



Surface Water Drainage Strategy

Site Address

63 Knowsley Street
Cheetham Hill
Manchester
M8 8HX

Client

Andersen Textiles Ltd

Report Reference

SWDS - 2020 - 00039

Prepared By

STM Environmental Consultants Ltd

Date

29/04/2022



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1 Document Control



Surface Water Drainage Strategy



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2 Abbreviations

Abbreviation	Description
STM	STM Environmental Consultants Limited
BGS	British Geological Survey
EA	Environment Agency
OS	Ordnance Survey of Great Britain
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
FWD	Floodline Warning Direct
FRMS	Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
SWMP	Surface Water Management Plan
SFRA	Strategic Flood Risk Assessment
CDA	Critical Drainage Area
SuDS	Sustainable Drainage Systems
GWSPZ	Groundwater Source Protection Zone

3 Disclaimer

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd (STM) and can only be used and relied upon by Andersen Textiles Ltd (Client).

STM has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report. Furthermore, STM accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report. Any party other than the Client using or placing reliance upon any information contained in this report, do so at their own risk.

4 Executive Summary

Location	63 Knowsley Street, Cheetham Hill, Manchester, M8 8HX Grid reference: 383871, 399753		
Proposed Development	7 wholesale units at ground floor with ancillary storage at first and second floor, and car parking.		
Current Use	Car park		
Hydrology	River Irwell 580m SW.		
Geology	Diamicton Till superficial deposits and the bedrock is classified as belonging to the Chester Pebble Bed (Sandstone). The BGS also identifies the site has been covered by infilled land (artificial deposits).		
Hydrogeology	Unproductive superficial and principal bedrock aquifer.		
Permeability	Highly variable superficial and freely draining bedrock.		
Infiltration Potential	Good potential.		
Fluvial Flood Risk	Low.		
Surface Water Flood Risk	Low.		
Groundwater Flood Risk	Low.		
Site Area	1160m ²		
Existing and Proposed Site Layout	Ground Cover	Existing	Proposed (Without SuDS)
	Buildings	0	581
	Driveways/Patio	1160	579
	Gardens/ Soft landscaping	0	0
	Total Impermeable Area	1160	1160

Run-Off Rates	Greenfield (GF) (l/s)	Pre - Development (PD) (l/s)	Post Development (PD) (l/s)
Qbar	0.4022	0.8771	0.8771
1 in 1	0.3418	0.7456	0.7456
1 in 30	0.9250	2.0174	2.0174
1 in 100	1.2829	2.7981	2.7981
1 in 100 + CC (40%)	1.9017	4.1480	4.1480
SuDS Target Requirement	As the development is taking place on an already developed site the non-statutory technical standards for sustainable drainage systems S3 (peak flow) and S5 and S6 (volume controls) apply.		
Storage Required to meet Planning Requirement	Using the Microdrainage quick storage estimate method the total storage volume required to match greenfield discharges or pre-development rate was calculated to be 57 - 82m ³ .		
Infiltration Testing	Infiltration testing was not undertaken due to the evidence of infilled ground covering the site as indicate by the BGS.		
SuDS Strategy	The use of permeable paving (16.875m³) and geocellular storage (95.0m³) will provide a total of 111.875m³ of interception and attenuation storage. A further 13.3m³ of storage will be available within the associated pipes and manholes. Excess run-off will be discharged into the nearby United Utilities sewer at a limited rate of 1.2l/s using an Orifice. This matches the greenfield development run-off rate for the major storm events. The proposed permeable paving will reduce the “effective impermeable site area” of the proposed development by 125m² and ensure that discharge rates match the greenfield runoff rate. It provides a filtration medium for all surface water runoff, including the rooftop and all surface waters will pass through an interceptor manhole before entering the Geocellular storage.		
Conclusion	With the proposed SuDS mitigation measures in place, we believe that the proposed development will reduce local flood risk and therefore be in compliance with Condition 17 of the planning permission 127544/FO/2020, the LLFA's current planning policy and the NPPF.		

5 Introduction

STM Environmental Consultants Limited have been appointment by Andersen Textiles Ltd to undertake a Surface Water Drainage Strategy for a proposed development at 63 Knowsley Street, Cheetham Hill, Manchester, M8 8HX.

5.1 Proposed Development

The SWDS is required to support a planning application (Reference: 127544/FO/2020) for the erection of 3 storey building to create 7 wholesale units at ground floor with ancillary storage at first and second floor, and car parking.

The planning condition 17 states as follows:

Prior to the commencement of above ground development, the following details shall be submitted and approved in writing by the City Council with regard to flood risk:

-  Surface water drainage layout, including proposed overland flow routes for extreme events (up to 1 in 100 year including climate change allowance);
-  Details of any surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester, Trafford and Salford Strategic Flood Risk Assessment.
-  Hydraulic calculations to support the drainage proposals.
-  Details of how the scheme will be maintained and managed after completion.

Reason - To prevent the increased risk of flooding, to improve and protect water quality and ensure future maintenance of the surface water drainage system, pursuant to policy EN17 of the Manchester Core Strategy. Some elements of the drainage of the site have not yet been fully defined. The details are required prior to works commencing on site to ensure the most suitable and appropriate methods of drainage are installed prior to buildings being constructed on site.

Copies of the development plans and decision noticed are presented in [Appendix 1](#).

5.2 Report Aims and Objectives

This report sets out the proposed drainage strategy that will be employed in the designs to meet the requirements of the planning condition and the National Planning Policy Framework.

5.3 Legislative and Policy Context

5.3.1 Legislative Context

Section H3 of the Building Regulations 2010 requires that adequate provision is made for rainwater to be carried from the building roofs and paved areas, and be preferentially discharged to soakaways or some other adequate infiltration system. Where that is not reasonably practicable, a watercourse; or sewer can be used.

The Flood and Water Management Act was introduced in 2010. The Act defines the role of lead local flood authority (LLFA) for an area. All LLFA are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area, called “local flood risk management strategy”.

Alongside the Act, Flood Risk Regulations (2009) outline the roles and responsibilities of the various authorities, which include preparing Flood Risk Management Plans and identifying how significant flood risks are to be mitigated.

5.3.2 Policy Context

The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. The policies set out in this framework apply to the preparation of local and neighbourhood plans and to decisions on planning applications.

Paragraph 163 of the National Planning Policy Framework (NPPF) states that:

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment
--

following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

-  within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location
-  development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

Paragraph 165 states that:

Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

-  take account of advice from the lead local flood authority;
-  have appropriate proposed minimum operational standards;
-  have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
-  where possible, provide multifunctional benefits.

A major development is defined as:

-  a residential development: 10 dwellings or more or residential development with a site area of 0.5 hectares or more where the number of dwellings is not yet known
-  a non-residential development: provision of a building or buildings where the total floor space to be created is 1000 square metres or more or where the floor area is not yet known, a site area of 1 hectare or more.

Evidence that sustainable drainage (SuDS) has been considered should be submitted for Minor Developments.

5.3.3 Manchester City Council - Policy EN 17 - Water Quality

Development should avoid any adverse impact on water quality, including during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological;

Development should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses;

Development close to a watercourse should also ensure that waste or litter cannot enter the watercourse from the site;

Development should, where feasible and appropriate, seek to open up any culverted or hidden watercourse beneath the site to improve the ecological status of that watercourse.

6 Site Characteristics

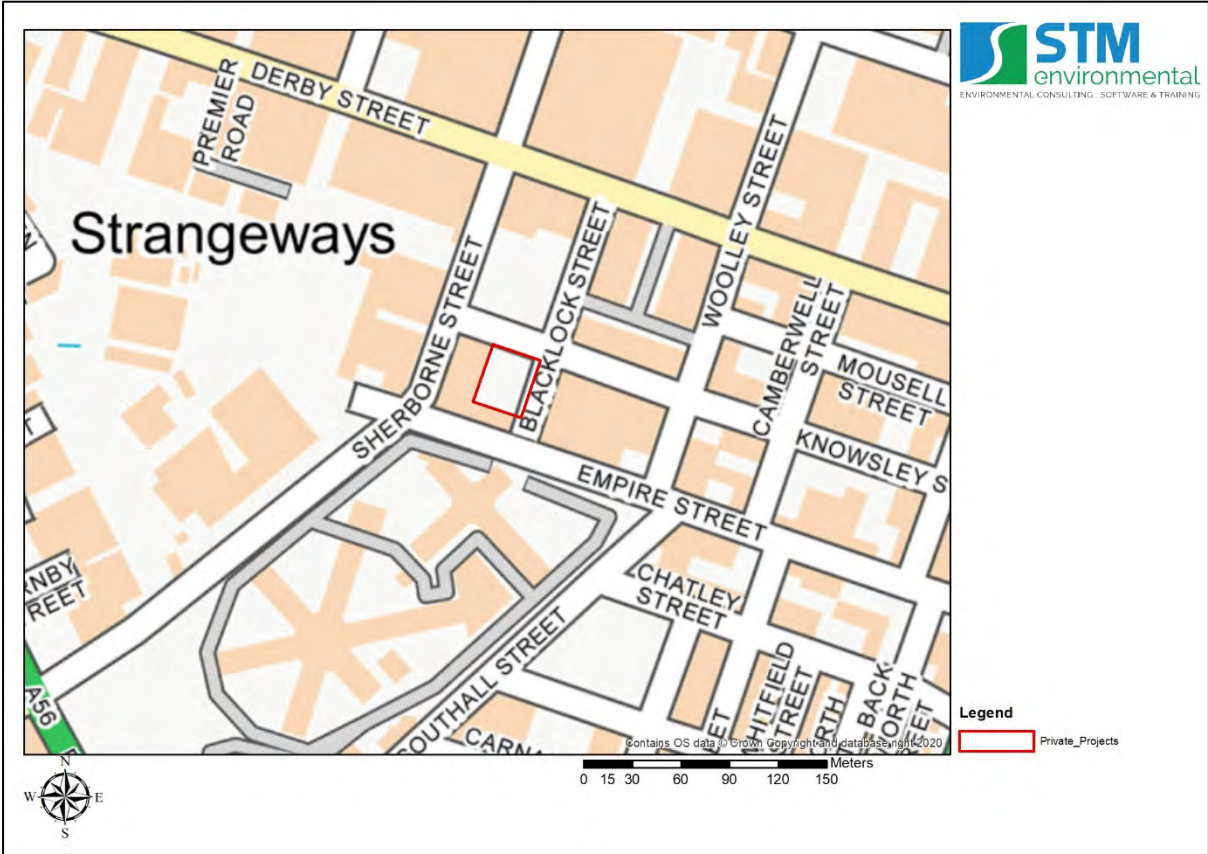
6.1 Location and Area

The site is centred at national grid reference 383871, 399753 and has an area of 1,160m².

It falls within the jurisdiction of Manchester City Council in terms of the planning consultation process on flood risk and surface water management. The LLFA is Manchester District Council.

Figure 1 provides the site location map and aerial imagery.

Figure 1: Site location map and aerial photo



6.2 Current Site

The site is currently used as car parking.

6.3 Site Topography

The mapping provided in [Appendix 2](#) shows that the topography within the site.

The site is flat at 45.3 - 45.5mAOD.

6.4 Geology and Hydrology

The nearest main watercourse is the River Irwell, located 580m south west of the site.

[Appendix 2](#) presents BGS mapping showing the geology in the area of the site.

The BGS Geoindex indicates that the superficial deposits at the site consist of Diamicton till whilst the bedrock is classified as belonging to the Chester Pebble Bed (Sandstone). The BGS also identifies the site to be covered by infilled land (artificial deposits).

6.5 Hydrogeology

[Appendix 2](#) presents mapping from the BGS with indications of the hydrogeological characteristics of the site.

The permeability of the bedrock geology is considered to be freely draining while that of the superficial geology is considered to be highly variable.

The BGS infiltration potential map suggests that there is likely to be good potential for infiltration methods at the site.

The maps also indicate that the groundwater table is greater than 5mBGL.

The site lies upon a principal bedrock aquifer and an unproductive superficial aquifer. The site does not lie within a groundwater source protection zone.

6.6 Flood Risk

6.6.1 Fluvial Flood Risk

Fluvial and tidal risk is assessed using flooding maps produced by the Environment Agency (EA). These maps use available historic data and hydraulic modelling to define zones of flood risk. The maps allow a site to be defined in terms of its Flood Zone (e.g. 1, 2, 3a or 3b) and in terms of the overall flood risk (very low, low, medium or high).

The EA Flood Zones are defined as:

-  Flood zone 1: Less than a 1 in 1000 annual probability of fluvial and/or tidal flooding;
-  Flood zone 2: Between 1 in 100 and 1 in 1000 annual probability of fluvial flooding and/or between 1 in 200 and 1 in 1000 annual probability of tidal flooding;
-  Flood zone 3a: Greater than 1 in 100 annual probability of fluvial flooding and/or greater than 1 in 200 annual probability of tidal flooding;
-  Flood zone 3b: functional flood plain (definition specific to the LLFA). Less than a 1 in 20 annual probability of fluvial and/or tidal flooding.

The site is designated as being within flood zone 1 and is therefore considered to have a low risk of flooding. This equates to a potential yearly risk of flooding of less than 1 in 1000 annual probability of fluvial and/or tidal flooding (0.1 % Annual Expected Probability).

6.6.2 Surface Water Flood Risk

Surface water flooding occurs when high intensity rainfall leads to run-off which flows over the ground surface, causing ponding in low-lying areas when the precipitation rate or overland flow rate is greater than the rate of infiltration, or return into watercourses. Surface water flooding can be exacerbated when the underlying soil and geology is saturated (as a result of prolonged precipitation or a high-water table) or when the drainage network has insufficient capacity.

The chief mechanisms for flooding can be divided into the following categories:

-  Runoff from higher topography – the areas of greatest flood depths tend to be at the base of the steeper land;
-  Localised surface water runoff – within the central parts of the borough, surface water flooding tends to be a result of localised ponding of surface water;
-  Sewer Flooding – areas where extensive and deep surface water flooding is likely to be influenced by sewer flooding. Where the sewer network has reached capacity, and surcharged, this will exacerbate the flood risk in these areas.
-  Low Lying Areas – areas such as underpasses, subways and lowered roads beneath railway lines are more susceptible to surface water flooding;
-  Railway Cuttings – leading to internal ponding and transport disruption;
-  Railway Embankments – discrete surface water flooding locations along the up-stream side of the raised network rail embankments where water flows are interrupted and ponding can occur.

A map showing the site and the modelled prediction of surface water flood risk and depth provided by the EA is available in [Appendix 3](#). This indicates that the site is at low risk of flooding.

The site will not witness any surface water flooding during the 1 in 30 or 1 in 100 years rainfall return period.

The site will witness surface water flooding depth of up to 150mm during the 1 in 1000 years event.

6.6.3 Groundwater Flood Risk

Groundwater flooding occurs when water rises from the underlying aquifer at the location of a spring – where the underlying impermeable geology meets the ground surface. This tends to occur after much longer periods of intense precipitation, in often low-lying areas where the water table is likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although

increasingly it is also being associated with more localised floodplain sands and gravels.

Groundwater susceptibility mapping provided by BGS is presented in [Appendix 3](#). This indicates that there is no significant potential for groundwater flooding to occur at the surface.

6.7 Existing Surface Water Drainage Features

The existing surface water runoff from the car park drains into the United Utilities sewer.

A utility search was undertaken which identified United Utilities as the waste water operator in the area.

United Utilities operates a combined sewer within the local area. The closest sewer run is located to the north of the site along Knowsley Street, flowing west to east across the northern boundary. The closest asset ID is 8707, it's cover level is 45.87mAOD and its invert level is 42.4mAOD.

7 Hydrological Run-off Assessment

To minimise the impact of the new development on local flood risk, the NPPF requires that the water drainage arrangements for any development site are that the volumes and peak flow rates leaving the site post-development are improved upon those of the existing conditions. The following run-off assessment predicts the Greenfield, pre- and post-development run-off rates and provides the required SuDS necessary for complying with the relevant planning policies.

7.1 Existing and Proposed Ground Cover

A summary of the existing and proposed site ground cover is shown below in Table 1 and Table 2 below.

Table 1: Breakdown of Ground Cover in the Proposed Development

Ground Cover	Existing Area (m ²)	Proposed Area (m ²) (Without SuDS)	Difference
Buildings	0	581	581
Driveways/Patio	1160	579	-581
Gardens/ Soft landscaping	0	0	0
Total	1160	1160	

Table 2: Summary of Permeable and Impermeable Areas

	Impermeable Area (m ²)	Permeable Area (m ²)	Total Area (m ²)
Existing Site	1160	0	1160
Proposed Site	1160	0	1160
Difference	0	0	

8 SuDS Requirements

8.1 Peak Flow Control

With regard to peak flow control, the non-statutory technical standards for sustainable drainage systems state that:

 S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

8.2 Volume Control Requirements

With regard to volume control, the non-statutory technical standards for sustainable drainage systems state that:

- S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.
- S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

8.3 Run-off and Storage Calculations

The IH124 method was applied to calculate the Greenfield and post-development run-off rates that include the 40% allowances for climate change. The full results are presented in [Appendix 4](#). Table 3 and Table 4 below give a summary of the results.

Table 3: Calculation of post-development run-off rates for the site.

	Greenfield (l/s)	Greenfield + CC	Pre - Development	Pre - Development + CC	Post Development	Post Development + CC
Qbar	0.4022	0.5962	0.8771	1.3003	0.8771	1.3003
1 in 1	0.3418	0.5067	0.7456	1.1053	0.7456	1.1053
1 in 30	0.9250	1.3712	2.0174	2.9907	2.0174	2.9907
1 in 100	1.2829	1.9017	2.7981	4.1480	2.7981	4.1480

As the development is taking place on an already developed site S3 (peak flow) and S5 and S6 (volume controls) apply. Therefore, the target discharge rate to the sewer or watercourse from this site, was set to no more than the 1 in 100 greenfield runoff rate which was calculated to be 1.2l/s.

United utilises have agreed in principle to an allowable discharge rate of 5.0 l/s to allow for a reduction in the required storage. LLFA to decided.

The quick storage estimate tool in Microdrainage was used to estimate the approximate storage required. The storage volume required to match greenfield rates

is estimated to be **57 - 82m³**. Screenshots of the quick storage estimate and variables are available in [Appendix 4](#).

9 Site Investigation

A site investigation has not been undertaken due to the evidence that this site is located on infilled land as indicated by the BGS artificial deposits layer file.

10 SuDS Options

As mentioned above, planning policies require that SuDS strategies consider source control (i.e. disposal of runoff within the plot boundary), followed by site control (site wide disposal) and then regional control (appropriate for larger development with strategic drainage infrastructure). They also require that those methods that give the most benefits in terms of sustainability are prioritised for employment (generally known as the SuDS Hierarchy) as further described below.

10.1 SuDS Hierarchy

The SuDS Hierarchy sets out the preferred method of selecting which Sustainable Drainage System should be used. Generally, 'soft SuDS' such as ponds and swales are the preferred drainage systems as they mimic natural drainage and provide a number of benefits including attenuation of surface water flows and flow rates as well as pollution.

Smaller developments which may not have the physical room for pond and swales would need to consider other options. In these cases, preference should be given to infiltration systems. However, care should be taken if implementing infiltration systems near aquifer protection zones, close to buildings or structural foundations or in areas where soils may be polluted.

The SuDS hierarchy is summarised in Figure 2 below.

Figure 2 SuDS Hierarchy

Most Sustainable Least Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviers	✓	✓	
	Tanked systems - over-sized pipes/tanks - storms cells	✓		

10.2 Assessment of SuDS Options

An assessment was made of the suitability of a range of potential SuDS techniques that could be implemented as part of the development. The results of the assessment are summarised in [Appendix 5](#) and are further discussed below.

10.2.1 Living Roofs

Although buildings account for more than 581m² of the site cover, given the proposed pitched style roofs, living roofs will not be suitable option.

10.2.2 Basins, Ponds, Filter Strips and Swales

Basins, ponds, filters strips and swales are not suitable due to limited space.

10.2.3 Infiltration Devices

Infiltration techniques should be given priority in any SuDS design as they deal with discharge on the site returning water to the aquifer and subsequently rivers via baseflow.

However, care must be taken to ensure that contamination of groundwater is prevented. The Environment Agency publication 'Groundwater protection: Policy and practice (GP3) Section G, 2012, states that the Environment Agency will support sustainable drainage systems for new discharges to ground subject to an appropriate risk assessment to demonstrate that ground conditions are suitable and infiltration systems do not present an unacceptable risk of promoting mobilisation of contaminants or creating new pathways for contaminant migration.

Mapping provided by the BGS showing the infiltration potential of the site is presented in [Appendix 3](#). The map indicates that although there is good potential for infiltration SuDS in the area, given that the location is covered by infilled land, it is thought that infiltration is not suitable for this site location.

10.2.4 Permeable Surfaces and Filter Drains

Over 580m² of the development will consist of car parking and driveways which could be designed to be permeable.

10.2.5 Tanked Systems

A tanked system incorporating a hydro brake restricting flow to the sewer would be a viable option if infiltration is not suitable. However, this option is ranked as being the least sustainable in the SuDS hierarchy.

10.2.6 Rainwater Harvesting

The use of rainwater butts and or harvesting tanks could be employed within each individual building and patios, although they would have a limited storage capacity and will be required to be an active system.

Detailed descriptions of some of the proposed SuDS techniques are available in [Appendix 7](#).

11 SuDS Implementation

11.1 Proposed Drainage System

The proposed drainage system will convert the car parking spaces into permeable block paving with a sub-base. All surface waters will drain via the permeable paving and an interceptor before entering a geocellular storage system. It will be installed below the roadway to provide for stormwater control before discharging into the United Utilities sewer along Knowsley Street to the north at a controlled discharge rate.

The proposed scheme is described in more detail below.

11.1.1 Permeable Block Paving

The car parking area within the yard to the front of the proposed units accounts for 125m². Runoff from this area will be managed using permeable block paving.

Permeable Paving (Marshalls Prior or similar) combines hardstanding with SuDS and works in a very different way to traditional pavement. It is designed to allow rainfall to percolate immediately through the surface near to where the raindrop lands – so surface ponding is completely eradicated without the need for an additional channel drainage system.

The construction will consist of 80mm interlocking concrete blocks with jointing, with a 200mm underlying bedding layer Dense Bitumen Macadam (DBM) and a 450mm sub-base consisting of a graded aggregate (Marshalls Priora Aggregates or similar) with a porosity of 0.30). This 450mm construction will allow for the heavy goods vehicles to manoeuvre over it without causing damage to its intended design.

This construction over 125m² will provide approximately 16.875m³ of interception, attenuation, and treatment storage. The construction will form a long strip along the western boundary, covering half of the car parking spaces (to allow for heavier vehicles to manoeuvre fully in and out the site) and will also be placed below the bin storage area in the north.

The water flows into a specially prepared sub-base, where the voids between the stones which make up the structure act as a temporary reservoir. During a rainstorm, the water is collected in the sub-base ('attenuated') before it is slowly released either by natural infiltration into the ground beneath the pavement.

