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FLOOD RISK ASSESSMENT REPORT FOR 19310 – HAWTHORNE FARM, CLITHEROE

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P03	07.11.2019	Conclusion update	Preliminary	MA	RA
P04	04.02.2021	Updates to watercourse diversion.	Preliminary	RA	RA

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1 EXECUTIVE SUMMARY

EDGE have been instructed by Persimmon Homes & Charles Church Lancashire to prepare a Flood Risk Assessment to support a full planning application which seeks permission for the erection of 58 residential dwellings together with associated infrastructure on land north of Hawthorne place, off Waddington Road in Clitheroe.

The site is located on the northern border of the urban area of Clitheroe approximately 500m north of the town centre. The site is surrounded on its south, east and western borders by existing residential dwellings with greenfield agricultural farmland to the northern boundary.

The site area extends to 1.73 ha, is roughly square in shape and is greenfield land. A copy of the architects site layout outlining the development proposals can be found in Appendix C.

The purpose of this report is to assess the risk of flooding to the site from fluvial, tidal, pluvial (overland) surface water and ground water sources as well as from reservoirs, canals and adjacent sewers.

The topographic survey, a copy of which can be found in Appendix B, shows that the site falls from north to south by approximately 3.3 metres and west to east by approximately 3.3 metres.

Levels on the northern corner of the site are shown at 82.50m AOD with levels at the southern corner at 79.20m AOD. The western extents of the site are at 82.60m AOD and the eastern side of the site is shown to be at 79.30m AOD.

The site is located wholly within flood zone 1.

Surface water must discharge from the site in the most sustainable manor and drainage proposals should adhere to the SUDs hierarchy.

New drainage proposals consist of traditional gravity sewers for both foul and surface water.

The surface water discharge rate is proposed to mimic the greenfield run off rate, in accordance with Lancashire County Council guidelines. Attenuation is required within the on-site drainage network.

An attenuation pond is proposed to store all surface water volumes up to and including the 1 in 30-year storm events in line with United Utilities requirements with further volume provided in the pond to store the 1 in 100 year + climate change storm events.

An existing ordinary watercourse runs through the site from north to south and a connection to this watercourse is preferred as discharge of surface water via infiltration is not viable.

An existing combined public sewer bisects the site and connection to this is preferred for the proposed foul sewers. United Utilities sewer maps are shown in Appendix D

All sewers, will be offered to United Utilities for adoption under a section 104 agreement and drainage proposals are shown in Appendix E.

2 INTRODUCTION

EDGE Consulting Engineers have undertaken a Flood Risk Assessment in line with National Planning Policy framework and the main aims of this report are:

- To determine whether the proposed development is likely to be affected by current or future flooding from any source;
- To determine whether it will increase flood risk elsewhere;
- To determine whether the measures proposed to deal with these effects and risks are appropriate
- To assess under SUDS Guidance the best way of reducing the flow rates from site to an acceptable rate of discharge.

The proposed development area is classed as an undeveloped greenfield site. The site and surrounding boundary conditions are shown on the Aerial Image in Figure 2.1.

Falling head permeability tests have been undertaken on the site to determine if infiltration to the ground would be a viable option for surface water discharge.

GEOL Consultants phase 2 ground investigation report GEOL19-9988 states "*The results have identified very low permeability classifications, with poor & practically impervious drainage characteristics, and as such the ground conditions are considered unsuitable for the use of traditional soakaways"*

The results of the tests and borehole location plan can be found in Appendix H

The outcome of the SUDs evaluation is that ground conditions show soakaway of surface water via infiltration will not be viable.

There is an unnamed culverted ordinary watercourse also running through the site from north to south. The culvert is roughly 600mm x 600mm made from stone flags.

The watercourse will be diverted and improved through the site. Surface water will connect to the culverted watercourse within the site.

United Utilities sewer records have been provided, which can be found in Appendix D and they indicate a 300mm diameter combined sewer which is situated in the middle of the site running north to south.

FIGURE 2.1 - SITE LOCATION

3 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework (NPPF) clearly identifies flood risk as a specific material consideration in the Planning Process and in the allocation and release of sites for development or re-development.

NPPF seeks to further strengthen the co-ordination between land use planning and development planning and the operational delivery of flood and coastal defence strategy. NPPF encourages local planning authorities to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. The framework expects local authorities to adopt a risk-based approach at all levels of planning, through the application of the Sequential Test detailed in Table 1 and 2, of the Technical Guidance to NPPF document, a copy of which is attached in Appendix A.

The aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment (SFRA) will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

The Water Resources Act 1991 [Section 105] also requires the Environment Agency to exercise a general supervision over all flood defence matters, including flood plains and wash lands which accommodate waters during periods of flood. In discharging their functions, the Agency from time to time carries out comprehensive surveys and flood studies, largely of 'main rivers' within its jurisdiction.

A Section 105 Study involves the Agency topographically surveying the subject watercourse (or parts of it) and obtaining details of the flow mechanics within the watercourse. This data then enables them to generate a comprehensive hydraulic computer model for the watercourse.

From this hydraulic model the EA can define the approximate extent of fluvial flood-plain associated with the 1 in 100-year (1% annual probability) flooding event or the extent of tidal floodplain associated with the 1 in 200-year (0.5% annual probability) flooding event.

The extents of the modelled floodplain are then provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood susceptible areas. If development is proposed in a flood susceptible area, or in an area where there is a history of flooding, the EA, as a statutory consultee in the Planning Process, will generally recommend that the risk of flooding be formally assessed, in accordance with the NPPF, and that a Flood Risk Assessment report be produced to support the Planning Application.

The broader modelled flood extents are also indicated on the EA's Flood Zone Maps, available through their website (Figure 5.1).

4 STRATEGIC FLOOD RISK ASSESSMENT

Local planning authorities are required to produce local development frameworks, which are a portfolio of local development documents [LDDs] that collectively deliver the spatial planning strategy for the authority area. The LDD's undergo a sustainability appraisal which assists planning authorities in ensuring their policies fulfil the principles of sustainability.

Strategic Flood Risk Assessments [SFRA] are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRAs should be used in the review or production of LDD's.

To assist Local Planning Authorities in their strategic land-use planning, SFRA's should present enough information to enable Local Authorities to apply the Sequential Test to their proposed development sites:

"*Decision makers should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas.*"

In May 2010 Ribble Valley borough council produced a level 1 Strategic Flood Risk Assessment.

The SFRA along with the EA flood risk maps indicate that the proposed development site lies predominantly within Flood Zone 1 (less than 1 in 1000 probability of flooding from river or sea) and therefore is unlikely to be at risk of fluvial flooding.

The SFRA has been developed with the assistance of the Environment Agency, United Utilities and key landowners to provide a robust assessment of current and future levels of flood risk, ensuring that future development takes full account of flood risk and sustainability at the outset.

In the application of the sequential test the strategic flood risk assessment has identified flood risk zones within the boroughs (1, 2 and 3) and has assessed the potential of the various possible development sites which have been identified by the councils. This has created a hierarchy of preferred development sites in line with the sequential approach required by the NPPF.

The SFRA refers to the Ribble Valley Catchment Flood Management Plan which contains high level "policies to manage flood risks in the whole River Ribble catchment which includes the Ribble Velley Borough Council area over the next 50 to 100 years and an action plan laying out how its policies can be achieved. These policies

consider the likely future impact of changes in climate and the effects of land management. The CFMP has been a significant source of information for the Ribble Valley Borough Council SFRA.

Appendix 4 of the Ribble Valley Borough Councils SFRA shows that, in Clitheroe, the policy unit is P5 which is to take further action to reduce flood risk in the area. Justification behind this policy selection is quoted below:

"This very small policy unit (4km2) is entirely urban but set within a much larger rural catchment with considerable landscape, cultural and environmental interests. About 260 properties are at risk of flooding (1% AEP event), at a cost of £38M worth of damage, with a further 230 properties at risk in 100 years with a 'do nothing' scenario.

In addition, 3 schools and 1 hospital are currently at risk in a 1% event, which is not forecast to increase in the future. Flood risk management activities in the town include the maintenance of screens on the inlet and outlet of culverted watercourses, general maintenance of banks of open watercourses, and the provision of formal flood warnings to the Clitheroe and Low Moor areas. Further action is 52 needed to reduce the predicted effects of climate change and further urban development in and around Clitheroe.

Culverted stretches of Mearley Brook pose a high flood risk to the town, and work is required to reduce this risk. Whilst the projected damages in this unit are not as high as other policy units where P5 is proposed, this level of damage in such a small area indicates the action is needed to reduce the flood risk and therefore a proactive P5 policy is recommended, rather than any policy which would provide a lower level of flood risk management now and into the future. Being a wholly urban policy unit means that, by implications, opportunities for a policy P6 policy are extremely limited, although there is potential for flood storage upstream of the town. Work in this policy unit is likely to get priority on a national scale, with work programmed in Clitheroe to address flood risk.

Implementing flood resilience measures within existing and future properties may also help to reduce flood risk." A copy of the SFRA is available from the Ribble Valley Borough Council's website.

5 FINDINGS OF A FLOOD RISK ASSESSMENT

EDGE Consulting Engineers have carried out a flood risk assessment in line with National Planning Policy Framework.

The Environment Agency's flood zone maps, now available on the GOV.uk website, indicate that the site is located within Flood Zone 1 (Ref Figure 5.1).

Flood Zone 1 indicates that there is a low risk of flooding from fluvial or tidal sources and current EA guidance indicates that all proposed developments in zone 1, larger than 1 hectare, should be accompanied by a flood risk assessment. The flood risk assessment should contain:

- Information about the surface water disposal measures already in place and their state of maintenance;
- An assessment of the volume of surface water run-off likely to be generated from the proposed development;
- Information on how that surface water run-off will be disposed of (from the new development);
- Estimates of how climate change could affect the probability and intensity of flooding events in the future;

FIGURE 5.1 – FLOOD ZONE MAP (RIVERS AND SEAS)

DRAINAGE STRATEGY

Existing Foul Drainage

There is a 300mm diameter existing public combined sewer running through the middle of the site from north to south. United Utilities asset search maps are shown in Appendix D. The appropriate easements should be provided/ maintained or diversion proposals, under a section 185 agreement be submitted to United Utilities for approval.

Proposed Foul Drainage

It is proposed that the foul flows generated from the development will utilise a traditional gravity system and connect to the existing combined sewer via new manholes which will be in accordance with consent being obtained from United Utilities. The depth of the existing sewer should be confirmed prior to detailed design works commencing to ensure its suitability for a gravity connection.

The proposed foul water drainage network will be offered to United Utilities for adoption under a section 104 agreement and will be designed in accordance with industry standard Sewers for Adoption and United Utilities guidelines and standard details. Foul water drainage proposals are shown in Appendix E.

Existing Storm Water Drainage

There is an unnamed culverted ordinary watercourse running through the site from north to south. The culvert runs just below ground level with a limited flow, serving a small (1.32Ha) greenfield catchment area.

Its size (600mm x 600mm) is not a result of the catchment flowing into it, but more an ad hoc built for convenience watercourse conveying flow from land drain connections and over land flow.

Its size is a result of it being constructed using 600 x 600 stone flags, most likely materials available at the time.

United Utilities sewer maps don't show surface water sewers in the vicinity of the site. The nearest surface water sewer is shown beyond existing residential dwellings running below Park Avenue to the south across 3rd party land.

The greenfield runoff rate for the site has been calculated using the ICP SUDS element of Micro drainage Source Control software. The output generated from Micro drainage shows that the QBAR greenfield run off rate is 11.7 litres per second. A pdf of the output can be found in Appendix F Drainage calculations.

Proposed Strom Water Drainage

Due to the cohesive nature of the underlying strata, as described in section 7 SUDs evaluation part of this report and in line with the grounds drainage characteristics and test findings provided in GEOL Consulting's phase 2 ground investigation report GEOL19-9988, discharging surface water flows via infiltration is not viable.

An existing ordinary watercourse runs through the site from north to south and a connection in the southern corner of the site is preferred. The line, depth and condition of the existing watercourse has been surveyed and confirmed and proposed levels ensure a gravity connection will be possible.

DEFRAs non statutory technical standards for sustainable drainage systems states that proposed developments on greenfield sites should control their peak flow as follows:

- *For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.*

The construction of the proposed development will result in an increase of impermeable areas and therefore a corresponding increase in surface water run-off. To ensure that the site poses no flood risk to proposed or existing properties a restriction of surface water run-off is required.

It is proposed to restrict surface water run off to the Greenfield QBAR rate 11.7 litres per second. Greenfield calculations are shown in Appendix F.

The surface water connection to the watercourse will be limited to 11.7 litres per second and to ensure the culvert has sufficient capacity and is in sufficient condition to accept the additional flow the drainage network has been modelled and simulated in micro drainage software showing a surcharged outfall. This will mimic flood conditions and prove the site poses no risk of flooding within the site boundary or increases the risk of flooding outside the site boundary. The surcharged outfall condition of the culvert outfall can be seen in the drainage calculations provided in appendix G.

The restriction of surface water run will result in volumes of storage being required. An attenuation pond is proposed to hold surface water within the site for all return periods up to the 30-year storm event.

Further storage volume is provided within the pond which will also be used to store volumes above the 30 year up to and including the 1 in 100-year climate change storm events. An additional 5% rainfall has been included in the micro drainage simulations to account for urban creep. 30 year and 100-year simulations and micro drainage calculations are shown in appendix G.

The proposed surface water drainage network is proposed to connect to the existing watercourse via a new manhole constructed on the culvert. Proposed sewers up to the outfall point will be offered to United Utilities for adoption under a section 104 agreement.

The proposed surface water network will be designed in accordance with industry standard Sewers for Adoption and United Utilities guidelines and standard details.

The existing 600mm x 600mm stone flagged culvert has been observed to be in poor condition with sections collapsed/ broken within the site. The culvert currently provides a cross sectional area of 0.36 square metres for upstream flows to pass through.

The development proposals allow for diversion and upgrading of the culvert by installing a 750mm diameter precast concrete piped section. This will provide a larger cross-sectional area (0.442m^2) and removal of the broken/ collapsed sections of culvert. The upgrading of the culvert within the site enhances the efficiency of the culvert allowing upstream flows to pass through smoothly and provide additional storage in more extreme events.

The surface water drainage design and culvert diversion/ upgrade proposals are shown within Appendix E.

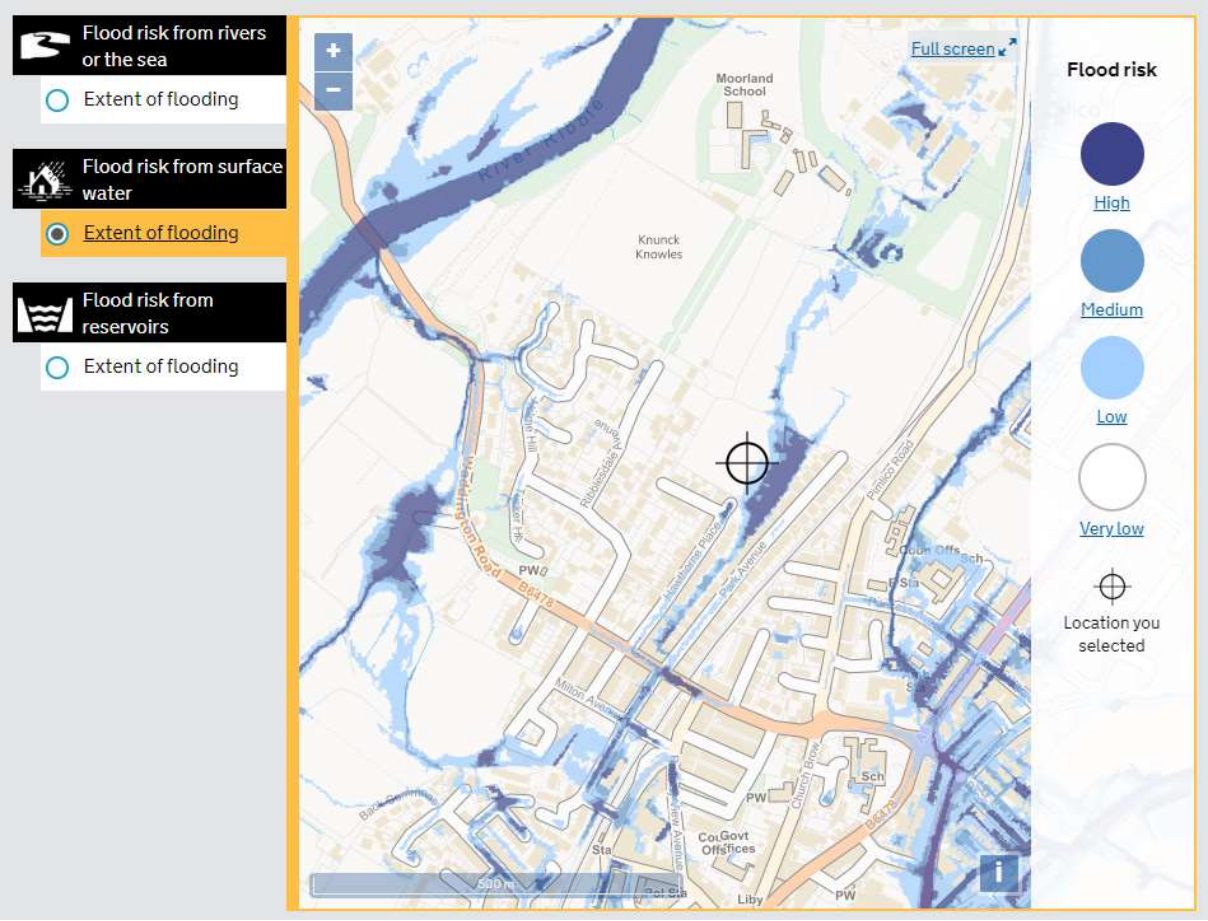
Flood Risk

- Fluvial – As mentioned in previous sections of this report the site is located within flood zone 1 and as such has a low probability of flooding from fluvial sources. An ordinary watercourse runs through the site and is not thought to pose a flood risk to the existing site, furthermore it is proposed to be opened and improved throughout its path within the development.

- Tidal – The site is located far enough inland to be considered at very low risk of flooding from the sea. Climate change is not thought to provide an increased risk to the site from tidal flooding during the lifetime of the development and so tidal flood risk is deemed to be low.

