-EH25	80.460	1.658	Open Manhole	1200	S15.001	78.802	225	S15.000	78.802	225	
S-ESW2	79.150	2.940	Open Manhole	1350	S11.005	76.210	450	S11.004	76.210	450	
								S13.010	78.154	450	1944

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								S15.001	78.109	225	1674
S-ESW3	77.540	3.586	Open Manhole	1500	S11.006	73.954	675	S11.005	74.179	450	
S-HW03	75.441	3.185	Junction		S1.012	72.256	500	S1.011	72.256	700	
								S11.006	72.284	675	403
S-P3-1	75.400	2.400	Open Manhole	1350	S16.000	73.000	375				
S-HW04	74.218	2.469	Junction		S16.001	71.749	375	S16.000	72.880	375	1131
S-P3-0	74.218	2.927	Junction		S1.013	71.291	1000	S1.012	71.291	500	
								S16.001	71.723	375	507
S-P1-1	71.600	1.900	Open Manhole	1350	S17.000	69.700	375				
S-HW08	71.500	2.553	Junction		S17.001	68.947	375	S17.000	69.568	375	621
S-P1-0	71.500	2.652	Junction		S1.014	68.848	1000	S1.013	69.272	1000	424
								S17.001	68.923	375	150
S-BASIN IN	70.887	2.397	Junction		S1.015	68.490	3100	S1.014	68.490	1000	
Sdummy 9a	80.000	2.000	Open Manhole	1200	S18.000	78.000	225				
Sdummy 9b	80.000	2.092	Open Manhole	1200	S18.001	77.908	225	S18.000	77.908	225	
S-96	78.530	1.725	Junction		S18.002	76.805	1500	S18.001	77.812	225	1082
S-97	77.000	1.957	Junction		S18.003	75.043	1600	S18.002	75.043	1500	
S-98	74.320	2.136	Junction		S18.004	72.184	1900	S18.003	72.184	1600	
S-99	73.000	2.355	Junction		S18.005	70.645	3200	S18.004	70.645	1900	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-BASIN2	70.800	2.473	Junction		S1.016	68.327	3100	S1.015	68.327	3100	
								S18.005	68.761	3200	434
S-HW09	70.800	2.600	Junction		S1.017	68.200	375	S1.016	68.241	3100	
S-ESW13	70.100	2.200	Open Manhole	1500	S1.018	67.900	600	S1.017	67.900	375	
S-ESW14	66.670	1.719	Open Manhole	1500	S1.019	64.951	600	S1.018	64.951	600	
S-ESW15	66.670	2.559	Open Manhole	2100	S1.020	64.111	1200	S1.019	64.711	600	
S-ESW16	66.670	2.783	Open Manhole	2100	S1.021	63.887	1200	S1.020	63.887	1200	
S-ESW17	66.670	2.954	Open Manhole	2100	S1.022	63.716	1200	S1.021	63.716	1200	
S-Ex Outfall	66.670	3.708	Open Manhole	0		OUTFALL		S1.022	62.962	1200	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-HB1	363062.685	430755.408			No Entry	
S-HB2	363056.354	430801.800			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
Sdummy 6	363025.605	430883.502	363025.605	430883.502	Required	
S-P6-1	363041.702	430885.659	363041.702	430885.659	Required	
S-P6-0	363052.625	430887.510			No Entry	
S-HB4	363042.185	430926.376			No Entry	
S-HB5	363032.908	430964.694			No Entry	
S-HB6	363024.814	431010.635			No Entry	
S-D1	363319.930	431218.442			No Entry	
S-D2	363295.387	431207.696			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-D3	363249.586	431187.769			No Entry	
S-D4	363203.331	431167.771			No Entry	
S-D5	363151.297	431144.938			No Entry	
S-D6	363141.994	431140.887			No Entry	
S-D7	363066.186	431106.805			No Entry	
S-P5-3	363018.432	431119.290	363018.432	431119.290	Required	
S-P5-2	363010.785	431103.417	363010.785	431103.417	Required	
S-P5-1	363018.397	431090.272	363018.397	431090.272	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-D8	363020.020	431085.390			No Entry	
S-D9	363018.946	431078.604			No Entry	
S-Headwall	363016.209	431048.703			No Entry	
S-ESW81	362965.718	430605.617	362965.718	430605.617	Required	
S-ESW82	362979.513	430653.676	362979.513	430653.676	Required	
S-ESW83	362988.022	430683.310	362988.022	430683.310	Required	
S-ESW84	362969.359	430688.662	362969.359	430688.662	Required	
Sdunny 7	362915.875	430673.008	362915.875	430673.008	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-P7-0	362920.190	430683.040	362920.190	430683.040	Required	
S-ESW85	362922.957	430701.432	362922.957	430701.432	Required	
Sdummy 8	362898.844	430730.798	362898.844	430730.798	Required	
S-ESW86	362907.977	430735.037	362907.977	430735.037	Required	
S-ESW87	362920.495	430743.910	362920.495	430743.910	Required	
S-ESW88	362916.623	430769.657	362916.623	430769.657	Required	
S-ESW89	362903.402	430809.265	362903.402	430809.265	Required	
S-ESW90	362890.964	430845.700	362890.964	430845.700	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-ESW91	362877.783	430874.908	362877.783	430874.908	Required	
S-ESW92	362886.005	430888.886	362886.005	430888.886	Required	
S-ESW93	362908.638	430905.019	362908.638	430905.019	Required	
S-ESW94	362918.730	430915.970	362918.730	430915.970	Required	
S-ESW95	362942.974	430940.909	362942.974	430940.909	Required	
S-ESW96	362959.628	430962.362	362959.628	430962.362	Required	
S-ESW97	362970.001	430978.489	362970.001	430978.489	Required	
S-Headwall	362991.070	430983.657			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-Basin	363009.073	431043.776			No Entry	
S-HB7	362970.749	431054.941	362970.749	431054.941	Required	
S-H31	362958.686	430984.985	362958.686	430984.985	Required	
S-H32	362976.931	431030.506	362976.931	431030.506	Required	
S-H33	362977.335	431063.450	362977.335	431063.450	Required	
S-ESW21	362962.040	431081.596	362962.040	431081.596	Required	
S-SW25	362867.898	431078.728	362867.898	431078.728	Required	
S-HB8	362835.750	431064.834	362835.750	431064.834	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
Sdummy 4	362866.736	431102.883	362866.736	431102.883	Required	
S-P4-0	362858.439	431095.790			No Entry	
S-HB9	362825.828	431069.063	362825.828	431069.063	Required	
S-HW01	362820.474	431063.059			No Entry	
S-P10-2	362703.205	430989.240	362703.205	430989.240	Required	
S-P10-1	362693.145	431003.106			No Entry	
S-P10-0	362688.243	431005.221			No Entry	
S-EH41	362912.358	430696.774	362912.358	430696.774	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-EH42	362908.114	430758.636	362908.114	430758.636	Required	
S-EH43	362886.010	430823.202	362886.010	430823.202	Required	
S-EH44	362867.001	430861.534	362867.001	430861.534	Required	
Sdummy 8b	362839.669	430842.831	362839.669	430842.831	Required	
S-P8-1	362842.070	430848.452	362842.070	430848.452	Required	
S-ESW1	362843.795	430861.169	362843.795	430861.169	Required	
S-EH16	362972.210	430532.540	362972.210	430532.540	Required	
S-EH15	362854.673	430515.428	362854.673	430515.428	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-EH14	362761.642	430501.885	362761.642	430501.885	Required	
S-EH13	362765.558	430514.465	362765.558	430514.465	Required	
S--EH12	362773.074	430520.454	362773.074	430520.454	Required	
S-EH11	362835.587	430542.511	362835.587	430542.511	Required	
S-EH9	362842.752	430556.119	362842.752	430556.119	Required	
S-EH1	362966.190	430543.351	362966.190	430543.351	Required	
S-EH2	362880.360	430542.473	362880.360	430542.473	Required	
S-EH3	362867.231	430559.423	362867.231	430559.423	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-EH4	362819.763	430612.505	362819.763	430612.505	Required	
S-EH5	362797.761	430624.096	362797.761	430624.096	Required	
S-EH8	362790.602	430616.469	362790.602	430616.469	Required	
S-EH21	362741.592	430687.949	362741.592	430687.949	Required	
S-EH22	362742.959	430765.872	362742.959	430765.872	Required	
S-EH23	362786.326	430831.723	362786.326	430831.723	Required	
S-EH26	362955.170	430979.140	362955.170	430979.140	Required	
S-EH25	362905.227	430921.258	362905.227	430921.258	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-ESW2	362831.672	430869.167	362831.672	430869.167	Required	
S-ESW3	362739.588	430939.299	362739.588	430939.299	Required	
S-HW03	362653.020	430989.807			No Entry	
S-P3-1	362544.978	430926.725	362544.978	430926.725	Required	
S-HW04	362544.977	430944.797			No Entry	
S-P3-0	362544.705	430948.692			No Entry	
S-P1-1	362244.561	430963.769	362244.561	430963.769	Required	
S-HW08	362244.561	430983.500			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-P1-0	362244.305	430987.039			No Entry	
S-BASIN IN	362190.548	430988.342			No Entry	
Sdummy 9a	362704.997	430738.453	362704.997	430738.453	Required	
Sdummy 9b	362704.997	430752.231	362704.997	430752.231	Required	
S-96	362706.170	430766.618			No Entry	
S-97	362577.833	430798.150			No Entry	
S-98	362366.575	430710.597			No Entry	
S-99	362246.047	430735.683			No Entry	

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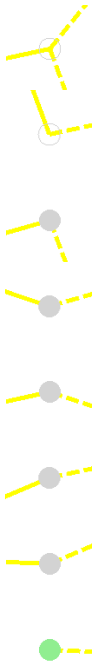
Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-BASIN2	362164.936	430956.790			No Entry	
S-HW09	362143.930	430952.276			No Entry	
S-ESW13	362135.771	430974.236	362135.771	430974.236	Required	
S-ESW14	362075.131	430956.750	362075.131	430956.750	Required	
S-ESW15	362068.221	430959.076	362068.221	430959.076	Required	
S-ESW16	362044.166	430953.784	362044.166	430953.784	Required	
S-ESW17	362026.925	430946.394	362026.925	430946.394	Required	
S-Ex Outfall	361944.013	430950.044			No Entry	



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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
2.000	-	-	85	2.690	2.287	2.287
2.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	10	1.404	0.140	0.140
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
3.000	-	-	80	0.648	0.518	0.518
3.001	-	-	80	0.141	0.113	0.113
3.002	-	-	80	0.090	0.072	0.072
3.003	-	-	80	0.100	0.080	0.080
3.004	-	-	80	0.000	0.000	0.000
3.005	-	-	80	0.162	0.130	0.130
3.006	-	-	80	0.089	0.071	0.071
4.000	-	-	85	4.175	3.549	3.549
4.001	-	-	100	0.000	0.000	0.000
4.002	-	-	100	0.000	0.000	0.000
3.007	-	-	80	0.000	0.000	0.000
3.008	-	-	80	0.000	0.000	0.000
3.009	-	-	100	0.000	0.000	0.000
5.000	-	-	20	0.335	0.067	0.067
5.001	-	-	20	0.166	0.033	0.033
5.002	-	-	100	0.000	0.000	0.000
5.003	-	-	100	0.000	0.000	0.000
6.000	-	-	100	0.000	0.000	0.000
6.001	-	-	85	1.374	1.168	1.168

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
5.004	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.000	0.000	0.000
7.001	-	-	85	1.263	1.074	1.074
5.005	-	-	100	0.000	0.000	0.000
5.006	-	-	100	0.000	0.000	0.000
5.007	-	-	100	0.000	0.000	0.000
5.008	-	-	100	0.000	0.000	0.000
5.009	-	-	100	0.000	0.000	0.000
5.010	-	-	100	0.000	0.000	0.000
5.011	-	-	100	0.000	0.000	0.000
5.012	-	-	100	0.000	0.000	0.000
5.013	-	-	100	0.000	0.000	0.000
5.014	-	-	100	0.000	0.000	0.000
5.015	-	-	100	0.000	0.000	0.000
5.016	-	-	50	0.632	0.316	0.316
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
8.000	-	-	80	0.071	0.057	0.057
8.001	-	-	80	0.061	0.049	0.049
8.002	-	-	80	0.263	0.210	0.210
8.003	-	-	80	0.138	0.110	0.110
8.004	-	-	80	0.132	0.106	0.106
1.008	-	-	100	0.000	0.000	0.000
9.000	-	-	100	0.000	0.000	0.000
9.001	-	-	85	3.050	2.593	2.593
1.009	-	-	87	0.355	0.309	0.309
1.010	Classification	Default	100	0.379	0.379	0.379