The construction of the permeable concrete block paving and the underlying sub-base will act as a filter medium and over time the microbial organisms will cultivate in the pavement helping to break down any hydrocarbons from fuel leaks, exhaust fumes and oil sumps drips.

The permeable block paving will be lined and will drain into an interceptor catchment manhole, to provide further protection to the geocellular storage, and receiving drainage network. The inclusion of the permeable surface will reduce the effective impermeable area by 125m²; however, it remains part of the positively drained area

11.1.2 Geocellular Storage

The remaining hardstanding (460m²) forms the roadway and turning area of the site. This will remain as impermeable concrete to allow for heavy goods vehicles.

The surface water runoff from the roadway and the downpipes from the proposed building (581m²) will drain into geocellular attenuation via the permeable paving and interceptor manhole mentioned above.

One geocellular storage structures will be installed and cover an area of 100m² with a thickness of 1.0m. The geocellular storage crates ([Geocell Drainage Crates](#) or similar) will have a porosity of 95%, stacked together to create the desired storage volume of thus providing a total storage volume of 95.0m³.

Excess stormwater from the geocellular units will be conveyed to a manhole located in the centre of the driveway which will convey it to the outfall on the northern boundary of the site via an Orifice flow control device (or similar) which will restrict the flow to 1.2l/s.

11.1.3 Discharge Control Device

An orifice flow control device chamber will be used to limit the discharge from the site into the United Utilities surface water sewer to 1.2l/s. Ensuring the surface water runoff rate is limited to the greenfield 1 in 100-year scenario.

An overflow pipe will be fitted to bypass the flow control in the event of a failure or unprecedented event.

Details and examples of product specification sheets are available in [Appendix 7](#).

11.1.4 Microdrainage Modelling

Microdrainage Modelling was carried out to assess the performance of the proposed drainage system under a variety of modelled storm events. The designed system including the proposed attenuation storage, provides a total storage of 125m³ when all pipes, manholes and storage structures are included.

No flooding was indicated during any of the modelled scenarios, including the 1 in 100 year plus 40% climate change event.

Full results, drainage layout including the proposed discharge point and exceedance flows of this are available in [Appendix 8](#).

11.1.5 Surface Water Discharge Points

As there is no nearby watercourse, run-off from the development will be conveyed via 225mm diameter lateral drains to the surface water sewer on Knowsley Street. The closest surface water asset identified is 8707, it has a cover level of 45.87 mAOD and invert level of 42.11 mAOD.

A agreement in principle has been agreed with United Utilities, a copy of the email chain is available in [Appendix 9](#).

A copy drainage asset search is available in [Appendix 9](#).

11.1.6 Treatment of Run-off

Treatment of roof water runoff will be provided through the provision of permeable paving and interceptor manhole to intercept gross solids and sediment and potential contamination; guidance will be provided to developer on appropriate maintenance requirements including regular cleaning of gullies.

11.1.7 Exceedance Flows

The site is flat at 45.3. Knowsley Street road runs northwest to east across the northern boundary. The elevation review of the LIDAR 1m DTM Mapping indicates that in the event of exceedance on the site, that overland flows would be contained within the kerbsides within the yard area before flowing gradually onto Knowsley Road and away from the site to the northwest. Knowsley Street slopes gradually to the west as indicated by the 1m DTM LIDAR data.

The buildings will have a threshold step of 150mm at the entrance ways, the finished floor level will be 45.45mAOD.

The access roadway and car parking, will be designed to fall away from the building, with a gradual drop of approximately 0.1m across the 12m from building towards western boundary. Any exceedance flow events will pool within the site before entering the drainage system once water levels recede. In the worst-case scenario, they will drain onto the roadway. However, this would be a very extreme event given the proposed attenuation and proposed camber.

Furthermore, a slotted drainage gully will be fitted to the entrance of all buildings and will extend around the perimeter of the site to ensure the conveyance of exceedance flows away from the new builds.

It can be seen from the design proposals; the proposed system includes approximately 111.9m³ of storage capacity. In addition, a safety factor of 2 was applied to the Microdrainage modelling, which gives a further degree of confidence that exceedance flows are unlikely to occur. However, in the unlikely event that an inundation of the proposed system results in overland flows, then appropriate level design will be employed to ensure that flood waters are directed away from buildings.

A map displaying the exceedance flow is available in [Appendix 8](#).

11.2 Maintenance and Adoption of SuDS

All SuDS features will be properly installed by competent persons. They will be maintained regularly to ensure that their design capacity and attenuation characteristics provide the required storage volume.

Landscaping and adjacent areas will be designed such that they do not cause soil, mulch and other materials to be washed onto the permeable surfaces and into drains causing clogging.

Owners of the properties/persons responsible for maintenance of SuDS components will be provided with operation and maintenance manuals which will include information such as:

-  the location of SuDS components;
-  an explanation of design intent and objective of the SuDS;
-  the requirements for regular and occasional inspection and maintenance;
-  visual indicators that may trigger maintenance.

Regular maintenance of SuDS components is relatively straightforward with the main tasks consisting of:

-  Regular visual inspections – checking inlets are not blocked and verifying that clogging has not occurred;
-  Litter and debris removal;
-  Grass cutting;
-  Preventive sweeping;
-  Weeding and invasive plant control;
-  Oil and stain removal.

Occasional maintenance activities to ensure the long-term performance of the SuDS features include:

-  Sediment removal
-  Vegetation and plant replacement

These simple measures will ensure that the storage capacity of the system is maintained and that the need for reconstruction and replacement of components is minimised.

Further details on SuDS maintenance measures that will be employed at the site can be found in [Appendix 8](#).

12 Conclusion and Recommendations

The use of permeable paving (16.875m^3) and geocellular storage (95.0m^3) will provide a total of 111.875m^3 of interception and attenuation storage. A further 13m^3 of storage will be available within the associated pipes and manholes giving a total of 125m^3 of storage.

Excess run-off from the system will be discharged into the nearby United Utilities sewer via an Orifice at a maximum rate of 1.2l/s . This matches the greenfield run-off rate for the 1 in 100-year storm event.

No flooding will be witnessed during the 1 in 100 plus 40% climate change event as shown in detailed Microdrainage modelling.

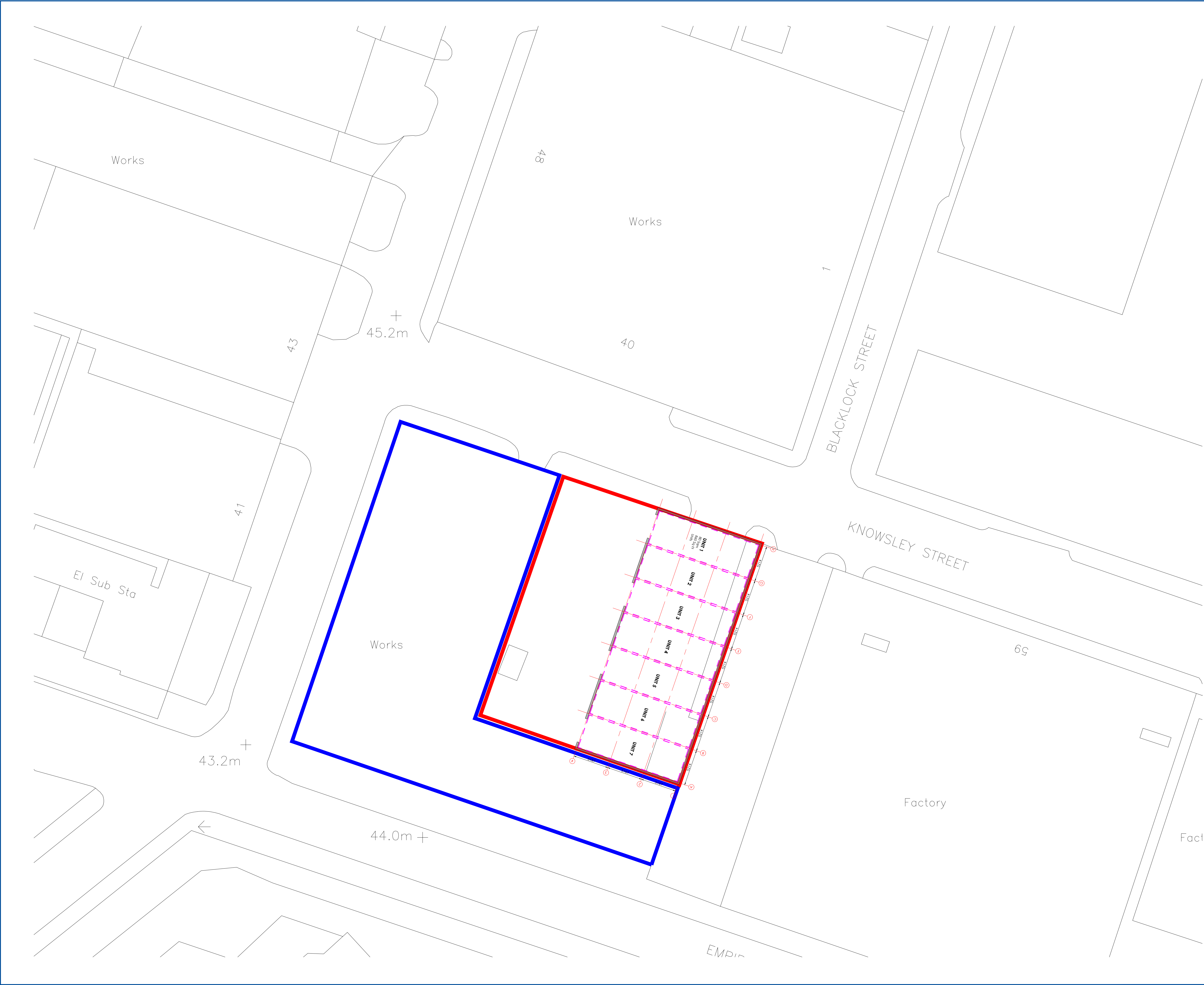
With the proposed SuDS mitigation measures in place, it is considered that the proposed development will reduce local flood risk and enhance the local environment and will therefore be in compliance with the LLFA's current planning policy and the NPPF.

13 References

1. Communities and Local Government - National Planning Policy Framework NPPF, March 2012.
2. Manchester City Council – Local Plan, 2018.
3. CIRIA, Defra, Environment Agency – UK SuDS Manual, 2015.

14 Appendices

14.1 Appendix 1 – Development Plans



Notes:

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2. WORK TO FIGURED DIMENSIONS ONLY.

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LOCATION PLAN

SCALE 1:250

REV:	DESCRIPTION:	BY:	DATE:
STATUS:			

gsmindustrial

0161 203 45410161 205 1980

Providence Works, Norton St, Manchester, M40 8EHwww.gsmindproperties.co.uk

CLIENT:

Amir
Andersen Textiles
63 Knowsley St
Manchester

SITE:

Style House
Knowsley St / Blacklock St
Manchester, M8 8HX

TITLE:

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	07.10.15	BWM	
PROJECT NO:	DRAWING NO:	REVISION:	



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SITE PLAN

SCALE 1:100

B	CAR PARK & REFUSE PROVISIONS	BM	18.08.16

REV:	DESCRIPTION:	BY:	DATE:
STATUS:	PLANNING		

gsmindustrial
0161 203 4541 0161 205 1980
Providence Works, Norton St, Manchester, M40 8EH www.gsmindproperties.co.uk

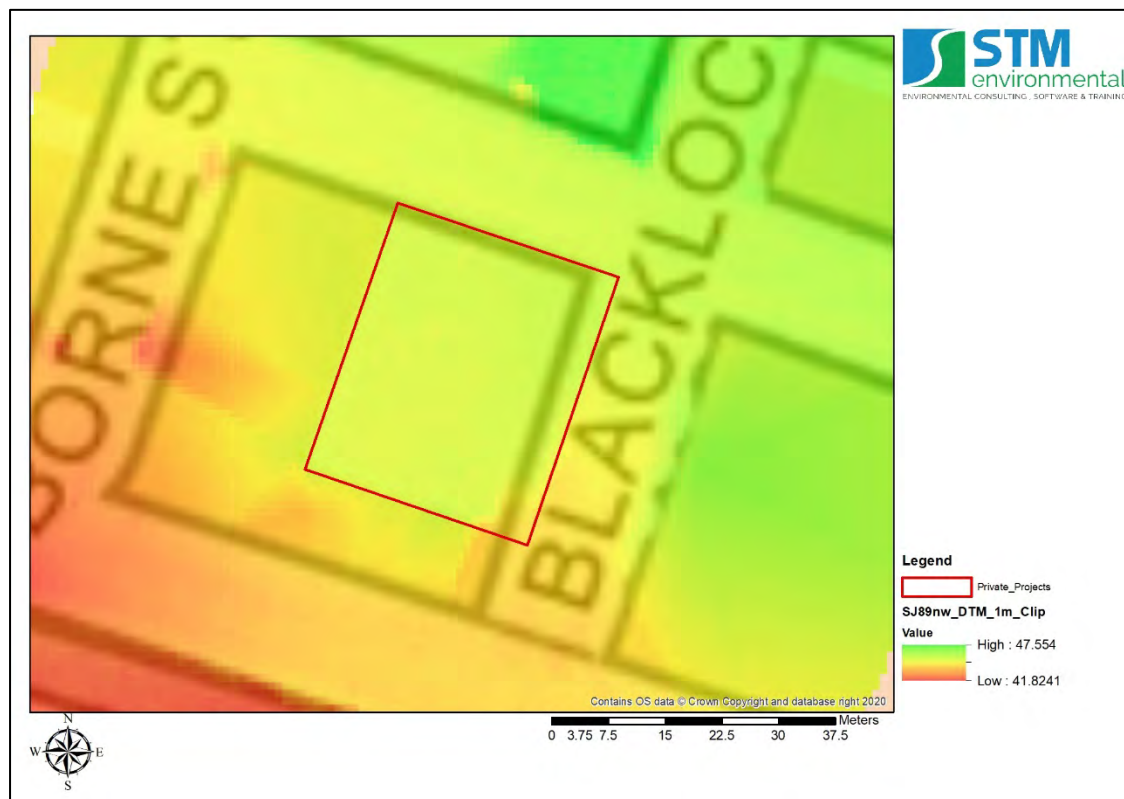
CLIENT:	Amir Andersen Textiles 63 Knowsley St Manchester
---------	---

SITE:	Style House Knowsley St / Blacklock St Manchester, M8 8HX
-------	---

TITLE:			
SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	07.10.15	BWM	
PROJECT NO:	DRAWING NO:		REVISION:
	001B		

14.2 Appendix 2– Site Topography and Drainage Characteristics

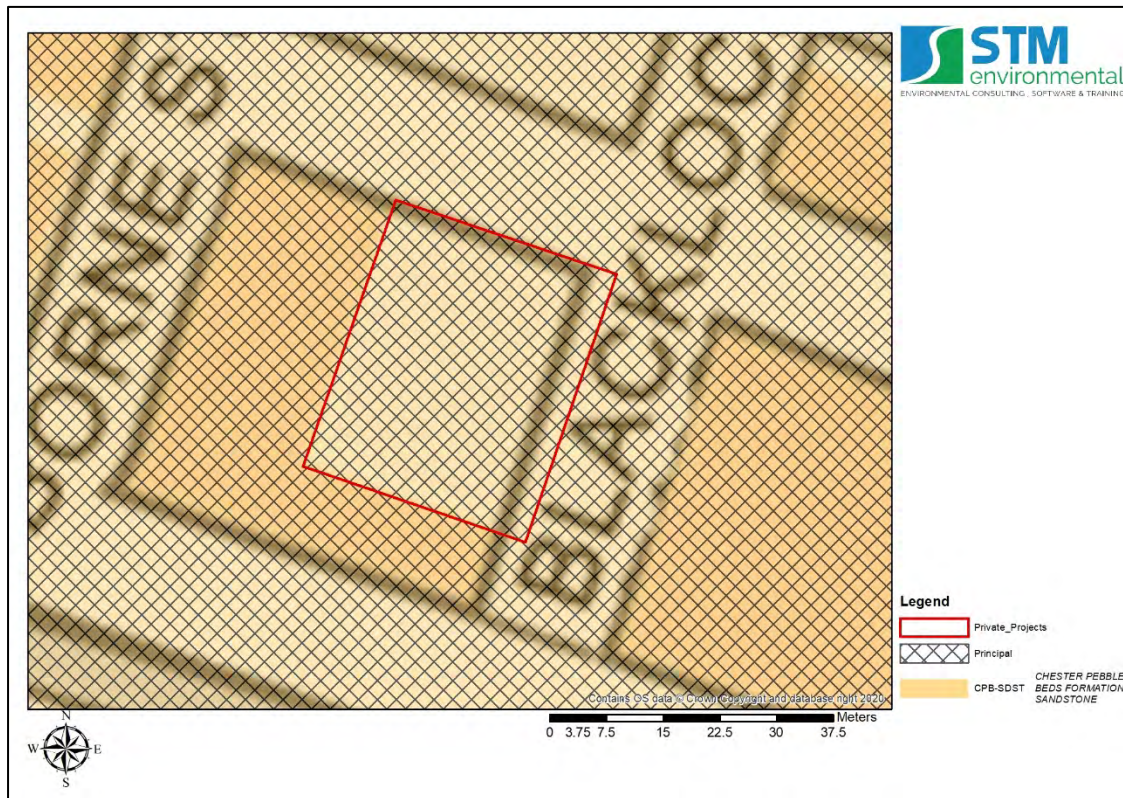
14.2.1 LIDAR Mapping showing Site Topography - (Source: OS 2017)



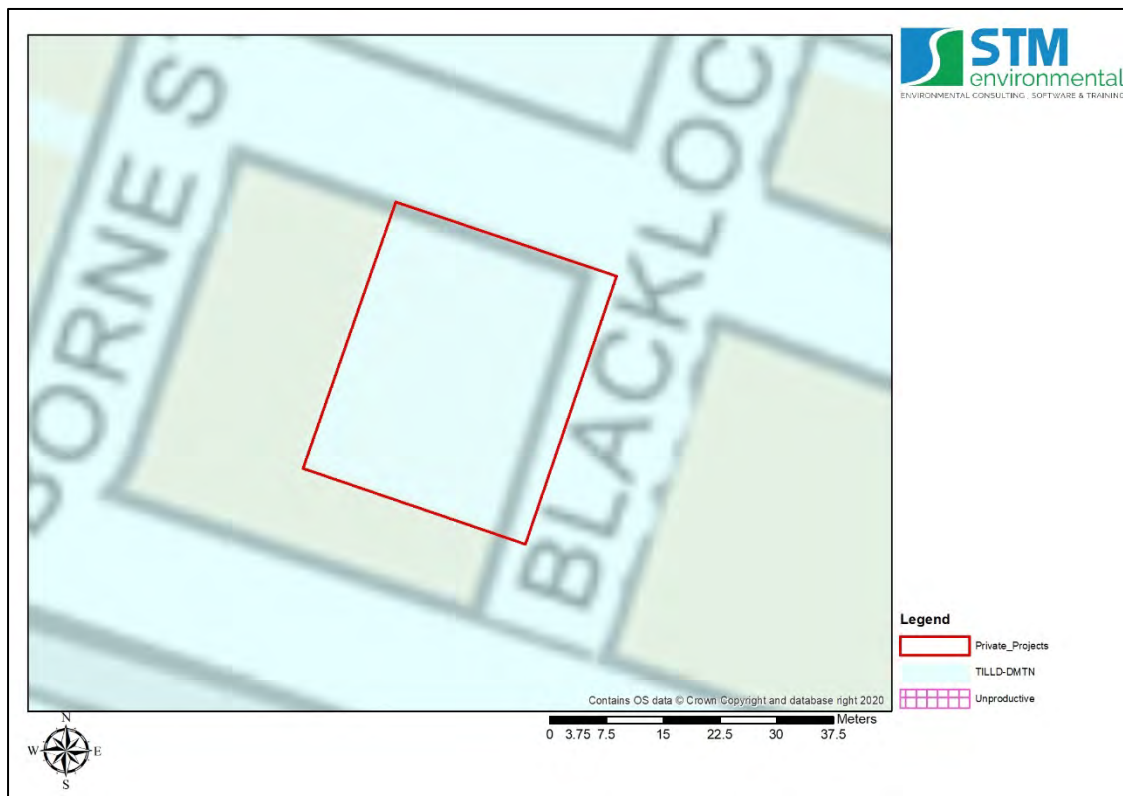
14.2.2 Topographic Survey

Not conducted.