- Surface Water – Surface water flooding may occur when intense rainfall causes the ground to be saturated and its capacity is exceeded. Excess surface water flows from the site are believed to drain naturally to the low point in the south and to the watercourse itself by overland flow. The surface water flood map available on the EAs website (Figure 5.2 below) shows that the site is predominantly at low risk of flooding from pluvial sources. The southern border of the site does show a medium to high risk of pluvial flooding. The flood risk appears to follow the line of the existing watercourse (which itself is close to the surface following existing ground levels) and it is expected that overland flow ponding and some surcharging in extreme events is the source of the pluvial flooding indicated in these areas. The collapsed/ broken sections of culvert will also be a cause for the flooding shown in the mapping by holding back runoff which would ordinarily pass through the culvert. Development proposals include upgrading the culvert to convey flows through the site improving the efficiency and enhancing the watercourses capacity within the development boundary. This will reduce the risk of flooding in the areas indicated, as medium and high risk, in the mapping below. Furthermore, the development of the site and introduction of impermeable areas (roofs, drives and roads etc) will collect and divert potential overland flows away from houses to soft landscaped areas and to gullies and drainage channels which connect to the drainage network via adoptable and private roads. Therefore, the volume of water previously seen to be ponding on site will be significantly lower and this source of flooding will be correspondingly reduced and mitigated. Finished floor levels of proposed dwellings should be set a minimum of 150mm above surrounding ground levels to minimise the risk of flooding from any remaining overland flows.

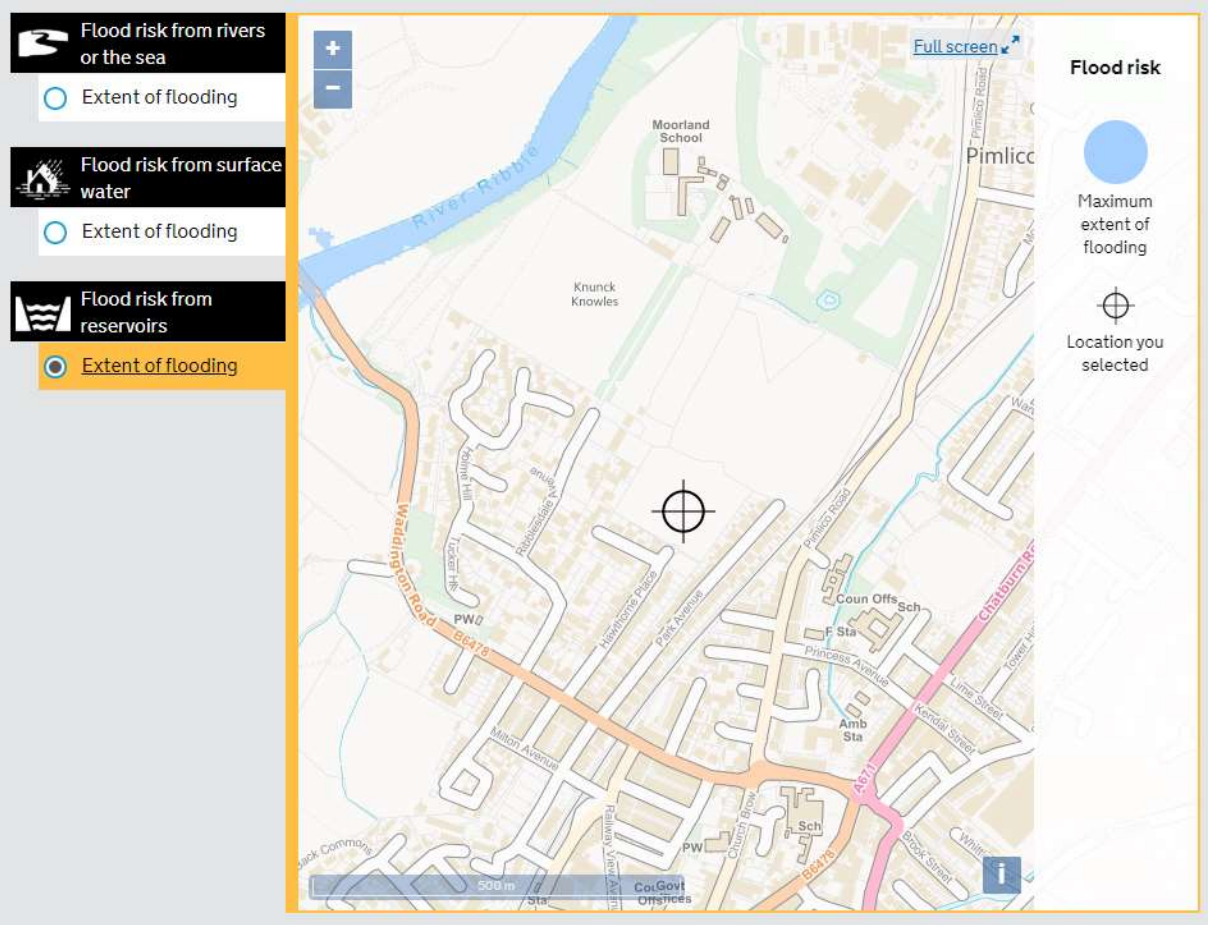
FIGURE 5.2 – FLOOD MAP (SURFACE WATER)



- Ground water – Gas and groundwater monitoring was undertaken by GEOL Consultants and the monitoring information can be found in their report GEOL19-9988. The report states: "*All the monitoring wells were recorded to be dry on the first monitoring visit, however water levels were noted to have risen significantly by the second visit to depths of between 0.30m and 1.17m below current ground levels, which coincided with periods of heavy rainfall. All the boreholes were purged of the standing water so that the response zones were no longer flooded. The increase in water levels is felt to be attributable to the ingress of surface water infiltration rather than representing a continuous groundwater surface, particularly when considering the nature of the drift deposits."* As well as the permeability testing, mentioned in section 7 of this report, which was undertaken at depths up to 3m below ground level and indicating no water strikes, a total of 15 boreholes were percussion drilled at depths between 1m and 4.0m. Groundwater strikes were not indicated within any of the boreholes. The observations within the ground water monitoring coincide with the data on surface water flood risk of the site, during rainfall events, which is discussed above. It is assumed, that flooding from ground water sources is low.

- Reservoirs, canals – Flooding can occur from the release of large volumes of water from reservoirs and canals. The image below (Figure 5.3) is taken from the Environment Agencies flood risk section of the website indicating the extent of flooding from reservoirs. The risk is considered to be low. There are no canals in the vicinity of the site and so flooding from this source is also considered to be low.

FIGURE 5.3 – FLOOD MAP (RESERVOIRS)



- Adjacent sewers – There is an existing combined public sewer within the site and the only risk of flooding from this would be failure or surcharge during periods of high flow. Assuming the existing public sewers have sufficient capacity for the catchments they are serving, and they are regularly maintained and inspected the risk of flooding from sewers is low.
- Proposed sewers – Drainage infrastructure is designed to ensure that rainwater drains off site at a restricted rate. An attenuation pond will hold all volumes up to and including the 1 in 100 year + climate change storm events. This will minimise the risk of flooding from proposed surface water sources. The proposed drainage system is shown in Appendix E.

6 RESIDUAL RISKS

The table below outlines the initial qualitative assessment of risk posed by each potential source of flooding, the mechanisms for flooding and the likely consequences. The Table also includes a review of possible mitigation measures and what effect, if any, the mitigation measures are likely to have on the residual risk posed by each potential flood source. Categories of risk have been qualitatively defined as:

- High Risk: Flooding is likely to result in significant damage to property and pose a significant risk to life;
- Medium Risk: Flooding is likely to result in possible minor damage to property, but flood progress would allow adequate time for residents to be warned and safely evacuated to higher ground or appropriate places of safety;
- Low' Risk: Flooding is unlikely to result in any damage to property and pose little or no risk to life.

Source	Flood Mechanism & Consequences	Assessment of Risk	Recommended Mitigation Measures	Residual Risk
Fluvial flooding	Risk of fluvial flooding at the site from adjacent Watercourses, Drains and other Water Bodies.	**Low**	• Fluvial flooding of the site is not expected during the 1 in 100-year event + climate change.	**Low**
Pluvial flooding	Risk of flooding from overland flows in extreme events. Ponding of surface water due to ground being saturated and capacity being exceeded.	**Medium**	• Upgrading of culvert through the site. • FFLs to be set 150mm above surrounding levels.	**Low**
Surcharging of artificial drainage systems	Drainage systems operating above design capacity, resulting in: • surcharging of manholes / drainage systems; • over-land flow through development; • ponding in low-lying areas of site; • no over-land flow route for flood waters accumulating in low-lying areas.	**Low**	• Appropriate design of SW drainage system to provide sufficient storage; • Provision of overland flood flow routes through proposed development.	**Low**
Infrastructure failure	Water main burst resulting in: • Possible over-land flows through / adjacent to the site and possible inundation of property; • Possible ponding in low-lying areas;	**Low**	• Safe access/egress available to adjacent highway. • Flood flow route through development.	**Low**

7 SUDs EVALUATION

Development of the site will result in an increase of impermeable areas and therefore a corresponding increase in run-off volumes. The use of SUDs techniques to discharge the additional surface water will be evaluated in this section of the report.

The storm water drainage system for the proposed development will be designed in accordance with 'Sewers for Adoption', which requires that any surface water drainage system, should not surcharge during the 1 in 2

year storm event, and should not flood during a 1 in 30 year storm event (i.e. all run-off contained wholly within the sewerage system during the 1 in 30 year event).

Whilst Sewers for Adoption requires there be no surface flooding during the 1 in 30-year storm event. It is generally accepted that a degree of surface flooding can be permitted during extreme storm events i.e. 1 in 100 year + climate change. This will be subject to specific areas being designated as flood susceptible and subject to flooding of these areas posing little or no risk to human life and damage to property. Examples of surface areas which might be permitted to flood in such events are:

- Agricultural land
- Recreational land (playing fields etc.)
- Landscaped areas
- Highways
- Car parks
- Other non-inhabited, designated areas

In all cases where surface flooding might be permitted or designed in to a scheme, due diligence needs to be given to the NPPF and the need to make potential users of such areas aware of their functionality and purpose, and the requirement to maintain safe egress and access at all times.

The Building Regulations Approved Document H (2002) outlines a hierarchy of potential methods of disposing surface water from a site:

- A soakaway; or where that is not practicable
- A watercourse or river; or where that is not practicable,
- A sewer.

The viability of each has been assessed below:

- Soakaway: Regarding the consideration of soakaway infiltration methods for the disposal of surface water, variable head (falling) permeability tests were undertaken on the 30th August 2019 by GEOL Consultants Ltd within BH02, BH06 and BH15, in general accordance with BS EN ISO 22282-2:2012 using the Hvorslev Method, to determine the coefficient of permeability (k) for the underlying natural deposits, in order to assess their suitability for the use of soakaways. A borehole location plan can be found along with the test results in Appendix H. The below bullet points provide an overview of the testing at each location:
    - BH02 at 3.0m below ground level shown that the grounds drainage characteristics were *"Poor/ practically impervious"* and the permeability classification was *"Very Low".* Testing in borehole BH02 shown that the water level remained consistent (only dropping 50mm) during the test period (60 minutes).
    - BH06 at 3.0m below ground level shown that the grounds drainage characteristics were *"Poor*" and the permeability classification was "*Very Low".* Testing in borehole BH06 shown that the water level dropped by a total of 100mm in the first 30 minutes and a further 50mm by the end of the test period (60 minutes).
    - BH15 at 2.72m below ground level shown that the grounds drainage characteristics were *"Poor/ practically impervious"* and the permeability classification was *"Very Low".* Testing in borehole BH15 shown that the water level remained consistent (only dropping 50mm) during the test period (60 minutes).

  Based on the results of the GEOL Consulting testing, discharge of surface water via infiltration has been discounted.

- Watercourses waterbodies: An unnamed ordinary watercourse runs through the site from north to south. Connection to the watercourse in the low portion of the site is the preferred method of discharge. Runoff rates should be restricted to mimic the greenfield run off rate.

- Sewers: A United Utilities combined sewer is located within the site. United Utilities will not allow surface water to discharge to the sewer if a connection higher up the SUDs hierarchy is viable.

8 CONCLUSIONS AND RECOMMENDATIONS

- EDGE have been instructed by Persimmon Homes & Charles Church Lancashire to prepare a Flood risk assessment which will support a full planning application seeking permission for the construction of 58 residential dwellings together with associated infrastructure.
- The site is located 500m north of the town centre of Clitheroe.
- The site area is 1.73 hectares and is almost square in shape. It is greenfield land.
- There is an existing culverted watercourse running north to south through the site.
- There is an existing combined public sewer within the site flowing from north to south.
- EDGE Consulting Engineers have been instructed to formally assess the risk of flooding through a flood risk assessment.
- The site lies within Flood Zone 1 and is therefore unlikely to be affected by fluvial flooding.
- Pluvial flood risk is mitigated by diverting and upgrading a section of the culvert by providing a new 750mm pipe through the site and raising finished floor levels 150mm above surrounding ground levels.
- The development of the site will result in an increase in impermeable area resulting in a corresponding increase in surface water run-off.
- Surface water flows will be restricted to a greenfield run off rate calculated as 11.7 litres per second.
- Surface water volumes will be stored within a pond.
- Climate change has been factored into the drainage calculations.
- An allowance for urban creep has been factored into the drainage calculations.
- Construction of the proposed development will not increase flood risk on or off the site.
- No mitigation measures are considered necessary to mitigate the risk from infrastructure failure.
- A drainage design (Appendix E) has been submitted in support of this flood risk assessment.
- Development of the site will not increase the flood risk to any other property.
- Based on the information provided to EDGE Consulting Engineers in support of this flood risk assessment, the development of the site would be considered sustainable in terms of flood risk, subject to the various recommendations in line with National and Local Planning Policy.

APPENDICES

Appendix A – Extract from chapter 14 of NPPF February 2019

14. Meeting the challenge of climate change, flooding and coastal change

148. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

Planning for climate change

149. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures[48]. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

150. New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

151. To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

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[48] In line with the objectives and provisions of the Climate Change Act 2008.

152. Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

153. In determining planning applications, local planning authorities should expect new development to:

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

154. When determining planning applications for renewable and low carbon development, local planning authorities should:

a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and

b) approve the application if its impacts are (or can be made) acceptable[49]. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

Planning and flood risk

155. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

156. Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

157. All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change

[49] Except for applications for the repowering of existing wind turbines, a proposed wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been fully addressed and the proposal has their backing.

– so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

a) applying the sequential test and then, if necessary, the exception test as set out below;

b) safeguarding land from development that is required, or likely to be required, for current or future flood management;

c) using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

158. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.

159. If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in national planning guidance.

160. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

161. Both elements of the exception test should be satisfied for development to be allocated or permitted.

162. Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-making stage, or if more recent information about existing or potential flood risk should be taken into account.

163. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment[50]. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) 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;

b) the development is appropriately flood resistant and resilient;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

164. Applications for some minor development and changes of use[51] should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 50.

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

a) take account of advice from the lead local flood authority;

b) have appropriate proposed minimum operational standards;

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d) where possible, provide multifunctional benefits.

Coastal change

166. In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.

---

[50] A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

[51] This includes householder development, small non-residential extensions (with a footprint of less than 250m^2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate.

167. Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast. They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and:

a) be clear as to what development will be appropriate in such areas and in what circumstances; and

b) make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.

168. Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:

a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;

b) the character of the coast including designations is not compromised;

c) the development provides wider sustainability benefits; and

d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast[52].

169. Local planning authorities should limit the planned lifetime of development in a Coastal Change Management Area through temporary permission and restoration conditions, where this is necessary to reduce a potentially unacceptable level of future risk to people and the development.

[52] As required by the Marine and Coastal Access Act 2009.

Appendix B – Topographic survey

N

W E

S

COORDINATED STATIONS

STATION	EASTING	NORTHING	LEVEL (m)
A	374219.913	442280.128	77.856
B	374304.950	442383.677	79.179
C	374354.825	442457.499	80.116

ABBREVIATIONS

AV	AIR VALVE/VENT
BOL	BOLLARD
BB	BELISHA BEACON
BM	BENCH MARK
BL	BED LEVEL
BS	BUS STOP
BT	BRITISH TELECOM
CL	COVER LEVEL
Dil	DILAPIDATED
Dis	DISUSED
EL	EAVES LEVEL
ELE	ELEC JUNCT. BOX
EP	ELECTRICITY POLE
FH	FIRE HYDRANT
FL	FLOOR LEVEL
FOS	FULL OF SEDIMENT
FP	FLAG POLE
G	GULLY
GM	GAS METER
GV	GAS VALVE
IC	INSPECT CHAMBER
IL	INVERT LEVEL
JKW	JAPANESE KNOTT WEED
LH	LAMP HOLE
LP	LAMP POST
NP	NAME PLATE
MH	MANHOLE
PS	POST/SIGN POST
PB	POST BOX
PX	UNKNOWN SERVICE
RE	ROODING EYE
RL	RIDGE LEVEL
RS	ROAD SIGN
ST	STOP TAP
TH	TRIAL HOLE
TL	TRAFFIC LIGHT
TP	TELEGRAPH POLE
TV	CABLE TV BOX
Utl	UNABLE TO LIFT
WM	WATER METER

SYMBOLS

SURVEY STATION	TREE
E O\H ELEC CABLE	BENCH MARK
T O\H PHONE LINE	TRIAL PIT
CANOPY\HEDGE	BOREHOLE

NOTES

A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

B) O/S USED AND ORIENTATED TO TRUE NORTH

C) LEVELS IN METRES RELATED TO G.P.S.

D) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date

PROPOSED DEVELOPMENT AT HAWTHORNE PLACE, CLITHEROE

PERSIMMON HOMES

TOPOGRAPHICAL SURVEY

(SHEET 2 OF 5)

PH252/T00

Drawn	S. FAIRHURST
Date	AUGUST 2018
Scale	1:500 @ A1

RJP Surveying Consultants Ltd

LAND SURVEYORS & SITE ENGINEERS

AYREFIELD COTTAGE
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ROBY MILL
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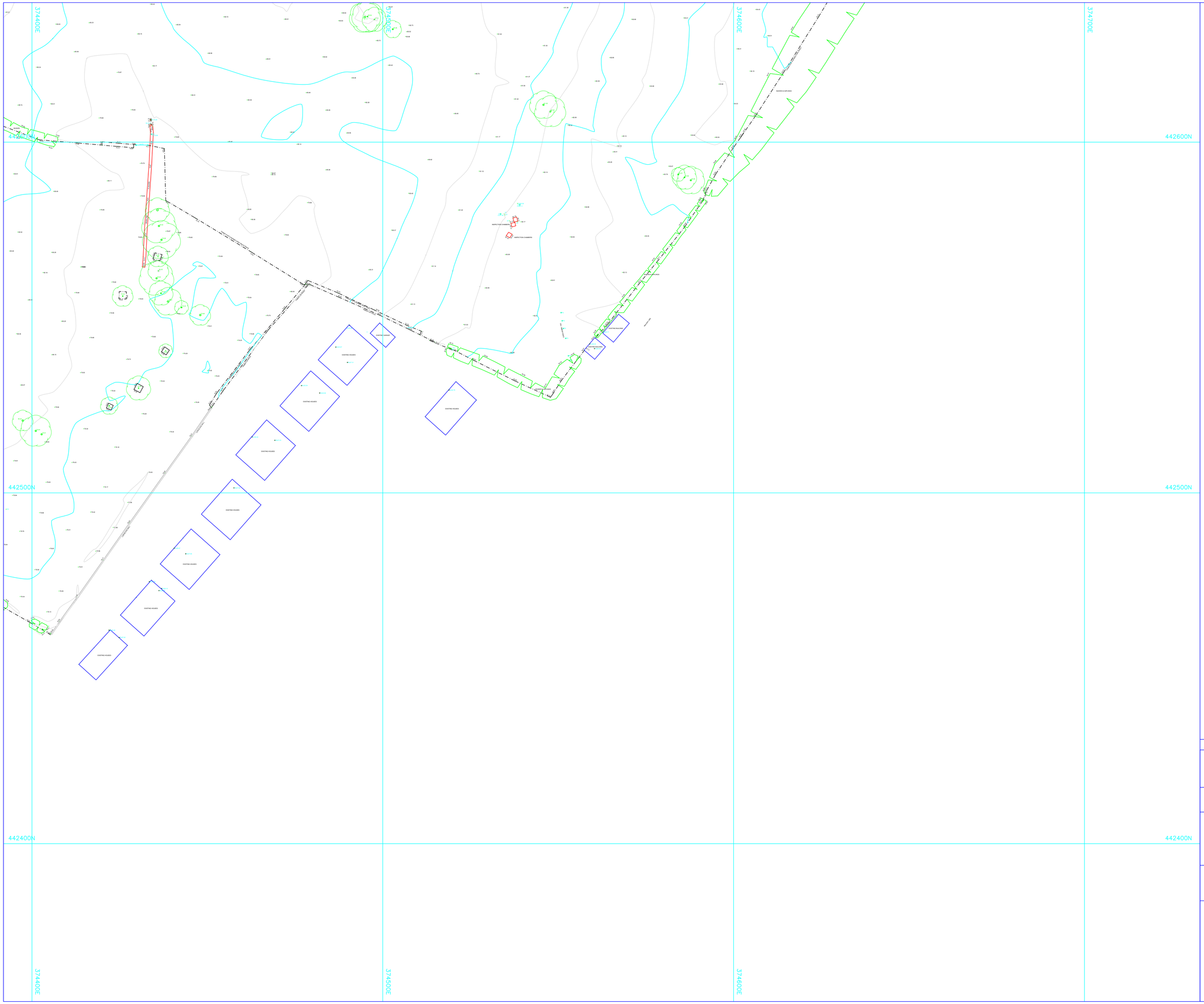
E-MAIL: mail@rjpsurveyors.co.uk

374100E 374200E 374300E

442700N 442600N 442500N



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W RJP E

S

COORDINATED STATIONS

STATION	EASTING	NORTHING	LEVEL (m)
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B	374304.950	442383.677	79.179
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ABBREVIATIONS

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BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
DI	DILAPIDATED	PB	POST BOX
Dis	DISUSED	PX	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	Uti	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

SYMBOLS

	SURVEY STATION		TREE
— E —	O\H ELEC CABLE		BENCH MARK
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PROPOSED DEVELOPMENT AT HAWTHORNE PLACE, CLITHEROE

PERSIMMON HOMES

TOPOGRAPHICAL SURVEY

(SHEET 5 OF 5)

PH252/T00

Drawn	S. FAIRHURST
Date	AUGUST 2018
Scale	1:500 @ A1

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Appendix C – Architects layout

MIX SCHEDULE

SITE AREA	**Acres**	Gross	4.275
		Net	3.674
	Hectares	Gross	1.730
		Net	1.487
	P.O.S. & Buffer	Acres	0.315
	Non Dev	Acres	0.286

Private

HOUSE TYPE	SQ.FT	NO	TOTAL SQ.FT
Danbury E	811	2	1622
Danbury M	811	1	811
Danbury S	811	2	1622
Delamare S	993	6	5958
Delamare	993	4	3972
Lockwood Cr	999	2	1998
Burnham	1115	10	11150
Coniston	1222	3	3666
Marston	1230	5	6150
Holywell	1414	5	7070
		40	**44019**

Affordable

HOUSE TYPE	SQ.FT	NO	TOTAL SQ.FT
Heartwood S	541	4	2164
Barton E	761	6	4566
Barton M	761	3	2283
Barton S	761	4	3044
		17	**12057**

TOTAL	**57**	**56076**

FOOTAGE (NET)	Per Acre	15,263
	Per Hectare	37,716
UNITS (NET)	Per Acre	16
	Per Hectare	38

KEY

- open market housing for over 55's, AD Part M4 (2) compliant
- rented affordable bungalows for over 55's
- rented affordable housing
- intermediate affordable housing
- bin collection point

BCP

Revision	Date	Amendment	Initials
H	12.11.20	Layout amended to accommodate 6x3 bungalows on Western boundary; reduced to 57 dwellings.	SDH
G	14.08.20	Layout amended to accommodate 6x3 integral garage house types - Delamare, Burnham & Marston. House type Buttermere, Grasmere, Hornsea, Belmont & Tiverton removed.	SDH
F	01.04.20	Open watercourse removed.	SDH
E	28.01.20	NW turning head amended to accommodate larger refuse vehicle; bin collection points identified; attenuation pond location shown.	SDH
D	02.12.19	Plot 48 & 49 amended to M4(ii) type; drive lengths increased; turning head radii increased.	SDH
C	06.11.19	Plot 33 handed; plot 52 corrected to non-corner Coniston.	SDH
B	28.08.19	Layout revised to client comments	WCD
A	14.08.19	Layout revised to accommodate additional land to NE corner.	SDH

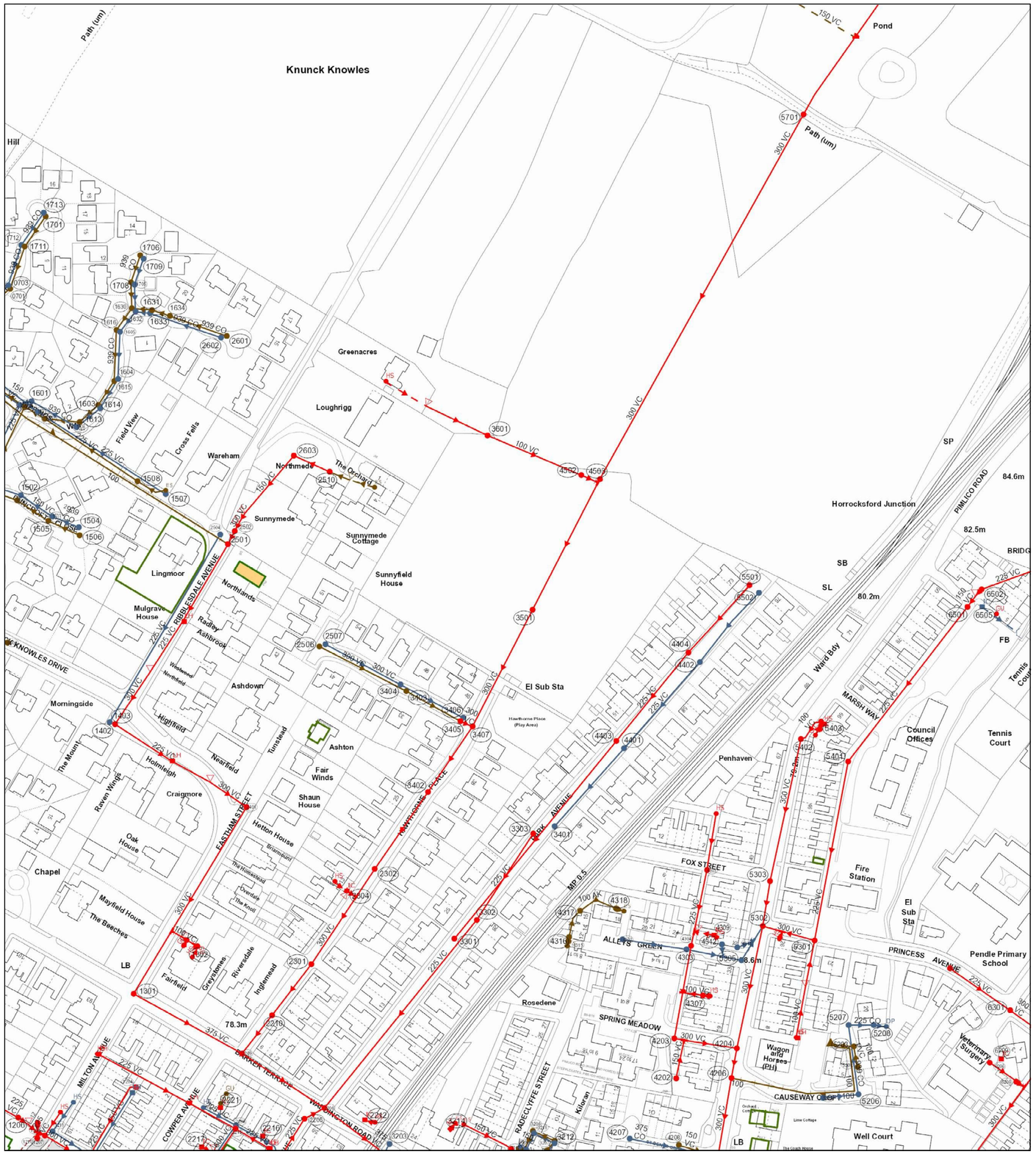
Development	Hawthorne Farm
Location	Clitheroe
Marketing Name	
Drawing Title	Planning Layout
Drawing Number	HTF.PL01
Revision	H
Scale @ A2	1:500
Drawn By	SDH
Date Started	Oct 2018
Checked by	Date

PERSIMMON

Persimmon Homes Lancashire

Persimmon House, Lancaster Business Park, Caton Road, Lancaster, LA13RQ
Tel: 01524 542 000 Fax: 01524 542 001 Web: www.persimmonhomes.com

Appendix D – United Utilities asset search maps



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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
3407		CO	0	300			VC	43,93365	
5501	81,63	CO	80,05	225			VC	50,53084	1 in 112
3501		CO		300			VC	73,1277	
2602		SW	0	939			CO	41,79082	
6301	76,72	CO	75,14	300			VC	31,8042	1 in 68
5206		SW	0	939			CO	39,00126	
1616		FO	0	939			CO	28,21596	
1211	78,81	SW	77,29	225			VC	26,19195	1 in 131
0506		FO	0	939			CO	15,63918	
3403		FO	0	300			VC	34,40399	
3402	79,98	CO	77,28	300			VC	51,9828	1 in 306
5502	81,65	SW	80,51	225			VC	50,62241	1 in 73
1709		SW	0	939			CO	15,13005	
4301	79,62	CO	76,48	225			VC	42,99156	
4316		FO		100			AK	16,33193	
1504		SW	0	939			CO	15,72715	
1634		FO	0	939			CO	10,46296	
3406		SW	0	300			VC	2,436001	
5701		CO	0	300			VC	103,9835	
4503		CO	0	300			VC	81,52834	
1208		CO	0	300			VC	5,244206	
6502	79,68	CO	78,01	225			VC	5,296386	1 in 530
4315		FO		100			AK	2,387086	
4204	79,02	CO	76,53	300			VC	18,81705	
1206	79,19	GO	76,8	225			VC	7,276434	
4302		SW	0	225			VC	36,02388	
1204	78,69	CO	76,99	225			VC	51,02184	
3207		FO		150			VC	13,29272	
1508	78,45	FO	76,95	225			VC	62,08035	1 in 18
2205	77,03	CO	75,88	225			VC	12,51706	1 in 78
5302	78,66	CO	76,58	300			VC	69,39209	1 in 2313
2504		SW	0	225			VC	121,0435	
2510		CO		150			VC	21,72715	
1614		FO	0	939			CO	14,0557	
1631		FO	0	939			CO	11,3017	
5401	78,69	CO	77,24	225			VC	101,207	1 in 202
2601		FO	0	939			CO	33,36135	
4304		CO	0	225			VC	52,34993	
1712		SW	0	939			CO	23,5498	
4208	79,92	FO	77,91	150			VC	22,67588	
1615		FO	0	939			CO	16,15303	
1701		FO	0	939			CO	20,43419	
2507		SW	0	300			VC	47,34771	
4206		CO	0	300			VC	44,08069	
4318		FO		100			AK	4,676182	
2501	82,77	CO	0	225			VC	83,40821	
3206		FO		150			VC	12,25528	
2301	78,42	CO	76,8	300			VC	35,59674	1 in 81
2401	82,07	CO	79,66	300			VC	121,2811	1 in 47
1210		CO	0	300			VC	3,100258	
1713		SW	0	939			CO	21,77798	
2603		CO		150			VC	41,87473	
3303	80,17	CO	0	225			VC	57,26549	
1603		SW	0	939			CO	16,70435	
5403		CO		100			VC	15,85951	
5203		FO	0	100			PVC	12,92955	
2302	79,05	CO	77,09	300			VC	63,57977	1 in 235
1612	75,26	FO	73,55	225			VC	13,03804	
5402	79,74	CO	77,15	300			VC	80,74579	1 in 188
1705		FO	0	939			CO	14,42641	
1711		FO	0	939			CO	24,69285	
1627		SW	0	150			VC	26,05719	
0510		FO	0	150			VC	18,46241	
2506		FO	0	300			VC	54,27273	
4404	81,15	CO	79,58	225			VC	63,28629	1 in 83
1633		SW	0	939			CO	8,067323	
1207	78,82	CO	76,57	300			VC	29,24769	
6501	79,67	CO	77,98	225			VC	106,5072	1 in 151
4317		FO		100			AK	23,09936	
4402	81,08	SW	79,8	225			VC	63,72642	1 in 108
3302	78,08	CO	77,44	225			VC	134,5455	1 in 78
1602	75,25	SW	73,62	225			VC	74,62141	
4401	80,54	SW	79,19	225			VC	57,91006	1 in 121
3203		SW	0	225			VC	205,9861	
4403	80,6	CO	78,8	225			VC	142,1689	1 in 134
1632		SW	0	939			CO	14,15265	
0701		FO	0	939			CO	30,41257	
1402	83,46	CO	80,62	225			VC	61,88216	1 in 91
1505		FO	0	150			VC	20,79617	
2209	77,78	CO	75,98	375			VC	54,85156	1 in 196
5208		SW	0	225			CO	7,003371	
5303	78,8	CO	76,7	300			VC	25,53235	1 in 253
0703		SW	0	939			CO	28,56633	
5301	78,19	CO	76,73	300			VC	29,83857	1 in 230
3404		SW	0	300			VC	39,33428	
4207	80,12	SW	78,24	375			CO	40,99031	1 in 111
1601		SW	0	939			CO	6,776821	
1502		SW	0	150			VC	23,59704	
1613		FO	0	225			CO	19,32862	
3601		CO		100			VC	56,59791	
3212		SW		150			VC	12,67379	
3211		SW		150			VC	10,25076	
6302	77,01	CO	75,97	225			VC	40,68728	1 in 59
5205		SW	0	939			CO	19,6644	
4303		SW	0	225			VC	31,09815	
1604		SW	0	939			CO	19,04681	
5204		FO	0	100			PVC	11,45173	
2210	78,09	CO	76,34	300			VC	27,15046	1 in 80
6206		CO		150			VC	18,28668	
1708		SW	0	939			CO	15,09154	
1630		FO	0	939			CO	14,83806	
5701		CO	0	300			VC	232,1514	
2208	77,45	CO	76,2	300			VC	54,74615	1 in 152
1503		SW	0	150			VC	21,30053	
1506		FO	0	939			CO	19,07764	
1706		FO	0	939			CO	15,87492	
2206	76,94	CO	75,69	375			VC	57,12059	1 in 168
6208		CO		150			VC	5,384523	
3217		CO		150			VC	31,69613	
2502	82,79	CO	81,21	300			VC	8,211194	
1628		FO	0	225			VC	18,7342	
1605		SW	0	939			CO	26,27518	
5305		SW	0	300			VC	22,37574	
4307		CO		100			VC	11,28512	
1507	80,13	SW	78,31	225			VC	84,52764	1 in 18
4502		CO		100			VC	10,15951	
1301	79,91	CO	77,06	375			VC	68,75974	1 in 65
3405		CO	0	300			VC	7,28309	
1626		SW	0	939			CO	28,99725	
4203	79,25	CO	77,07	300			VC	35,12064	1 in 76
2215	77,43	SW	75,28	600			VC	166,2697	1 in 406
4202	79,51	CO	78,04	150			VC	21,71918	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

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	Scuare		

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 Culverted
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:

1 HAWTHORNE PLACE,
CLITHEROE,
BB7 2HU

Scale: 1:1250 **Date:** 08/02/2019

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly

Appendix E – Proposed drainage layout

NOTES:

1. ALL SEWERS ARE DESIGNED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES GUIDELINES AND STANDARD DETAILS.
2. ALL CO-ORDINATES AND LEVELS SHOWN ARE RELATIVE TO THE TOPOGRAPHIC SURVEY.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THE LINE AND LOCATION OF ANY EXISTING SEWERS, AS WELL AS ANY EXISTING GROUND AND INVERT LEVELS SHOWN ON THE DRAWING ARE CORRECT PRIOR TO THE COMMENCEMENT OF ANY WORKS. ANY DISCREPANCIES MUST BE MUST BE REPORTED IMMEDIATELY.
4. PRIOR TO THE COMMENCEMENT OF ANY ON SITE WORKS THE CONTRACTOR MUST CONTACT THE STATUTORY UNDERTAKER AND BE IN POSSESSION OF THE LATEST DRAWINGS SHOWING THEIR APPARATUS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ALLOW FOR THE SUPERVISION OF THE CONSTRUCTION WORKS BY UNITED UTILITIES AND/ OR THE HIGHWAYS AUTHORITY. THE CONTRACTOR WILL NOTIFY THE SUPERVISING OFFICER GIVING NOTICE WHICH WILL BE IN ACCORDANCE WITH THE AUTHORITIES REQUIREMENTS.
6. THE PROPOSED SEWERS WILL BE CLAY PIPE WORK AND SHALL BE EXTRA STRENGTH TO BS EN 295:1991 PART 1.
7. ANY PCC PIPE WORK WILL BE IN ACCORDANCE WITH BS EN 1916:2002.
8. ALL MANHOLES AND CHAMBERS SHALL BE IN ACCORDANCE WITH BS EN 1917:2002
9. SEWERS WITH COVER TO SOFFIT GREATER THAN 1.2m IN ROADS AND 0.9m IN FIELDS SHALL HAVE BED AND SURROUND AS FOLLOWS: RIGID PIPE EMBEDMENT SHALL BE CLASS S. SEMI RIGID PIPE EMBEDMENT SHALL BE CLASS S ALL IN ACCORDANCE WITH UNITED UTILITIES STANDARD DETAIL STND/05/001.
10. PRIVATE DRAINAGE CONNECTIONS TO THE SEWER WILL BE 150MM DIAMETER AND LAID TO THE SPECIFIED INVERT.
11. THE INVERT LEVELS SPECIFIED AT THE DRAG OUT CHAMBER ARE INCOMING LEVELS.
12. WHEREVER POSSIBLE PRIVATE DRAINAGE RUNS WILL REMAIN WITHIN THE CURTILAGE OF THE DWELLING FOR WHICH THEY SERVE.
13. THE CONNECTION TO THE ADOPTABLE SEWER SHALL BE MANUFACTURED JUNCTION PIPES A SADDLE CONNECTION IS NOT PERMITTED UNLESS IT IS CLEARLY SPECIFIED.
14. ANY SEWER FOR ADOPTION WITH A COVER OF LESS THAN 1.2M TO PIPE SOFFIT IN ROADS OR 0.9m TO PIPE SOFFIT IN FIELDS WILL HAVE A MINIMUM 150mm GEN 3 CONCRETE BED AND SURROUND WITH FLEXIBILITY MAINTAINED WITH FLEXCELL EXPANSION JOINT FILLER OR SIMILAR APPROVED AT EACH PIPE JOINT.
15. CONNECTIONS TO THE EXISTING SEWER WILL BE IN ACCORDANCE WITH SECTION 104 APPROVAL GRANTED BY UNITED UTILITIES.
24. CONNECTIONS TO THE EXISTING WATERCOURSE WILL BE IN ACCORDANCE WITH APPROVAL GRANTED BY THE EA.