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
10.000	Classification	Default	100	3.444	3.444	3.444
10.001	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.000	0.000	0.000
11.000	-	-	90	0.093	0.084	0.084
11.001	-	-	90	0.093	0.084	0.084
11.002	-	-	90	0.067	0.060	0.060
11.003	-	-	90	0.046	0.041	0.041
12.000	-	-	100	0.000	0.000	0.000
12.001	-	-	85	1.595	1.356	1.356
11.004	-	-	100	0.000	0.000	0.000
13.000	-	-	90	0.143	0.129	0.129
13.001	-	-	90	0.094	0.085	0.085
13.002	-	-	90	0.000	0.000	0.000
13.003	-	-	90	0.000	0.000	0.000
13.004	-	-	90	0.134	0.121	0.121
13.005	-	-	90	0.046	0.041	0.041
13.006	-	-	90	0.080	0.072	0.072
14.000	-	-	90	0.162	0.146	0.146
14.001	-	-	90	0.050	0.045	0.045
14.002	-	-	90	0.085	0.077	0.077
14.003	-	-	90	0.029	0.026	0.026
14.004	-	-	100	0.000	0.000	0.000
13.007	-	-	90	0.110	0.099	0.099
13.008	-	-	90	0.106	0.095	0.095
13.009	-	-	90	0.114	0.103	0.103
13.010	-	-	90	0.099	0.089	0.089
15.000	-	-	90	0.122	0.110	0.110

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
15.001	-	-	90	0.117	0.105	0.105
11.005	-	-	100	0.000	0.000	0.000
11.006	-	-	100	0.000	0.000	0.000
1.012	-	-	85	0.372	0.316	0.316
16.000	-	-	85	3.221	2.738	2.738
16.001	-	-	100	0.000	0.000	0.000
1.013	-	-	85	0.593	0.504	0.504
17.000	-	-	85	6.548	5.566	5.566
17.001	-	-	100	0.000	0.000	0.000
1.014	-	-	85	0.065	0.055	0.055
1.015	-	-	8	0.458	0.037	0.037
18.000	-	-	85	1.897	1.612	1.612
18.001	-	-	100	0.000	0.000	0.000
18.002	-	-	1	1.897	0.019	0.019
18.003	-	-	85	0.688	0.585	0.585
18.004	-	-	85	0.660	0.561	0.561
18.005	-	-	85	1.760	1.496	1.496
1.016	-	-	100	0.000	0.000	0.000
1.017	-	-	100	0.000	0.000	0.000
1.018	-	-	100	0.000	0.000	0.000
1.019	-	-	100	0.000	0.000	0.000
1.020	-	-	100	0.000	0.000	0.000
1.021	-	-	100	0.000	0.000	0.000
1.022	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				42.707	33.330	33.330

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.022	S-Ex Outfall	66.670	62.962	0.000	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs 12	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 10	Number of Storage Structures 12	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.000	Cv (Summer)	0.750
Return Period (years)	2	Ratio R	0.300	Cv (Winter)	0.840
Region England and Wales	Profile Type	Summer	Storm Duration (mins)		30

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S-P6-1, DS/PN: S2.001, Volume (m³): 3.1

Unit Reference	MD-SHE-0208-2220-1000-2220	Sump Available	Yes
Design Head (m)	1.000	Diameter (mm)	208
Design Flow (l/s)	22.2	Invert Level (m)	80.670
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	22.2	Kick-Flo®	0.729	19.1
Flush-Flo™	0.352	22.2	Mean Flow over Head Range	-	18.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.1	0.600	21.1	1.600	27.8	2.600	35.1	5.000	48.1	7.500	58.5
0.200	20.0	0.800	20.0	1.800	29.4	3.000	37.6	5.500	50.4	8.000	60.4
0.300	22.1	1.000	22.2	2.000	30.9	3.500	40.5	6.000	52.5	8.500	62.2
0.400	22.1	1.200	24.2	2.200	32.4	4.000	43.2	6.500	54.6	9.000	64.0
0.500	21.7	1.400	26.0	2.400	33.7	4.500	45.7	7.000	56.6	9.500	65.7

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Hydro-Brake® Optimum Manhole: S-P5-2, DS/PN: S4.001, Volume (m³): 3.6

Unit Reference	MD-SHE-0251-3430-1000-3430	Sump Available	Yes
Design Head (m)	1.000	Diameter (mm)	251
Design Flow (l/s)	34.3	Invert Level (m)	79.811
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	300
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1800
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	34.3	Kick-Flo®	0.755	30.0
Flush-Flo™	0.395	34.3	Mean Flow over Head Range	-	28.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.1	0.600	33.1	1.600	43.0	2.600	54.3	5.000	74.6	7.500	90.9
0.200	25.6	0.800	30.8	1.800	45.5	3.000	58.2	5.500	78.2	8.000	93.8
0.300	33.8	1.000	34.3	2.000	47.9	3.500	62.8	6.000	81.5	8.500	96.6
0.400	34.3	1.200	37.4	2.200	50.1	4.000	67.0	6.500	84.8	9.000	99.4
0.500	33.9	1.400	40.3	2.400	52.3	4.500	70.9	7.000	87.9	9.500	102.0

Hydro-Brake® Optimum Manhole: S-P7-0, DS/PN: S6.001, Volume (m³): 3.1

Unit Reference	MD-SHE-0138-1110-2000-1110	Flush-Flo™	Calculated
Design Head (m)	2.000	Objective	Minimise upstream storage
Design Flow (l/s)	11.1	Application	Surface

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Hydro-Brake® Optimum Manhole: S-P7-0, DS/PN: S6.001, Volume (m³): 3.1

Sump Available	Yes	Minimum Outlet Pipe Diameter (mm)	150
Diameter (mm)	138	Suggested Manhole Diameter (mm)	1500
Invert Level (m)	80.414		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	11.1	Kick-Flo®	1.208	8.7
Flush-Flo™	0.586	11.1	Mean Flow over Head Range	-	9.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	0.600	11.1	1.600	10.0	2.600	12.6	5.000	17.1	7.500	20.8
0.200	9.2	0.800	10.9	1.800	10.6	3.000	13.4	5.500	17.9	8.000	21.5
0.300	10.3	1.000	10.3	2.000	11.1	3.500	14.5	6.000	18.7	8.500	22.1
0.400	10.8	1.200	8.9	2.200	11.6	4.000	15.4	6.500	19.4	9.000	22.7
0.500	11.0	1.400	9.4	2.400	12.1	4.500	16.3	7.000	20.1	9.500	23.3

Hydro-Brake® Optimum Manhole: S-ESW86, DS/PN: S7.001, Volume (m³): 2.2

Unit Reference	MD-SHE-0153-1180-1250-1180	Sump Available	Yes
Design Head (m)	1.250	Diameter (mm)	153
Design Flow (l/s)	11.8	Invert Level (m)	80.300
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

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Hydro-Brake® Optimum Manhole: S-ESW86, DS/PN: S7.001, Volume (m³): 2.2

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.250	11.8	Kick-Flo®	0.816	9.7
Flush-Flo™	0.374	11.8	Mean Flow over Head Range	-	10.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.5	0.600	11.4	1.600	13.3	2.600	16.7	5.000	22.8	7.500	27.7
0.200	11.1	0.800	9.9	1.800	14.0	3.000	17.9	5.500	23.9	8.000	28.6
0.300	11.7	1.000	10.6	2.000	14.7	3.500	19.2	6.000	24.9	8.500	29.5
0.400	11.8	1.200	11.6	2.200	15.4	4.000	20.5	6.500	25.9	9.000	30.3
0.500	11.6	1.400	12.4	2.400	16.1	4.500	21.7	7.000	26.8	9.500	31.1

Hydro-Brake® Optimum Manhole: S-P4-0, DS/PN: S9.001, Volume (m³): 1.6

Unit Reference	MD-SHE-0198-2240-1750-2240	Sump Available	Yes
Design Head (m)	1.750	Diameter (mm)	198
Design Flow (l/s)	22.4	Invert Level (m)	76.130
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1800
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	22.4	Kick-Flo®	1.114	18.1
Flush-Flo™	0.513	22.4	Mean Flow over Head Range	-	19.4

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Hydro-Brake® Optimum Manhole: S-P4-0, DS/PN: S9.001, Volume (m³): 1.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.8	0.600	22.3	1.600	21.4	2.600	27.0	5.000	37.0	7.500	45.1
0.200	18.6	0.800	21.6	1.800	22.7	3.000	29.0	5.500	38.8	8.000	46.5
0.300	21.3	1.000	20.0	2.000	23.9	3.500	31.2	6.000	40.5	8.500	47.9
0.400	22.2	1.200	18.7	2.200	25.0	4.000	33.3	6.500	42.0	9.000	49.2
0.500	22.4	1.400	20.1	2.400	26.0	4.500	35.2	7.000	43.6	9.500	50.5

Hydro-Brake® Optimum Manhole: S-P10-1, DS/PN: S10.001, Volume (m³): 0.7

Unit Reference	MD-SHE-0220-3160-2500-3160	Sump Available	Yes
Design Head (m)	2.500	Diameter (mm)	220
Design Flow (l/s)	31.6	Invert Level (m)	73.111
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	300
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	2100
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	31.5	Kick-Flo®	1.533	25.0
Flush-Flo™	0.724	31.6	Mean Flow over Head Range	-	27.5

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

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Hydro-Brake® Optimum Manhole: S-P10-1, DS/PN: S10.001, Volume (m³): 0.7

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.4	0.600	31.4	1.600	25.5	2.600	32.1	5.000	44.0	7.500	53.6
0.200	21.8	0.800	31.5	1.800	27.0	3.000	34.4	5.500	46.1	8.000	55.3
0.300	27.8	1.000	31.0	2.000	28.3	3.500	37.1	6.000	48.1	8.500	57.0
0.400	29.7	1.200	29.8	2.200	29.7	4.000	39.5	6.500	50.0	9.000	58.6
0.500	30.8	1.400	27.6	2.400	30.9	4.500	41.9	7.000	51.8	9.500	60.1

Hydro-Brake® Optimum Manhole: S-P8-1, DS/PN: S12.001, Volume (m³): 2.8

Unit Reference	MD-SHE-0146-1180-1750-1180	Sump Available	Yes
Design Head (m)	1.750	Diameter (mm)	146
Design Flow (l/s)	11.8	Invert Level (m)	77.275
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	11.8	Kick-Flo®	1.069	9.3
Flush-Flo™	0.507	11.8	Mean Flow over Head Range	-	10.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.300	11.2	0.500	11.8	0.800	11.3	1.200	9.9	1.600	11.3
0.200	10.2	0.400	11.7	0.600	11.7	1.000	10.1	1.400	10.6	1.800	11.9

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Hydro-Brake® Optimum Manhole: S-P8-1, DS/PN: S12.001, Volume (m³): 2.8

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	12.6	2.600	14.2	4.000	17.5	5.500	20.3	7.000	22.8	8.500	25.1
2.200	13.1	3.000	15.2	4.500	18.5	6.000	21.2	7.500	23.6	9.000	25.8
2.400	13.7	3.500	16.4	5.000	19.4	6.500	22.0	8.000	24.3	9.500	26.4

Hydro-Brake® Optimum Manhole: S-HW04, DS/PN: S16.001, Volume (m³): 1.9

Unit Reference	MD-SHE-0298-5830-2250-5830
Design Head (m)	2.250
Design Flow (l/s)	58.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	298
Invert Level (m)	71.749
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.250	58.3	Kick-Flo®	1.478	47.6
Flush-Flo™	0.681	58.3	Mean Flow over Head Range	-	50.3

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

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Hydro-Brake® Optimum Manhole: S-HW04, DS/PN: S16.001, Volume (m³): 1.9

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.600	58.1	1.600	49.4	2.600	62.5	5.000	85.8	7.500	104.5
0.200	30.7	0.800	58.0	1.800	52.3	3.000	66.9	5.500	89.8	8.000	107.8
0.300	51.8	1.000	56.9	2.000	55.0	3.500	72.1	6.000	93.7	8.500	111.1
0.400	55.6	1.200	54.9	2.200	57.6	4.000	77.0	6.500	97.5	9.000	114.2
0.500	57.3	1.400	50.5	2.400	60.1	4.500	81.5	7.000	101.0	9.500	117.3