14.2.3 Bedrock Hydrogeology (Source: BGS, 2016)



14.2.4 Superficial Hydrogeology (Source: BGS, 2016)



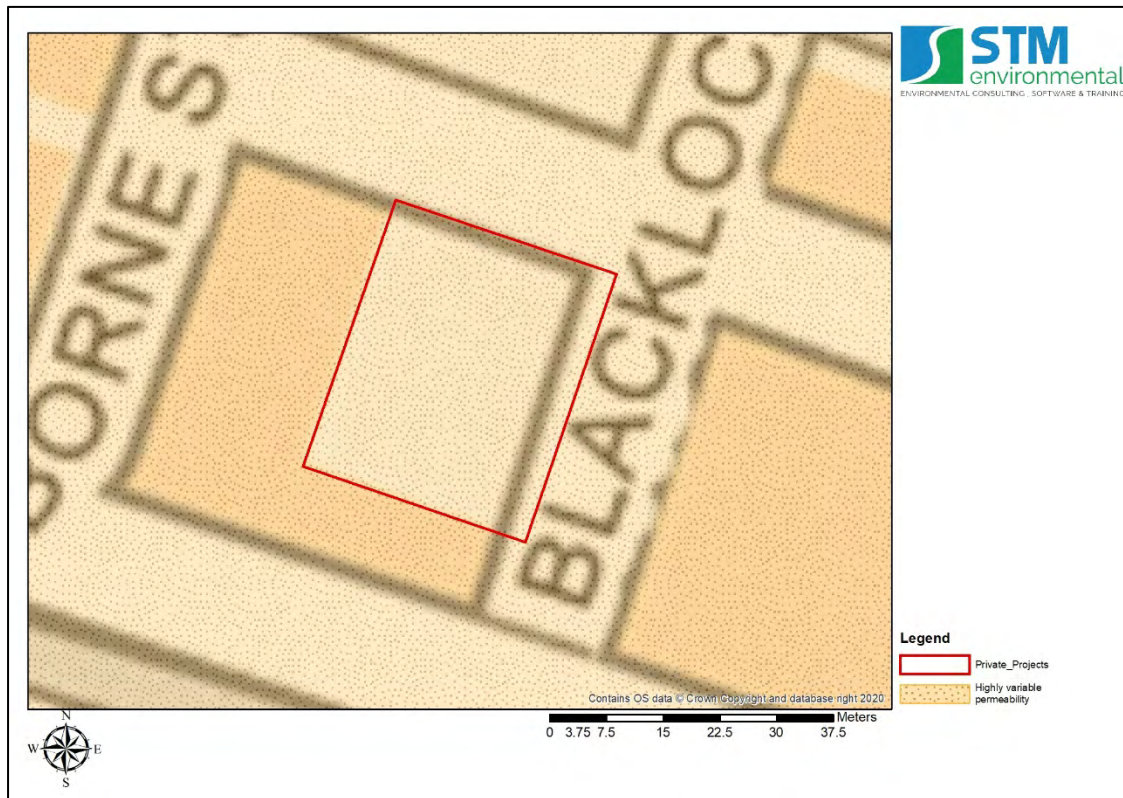
Contains OS data © Crown Copyright and database right 2020

0 3.75 7.5 15 22.5 30 37.5 Meters

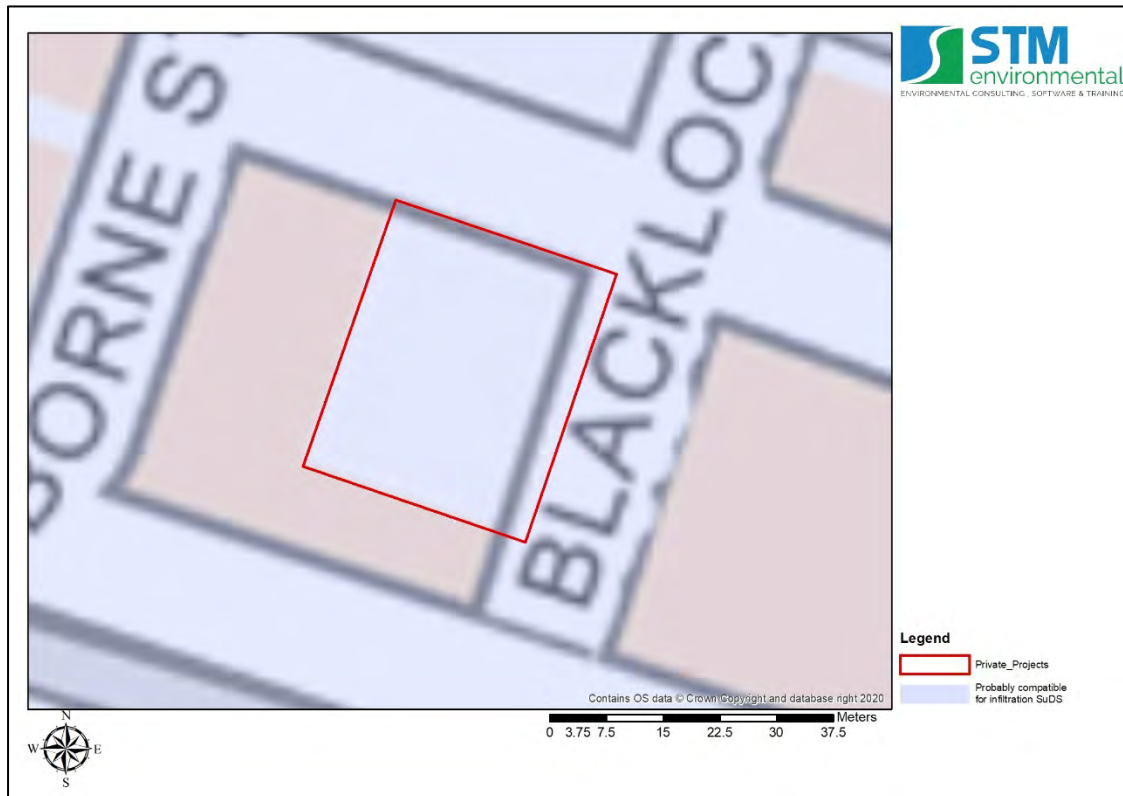
Legend

- Private_Projects
- Free draining

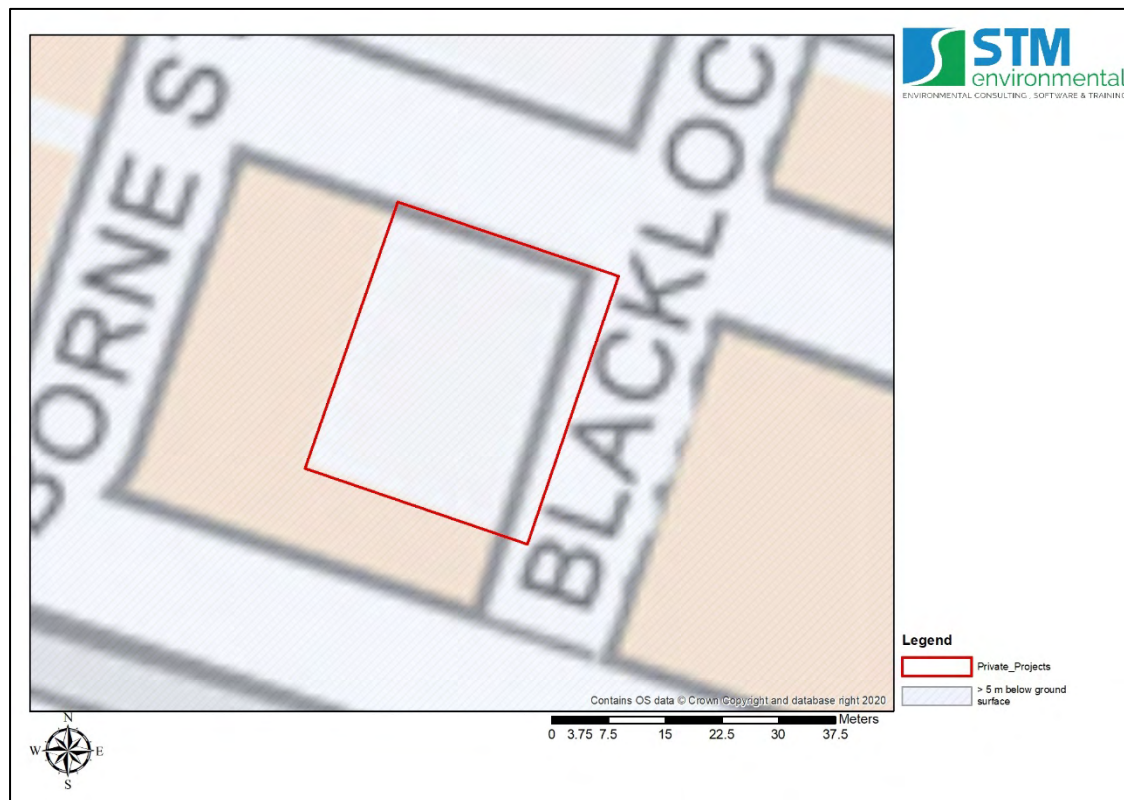
14.2.7 Superficial Permeability (Source BGS:2016)



14.2.8 Infiltration Drainage Potential (Source: BGS, 2016)



14.2.9 Groundwater Table Depth (Source: BGS 2016)

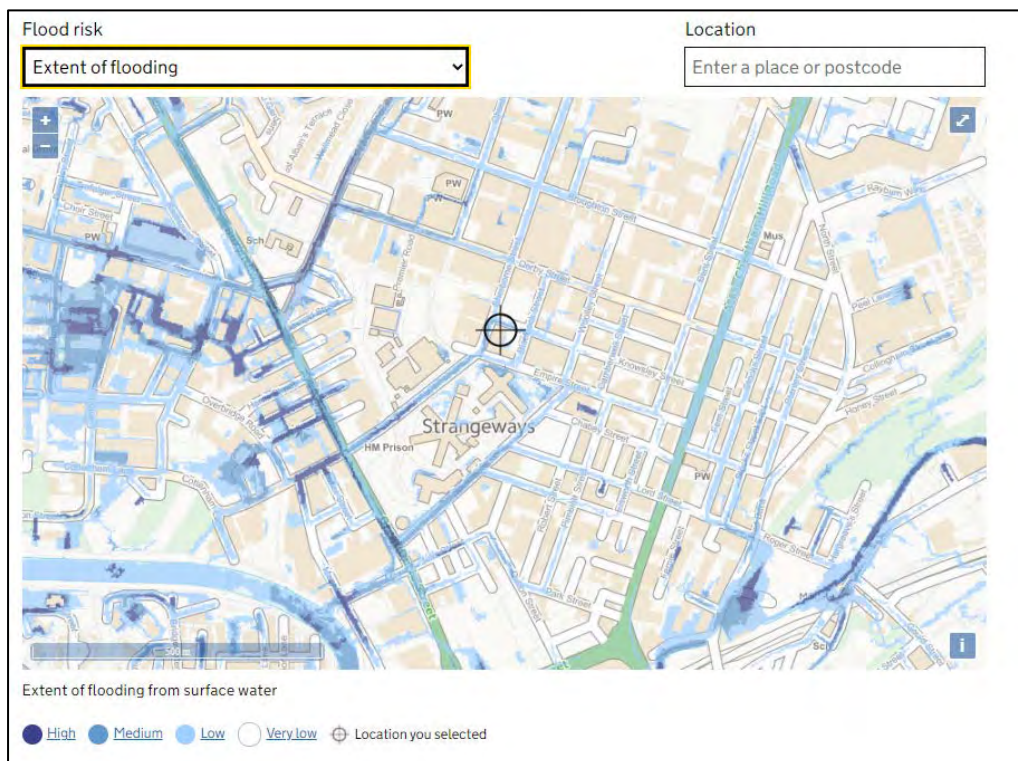


14.3 Appendix 3 – Flood Risk Mapping

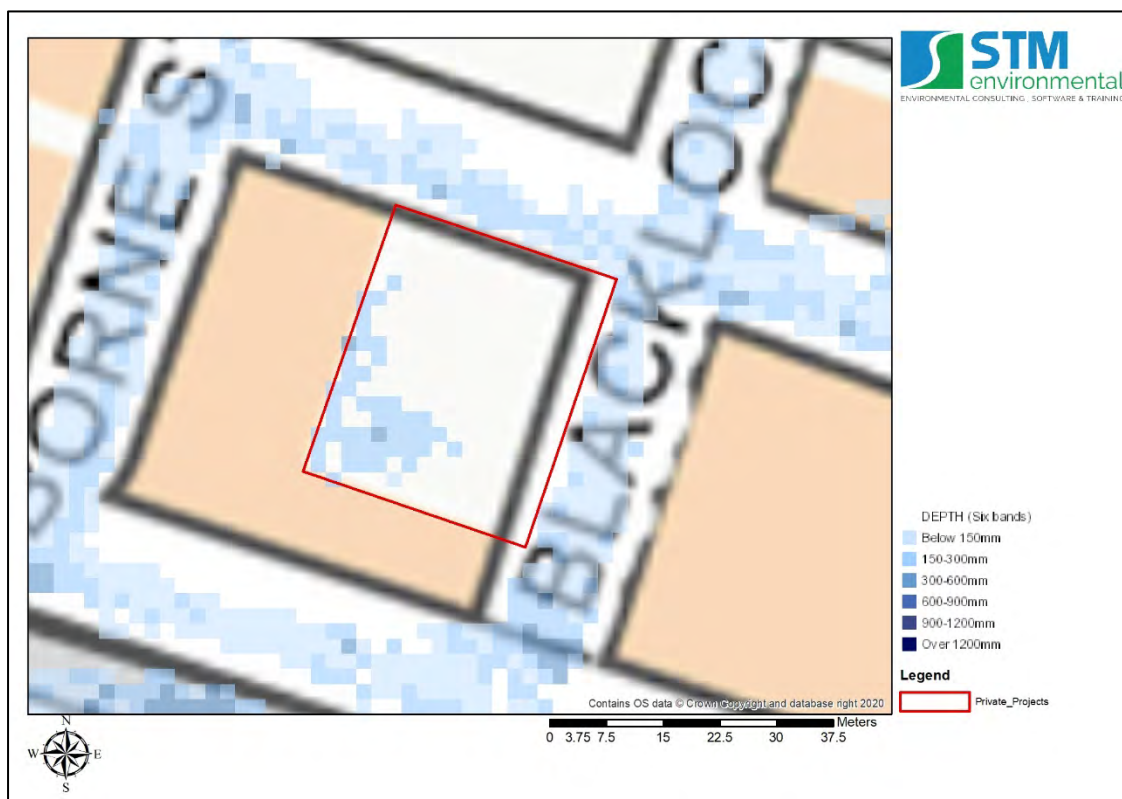
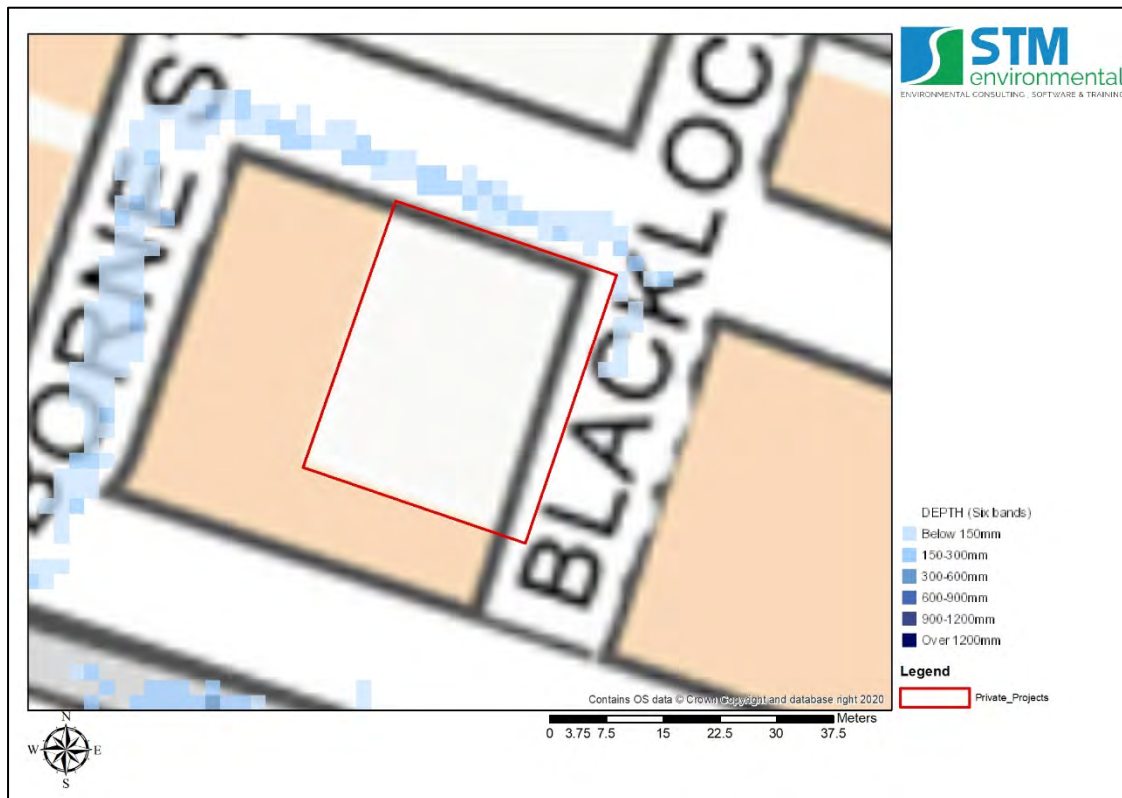
14.3.1 Long Term Fluvial Flood Risk Map (EA)



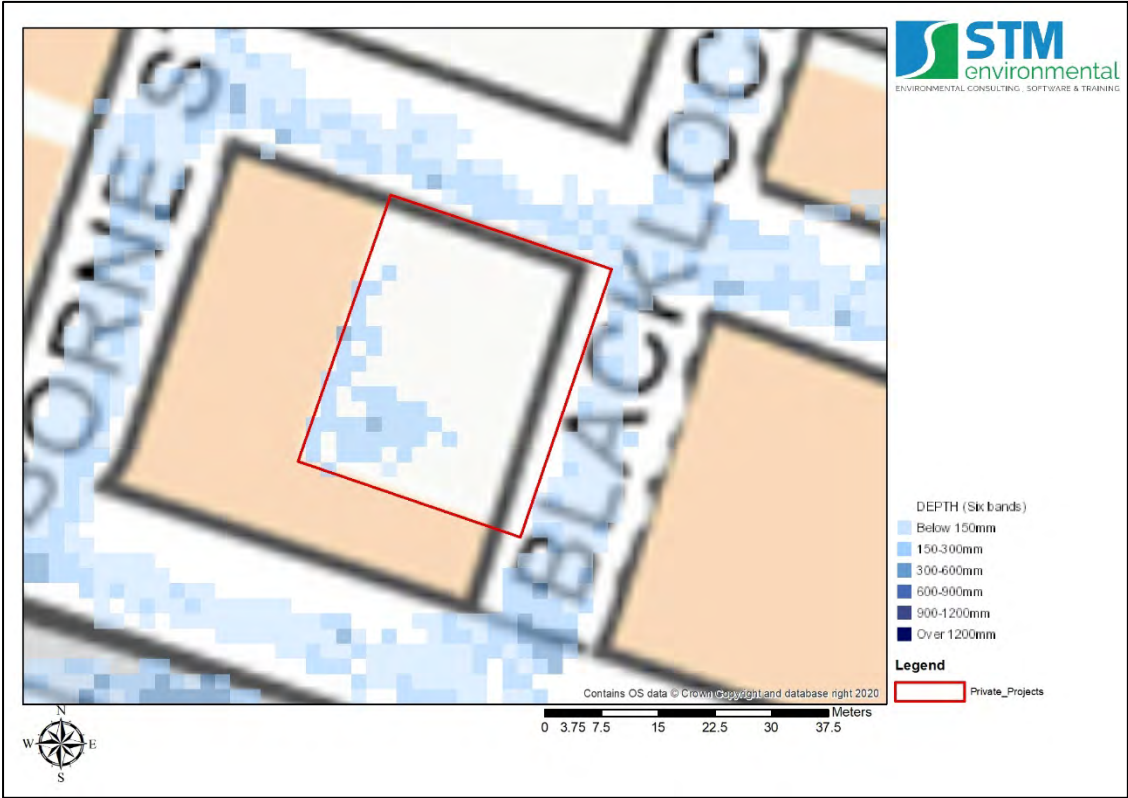
14.3.2 Long Term Pluvial Flood Risk Map (EA)



14.3.3 Surface water flood depth during the 1 in 100 & 1 in 1000 year rainfall return periods (Source: EA, 2016).



14.3.4 Groundwater flooding susceptibility (Source: BGS, 2016).



14.4 Appendix 4 – Run-Off Rate and Storage Calculations

14.4.1 UK SuDS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Matthew Ashdown
Site name:	63 Knowsley Street
Site location:	M8 8HX

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.49424° N
Longitude:	2.24457° W
Reference:	2389287416
Date:	Feb 08 2021 16:20

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.1160
-----------------------	--------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	899	899
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.75	0.75
1 in 1 year (l/s):	0.65	0.65
1 in 30 years (l/s):	1.28	1.28
1 in 100 year (l/s):	1.56	1.56
1 in 200 years (l/s):	1.78	1.78

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site characteristics

Total site area (ha):	0.1160
Significant public open space (ha):	0
Area positively drained (ha):	0.116
Impermeable area (ha):	0.1160
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.12
Net impermeable area for storage volume design (ha):	0.12
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:

Urban creep allowance factor:

Volume control approach:

Interception rainfall depth (mm):

Minimum flow rate (l/s):

Methodology

esti

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	55
Rainfall 100 yrs 12 hrs:	--	72.45
FEH / FSR conversion factor:	1.15	1.15
SAAR (mm):	899	899
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	0.75	0.75
Q_{BAR} for net site area (l/s):	0.75	0.75

Site discharge rates

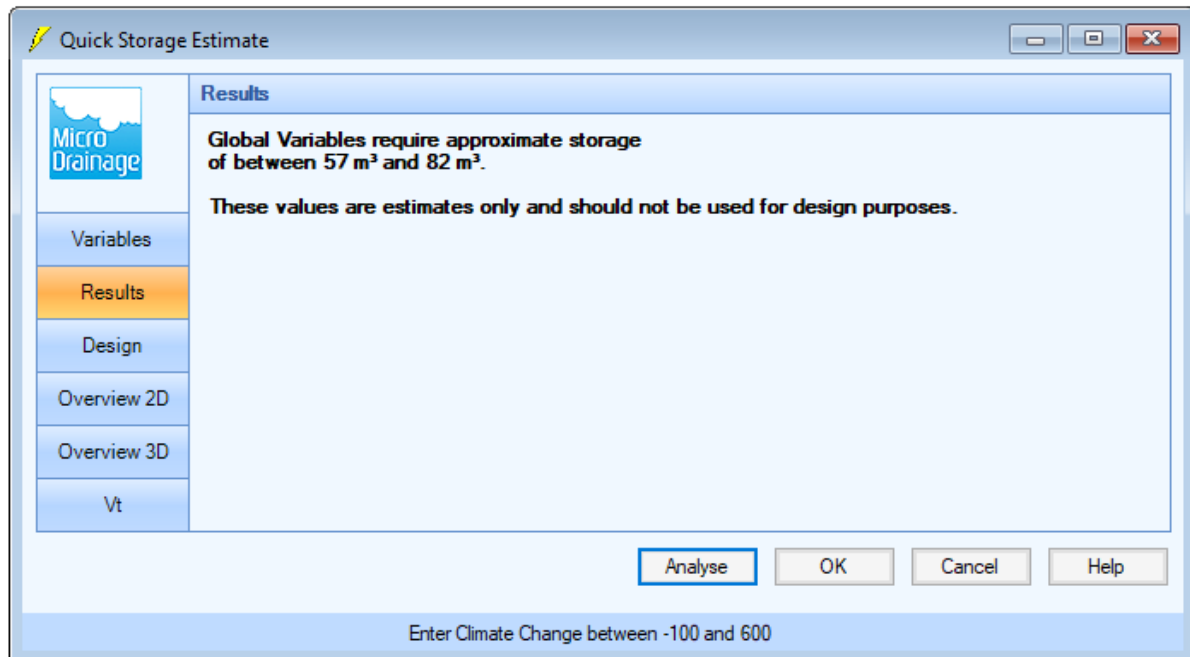
	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	53	53
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	53	53

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://www.uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