KEY:

- SW SEWER
- FW SEWER
- PROPOSED LAND DRAINAGE
- EXISTING PUBLIC FW SEWER
- PROPOSED FW DIVERSION
- SW DRAGOUT
- FW DRAGOUT
- GULLY
- PROPOSED CULVERTED WATERCOURSE
- GAS MAIN (APPROXIMATE LOCATION)
- EXISTING WATERCOURSE
- EXISTING CULVERT TO BE ABANDONED

Rev	Date	Description	By	Chk
P09	17.11.20	Updated to site layout rev H	J.C	R.A
P08	30.09.20	PRELIMINARY - Updated to suit latest site layout	D.A	R.A
P07	24.08.20	PRELIMINARY - Updated to suit S.104 comments	D.A	R.A
P06	30.06.20	PRELIMINARY - Updated to suit S.104 comments	D.A	R.A
P05	17.04.20	PRELIMINARY - Updated to suit S.104 comments	D.A	R.A
P04	23.03.20	PRELIMINARY - Updated to suit S.104 comments	D.A	R.A
P03	20.02.20	PRELIMINARY - Updated in line with S.104 comments	D.A	R.A
P02	24.01.20	PRELIMINARY - Further culvert details and existing foul sewer information added. Proposals amended to suit.	D.A	R.A

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Project Name
HAWTHORNE FARM
CLITHEROE

Client
PERSIMMON HOMES

Designed	Drawn	Checked	Scale @ A1
D.A	D.A	R.A	1:250

Drawing Title
DRAINAGE LAYOUT

Project No.
19310

PRELIMINARY
NOT FOR CONSTRUCTION

Drawing No.
19310-EDGE-XX-XX-DR-C-C2001

Revision
P09

FILENAME
PLOT DATE
0 mm 10 20 30 40 50

Appendix F – Greenfield runoff calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	30	Soil	0.450
Area (ha)	1.730	Urban	0.000
SAAR (mm)	1010	Region Number	Region 10

Results l/s

QBAR Rural	11.7
QBAR Urban	11.7
Q30 years	19.8
Q1 year	10.2
Q30 years	19.8
Q100 years	24.3

Appendix G – Micro drainage Calculations and simulations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for SW

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.508	4-8	0.487	8-12	0.017

Total Area Contributing (ha) = 1.012

Total Pipe Volume (m^3) = 107.633

Network Design Table for SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.580	0.111	167.4	0.121	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	36.068	0.147	245.4	0.083	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	35.623	0.253	140.8	0.140	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	26.998	0.180	150.0	0.039	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.31	80.320	0.121	0.0	0.0	0.0	1.01	40.1	16.4
1.001	50.00	5.91	80.134	0.204	0.0	0.0	0.0	1.00	70.6	27.6
1.002	50.00	6.36	79.987	0.344	0.0	0.0	0.0	1.32	93.5	46.6
1.003	50.00	6.66	79.659	0.383	0.0	0.0	0.0	1.48	163.1	51.9

Network Design Table for SW

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
2.000	25.358	0.079	321.0	0.078	5.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	36.673	0.091	403.0	0.112	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	18.005	0.044	409.2	0.054	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.000	33.413	0.234	142.8	0.062	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	9.625	0.025	385.0	0.023	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.007	7.777	0.020	388.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	8.747	0.022	397.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.009	17.540	0.044	398.6	0.160	0.00	0.0	0.600	o	750	Pipe/Conduit	
4.000	14.818	0.111	133.5	0.140	1.00	25.4	0.600	600 []	600	600 Culvert	
4.001	25.456	0.191	133.3	0.000	0.00	0.0	0.600	600 []	600	600 Culvert	
4.002	11.184	0.063	177.5	0.000	0.00	0.0	0.600	600 []	600	600 Culvert	
4.003	4.968	0.049	101.4	0.000	0.00	0.0	0.600	600 []	600	600 Culvert	
4.004	35.913	0.089	403.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.010	21.289	0.063	337.9	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	5.42	79.558	0.078	0.0	0.0	0.0	1.01	111.1	10.6
1.004	50.00	7.27	79.404	0.573	0.0	0.0	0.0	1.01	160.1	77.6
1.005	50.00	7.54	79.238	0.627	0.0	0.0	0.0	1.10	238.3	84.9
3.000	50.00	5.33	79.503	0.062	0.0	0.0	0.0	1.70	270.3	8.4
1.006	50.00	7.68	79.194	0.712	0.0	0.0	0.0	1.14	245.8	96.4
1.007	50.00	7.80	79.169	0.712	0.0	0.0	0.0	1.13	244.6	96.4
1.008	50.00	7.90	78.924	0.712	0.0	0.0	0.0	1.40	617.3	96.4
1.009	50.00	8.11	78.902	0.872	0.0	0.0	0.0	1.40	616.5	118.1
4.000	50.00	1.12	79.361	0.140	25.4	0.0	0.0	2.06	577.3	44.4
4.001	50.00	1.33	79.250	0.140	25.4	0.0	0.0	2.06	577.7	44.4
4.002	50.00	1.43	79.059	0.140	25.4	0.0	0.0	1.79	500.1	44.4
4.003	50.00	1.46	78.996	0.140	25.4	0.0	0.0	2.37	662.9	44.4
4.004	50.00	1.90	78.936	0.140	25.4	0.0	0.0	1.39	612.7	44.4
1.010	50.00	8.35	78.858	1.012	25.4	0.0	0.0	1.52	670.0	162.4

Network Design Table for SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.011	25.640	0.223	115.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.012	29.928	0.272	110.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.011	50.00	8.51	78.795	1.012	25.4	0.0	0.0	2.61	1152.7	162.4
1.012	50.00	8.70	78.572	1.012	25.4	0.0	0.0	2.67	1178.5	162.4

Manhole Schedules for SW

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)	Backdr (mm)
SW1	81.745	1.425	Open Manhole	1350	1.000	80.320	225				
SW2	81.819	1.685	Open Manhole	1350	1.001	80.134	300	1.000	80.209	225	
SW3	81.712	1.725	Open Manhole	1350	1.002	79.987	300	1.001	79.987	300	
SW4	81.234	1.575	Open Manhole	1350	1.003	79.659	375	1.002	79.734	300	
SW15	80.809	1.251	Open Manhole	1500	2.000	79.558	375				
SW5	81.085	1.681	Open Manhole	1800	1.004	79.404	450	1.003	79.479	375	
								2.000	79.479	375	
SW6	81.222	1.984	Open Manhole	2100	1.005	79.238	525	1.004	79.313	450	
SW16	81.139	1.636	Open Manhole	2100	3.000	79.503	450				
SW7	81.043	1.849	Open Manhole	2400	1.006	79.194	525	1.005	79.194	525	
								3.000	79.269	450	
SW8hwall	81.924	2.755	Open Manhole	2400	1.007	79.169	525	1.006	79.169	525	
SW9hwall	81.924	3.000	Open Manhole	2400	1.008	78.924	750	1.007	79.149	525	
S10 HYDROBRAKE	81.000	2.098	Open Manhole	2400	1.009	78.902	750	1.008	78.902	750	
CUL1	81.000	1.639	Open Manhole	1800	4.000	79.361	600				
CUL2	81.200	1.950	Open Manhole	1800	4.001	79.250	600	4.000	79.250	600	
CUL3	81.200	2.141	Open Manhole	1800	4.002	79.059	600	4.001	79.059	600	
CUL4	79.596	0.600	Open Manhole	1800	4.003	78.996	600	4.002	78.996	600	
SW17	81.259	2.323	Open Manhole	1800	4.004	78.936	750	4.003	78.947	600	
SW11	80.800	1.953	Open Manhole	1800	1.010	78.858	750	1.009	78.858	750	
								4.004	78.847	750	
SW12	80.500	1.705	Open Manhole	1800	1.011	78.795	750	1.010	78.795	750	
SW13	80.450	1.878	Open Manhole	1800	1.012	78.572	750	1.011	78.572	750	
SW14	80.800	2.500	Open Manhole	1800		OUTFALL		1.012	78.300	750	

PIPELINE SCHEDULES for SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW1	81.745	80.320	1.200	Open Manhole	1350
1.001	o	300	SW2	81.819	80.134	1.385	Open Manhole	1350
1.002	o	300	SW3	81.712	79.987	1.425	Open Manhole	1350
1.003	o	375	SW4	81.234	79.659	1.200	Open Manhole	1350
2.000	o	375	SW15	80.809	79.558	0.876	Open Manhole	1500
1.004	o	450	SW5	81.085	79.404	1.231	Open Manhole	1800
1.005	o	525	SW6	81.222	79.238	1.459	Open Manhole	2100
3.000	o	450	SW16	81.139	79.503	1.186	Open Manhole	2100
1.006	o	525	SW7	81.043	79.194	1.324	Open Manhole	2400
1.007	o	525	SW8hwall	81.924	79.169	2.230	Open Manhole	2400
1.008	o	750	SW9hwall	81.924	78.924	2.250	Open Manhole	2400
1.009	o	750	S10 HYDROBRAKE	81.000	78.902	1.348	Open Manhole	2400
4.000	600 []	600	CUL1	81.000	79.361	1.039	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.580	167.4	SW2	81.819	80.209	1.385	Open Manhole	1350
1.001	36.068	245.4	SW3	81.712	79.987	1.425	Open Manhole	1350
1.002	35.623	140.8	SW4	81.234	79.734	1.200	Open Manhole	1350
1.003	26.998	150.0	SW5	81.085	79.479	1.231	Open Manhole	1800
2.000	25.358	321.0	SW5	81.085	79.479	1.231	Open Manhole	1800
1.004	36.673	403.0	SW6	81.222	79.313	1.459	Open Manhole	2100
1.005	18.005	409.2	SW7	81.043	79.194	1.324	Open Manhole	2400
3.000	33.413	142.8	SW7	81.043	79.269	1.324	Open Manhole	2400
1.006	9.625	385.0	SW8hwall	81.924	79.169	2.230	Open Manhole	2400
1.007	7.777	388.9	SW9hwall	81.924	79.149	2.250	Open Manhole	2400
1.008	8.747	397.6	S10 HYDROBRAKE	81.000	78.902	1.348	Open Manhole	2400
1.009	17.540	398.6	SW11	80.800	78.858	1.192	Open Manhole	1800
4.000	14.818	133.5	CUL2	81.200	79.250	1.350	Open Manhole	1800

PIPELINE SCHEDULES for SW

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)
4.001	600 []	600	CUL2	81.200	79.250	1.350	Open Manhole	1800
4.002	600 []	600	CUL3	81.200	79.059	1.541	Open Manhole	1800
4.003	600 []	600	CUL4	79.596	78.996	0.000	Open Manhole	1800
4.004	o	750	SW17	81.259	78.936	1.573	Open Manhole	1800
1.010	o	750	SW11	80.800	78.858	1.192	Open Manhole	1800
1.011	o	750	SW12	80.500	78.795	0.955	Open Manhole	1800
1.012	o	750	SW13	80.450	78.572	1.128	Open Manhole	1800

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)
4.001	25.456	133.3	CUL3	81.200	79.059	1.541	Open Manhole	1800
4.002	11.184	177.5	CUL4	79.596	78.996	0.000	Open Manhole	1800
4.003	4.968	101.4	SW17	81.259	78.947	1.712	Open Manhole	1800
4.004	35.913	403.5	SW11	80.800	78.847	1.203	Open Manhole	1800
1.010	21.289	337.9	SW12	80.500	78.795	0.955	Open Manhole	1800
1.011	25.640	115.0	SW13	80.450	78.572	1.128	Open Manhole	1800
1.012	29.928	110.0	SW14	80.800	78.300	1.750	Open Manhole	1800

Free Flowing Outfall Details for SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012	SW14	80.800	78.300	0.000	1800	0

Simulation Criteria for SW

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

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

Synthetic Rainfall Details

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

Online Controls for SW

Non Return Valve Manhole: SW7, DS/PN: 1.006, Volume (m³): 16.7

Hydro-Brake® Optimum Manhole: S10 HYDROBRAKE, DS/PN: 1.009, Volume (m³): 12.3

Unit Reference	MD-SHE-0143-1170-1900-1170
Design Head (m)	1.900
Design Flow (l/s)	11.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	143
Invert Level (m)	78.902
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.900	11.7	Kick-Flo®	1.152	9.2
Flush-Flo™	0.555	11.7	Mean Flow over Head Range	-	10.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	9.4	3.000	14.5	7.000	21.8
0.200	9.9	1.400	10.1	3.500	15.6	7.500	22.5
0.300	11.0	1.600	10.8	4.000	16.7	8.000	23.2
0.400	11.5	1.800	11.4	4.500	17.6	8.500	23.9
0.500	11.7	2.000	12.0	5.000	18.5	9.000	24.6
0.600	11.7	2.200	12.5	5.500	19.4	9.500	25.2
0.800	11.4	2.400	13.1	6.000	20.2		
1.000	10.6	2.600	13.6	6.500	21.0		

Storage Structures for SW

Tank or Pond Manhole: S10 HYDROBRAKE, DS/PN: 1.009

Invert Level (m) 79.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	71.0	2.000	493.0

Summary Wizard of 15 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	2	81.684	1.139	0.000	1.58		57.0	FLOOD RISK
1.001	SW2	2	81.433	0.999	0.000	1.35		87.9	SURCHARGED
1.002	SW3	2	81.161	0.874	0.000	1.70		146.8	SURCHARGED
1.003	SW4	24	80.419	0.385	0.000	1.11		158.3	SURCHARGED
2.000	SW15	24	80.211	0.278	0.000	0.36		34.3	SURCHARGED
1.004	SW5	24	80.189	0.335	0.000	1.64		231.3	SURCHARGED
1.005	SW6	24	79.984	0.221	0.000	1.43		244.7	SURCHARGED
3.000	SW16	24	79.972	0.019	0.000	0.11		26.7	SURCHARGED
1.006	SW7	24	79.972	0.253	0.000	1.85		262.3	SURCHARGED
1.007	SW8hwall	24	79.969	0.275	0.000	1.97		259.0	SURCHARGED
1.008	SW9hwall	24	79.967	0.293	0.000	0.85		251.1	SURCHARGED
1.009	S10 HYDROBRAKE	24	79.966	0.314	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	1	79.608	-0.353	0.000	0.42		142.0	OK
4.001	CUL2	1	79.486	-0.364	0.000	0.30		130.2	OK
4.002	CUL3	1	79.335	-0.324	0.000	0.43		141.9	OK

Summary Wizard of 15 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm	Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	1	1	79.255	-0.341	0.000	0.41		137.3	OK
4.004	SW17	1	1	79.219	-0.467	0.000	0.27		130.5	OK
1.010	SW11	1	1	79.127	-0.481	0.000	0.27		128.2	OK
1.011	SW12	1	1	79.008	-0.537	0.000	0.18		131.4	OK
1.012	SW13	1	1	78.770	-0.552	0.000	0.16		127.2	OK

Summary Wizard of 30 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	3	81.579	1.034	0.000	1.46		52.6	FLOOD RISK
1.001	SW2	3	81.341	0.907	0.000	1.29		84.4	SURCHARGED
1.002	SW3	3	81.093	0.806	0.000	1.65		142.2	SURCHARGED
1.003	SW4	22	80.446	0.412	0.000	1.10		156.1	SURCHARGED
2.000	SW15	23	80.285	0.352	0.000	0.35		33.6	SURCHARGED
1.004	SW5	23	80.267	0.413	0.000	1.62		227.8	SURCHARGED
1.005	SW6	22	80.204	0.441	0.000	1.40		238.6	SURCHARGED
3.000	SW16	22	80.198	0.245	0.000	0.12		27.7	SURCHARGED
1.006	SW7	22	80.198	0.479	0.000	1.79		254.4	SURCHARGED
1.007	SW8hwall	22	80.195	0.501	0.000	1.88		247.0	SURCHARGED
1.008	SW9hwall	22	80.194	0.520	0.000	0.81		239.9	SURCHARGED
1.009	S10 HYDROBRAKE	22	80.193	0.541	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	3	79.568	-0.393	0.000	0.33		112.4	OK
4.001	CUL2	3	79.448	-0.402	0.000	0.26		112.8	OK
4.002	CUL3	3	79.293	-0.366	0.000	0.34		110.9	OK