Hydro-Brake® Optimum Manhole: S-HW08, DS/PN: S17.001, Volume (m³): 2.1

Unit Reference	MD-SHE-0299-5880-2250-5880
Design Head (m)	2.250
Design Flow (l/s)	58.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	299
Invert Level (m)	68.947
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.250	58.7	Kick-Flo®	1.471	47.9
Flush-Flo™	0.671	58.8	Mean Flow over Head Range	-	50.7

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

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Hydro-Brake® Optimum Manhole: S-HW08, DS/PN: S17.001, Volume (m³): 2.1

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.2	0.600	58.7	1.600	49.8	2.600	63.0	5.000	86.5	7.500	105.4
0.200	30.7	0.800	58.5	1.800	52.7	3.000	67.5	5.500	90.6	8.000	108.7
0.300	52.0	1.000	57.3	2.000	55.5	3.500	72.7	6.000	94.5	8.500	112.0
0.400	56.2	1.200	55.2	2.200	58.1	4.000	77.6	6.500	98.3	9.000	115.2
0.500	57.9	1.400	50.6	2.400	60.6	4.500	82.2	7.000	101.9	9.500	118.3

Hydro-Brake® Optimum Manhole: Sdummy 9b, DS/PN: S18.001, Volume (m³): 2.9

Unit Reference	MD-SHE-0109-7000-2000-7000	Sump Available	Yes
Design Head (m)	2.000	Diameter (mm)	109
Design Flow (l/s)	7.0	Invert Level (m)	77.908
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	7.0	Kick-Flo®	0.973	5.0
Flush-Flo™	0.475	6.3	Mean Flow over Head Range	-	5.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	0.200	5.6	0.300	6.1	0.400	6.3	0.500	6.3	0.600	6.2

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Hydro-Brake® Optimum Manhole: Sdummy 9b, DS/PN: S18.001, Volume (m³): 2.9

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.800	5.9	1.600	6.3	2.400	7.6	4.000	9.7	6.000	11.8	8.000	13.5
1.000	5.1	1.800	6.7	2.600	7.9	4.500	10.3	6.500	12.2	8.500	13.9
1.200	5.5	2.000	7.0	3.000	8.5	5.000	10.8	7.000	12.7	9.000	14.3
1.400	5.9	2.200	7.3	3.500	9.1	5.500	11.3	7.500	13.1	9.500	14.6

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Storage Structures for Storm

Tank or Pond Manhole: Sdummy 6, DS/PN: S2.000

Invert Level (m) 80.778

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2000.0	1.000	2000.0	1.001	0.0

Tank or Pond Manhole: S-P5-3, DS/PN: S4.000

Invert Level (m) 79.915

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2500.0	2.000	2500.0	2.001	0.0

Tank or Pond Manhole: S-P7-0, DS/PN: S6.001

Invert Level (m) 80.414

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3000.0	2.000	3000.0	2.001	0.0

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Tank or Pond Manhole: S-ESW86, DS/PN: S7.001

Invert Level (m) 80.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	5000.0	1.000	5000.0	1.001	0.0

Tank or Pond Manhole: S-Basin, DS/PN: S1.006

Invert Level (m) 78.230

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1420.0	0.400	1960.0	1.600	2830.0	1.650	0.0	2.000	0.0

Tank or Pond Manhole: Sdummy 4, DS/PN: S9.000

Invert Level (m) 76.250

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	5000.0	1.000	5000.0	1.001	0.0

Tank or Pond Manhole: S-P10-2, DS/PN: S10.000

Invert Level (m) 73.225

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Tank or Pond Manhole: S-P10-2, DS/PN: S10.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2000.0	2.000	2000.0	2.001	0.0

Tank or Pond Manhole: S-P8-1, DS/PN: S12.001

Invert Level (m) 77.275

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2500.0	1.000	2500.0	1.001	0.0

Tank or Pond Manhole: S-P3-1, DS/PN: S16.000

Invert Level (m) 73.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2500.0	2.000	2500.0	2.001	0.0

Tank or Pond Manhole: S-P1-1, DS/PN: S17.000

Invert Level (m) 69.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	5000.0	1.000	5000.0	1.001	0.0

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Tank or Pond Manhole: Sdummy 9a, DS/PN: S18.000

Invert Level (m) 78.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2500.0	1.000	2500.0	1.001	0.0

Tank or Pond Manhole: S-BASIN2, DS/PN: S1.016

Invert Level (m) 68.350

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1834.0	2.000	2200.0

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

Simulation Criteria

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

Number of Input Hydrographs 12 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S-HB1	240 Summer	1	+0%					83.569	-1.181	0.000	0.00			19.0
S1.001	S-HB2	240 Summer	1	+0%					82.084	-1.086	0.000	0.00			52.2

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

PN	US/MH Name	Status	Level Exceeded
S1.000	S-HB1	OK	
S1.001	S-HB2	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S2.000	Sdummy 6	960 Winter	1	+0%	30/120 Winter				80.953	-0.125	0.000	0.64	
S2.001	S-P6-1	960 Winter	1	+0%	30/120 Winter				80.825	-0.145	0.000	0.17	
S1.002	S-P6-0	960 Winter	1	+0%					80.576	-0.864	0.000	0.01	
S1.003	S-HB4	960 Winter	1	+0%					80.098	-1.072	0.000	0.01	
S1.004	S-HB5	960 Winter	1	+0%					79.385	-1.565	0.000	0.00	
S1.005	S-HB6	960 Winter	1	+0%					78.680	-1.860	0.000	0.00	
S3.000	S-D1	15 Winter	1	+0%					82.111	-0.439	0.000	0.06	
S3.001	S-D2	15 Winter	1	+0%					81.745	-0.405	0.000	0.09	
S3.002	S-D3	15 Winter	1	+0%					81.341	-0.359	0.000	0.11	
S3.003	S-D4	15 Winter	1	+0%					80.857	-0.593	0.000	0.06	
S3.004	S-D5	15 Winter	1	+0%	100/15 Summer				80.435	-0.345	0.000	0.38	
S3.005	S-D6	15 Winter	1	+0%					80.222	-0.878	0.000	0.02	
S3.006	S-D7	15 Winter	1	+0%					79.739	-0.531	0.000	0.05	
S4.000	S-P5-3	480 Winter	1	+0%	30/60 Winter				80.098	-0.117	0.000	0.35	
S4.001	S-P5-2	480 Winter	1	+0%	30/30 Winter				80.070	-0.041	0.000	0.36	
S4.002	S-P5-1	480 Winter	1	+0%					79.863	-0.159	0.000	0.45	
S3.007	S-D8	15 Winter	1	+0%					79.417	-1.153	0.000	0.01	
S3.008	S-D9	15 Winter	1	+0%					79.311	-1.259	0.000	0.01	
S3.009	S-Headwall	480 Winter	1	+0%					78.351	-1.949	0.000	0.00	
S5.000	S-ESW81	15 Winter	1	+0%	100/15 Winter				85.642	-0.108	0.000	0.18	
S5.001	S-ESW82	15 Winter	1	+0%	30/15 Summer				83.579	-0.070	0.000	0.55	
S5.002	S-ESW83	15 Winter	1	+0%	100/15 Summer				82.504	-0.093	0.000	0.31	
S5.003	S-ESW84	15 Winter	1	+0%	100/15 Summer				80.535	-0.146	0.000	0.26	
S6.000	Sdunny 7	15 Summer	1	+0%	100/240 Winter				80.500	-0.150	0.000	0.00	
S6.001	S-P7-0	1440 Winter	1	+0%	30/960 Winter				80.499	-0.065	0.000	0.29	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	Sdummy 6		14.5	OK	
S2.001	S-P6-1		14.5	OK	
S1.002	S-P6-0		66.5	OK	
S1.003	S-HB4		68.0	OK	
S1.004	S-HB5		68.2	OK	
S1.005	S-HB6		69.1	OK	
S3.000	S-D1		61.2	OK	
S3.001	S-D2		69.9	OK	
S3.002	S-D3		74.2	OK	
S3.003	S-D4		78.4	OK	
S3.004	S-D5		77.1	OK*	
S3.005	S-D6		83.3	OK	
S3.006	S-D7		86.9	OK	
S4.000	S-P5-3		25.6	OK	
S4.001	S-P5-2		25.6	OK	
S4.002	S-P5-1		25.6	OK	
S3.007	S-D8		95.6	OK	
S3.008	S-D9		95.7	OK	
S3.009	S-Headwall		43.6	OK	
S5.000	S-ESW81		6.3	OK	
S5.001	S-ESW82		9.4	OK	
S5.002	S-ESW83		9.4	OK	
S5.003	S-ESW84		9.3	OK	
S6.000	Sdunny 7		0.0	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S6.001	S-P7-0		3.9	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S5.004	S-ESW85	15 Winter	1	+0%	100/15 Summer				80.310	-0.130	0.000	0.36	
S7.000	Sdummy 8	15 Summer	1	+0%					80.400	-0.225	0.000	0.00	
S7.001	S-ESW86	1440 Winter	1	+0%					80.355	-0.170	0.000	0.04	
S5.005	S-ESW87	15 Winter	1	+0%	100/30 Winter				80.180	-0.147	0.000	0.26	
S5.006	S-ESW88	15 Winter	1	+0%	100/15 Winter				80.044	-0.142	0.000	0.29	
S5.007	S-ESW89	15 Winter	1	+0%					79.862	-0.155	0.000	0.21	
S5.008	S-ESW90	15 Winter	1	+0%	100/30 Winter				79.581	-0.147	0.000	0.26	
S5.009	S-ESW91	15 Winter	1	+0%	100/15 Summer				79.432	-0.136	0.000	0.33	
S5.010	S-ESW92	15 Winter	1	+0%	100/480 Winter				79.368	-0.144	0.000	0.28	
S5.011	S-ESW93	15 Winter	1	+0%	100/480 Winter				79.242	-0.152	0.000	0.23	
S5.012	S-ESW94	15 Winter	1	+0%	100/360 Winter				79.134	-0.154	0.000	0.21	
S5.013	S-ESW95	15 Winter	1	+0%	100/15 Summer				78.914	-0.134	0.000	0.34	
S5.014	S-ESW96	15 Winter	1	+0%	100/240 Summer				78.820	-0.153	0.000	0.23	
S5.015	S-ESW97	15 Winter	1	+0%	100/240 Summer				78.699	-0.146	0.000	0.27	
S5.016	S-Headwall	15 Winter	1	+0%					78.602	-1.568	0.000	0.00	
S1.006	S-Basin	480 Winter	1	+0%	100/60 Summer				78.348	-0.182	0.000	0.66	
S1.007	S-HB7	480 Winter	1	+0%	100/480 Winter				76.598	-0.204	0.000	0.58	
S8.000	S-H31	15 Winter	1	+0%	100/15 Summer	100/15 Summer			79.791	-0.089	0.000	0.33	
S8.001	S-H32	15 Winter	1	+0%	30/15 Summer	100/15 Summer			79.081	-0.070	0.000	0.55	
S8.002	S-H33	15 Winter	1	+0%	30/15 Summer	100/15 Winter			78.424	-0.196	0.000	0.26	
S8.003	S-ESW21	15 Winter	1	+0%	30/15 Summer	100/15 Summer			78.073	-0.148	0.000	0.48	
S8.004	S-SW25	15 Winter	1	+0%	30/15 Summer	100/15 Summer			77.464	-0.129	0.000	0.61	
S1.008	S-HB8	360 Winter	1	+0%					75.948	-0.313	0.000	0.20	
S9.000	Sdummy 4	240 Winter	1	+0%					76.290	-0.410	0.000	0.02	
S9.001	S-P4-0	15 Summer	1	+0%	1/15 Summer				76.627	0.047	0.000	0.09	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.004	S-ESW85		9.2	OK	
S7.000	Sdummy 8		0.0	OK	
S7.001	S-ESW86		2.0	OK	
S5.005	S-ESW87		9.2	OK	
S5.006	S-ESW88		9.0	OK	
S5.007	S-ESW89		9.0	OK	
S5.008	S-ESW90		8.9	OK	
S5.009	S-ESW91		8.9	OK	
S5.010	S-ESW92		8.8	OK	
S5.011	S-ESW93		8.8	OK	
S5.012	S-ESW94		8.7	OK	
S5.013	S-ESW95		8.7	OK	
S5.014	S-ESW96		8.7	OK	
S5.015	S-ESW97		8.6	OK	
S5.016	S-Headwall		32.2	OK	
S1.006	S-Basin		113.9	OK*	
S1.007	S-HB7		113.9	OK	
S8.000	S-H31		7.1	OK	4
S8.001	S-H32		12.0	OK	4
S8.002	S-H33		33.1	OK	1
S8.003	S-ESW21		41.9	OK	4
S8.004	S-SW25		51.1	OK	4
S1.008	S-HB8		119.6	OK	
S9.000	Sdummy 4		3.2	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S9.001	S-P4-0		22.4	SURCHARGED*	