14.4.2 Microdrainage Quick Storage Estimates - Greenfield Runoff (1.2l/s)



Micro Drainage

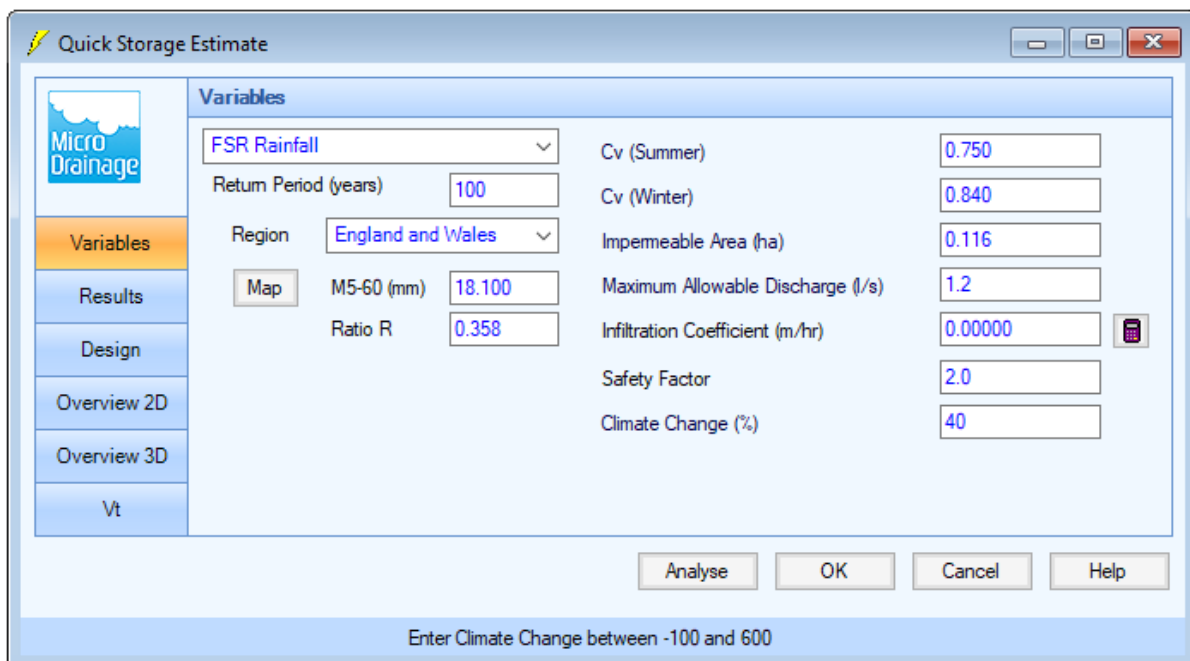
Results

Global Variables require approximate storage of between 57 m³ and 82 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600



Micro Drainage

Variables

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
Region	Impervious Area (ha)	0.116
Map	Maximum Allowable Discharge (l/s)	1.2
M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
Ratio R	Safety Factor	2.0
	Climate Change (%)	40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

14.5 Appendix 5 – SuDS Suitability Assessment



SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
Rainwater harvesting	Capture of rainwater into a tank(s) for use (usually non-potable) such as irrigation, toilet flushing, vehicle or plant cleansing.	Care is needed to prevent the development of bacteria, algae and insect infestation.	Suitable on small scale for interception storage
Infiltration: Soakaways Infiltrations trenches and basins	Infiltration components are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, into the groundwater.	Free draining bedrock with low groundwater, in a principal aquifer. Artificial ground. Maintenance	Unsuitable - Artificial ground

SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
Green/brown /blue roofs	Used on flat or shallow pitched roofs to provide a durable roof covering which also provides thermal insulation, amenity space, biodiversity habitat as well as attenuation of rainwater.	Maintenance - Ensuring safe access	Unsuitable - Weight
Raingardens	Creation of planted landscaped areas to allow the diversion of a portion of rainwater from either downpipes or surrounding paved surfaces. Raingardens can either allow infiltration into the ground or have tanked systems for water retention.	Require maintenance	Unsuitable.
Permeable pavements / surfaces	Permeable hard surfaces that allow rainwater to pass through either into the ground or to tanked systems. Good as interception storage.	Potential impact of saturation on pavement stability to be considered. May require extensive use of impermeable membranes and under-drainage. Maintenance required.	Suitable - Lined
Swales	Dry ditches used as landscape features to allow the storage and infiltration of rainwater. Often used as linear features alongside roads, footpaths or rail lines but capable of being integrated into the design of many open spaces.	Finding available space in proposed site layout	Unsuitable - space
Detention basin/ponds	Landscape features designed to store and in some cases infiltrate rainwater. Detentions basins are usually dry, whereas a pond should retain water. These features need areas of open space but can often be combined with	Potential health and safety issues. Finding available	Unsuitable - space

SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
	other sustainable drainage techniques.	space in proposed site layout	
Storage tanks/ Geocellular storage	Usually below ground level, they attenuate rainwater for later slow release back into the drainage system.	Pumping may sometimes be required to empty the tank into the drainage system	Suitable
Oversized piping	Using larger than necessary pipework creates additional space to store rainwater.	Lacks the wider benefits of the green infrastructure-based techniques	Suitable

14.6 Appendix 6 – Descriptions Of SuDS Techniques

14.6.1 Permeable Paving

Various options are available for the type of permeable paving that can be installed. Permeable block paving allows for infiltration through gaps in the surface. This can be underlain by a geotextile membrane and fine gravel course followed by with a sub-base or geocellular crates as shown in the figures below.

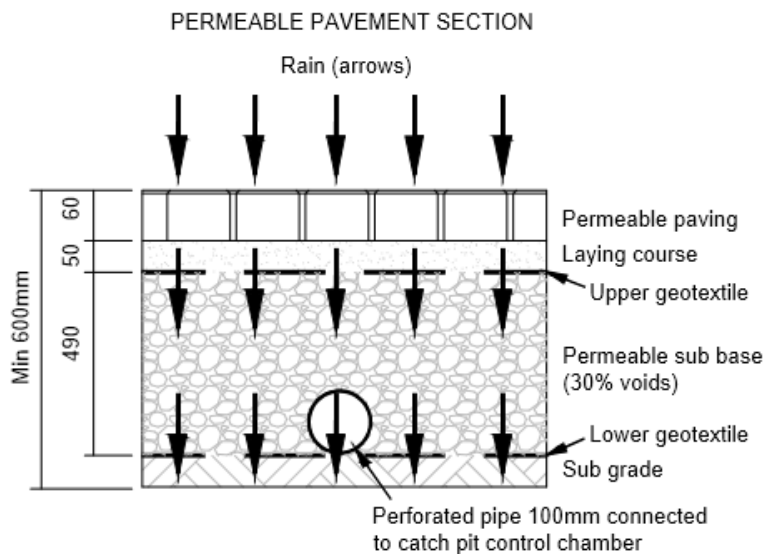


Figure 3 Block Permeable Paving with sub-base

The use of geocellular module storage provides structural strength (up to 400kN/m²) and high-water storage capacity with void space of 95%+.

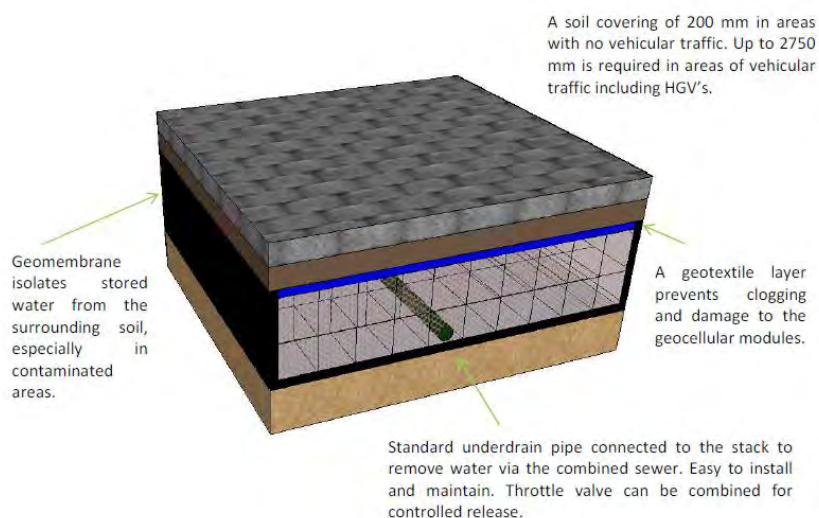


Figure 4 Block Permeable Paving with Geocellular Module

The plastic or concrete grid system is usually installed with a depth of 40 mm, with gaps between filled with an appropriate planting soil and seeded with a turf mix.

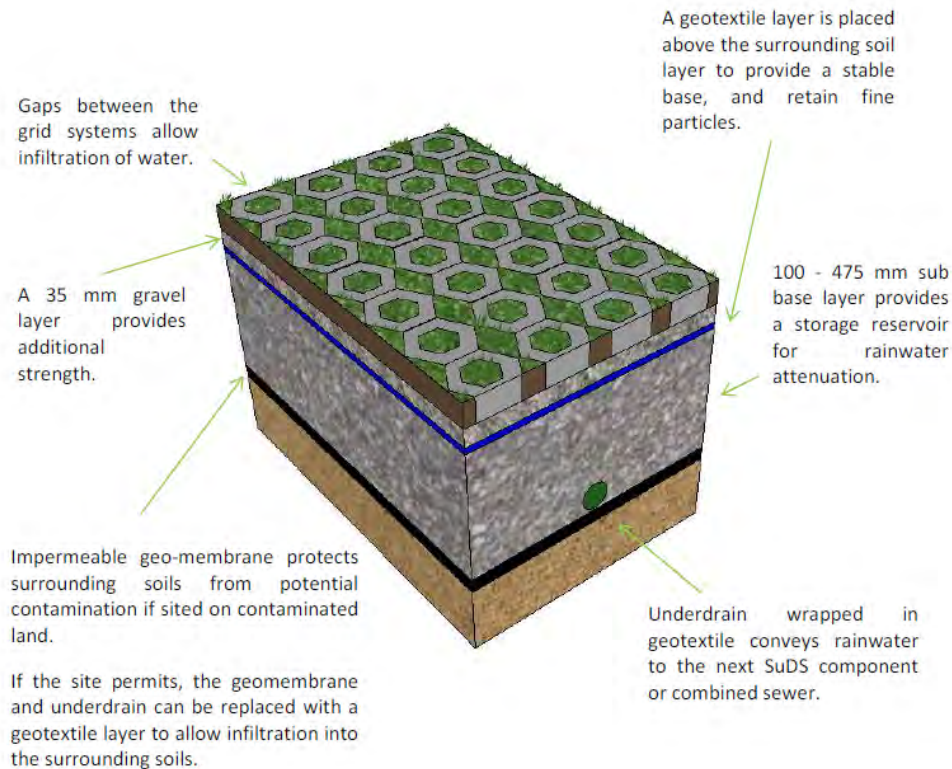


Figure 5 Plastic or Grid Permeable Paving with Sub-base

14.6.2 Permeable Paving Example Construction

Priora Sub-Base Construction

The aggregate installed beneath a Marshalls Priora surface is an essential element of the Marshalls Priora system. The aggregate must provide sufficient porosity to store water in the voids between the granular elements. It must also be of sufficient structural strength to withstand the loads to which the structure will be subjected.

Therefore, for the Marshalls Priora system to work effectively, we provide thorough aggregate specification to help source the correct material.

For detailed aggregate specification please see page 45, and for details of Marshalls Priora Aggregate, please see page 34.

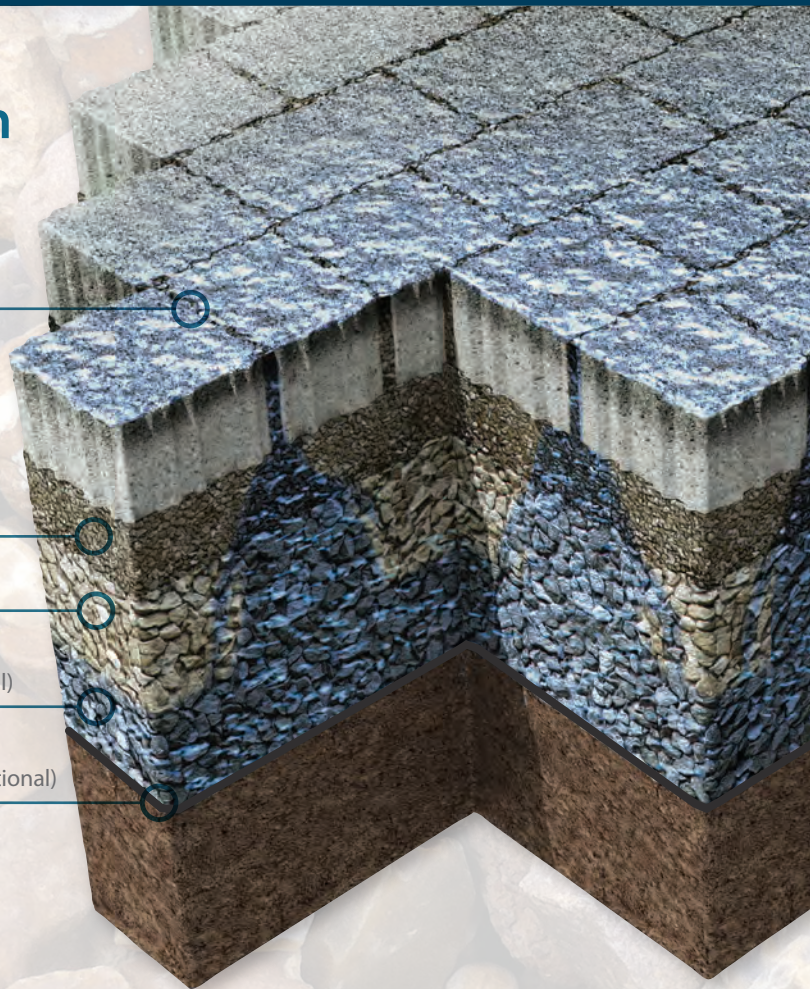
6mm Jointing

6mm Laying Course

20mm Sub-base

Capping Layer (Optional)

Marshalls M15 Grid (Optional)



Jointing

A traditional concrete block pavement would use sand to fill the joints between the blocks. A Marshalls Priora system requires a more open graded coarse material, which will allow water to easily pass through into the sub-base without clogging.

It should also be of an angular nature to maximise interlock within the aggregate and between the blocks to provide additional stability to the surface layer.

Jointing Aggregate Specification:
6mm Open Graded Crushed Rock



6mm Aggregate

Laying Course

The large size of sub-base material aggregate creates an uneven surface when compacted and has an open textured surface. Therefore a laying course material is required, to provide a flatter platform onto which the blocks are laid. This should prevent any rocking or instability of the blocks in-situ.

Crucially, the laying course in a Marshalls Priora system should also provide maximum infiltration properties, allowing water to flow freely through the joints.

Laying Course Aggregate Specification:
6mm Open Graded Crushed Rock

Sub-Base

In addition to providing structural stability (as it would in a traditional pavement), the sub-base of a Marshalls Priora system must also provide sufficient hydraulic capacity to store water. This is achieved by using an aggregate with a high permeability.

Permeability is measured in terms of the aggregate/ void ratio. We recommend the use of an aggregate with a void ratio of between 30% - 32%. In effect this means that every 3m³ of aggregate can store approximately 1m³ of water

Sub-Base Aggregate Specification:
20mm Open Graded Crushed Rock



20mm Aggregate

Capping Layer

A capping layer is required on weak ground to improve the bearing capacity of the pavement. Ground is considered "weak" when the CBR (California Bearing Ratio) is below 5%. Marshalls M15 Grid can be used at the interface of the capping layer and the subgrade to confine the capping material and stabilise the structure, reducing the amount of capping material required. See page 45 for Capping Material specification. See page 33 for information on M15 Grid.

Full specification of suitable aggregate is set out in EN 13242: 2002

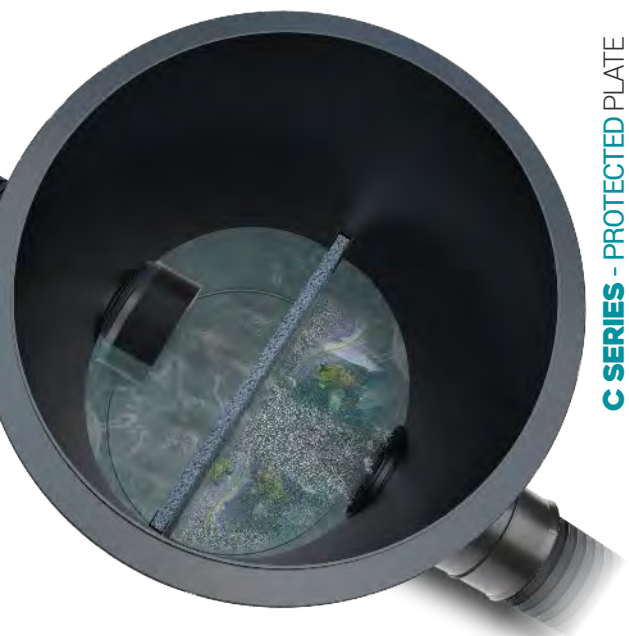
14.6.3 Geocellular structures, oversized pipes and tanks

Modular plastic geocellular structures, with a high void ratio, are a new below ground storage arrangement that can replace underground pipes or tanks that have been used to store water. They can also be used to convey or infiltrate surface water runoff into the ground.

Underground storage features attenuate an agreed volume with a control structure to limit the discharge rate. Structural design must be provided to ensure integrity of the box, pipe or tank under loading. Silt interception and management arrangement is critical to long-term effectiveness of these structures and this must be demonstrated at design stage and confirmed for the design life of the development. It can be implemented either in the form of a modular box system with inlet and outlet pipework connected to the sides of the structure or in the form of a honeycomb structure with perforated pipes running under or through the box. Water is forced into the box when flows increase. There are now shallow, load bearing boxes which can be used under pavements and in particular below permeable pavement which protects the box from silt contamination and provides treatment with enhanced storage. Moreover, geocellular systems can be installed above a high-water table.

14.6.4 Geocellular Examples

14.6.5 Orifice Examples



C SERIES - PROTECTED PLATE

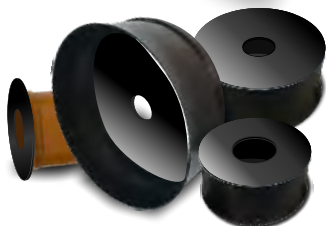


FLOW CONTROL CHAMBERS

MODEL: OFCC1050

Flow Control Chamber for use with 110mm to 450mm pipework diameters

DATA SHEET



Orifice plates are manufactured to suit outlet pipework and can be changed easily if different orifice size is required

OVERVIEW

The ORIFLO OFCC1050 is a protected orifice plate - flow control chamber. Designed to support SuDS management and the sewer infrastructure, as part of a designed attenuation system, helping prevent flooding by controlling the flow into the main sewer.

APPLICATION

Designed to be installed downstream of larger attenuation systems, ie. tank and oversized pipe systems, forming the final part of the SuDS chain.

DESCRIPTION

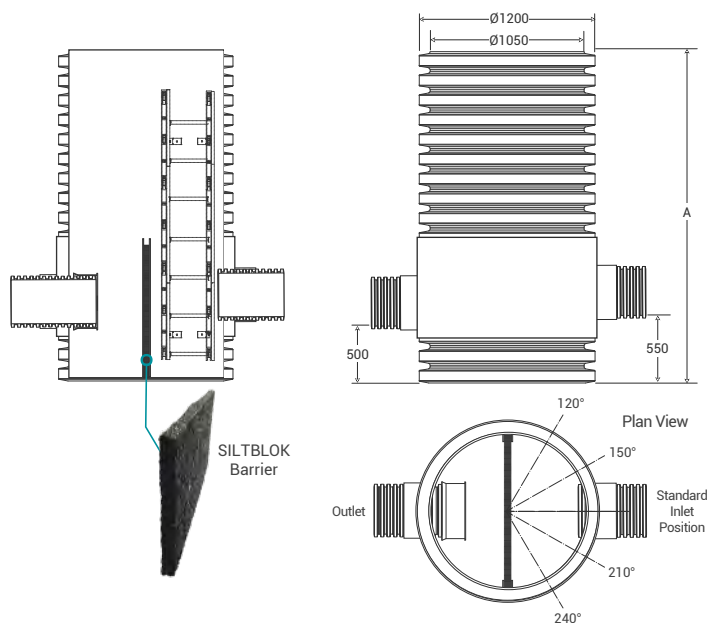
1200 diameter, single piece - factory built units, delivered to site ready to install. Integrally there is a unique SILTBLOK filter and debris barrier. The barrier protects the orifice plate from being blocked, as well as protecting the downstream watercourse. All units feature an impact resistant, twinwall body, with a choice of main pipework diameters from 110mm EN 1401 to 450mm twinwall, with extra inlets available on request and a choice of positions from 120° to 240° (as shown in Plan View below). The number of extra inlets will be dependant on size of pipe and orientation. Chambers can be supplied with fitted ladder for full access, if required.