Summary Wizard of 30 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	3	79.226	-0.370	0.000	0.34		112.1	OK
4.004	SW17	3	79.195	-0.491	0.000	0.22		109.5	OK
1.010	SW11	3	79.109	-0.499	0.000	0.24		117.7	OK
1.011	SW12	3	78.994	-0.551	0.000	0.16		115.9	OK
1.012	SW13	3	78.761	-0.561	0.000	0.14		116.9	OK

Summary Wizard of 60 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	5	81.124	0.579	0.000	1.16		41.9	SURCHARGED
1.001	SW2	5	80.974	0.540	0.000	1.06		68.8	SURCHARGED
1.002	SW3	6	80.810	0.523	0.000	1.35		116.7	SURCHARGED
1.003	SW4	23	80.423	0.389	0.000	0.89		126.9	SURCHARGED
2.000	SW15	20	80.415	0.482	0.000	0.27		25.6	SURCHARGED
1.004	SW5	20	80.414	0.560	0.000	1.31		185.1	SURCHARGED
1.005	SW6	20	80.406	0.643	0.000	1.16		198.1	SURCHARGED
3.000	SW16	20	80.401	0.448	0.000	0.08		19.2	SURCHARGED
1.006	SW7	20	80.401	0.682	0.000	1.53		217.2	SURCHARGED
1.007	SW8hwall	20	80.398	0.704	0.000	1.61		212.0	SURCHARGED
1.008	SW9hwall	20	80.396	0.722	0.000	0.70		206.5	SURCHARGED
1.009	S10 HYDROBRAKE	20	80.396	0.744	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	5	79.541	-0.420	0.000	0.26		86.9	OK
4.001	CUL2	5	79.422	-0.428	0.000	0.20		87.0	OK
4.002	CUL3	5	79.260	-0.399	0.000	0.26		86.4	OK

Summary Wizard of 60 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	5	79.192	-0.404	0.000	0.26		86.8	OK
4.004	SW17	5	79.167	-0.519	0.000	0.17		85.9	OK
1.010	SW11	5	79.084	-0.524	0.000	0.20		95.8	OK
1.011	SW12	5	78.974	-0.571	0.000	0.13		95.1	OK
1.012	SW13	5	78.742	-0.580	0.000	0.12		95.6	OK

Summary Wizard of 120 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	15	80.686	0.141	0.000	0.88		31.6	SURCHARGED
1.001	SW2	19	80.620	0.186	0.000	0.77		50.3	SURCHARGED
1.002	SW3	21	80.586	0.299	0.000	0.96		82.3	SURCHARGED
1.003	SW4	15	80.575	0.541	0.000	0.63		90.3	SURCHARGED
2.000	SW15	15	80.571	0.638	0.000	0.20		18.8	FLOOD RISK
1.004	SW5	15	80.569	0.715	0.000	0.95		133.3	SURCHARGED
1.005	SW6	15	80.563	0.800	0.000	0.84		143.6	SURCHARGED
3.000	SW16	15	80.560	0.607	0.000	0.06		13.7	SURCHARGED
1.006	SW7	15	80.560	0.841	0.000	1.12		158.8	SURCHARGED
1.007	SW8hwall	15	80.558	0.864	0.000	1.18		155.4	SURCHARGED
1.008	SW9hwall	15	80.556	0.882	0.000	0.52		152.0	SURCHARGED
1.009	S10 HYDROBRAKE	15	80.555	0.903	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	7	79.513	-0.448	0.000	0.20		65.9	OK
4.001	CUL2	7	79.396	-0.454	0.000	0.15		66.0	OK
4.002	CUL3	7	79.231	-0.428	0.000	0.20		65.7	OK

Summary Wizard of 120 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm	Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	7		79.160	-0.436	0.000	0.20		65.9	OK
4.004	SW17	7		79.137	-0.549	0.000	0.13		65.5	OK
1.010	SW11	7		79.057	-0.551	0.000	0.16		76.6	OK
1.011	SW12	7		78.956	-0.589	0.000	0.10		76.5	OK
1.012	SW13	7		78.726	-0.596	0.000	0.09		76.6	OK

Summary Wizard of 180 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	18	80.645	0.100	0.000	0.71		25.7	SURCHARGED
1.001	SW2	17	80.641	0.207	0.000	0.63		41.1	SURCHARGED
1.002	SW3	17	80.636	0.349	0.000	0.75		64.3	SURCHARGED
1.003	SW4	11	80.628	0.594	0.000	0.49		70.0	SURCHARGED
2.000	SW15	11	80.624	0.691	0.000	0.15		14.9	FLOOD RISK
1.004	SW5	11	80.623	0.769	0.000	0.75		105.2	SURCHARGED
1.005	SW6	11	80.619	0.856	0.000	0.67		113.9	SURCHARGED
3.000	SW16	11	80.616	0.663	0.000	0.05		10.8	SURCHARGED
1.006	SW7	11	80.616	0.897	0.000	0.89		126.3	SURCHARGED
1.007	SW8hwall	11	80.614	0.920	0.000	0.94		123.9	SURCHARGED
1.008	SW9hwall	11	80.612	0.938	0.000	0.41		121.3	SURCHARGED
1.009	S10 HYDROBRAKE	11	80.612	0.960	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	8	79.499	-0.462	0.000	0.17		55.9	OK
4.001	CUL2	8	79.383	-0.467	0.000	0.13		55.9	OK
4.002	CUL3	8	79.214	-0.445	0.000	0.17		55.9	OK

Summary Wizard of 180 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	8	79.144	-0.452	0.000	0.17		55.9	OK
4.004	SW17	8	79.122	-0.564	0.000	0.11		55.8	OK
1.010	SW11	8	79.044	-0.564	0.000	0.14		67.3	OK
1.011	SW12	8	78.947	-0.598	0.000	0.09		67.2	OK
1.012	SW13	8	78.715	-0.607	0.000	0.08		67.2	OK

Summary Wizard of 240 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	16	80.655	0.110	0.000	0.59		21.2	SURCHARGED
1.001	SW2	15	80.652	0.218	0.000	0.53		34.8	SURCHARGED
1.002	SW3	15	80.648	0.361	0.000	0.62		53.5	SURCHARGED
1.003	SW4	9	80.641	0.607	0.000	0.41		58.0	SURCHARGED
2.000	SW15	9	80.638	0.705	0.000	0.13		12.3	FLOOD RISK
1.004	SW5	9	80.637	0.783	0.000	0.62		87.3	SURCHARGED
1.005	SW6	9	80.633	0.870	0.000	0.55		94.7	SURCHARGED
3.000	SW16	9	80.631	0.678	0.000	0.04		8.9	SURCHARGED
1.006	SW7	9	80.631	0.912	0.000	0.74		105.1	SURCHARGED
1.007	SW8hwall	9	80.629	0.935	0.000	0.78		103.1	SURCHARGED
1.008	SW9hwall	9	80.628	0.954	0.000	0.34		101.1	SURCHARGED
1.009	S10 HYDROBRAKE	9	80.627	0.975	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	10	79.491	-0.470	0.000	0.15		50.2	OK
4.001	CUL2	10	79.376	-0.474	0.000	0.12		50.2	OK
4.002	CUL3	10	79.204	-0.455	0.000	0.15		50.2	OK

Summary Wizard of 240 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	10	79.134	-0.462	0.000	0.15		50.2	OK
4.004	SW17	10	79.113	-0.573	0.000	0.10		50.2	OK
1.010	SW11	10	79.035	-0.573	0.000	0.13		61.5	OK
1.011	SW12	10	78.939	-0.606	0.000	0.08		61.5	OK
1.012	SW13	10	78.707	-0.615	0.000	0.08		61.4	OK

Summary Wizard of 360 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	17	80.651	0.106	0.000	0.44		16.0	SURCHARGED
1.001	SW2	16	80.647	0.213	0.000	0.41		26.7	SURCHARGED
1.002	SW3	16	80.643	0.356	0.000	0.49		42.1	SURCHARGED
1.003	SW4	10	80.637	0.603	0.000	0.31		44.3	SURCHARGED
2.000	SW15	10	80.634	0.701	0.000	0.10		9.3	FLOOD RISK
1.004	SW5	10	80.634	0.780	0.000	0.47		66.8	SURCHARGED
1.005	SW6	10	80.630	0.867	0.000	0.42		72.5	SURCHARGED
3.000	SW16	10	80.628	0.675	0.000	0.03		6.8	SURCHARGED
1.006	SW7	10	80.628	0.909	0.000	0.57		80.6	SURCHARGED
1.007	SW8hwall	10	80.626	0.932	0.000	0.60		79.0	SURCHARGED
1.008	SW9hwall	10	80.625	0.951	0.000	0.26		77.5	SURCHARGED
1.009	S10 HYDROBRAKE	10	80.624	0.972	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	12	79.483	-0.478	0.000	0.13		43.9	OK
4.001	CUL2	12	79.367	-0.483	0.000	0.10		43.9	OK
4.002	CUL3	12	79.194	-0.465	0.000	0.13		43.9	OK

Summary Wizard of 360 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	12	79.124	-0.472	0.000	0.13		43.9	OK
4.004	SW17	12	79.102	-0.584	0.000	0.09		43.9	OK
1.010	SW11	12	79.026	-0.582	0.000	0.11		55.1	OK
1.011	SW12	12	78.930	-0.615	0.000	0.07		55.1	OK
1.012	SW13	12	78.699	-0.623	0.000	0.07		55.1	OK

Summary Wizard of 480 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	19	80.636	0.091	0.000	0.36		13.0	SURCHARGED
1.001	SW2	18	80.633	0.199	0.000	0.34		21.8	SURCHARGED
1.002	SW3	18	80.629	0.342	0.000	0.40		34.7	SURCHARGED
1.003	SW4	12	80.623	0.589	0.000	0.26		36.5	SURCHARGED
2.000	SW15	12	80.620	0.687	0.000	0.08		7.6	FLOOD RISK
1.004	SW5	12	80.619	0.765	0.000	0.39		54.8	SURCHARGED
1.005	SW6	12	80.616	0.853	0.000	0.35		59.4	SURCHARGED
3.000	SW16	12	80.614	0.661	0.000	0.02		5.5	SURCHARGED
1.006	SW7	12	80.614	0.895	0.000	0.47		66.0	SURCHARGED
1.007	SW8hwall	12	80.612	0.918	0.000	0.49		64.8	SURCHARGED
1.008	SW9hwall	12	80.610	0.936	0.000	0.22		63.5	SURCHARGED
1.009	S10 HYDROBRAKE	12	80.610	0.958	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	14	79.476	-0.485	0.000	0.12		40.4	OK
4.001	CUL2	14	79.361	-0.489	0.000	0.09		40.4	OK
4.002	CUL3	14	79.188	-0.471	0.000	0.12		40.4	OK

Summary Wizard of 480 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	14	79.118	-0.478	0.000	0.12		40.4	OK
4.004	SW17	14	79.097	-0.589	0.000	0.08		40.4	OK
1.010	SW11	14	79.021	-0.587	0.000	0.11		51.7	OK
1.011	SW12	14	78.924	-0.621	0.000	0.07		51.7	OK
1.012	SW13	14	78.694	-0.628	0.000	0.06		51.7	OK

Summary Wizard of 600 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	20	80.619	0.074	0.000	0.31		11.0	SURCHARGED
1.001	SW2	20	80.615	0.181	0.000	0.28		18.5	SURCHARGED
1.002	SW3	19	80.611	0.324	0.000	0.35		30.1	SURCHARGED
1.003	SW4	13	80.605	0.571	0.000	0.22		31.7	SURCHARGED
2.000	SW15	13	80.602	0.669	0.000	0.07		6.5	FLOOD RISK
1.004	SW5	13	80.602	0.748	0.000	0.34		47.3	SURCHARGED
1.005	SW6	13	80.598	0.835	0.000	0.30		51.3	SURCHARGED
3.000	SW16	13	80.596	0.643	0.000	0.02		4.7	SURCHARGED
1.006	SW7	13	80.596	0.877	0.000	0.40		56.9	SURCHARGED
1.007	SW8hwall	13	80.594	0.900	0.000	0.42		55.8	SURCHARGED
1.008	SW9hwall	13	80.593	0.919	0.000	0.19		54.7	SURCHARGED
1.009	S10 HYDROBRAKE	13	80.592	0.940	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	16	79.472	-0.489	0.000	0.11		38.1	OK
4.001	CUL2	16	79.357	-0.493	0.000	0.09		38.2	OK
4.002	CUL3	16	79.184	-0.475	0.000	0.12		38.1	OK

Summary Wizard of 600 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	16	79.114	-0.482	0.000	0.11		38.2	OK
4.004	SW17	16	79.093	-0.593	0.000	0.08		38.1	OK
1.010	SW11	15	79.018	-0.590	0.000	0.10		49.5	OK
1.011	SW12	15	78.921	-0.624	0.000	0.07		49.5	OK
1.012	SW13	15	78.691	-0.631	0.000	0.06		49.5	OK

Summary Wizard of 720 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	21	80.599	0.054	0.000	0.27		9.6	SURCHARGED
1.001	SW2	21	80.596	0.162	0.000	0.25		16.2	SURCHARGED
1.002	SW3	20	80.592	0.305	0.000	0.31		26.9	SURCHARGED
1.003	SW4	14	80.586	0.552	0.000	0.20		27.9	SURCHARGED
2.000	SW15	14	80.583	0.650	0.000	0.06		5.7	FLOOD RISK
1.004	SW5	14	80.583	0.729	0.000	0.30		41.6	SURCHARGED
1.005	SW6	14	80.579	0.816	0.000	0.26		45.1	SURCHARGED
3.000	SW16	14	80.577	0.624	0.000	0.02		4.1	SURCHARGED
1.006	SW7	14	80.577	0.858	0.000	0.35		50.1	SURCHARGED
1.007	SW8hwall	14	80.575	0.881	0.000	0.37		49.2	SURCHARGED
1.008	SW9hwall	14	80.574	0.900	0.000	0.16		48.2	SURCHARGED
1.009	S10 HYDROBRAKE	14	80.573	0.921	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	17	79.469	-0.492	0.000	0.11		36.5	OK
4.001	CUL2	17	79.354	-0.496	0.000	0.08		36.5	OK
4.002	CUL3	17	79.181	-0.478	0.000	0.11		36.5	OK

Summary Wizard of 720 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	17	79.110	-0.486	0.000	0.11		36.5	OK
4.004	SW17	17	79.090	-0.596	0.000	0.07		36.5	OK
1.010	SW11	17	79.016	-0.592	0.000	0.10		48.0	OK
1.011	SW12	17	78.919	-0.626	0.000	0.06		48.0	OK
1.012	SW13	17	78.689	-0.633	0.000	0.06		48.0	OK

Summary Wizard of 960 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	22	80.557	0.012	0.000	0.22		7.8	SURCHARGED
1.001	SW2	22	80.554	0.120	0.000	0.20		13.1	SURCHARGED
1.002	SW3	22	80.550	0.263	0.000	0.26		22.1	SURCHARGED
1.003	SW4	16	80.544	0.510	0.000	0.16		22.9	SURCHARGED
2.000	SW15	16	80.541	0.608	0.000	0.05		4.6	FLOOD RISK
1.004	SW5	16	80.541	0.687	0.000	0.24		33.9	SURCHARGED
1.005	SW6	16	80.537	0.774	0.000	0.21		36.7	SURCHARGED
3.000	SW16	16	80.535	0.582	0.000	0.01		3.4	SURCHARGED
1.006	SW7	16	80.535	0.816	0.000	0.29		40.7	SURCHARGED
1.007	SW8hwall	16	80.533	0.839	0.000	0.30		40.0	SURCHARGED
1.008	SW9hwall	16	80.532	0.858	0.000	0.13		39.3	SURCHARGED
1.009	S10 HYDROBRAKE	16	80.531	0.879	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	20	79.465	-0.496	0.000	0.10		34.4	OK
4.001	CUL2	20	79.350	-0.500	0.000	0.08		34.4	OK
4.002	CUL3	20	79.177	-0.482	0.000	0.10		34.4	OK

Summary Wizard of 960 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	20	79.105	-0.491	0.000	0.10		34.4	OK
4.004	SW17	19	79.087	-0.599	0.000	0.07		34.4	OK
1.010	SW11	19	79.013	-0.595	0.000	0.10		46.0	OK
1.011	SW12	19	78.916	-0.629	0.000	0.06		46.0	OK
1.012	SW13	19	78.686	-0.636	0.000	0.06		46.0	OK

Summary Wizard of 1440 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	24	80.462	-0.083	0.000	0.16		5.7	OK
1.001	SW2	24	80.459	0.025	0.000	0.15		9.7	SURCHARGED
1.002	SW3	24	80.455	0.168	0.000	0.19		16.3	SURCHARGED
1.003	SW4	21	80.449	0.415	0.000	0.12		17.3	SURCHARGED
2.000	SW15	19	80.447	0.514	0.000	0.04		3.4	SURCHARGED
1.004	SW5	19	80.446	0.592	0.000	0.18		25.3	SURCHARGED
1.005	SW6	19	80.442	0.679	0.000	0.16		27.4	SURCHARGED
3.000	SW16	19	80.440	0.487	0.000	0.01		2.5	SURCHARGED
1.006	SW7	19	80.440	0.721	0.000	0.21		30.4	SURCHARGED
1.007	SW8hwall	19	80.439	0.745	0.000	0.23		29.9	SURCHARGED
1.008	SW9hwall	19	80.437	0.763	0.000	0.10		29.4	SURCHARGED
1.009	S10 HYDROBRAKE	19	80.437	0.785	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	22	79.460	-0.501	0.000	0.09		32.0	OK
4.001	CUL2	22	79.346	-0.504	0.000	0.07		32.0	OK
4.002	CUL3	22	79.171	-0.488	0.000	0.10		32.0	OK

Summary Wizard of 1440 minute 100 year Summer I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	22	79.100	-0.496	0.000	0.10		32.0	OK
4.004	SW17	22	79.081	-0.605	0.000	0.07		32.0	OK
1.010	SW11	22	79.010	-0.598	0.000	0.09		43.7	OK
1.011	SW12	22	78.912	-0.633	0.000	0.06		43.7	OK
1.012	SW13	22	78.683	-0.639	0.000	0.05		43.7	OK