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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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S1.009	S-HB9	30 Winter	1	+0%					74.707	-0.475	0.000	0.29	
S1.010	S-HW01	15 Winter	1	+0%					74.385	-3.385	0.000	0.00	
S10.000	S-P10-2	360 Winter	1	+0%	2/120 Winter				73.433	-0.017	0.000	0.71	
S10.001	S-P10-1	1440 Summer	1	+0%					73.336	0.000	0.000	0.85	
S1.011	S-P10-0	30 Winter	1	+0%					72.781	-3.024	0.000	0.00	
S11.000	S-EH41	15 Winter	1	+0%	30/15 Summer	100/15 Winter			80.359	-0.096	0.000	0.57	
S11.001	S-EH42	15 Winter	1	+0%	30/15 Summer	100/15 Winter			79.812	-0.158	0.000	0.42	
S11.002	S-EH43	15 Winter	1	+0%	30/15 Summer	100/15 Summer			79.210	-0.140	0.000	0.54	
S11.003	S-EH44	15 Winter	1	+0%	30/15 Summer				78.829	-0.132	0.000	0.60	
S12.000	Sdummy 8b	15 Summer	1	+0%					77.500	-0.225	0.000	0.00	
S12.001	S-P8-1	1440 Winter	1	+0%	100/60 Winter				77.381	-0.119	0.000	0.30	
S11.004	S-ESW1	15 Winter	1	+0%	30/15 Summer				76.615	-0.335	0.000	0.15	
S13.000	S-EH16	15 Winter	1	+0%	30/15 Summer	100/15 Summer			88.703	-0.067	0.000	0.54	
S13.001	S-EH15	15 Winter	1	+0%	2/15 Summer	30/15 Summer			85.758	-0.043	0.000	0.82	
S13.002	S-EH14	15 Winter	1	+0%	30/15 Summer				83.326	-0.125	0.000	0.41	
S13.003	S-EH13	15 Winter	1	+0%	30/15 Summer				83.140	-0.108	0.000	0.53	
S13.004	S--EH12	15 Winter	1	+0%	30/15 Summer	30/15 Winter			83.063	-0.089	0.000	0.66	
S13.005	S-EH11	15 Winter	1	+0%	30/15 Summer				82.392	-0.097	0.000	0.61	
S13.006	S-EH9	15 Winter	1	+0%	2/15 Winter				82.161	-0.066	0.000	0.81	
S14.000	S-EH1	15 Winter	1	+0%	30/15 Summer	100/15 Summer			88.388	-0.072	0.000	0.52	
S14.001	S-EH2	15 Winter	1	+0%	100/15 Summer				84.897	-0.130	0.000	0.37	
S14.002	S-EH3	15 Winter	1	+0%	100/15 Summer				84.534	-0.136	0.000	0.33	
S14.003	S-EH4	15 Winter	1	+0%	30/15 Summer	100/15 Summer			82.166	-0.130	0.000	0.37	
S14.004	S-EH5	15 Winter	1	+0%	2/15 Summer	100/15 Summer			81.401	-0.066	0.000	0.84	
S13.007	S-EH8	15 Winter	1	+0%	30/15 Summer	100/15 Summer			81.286	-0.143	0.000	0.53	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.009	S-HB9		162.9	OK	
S1.010	S-HW01		195.4	OK	
S10.000	S-P10-2		26.9	OK	
S10.001	S-P10-1		25.4	SURCHARGED*	
S1.011	S-P10-0		202.5	OK	
S11.000	S-EH41		9.8	OK	1
S11.001	S-EH42		16.7	OK	1
S11.002	S-EH43		21.4	OK	6
S11.003	S-EH44		24.5	OK	
S12.000	Sdummy 8b		0.0	OK	
S12.001	S-P8-1		5.7	OK	
S11.004	S-ESW1		24.8	OK	
S13.000	S-EH16		15.2	OK	6
S13.001	S-EH15		22.8	OK	12
S13.002	S-EH14		23.0	OK	
S13.003	S-EH13		23.0	OK	
S13.004	S--EH12		33.1	OK	10
S13.005	S-EH11		36.5	OK	
S13.006	S-EH9		41.1	OK	
S14.000	S-EH1		18.2	OK	5
S14.001	S-EH2		22.6	OK	
S14.002	S-EH3		30.3	OK	
S14.003	S-EH4		32.9	OK	6
S14.004	S-EH5		32.7	OK	6

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.007	S-EH8		77.6	OK	1

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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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S13.008	S-EH21	15 Winter	1	+0%	2/15 Summer	100/15 Summer			79.759	-0.080	0.000	0.87	
S13.009	S-EH22	15 Winter	1	+0%	30/15 Summer				79.145	-0.140	0.000	0.69	
S13.010	S-EH23	15 Winter	1	+0%	100/15 Summer				78.750	-0.260	0.000	0.37	
S15.000	S-EH26	15 Winter	1	+0%	100/15 Summer	100/15 Winter			79.477	-0.138	0.000	0.30	
S15.001	S-EH25	15 Winter	1	+0%	30/15 Summer	100/15 Summer			78.919	-0.108	0.000	0.53	
S11.005	S-ESW2	15 Winter	1	+0%	30/15 Summer	100/15 Winter			76.518	-0.142	0.000	0.81	
S11.006	S-ESW3	15 Winter	1	+0%					74.198	-0.431	0.000	0.28	
S1.012	S-HW03	30 Winter	1	+0%					72.581	-2.860	0.000	0.01	
S16.000	S-P3-1	480 Winter	1	+0%	100/60 Summer				73.153	-0.222	0.000	0.35	
S16.001	S-HW04	480 Winter	1	+0%	30/240 Winter				71.908	-0.216	0.000	0.34	
S1.013	S-P3-0	30 Winter	1	+0%					71.569	-2.649	0.000	0.01	
S17.000	S-P1-1	960 Winter	1	+0%	100/60 Summer				69.889	-0.186	0.000	0.50	
S17.001	S-HW08	960 Winter	1	+0%	2/960 Winter				69.272	-0.050	0.000	0.49	
S1.014	S-P1-0	30 Winter	1	+0%					69.126	-2.374	0.000	0.01	
S1.015	S-BASIN IN	480 Winter	1	+0%					68.764	-2.123	0.000	0.01	
S18.000	Sdummy 9a	1440 Winter	1	+0%	30/240 Winter				78.132	-0.093	0.000	0.52	
S18.001	Sdummy 9b	1440 Winter	1	+0%	30/120 Winter				78.098	-0.035	0.000	0.52	
S18.002	S-96	1440 Winter	1	+0%					76.816	-1.714	0.000	0.00	
S18.003	S-97	15 Winter	1	+0%					75.118	-1.882	0.000	0.00	
S18.004	S-98	15 Winter	1	+0%					72.285	-2.035	0.000	0.00	
S18.005	S-99	15 Winter	1	+0%					70.784	-2.216	0.000	0.00	
S1.016	S-BASIN2	480 Winter	1	+0%					68.738	-2.062	0.000	0.01	
S1.017	S-HW09	480 Winter	1	+0%	1/60 Summer				68.733	0.158	0.000	1.26	
S1.018	S-ESW13	480 Winter	1	+0%					68.082	-0.418	0.000	0.20	
S1.019	S-ESW14	480 Winter	1	+0%					65.269	-0.282	0.000	0.55	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.008	S-EH21		83.3	OK	6
S13.009	S-EH22		87.5	OK	
S13.010	S-EH23		92.0	OK	
S15.000	S-EH26		13.1	OK	1
S15.001	S-EH25		23.7	OK	4
S11.005	S-ESW2		131.6	OK	5
S11.006	S-ESW3		127.7	OK	
S1.012	S-HW03		328.9	OK	
S16.000	S-P3-1		21.1	OK	
S16.001	S-HW04		21.1	OK*	
S1.013	S-P3-0		362.7	OK	
S17.000	S-P1-1		30.5	OK	
S17.001	S-HW08		30.5	OK*	
S1.014	S-P1-0		369.6	OK	
S1.015	S-BASIN IN		273.4	OK	
S18.000	Sdummy 9a		5.5	OK	
S18.001	Sdummy 9b		5.5	OK	
S18.002	S-96		5.6	OK	
S18.003	S-97		57.1	OK	
S18.004	S-98		108.6	OK	
S18.005	S-99		245.8	OK	
S1.016	S-BASIN2		270.3	OK	
S1.017	S-HW09		270.2	SURCHARGED*	
S1.018	S-ESW13		270.2	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.019	S-ESW14		270.2	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.020	S-ESW15	480 Winter	1	+0%					64.405	-0.906	0.000	0.14			270.2
S1.021	S-ESW16	480 Winter	1	+0%					64.181	-0.906	0.000	0.14			270.2
S1.022	S-ESW17	480 Winter	1	+0%					63.941	-0.975	0.000	0.08			270.2

PN	US/MH Name	Status	Level Exceeded
S1.020	S-ESW15	OK	
S1.021	S-ESW16	OK	
S1.022	S-ESW17	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 12 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S-HB1	240 Summer	2	+0%					83.569	-1.181	0.000	0.00			19.1
S1.001	S-HB2	240 Summer	2	+0%					82.084	-1.086	0.000	0.00			52.3