COMPLIANCE

- Design & Construction Guidance - April 2020. Section C7.12 - Flow Control Device
- Building Regulations - Part H1
- New DCG (Design and Construction Guidance) states; In Adoptable applications, this type of flow control device, is designed with a minimum 50mm orifice diameter

FEATURES & BENEFITS

- Single piece unit delivered ready to install, reducing installation time and costs
- Offers significant onsite savings against PCC and other traditional construction methods, as they need no construction or wet trades
- Eliminates wastage associated with in-situ construction
- Removable Orifice Plate
- Orifice Plate can be changed easily and extremely cost effectively, should the hydraulics and flow rates change due to future development
- Robust, chemical resistant- twinwall body
- Available in four depths
- Unique filter and debris barrier - manufactured from 100% recycled plastic
- Large range of pipework options available from 110mm EN 1401 to 450mm twinwall
- Option of fitted ladders
- Relatively Lightweight compared to traditional construction methods
- Access shafts can be trimmed to suit required invert
- 500mm sump depth for catchment of suspended fines
- Can be installed in granular backfill
- 60 year Design Life
- Manufactured in the UK

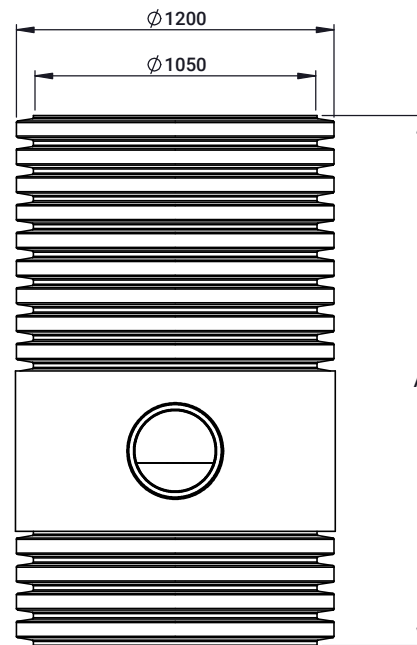
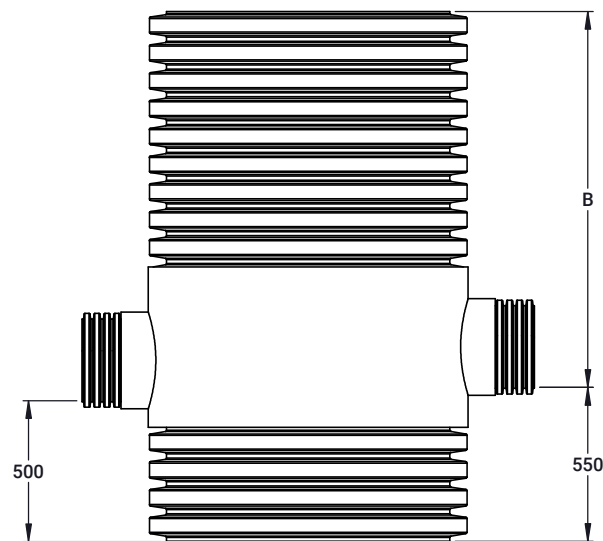
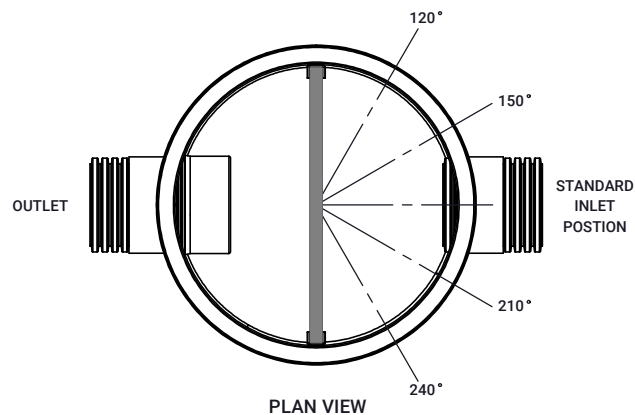


Product Code	Outlet pipework Ø mm	Optional Inlets Ø mm	Overall Depth A mm	Invert inlet B mm	Approx. Weight kg
OFCC1050/1.5	110 - 450	110 - 450	1465	915	135
OFCC1050/2	110 - 450	110 - 450	1983	1433	160
OFCC1050/2.5	110 - 450	110 - 450	2496	1946	185
OFCC1050/3	110 - 450	110 - 450	3016	2466	210

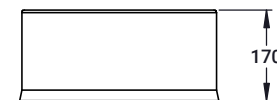
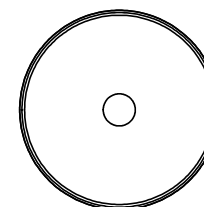
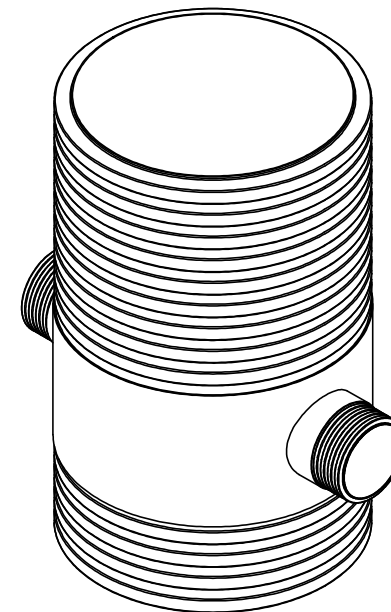
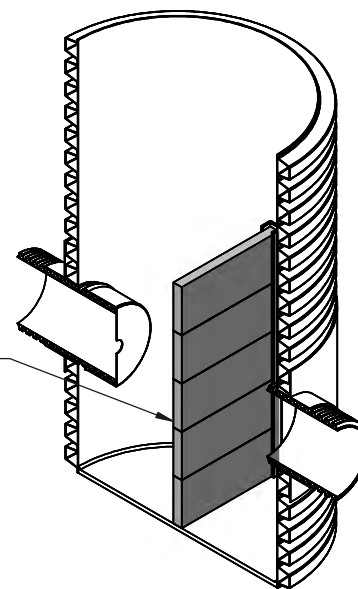
Please Note: The orifice plates in these units can be removed but the unit would need access ladders or fitted ladder to enter chamber



.. To calculate the specific orifice diameter from a prescribed restricted flow rate, you can use the flow rate calculator on our website: www.turtleenviro.co.uk/oriflo



SILTBLOK BARRIER



ORIFICE PLATE

PRODUCT CODE	OUTLET PIPEWORK Ø mm	OPTIONAL INLETS Ø mm	OVERALL DEPTH A mm	INVERT INLET B mm	APPROX. WEIGHT KG
OFCC1050/1.5	110 - 450	110 - 450	1465	915	135
OFCC1050/2	110 - 450	110 - 450	1983	1433	160
OFCC1050/2.5	110 - 450	110 - 450	2496	1946	185
OFCC1050/3	110 - 450	110 - 450	3016	2466	210



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DRAWN BY A.T	CONTRACT
DRAWN DATE 10/05/2021	
APPROVED BY D.A	PRODUCT DESCRIPTION C SERIES - ORIFLO OFCC1050
APPROVED DATE 10/05/2021	PRODUCT/CODE OFCC1050
SCALE: 1:20	SHEET/SIZE A3
REV: 1	

14.7 Appendix 7 – SuDS Maintenance Manual

All maintenance activities will be the responsibility of the developer Andersen Textiles Ltd. They will appoint a management company to undertake the general maintenance duties within the site and will join service agreements with the suppliers and manufactures of the SuDS/Pumps when required.

The information presented below is taken from the CIRIA SuDS Manual (Report c753) and [SuDS](#). Further details on installation and maintenance can be found detailed below and online.

14.7.1 Pervious Pavements

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.	Andersen Textiles Ltd will be responsible for setting up the management company.
Occasional maintenance	Stabilise and mow contributing areas.	As required.	
	Removal of weeds or manage using weed killer applied directly into the weeds rather than spraying.	As required - once per year on less frequently used pavements.	
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.	
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and lost material.	As required.	

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging).	Andersen Textiles Ltd will be responsible for setting up the management company.
Monitoring	Initial Inspection.	Monthly for three months after installation.	
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48h after large storms in first six months.	
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.	
	Monitor Inspection chambers.	Annually.	

Many of the specific maintenance activities for pervious pavements can be undertaken as part of a general site cleaning contract (many car parks or roads are swept to remove litter and for visual reasons to keep them tidy). Therefore, if litter management is already required at the site, this should have marginal cost implications.

14.7.2 Geo-Cellular Maintenance

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually.	Andersen Textiles Ltd will be responsible for setting up the management company.
	Cleaning of gutters and any filters on downpipes.	Annually (or as required based on inspections).	
	Trimming any roots that may be causing blockages.	Annually (or as required).	
Occasional maintenance	Remove sediment and debris from manhole, storage structure and components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections.	
Remedial actions	Reconstruct geocellular and/or replace or clean void fill, if performance failure occurs	As required	Andersen Textiles Ltd will be responsible for setting up the management company.
	Replacement of clogged geotextile (will require reconstruction of soakaway).	As required.	
Monitoring	Inspect silt raps and note rate of sediment accumulation.	Monthly in the first year and then annually.	
	Check soakaway to ensure emptying is occurring.	Annually.	

Maintenance will usually be carried out manually, although a suction tanker can be used for sediment / debris removal for large systems. If maintenance is not undertaken

for long periods, deposits can become hard-packed and require considerable effort to remove.

Replacement of the geocellular units will be necessary if the system becomes blocked with silt. Effective monitoring will give information on changes in infiltration rate and provide a warning of potential failure in the long term.

Areas draining to infiltration components should be regularly swept to prevent silt being washed off the surface. This will minimize the need for maintenance.

Maintenance responsibility should be placed with an appropriate organisation, and maintenance schedules should be developed during the design phase.

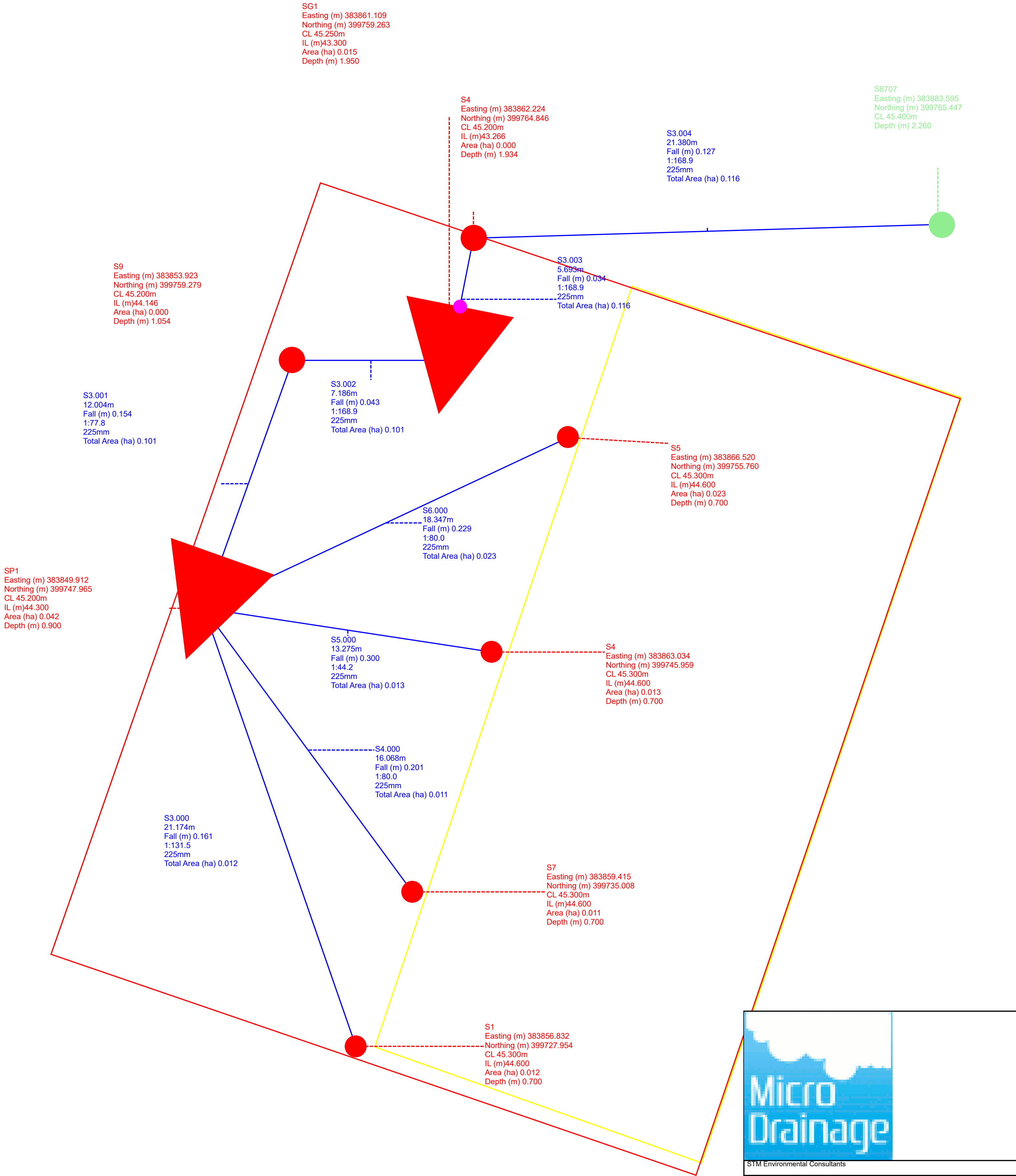
14.7.3 Interceptor & Flow Control Maintenance

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
Regular maintenance	Inspect for sediment and debris;	Quarterly; As required. Increase freq. to Monthly during Autumn;	Andersen Textiles Ltd will be responsible for setting up the management company.
	Inspection & Cleaning of SuDS components upstream of flow control element.	Quarterly; Increase freq. to Monthly during Autumn;	
Remedial actions	Removal of debris and sediment;	Annually; Or as required.	
Remedial actions	Replacement of parts; Manhole cover, filters or components of flow control device;	As required;	
Monitoring	Ensure flow control device is function correctly during and after storm events; Check water levels up stream and downstream of flow control device	Monthly; During 1 st year of installation or during and after storm event; When possible Reduce to Quarterly following the 1 st year;	
	Check for damage to flow control components	Annually;	
	Check for securely fitting manhole lid; Ensures debris cannot enter the system unfiltered;	Annually;	

14.8 Appendix 8 - Microdrainage

14.8.1 Layout of Network

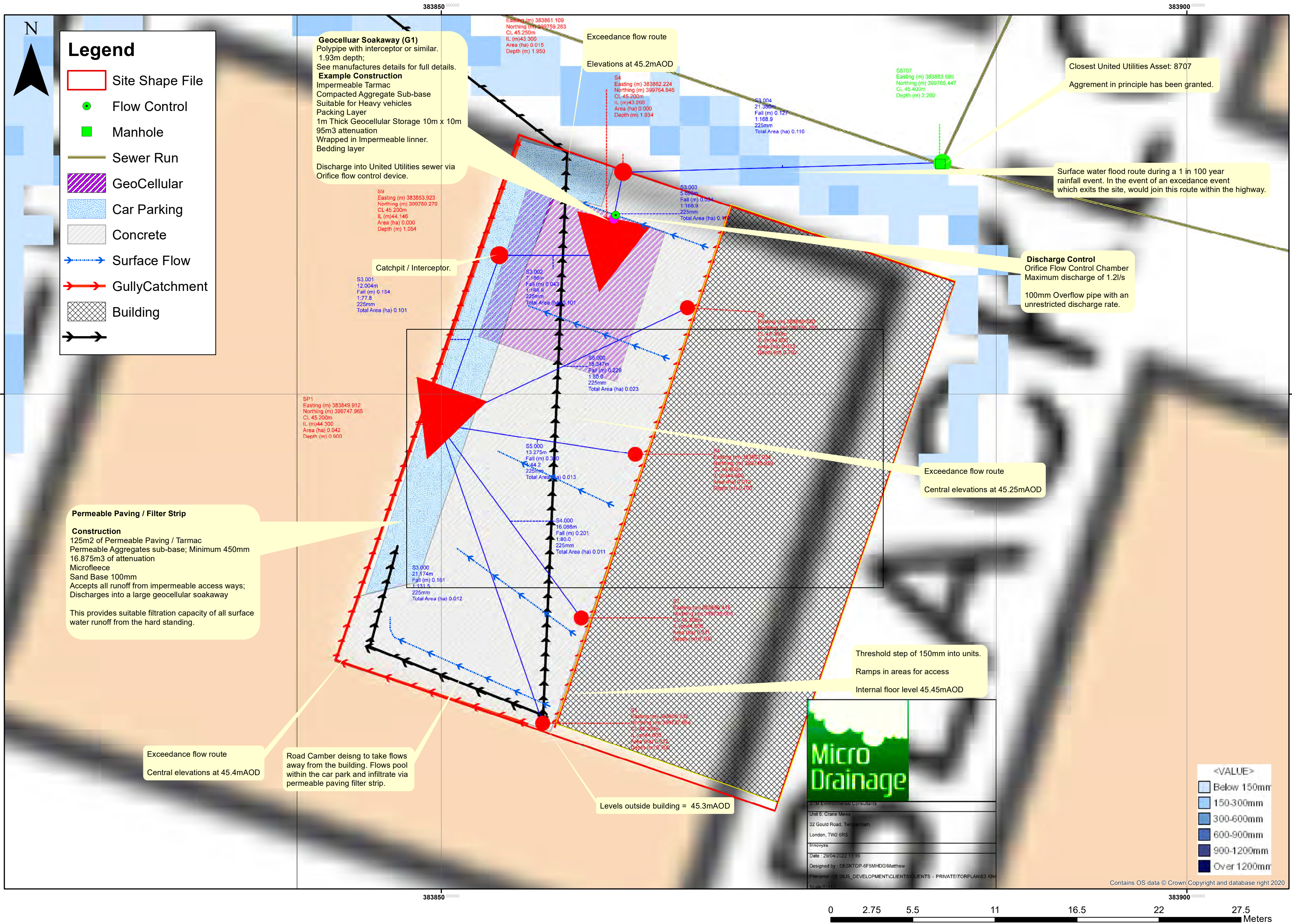
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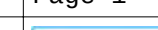
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Unit 6, Crane Mews
32 Gould Road, Twickenham
London, TW2 6RS
Innovyze
Date : 29/04/2022 11:16
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14.8.2 Layout of Network - Features, Exceedance flows and Sewer Connection

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14.8.4 Microdrainage results

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STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.084	4-8	0.032

Network Design Table for Storm

Network Results Table

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S6.000	18.347	0.229	80.0	0.023	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	12.004	0.154	77.8	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	7.186	0.043	168.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.003	5.693	0.034	168.9	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.004	21.380	0.127	168.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

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
S6.000	50.00	5.21	44.600	0.023	0.0	0.0	0.0	1.46	58.2	3.1
S3.001	50.00	5.44	44.300	0.101	0.0	0.0	0.0	1.48	59.0	13.6
S3.002	50.00	5.56	44.146	0.101	0.0	0.0	0.0	1.00	39.9	13.6
S3.003	50.00	5.66	43.300	0.116	0.0	0.0	0.0	1.00	39.9	15.6
S3.004	50.00	6.01	43.266	0.116	0.0	0.0	0.0	1.00	39.9	15.6

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	45.300	0.700	Open Manhole	1000	S3.000	44.600	225				
S7	45.300	0.700	Open Manhole	1000	S4.000	44.600	225				
S4	45.300	0.700	Open Manhole	1000	S5.000	44.600	225				
S5	45.300	0.700	Open Manhole	1000	S6.000	44.600	225				
SP1	45.200	0.900	Open Manhole	1200	S3.001	44.300	225	S3.000	44.439	225	139
								S4.000	44.399	225	99
								S5.000	44.300	225	
								S6.000	44.371	225	71
S9	45.200	1.054	Open Manhole	1200	S3.002	44.146	225	S3.001	44.146	225	
SG1	45.250	1.950	Open Manhole	1200	S3.003	43.300	225	S3.002	44.103	225	803
S4	45.200	1.934	Open Manhole	1200	S3.004	43.266	225	S3.003	43.266	225	
S8707	45.400	2.260	Open Manhole	1200		OUTFALL		S3.004	43.140	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	383856.832	399727.954	383856.832	399727.954	Required	
S7	383859.415	399735.008	383859.415	399735.008	Required	
S4	383863.034	399745.959	383863.034	399745.959	Required	
S5	383866.520	399755.760	383866.520	399755.760	Required	
SP1	383849.912	399747.965	383849.912	399747.965	Required	
S9	383853.923	399759.279	383853.923	399759.279	Required	
SG1	383861.109	399759.263	383861.109	399759.263	Required	
S4	383862.224	399764.846	383862.224	399764.846	Required	

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MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
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No Entry



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	o	225	S1	45.300	44.600	0.475	Open Manhole	1000
S4.000	o	225	S7	45.300	44.600	0.475	Open Manhole	1000
S5.000	o	225	S4	45.300	44.600	0.475	Open Manhole	1000
S6.000	o	225	S5	45.300	44.600	0.475	Open Manhole	1000
S3.001	o	225	SP1	45.200	44.300	0.675	Open Manhole	1200
S3.002	o	225	S9	45.200	44.146	0.829	Open Manhole	1200
S3.003	o	225	SG1	45.250	43.300	1.725	Open Manhole	1200
S3.004	o	225	S4	45.200	43.266	1.709	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S3.000	21.174	131.5	SP1	45.200	44.439	0.536	Open Manhole	1200
S4.000	16.068	80.0	SP1	45.200	44.399	0.576	Open Manhole	1200
S5.000	13.275	44.2	SP1	45.200	44.300	0.675	Open Manhole	1200
S6.000	18.347	80.0	SP1	45.200	44.371	0.604	Open Manhole	1200
S3.001	12.004	77.8	S9	45.200	44.146	0.829	Open Manhole	1200
S3.002	7.186	168.9	SG1	45.250	44.103	0.922	Open Manhole	1200
S3.003	5.693	168.9	S4	45.200	43.266	1.709	Open Manhole	1200
S3.004	21.380	168.9	S8707	45.400	43.140	2.035	Open Manhole	1200

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Setting Out Information - True Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S3.000	S1	1000		383856.832	399727.954	383856.832	399727.954	
S4.000	S7	1000		383859.415	399735.008	383859.415	399735.008	
S5.000	S4	1000		383863.034	399745.959	383863.034	399745.959	
S6.000	S5	1000		383866.520	399755.760	383866.520	399755.760	
S3.001	SP1	1200		383849.912	399747.965	383849.912	399747.965	
S3.002	S9	1200		383853.923	399759.279	383853.923	399759.279	
S3.003	SG1	1200		383861.109	399759.263	383861.109	399759.263	
S3.004	S4	1200		383862.224	399764.846	383862.224	399764.846	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S3.004	S8707	1200		383883.595	399765.447	

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PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S3.000	S1	1000		383856.832	399727.954	383856.832	399727.954	
S4.000	S7	1000		383859.415	399735.008	383859.415	399735.008	
S5.000	S4	1000		383863.034	399745.959	383863.034	399745.959	
S6.000	S5	1000		383866.520	399755.760	383866.520	399755.760	
S3.001	SP1	1200		383849.912	399747.965	383849.912	399747.965	
S3.002	S9	1200		383853.923	399759.279	383853.923	399759.279	
S3.003	SG1	1200		383861.109	399759.263	383861.109	399759.263	
S3.004	S4	1200		383862.224	399764.846	383862.224	399764.846	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S3.004	S8707	1200		383883.595	399765.447	

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.000	User	-	100	0.012	0.012	0.012
4.000	User	-	100	0.011	0.011	0.011
5.000	User	-	100	0.013	0.013	0.013
6.000	User	-	100	0.023	0.023	0.023
3.001	User	-	100	0.030	0.030	0.030
	User	-	100	0.011	0.011	0.042
3.002	-	-	100	0.000	0.000	0.000
3.003	User	-	100	0.015	0.015	0.015
3.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.116	0.116	0.116

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S3.000	S1	225	0.475	0.536	Unclassified	1000	0	0.475	Unclassified
S4.000	S7	225	0.475	0.576	Unclassified	1000	0	0.475	Unclassified
S5.000	S4	225	0.475	0.675	Unclassified	1000	0	0.475	Unclassified
S6.000	S5	225	0.475	0.604	Unclassified	1000	0	0.475	Unclassified
S3.001	SP1	225	0.675	0.829	Unclassified	1200	0	0.675	Unclassified
S3.002	S9	225	0.829	0.922	Unclassified	1200	0	0.829	Unclassified
S3.003	SG1	225	1.709	1.725	Unclassified	1200	0	1.725	Unclassified
S3.004	S4	225	1.709	2.035	Unclassified	1200	0	1.709	Unclassified

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)
---------------------	--------------	--------------	--------------	------------------	-----------	--------

S3.004	S8707	45.400	43.140	0.000	1200	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.200	Storm Duration (mins)	30
Ratio R	0.358		