Summary Wizard of 15 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	1	81.745	1.200	0.501	1.63		58.7	FLOOD
1.001	SW2	1	81.564	1.130	0.000	1.35		87.8	FLOOD RISK
1.002	SW3	1	81.299	1.012	0.000	1.73		149.4	SURCHARGED
1.003	SW4	19	80.528	0.494	0.000	1.14		163.1	SURCHARGED
2.000	SW15	21	80.331	0.398	0.000	0.37		35.2	SURCHARGED
1.004	SW5	22	80.309	0.455	0.000	1.70		239.7	SURCHARGED
1.005	SW6	23	80.072	0.309	0.000	1.50		255.7	SURCHARGED
3.000	SW16	23	80.056	0.103	0.000	0.12		27.7	SURCHARGED
1.006	SW7	23	80.056	0.337	0.000	1.98		280.4	SURCHARGED
1.007	SW8hwall	23	80.052	0.358	0.000	2.07		273.2	SURCHARGED
1.008	SW9hwall	23	80.050	0.376	0.000	0.90		263.9	SURCHARGED
1.009	S10 HYDROBRAKE	23	80.050	0.398	0.000	0.03		11.6	SURCHARGED

Summary Wizard of 15 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.000	CUL1	2	79.580	-0.381	0.000	0.36		121.6	OK
4.001	CUL2	2	79.459	-0.391	0.000	0.27		117.9	OK
4.002	CUL3	2	79.306	-0.353	0.000	0.37		121.6	OK
4.003	CUL4	2	79.234	-0.362	0.000	0.36		120.4	OK
4.004	SW17	2	79.204	-0.482	0.000	0.24		117.8	OK
1.010	SW11	2	79.117	-0.491	0.000	0.26		123.2	OK
1.011	SW12	2	79.000	-0.545	0.000	0.17		124.0	OK
1.012	SW13	2	78.766	-0.556	0.000	0.15		121.3	OK

Summary Wizard of 30 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	4	81.436	0.891	0.000	1.33		48.1	SURCHARGED
1.001	SW2	4	81.239	0.805	0.000	1.21		79.0	SURCHARGED
1.002	SW3	4	81.024	0.737	0.000	1.55		133.7	SURCHARGED
1.003	SW4	20	80.474	0.440	0.000	1.03		146.6	SURCHARGED
2.000	SW15	22	80.326	0.393	0.000	0.32		31.1	SURCHARGED
1.004	SW5	21	80.320	0.466	0.000	1.52		214.7	SURCHARGED
1.005	SW6	21	80.304	0.541	0.000	1.34		228.5	SURCHARGED
3.000	SW16	21	80.297	0.344	0.000	0.11		25.0	SURCHARGED
1.006	SW7	21	80.297	0.578	0.000	1.75		248.4	SURCHARGED
1.007	SW8hwall	21	80.293	0.599	0.000	1.84		242.0	SURCHARGED
1.008	SW9hwall	21	80.292	0.618	0.000	0.80		236.5	SURCHARGED
1.009	S10 HYDROBRAKE	21	80.291	0.639	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	4	79.549	-0.412	0.000	0.28		93.8	OK
4.001	CUL2	4	79.430	-0.420	0.000	0.22		93.9	OK
4.002	CUL3	4	79.269	-0.390	0.000	0.28		93.5	OK

Summary Wizard of 30 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	4	79.201	-0.395	0.000	0.28		93.7	OK
4.004	SW17	4	79.177	-0.509	0.000	0.19		93.0	OK
1.010	SW11	4	79.093	-0.515	0.000	0.22		103.6	OK
1.011	SW12	4	78.981	-0.564	0.000	0.14		103.0	OK
1.012	SW13	4	78.749	-0.573	0.000	0.13		103.5	OK

Summary Wizard of 60 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	6	80.911	0.366	0.000	0.96		34.8	SURCHARGED
1.001	SW2	7	80.815	0.381	0.000	0.89		57.8	SURCHARGED
1.002	SW3	13	80.710	0.423	0.000	1.14		97.8	SURCHARGED
1.003	SW4	17	80.543	0.509	0.000	0.76		107.6	SURCHARGED
2.000	SW15	17	80.534	0.601	0.000	0.22		21.6	FLOOD RISK
1.004	SW5	17	80.531	0.677	0.000	1.12		158.6	SURCHARGED
1.005	SW6	18	80.521	0.758	0.000	1.00		170.4	SURCHARGED
3.000	SW16	18	80.516	0.563	0.000	0.07		15.7	SURCHARGED
1.006	SW7	18	80.515	0.796	0.000	1.32		187.8	SURCHARGED
1.007	SW8hwall	18	80.512	0.818	0.000	1.40		184.1	SURCHARGED
1.008	SW9hwall	18	80.510	0.836	0.000	0.61		180.3	SURCHARGED
1.009	S10 HYDROBRAKE	18	80.510	0.858	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	6	79.520	-0.441	0.000	0.21		71.2	OK
4.001	CUL2	6	79.402	-0.448	0.000	0.16		71.2	OK
4.002	CUL3	6	79.239	-0.420	0.000	0.22		71.1	OK

Summary Wizard of 60 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	6	79.169	-0.427	0.000	0.21		71.2	OK
4.004	SW17	6	79.146	-0.540	0.000	0.14		71.0	OK
1.010	SW11	6	79.065	-0.543	0.000	0.17		82.2	OK
1.011	SW12	6	78.961	-0.584	0.000	0.11		82.2	OK
1.012	SW13	6	78.730	-0.592	0.000	0.10		82.3	OK

Summary Wizard of 120 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	13	80.739	0.194	0.000	0.69		25.0	SURCHARGED
1.001	SW2	13	80.731	0.297	0.000	0.62		40.5	SURCHARGED
1.002	SW3	12	80.723	0.436	0.000	0.75		64.6	SURCHARGED
1.003	SW4	7	80.709	0.675	0.000	0.50		71.1	SURCHARGED
2.000	SW15	7	80.703	0.770	0.000	0.15		14.5	FLOOD RISK
1.004	SW5	7	80.702	0.848	0.000	0.75		105.8	SURCHARGED
1.005	SW6	7	80.695	0.932	0.000	0.67		114.4	SURCHARGED
3.000	SW16	7	80.692	0.739	0.000	0.04		10.5	SURCHARGED
1.006	SW7	7	80.692	0.973	0.000	0.89		126.8	SURCHARGED
1.007	SW8hwall	7	80.689	0.995	0.000	0.94		124.4	SURCHARGED
1.008	SW9hwall	7	80.688	1.014	0.000	0.41		122.1	SURCHARGED
1.009	S10 HYDROBRAKE	7	80.687	1.035	0.000	0.03		11.6	SURCHARGED
4.000	CUL1	9	79.498	-0.463	0.000	0.16		54.7	OK
4.001	CUL2	9	79.382	-0.468	0.000	0.13		54.7	OK
4.002	CUL3	9	79.212	-0.447	0.000	0.17		54.6	OK

Summary Wizard of 120 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	9	79.142	-0.454	0.000	0.16		54.7	OK
4.004	SW17	9	79.120	-0.566	0.000	0.11		54.6	OK
1.010	SW11	9	79.042	-0.566	0.000	0.14		65.9	OK
1.011	SW12	9	78.945	-0.600	0.000	0.09		65.9	OK
1.012	SW13	9	78.713	-0.609	0.000	0.08		65.9	OK

Summary Wizard of 180 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	10	80.796	0.251	0.000	0.53		19.0	SURCHARGED
1.001	SW2	10	80.790	0.356	0.000	0.47		30.8	SURCHARGED
1.002	SW3	9	80.783	0.496	0.000	0.57		49.1	SURCHARGED
1.003	SW4	4	80.773	0.739	0.000	0.38		54.0	SURCHARGED
2.000	SW15	4	80.769	0.836	0.000	0.12		11.1	FLOOD RISK
1.004	SW5	4	80.768	0.914	0.000	0.57		80.7	SURCHARGED
1.005	SW6	4	80.763	1.000	0.000	0.51		87.5	SURCHARGED
3.000	SW16	4	80.760	0.807	0.000	0.03		8.1	SURCHARGED
1.006	SW7	4	80.760	1.041	0.000	0.69		97.2	FLOOD RISK
1.007	SW8hwall	4	80.758	1.064	0.000	0.73		95.5	SURCHARGED
1.008	SW9hwall	4	80.756	1.082	0.000	0.32		93.8	SURCHARGED
1.009	S10 HYDROBRAKE	4	80.755	1.103	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	11	79.488	-0.473	0.000	0.14		47.5	OK
4.001	CUL2	11	79.372	-0.478	0.000	0.11		47.5	OK
4.002	CUL3	11	79.200	-0.459	0.000	0.14		47.5	OK

Summary Wizard of 180 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	11	79.130	-0.466	0.000	0.14		47.5	OK
4.004	SW17	11	79.108	-0.578	0.000	0.10		47.5	OK
1.010	SW11	11	79.031	-0.577	0.000	0.12		58.3	OK
1.011	SW12	11	78.934	-0.611	0.000	0.08		58.3	OK
1.012	SW13	11	78.703	-0.619	0.000	0.07		58.3	OK

Summary Wizard of 240 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	8	80.815	0.270	0.000	0.43		15.5	SURCHARGED
1.001	SW2	8	80.811	0.377	0.000	0.39		25.1	SURCHARGED
1.002	SW3	7	80.805	0.518	0.000	0.47		40.4	SURCHARGED
1.003	SW4	2	80.797	0.763	0.000	0.31		44.0	SURCHARGED
2.000	SW15	2	80.793	0.860	0.000	0.09		9.1	FLOOD RISK
1.004	SW5	2	80.793	0.939	0.000	0.47		66.1	FLOOD RISK
1.005	SW6	2	80.788	1.025	0.000	0.42		71.7	SURCHARGED
3.000	SW16	2	80.785	0.832	0.000	0.03		6.6	SURCHARGED
1.006	SW7	2	80.786	1.067	0.000	0.56		79.8	FLOOD RISK
1.007	SW8hwall	2	80.784	1.090	0.000	0.60		78.4	SURCHARGED
1.008	SW9hwall	2	80.782	1.108	0.000	0.26		77.0	SURCHARGED
1.009	S10 HYDROBRAKE	2	80.781	1.129	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	13	79.482	-0.479	0.000	0.13		43.3	OK
4.001	CUL2	13	79.366	-0.484	0.000	0.10		43.3	OK
4.002	CUL3	13	79.193	-0.466	0.000	0.13		43.3	OK

Summary Wizard of 240 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	13	79.123	-0.473	0.000	0.13		43.3	OK
4.004	SW17	13	79.101	-0.585	0.000	0.09		43.3	OK
1.010	SW11	13	79.024	-0.584	0.000	0.11		54.0	OK
1.011	SW12	13	78.928	-0.617	0.000	0.07		54.0	OK
1.012	SW13	13	78.697	-0.625	0.000	0.07		54.0	OK

Summary Wizard of 360 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	7	80.820	0.275	0.000	0.32		11.5	SURCHARGED
1.001	SW2	6	80.816	0.382	0.000	0.29		18.8	SURCHARGED
1.002	SW3	5	80.812	0.525	0.000	0.35		30.2	SURCHARGED
1.003	SW4	1	80.805	0.771	0.000	0.23		33.2	SURCHARGED
2.000	SW15	1	80.802	0.869	0.000	0.07		6.8	FLOOD RISK
1.004	SW5	1	80.802	0.948	0.000	0.35		49.8	FLOOD RISK
1.005	SW6	1	80.798	1.035	0.000	0.32		54.0	SURCHARGED
3.000	SW16	1	80.795	0.842	0.000	0.02		5.0	SURCHARGED
1.006	SW7	1	80.795	1.076	0.000	0.42		60.2	FLOOD RISK
1.007	SW8hwall	1	80.794	1.100	0.000	0.45		59.2	SURCHARGED
1.008	SW9hwall	1	80.792	1.118	0.000	0.20		58.2	SURCHARGED
1.009	S10 HYDROBRAKE	1	80.791	1.139	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	15	79.473	-0.488	0.000	0.11		38.8	OK
4.001	CUL2	15	79.358	-0.492	0.000	0.09		38.8	OK
4.002	CUL3	15	79.185	-0.474	0.000	0.12		38.8	OK

Summary Wizard of 360 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	15	79.115	-0.481	0.000	0.12		38.8	OK
4.004	SW17	15	79.093	-0.593	0.000	0.08		38.8	OK
1.010	SW11	16	79.018	-0.590	0.000	0.10		49.4	OK
1.011	SW12	16	78.921	-0.624	0.000	0.07		49.4	OK
1.012	SW13	16	78.691	-0.631	0.000	0.06		49.4	OK

Summary Wizard of 480 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	9	80.796	0.251	0.000	0.26		9.4	SURCHARGED
1.001	SW2	9	80.793	0.359	0.000	0.24		15.4	SURCHARGED
1.002	SW3	8	80.790	0.503	0.000	0.29		24.7	SURCHARGED
1.003	SW4	3	80.783	0.749	0.000	0.19		27.1	SURCHARGED
2.000	SW15	3	80.781	0.848	0.000	0.06		5.6	FLOOD RISK
1.004	SW5	3	80.780	0.926	0.000	0.29		40.5	SURCHARGED
1.005	SW6	3	80.776	1.013	0.000	0.26		44.0	SURCHARGED
3.000	SW16	3	80.774	0.821	0.000	0.02		4.1	SURCHARGED
1.006	SW7	3	80.774	1.055	0.000	0.35		49.0	FLOOD RISK
1.007	SW8hwall	3	80.773	1.079	0.000	0.37		48.2	SURCHARGED
1.008	SW9hwall	3	80.771	1.097	0.000	0.16		47.4	SURCHARGED
1.009	S10 HYDROBRAKE	3	80.770	1.118	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	18	79.468	-0.493	0.000	0.11		36.2	OK
4.001	CUL2	18	79.353	-0.497	0.000	0.08		36.2	OK
4.002	CUL3	18	79.180	-0.479	0.000	0.11		36.2	OK

Summary Wizard of 480 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	18	79.109	-0.487	0.000	0.11		36.2	OK
4.004	SW17	18	79.089	-0.597	0.000	0.07		36.2	OK
1.010	SW11	18	79.014	-0.594	0.000	0.10		47.0	OK
1.011	SW12	18	78.917	-0.628	0.000	0.06		47.0	OK
1.012	SW13	18	78.688	-0.634	0.000	0.06		47.0	OK

Summary Wizard of 600 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	11	80.775	0.230	0.000	0.22		8.0	SURCHARGED
1.001	SW2	11	80.771	0.337	0.000	0.20		13.2	SURCHARGED
1.002	SW3	10	80.767	0.480	0.000	0.25		21.3	SURCHARGED
1.003	SW4	5	80.761	0.727	0.000	0.16		22.9	SURCHARGED
2.000	SW15	5	80.758	0.825	0.000	0.05		4.7	FLOOD RISK
1.004	SW5	5	80.757	0.903	0.000	0.24		34.3	SURCHARGED
1.005	SW6	5	80.753	0.990	0.000	0.22		37.3	SURCHARGED
3.000	SW16	5	80.751	0.798	0.000	0.01		3.5	SURCHARGED
1.006	SW7	5	80.751	1.032	0.000	0.29		41.5	FLOOD RISK
1.007	SW8hwall	5	80.749	1.055	0.000	0.31		40.9	SURCHARGED
1.008	SW9hwall	5	80.748	1.074	0.000	0.14		40.3	SURCHARGED
1.009	S10 HYDROBRAKE	5	80.747	1.095	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	19	79.465	-0.496	0.000	0.10		34.6	OK
4.001	CUL2	19	79.350	-0.500	0.000	0.08		34.6	OK
4.002	CUL3	19	79.177	-0.482	0.000	0.11		34.6	OK

Summary Wizard of 600 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	19	79.106	-0.490	0.000	0.10		34.6	OK
4.004	SW17	20	79.087	-0.599	0.000	0.07		34.6	OK
1.010	SW11	20	79.012	-0.596	0.000	0.09		45.6	OK
1.011	SW12	20	78.915	-0.630	0.000	0.06		45.6	OK
1.012	SW13	20	78.686	-0.636	0.000	0.06		45.6	OK

Summary Wizard of 720 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	12	80.749	0.204	0.000	0.19		6.9	SURCHARGED
1.001	SW2	12	80.746	0.312	0.000	0.18		11.6	SURCHARGED
1.002	SW3	11	80.742	0.455	0.000	0.22		18.9	SURCHARGED
1.003	SW4	6	80.735	0.701	0.000	0.14		19.9	SURCHARGED
2.000	SW15	6	80.732	0.799	0.000	0.04		4.1	FLOOD RISK
1.004	SW5	6	80.731	0.877	0.000	0.21		30.0	SURCHARGED
1.005	SW6	6	80.728	0.965	0.000	0.19		32.6	SURCHARGED
3.000	SW16	6	80.725	0.772	0.000	0.01		3.1	SURCHARGED
1.006	SW7	6	80.726	1.007	0.000	0.26		36.4	SURCHARGED
1.007	SW8hwall	6	80.724	1.030	0.000	0.27		35.8	SURCHARGED
1.008	SW9hwall	6	80.722	1.048	0.000	0.12		35.2	SURCHARGED
1.009	S10 HYDROBRAKE	6	80.722	1.070	0.000	0.03		11.7	FLOOD RISK
4.000	CUL1	21	79.463	-0.498	0.000	0.10		33.4	OK
4.001	CUL2	21	79.348	-0.502	0.000	0.08		33.4	OK
4.002	CUL3	21	79.174	-0.485	0.000	0.10		33.4	OK

Summary Wizard of 720 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	21	79.103	-0.493	0.000	0.10		33.4	OK
4.004	SW17	21	79.084	-0.602	0.000	0.07		33.4	OK
1.010	SW11	21	79.011	-0.597	0.000	0.09		44.6	OK
1.011	SW12	21	78.914	-0.631	0.000	0.06		44.6	OK
1.012	SW13	21	78.684	-0.638	0.000	0.05		44.6	OK

Summary Wizard of 960 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	14	80.689	0.144	0.000	0.16		5.6	SURCHARGED
1.001	SW2	14	80.685	0.251	0.000	0.15		9.5	SURCHARGED
1.002	SW3	14	80.681	0.394	0.000	0.18		15.6	SURCHARGED
1.003	SW4	8	80.675	0.641	0.000	0.11		16.3	SURCHARGED
2.000	SW15	8	80.672	0.739	0.000	0.03		3.4	FLOOD RISK
1.004	SW5	8	80.671	0.817	0.000	0.17		24.4	SURCHARGED
1.005	SW6	8	80.668	0.905	0.000	0.16		26.6	SURCHARGED
3.000	SW16	8	80.665	0.712	0.000	0.01		2.5	SURCHARGED
1.006	SW7	8	80.666	0.947	0.000	0.21		29.6	SURCHARGED
1.007	SW8hwall	8	80.664	0.970	0.000	0.22		29.2	SURCHARGED
1.008	SW9hwall	8	80.662	0.988	0.000	0.10		28.8	SURCHARGED
1.009	S10 HYDROBRAKE	8	80.662	1.010	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	23	79.460	-0.501	0.000	0.09		31.9	OK
4.001	CUL2	23	79.345	-0.505	0.000	0.07		31.9	OK
4.002	CUL3	23	79.171	-0.488	0.000	0.10		31.9	OK