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

PN	US/MH Name	Status	Level Exceeded
S1.000	S-HB1	OK	
S1.001	S-HB2	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S2.000	Sdummy 6	960 Winter	2	+0%	30/120 Winter				80.979	-0.099	0.000	0.79	
S2.001	S-P6-1	960 Winter	2	+0%	30/120 Winter				80.849	-0.121	0.000	0.21	
S1.002	S-P6-0	480 Winter	2	+0%					80.578	-0.862	0.000	0.01	
S1.003	S-HB4	480 Winter	2	+0%					80.101	-1.069	0.000	0.01	
S1.004	S-HB5	480 Winter	2	+0%					79.388	-1.562	0.000	0.00	
S1.005	S-HB6	480 Winter	2	+0%					78.683	-1.857	0.000	0.00	
S3.000	S-D1	15 Winter	2	+0%					82.129	-0.421	0.000	0.08	
S3.001	S-D2	15 Winter	2	+0%					81.770	-0.380	0.000	0.12	
S3.002	S-D3	15 Winter	2	+0%					81.364	-0.336	0.000	0.14	
S3.003	S-D4	15 Winter	2	+0%					80.882	-0.568	0.000	0.08	
S3.004	S-D5	15 Winter	2	+0%	100/15 Summer				80.476	-0.304	0.000	0.49	
S3.005	S-D6	15 Winter	2	+0%					80.239	-0.861	0.000	0.03	
S3.006	S-D7	15 Winter	2	+0%					79.757	-0.513	0.000	0.06	
S4.000	S-P5-3	480 Winter	2	+0%	30/60 Winter				80.140	-0.075	0.000	0.38	
S4.001	S-P5-2	480 Winter	2	+0%	30/30 Winter				80.106	-0.005	0.000	0.39	
S4.002	S-P5-1	480 Winter	2	+0%					79.871	-0.151	0.000	0.49	
S3.007	S-D8	15 Winter	2	+0%					79.425	-1.145	0.000	0.01	
S3.008	S-D9	15 Winter	2	+0%					79.317	-1.253	0.000	0.01	
S3.009	S-Headwall	360 Winter	2	+0%					78.368	-1.932	0.000	0.00	
S5.000	S-ESW81	15 Winter	2	+0%	100/15 Winter				85.648	-0.102	0.000	0.23	
S5.001	S-ESW82	15 Winter	2	+0%	30/15 Summer				83.594	-0.055	0.000	0.72	
S5.002	S-ESW83	15 Winter	2	+0%	100/15 Summer				82.513	-0.084	0.000	0.40	
S5.003	S-ESW84	15 Winter	2	+0%	100/15 Summer				80.547	-0.134	0.000	0.34	
S6.000	Sdunny 7	1440 Winter	2	+0%	100/240 Winter				80.512	-0.138	0.000	0.00	
S6.001	S-P7-0	1440 Winter	2	+0%	30/960 Winter				80.512	-0.052	0.000	0.35	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	Sdummy 6		17.7	OK	
S2.001	S-P6-1		17.7	OK	
S1.002	S-P6-0		69.8	OK	
S1.003	S-HB4		71.6	OK	
S1.004	S-HB5		71.8	OK	
S1.005	S-HB6		72.7	OK	
S3.000	S-D1		79.2	OK	
S3.001	S-D2		90.5	OK	
S3.002	S-D3		96.2	OK	
S3.003	S-D4		101.6	OK	
S3.004	S-D5		99.9	OK*	
S3.005	S-D6		108.1	OK	
S3.006	S-D7		111.9	OK	
S4.000	S-P5-3		27.9	OK	
S4.001	S-P5-2		27.9	OK	
S4.002	S-P5-1		27.9	OK	
S3.007	S-D8		125.3	OK	
S3.008	S-D9		125.5	OK	
S3.009	S-Headwall		54.3	OK	
S5.000	S-ESW81		8.2	OK	
S5.001	S-ESW82		12.2	OK	
S5.002	S-ESW83		12.2	OK	
S5.003	S-ESW84		12.0	OK	
S6.000	Sdunny 7		0.0	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S6.001	S-P7-0		4.8	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S5.004	S-ESW85	15 Winter	2	+0%	100/15 Summer				80.325	-0.115	0.000	0.47	
S7.000	Sdummy 8	15 Summer	2	+0%					80.400	-0.225	0.000	0.00	
S7.001	S-ESW86	1440 Winter	2	+0%					80.364	-0.161	0.000	0.05	
S5.005	S-ESW87	15 Winter	2	+0%	100/30 Winter				80.192	-0.135	0.000	0.34	
S5.006	S-ESW88	15 Winter	2	+0%	100/15 Winter				80.057	-0.129	0.000	0.38	
S5.007	S-ESW89	15 Winter	2	+0%					79.872	-0.145	0.000	0.27	
S5.008	S-ESW90	15 Winter	2	+0%	100/30 Winter				79.593	-0.135	0.000	0.34	
S5.009	S-ESW91	15 Winter	2	+0%	100/15 Summer				79.446	-0.122	0.000	0.43	
S5.010	S-ESW92	15 Winter	2	+0%	100/480 Winter				79.381	-0.131	0.000	0.37	
S5.011	S-ESW93	15 Winter	2	+0%	100/480 Winter				79.253	-0.141	0.000	0.30	
S5.012	S-ESW94	15 Winter	2	+0%	100/360 Winter				79.144	-0.144	0.000	0.28	
S5.013	S-ESW95	15 Winter	2	+0%	100/15 Summer				78.929	-0.119	0.000	0.45	
S5.014	S-ESW96	15 Winter	2	+0%	100/240 Summer				78.831	-0.142	0.000	0.30	
S5.015	S-ESW97	15 Winter	2	+0%	100/240 Summer				78.712	-0.133	0.000	0.35	
S5.016	S-Headwall	15 Winter	2	+0%					78.615	-1.555	0.000	0.00	
S1.006	S-Basin	360 Winter	2	+0%	100/60 Summer				78.366	-0.164	0.000	0.73	
S1.007	S-HB7	360 Winter	2	+0%	100/480 Winter				76.613	-0.189	0.000	0.64	
S8.000	S-H31	15 Winter	2	+0%	100/15 Summer	100/15 Summer			79.800	-0.080	0.000	0.43	
S8.001	S-H32	15 Winter	2	+0%	30/15 Summer	100/15 Summer			79.096	-0.055	0.000	0.72	
S8.002	S-H33	15 Winter	2	+0%	30/15 Summer	100/15 Winter			78.440	-0.180	0.000	0.33	
S8.003	S-ESW21	15 Winter	2	+0%	30/15 Summer	100/15 Summer			78.099	-0.122	0.000	0.62	
S8.004	S-SW25	15 Winter	2	+0%	30/15 Summer	100/15 Summer			77.496	-0.097	0.000	0.79	
S1.008	S-HB8	240 Winter	2	+0%					75.956	-0.305	0.000	0.23	
S9.000	Sdummy 4	240 Winter	2	+0%					76.306	-0.394	0.000	0.04	
S9.001	S-P4-0	15 Summer	2	+0%	1/15 Summer				76.627	0.047	0.000	0.09	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.004	S-ESW85		11.9	OK	
S7.000	Sdummy 8		0.0	OK	
S7.001	S-ESW86		2.5	OK	
S5.005	S-ESW87		11.9	OK	
S5.006	S-ESW88		11.7	OK	
S5.007	S-ESW89		11.7	OK	
S5.008	S-ESW90		11.6	OK	
S5.009	S-ESW91		11.6	OK	
S5.010	S-ESW92		11.4	OK	
S5.011	S-ESW93		11.5	OK	
S5.012	S-ESW94		11.4	OK	
S5.013	S-ESW95		11.3	OK	
S5.014	S-ESW96		11.3	OK	
S5.015	S-ESW97		11.2	OK	
S5.016	S-Headwall		41.8	OK	
S1.006	S-Basin		125.1	OK*	
S1.007	S-HB7		125.1	OK	
S8.000	S-H31		9.1	OK	4
S8.001	S-H32		15.6	OK	4
S8.002	S-H33		42.8	OK	1
S8.003	S-ESW21		54.2	OK	4
S8.004	S-SW25		66.1	OK	4
S1.008	S-HB8		132.9	OK	
S9.000	Sdummy 4		6.2	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S9.001	S-P4-0		22.4	SURCHARGED*	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S1.009	S-HB9	30 Winter	2	+0%					74.729	-0.453	0.000	0.33	
S1.010	S-HW01	15 Winter	2	+0%					74.403	-3.367	0.000	0.00	
S10.000	S-P10-2	360 Winter	2	+0%	2/120 Winter				73.484	0.034	0.000	0.74	
S10.001	S-P10-1	1440 Summer	2	+0%					73.336	0.000	0.000	0.90	
S1.011	S-P10-0	30 Winter	2	+0%					72.793	-3.012	0.000	0.00	
S11.000	S-EH41	15 Winter	2	+0%	30/15 Summer	100/15 Winter			80.384	-0.071	0.000	0.74	
S11.001	S-EH42	15 Winter	2	+0%	30/15 Summer	100/15 Winter			79.836	-0.134	0.000	0.54	
S11.002	S-EH43	15 Winter	2	+0%	30/15 Summer	100/15 Summer			79.239	-0.111	0.000	0.70	
S11.003	S-EH44	15 Winter	2	+0%	30/15 Summer				78.860	-0.101	0.000	0.77	
S12.000	Sdummy 8b	15 Summer	2	+0%					77.500	-0.225	0.000	0.00	
S12.001	S-P8-1	1440 Winter	2	+0%	100/60 Winter				77.396	-0.104	0.000	0.37	
S11.004	S-ESW1	15 Winter	2	+0%	30/15 Summer				76.639	-0.311	0.000	0.19	
S13.000	S-EH16	15 Winter	2	+0%	30/15 Summer	100/15 Summer			88.719	-0.051	0.000	0.70	
S13.001	S-EH15	15 Winter	2	+0%	2/15 Summer	30/15 Summer			85.841	0.040	0.000	1.00	
S13.002	S-EH14	15 Winter	2	+0%	30/15 Summer				83.338	-0.113	0.000	0.50	
S13.003	S-EH13	15 Winter	2	+0%	30/15 Summer				83.155	-0.093	0.000	0.65	
S13.004	S--EH12	15 Winter	2	+0%	30/15 Summer	30/15 Winter			83.084	-0.068	0.000	0.81	
S13.005	S-EH11	15 Winter	2	+0%	30/15 Summer				82.412	-0.077	0.000	0.76	
S13.006	S-EH9	15 Winter	2	+0%	2/15 Winter				82.252	0.025	0.000	1.01	
S14.000	S-EH1	15 Winter	2	+0%	30/15 Summer	100/15 Summer			88.401	-0.059	0.000	0.67	
S14.001	S-EH2	15 Winter	2	+0%	100/15 Summer				84.913	-0.114	0.000	0.48	
S14.002	S-EH3	15 Winter	2	+0%	100/15 Summer				84.548	-0.122	0.000	0.42	
S14.003	S-EH4	15 Winter	2	+0%	30/15 Summer	100/15 Summer			82.181	-0.115	0.000	0.48	
S14.004	S-EH5	15 Winter	2	+0%	2/15 Summer	100/15 Summer			81.475	0.008	0.000	1.07	
S13.007	S-EH8	15 Winter	2	+0%	30/15 Summer	100/15 Summer			81.312	-0.117	0.000	0.68	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.009	S-HB9		185.6	OK	
S1.010	S-HW01		228.4	OK	
S10.000	S-P10-2		28.1	SURCHARGED	
S10.001	S-P10-1		26.8	SURCHARGED*	
S1.011	S-P10-0		239.0	OK	
S11.000	S-EH41		12.7	OK	1
S11.001	S-EH42		21.6	OK	1
S11.002	S-EH43		27.6	OK	6
S11.003	S-EH44		31.7	OK	
S12.000	Sdummy 8b		0.0	OK	
S12.001	S-P8-1		6.9	OK	
S11.004	S-ESW1		32.2	OK	
S13.000	S-EH16		19.7	OK	6
S13.001	S-EH15		27.9	SURCHARGED	12
S13.002	S-EH14		27.9	OK	
S13.003	S-EH13		27.9	OK	
S13.004	S--EH12		41.0	FLOOD RISK	10
S13.005	S-EH11		45.4	OK	
S13.006	S-EH9		51.1	SURCHARGED	
S14.000	S-EH1		23.5	OK	5
S14.001	S-EH2		29.2	OK	
S14.002	S-EH3		39.2	OK	
S14.003	S-EH4		42.5	OK	6
S14.004	S-EH5		41.7	SURCHARGED	6

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.007	S-EH8		98.9	OK	1

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S13.008	S-EH21	15 Winter	2	+0%	2/15 Summer	100/15 Summer			79.951	0.112	0.000	1.08	
S13.009	S-EH22	15 Winter	2	+0%	30/15 Summer				79.185	-0.100	0.000	0.86	
S13.010	S-EH23	15 Winter	2	+0%	100/15 Summer				78.776	-0.234	0.000	0.46	
S15.000	S-EH26	15 Winter	2	+0%	100/15 Summer	100/15 Winter			79.490	-0.125	0.000	0.38	
S15.001	S-EH25	15 Winter	2	+0%	30/15 Summer	100/15 Summer			78.940	-0.087	0.000	0.69	
S11.005	S-ESW2	15 Winter	2	+0%	30/15 Summer	100/15 Winter			76.603	-0.057	0.000	1.00	
S11.006	S-ESW3	15 Winter	2	+0%					74.229	-0.400	0.000	0.34	
S1.012	S-HW03	30 Winter	2	+0%					72.607	-2.834	0.000	0.01	
S16.000	S-P3-1	480 Winter	2	+0%	100/60 Summer				73.178	-0.197	0.000	0.46	
S16.001	S-HW04	480 Winter	2	+0%	30/240 Winter				71.935	-0.189	0.000	0.44	
S1.013	S-P3-0	30 Winter	2	+0%					71.599	-2.619	0.000	0.01	
S17.000	S-P1-1	960 Winter	2	+0%	100/60 Summer				69.916	-0.159	0.000	0.63	
S17.001	S-HW08	960 Winter	2	+0%	2/960 Winter				69.324	0.002	0.000	0.61	
S1.014	S-P1-0	30 Winter	2	+0%					69.155	-2.345	0.000	0.01	
S1.015	S-BASIN IN	480 Winter	2	+0%					68.858	-2.029	0.000	0.01	
S18.000	Sdummy 9a	1440 Winter	2	+0%	30/240 Winter				78.158	-0.067	0.000	0.54	
S18.001	Sdummy 9b	1440 Winter	2	+0%	30/120 Winter				78.123	-0.010	0.000	0.54	
S18.002	S-96	1440 Winter	2	+0%					76.817	-1.713	0.000	0.00	
S18.003	S-97	15 Winter	2	+0%					75.131	-1.869	0.000	0.00	
S18.004	S-98	15 Winter	2	+0%					72.301	-2.019	0.000	0.00	
S18.005	S-99	15 Winter	2	+0%					70.806	-2.194	0.000	0.01	
S1.016	S-BASIN2	480 Winter	2	+0%					68.847	-1.953	0.000	0.01	
S1.017	S-HW09	480 Winter	2	+0%	1/60 Summer				68.841	0.266	0.000	1.40	
S1.018	S-ESW13	480 Winter	2	+0%					68.091	-0.409	0.000	0.22	
S1.019	S-ESW14	480 Winter	2	+0%					65.290	-0.261	0.000	0.61	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.008	S-EH21		103.6	SURCHARGED	6
S13.009	S-EH22		109.2	OK	
S13.010	S-EH23		114.7	OK	
S15.000	S-EH26		16.9	OK	1
S15.001	S-EH25		30.7	OK	4
S11.005	S-ESW2		162.2	OK	5
S11.006	S-ESW3		158.0	OK	
S1.012	S-HW03		402.8	OK	
S16.000	S-P3-1		27.4	OK	
S16.001	S-HW04		27.4	OK*	
S1.013	S-P3-0		447.2	OK	
S17.000	S-P1-1		38.1	OK	
S17.001	S-HW08		38.1	SURCHARGED*	
S1.014	S-P1-0		457.5	OK	
S1.015	S-BASIN IN		311.7	OK	
S18.000	Sdummy 9a		5.7	OK	
S18.001	Sdummy 9b		5.7	OK	
S18.002	S-96		5.8	OK	
S18.003	S-97		74.0	OK	
S18.004	S-98		140.4	OK	
S18.005	S-99		317.6	OK	
S1.016	S-BASIN2		299.6	OK	
S1.017	S-HW09		299.4	SURCHARGED*	
S1.018	S-ESW13		299.4	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.019	S-ESW14		299.4	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.020	S-ESW15	480 Winter	2	+0%					64.422	-0.889	0.000	0.15			299.4
S1.021	S-ESW16	480 Winter	2	+0%					64.198	-0.889	0.000	0.15			299.4
S1.022	S-ESW17	480 Winter	2	+0%					63.956	-0.960	0.000	0.09			299.4