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Innovyze	Network 2020.1	
Online Controls for Storm Orifice Manhole: SG1, DS/PN: S3.003, Volume (m³): 2.4 Diameter (m) 0.019 Discharge Coefficient 0.600 Invert Level (m) 43.300		
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Unit 6, Crane Mews 32 Gould Road, Twickenham London, TW2 6RS																																																																																		
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Innovyze		Network 2020.1																																																																																
Storage Structures for Storm Porous Car Park Manhole: SP1, DS/PN: S3.001 Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0 Membrane Percolation (mm/hr) 1000 Length (m) 25.0 Max Percolation (l/s) 34.7 Slope (1:X) 0.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 44.750 Cap Volume Depth (m) 0.450 Cellular Storage Manhole: SG1, DS/PN: S3.003 Invert Level (m) 43.300 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td></tr><tr><td>0.000</td><td>100.0</td><td>100.0</td><td>1.001</td><td>0.0</td><td>140.0</td></tr><tr><td>1.000</td><td>100.0</td><td>140.0</td><td></td><td></td><td></td></tr></table> Volume Summary (Static) Length Calculations based on Centre-Centre <table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>S3.000</td><td>S1</td><td>0.550</td><td>0.842</td><td>0.000</td><td>1.392</td></tr><tr><td>S4.000</td><td>S7</td><td>0.550</td><td>0.639</td><td>0.000</td><td>1.189</td></tr><tr><td>S5.000</td><td>S4</td><td>0.550</td><td>0.528</td><td>0.000</td><td>1.078</td></tr><tr><td>S6.000</td><td>S5</td><td>0.550</td><td>0.729</td><td>0.000</td><td>1.279</td></tr><tr><td>S3.001</td><td>SP1</td><td>1.018</td><td>0.477</td><td>16.875</td><td>18.370</td></tr><tr><td>S3.002</td><td>S9</td><td>1.192</td><td>0.286</td><td>0.000</td><td>1.478</td></tr><tr><td>S3.003</td><td>SG1</td><td>2.205</td><td>0.226</td><td>95.032</td><td>97.463</td></tr><tr><td>S3.004</td><td>S4</td><td>2.187</td><td>0.850</td><td>0.000</td><td>3.037</td></tr><tr><td colspan="2">Total</td><td>8.802</td><td>4.578</td><td>111.907</td><td>125.286</td></tr></table> ©1982-2020 Innovyze					Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	100.0	100.0	1.001	0.0	140.0	1.000	100.0	140.0				Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	S3.000	S1	0.550	0.842	0.000	1.392	S4.000	S7	0.550	0.639	0.000	1.189	S5.000	S4	0.550	0.528	0.000	1.078	S6.000	S5	0.550	0.729	0.000	1.279	S3.001	SP1	1.018	0.477	16.875	18.370	S3.002	S9	1.192	0.286	0.000	1.478	S3.003	SG1	2.205	0.226	95.032	97.463	S3.004	S4	2.187	0.850	0.000	3.037	Total		8.802	4.578	111.907	125.286
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																													
0.000	100.0	100.0	1.001	0.0	140.0																																																																													
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<u>Volume Summary (Static)</u> Length Calculations based on True Length <table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>S3.000</td><td>S1</td><td>0.550</td><td>0.798</td><td>0.000</td><td>1.348</td></tr><tr><td>S4.000</td><td>S7</td><td>0.550</td><td>0.595</td><td>0.000</td><td>1.145</td></tr><tr><td>S5.000</td><td>S4</td><td>0.550</td><td>0.484</td><td>0.000</td><td>1.034</td></tr><tr><td>S6.000</td><td>S5</td><td>0.550</td><td>0.686</td><td>0.000</td><td>1.236</td></tr><tr><td>S3.001</td><td>SP1</td><td>1.018</td><td>0.430</td><td>16.875</td><td>18.322</td></tr><tr><td>S3.002</td><td>S9</td><td>1.192</td><td>0.238</td><td>0.000</td><td>1.430</td></tr><tr><td>S3.003</td><td>SG1</td><td>2.205</td><td>0.179</td><td>95.032</td><td>97.416</td></tr><tr><td>S3.004</td><td>S4</td><td>2.187</td><td>0.802</td><td>0.000</td><td>2.989</td></tr><tr><td colspan="2">Total</td><td>8.802</td><td>4.212</td><td>111.907</td><td>124.920</td></tr></table>						Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	S3.000	S1	0.550	0.798	0.000	1.348	S4.000	S7	0.550	0.595	0.000	1.145	S5.000	S4	0.550	0.484	0.000	1.034	S6.000	S5	0.550	0.686	0.000	1.236	S3.001	SP1	1.018	0.430	16.875	18.322	S3.002	S9	1.192	0.238	0.000	1.430	S3.003	SG1	2.205	0.179	95.032	97.416	S3.004	S4	2.187	0.802	0.000	2.989	Total		8.802	4.212	111.907	124.920
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Summary Wizard of 15 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Surcharged			Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)				
S3.000	S1	18	44.627	-0.198	0.000	0.03		1.4	OK	
S4.000	S7	18	44.624	-0.201	0.000	0.02		1.3	OK	
S5.000	S4	18	44.623	-0.202	0.000	0.02		1.5	OK	
S6.000	S5	18	44.633	-0.192	0.000	0.05		2.6	OK	
S3.001	SP1	20	44.372	-0.153	0.000	0.21	8	10.8	OK	
S3.002	S9	20	44.240	-0.131	0.000	0.36		10.9	OK	
S3.003	SG1	54	43.353	-0.172	0.000	0.01	336	0.2	OK	
S3.004	S4	54	43.271	-0.220	0.000	0.00		0.2	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	21	44.626	-0.199	0.000	0.03		1.3	OK
S4.000	S7	21	44.623	-0.202	0.000	0.02		1.2	OK
S5.000	S4	21	44.622	-0.203	0.000	0.02		1.4	OK
S6.000	S5	21	44.631	-0.194	0.000	0.05		2.4	OK
S3.001	SP1	22	44.368	-0.157	0.000	0.20	7	10.1	OK
S3.002	S9	22	44.236	-0.135	0.000	0.34		10.0	OK
S3.003	SG1	52	43.372	-0.153	0.000	0.01	373	0.2	OK
S3.004	S4	52	43.272	-0.219	0.000	0.01		0.2	OK

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Summary Wizard of 60 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	27	44.623	-0.202	0.000	0.02		1.0	OK
S4.000	S7	27	44.619	-0.206	0.000	0.02		0.9	OK
S5.000	S4	27	44.617	-0.208	0.000	0.02		1.1	OK
S6.000	S5	27	44.627	-0.198	0.000	0.04		1.9	OK
S3.001	SP1	27	44.359	-0.166	0.000	0.16	10	7.9	OK
S3.002	S9	27	44.224	-0.146	0.000	0.27		7.9	OK
S3.003	SG1	50	43.393	-0.132	0.000	0.01	413	0.2	OK
S3.004	S4	50	43.273	-0.219	0.000	0.01		0.2	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	32	44.617	-0.208	0.000	0.02		0.7	OK
S4.000	S7	32	44.613	-0.212	0.000	0.01		0.6	OK
S5.000	S4	32	44.612	-0.213	0.000	0.01		0.7	OK
S6.000	S5	32	44.624	-0.201	0.000	0.02		1.3	OK
S3.001	SP1	32	44.350	-0.175	0.000	0.11	17	5.6	OK
S3.002	S9	32	44.211	-0.160	0.000	0.19		5.6	OK
S3.003	SG1	48	43.415	-0.110	0.000	0.01	452	0.2	OK
S3.004	S4	48	43.273	-0.218	0.000	0.01		0.2	OK

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Summary Wizard of 240 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	39	44.611	-0.214	0.000	0.01		0.4	OK
S4.000	S7	39	44.608	-0.217	0.000	0.01		0.4	OK
S5.000	S4	39	44.608	-0.217	0.000	0.01		0.5	OK
S6.000	S5	39	44.617	-0.208	0.000	0.02		0.8	OK
S3.001	SP1	40	44.340	-0.185	0.000	0.07	34	3.7	OK
S3.002	S9	40	44.198	-0.173	0.000	0.12		3.7	OK
S3.003	SG1	46	43.436	-0.089	0.000	0.01	488	0.3	OK
S3.004	S4	46	43.274	-0.217	0.000	0.01		0.3	OK

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Summary Wizard of 360 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap. (l/s)	Half Drain	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)		Time (mins)	Flow (l/s)	
S3.000	S1	43	44.609	-0.216	0.000	0.01		0.3	OK
S4.000	S7	43	44.606	-0.219	0.000	0.01		0.3	OK
S5.000	S4	43	44.606	-0.219	0.000	0.01		0.4	OK
S6.000	S5	43	44.613	-0.212	0.000	0.01		0.6	OK
S3.001	SP1	43	44.334	-0.191	0.000	0.06	46	2.8	OK
S3.002	S9	43	44.192	-0.179	0.000	0.10		2.8	OK
S3.003	SG1	44	43.445	-0.080	0.000	0.01	509	0.3	OK
S3.004	S4	44	43.274	-0.217	0.000	0.01		0.3	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)			
S3.000	S1	45	44.607	-0.218	0.000	0.01				0.3		OK
S4.000	S7	45	44.605	-0.220	0.000	0.00				0.3		OK
S5.000	S4	45	44.605	-0.220	0.000	0.00				0.3		OK
S6.000	S5	45	44.611	-0.214	0.000	0.01				0.5		OK
S3.001	SP1	45	44.331	-0.194	0.000	0.05			54	2.3		OK
S3.002	S9	45	44.187	-0.183	0.000	0.08				2.3		OK
S3.003	SG1	43	43.450	-0.075	0.000	0.01			574	0.3		OK
S3.004	S4	43	43.275	-0.217	0.000	0.01				0.3		OK

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Summary Wizard of 960 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	51	44.604	-0.221	0.000	0.00		0.2	OK
S4.000	S7	51	44.603	-0.222	0.000	0.00		0.2	OK
S5.000	S4	51	44.603	-0.222	0.000	0.00		0.2	OK
S6.000	S5	51	44.607	-0.218	0.000	0.01		0.3	OK
S3.001	SP1	51	44.325	-0.200	0.000	0.03	77	1.4	OK
S3.002	S9	51	44.177	-0.193	0.000	0.05		1.4	OK
S3.003	SG1	40	43.460	-0.065	0.000	0.01	714	0.3	OK
S3.004	S4	40	43.275	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 1440 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	52	44.603	-0.222	0.000	0.00		0.1	OK
S4.000	S7	52	44.602	-0.223	0.000	0.00		0.1	OK
S5.000	S4	52	44.602	-0.223	0.000	0.00		0.1	OK
S6.000	S5	52	44.605	-0.220	0.000	0.00		0.2	OK
S3.001	SP1	52	44.323	-0.202	0.000	0.02	89	1.1	OK
S3.002	S9	52	44.173	-0.197	0.000	0.04		1.1	OK
S3.003	SG1	39	43.461	-0.064	0.000	0.01	798	0.3	OK
S3.004	S4	39	43.275	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 15 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)				
S3.000	S1	8	44.643	-0.182	0.000	0.08			3.4	OK	
S4.000	S7	8	44.636	-0.189	0.000	0.06			3.1	OK	
S5.000	S4	8	44.634	-0.191	0.000	0.06			3.7	OK	
S6.000	S5	8	44.653	-0.172	0.000	0.12			6.4	OK	
S3.001	SP1	7	44.426	-0.099	0.000	0.59		4	29.7	OK	
S3.002	S9	7	44.326	-0.044	0.000	0.98			29.4	OK	
S3.003	SG1	45	43.440	-0.085	0.000	0.01		494	0.3	OK	
S3.004	S4	45	43.274	-0.217	0.000	0.01			0.3	OK	

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Summary Wizard of 30 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	9	44.641	-0.184	0.000	0.08		3.1	OK
S4.000	S7	9	44.634	-0.191	0.000	0.06		2.9	OK
S5.000	S4	9	44.632	-0.193	0.000	0.05		3.5	OK
S6.000	S5	9	44.650	-0.175	0.000	0.11		5.9	OK
S3.001	SP1	9	44.418	-0.107	0.000	0.53	6	26.7	OK
S3.002	S9	9	44.312	-0.059	0.000	0.90		26.8	OK
S3.003	SG1	34	43.487	-0.038	0.000	0.01	563	0.3	OK
S3.004	S4	34	43.276	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 60 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	12	44.635	-0.190	0.000	0.06		2.4	OK
S4.000	S7	12	44.630	-0.195	0.000	0.04		2.2	OK
S5.000	S4	12	44.628	-0.197	0.000	0.04		2.6	OK
S6.000	S5	12	44.644	-0.181	0.000	0.09		4.5	OK
S3.001	SP1	12	44.399	-0.126	0.000	0.40	10	20.1	OK
S3.002	S9	12	44.281	-0.090	0.000	0.67		20.1	OK
S3.003	SG1	32	43.537	0.012	0.000	0.01	627	0.4	SURCHARGED
S3.004	S4	32	43.277	-0.214	0.000	0.01		0.4	OK

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Summary Wizard of 120 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	16	44.628	-0.197	0.000	0.04		1.6	OK
S4.000	S7	16	44.625	-0.200	0.000	0.03		1.5	OK
S5.000	S4	16	44.624	-0.201	0.000	0.03		1.8	OK
S6.000	S5	16	44.635	-0.190	0.000	0.06		3.0	OK
S3.001	SP1	16	44.379	-0.146	0.000	0.27	18	13.5	OK
S3.002	S9	16	44.251	-0.119	0.000	0.45		13.5	OK
S3.003	SG1	29	43.587	0.062	0.000	0.01	687	0.4	SURCHARGED
S3.004	S4	29	43.278	-0.213	0.000	0.01		0.4	OK

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<u>Summary Wizard of 240 minute 30 year Summer I+0% for Storm</u>																																																																																																														
<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																														
<u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.357 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 18.200 Cv (Winter) 0.840 Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status ON DVD Status ON Inertia Status ON Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40																																																																																																														
<table><tr><th>PN</th><th>US/MH Name</th><th>Storm Rank</th><th>Water Level (m)</th><th>Surcharged Depth (m)</th><th>Flooded Volume (m³)</th><th>Flow / Cap.</th><th>Overflow (l/s)</th><th>Half Drain Time (mins)</th><th>Pipe Flow (l/s)</th><th>Status</th></tr><tr><td>S3.000</td><td>S1</td><td>25</td><td>44.624</td><td>-0.201</td><td>0.000</td><td>0.02</td><td></td><td></td><td>1.0</td><td>OK</td></tr><tr><td>S4.000</td><td>S7</td><td>25</td><td>44.619</td><td>-0.206</td><td>0.000</td><td>0.02</td><td></td><td></td><td>0.9</td><td>OK</td></tr><tr><td>S5.000</td><td>S4</td><td>25</td><td>44.618</td><td>-0.207</td><td>0.000</td><td>0.02</td><td></td><td></td><td>1.1</td><td>OK</td></tr><tr><td>S6.000</td><td>S5</td><td>25</td><td>44.628</td><td>-0.197</td><td>0.000</td><td>0.04</td><td></td><td></td><td>1.9</td><td>OK</td></tr><tr><td>S3.001</td><td>SP1</td><td>25</td><td>44.362</td><td>-0.163</td><td>0.000</td><td>0.17</td><td></td><td>32</td><td>8.5</td><td>OK</td></tr><tr><td>S3.002</td><td>S9</td><td>25</td><td>44.227</td><td>-0.144</td><td>0.000</td><td>0.28</td><td></td><td></td><td>8.5</td><td>OK</td></tr><tr><td>S3.003</td><td>SG1</td><td>26</td><td>43.631</td><td>0.106</td><td>0.000</td><td>0.01</td><td></td><td>736</td><td>0.4</td><td>SURCHARGED</td></tr><tr><td>S3.004</td><td>S4</td><td>26</td><td>43.279</td><td>-0.212</td><td>0.000</td><td>0.01</td><td></td><td></td><td>0.4</td><td>OK</td></tr></table>												PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	S3.000	S1	25	44.624	-0.201	0.000	0.02			1.0	OK	S4.000	S7	25	44.619	-0.206	0.000	0.02			0.9	OK	S5.000	S4	25	44.618	-0.207	0.000	0.02			1.1	OK	S6.000	S5	25	44.628	-0.197	0.000	0.04			1.9	OK	S3.001	SP1	25	44.362	-0.163	0.000	0.17		32	8.5	OK	S3.002	S9	25	44.227	-0.144	0.000	0.28			8.5	OK	S3.003	SG1	26	43.631	0.106	0.000	0.01		736	0.4	SURCHARGED	S3.004	S4	26	43.279	-0.212	0.000	0.01			0.4	OK
PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																																				
S3.000	S1	25	44.624	-0.201	0.000	0.02			1.0	OK																																																																																																				
S4.000	S7	25	44.619	-0.206	0.000	0.02			0.9	OK																																																																																																				
S5.000	S4	25	44.618	-0.207	0.000	0.02			1.1	OK																																																																																																				
S6.000	S5	25	44.628	-0.197	0.000	0.04			1.9	OK																																																																																																				
S3.001	SP1	25	44.362	-0.163	0.000	0.17		32	8.5	OK																																																																																																				
S3.002	S9	25	44.227	-0.144	0.000	0.28			8.5	OK																																																																																																				
S3.003	SG1	26	43.631	0.106	0.000	0.01		736	0.4	SURCHARGED																																																																																																				
S3.004	S4	26	43.279	-0.212	0.000	0.01			0.4	OK																																																																																																				
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Summary Wizard of 360 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	30	44.620	-0.205	0.000	0.02		0.8	OK
S4.000	S7	30	44.614	-0.211	0.000	0.01		0.7	OK
S5.000	S4	30	44.613	-0.212	0.000	0.01		0.8	OK
S6.000	S5	30	44.625	-0.200	0.000	0.03		1.4	OK
S3.001	SP1	30	44.353	-0.172	0.000	0.13	46	6.3	OK
S3.002	S9	30	44.216	-0.155	0.000	0.21		6.3	OK
S3.003	SG1	24	43.650	0.125	0.000	0.01	756	0.4	SURCHARGED
S3.004	S4	24	43.279	-0.212	0.000	0.01		0.4	OK

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Summary Wizard of 480 minute 30 year Summer I+0% for Storm																																																																																																				
Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000																																																																																																				
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Synthetic Rainfall Details Rainfall Model FSR Ratio R 0.357 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 18.200 Cv (Winter) 0.840																																																																																																				
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Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40																																																																																																				
<table><tr><th>PN</th><th>US/MH Name</th><th>Storm Rank</th><th>Water Level (m)</th><th>Surcharged Depth (m)</th><th>Flooded Volume (m³)</th><th>Flow / Overflow Cap.</th><th>Half Drain Time (mins)</th><th>Pipe Flow (l/s)</th><th>Status</th></tr><tr><td>S3.000</td><td>S1</td><td>34</td><td>44.616</td><td>-0.209</td><td>0.000</td><td>0.01</td><td></td><td>0.6</td><td>OK</td></tr><tr><td>S4.000</td><td>S7</td><td>34</td><td>44.612</td><td>-0.213</td><td>0.000</td><td>0.01</td><td></td><td>0.6</td><td>OK</td></tr><tr><td>S5.000</td><td>S4</td><td>34</td><td>44.611</td><td>-0.214</td><td>0.000</td><td>0.01</td><td></td><td>0.7</td><td>OK</td></tr><tr><td>S6.000</td><td>S5</td><td>34</td><td>44.623</td><td>-0.202</td><td>0.000</td><td>0.02</td><td></td><td>1.2</td><td>OK</td></tr><tr><td>S3.001</td><td>SP1</td><td>34</td><td>44.348</td><td>-0.177</td><td>0.000</td><td>0.10</td><td>59</td><td>5.1</td><td>OK</td></tr><tr><td>S3.002</td><td>S9</td><td>34</td><td>44.208</td><td>-0.163</td><td>0.000</td><td>0.17</td><td></td><td>5.1</td><td>OK</td></tr><tr><td>S3.003</td><td>SG1</td><td>23</td><td>43.660</td><td>0.135</td><td>0.000</td><td>0.01</td><td>767</td><td>0.4</td><td>SURCHARGED</td></tr><tr><td>S3.004</td><td>S4</td><td>23</td><td>43.279</td><td>-0.212</td><td>0.000</td><td>0.01</td><td></td><td>0.4</td><td>OK</td></tr></table>											PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status	S3.000	S1	34	44.616	-0.209	0.000	0.01		0.6	OK	S4.000	S7	34	44.612	-0.213	0.000	0.01		0.6	OK	S5.000	S4	34	44.611	-0.214	0.000	0.01		0.7	OK	S6.000	S5	34	44.623	-0.202	0.000	0.02		1.2	OK	S3.001	SP1	34	44.348	-0.177	0.000	0.10	59	5.1	OK	S3.002	S9	34	44.208	-0.163	0.000	0.17		5.1	OK	S3.003	SG1	23	43.660	0.135	0.000	0.01	767	0.4	SURCHARGED	S3.004	S4	23	43.279	-0.212	0.000	0.01		0.4	OK
PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																											
S3.000	S1	34	44.616	-0.209	0.000	0.01		0.6	OK																																																																																											
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S3.004	S4	23	43.279	-0.212	0.000	0.01		0.4	OK																																																																																											
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Summary Wizard of 960 minute 30 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	41	44.609	-0.216	0.000	0.01		0.4	OK
S4.000	S7	41	44.607	-0.218	0.000	0.01		0.3	OK
S5.000	S4	41	44.606	-0.219	0.000	0.01		0.4	OK
S6.000	S5	41	44.614	-0.211	0.000	0.01		0.7	OK
S3.001	SP1	41	44.336	-0.189	0.000	0.06	114	3.0	OK
S3.002	S9	41	44.193	-0.177	0.000	0.10		3.0	OK
S3.003	SG1	21	43.669	0.144	0.000	0.02	946	0.5	SURCHARGED
S3.004	S4	21	43.280	-0.212	0.000	0.01		0.5	OK

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<u>Summary Wizard of 1440 minute 30 year Summer I+0% for Storm</u>																																																																																																												
<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																												
<u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.357 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 18.200 Cv (Winter) 0.840 Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status ON DVD Status ON Inertia Status ON Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40																																																																																																												
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PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																																		
S3.000	S1	46	44.607	-0.218	0.000	0.01			0.3	OK																																																																																																		
S4.000	S7	46	44.605	-0.220	0.000	0.00			0.2	OK																																																																																																		
S5.000	S4	46	44.605	-0.220	0.000	0.00			0.3	OK																																																																																																		
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S3.003	SG1	22	43.668	0.143	0.000	0.02		1060	0.5	SURCHARGED																																																																																																		
S3.004	S4	22	43.280	-0.212	0.000	0.01			0.5	OK																																																																																																		
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Summary Wizard of 30 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	3	44.655	-0.170	0.000	0.14		5.7	OK
S4.000	S7	3	44.648	-0.177	0.000	0.10		5.2	OK
S5.000	S4	3	44.646	-0.179	0.000	0.09		6.3	OK
S6.000	S5	3	44.669	-0.156	0.000	0.21		10.8	OK
S3.001	SP1	3	44.557	0.032	0.000	0.90	4	45.5	SURCHARGED
S3.002	S9	3	44.425	0.054	0.000	1.53		45.9	SURCHARGED
S3.003	SG1	25	43.649	0.124	0.000	0.01	754	0.4	SURCHARGED
S3.004	S4	25	43.279	-0.212	0.000	0.01		0.4	OK

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Summary Wizard of 60 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	5	44.649	-0.176	0.000	0.11		4.4	OK
S4.000	S7	5	44.641	-0.184	0.000	0.08		4.0	OK
S5.000	S4	5	44.639	-0.186	0.000	0.07		4.8	OK
S6.000	S5	5	44.660	-0.165	0.000	0.16		8.3	OK
S3.001	SP1	5	44.467	-0.058	0.000	0.73	4	36.6	OK
S3.002	S9	5	44.385	0.014	0.000	1.22		36.5	SURCHARGED
S3.003	SG1	14	43.744	0.219	0.000	0.02	847	0.5	SURCHARGED
S3.004	S4	14	43.281	-0.210	0.000	0.01		0.5	OK