Summary Wizard of 960 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	23	79.099	-0.497	0.000	0.10		31.9	OK
4.004	SW17	23	79.081	-0.605	0.000	0.06		31.9	OK
1.010	SW11	23	79.009	-0.599	0.000	0.09		43.3	OK
1.011	SW12	23	78.912	-0.633	0.000	0.06		43.3	OK
1.012	SW13	23	78.682	-0.640	0.000	0.05		43.3	OK

Summary Wizard of 1440 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	23	80.546	0.001	0.000	0.12		4.1	SURCHARGED
1.001	SW2	23	80.543	0.109	0.000	0.11		7.0	SURCHARGED
1.002	SW3	23	80.539	0.252	0.000	0.14		11.8	SURCHARGED
1.003	SW4	18	80.533	0.499	0.000	0.09		12.7	SURCHARGED
2.000	SW15	18	80.530	0.597	0.000	0.03		2.6	FLOOD RISK
1.004	SW5	18	80.530	0.676	0.000	0.13		18.4	SURCHARGED
1.005	SW6	17	80.526	0.763	0.000	0.12		20.0	SURCHARGED
3.000	SW16	17	80.524	0.571	0.000	0.01		1.9	SURCHARGED
1.006	SW7	17	80.524	0.805	0.000	0.16		22.3	SURCHARGED
1.007	SW8hwall	17	80.523	0.829	0.000	0.17		22.1	SURCHARGED
1.008	SW9hwall	17	80.521	0.847	0.000	0.07		21.8	SURCHARGED
1.009	S10 HYDROBRAKE	17	80.520	0.868	0.000	0.03		11.7	SURCHARGED
4.000	CUL1	24	79.456	-0.505	0.000	0.09		30.2	OK
4.001	CUL2	24	79.342	-0.508	0.000	0.07		30.2	OK
4.002	CUL3	24	79.167	-0.492	0.000	0.09		30.2	OK

Summary Wizard of 1440 minute 100 year Winter I+45% for SW

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
4.003	CUL4	24	79.095	-0.501	0.000	0.09		30.2	OK
4.004	SW17	24	79.077	-0.609	0.000	0.06		30.2	OK
1.010	SW11	24	79.006	-0.602	0.000	0.09		41.8	OK
1.011	SW12	24	78.909	-0.636	0.000	0.06		41.8	OK
1.012	SW13	24	78.680	-0.642	0.000	0.05		41.8	OK

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for SW

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.488	4-8	0.381	8-12	0.003

Total Area Contributing (ha) = 0.872

Total Pipe Volume (m^3) = 42.014

Network Design Table for SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.580	0.111	167.4	0.121	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	36.068	0.147	245.4	0.083	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	35.623	0.253	140.8	0.140	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	26.998	0.180	150.0	0.039	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.31	80.320	0.121	0.0	0.0	0.0	1.01	40.1	16.4
1.001	50.00	5.91	80.134	0.204	0.0	0.0	0.0	1.00	70.6	27.6
1.002	50.00	6.36	79.987	0.344	0.0	0.0	0.0	1.32	93.5	46.6
1.003	50.00	6.66	79.659	0.383	0.0	0.0	0.0	1.48	163.1	51.9

Network Design Table for SW

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
2.000	25.358	0.079	321.0	0.078	5.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	36.673	0.091	403.0	0.112	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	18.005	0.044	409.2	0.054	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.000	33.413	0.234	142.8	0.062	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	9.625	0.025	385.0	0.023	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.007	7.777	0.020	388.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	8.747	0.022	397.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.009	17.540	0.044	398.6	0.160	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	5.42	79.558	0.078	0.0	0.0	0.0	1.01	111.1	10.6
1.004	50.00	7.27	79.404	0.573	0.0	0.0	0.0	1.01	160.1	77.6
1.005	50.00	7.54	79.238	0.627	0.0	0.0	0.0	1.10	238.3	84.9
3.000	50.00	5.33	79.503	0.062	0.0	0.0	0.0	1.70	270.3	8.4
1.006	50.00	7.68	79.194	0.712	0.0	0.0	0.0	1.14	245.8	96.4
1.007	50.00	7.80	79.169	0.712	0.0	0.0	0.0	1.13	244.6	96.4
1.008	50.00	7.90	78.924	0.712	0.0	0.0	0.0	1.40	617.3	96.4
1.009	50.00	8.11	78.902	0.872	0.0	0.0	0.0	1.40	616.5	118.1

Manhole Schedules for SW

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW1	81.745	1.425	Open Manhole	1350	1.000	80.320	225				
SW2	81.819	1.685	Open Manhole	1350	1.001	80.134	300	1.000	80.209	225	
SW3	81.712	1.725	Open Manhole	1350	1.002	79.987	300	1.001	79.987	300	
SW4	81.234	1.575	Open Manhole	1350	1.003	79.659	375	1.002	79.734	300	
SW15	80.809	1.251	Open Manhole	1500	2.000	79.558	375				
SW5	81.085	1.681	Open Manhole	1800	1.004	79.404	450	1.003	79.479	375	
								2.000	79.479	375	
SW6	81.222	1.984	Open Manhole	2100	1.005	79.238	525	1.004	79.313	450	
SW16	81.139	1.636	Open Manhole	2100	3.000	79.503	450				
SW7	81.043	1.849	Open Manhole	2400	1.006	79.194	525	1.005	79.194	525	
								3.000	79.269	450	
SW8hwall	81.924	2.755	Open Manhole	2400	1.007	79.169	525	1.006	79.169	525	
SW9hwall	81.924	3.000	Open Manhole	2400	1.008	78.924	750	1.007	79.149	525	
SW12	81.000	2.098	Open Manhole	2400	1.009	78.902	750	1.008	78.902	750	
SW13	80.800	1.942	Open Manhole	1800		OUTFALL		1.009	78.858	750	

PIPELINE SCHEDULES for SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW1	81.745	80.320	1.200	Open Manhole	1350
1.001	o	300	SW2	81.819	80.134	1.385	Open Manhole	1350
1.002	o	300	SW3	81.712	79.987	1.425	Open Manhole	1350
1.003	o	375	SW4	81.234	79.659	1.200	Open Manhole	1350
2.000	o	375	SW15	80.809	79.558	0.876	Open Manhole	1500
1.004	o	450	SW5	81.085	79.404	1.231	Open Manhole	1800
1.005	o	525	SW6	81.222	79.238	1.459	Open Manhole	2100
3.000	o	450	SW16	81.139	79.503	1.186	Open Manhole	2100
1.006	o	525	SW7	81.043	79.194	1.324	Open Manhole	2400
1.007	o	525	SW8hwall	81.924	79.169	2.230	Open Manhole	2400
1.008	o	750	SW9hwall	81.924	78.924	2.250	Open Manhole	2400
1.009	o	750	SW12	81.000	78.902	1.348	Open Manhole	2400

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.580	167.4	SW2	81.819	80.209	1.385	Open Manhole	1350
1.001	36.068	245.4	SW3	81.712	79.987	1.425	Open Manhole	1350
1.002	35.623	140.8	SW4	81.234	79.734	1.200	Open Manhole	1350
1.003	26.998	150.0	SW5	81.085	79.479	1.231	Open Manhole	1800
2.000	25.358	321.0	SW5	81.085	79.479	1.231	Open Manhole	1800
1.004	36.673	403.0	SW6	81.222	79.313	1.459	Open Manhole	2100
1.005	18.005	409.2	SW7	81.043	79.194	1.324	Open Manhole	2400
3.000	33.413	142.8	SW7	81.043	79.269	1.324	Open Manhole	2400
1.006	9.625	385.0	SW8hwall	81.924	79.169	2.230	Open Manhole	2400
1.007	7.777	388.9	SW9hwall	81.924	79.149	2.250	Open Manhole	2400
1.008	8.747	397.6	SW12	81.000	78.902	1.348	Open Manhole	2400
1.009	17.540	398.6	SW13	80.800	78.858	1.192	Open Manhole	1800

Surcharged Outfall Details for SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009	SW13	80.800	78.858	0.000	1800	0

Datum (m) 79.608 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
20	1.000	40	1.000	60	1.000	80	1.000	100	1.000	120	1.000

Simulation Criteria for SW

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

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

Synthetic Rainfall Details

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

Online Controls for SW

Non Return Valve Manhole: SW7, DS/PN: 1.006, Volume (m³): 16.7

Hydro-Brake® Optimum Manhole: SW12, DS/PN: 1.009, Volume (m³): 12.3

Unit Reference	MD-SHE-0143-1170-1900-1170
Design Head (m)	1.900
Design Flow (l/s)	11.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	143
Invert Level (m)	78.902
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.900	11.7	Kick-Flo®	1.152	9.2
Flush-Flo™	0.555	11.7	Mean Flow over Head Range	-	10.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	9.4	3.000	14.5	7.000	21.8
0.200	9.9	1.400	10.1	3.500	15.6	7.500	22.5
0.300	11.0	1.600	10.8	4.000	16.7	8.000	23.2
0.400	11.5	1.800	11.4	4.500	17.6	8.500	23.9
0.500	11.7	2.000	12.0	5.000	18.5	9.000	24.6
0.600	11.7	2.200	12.5	5.500	19.4	9.500	25.2
0.800	11.4	2.400	13.1	6.000	20.2		
1.000	10.6	2.600	13.6	6.500	21.0		

Storage Structures for SW

Tank or Pond Manhole: SW12, DS/PN: 1.009

Invert Level (m) 79.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	71.0	2.000	493.0

Summary Wizard of 15 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	2	81.684	1.139	0.000	1.58		57.0	FLOOD RISK
1.001	SW2	2	81.433	0.999	0.000	1.35		87.9	SURCHARGED
1.002	SW3	2	81.161	0.874	0.000	1.70		146.8	SURCHARGED
1.003	SW4	24	80.419	0.385	0.000	1.11		158.3	SURCHARGED
2.000	SW15	24	80.211	0.278	0.000	0.36		34.3	SURCHARGED
1.004	SW5	24	80.190	0.336	0.000	1.64		231.3	SURCHARGED
1.005	SW6	24	80.012	0.249	0.000	1.43		244.7	SURCHARGED
3.000	SW16	24	80.006	0.053	0.000	0.11		26.7	SURCHARGED
1.006	SW7	24	80.006	0.287	0.000	1.85		262.0	SURCHARGED
1.007	SW8hwall	24	80.006	0.312	0.000	1.95		256.3	SURCHARGED
1.008	SW9hwall	24	80.007	0.333	0.000	0.84		248.4	SURCHARGED
1.009	SW12	24	80.007	0.355	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 30 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	3	81.585	1.040	0.000	1.45		52.3	FLOOD RISK
1.001	SW2	3	81.350	0.916	0.000	1.29		83.9	SURCHARGED
1.002	SW3	3	81.104	0.817	0.000	1.65		141.8	SURCHARGED
1.003	SW4	23	80.467	0.433	0.000	1.09		155.4	SURCHARGED
2.000	SW15	23	80.307	0.374	0.000	0.35		33.5	SURCHARGED
1.004	SW5	23	80.289	0.435	0.000	1.61		226.4	SURCHARGED
1.005	SW6	22	80.252	0.489	0.000	1.39		236.8	SURCHARGED
3.000	SW16	22	80.249	0.296	0.000	0.12		27.2	SURCHARGED
1.006	SW7	22	80.249	0.530	0.000	1.78		252.6	SURCHARGED
1.007	SW8hwall	22	80.249	0.555	0.000	1.87		245.7	SURCHARGED
1.008	SW9hwall	22	80.249	0.575	0.000	0.81		238.4	SURCHARGED
1.009	SW12	22	80.249	0.597	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 60 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	5	81.175	0.630	0.000	1.16		41.8	SURCHARGED
1.001	SW2	5	81.026	0.592	0.000	1.05		68.5	SURCHARGED
1.002	SW3	11	80.862	0.575	0.000	1.34		115.4	SURCHARGED
1.003	SW4	21	80.507	0.473	0.000	0.89		126.7	SURCHARGED
2.000	SW15	20	80.500	0.567	0.000	0.27		25.7	SURCHARGED
1.004	SW5	20	80.499	0.645	0.000	1.31		185.0	SURCHARGED
1.005	SW6	20	80.493	0.730	0.000	1.16		198.6	SURCHARGED
3.000	SW16	20	80.490	0.537	0.000	0.08		18.7	SURCHARGED
1.006	SW7	20	80.490	0.771	0.000	1.54		218.1	SURCHARGED
1.007	SW8hwall	20	80.490	0.796	0.000	1.62		213.2	SURCHARGED
1.008	SW9hwall	20	80.490	0.816	0.000	0.71		207.9	SURCHARGED
1.009	SW12	20	80.490	0.838	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 120 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	21	80.805	0.260	0.000	0.83		29.9	SURCHARGED
1.001	SW2	23	80.744	0.310	0.000	0.76		49.6	SURCHARGED
1.002	SW3	23	80.738	0.451	0.000	0.97		83.2	SURCHARGED
1.003	SW4	18	80.727	0.693	0.000	0.64		91.8	SURCHARGED
2.000	SW15	18	80.723	0.790	0.000	0.19		18.8	FLOOD RISK
1.004	SW5	18	80.721	0.867	0.000	0.96		135.9	SURCHARGED
1.005	SW6	18	80.716	0.953	0.000	0.86		146.5	SURCHARGED
3.000	SW16	18	80.712	0.759	0.000	0.06		13.7	SURCHARGED
1.006	SW7	18	80.712	0.993	0.000	1.14		161.9	SURCHARGED
1.007	SW8hwall	18	80.710	1.016	0.000	1.20		158.7	SURCHARGED
1.008	SW9hwall	18	80.708	1.034	0.000	0.53		155.3	SURCHARGED
1.009	SW12	18	80.707	1.055	0.000	0.03		11.5	FLOOD RISK