PN	US/MH Name	Status	Level Exceeded
S1.020	S-ESW15	OK	
S1.021	S-ESW16	OK	
S1.022	S-ESW17	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 12 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S-HB1	1440 Summer	30	+0%					83.590	-1.160	0.000	0.00			39.2
S1.001	S-HB2	1440 Summer	30	+0%					82.112	-1.058	0.000	0.01			87.5

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

PN	US/MH Name	Status	Level Exceeded
S1.000	S-HB1	OK	
S1.001	S-HB2	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S2.000	Sdummy 6	480 Winter	30	+0%	30/120 Winter				81.140	0.062	0.000	1.00	
S2.001	S-P6-1	480 Winter	30	+0%	30/120 Winter				81.036	0.066	0.000	0.26	
S1.002	S-P6-0	1440 Summer	30	+0%					80.608	-0.832	0.000	0.02	
S1.003	S-HB4	1440 Summer	30	+0%					80.126	-1.044	0.000	0.01	
S1.004	S-HB5	1440 Summer	30	+0%					79.414	-1.536	0.000	0.00	
S1.005	S-HB6	1440 Summer	30	+0%					78.713	-1.827	0.000	0.00	
S3.000	S-D1	15 Winter	30	+0%					82.188	-0.362	0.000	0.15	
S3.001	S-D2	15 Winter	30	+0%					81.852	-0.298	0.000	0.23	
S3.002	S-D3	15 Winter	30	+0%					81.442	-0.258	0.000	0.26	
S3.003	S-D4	15 Winter	30	+0%					80.965	-0.485	0.000	0.14	
S3.004	S-D5	15 Winter	30	+0%	100/15 Summer				80.619	-0.161	0.000	0.89	
S3.005	S-D6	15 Winter	30	+0%					80.285	-0.815	0.000	0.04	
S3.006	S-D7	15 Winter	30	+0%					79.805	-0.465	0.000	0.11	
S4.000	S-P5-3	480 Winter	30	+0%	30/60 Winter				80.357	0.142	0.000	0.49	
S4.001	S-P5-2	480 Winter	30	+0%	30/30 Winter				80.399	0.288	0.000	0.47	
S4.002	S-P5-1	960 Winter	30	+0%					79.889	-0.133	0.000	0.60	
S3.007	S-D8	15 Winter	30	+0%					79.447	-1.123	0.000	0.03	
S3.008	S-D9	15 Winter	30	+0%					79.334	-1.236	0.000	0.02	
S3.009	S-Headwall	1440 Summer	30	+0%					78.509	-1.791	0.000	0.00	
S5.000	S-ESW81	15 Winter	30	+0%	100/15 Winter				85.669	-0.081	0.000	0.43	
S5.001	S-ESW82	15 Winter	30	+0%	30/15 Summer				83.897	0.248	0.000	1.34	
S5.002	S-ESW83	15 Winter	30	+0%	100/15 Summer				82.544	-0.053	0.000	0.75	
S5.003	S-ESW84	15 Winter	30	+0%	100/15 Summer				80.589	-0.092	0.000	0.64	
S6.000	Sdunny 7	960 Winter	30	+0%	100/240 Winter				80.569	-0.081	0.000	0.00	
S6.001	S-P7-0	960 Winter	30	+0%	30/960 Winter				80.569	0.005	0.000	0.61	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	Sdummy 6		22.4	SURCHARGED	
S2.001	S-P6-1		22.1	SURCHARGED	
S1.002	S-P6-0		109.6	OK	
S1.003	S-HB4		114.7	OK	
S1.004	S-HB5		115.2	OK	
S1.005	S-HB6		117.5	OK	
S3.000	S-D1		149.2	OK	
S3.001	S-D2		173.9	FLOOD RISK*	
S3.002	S-D3		184.2	FLOOD RISK*	
S3.003	S-D4		191.3	OK	
S3.004	S-D5		181.4	OK*	
S3.005	S-D6		188.2	OK	
S3.006	S-D7		191.3	OK	
S4.000	S-P5-3		35.8	SURCHARGED	
S4.001	S-P5-2		33.8	SURCHARGED	
S4.002	S-P5-1		33.7	OK	
S3.007	S-D8		215.8	OK	
S3.008	S-D9		216.2	OK	
S3.009	S-Headwall		61.3	OK	
S5.000	S-ESW81		15.4	OK	
S5.001	S-ESW82		22.9	SURCHARGED	
S5.002	S-ESW83		22.8	OK	
S5.003	S-ESW84		22.4	OK	
S6.000	Sdunny 7		0.0	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S6.001	S-P7-0		8.3	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.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S5.004	S-ESW85	15 Winter	30	+0%	100/15 Summer				80.383	-0.057	0.000	0.90	
S7.000	Sdummy 8	15 Summer	30	+0%					80.400	-0.225	0.000	0.00	
S7.001	S-ESW86	1440 Winter	30	+0%					80.400	-0.125	0.000	0.11	
S5.005	S-ESW87	15 Winter	30	+0%	100/30 Winter				80.234	-0.093	0.000	0.64	
S5.006	S-ESW88	15 Winter	30	+0%	100/15 Winter				80.104	-0.082	0.000	0.72	
S5.007	S-ESW89	15 Winter	30	+0%					79.908	-0.109	0.000	0.52	
S5.008	S-ESW90	15 Winter	30	+0%	100/30 Winter				79.635	-0.093	0.000	0.64	
S5.009	S-ESW91	15 Winter	30	+0%	100/15 Summer				79.498	-0.070	0.000	0.82	
S5.010	S-ESW92	15 Winter	30	+0%	100/480 Winter				79.426	-0.086	0.000	0.70	
S5.011	S-ESW93	15 Winter	30	+0%	100/480 Winter				79.290	-0.104	0.000	0.56	
S5.012	S-ESW94	15 Winter	30	+0%	100/360 Winter				79.180	-0.108	0.000	0.53	
S5.013	S-ESW95	15 Winter	30	+0%	100/15 Summer				78.984	-0.064	0.000	0.85	
S5.014	S-ESW96	15 Winter	30	+0%	100/240 Summer				78.869	-0.104	0.000	0.56	
S5.015	S-ESW97	30 Winter	30	+0%	100/240 Summer				78.755	-0.090	0.000	0.67	
S5.016	S-Headwall	15 Winter	30	+0%					78.673	-1.497	0.000	0.01	
S1.006	S-Basin	1440 Summer	30	+0%	100/60 Summer				78.508	-0.022	0.000	1.00	
S1.007	S-HB7	960 Summer	30	+0%	100/480 Winter				76.678	-0.124	0.000	0.87	
S8.000	S-H31	15 Winter	30	+0%	100/15 Summer	100/15 Summer			79.868	-0.012	0.000	0.80	
S8.001	S-H32	15 Winter	30	+0%	30/15 Summer	100/15 Summer			79.539	0.388	0.000	1.18	
S8.002	S-H33	15 Winter	30	+0%	30/15 Summer	100/15 Winter			78.840	0.220	0.000	0.63	
S8.003	S-ESW21	15 Winter	30	+0%	30/15 Summer	100/15 Summer			78.675	0.454	0.000	1.14	
S8.004	S-SW25	15 Winter	30	+0%	30/15 Summer	100/15 Summer			77.817	0.224	0.000	1.42	
S1.008	S-HB8	30 Winter	30	+0%					75.989	-0.272	0.000	0.33	
S9.000	Sdummy 4	240 Winter	30	+0%					76.389	-0.311	0.000	0.12	
S9.001	S-P4-0	15 Summer	30	+0%	1/15 Summer				76.627	0.047	0.000	0.09	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.004	S-ESW85		22.7	OK	
S7.000	Sdummy 8		0.0	OK	
S7.001	S-ESW86		5.5	OK	
S5.005	S-ESW87		22.8	OK	
S5.006	S-ESW88		22.5	OK	
S5.007	S-ESW89		22.2	OK	
S5.008	S-ESW90		22.1	OK	
S5.009	S-ESW91		22.0	OK	
S5.010	S-ESW92		21.8	OK	
S5.011	S-ESW93		21.7	OK	
S5.012	S-ESW94		21.6	OK	
S5.013	S-ESW95		21.4	OK	
S5.014	S-ESW96		21.4	OK	
S5.015	S-ESW97		21.3	OK	
S5.016	S-Headwall		97.8	OK	
S1.006	S-Basin		171.4	OK*	
S1.007	S-HB7		171.4	OK	
S8.000	S-H31		17.0	OK	4
S8.001	S-H32		25.6	SURCHARGED	4
S8.002	S-H33		80.6	SURCHARGED	1
S8.003	S-ESW21		99.9	SURCHARGED	4
S8.004	S-SW25		118.0	SURCHARGED	4
S1.008	S-HB8		194.5	OK	
S9.000	Sdummy 4		20.3	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S9.001	S-P4-0		22.4	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.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S1.009	S-HB9	15 Winter	30	+0%					74.809	-0.373	0.000	0.49	
S1.010	S-HW01	15 Winter	30	+0%					74.479	-3.291	0.000	0.00	
S10.000	S-P10-2	480 Winter	30	+0%	2/120 Winter				73.750	0.300	0.000	0.84	
S10.001	S-P10-1	15 Summer	30	+0%					73.336	0.000	0.000	0.89	
S1.011	S-P10-0	15 Winter	30	+0%					72.838	-2.967	0.000	0.01	
S11.000	S-EH41	15 Winter	30	+0%	30/15 Summer	100/15 Winter			80.837	0.382	0.000	1.25	
S11.001	S-EH42	15 Winter	30	+0%	30/15 Summer	100/15 Winter			80.031	0.061	0.000	0.93	
S11.002	S-EH43	15 Winter	30	+0%	30/15 Summer	100/15 Summer			79.505	0.155	0.000	1.09	
S11.003	S-EH44	15 Winter	30	+0%	30/15 Summer				79.032	0.071	0.000	1.17	
S12.000	Sdummy 8b	15 Summer	30	+0%					77.500	-0.225	0.000	0.00	
S12.001	S-P8-1	960 Winter	30	+0%	100/60 Winter				77.477	-0.023	0.000	0.54	
S11.004	S-ESW1	30 Winter	30	+0%	30/15 Summer				78.585	1.635	0.000	0.22	
S13.000	S-EH16	15 Winter	30	+0%	30/15 Summer	100/15 Summer			89.413	0.643	0.000	0.97	
S13.001	S-EH15	15 Winter	30	+0%	2/15 Summer	30/15 Summer			86.543	0.742	2.837	1.12	
S13.002	S-EH14	15 Summer	30	+0%	30/15 Summer				83.593	0.142	0.000	0.61	
S13.003	S-EH13	30 Winter	30	+0%	30/15 Summer				83.492	0.244	0.000	0.78	
S13.004	S--EH12	30 Winter	30	+0%	30/15 Summer	30/15 Winter			83.382	0.230	1.616	1.02	
S13.005	S-EH11	15 Winter	30	+0%	30/15 Summer				83.084	0.595	0.000	0.93	
S13.006	S-EH9	15 Winter	30	+0%	2/15 Winter				82.959	0.732	0.000	1.14	
S14.000	S-EH1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			88.799	0.339	0.000	1.04	
S14.001	S-EH2	15 Winter	30	+0%	100/15 Summer				84.958	-0.069	0.000	0.81	
S14.002	S-EH3	15 Winter	30	+0%	100/15 Summer				84.598	-0.072	0.000	0.78	
S14.003	S-EH4	15 Winter	30	+0%	30/15 Summer	100/15 Summer			82.690	0.394	0.000	0.82	
S14.004	S-EH5	15 Winter	30	+0%	2/15 Summer	100/15 Summer			82.245	0.778	0.000	1.66	
S13.007	S-EH8	15 Winter	30	+0%	30/15 Summer	100/15 Summer			82.034	0.605	0.000	0.89	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.009	S-HB9		276.4	OK	
S1.010	S-HW01		385.5	OK	
S10.000	S-P10-2		31.5	SURCHARGED	
S10.001	S-P10-1		26.6	SURCHARGED*	
S1.011	S-P10-0		397.7	OK	
S11.000	S-EH41		21.4	SURCHARGED	1
S11.001	S-EH42		36.9	SURCHARGED	1
S11.002	S-EH43		43.3	SURCHARGED	6
S11.003	S-EH44		48.0	SURCHARGED	
S12.000	Sdummy 8b		0.0	OK	
S12.001	S-P8-1		10.3	OK	
S11.004	S-ESW1		36.3	SURCHARGED	
S13.000	S-EH16		27.1	SURCHARGED	6
S13.001	S-EH15		31.2	FLOOD	12
S13.002	S-EH14		33.9	SURCHARGED	
S13.003	S-EH13		33.5	SURCHARGED	
S13.004	S--EH12		51.4	FLOOD	10
S13.005	S-EH11		55.5	SURCHARGED	
S13.006	S-EH9		57.5	SURCHARGED	
S14.000	S-EH1		36.7	SURCHARGED	5
S14.001	S-EH2		49.5	OK	
S14.002	S-EH3		71.8	OK	
S14.003	S-EH4		72.0	SURCHARGED	6
S14.004	S-EH5		64.7	SURCHARGED	6