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Summary Wizard of 120 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	10	44.639	-0.186	0.000	0.07		3.0	OK
S4.000	S7	10	44.633	-0.192	0.000	0.05		2.7	OK
S5.000	S4	10	44.631	-0.194	0.000	0.05		3.3	OK
S6.000	S5	10	44.649	-0.176	0.000	0.11		5.6	OK
S3.001	SP1	10	44.412	-0.113	0.000	0.49	16	24.9	OK
S3.002	S9	10	44.303	-0.068	0.000	0.83		24.9	OK
S3.003	SG1	12	43.841	0.316	0.000	0.02	932	0.5	SURCHARGED
S3.004	S4	12	43.282	-0.209	0.000	0.02		0.5	OK

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Summary Wizard of 240 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	15	44.631	-0.194	0.000	0.05		1.9	OK
S4.000	S7	15	44.626	-0.199	0.000	0.03		1.7	OK
S5.000	S4	15	44.626	-0.199	0.000	0.03		2.1	OK
S6.000	S5	15	44.638	-0.187	0.000	0.07		3.5	OK
S3.001	SP1	15	44.386	-0.139	0.000	0.31	34	15.6	OK
S3.002	S9	15	44.261	-0.110	0.000	0.52		15.6	OK
S3.003	SG1	10	43.928	0.403	0.000	0.02	1003	0.6	SURCHARGED
S3.004	S4	10	43.284	-0.208	0.000	0.02		0.6	OK

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Summary Wizard of 360 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	19	44.627	-0.198	0.000	0.03		1.4	OK
S4.000	S7	19	44.624	-0.201	0.000	0.02		1.3	OK
S5.000	S4	19	44.623	-0.202	0.000	0.02		1.5	OK
S6.000	S5	19	44.632	-0.193	0.000	0.05		2.6	OK
S3.001	SP1	18	44.373	-0.152	0.000	0.23	48	11.6	OK
S3.002	S9	18	44.242	-0.128	0.000	0.39		11.5	OK
S3.003	SG1	9	43.967	0.442	0.000	0.02	1032	0.6	SURCHARGED
S3.004	S4	9	43.284	-0.207	0.000	0.02		0.6	OK

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Summary Wizard of 480 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water			Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)					
S3.000	S1	24	44.624	-0.201	0.000	0.03			60	1.1	OK	
S4.000	S7	24	44.621	-0.204	0.000	0.02				1.0	OK	
S5.000	S4	24	44.619	-0.206	0.000	0.02				1.2	OK	
S6.000	S5	24	44.629	-0.196	0.000	0.04				2.1	OK	
S3.001	SP1	24	44.365	-0.160	0.000	0.18				9.3	OK	
S3.002	S9	24	44.231	-0.139	0.000	0.31				9.3	OK	
S3.003	SG1	8	43.989	0.464	0.000	0.02			1050	0.6	SURCHARGED	
S3.004	S4	8	43.284	-0.207	0.000	0.02				0.6	OK	

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Summary Wizard of 960 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	33	44.617	-0.208	0.000	0.02		0.6	OK
S4.000	S7	33	44.612	-0.213	0.000	0.01		0.6	OK
S5.000	S4	33	44.611	-0.214	0.000	0.01		0.7	OK
S6.000	S5	33	44.623	-0.202	0.000	0.02		1.2	OK
S3.001	SP1	33	44.349	-0.176	0.000	0.11	112	5.4	OK
S3.002	S9	33	44.210	-0.161	0.000	0.18		5.4	OK
S3.003	SG1	5	44.010	0.485	0.000	0.02	1184	0.6	SURCHARGED
S3.004	S4	5	43.285	-0.207	0.000	0.02		0.6	OK

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Summary Wizard of 1440 minute 100 year Summer I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	37	44.612	-0.213	0.000	0.01		0.5	OK
S4.000	S7	37	44.609	-0.216	0.000	0.01		0.4	OK
S5.000	S4	37	44.608	-0.217	0.000	0.01		0.5	OK
S6.000	S5	37	44.618	-0.207	0.000	0.02		0.9	OK
S3.001	SP1	37	44.342	-0.183	0.000	0.08	182	4.0	OK
S3.002	S9	37	44.200	-0.171	0.000	0.13		4.0	OK
S3.003	SG1	7	44.008	0.483	0.000	0.02	1341	0.6	SURCHARGED
S3.004	S4	7	43.285	-0.207	0.000	0.02		0.6	OK

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Summary Wizard of 15 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain		Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Time (mins)	Flow (l/s)			
S3.000	S1	17	44.627	-0.198	0.000	0.03				1.4		OK
S4.000	S7	17	44.624	-0.201	0.000	0.03				1.3		OK
S5.000	S4	17	44.623	-0.202	0.000	0.02				1.6		OK
S6.000	S5	17	44.633	-0.192	0.000	0.05				2.7		OK
S3.001	SP1	17	44.373	-0.152	0.000	0.23			7	11.4		OK
S3.002	S9	17	44.242	-0.128	0.000	0.38				11.5		OK
S3.003	SG1	53	43.361	-0.164	0.000	0.01			351	0.2		OK
S3.004	S4	53	43.271	-0.220	0.000	0.00				0.2		OK

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	23	44.625	-0.200	0.000	0.03		1.2	OK
S4.000	S7	23	44.622	-0.203	0.000	0.02		1.1	OK
S5.000	S4	23	44.620	-0.205	0.000	0.02		1.3	OK
S6.000	S5	23	44.629	-0.196	0.000	0.04		2.2	OK
S3.001	SP1	23	44.365	-0.160	0.000	0.19	9	9.3	OK
S3.002	S9	23	44.232	-0.139	0.000	0.31		9.3	OK
S3.003	SG1	51	43.381	-0.144	0.000	0.01	392	0.2	OK
S3.004	S4	51	43.272	-0.219	0.000	0.01		0.2	OK

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Summary Wizard of 60 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	29	44.620	-0.205	0.000	0.02		0.8	OK
S4.000	S7	29	44.615	-0.210	0.000	0.01		0.7	OK
S5.000	S4	29	44.614	-0.211	0.000	0.01		0.9	OK
S6.000	S5	29	44.625	-0.200	0.000	0.03		1.5	OK
S3.001	SP1	29	44.354	-0.171	0.000	0.13	15	6.5	OK
S3.002	S9	29	44.217	-0.154	0.000	0.22		6.6	OK
S3.003	SG1	49	43.405	-0.120	0.000	0.01	435	0.2	OK
S3.004	S4	49	43.273	-0.218	0.000	0.01		0.2	OK

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	36	44.613	-0.212	0.000	0.01		0.5	OK
S4.000	S7	36	44.610	-0.215	0.000	0.01		0.5	OK
S5.000	S4	36	44.609	-0.216	0.000	0.01		0.6	OK
S6.000	S5	36	44.620	-0.205	0.000	0.02		1.0	OK
S3.001	SP1	36	44.344	-0.181	0.000	0.08	28	4.3	OK
S3.002	S9	36	44.202	-0.169	0.000	0.14		4.3	OK
S3.003	SG1	47	43.430	-0.095	0.000	0.01	477	0.3	OK
S3.004	S4	47	43.274	-0.217	0.000	0.01		0.3	OK

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Summary Wizard of 240 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	44	44.608	-0.217	0.000	0.01		0.3	OK
S4.000	S7	44	44.606	-0.219	0.000	0.01		0.3	OK
S5.000	S4	44	44.606	-0.219	0.000	0.01		0.4	OK
S6.000	S5	44	44.613	-0.212	0.000	0.01		0.6	OK
S3.001	SP1	44	44.333	-0.192	0.000	0.05	53	2.7	OK
S3.002	S9	44	44.191	-0.180	0.000	0.09		2.7	OK
S3.003	SG1	42	43.454	-0.071	0.000	0.01	517	0.3	OK
S3.004	S4	42	43.275	-0.217	0.000	0.01		0.3	OK

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Summary Wizard of 360 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)				
S3.000	S1	48	44.606	-0.219	0.000	0.01			0.2	OK	
S4.000	S7	48	44.605	-0.220	0.000	0.00			0.2	OK	
S5.000	S4	48	44.604	-0.221	0.000	0.00			0.3	OK	
S6.000	S5	48	44.610	-0.215	0.000	0.01			0.5	OK	
S3.001	SP1	48	44.329	-0.196	0.000	0.04		71	2.1	OK	
S3.002	S9	48	44.184	-0.186	0.000	0.07			2.1	OK	
S3.003	SG1	38	43.466	-0.059	0.000	0.01		540	0.3	OK	
S3.004	S4	38	43.275	-0.216	0.000	0.01			0.3	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	49	44.605	-0.220	0.000	0.00		0.2	OK
S4.000	S7	49	44.604	-0.221	0.000	0.00		0.2	OK
S5.000	S4	49	44.603	-0.222	0.000	0.00		0.2	OK
S6.000	S5	49	44.608	-0.217	0.000	0.01		0.4	OK
S3.001	SP1	49	44.327	-0.198	0.000	0.03	85	1.7	OK
S3.002	S9	49	44.180	-0.191	0.000	0.06		1.7	OK
S3.003	SG1	37	43.471	-0.054	0.000	0.01	558	0.3	OK
S3.004	S4	37	43.275	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 960 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)				
S3.000	S1	53	44.603	-0.222	0.000	0.00			0.1	OK	
S4.000	S7	53	44.602	-0.223	0.000	0.00			0.1	OK	
S5.000	S4	53	44.602	-0.223	0.000	0.00			0.1	OK	
S6.000	S5	53	44.605	-0.220	0.000	0.00			0.2	OK	
S3.001	SP1	53	44.322	-0.203	0.000	0.02		120	1.0	OK	
S3.002	S9	53	44.173	-0.198	0.000	0.03			1.0	OK	
S3.003	SG1	35	43.479	-0.046	0.000	0.01		709	0.3	OK	
S3.004	S4	35	43.275	-0.216	0.000	0.01			0.3	OK	

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Summary Wizard of 1440 minute 1 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	54	44.602	-0.223	0.000	0.00		0.1	OK
S4.000	S7	54	44.602	-0.223	0.000	0.00		0.1	OK
S5.000	S4	54	44.602	-0.223	0.000	0.00		0.1	OK
S6.000	S5	54	44.604	-0.221	0.000	0.00		0.2	OK
S3.001	SP1	54	44.317	-0.208	0.000	0.02	163	0.8	OK
S3.002	S9	54	44.170	-0.201	0.000	0.03		0.8	OK
S3.003	SG1	36	43.478	-0.047	0.000	0.01	776	0.3	OK
S3.004	S4	36	43.275	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 15 minute 30 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	6	44.645	-0.180	0.000	0.09		3.5	OK
S4.000	S7	6	44.637	-0.188	0.000	0.06		3.3	OK
S5.000	S4	6	44.635	-0.190	0.000	0.06		3.9	OK
S6.000	S5	6	44.654	-0.171	0.000	0.13		6.8	OK
S3.001	SP1	6	44.428	-0.097	0.000	0.60	4	30.4	OK
S3.002	S9	6	44.337	-0.034	0.000	1.00		29.9	OK
S3.003	SG1	41	43.458	-0.067	0.000	0.01	521	0.3	OK
S3.004	S4	41	43.275	-0.216	0.000	0.01		0.3	OK

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Summary Wizard of 30 minute 30 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 18.200 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	11	44.638	-0.187	0.000	0.07		2.8	OK
S4.000	S7	11	44.632	-0.193	0.000	0.05		2.6	OK
S5.000	S4	11	44.631	-0.194	0.000	0.05		3.1	OK
S6.000	S5	11	44.648	-0.177	0.000	0.10		5.4	OK
S3.001	SP1	11	44.409	-0.116	0.000	0.47	9	23.9	OK
S3.002	S9	11	44.298	-0.073	0.000	0.80		23.9	OK
S3.003	SG1	33	43.511	-0.014	0.000	0.01	594	0.3	OK
S3.004	S4	33	43.276	-0.215	0.000	0.01		0.3	OK

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<u>Summary Wizard of 60 minute 30 year Winter I+0% for Storm</u>										
<u>Simulation Criteria</u>										
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000										
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000										
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800										
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000										
Foul Sewage per hectare (l/s) 0.000										
Number of Input Hydrographs 0 Number of Storage Structures 2										
Number of Online Controls 1 Number of Time/Area Diagrams 0										
Number of Offline Controls 0 Number of Real Time Controls 0										
<u>Synthetic Rainfall Details</u>										
Rainfall Model FSR Ratio R 0.357										
Region England and Wales Cv (Summer) 0.750										
M5-60 (mm) 18.200 Cv (Winter) 0.840										
Margin for Flood Risk Warning (mm) 300.0										
Analysis Timestep 2.5 Second Increment (Extended)										
DTS Status ON										
DVD Status ON										
Inertia Status ON										
<u>Profile(s)</u> Summer and Winter										
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440										
Return Period(s) (years) 1, 30, 100										
Climate Change (%) 0, 0, 40										

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Summary Wizard of 120 minute 30 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	22	44.625	-0.200	0.000	0.03		1.2	OK
S4.000	S7	22	44.623	-0.202	0.000	0.02		1.1	OK
S5.000	S4	22	44.621	-0.204	0.000	0.02		1.3	OK
S6.000	S5	22	44.630	-0.195	0.000	0.04		2.3	OK
S3.001	SP1	21	44.368	-0.157	0.000	0.20	28	10.2	OK
S3.002	S9	21	44.236	-0.135	0.000	0.34		10.2	OK
S3.003	SG1	27	43.623	0.098	0.000	0.01	727	0.4	SURCHARGED
S3.004	S4	27	43.279	-0.213	0.000	0.01		0.4	OK

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Summary Wizard of 240 minute 30 year Winter I+0% for Storm																																																																																																			
Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000																																																																																																			
Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																			
Synthetic Rainfall Details Rainfall Model FSR Ratio R 0.357 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 18.200 Cv (Winter) 0.840																																																																																																			
Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status ON DVD Status ON Inertia Status ON																																																																																																			
Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40																																																																																																			
<table><tr><th>PN</th><th>US/MH Name</th><th>Storm Rank</th><th>Water Level (m)</th><th>Surcharged Depth (m)</th><th>Flooded Volume (m³)</th><th>Flow / Overflow Cap.</th><th>Half Drain Time (mins)</th><th>Pipe Flow (l/s)</th><th>Status</th></tr><tr><td>S3.000</td><td>S1</td><td>31</td><td>44.619</td><td>-0.206</td><td>0.000</td><td>0.02</td><td></td><td>0.7</td><td>OK</td></tr><tr><td>S4.000</td><td>S7</td><td>31</td><td>44.614</td><td>-0.211</td><td>0.000</td><td>0.01</td><td></td><td>0.7</td><td>OK</td></tr><tr><td>S5.000</td><td>S4</td><td>31</td><td>44.613</td><td>-0.212</td><td>0.000</td><td>0.01</td><td></td><td>0.8</td><td>OK</td></tr><tr><td>S6.000</td><td>S5</td><td>31</td><td>44.624</td><td>-0.201</td><td>0.000</td><td>0.03</td><td></td><td>1.4</td><td>OK</td></tr><tr><td>S3.001</td><td>SP1</td><td>31</td><td>44.352</td><td>-0.173</td><td>0.000</td><td>0.12</td><td>54</td><td>6.2</td><td>OK</td></tr><tr><td>S3.002</td><td>S9</td><td>31</td><td>44.215</td><td>-0.156</td><td>0.000</td><td>0.21</td><td></td><td>6.2</td><td>OK</td></tr><tr><td>S3.003</td><td>SG1</td><td>20</td><td>43.675</td><td>0.150</td><td>0.000</td><td>0.02</td><td>781</td><td>0.5</td><td>SURCHARGED</td></tr><tr><td>S3.004</td><td>S4</td><td>20</td><td>43.280</td><td>-0.212</td><td>0.000</td><td>0.01</td><td></td><td>0.5</td><td>OK</td></tr></table>										PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status	S3.000	S1	31	44.619	-0.206	0.000	0.02		0.7	OK	S4.000	S7	31	44.614	-0.211	0.000	0.01		0.7	OK	S5.000	S4	31	44.613	-0.212	0.000	0.01		0.8	OK	S6.000	S5	31	44.624	-0.201	0.000	0.03		1.4	OK	S3.001	SP1	31	44.352	-0.173	0.000	0.12	54	6.2	OK	S3.002	S9	31	44.215	-0.156	0.000	0.21		6.2	OK	S3.003	SG1	20	43.675	0.150	0.000	0.02	781	0.5	SURCHARGED	S3.004	S4	20	43.280	-0.212	0.000	0.01		0.5	OK
PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																										
S3.000	S1	31	44.619	-0.206	0.000	0.02		0.7	OK																																																																																										
S4.000	S7	31	44.614	-0.211	0.000	0.01		0.7	OK																																																																																										
S5.000	S4	31	44.613	-0.212	0.000	0.01		0.8	OK																																																																																										
S6.000	S5	31	44.624	-0.201	0.000	0.03		1.4	OK																																																																																										
S3.001	SP1	31	44.352	-0.173	0.000	0.12	54	6.2	OK																																																																																										
S3.002	S9	31	44.215	-0.156	0.000	0.21		6.2	OK																																																																																										
S3.003	SG1	20	43.675	0.150	0.000	0.02	781	0.5	SURCHARGED																																																																																										
S3.004	S4	20	43.280	-0.212	0.000	0.01		0.5	OK																																																																																										
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Summary Wizard of 360 minute 30 year Winter I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	35	44.614	-0.211	0.000	0.01		0.5	OK
S4.000	S7	35	44.610	-0.215	0.000	0.01		0.5	OK
S5.000	S4	35	44.609	-0.216	0.000	0.01		0.6	OK
S6.000	S5	35	44.621	-0.204	0.000	0.02		1.0	OK
S3.001	SP1	35	44.346	-0.179	0.000	0.09	78	4.6	OK
S3.002	S9	35	44.204	-0.167	0.000	0.15		4.6	OK
S3.003	SG1	18	43.698	0.173	0.000	0.02	807	0.5	SURCHARGED
S3.004	S4	18	43.280	-0.211	0.000	0.01		0.5	OK

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Summary Wizard of 960 minute 30 year Winter I+0% for Storm																																																																																																												
Simulation Criteria Areal Reduction Factor 1.000 Hot Start (mins) 0 Hot Start Level (mm) 0 Manhole Headloss Coeff (Global) 0.500 Foul Sewage per hectare (l/s) 0.000 Additional Flow - % of Total Flow 0.000 MADD Factor * 10m³/ha Storage 2.000 Inlet Coeffiecient 0.800 Flow per Person per Day (l/per/day) 0.000																																																																																																												
Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																												
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<table><tr><th>PN</th><th>US/MH Name</th><th>Storm Rank</th><th>Water Level (m)</th><th>Surcharged Depth (m)</th><th>Flooded Volume (m³)</th><th>Flow / Cap.</th><th>Overflow (l/s)</th><th>Half Drain Time (mins)</th><th>Pipe Flow (l/s)</th><th>Status</th></tr><tr><td>S3.000</td><td>S1</td><td>47</td><td>44.607</td><td>-0.218</td><td>0.000</td><td>0.01</td><td></td><td></td><td>0.3</td><td>OK</td></tr><tr><td>S4.000</td><td>S7</td><td>47</td><td>44.605</td><td>-0.220</td><td>0.000</td><td>0.00</td><td></td><td></td><td>0.2</td><td>OK</td></tr><tr><td>S5.000</td><td>S4</td><td>47</td><td>44.605</td><td>-0.220</td><td>0.000</td><td>0.00</td><td></td><td></td><td>0.3</td><td>OK</td></tr><tr><td>S6.000</td><td>S5</td><td>47</td><td>44.610</td><td>-0.215</td><td>0.000</td><td>0.01</td><td></td><td></td><td>0.5</td><td>OK</td></tr><tr><td>S3.001</td><td>SP1</td><td>47</td><td>44.330</td><td>-0.195</td><td>0.000</td><td>0.04</td><td></td><td>184</td><td>2.2</td><td>OK</td></tr><tr><td>S3.002</td><td>S9</td><td>47</td><td>44.186</td><td>-0.185</td><td>0.000</td><td>0.07</td><td></td><td></td><td>2.2</td><td>OK</td></tr><tr><td>S3.003</td><td>SG1</td><td>15</td><td>43.719</td><td>0.194</td><td>0.000</td><td>0.02</td><td></td><td>972</td><td>0.5</td><td>SURCHARGED</td></tr><tr><td>S3.004</td><td>S4</td><td>15</td><td>43.280</td><td>-0.211</td><td>0.000</td><td>0.01</td><td></td><td></td><td>0.5</td><td>OK</td></tr></table>										PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	S3.000	S1	47	44.607	-0.218	0.000	0.01			0.3	OK	S4.000	S7	47	44.605	-0.220	0.000	0.00			0.2	OK	S5.000	S4	47	44.605	-0.220	0.000	0.00			0.3	OK	S6.000	S5	47	44.610	-0.215	0.000	0.01			0.5	OK	S3.001	SP1	47	44.330	-0.195	0.000	0.04		184	2.2	OK	S3.002	S9	47	44.186	-0.185	0.000	0.07			2.2	OK	S3.003	SG1	15	43.719	0.194	0.000	0.02		972	0.5	SURCHARGED	S3.004	S4	15	43.280	-0.211	0.000	0.01			0.5	OK
PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																																		
S3.000	S1	47	44.607	-0.218	0.000	0.01			0.3	OK																																																																																																		
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<u>Summary Wizard of 1440 minute 30 year Winter I+0% for Storm</u>																																																																																																												
<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																																																												
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PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status																																																																																																		
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Summary Wizard of 15 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	1	44.660	-0.165	0.000	0.15		6.4	OK
S4.000	S7	1	44.651	-0.174	0.000	0.11		5.9	OK
S5.000	S4	1	44.649	-0.176	0.000	0.10		7.1	OK
S6.000	S5	1	44.674	-0.151	0.000	0.23		12.2	OK
S3.001	SP1	1	44.603	0.078	0.000	1.00	3	50.4	SURCHARGED
S3.002	S9	1	44.447	0.076	0.000	1.67		49.9	SURCHARGED
S3.003	SG1	28	43.592	0.067	0.000	0.01	693	0.4	SURCHARGED
S3.004	S4	28	43.278	-0.213	0.000	0.01		0.4	OK

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Summary Wizard of 30 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	4	44.653	-0.172	0.000	0.13		5.2	OK
S4.000	S7	4	44.646	-0.179	0.000	0.09		4.7	OK
S5.000	S4	4	44.643	-0.182	0.000	0.08		5.7	OK
S6.000	S5	4	44.666	-0.159	0.000	0.19		9.8	OK
S3.001	SP1	4	44.522	-0.003	0.000	0.84	4	42.2	OK
S3.002	S9	4	44.407	0.036	0.000	1.40		42.0	SURCHARGED
S3.003	SG1	19	43.692	0.167	0.000	0.02	797	0.5	SURCHARGED
S3.004	S4	19	43.280	-0.211	0.000	0.01		0.5	OK