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.007	S-EH8		129.8	SURCHARGED	1

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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.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S13.008	S-EH21	30 Winter	30	+0%	2/15 Summer	100/15 Summer			80.767	0.928	0.000	1.45	
S13.009	S-EH22	30 Winter	30	+0%	30/15 Summer				79.432	0.147	0.000	1.20	
S13.010	S-EH23	30 Winter	30	+0%	100/15 Summer				78.828	-0.182	0.000	0.66	
S15.000	S-EH26	15 Winter	30	+0%	100/15 Summer	100/15 Winter			79.547	-0.068	0.000	0.72	
S15.001	S-EH25	15 Winter	30	+0%	30/15 Summer	100/15 Summer			79.296	0.269	0.000	1.17	
S11.005	S-ESW2	30 Winter	30	+0%	30/15 Summer	100/15 Winter			78.484	1.824	0.000	1.37	
S11.006	S-ESW3	30 Winter	30	+0%					74.284	-0.345	0.000	0.48	
S1.012	S-HW03	30 Winter	30	+0%					72.679	-2.762	0.000	0.01	
S16.000	S-P3-1	360 Winter	30	+0%	100/60 Summer				73.289	-0.086	0.000	0.95	
S16.001	S-HW04	360 Winter	30	+0%	30/240 Winter				72.217	0.093	0.000	0.92	
S1.013	S-P3-0	30 Winter	30	+0%					71.682	-2.536	0.000	0.01	
S17.000	S-P1-1	480 Winter	30	+0%	100/60 Summer				70.059	-0.016	0.000	1.00	
S17.001	S-HW08	480 Winter	30	+0%	2/960 Winter				69.935	0.613	0.000	0.94	
S1.014	S-P1-0	960 Winter	30	+0%					69.387	-2.113	0.000	0.01	
S1.015	S-BASIN IN	960 Winter	30	+0%					69.363	-1.524	0.000	0.01	
S18.000	Sdummy 9a	1440 Winter	30	+0%	30/240 Winter				78.286	0.061	0.000	0.59	
S18.001	Sdummy 9b	1440 Winter	30	+0%	30/120 Winter				78.248	0.115	0.000	0.59	
S18.002	S-96	120 Winter	30	+0%					76.820	-1.710	0.000	0.00	
S18.003	S-97	15 Winter	30	+0%					75.176	-1.824	0.000	0.00	
S18.004	S-98	15 Winter	30	+0%					72.358	-1.962	0.000	0.01	
S18.005	S-99	15 Winter	30	+0%					70.883	-2.117	0.000	0.01	
S1.016	S-BASIN2	960 Winter	30	+0%					69.349	-1.451	0.000	0.01	
S1.017	S-HW09	960 Winter	30	+0%	1/60 Summer				69.341	0.766	0.000	1.90	
S1.018	S-ESW13	960 Winter	30	+0%					68.126	-0.374	0.000	0.30	
S1.019	S-ESW14	960 Winter	30	+0%					65.370	-0.181	0.000	0.83	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.008	S-EH21		139.3	SURCHARGED	6
S13.009	S-EH22		152.0	SURCHARGED	
S13.010	S-EH23		162.9	OK	
S15.000	S-EH26		31.7	OK	1
S15.001	S-EH25		52.0	SURCHARGED	4
S11.005	S-ESW2		223.2	SURCHARGED	5
S11.006	S-ESW3		222.7	OK	
S1.012	S-HW03		621.1	OK	
S16.000	S-P3-1		56.9	OK	
S16.001	S-HW04		56.9	SURCHARGED*	
S1.013	S-P3-0		734.2	OK	
S17.000	S-P1-1		60.3	OK	
S17.001	S-HW08		58.7	SURCHARGED*	
S1.014	S-P1-0		437.2	OK	
S1.015	S-BASIN IN		431.9	OK	
S18.000	Sdummy 9a		6.2	SURCHARGED	
S18.001	Sdummy 9b		6.2	SURCHARGED	
S18.002	S-96		7.0	OK	
S18.003	S-97		150.9	OK	
S18.004	S-98		276.4	OK	
S18.005	S-99		624.6	OK	
S1.016	S-BASIN2		407.9	OK	
S1.017	S-HW09		407.6	SURCHARGED*	
S1.018	S-ESW13		407.6	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.019	S-ESW14		407.6	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.020	S-ESW15	960 Winter	30	+0%					64.480	-0.831	0.000	0.21			407.6
S1.021	S-ESW16	960 Winter	30	+0%					64.256	-0.831	0.000	0.21			407.6
S1.022	S-ESW17	960 Winter	30	+0%					63.992	-0.924	0.000	0.12			407.6

PN	US/MH Name	Status	Level Exceeded
S1.020	S-ESW15	OK	
S1.021	S-ESW16	OK	
S1.022	S-ESW17	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 12 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 12 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S-HB1	960 Summer	100	+40%					83.632	-1.118	0.000	0.01			100.7
S1.001	S-HB2	480 Summer	100	+40%					82.170	-1.000	0.000	0.02			200.9

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

PN	US/MH Name	Status	Level Exceeded
S1.000	S-HB1	OK	
S1.001	S-HB2	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S2.000	Sdummy 6	960 Winter	100	+40%	30/120 Winter				81.526	0.448	0.000	0.99	
S2.001	S-P6-1	960 Winter	100	+40%	30/120 Winter				81.444	0.474	0.000	0.26	
S1.002	S-P6-0	480 Summer	100	+40%					80.676	-0.764	0.000	0.04	
S1.003	S-HB4	480 Summer	100	+40%					80.175	-0.995	0.000	0.02	
S1.004	S-HB5	480 Summer	100	+40%					79.469	-1.481	0.000	0.01	
S1.005	S-HB6	1440 Summer	100	+40%					79.320	-1.220	0.000	0.01	
S3.000	S-D1	15 Winter	100	+40%					82.266	-0.284	0.000	0.26	
S3.001	S-D2	15 Winter	100	+40%					81.953	-0.197	0.000	0.42	
S3.002	S-D3	15 Winter	100	+40%					81.539	-0.161	0.000	0.48	
S3.003	S-D4	15 Winter	100	+40%					81.070	-0.380	0.000	0.26	
S3.004	S-D5	15 Winter	100	+40%	100/15 Summer				80.847	0.067	0.000	1.61	
S3.005	S-D6	15 Winter	100	+40%					80.355	-0.745	0.000	0.08	
S3.006	S-D7	15 Winter	100	+40%					79.875	-0.395	0.000	0.19	
S4.000	S-P5-3	480 Winter	100	+40%	30/60 Winter				80.827	0.612	0.000	0.54	
S4.001	S-P5-2	480 Winter	100	+40%	30/30 Winter				81.369	1.258	0.000	0.48	
S4.002	S-P5-1	960 Winter	100	+40%					79.895	-0.127	0.000	0.61	
S3.007	S-D8	15 Winter	100	+40%					79.477	-1.093	0.000	0.04	
S3.008	S-D9	30 Winter	100	+40%					79.357	-1.213	0.000	0.03	
S3.009	S-Headwall	1440 Summer	100	+40%					79.304	-0.996	0.000	0.00	
S5.000	S-ESW81	15 Winter	100	+40%	100/15 Winter				85.879	0.129	0.000	0.75	
S5.001	S-ESW82	15 Winter	100	+40%	30/15 Summer				84.810	1.161	0.000	2.18	
S5.002	S-ESW83	15 Winter	100	+40%	100/15 Summer				82.880	0.283	0.000	1.20	
S5.003	S-ESW84	30 Winter	100	+40%	100/15 Summer				80.769	0.088	0.000	1.01	
S6.000	Sdunny 7	960 Winter	100	+40%	100/240 Winter				80.700	0.050	0.000	0.00	
S6.001	S-P7-0	960 Winter	100	+40%	30/960 Winter				80.700	0.136	0.000	0.75	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	Sdummy 6		22.3	SURCHARGED	
S2.001	S-P6-1		22.1	SURCHARGED	
S1.002	S-P6-0		222.9	OK	
S1.003	S-HB4		236.0	OK	
S1.004	S-HB5		236.6	OK	
S1.005	S-HB6		222.7	OK	
S3.000	S-D1		268.9	FLOOD RISK*	
S3.001	S-D2		314.0	FLOOD RISK*	
S3.002	S-D3		332.8	FLOOD RISK*	
S3.003	S-D4		345.7	OK	
S3.004	S-D5		329.6	SURCHARGED*	
S3.005	S-D6		338.2	OK	
S3.006	S-D7		337.1	OK	
S4.000	S-P5-3		39.5	SURCHARGED	
S4.001	S-P5-2		34.3	SURCHARGED	
S4.002	S-P5-1		34.2	OK	
S3.007	S-D8		370.3	OK	
S3.008	S-D9		367.9	OK	
S3.009	S-Headwall		87.7	OK	
S5.000	S-ESW81		26.7	SURCHARGED	
S5.001	S-ESW82		37.1	FLOOD RISK	
S5.002	S-ESW83		36.7	SURCHARGED	
S5.003	S-ESW84		35.5	SURCHARGED	
S6.000	Sdunny 7		0.0	SURCHARGED	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S6.001	S-P7-0		10.2	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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S5.004	S-ESW85	30 Winter	100	+40%	100/15 Summer				80.530	0.090	0.000	1.36	
S7.000	Sdummy 8	1440 Winter	100	+40%					80.465	-0.160	0.000	0.00	
S7.001	S-ESW86	1440 Winter	100	+40%					80.465	-0.060	0.000	0.20	
S5.005	S-ESW87	30 Winter	100	+40%	100/30 Winter				80.336	0.009	0.000	0.97	
S5.006	S-ESW88	30 Winter	100	+40%	100/15 Winter				80.206	0.020	0.000	1.08	
S5.007	S-ESW89	30 Winter	100	+40%					79.944	-0.073	0.000	0.79	
S5.008	S-ESW90	1440 Winter	100	+40%	100/30 Winter				79.790	0.062	0.000	0.64	
S5.009	S-ESW91	1440 Winter	100	+40%	100/15 Summer				79.727	0.159	0.000	0.81	
S5.010	S-ESW92	1440 Winter	100	+40%	100/480 Winter				79.679	0.167	0.000	0.70	
S5.011	S-ESW93	1440 Winter	100	+40%	100/480 Winter				79.623	0.229	0.000	0.57	
S5.012	S-ESW94	1440 Winter	100	+40%	100/360 Winter				79.557	0.269	0.000	0.54	
S5.013	S-ESW95	1440 Winter	100	+40%	100/15 Summer				79.490	0.442	0.000	0.86	
S5.014	S-ESW96	1440 Winter	100	+40%	100/240 Summer				79.435	0.462	0.000	0.57	
S5.015	S-ESW97	1440 Winter	100	+40%	100/240 Summer				79.369	0.524	0.000	0.68	
S5.016	S-Headwall	1440 Winter	100	+40%					79.312	-0.858	0.000	0.00	
S1.006	S-Basin	1440 Summer	100	+40%	100/60 Summer				79.299	0.769	0.000	1.20	
S1.007	S-HB7	1440 Summer	100	+40%	100/480 Winter				76.828	0.026	0.000	1.04	
S8.000	S-H31	15 Winter	100	+40%	100/15 Summer	100/15 Summer			81.001	1.121	1.163	0.83	
S8.001	S-H32	15 Winter	100	+40%	30/15 Summer	100/15 Summer			80.603	1.452	2.983	1.77	
S8.002	S-H33	15 Winter	100	+40%	30/15 Summer	100/15 Winter			80.260	1.640	0.229	0.97	
S8.003	S-ESW21	15 Winter	100	+40%	30/15 Summer	100/15 Summer			79.864	1.643	3.866	1.57	
S8.004	S-SW25	15 Winter	100	+40%	30/15 Summer	100/15 Summer			78.301	0.708	1.216	2.03	
S1.008	S-HB8	60 Winter	100	+40%					76.040	-0.221	0.000	0.51	
S9.000	Sdummy 4	480 Winter	100	+40%					76.566	-0.134	0.000	0.13	
S9.001	S-P4-0	15 Summer	100	+40%	1/15 Summer				76.627	0.047	0.000	0.13	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded	
S5.004	S-ESW85		34.4	SURCHARGED		
S7.000	Sdummy 8		0.0	OK		
S7.001	S-ESW86		10.4	OK		
S5.005	S-ESW87		34.2	SURCHARGED		
S5.006	S-ESW88		33.8	SURCHARGED		
S5.007	S-ESW89		33.7	OK		
S5.008	S-ESW90		21.9	SURCHARGED		
S5.009	S-ESW91		21.8	SURCHARGED		
S5.010	S-ESW92		21.8	SURCHARGED		
S5.011	S-ESW93		21.8	SURCHARGED		
S5.012	S-ESW94		21.8	SURCHARGED		
S5.013	S-ESW95		21.7	SURCHARGED		
S5.014	S-ESW96		21.7	SURCHARGED		
S5.015	S-ESW97		21.7	SURCHARGED		
S5.016	S-Headwall		29.4	OK		
S1.006	S-Basin		204.9	SURCHARGED*		
S1.007	S-HB7		204.9	SURCHARGED		
S8.000	S-H31		17.6	FLOOD		4
S8.001	S-H32		38.5	FLOOD		4
S8.002	S-H33		124.5	FLOOD		1
S8.003	S-ESW21		137.6	FLOOD		4
S8.004	S-SW25		168.7	FLOOD		4
S1.008	S-HB8		301.1	OK		
S9.000	Sdummy 4		22.1	OK		

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S9.001	S-P4-0		31.1	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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S1.009	S-HB9	15 Winter	100	+40%					74.923	-0.259	0.000	0.72	
S1.010	S-HW01	15 Winter	100	+40%					74.554	-3.216	0.000	0.01	
S10.000	S-P10-2	480 Winter	100	+40%	2/120 Winter				74.331	0.881	0.000	0.84	
S10.001	S-P10-1	15 Summer	100	+40%					73.336	0.000	0.000	1.00	
S1.011	S-P10-0	30 Summer	100	+40%					72.895	-2.910	0.000	0.01	
S11.000	S-EH41	15 Winter	100	+40%	30/15 Summer	100/15 Winter			82.610	2.155	0.171	1.66	
S11.001	S-EH42	15 Winter	100	+40%	30/15 Summer	100/15 Winter			81.280	1.310	0.047	1.34	
S11.002	S-EH43	30 Winter	100	+40%	30/15 Summer	100/15 Summer			80.048	0.698	7.825	1.28	
S11.003	S-EH44	30 Winter	100	+40%	30/15 Summer				79.659	0.698	0.000	1.46	
S12.000	Sdummy 8b	960 Winter	100	+40%					77.663	-0.062	0.000	0.00	
S12.001	S-P8-1	960 Winter	100	+40%	100/60 Winter				77.663	0.163	0.000	0.61	
S11.004	S-ESW1	30 Winter	100	+40%	30/15 Summer				79.264	2.314	0.000	0.26	
S13.000	S-EH16	15 Winter	100	+40%	30/15 Summer	100/15 Summer			89.927	1.157	7.104	1.07	
S13.001	S-EH15	60 Winter	100	+40%	2/15 Summer	30/15 Summer			86.558	0.757	18.451	1.12	
S13.002	S-EH14	60 Winter	100	+40%	30/15 Summer				83.620	0.169	0.000	0.57	
S13.003	S-EH13	60 Winter	100	+40%	30/15 Summer				83.525	0.277	0.000	0.74	
S13.004	S--EH12	60 Winter	100	+40%	30/15 Summer	30/15 Winter			83.421	0.269	40.626	1.10	
S13.005	S-EH11	15 Summer	100	+40%	30/15 Summer				83.712	1.223	0.000	0.93	
S13.006	S-EH9	15 Summer	100	+40%	2/15 Winter				83.704	1.477	0.000	1.19	
S14.000	S-EH1	15 Winter	100	+40%	30/15 Summer	100/15 Summer			89.616	1.156	6.128	1.15	
S14.001	S-EH2	15 Winter	100	+40%	100/15 Summer				85.692	0.665	0.000	0.91	
S14.002	S-EH3	15 Winter	100	+40%	100/15 Summer				85.419	0.749	0.000	0.91	
S14.003	S-EH4	30 Winter	100	+40%	30/15 Summer	100/15 Summer			83.503	1.207	3.483	0.87	
S14.004	S-EH5	30 Winter	100	+40%	2/15 Summer	100/15 Summer			82.879	1.412	8.722	2.02	
S13.007	S-EH8	15 Winter	100	+40%	30/15 Summer	100/15 Summer			82.840	1.411	0.248	0.97	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.009	S-HB9		407.3	OK	
S1.010	S-HW01		603.6	OK	
S10.000	S-P10-2		31.6	SURCHARGED	
S10.001	S-P10-1		29.8	SURCHARGED*	
S1.011	S-P10-0		612.3	OK	
S11.000	S-EH41		28.4	FLOOD	1
S11.001	S-EH42		53.2	FLOOD	1
S11.002	S-EH43		50.8	FLOOD	6
S11.003	S-EH44		60.0	SURCHARGED	
S12.000	Sdummy 8b		0.0	OK	
S12.001	S-P8-1		11.6	SURCHARGED	
S11.004	S-ESW1		43.5	FLOOD RISK	
S13.000	S-EH16		29.7	FLOOD	6
S13.001	S-EH15		31.3	FLOOD	12
S13.002	S-EH14		31.6	SURCHARGED	
S13.003	S-EH13		31.8	SURCHARGED	
S13.004	S--EH12		55.3	FLOOD	10
S13.005	S-EH11		55.9	SURCHARGED	
S13.006	S-EH9		60.1	SURCHARGED	
S14.000	S-EH1		40.6	FLOOD	5
S14.001	S-EH2		55.9	FLOOD RISK	
S14.002	S-EH3		84.6	SURCHARGED	
S14.003	S-EH4		76.4	FLOOD	6
S14.004	S-EH5		78.8	FLOOD	6

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.007	S-EH8		141.0	FLOOD	1

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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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)
S13.008	S-EH21	30 Winter	100	+40%	2/15 Summer	100/15 Summer			81.347	1.508	7.061	1.60	
S13.009	S-EH22	30 Winter	100	+40%	30/15 Summer				80.068	0.783	0.000	1.45	
S13.010	S-EH23	30 Winter	100	+40%	100/15 Summer				79.437	0.427	0.000	0.80	
S15.000	S-EH26	15 Winter	100	+40%	100/15 Summer	100/15 Winter			80.970	1.355	0.457	0.91	
S15.001	S-EH25	15 Winter	100	+40%	30/15 Summer	100/15 Summer			80.461	1.434	1.124	1.61	
S11.005	S-ESW2	30 Winter	100	+40%	30/15 Summer	100/15 Winter			79.164	2.504	13.650	1.50	
S11.006	S-ESW3	30 Winter	100	+40%					74.301	-0.328	0.000	0.52	
S1.012	S-HW03	15 Winter	100	+40%					72.777	-2.664	0.000	0.01	
S16.000	S-P3-1	360 Winter	100	+40%	100/60 Summer				73.585	0.210	0.000	1.00	
S16.001	S-HW04	1440 Summer	100	+40%	30/240 Winter				73.255	1.131	0.000	0.94	
S1.013	S-P3-0	30 Summer	100	+40%					71.793	-2.425	0.000	0.02	
S17.000	S-P1-1	960 Winter	100	+40%	100/60 Summer				70.423	0.348	0.000	1.00	
S17.001	S-HW08	1440 Summer	100	+40%	2/960 Winter				69.943	0.621	0.000	0.94	
S1.014	S-P1-0	960 Winter	100	+40%					69.896	-1.604	0.000	0.01	
S1.015	S-BASIN IN	960 Winter	100	+40%					69.863	-1.024	0.000	0.01	
S18.000	Sdummy 9a	1440 Winter	100	+40%	30/240 Winter				78.568	0.343	0.000	0.60	
S18.001	Sdummy 9b	1440 Winter	100	+40%	30/120 Winter				78.530	0.397	0.000	0.60	
S18.002	S-96	30 Summer	100	+40%					76.829	-1.701	0.000	0.00	
S18.003	S-97	15 Winter	100	+40%					75.229	-1.771	0.000	0.01	
S18.004	S-98	15 Winter	100	+40%					72.419	-1.901	0.000	0.01	
S18.005	S-99	15 Winter	100	+40%					70.969	-2.031	0.000	0.02	
S1.016	S-BASIN2	960 Winter	100	+40%					69.841	-0.959	0.000	0.01	
S1.017	S-HW09	960 Winter	100	+40%	1/60 Summer				69.829	1.254	0.000	2.29	
S1.018	S-ESW13	960 Winter	100	+40%					68.151	-0.349	0.000	0.37	
S1.019	S-ESW14	960 Winter	100	+40%					65.431	-0.120	0.000	1.00	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S13.008	S-EH21		153.4	FLOOD	6
S13.009	S-EH22		183.7	SURCHARGED	
S13.010	S-EH23		198.6	SURCHARGED	
S15.000	S-EH26		40.3	FLOOD	1
S15.001	S-EH25		71.4	FLOOD	4
S11.005	S-ESW2		243.5	FLOOD	5
S11.006	S-ESW3		243.4	OK	
S1.012	S-HW03		931.6	OK	
S16.000	S-P3-1		59.9	SURCHARGED	
S16.001	S-HW04		58.2	SURCHARGED*	
S1.013	S-P3-0		1152.3	OK	
S17.000	S-P1-1		60.3	SURCHARGED	
S17.001	S-HW08		58.7	SURCHARGED*	
S1.014	S-P1-0		530.1	OK	
S1.015	S-BASIN IN		518.8	OK	
S18.000	Sdummy 9a		6.3	SURCHARGED	
S18.001	Sdummy 9b		6.3	SURCHARGED	
S18.002	S-96		10.9	OK	
S18.003	S-97		256.2	OK	
S18.004	S-98		489.3	OK	
S18.005	S-99		1127.2	OK	
S1.016	S-BASIN2		491.6	OK	
S1.017	S-HW09		490.9	SURCHARGED*	
S1.018	S-ESW13		490.9	OK	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.019	S-ESW14		490.9	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	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.020	S-ESW15	960 Winter	100	+40%					64.516	-0.795	0.000	0.25			490.9
S1.021	S-ESW16	960 Winter	100	+40%					64.292	-0.795	0.000	0.25			490.9
S1.022	S-ESW17	960 Winter	100	+40%					64.019	-0.897	0.000	0.15			490.9

PN	US/MH Name	Status	Level Exceeded
S1.020	S-ESW15	OK	
S1.021	S-ESW16	OK	
S1.022	S-ESW17	OK	

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Cundall Johnston & Partners LLP
10th Floor Manchester One Portland Street
Manchester M1 3LD United Kingdom
Tel:+44 (0)161 244 5660
Asia Australia Europe MENA UK and Ireland
www.cundall.com

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