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Summary Wizard of 60 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	7	44.644	-0.181	0.000	0.09		3.5	OK
S4.000	S7	7	44.636	-0.189	0.000	0.06		3.2	OK
S5.000	S4	7	44.635	-0.190	0.000	0.06		3.9	OK
S6.000	S5	7	44.653	-0.172	0.000	0.13		6.7	OK
S3.001	SP1	8	44.424	-0.101	0.000	0.59	12	29.7	OK
S3.002	S9	8	44.325	-0.046	0.000	0.99		29.7	OK
S3.003	SG1	13	43.799	0.274	0.000	0.02	896	0.5	SURCHARGED
S3.004	S4	13	43.282	-0.210	0.000	0.01		0.5	OK

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Summary Wizard of 120 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	13	44.634	-0.191	0.000	0.05		2.2	OK
S4.000	S7	13	44.629	-0.196	0.000	0.04		2.1	OK
S5.000	S4	13	44.628	-0.197	0.000	0.04		2.5	OK
S6.000	S5	13	44.643	-0.182	0.000	0.08		4.2	OK
S3.001	SP1	13	44.395	-0.130	0.000	0.37	29	18.7	OK
S3.002	S9	13	44.275	-0.096	0.000	0.63		18.8	OK
S3.003	SG1	11	43.909	0.384	0.000	0.02	988	0.6	SURCHARGED
S3.004	S4	11	43.283	-0.208	0.000	0.02		0.6	OK

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Innovyze	Network 2020.1	

Summary Wizard of 240 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	20	44.626	-0.199	0.000	0.03		1.4	OK
S4.000	S7	20	44.623	-0.202	0.000	0.02		1.2	OK
S5.000	S4	20	44.623	-0.202	0.000	0.02		1.5	OK
S6.000	S5	20	44.632	-0.193	0.000	0.05		2.6	OK
S3.001	SP1	19	44.372	-0.153	0.000	0.23	55	11.4	OK
S3.002	S9	19	44.242	-0.129	0.000	0.38		11.4	OK
S3.003	SG1	6	44.008	0.483	0.000	0.02	1064	0.6	SURCHARGED
S3.004	S4	6	43.285	-0.207	0.000	0.02		0.6	OK

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Summary Wizard of 360 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	26	44.624	-0.201	0.000	0.02		1.0	OK
S4.000	S7	26	44.619	-0.206	0.000	0.02		0.9	OK
S5.000	S4	26	44.617	-0.208	0.000	0.02		1.1	OK
S6.000	S5	26	44.628	-0.197	0.000	0.04		1.9	OK
S3.001	SP1	26	44.361	-0.164	0.000	0.17	79	8.3	OK
S3.002	S9	26	44.226	-0.144	0.000	0.28		8.3	OK
S3.003	SG1	4	44.054	0.529	0.000	0.02	1098	0.7	SURCHARGED
S3.004	S4	4	43.285	-0.206	0.000	0.02		0.7	OK

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Summary Wizard of 480 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water		Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)					
S3.000	S1	28	44.621	-0.204	0.000	0.02			0.8	OK	
S4.000	S7	28	44.615	-0.210	0.000	0.01			0.7	OK	
S5.000	S4	28	44.614	-0.211	0.000	0.01			0.9	OK	
S6.000	S5	28	44.625	-0.200	0.000	0.03			1.5	OK	
S3.001	SP1	28	44.354	-0.171	0.000	0.13		104	6.7	OK	
S3.002	S9	28	44.218	-0.153	0.000	0.22			6.7	OK	
S3.003	SG1	3	44.082	0.557	0.000	0.02		1120	0.7	SURCHARGED	
S3.004	S4	3	43.286	-0.206	0.000	0.02			0.7	OK	

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Summary Wizard of 960 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water	Surcharged	Flooded	Flow / Overflow Cap.	Half Drain Time (mins)	Pipe	Status
			Level (m)	Depth (m)	Volume (m ³)			Flow (l/s)	
S3.000	S1	38	44.612	-0.213	0.000	0.01		0.5	OK
S4.000	S7	38	44.609	-0.216	0.000	0.01		0.4	OK
S5.000	S4	38	44.608	-0.217	0.000	0.01		0.5	OK
S6.000	S5	38	44.618	-0.207	0.000	0.02		0.9	OK
S3.001	SP1	38	44.341	-0.184	0.000	0.08	209	3.9	OK
S3.002	S9	38	44.200	-0.171	0.000	0.13		3.9	OK
S3.003	SG1	1	44.112	0.587	0.000	0.02	1169	0.7	SURCHARGED
S3.004	S4	1	43.286	-0.205	0.000	0.02		0.7	OK

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Summary Wizard of 1440 minute 100 year Winter I+40% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.200	Cv (Winter)	0.840

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

Profile(s)

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

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.000	S1	42	44.609	-0.216	0.000	0.01		0.3	OK
S4.000	S7	42	44.606	-0.219	0.000	0.01		0.3	OK
S5.000	S4	42	44.606	-0.219	0.000	0.01		0.4	OK
S6.000	S5	42	44.613	-0.212	0.000	0.01		0.6	OK
S3.001	SP1	42	44.334	-0.191	0.000	0.06	303	2.9	OK
S3.002	S9	42	44.192	-0.178	0.000	0.10		2.9	OK
S3.003	SG1	2	44.104	0.579	0.000	0.02	1366	0.7	SURCHARGED
S3.004	S4	2	43.286	-0.205	0.000	0.02		0.7	OK

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14.9 Appendix 9 - United Utilities

14.9.1 Asset Map

STM Environmental Ltd

**Unit 6
Crane Mews, 32 Gould Road,
Twickham,
TW2 6RS**

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: 63 Knowsley
Our Ref: UUPS-ORD-250254
Date: 22/02/2021**

Dear Sirs

Location: 63 Knowsley Street

I acknowledge with thanks your request dated 12/02/2021 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



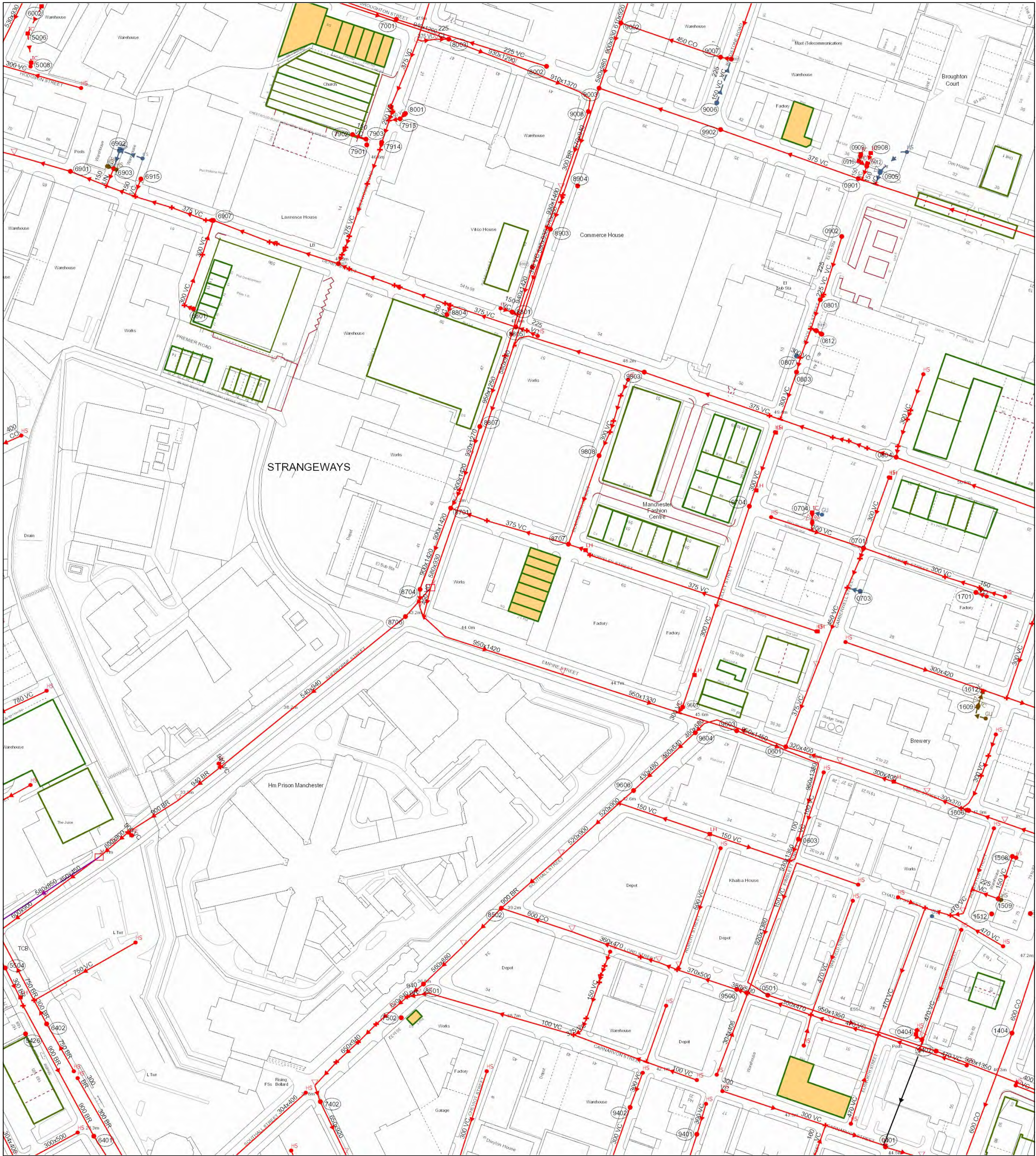
Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

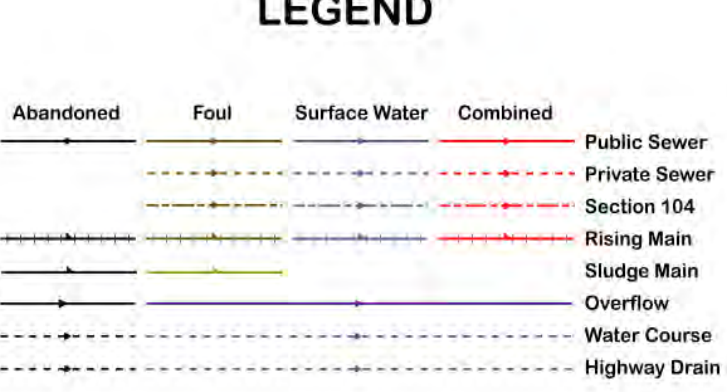
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0811	49.67	CO	0	300			VC	3.162278	
0804	50.9	CO	0	47.4	375		VC	16.76305	
1404	46.61	CO	40.72	600			CO	85.44004	1 in 38
6907	42.41	CO	37.44	375			VC	4	
7001	47.71	CO	44.93	225			VC	67.6767	1 in 88
6401	28.13	CO	32.73	300			BR	52.13362	1 in 145
6903		CO		150			UN	10.27689	
6915		CO		150			VC	10.28776	
6801	42.48	CO	0	300			VC	5.385165	
9902	46.61	CO	47.32	375			VC	70.83784	
8501	35.48	CO	30.17	300			BR	45.54119	1 in 112
0912		CO		150			VC	8.640379	
9008	50.2	CO	38.21	300			BR	45.54119	
5504	27.36	CO	24.01	300			BR	23.27371	
8001	46.11	CO	30.01	630			VC	17.72005	
8707	45.8	CO	42.4	375			VC	46.84015	
8001	47.18	CO	45.28	150			VC	4.24064	1 in 14
9402	41.75	CO	38.81	300			VC	118.596	1 in 47
0701	48.96	CO	44.49	375			VC	3.162278	
8704	43.45	CO	35.53	920			BR	10	
0807	49.39	BR	0	300			VC	2.236068	
8704	48.1	CO	44.33	300			VC	117.0543	1 in 43
7402	32.78	CO	29.37	650			BR	32.20248	1 in 66
8708	42.4	CO	38.15	540			BR	131.9209	
1608	47.98	CO	44.28	300			VC	4.123106	
0902	50.88	CO	48.05	225			VC	33.52611	
7907	46.61	CO	41.2	375			VC	35.78514	
9803	48.25	CO	45.08	375			VC	77.15124	
8002	46.83	CO	47.03	225			VC	88.97701	1 in 80
0803	49.42	CO	46.14	300			VC	27.51363	
9003	50.27	CO	46.83	570			BR	62.20767	
7914	46.79	CO	41.99	375			VC	4.123106	
0703	48.57	SW	0	450			VC	7.28011	
1509		CO	0	225			VC	15.28911	
8801		CO	31.57	150			VC	3.42654	
8502	38.99	CO	31.57	900			BR	29.69848	1 in 93
9401	42.71	CO	39.38	300			VC	137.8768	
0901	43.98	CO	34.98	650			BR	98.03061	1 in 654
9002	50.61	CO	47.19	600			BR	18.97367	1 in 105
6901	38.11	CO	35.12	375			VC	32.28003	1 in 17
9808	47.06	CO	42.99	300			VC	51.88521	1 in 115
8805	47.43	CO	42.43	375			VC	37.94733	
6902		BR		150			PF	10.56117	
9007	50.87	CO	48.09	450			VC	24.88755	1 in 216
1508		CO	39.34	370			VC	58.18955	
9508	43.61	CO	35.21	950			BR	48.49648	
9603	45.74	CO	0	150			VC	3.695551	
0812		CO	0	150			VC	3.695551	
8803	48.67	CO	45.64	375			VC	57.24509	1 in 18
8005	50.82	CO	46.15	450			CO	6.082763	1 in 152
0901	51.58	CO	48.23	375			VC	80.65358	1 in 117
0402	45.65	CO	34.82	920			BR	96.59604	1 in 508
6402	27.69	CO	24.5	300			BR	14.74482	
9601	45.29	CO	36.54	225			VC	1.414214	
7915	47.23	CO	43.81	150			VC	6.082763	
8802	46.09	CO	36.08	940			BR	27.20294	
9604	45.01	CO	39.9	460			BR	23.34524	1 in 12
8701	45.1	CO	35.76	900			VC	48.10405	1 in 481
0801	46.61	CO	46.44	300			VC	16.76305	
0601	46.3	CO	41.83	320			VC	50.96193	
8003	45.27	CO	36.36	930			BR	38.52642	
0401	44.58	CO	39.72	320			VC	20.89061	
9006	50.66	SW	40.08	150			VC	12.54911	1 in 141
9606	42.96	CO	33.23	520			BR	53.81579	
7902		CO	35.13	150			VC	7.67868	
6903		CO	35.13	930			BR	15	
8903	45.67	CO	45.64	580			BR	208.8163	1 in 39

Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0811	49.67	CO	0	300			VC	3.162278	
0804	50.9	CO	0	47.4	375		VC	16.76305	
1404	46.61	CO	40.72	600			CO	85.44004	1 in 38
6907	42.41	CO	37.44	375			VC	4	
7001	47.71	CO	44.93	225			VC	67.6767	1 in 88
6401	28.13	CO	32.73	300			BR	52.13362	1 in 145
6903		CO		150			UN	10.27689	
6915		CO		150			VC	10.28776	
6801	42.48	CO	0	300			VC	5.385165	
9902	46.61	CO	47.32	375			VC	70.83784	
8501	35.48	CO	30.17	300			BR	45.54119	1 in 112
0912		CO		150			VC	8.640379	
9008	50.2	CO	38.21	300			BR	45.54119	
5504	27.36	CO	24.01	300			BR	23.27371	
8001	46.11	CO	30.01	630			VC	17.72005	
8707	45.8	CO	42.4	375			VC	46.84015	
8001	47.18	CO	45.28	150			VC	4.24064	1 in 14
9402	41.75	CO	38.81	300			VC	118.596	1 in 47
0701	48.96	CO	44.49	375			VC	3.162278	
8704	43.45	CO	35.53	920			BR	10	
0807	49.39	BR	0	300			VC	2.236068	
8704	48.1	CO	44.33	300			VC	117.0543	1 in 43
7402	32.78	CO	29.37	650			BR	32.20248	1 in 66
8708	42.4	CO	38.15	540			BR	131.9209	
1608	47.98	CO	44.28	300			VC	4.123106	
0902	50.88	CO	48.05	225			VC	33.52611	
7907	46.61	CO	41.2	375			VC	35.78514	
9803	48.25	CO	45.08	375			VC	77.15124	
8002	46.83	CO	47.03	225			VC	88.97701	1 in 80
0803	49.42	CO	46.14	300			VC	27.51363	
9003	50.27	CO	46.83	570			BR	62.20767	
7914	46.79	CO	41.99	375			VC	4.123106	
0703	48.57	SW	0	450			VC	7.28011	
1509		CO	0	225			VC	15.28911	
8801		CO	31.57	150			VC	3.42654	
8502	38.99	CO	31.57	900			BR	29.69848	1 in 93
9401	42.71	CO	39.38	300			VC	137.8768	
0901	43.98	CO	34.98	650			BR	98.03061	1 in 654
9002	50.61	CO	47.19	600			BR	18.97367	1 in 105
6901	38.11	CO	35.12	375			VC	32.28003	1 in 17
9808	47.06	CO	42.99	300			VC	51.88521	1 in 115
8805	47.43	CO	42.43	375			VC	37.94733	
6902		BR		150			PF	10.56117	
9007	50.87	CO	48.09	450			VC	24.88755	1 in 216
1508		CO	39.34	370			VC	58.18955	
9508	43.61	CO	35.21	950			BR	48.49648	
9603	45.74	CO	0	150			VC	3.695551	
0812		CO	0	150			VC	3.695551	
8803	48.67	CO	45.64	375			VC	57.24509	1 in 18
8005	50.82	CO	46.15	450			CO	6.082763	1 in 152
0901	51.58	CO	48.23	375			VC	80.65358	1 in 117
0402	45.65	CO	34.82	920			BR	96.59604	1 in 508
6402	27.69	CO	24.5	300			BR	14.74482	
9601	45.29	CO	36.54	225			VC	1.414214	
7915	47.23	CO	43.81	150			VC	6.082763	
8802	46.09	CO	36.08	940			BR	27.20294	
9604	45.01	CO	39.9	460			BR	23.34524	1 in 12
8701	45.1	CO	35.76	900			VC	48.10405	1 in 481
0801	46.61	CO	46.44	300			VC	16.76305	
0601	46.3	CO	41.83	320			VC	50.96193	
8003	45.27	CO	36.36	930			BR	38.52642	
0401	44.58	CO	39.72	320			VC	20.89061	
9006	50.66	SW	40.08	150			VC	12.54911	1 in 141
9606	42.96	CO	33.23	520			BR	53.81579	
7902		CO	35.13	150			VC	7.67868	
6903		CO	35.13	930			BR	15	
8903	45.67	CO	45.64	580			BR	208.8163	1 in 39



All point assets follow the standard colour convention:
red - combined
blue - surface water
brown - foul
purple - overflow



MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
EG Egg AR Arch
OV Oval BA Barrel
FT Flat Top HO HorseShoe
RE Rectangular UN Unspecified
SQ Square

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culvert
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

63 Knowsley Street,

Scale: 1:1250 **Date:** 22/02/2021

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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14.9.2 Connection Agreement in Principle

From: [Perry, Graham](#)
To: [Matthew Ashdown](#)
Cc: [Wastewater Developer Services](#)
Subject: RE: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number :4200045192
Date: 14 December 2021 21:57:07
Attachments: [image004.png](#)
[image006.png](#)
[image007.png](#)

Hello Matthew

I have reviewed your correspondence with Gary and can confirm that a connection to the combined sewer would be acceptable at a point convenient to your design. To minimise the attenuation required we would accept a discharge of 5 l/s but you must seek approval from the LLFA for this.

If you are proposing to install basements then you must ensure that any foul is pumped at lower levels to prevent surcharging in the existing sewer from entering your system.

Thanks

Graham Perry

 United Utilities Water for the North West	Graham Perry Development Engineer Developer Services M: 07557 577548 T: 01925 679405 unitedutilities.com
---	---

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From: Matthew Ashdown [mailto:matthew@stmenvironmental.co.uk]
Sent: 02 December 2021 13:40
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number :4200045192

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Good afternoon,

I've been in discussion with the highways authorities regarding the use of their drainage assets.

They have stated that they would prefer the discharge is connected into the combined sewer

run, to ensure no overrun of the carriage during times when the highways system is unable to cope.

Is this an acceptable assessment to allow the a connection to be agreed in principle?

Kind regards

Kind regards,

Matthew Ashdown

Senior Environmental Consultant (BSc)



T: 0845 303 9434;

M: 07810 512 806;

E: matthew@stmenvironmental.co.uk

W: <http://www.stmenvironmental.co.uk/>

A: Unit 6, Crane Mews, 32, Gould Rd, Twickenham TW2 6RS

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From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Sent: 24 November 2021 11:28

To: Matthew Ashdown <matthew@stmenvironmental.co.uk>

Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Pre Development Enquiry for: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number : 4200045192

Good Morning, Matthew

Pre Development Enquiry for: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number : 4200045192

-

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 375mm diameter public combined sewer within Knowsley Street located to the North of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Thank you for providing historic bore hole records indicating that the site would not be suitable to discharge surface water via soakaway. United Utilities accept that this would be unfeasible.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 375mm diameter public combined sewer within Knowsley Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we

recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

-

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-connections/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

 United Utilities Water for the North West	Gary Jaundrell Assistant Developer Engineer Developer Services & Metering Customer Services T: 07388 715 589 unitedutilities.com
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Coronavirus

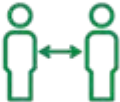
Prevent the spread



Wash your hands



Disinfect common surfaces



Practise social distancing



Stay home if you have symptoms

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From: Matthew Ashdown [<mailto:matthew@stmenvironmental.co.uk>]

Sent: 17 November 2021 11:57

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Surface Water Pre-Application Capacity Check - 63 Knowsley Street (Part 2)

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Part 2.

From: Matthew Ashdown
Sent: 17 November 2021 11:35
To: WastewaterDeveloperServices@uuplc.co.uk
Subject: FW: Surface Water Pre-Application Capacity Check

Good afternoon,

I would like to raise a surface water capacity check into the United Utilities Combined sewer at the following site address:

63 Knowsley Street
Cheetham Hill
Manchester
M8 8HX

The proposal is to discharge all surface water into the combined sewer run into manhole asset ID – 8707 at a maximum rate of 1.2l/s.

Please see the following information attached:

STM Environmental - Surface Water Drainage Strategy - 63 Knowsley Street - FINAL V1.1_R.pdf - was(Split into 4 parts due to size)

SI Report.pdf

Signed -wastewater-pre-development-enquiry-2021-update-web-acc.pdf

Please let me know if further information is required.

For info regarding the required info; please see the table below.

Page numbers in the table below refer to the “STM Environmental - Surface Water Drainage Strategy - 63 Knowsley Street - FINAL V1.1_R.pdf”

• Site location plan including site boundary and road/street names	Yes – Page 15 / 33 - 35
• Preferred drainage outfall route(s) and point(s) of access etc.	Yes - 65 - 68
• Topographical survey	Yes - *LiDAR – Page 40
• Ground investigation report	Yes –SI Report
• Evidence of existing drainage connections and estimated rates of discharge (for Brownfield sites)	Yes – 21
• Full calculations to show pre-development surface water rates for Greenfield sites	Yes – 21

Kind regards,

Matthew Ashdown
Senior Environmental Consultant (BSc)



T: 0845 303 9434;

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