Summary Wizard of 180 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	23	80.799	0.254	0.000	0.66		23.8	SURCHARGED
1.001	SW2	22	80.795	0.361	0.000	0.60		39.3	SURCHARGED
1.002	SW3	21	80.790	0.503	0.000	0.77		66.3	SURCHARGED
1.003	SW4	16	80.782	0.748	0.000	0.51		73.2	SURCHARGED
2.000	SW15	16	80.778	0.845	0.000	0.15		14.8	FLOOD RISK
1.004	SW5	16	80.777	0.923	0.000	0.77		108.4	SURCHARGED
1.005	SW6	16	80.773	1.010	0.000	0.69		117.2	SURCHARGED
3.000	SW16	16	80.770	0.817	0.000	0.05		10.8	SURCHARGED
1.006	SW7	16	80.770	1.051	0.000	0.91		129.7	FLOOD RISK
1.007	SW8hwall	16	80.768	1.074	0.000	0.97		127.3	SURCHARGED
1.008	SW9hwall	16	80.767	1.093	0.000	0.42		124.8	SURCHARGED
1.009	SW12	16	80.766	1.114	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 240 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	22	80.804	0.259	0.000	0.55		19.8	SURCHARGED
1.001	SW2	21	80.800	0.366	0.000	0.50		32.8	SURCHARGED
1.002	SW3	20	80.796	0.509	0.000	0.64		55.4	SURCHARGED
1.003	SW4	15	80.790	0.756	0.000	0.43		61.3	SURCHARGED
2.000	SW15	15	80.787	0.854	0.000	0.13		12.4	FLOOD RISK
1.004	SW5	15	80.786	0.932	0.000	0.65		91.0	FLOOD RISK
1.005	SW6	15	80.782	1.019	0.000	0.58		98.5	SURCHARGED
3.000	SW16	15	80.779	0.826	0.000	0.04		9.1	SURCHARGED
1.006	SW7	15	80.780	1.061	0.000	0.77		109.4	FLOOD RISK
1.007	SW8hwall	15	80.778	1.084	0.000	0.82		107.6	SURCHARGED
1.008	SW9hwall	15	80.776	1.102	0.000	0.36		105.8	SURCHARGED
1.009	SW12	15	80.776	1.124	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 360 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	20	80.810	0.265	0.000	0.42		15.0	SURCHARGED
1.001	SW2	20	80.807	0.373	0.000	0.38		24.7	SURCHARGED
1.002	SW3	19	80.804	0.517	0.000	0.49		42.0	SURCHARGED
1.003	SW4	14	80.799	0.765	0.000	0.33		46.6	SURCHARGED
2.000	SW15	14	80.796	0.863	0.000	0.10		9.4	FLOOD RISK
1.004	SW5	14	80.796	0.942	0.000	0.49		69.4	FLOOD RISK
1.005	SW6	14	80.792	1.029	0.000	0.44		75.2	SURCHARGED
3.000	SW16	14	80.790	0.837	0.000	0.03		7.0	SURCHARGED
1.006	SW7	14	80.790	1.071	0.000	0.59		83.6	FLOOD RISK
1.007	SW8hwall	14	80.789	1.095	0.000	0.62		82.3	SURCHARGED
1.008	SW9hwall	14	80.788	1.114	0.000	0.27		80.9	SURCHARGED
1.009	SW12	14	80.787	1.135	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 480 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	17	80.826	0.281	0.000	0.34		12.3	SURCHARGED
1.001	SW2	17	80.823	0.389	0.000	0.31		20.3	SURCHARGED
1.002	SW3	16	80.819	0.532	0.000	0.40		34.6	SURCHARGED
1.003	SW4	11	80.814	0.780	0.000	0.27		38.3	SURCHARGED
2.000	SW15	11	80.811	0.878	1.607	0.08		7.7	FLOOD
1.004	SW5	11	80.810	0.956	0.000	0.40		57.1	FLOOD RISK
1.005	SW6	11	80.807	1.044	0.000	0.36		61.9	SURCHARGED
3.000	SW16	11	80.805	0.852	0.000	0.02		5.7	SURCHARGED
1.006	SW7	11	80.805	1.086	0.000	0.49		68.9	FLOOD RISK
1.007	SW8hwall	11	80.804	1.110	0.000	0.52		67.9	SURCHARGED
1.008	SW9hwall	11	80.803	1.129	0.000	0.23		66.9	SURCHARGED
1.009	SW12	11	80.802	1.150	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 600 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	15	80.830	0.285	0.000	0.29		10.5	SURCHARGED
1.001	SW2	15	80.826	0.392	0.000	0.27		17.3	SURCHARGED
1.002	SW3	14	80.822	0.535	0.000	0.34		29.5	SURCHARGED
1.003	SW4	9	80.816	0.782	0.000	0.23		32.7	SURCHARGED
2.000	SW15	8	80.813	0.880	3.700	0.07		6.6	FLOOD
1.004	SW5	9	80.813	0.959	0.000	0.35		48.8	FLOOD RISK
1.005	SW6	8	80.809	1.046	0.000	0.31		52.9	SURCHARGED
3.000	SW16	8	80.808	0.855	0.000	0.02		4.9	SURCHARGED
1.006	SW7	8	80.808	1.089	0.000	0.42		59.0	FLOOD RISK
1.007	SW8hwall	8	80.806	1.112	0.000	0.44		58.1	SURCHARGED
1.008	SW9hwall	8	80.805	1.131	0.000	0.19		57.3	SURCHARGED
1.009	SW12	8	80.804	1.152	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 720 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	16	80.830	0.285	0.000	0.25		9.2	SURCHARGED
1.001	SW2	16	80.826	0.392	0.000	0.23		15.2	SURCHARGED
1.002	SW3	15	80.821	0.534	0.000	0.30		25.9	SURCHARGED
1.003	SW4	10	80.815	0.781	0.000	0.20		28.7	SURCHARGED
2.000	SW15	9	80.812	0.879	3.223	0.06		5.8	FLOOD
1.004	SW5	10	80.812	0.958	0.000	0.30		42.8	FLOOD RISK
1.005	SW6	10	80.809	1.046	0.000	0.27		46.4	SURCHARGED
3.000	SW16	9	80.807	0.854	0.000	0.02		4.3	SURCHARGED
1.006	SW7	9	80.807	1.088	0.000	0.37		51.8	FLOOD RISK
1.007	SW8hwall	9	80.806	1.112	0.000	0.39		51.1	SURCHARGED
1.008	SW9hwall	9	80.804	1.130	0.000	0.17		50.4	SURCHARGED
1.009	SW12	9	80.804	1.152	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 960 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	19	80.816	0.271	0.000	0.21		7.6	SURCHARGED
1.001	SW2	19	80.812	0.378	0.000	0.19		12.3	SURCHARGED
1.002	SW3	18	80.809	0.522	0.000	0.24		21.0	SURCHARGED
1.003	SW4	13	80.803	0.769	0.000	0.16		23.2	SURCHARGED
2.000	SW15	13	80.801	0.868	0.000	0.05		4.7	FLOOD RISK
1.004	SW5	13	80.800	0.946	0.000	0.25		34.7	FLOOD RISK
1.005	SW6	13	80.797	1.034	0.000	0.22		37.7	SURCHARGED
3.000	SW16	13	80.795	0.842	0.000	0.01		3.5	SURCHARGED
1.006	SW7	13	80.795	1.076	0.000	0.30		42.1	FLOOD RISK
1.007	SW8hwall	13	80.794	1.100	0.000	0.32		41.5	SURCHARGED
1.008	SW9hwall	13	80.792	1.118	0.000	0.14		41.0	SURCHARGED
1.009	SW12	13	80.792	1.140	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 1440 minute 100 year Summer I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	24	80.741	0.196	0.000	0.16		5.7	SURCHARGED
1.001	SW2	24	80.737	0.303	0.000	0.14		9.3	SURCHARGED
1.002	SW3	24	80.734	0.447	0.000	0.18		15.4	SURCHARGED
1.003	SW4	17	80.728	0.694	0.000	0.12		17.1	SURCHARGED
2.000	SW15	17	80.725	0.792	0.000	0.04		3.5	FLOOD RISK
1.004	SW5	17	80.725	0.871	0.000	0.18		25.6	SURCHARGED
1.005	SW6	17	80.721	0.958	0.000	0.16		27.8	SURCHARGED
3.000	SW16	17	80.719	0.766	0.000	0.01		2.6	SURCHARGED
1.006	SW7	17	80.719	1.000	0.000	0.22		31.1	SURCHARGED
1.007	SW8hwall	17	80.718	1.024	0.000	0.23		30.8	SURCHARGED
1.008	SW9hwall	17	80.716	1.042	0.000	0.10		30.4	SURCHARGED
1.009	SW12	17	80.716	1.064	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 15 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	1	81.745	1.200	0.501	1.63		58.6	FLOOD
1.001	SW2	1	81.564	1.130	0.000	1.34		87.6	FLOOD RISK
1.002	SW3	1	81.299	1.012	0.000	1.73		149.4	SURCHARGED
1.003	SW4	20	80.534	0.500	0.000	1.14		163.0	SURCHARGED
2.000	SW15	22	80.337	0.404	0.000	0.37		35.2	SURCHARGED
1.004	SW5	22	80.316	0.462	0.000	1.70		239.5	SURCHARGED
1.005	SW6	23	80.095	0.332	0.000	1.49		255.3	SURCHARGED
3.000	SW16	23	80.088	0.135	0.000	0.12		27.7	SURCHARGED
1.006	SW7	23	80.088	0.369	0.000	1.97		279.1	SURCHARGED
1.007	SW8hwall	23	80.088	0.394	0.000	2.06		271.3	SURCHARGED
1.008	SW9hwall	23	80.089	0.415	0.000	0.89		261.0	SURCHARGED
1.009	SW12	23	80.089	0.437	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 30 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	4	81.450	0.905	0.000	1.33		47.8	FLOOD RISK
1.001	SW2	4	81.255	0.821	0.000	1.21		78.6	SURCHARGED
1.002	SW3	4	81.041	0.754	0.000	1.54		132.9	SURCHARGED
1.003	SW4	22	80.494	0.460	0.000	1.02		145.7	SURCHARGED
2.000	SW15	21	80.363	0.430	0.000	0.32		30.5	SURCHARGED
1.004	SW5	21	80.361	0.507	0.000	1.51		212.9	SURCHARGED
1.005	SW6	21	80.347	0.584	0.000	1.33		227.7	SURCHARGED
3.000	SW16	21	80.344	0.391	0.000	0.10		24.7	SURCHARGED
1.006	SW7	21	80.344	0.625	0.000	1.75		248.5	SURCHARGED
1.007	SW8hwall	21	80.344	0.650	0.000	1.84		242.1	SURCHARGED
1.008	SW9hwall	21	80.344	0.670	0.000	0.80		235.5	SURCHARGED
1.009	SW12	21	80.344	0.692	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 60 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	6	80.966	0.421	0.000	0.96		34.7	SURCHARGED
1.001	SW2	12	80.870	0.436	0.000	0.89		57.7	SURCHARGED
1.002	SW3	22	80.765	0.478	0.000	1.13		97.4	SURCHARGED
1.003	SW4	19	80.620	0.586	0.000	0.75		107.4	SURCHARGED
2.000	SW15	19	80.612	0.679	0.000	0.22		21.6	FLOOD RISK
1.004	SW5	19	80.610	0.756	0.000	1.13		158.8	SURCHARGED
1.005	SW6	19	80.601	0.838	0.000	1.00		170.8	SURCHARGED
3.000	SW16	19	80.598	0.645	0.000	0.07		15.6	SURCHARGED
1.006	SW7	19	80.598	0.879	0.000	1.33		188.3	SURCHARGED
1.007	SW8hwall	19	80.598	0.904	0.000	1.40		184.1	SURCHARGED
1.008	SW9hwall	19	80.598	0.924	0.000	0.61		180.4	SURCHARGED
1.009	SW12	19	80.598	0.946	0.000	0.00		0.0	SURCHARGED

Summary Wizard of 120 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	14	80.853	0.308	0.000	0.68		24.3	SURCHARGED
1.001	SW2	14	80.845	0.411	0.000	0.59		38.8	SURCHARGED
1.002	SW3	13	80.836	0.549	0.000	0.76		65.6	SURCHARGED
1.003	SW4	8	80.822	0.788	0.000	0.51		72.4	SURCHARGED
2.000	SW15	10	80.811	0.878	2.341	0.15		14.5	FLOOD
1.004	SW5	8	80.814	0.960	0.000	0.76		107.3	FLOOD RISK
1.005	SW6	9	80.809	1.046	0.000	0.68		116.1	SURCHARGED
3.000	SW16	10	80.807	0.854	0.000	0.04		10.5	SURCHARGED
1.006	SW7	10	80.807	1.088	0.000	0.91		128.5	FLOOD RISK
1.007	SW8hwall	10	80.805	1.111	0.000	0.96		126.2	SURCHARGED
1.008	SW9hwall	10	80.803	1.129	0.000	0.42		123.8	SURCHARGED
1.009	SW12	10	80.802	1.150	0.000	0.03		10.9	FLOOD RISK

Summary Wizard of 180 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	7	80.892	0.347	0.000	0.51		18.2	SURCHARGED
1.001	SW2	6	80.876	0.442	0.000	0.46		29.8	SURCHARGED
1.002	SW3	10	80.863	0.576	0.000	0.58		50.4	SURCHARGED
1.003	SW4	6	80.852	0.818	0.000	0.39		55.7	SURCHARGED
2.000	SW15	7	80.840	0.907	30.904	0.12		11.1	FLOOD
1.004	SW5	6	80.846	0.992	0.000	0.59		82.6	FLOOD RISK
1.005	SW6	6	80.843	1.080	0.000	0.52		89.5	SURCHARGED
3.000	SW16	6	80.842	0.889	0.000	0.03		8.1	FLOOD RISK
1.006	SW7	6	80.842	1.123	0.000	0.70		99.2	FLOOD RISK
1.007	SW8hwall	6	80.840	1.146	0.000	0.74		97.5	SURCHARGED
1.008	SW9hwall	6	80.839	1.165	0.000	0.32		95.8	SURCHARGED
1.009	SW12	6	80.839	1.187	0.000	0.03		10.8	FLOOD RISK

Summary Wizard of 240 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	8	80.889	0.344	0.000	0.41		14.6	SURCHARGED
1.001	SW2	7	80.876	0.442	0.000	0.38		24.5	SURCHARGED
1.002	SW3	7	80.866	0.579	0.000	0.48		41.5	SURCHARGED
1.003	SW4	5	80.857	0.823	0.000	0.32		46.0	SURCHARGED
2.000	SW15	5	80.849	0.916	39.754	0.10		9.2	FLOOD
1.004	SW5	5	80.852	0.998	0.000	0.48		68.3	FLOOD RISK
1.005	SW6	5	80.849	1.086	0.000	0.43		74.0	SURCHARGED
3.000	SW16	5	80.848	0.895	0.000	0.03		6.8	FLOOD RISK
1.006	SW7	5	80.848	1.129	0.000	0.58		82.4	FLOOD RISK
1.007	SW8hwall	5	80.846	1.152	0.000	0.62		81.2	SURCHARGED
1.008	SW9hwall	5	80.845	1.171	0.000	0.27		80.0	SURCHARGED
1.009	SW12	5	80.845	1.193	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 360 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	10	80.880	0.335	0.000	0.31		11.0	SURCHARGED
1.001	SW2	10	80.871	0.437	0.000	0.28		18.3	SURCHARGED
1.002	SW3	9	80.864	0.577	0.000	0.36		31.0	SURCHARGED
1.003	SW4	4	80.857	0.823	0.000	0.24		34.3	SURCHARGED
2.000	SW15	4	80.853	0.920	43.681	0.07		6.9	FLOOD
1.004	SW5	4	80.853	0.999	0.000	0.36		51.2	FLOOD RISK
1.005	SW6	4	80.850	1.087	0.000	0.33		55.5	SURCHARGED
3.000	SW16	4	80.849	0.896	0.000	0.02		5.1	FLOOD RISK
1.006	SW7	4	80.849	1.130	0.000	0.44		61.9	FLOOD RISK
1.007	SW8hwall	4	80.847	1.153	0.000	0.46		61.0	SURCHARGED
1.008	SW9hwall	4	80.846	1.172	0.000	0.20		60.1	SURCHARGED
1.009	SW12	4	80.845	1.193	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 480 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	9	80.882	0.337	0.000	0.25		9.0	SURCHARGED
1.001	SW2	8	80.874	0.440	0.000	0.23		14.9	SURCHARGED
1.002	SW3	6	80.866	0.579	0.000	0.29		25.3	SURCHARGED
1.003	SW4	1	80.861	0.827	0.000	0.20		28.0	SURCHARGED
2.000	SW15	1	80.857	0.924	48.331	0.07		6.8	FLOOD
1.004	SW5	1	80.857	1.003	0.000	0.30		41.7	FLOOD RISK
1.005	SW6	1	80.854	1.091	0.000	0.27		45.3	SURCHARGED
3.000	SW16	1	80.852	0.899	0.000	0.02		4.2	FLOOD RISK
1.006	SW7	1	80.852	1.133	0.000	0.36		50.6	FLOOD RISK
1.007	SW8hwall	1	80.851	1.157	0.000	0.38		49.9	SURCHARGED
1.008	SW9hwall	1	80.849	1.175	0.000	0.17		49.2	SURCHARGED
1.009	SW12	1	80.849	1.197	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 600 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	11	80.880	0.335	0.000	0.21		7.6	SURCHARGED
1.001	SW2	9	80.873	0.439	0.000	0.20		12.7	SURCHARGED
1.002	SW3	5	80.867	0.580	0.000	0.25		21.5	SURCHARGED
1.003	SW4	2	80.859	0.825	0.000	0.17		23.8	SURCHARGED
2.000	SW15	2	80.856	0.923	47.084	0.07		6.8	FLOOD
1.004	SW5	2	80.856	1.002	0.000	0.25		35.6	FLOOD RISK
1.005	SW6	2	80.853	1.090	0.000	0.23		38.6	SURCHARGED
3.000	SW16	2	80.851	0.898	0.000	0.02		3.6	FLOOD RISK
1.006	SW7	2	80.851	1.132	0.000	0.30		43.2	FLOOD RISK
1.007	SW8hwall	2	80.850	1.156	0.000	0.32		42.6	SURCHARGED
1.008	SW9hwall	2	80.848	1.174	0.000	0.14		42.1	SURCHARGED
1.009	SW12	2	80.848	1.196	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 720 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	12	80.876	0.331	0.000	0.19		6.7	SURCHARGED
1.001	SW2	11	80.870	0.436	0.000	0.17		11.1	SURCHARGED
1.002	SW3	8	80.865	0.578	0.000	0.22		18.8	SURCHARGED
1.003	SW4	3	80.857	0.823	0.000	0.15		20.9	SURCHARGED
2.000	SW15	3	80.854	0.921	45.010	0.07		6.8	FLOOD
1.004	SW5	3	80.854	1.000	0.000	0.22		31.2	FLOOD RISK
1.005	SW6	3	80.851	1.088	0.000	0.20		33.9	SURCHARGED
3.000	SW16	3	80.849	0.896	0.000	0.01		3.2	FLOOD RISK
1.006	SW7	3	80.849	1.130	0.000	0.27		37.9	FLOOD RISK
1.007	SW8hwall	3	80.848	1.154	0.000	0.28		37.4	SURCHARGED
1.008	SW9hwall	3	80.847	1.173	0.000	0.13		37.0	SURCHARGED
1.009	SW12	3	80.846	1.194	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 960 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

WARNING: The analysis maybe unstable. Please see the method of analysis help for more details.

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	13	80.863	0.318	0.000	0.15		5.4	SURCHARGED
1.001	SW2	13	80.859	0.425	0.000	0.14		9.0	SURCHARGED
1.002	SW3	12	80.854	0.567	0.000	0.18		15.3	SURCHARGED
1.003	SW4	7	80.847	0.813	0.000	0.12		16.9	SURCHARGED
2.000	SW15	6	80.844	0.911	34.865	0.07		6.6	FLOOD
1.004	SW5	7	80.844	0.990	0.000	0.18		25.3	FLOOD RISK
1.005	SW6	7	80.841	1.078	0.000	0.16		27.5	SURCHARGED
3.000	SW16	7	80.839	0.886	0.000	0.01		2.6	SURCHARGED
1.006	SW7	7	80.839	1.120	0.000	0.22		30.8	FLOOD RISK
1.007	SW8hwall	7	80.837	1.143	0.000	0.23		30.4	SURCHARGED
1.008	SW9hwall	7	80.836	1.162	0.000	0.10		30.1	SURCHARGED
1.009	SW12	7	80.836	1.184	0.000	0.03		11.7	FLOOD RISK

Summary Wizard of 1440 minute 100 year Winter I+45% for SW

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	45

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SW1	18	80.818	0.273	0.000	0.11		4.1	SURCHARGED
1.001	SW2	18	80.815	0.381	0.000	0.10		6.7	SURCHARGED
1.002	SW3	17	80.811	0.524	0.000	0.13		11.3	SURCHARGED
1.003	SW4	12	80.806	0.772	0.000	0.09		12.5	SURCHARGED
2.000	SW15	12	80.803	0.870	0.000	0.03		2.5	FLOOD RISK
1.004	SW5	12	80.803	0.949	0.000	0.13		18.7	FLOOD RISK
1.005	SW6	12	80.799	1.036	0.000	0.12		20.4	SURCHARGED
3.000	SW16	12	80.798	0.845	0.000	0.01		1.9	SURCHARGED
1.006	SW7	12	80.798	1.079	0.000	0.16		22.9	FLOOD RISK
1.007	SW8hwall	12	80.796	1.102	0.000	0.17		22.6	SURCHARGED
1.008	SW9hwall	12	80.795	1.121	0.000	0.08		22.4	SURCHARGED
1.009	SW12	12	80.794	1.142	0.000	0.03		11.7	FLOOD RISK

Appendix H – GEOL Consulting ground permeability tests and borehole location plan


442600N
442550N
442500N
374300E
374350E
374400E
374450E
82.26
BH3
80.58
BH8
81.15
BH5
82.31
BH2
79.64
BH11
80.66
BH7
82.34
BH1
81.43
BH4
79.29
BH15
79.64
BH13
79.80
BH10
80.72
BH6
79.13
BH14
79.29
BH12
79.56
BH9
existing gas mains & associated easement
landscaped buffer strip
existing play area
POS
POS
Cottage

Geol Consultants Limited

VARIABLE HEAD (FALLING) PERMEABILITY TEST

SITE DETAILS: Land at Hawthorne Farm, Hawthorne Place, Clitheroe BOREHOLE: BH02 at 3.00mBGL

Bottom of Borehole	3.00	mBGL
Base of casing	1.00	mBGL
Diameter of casing	50.00	mm
Height of casing	0.00	mAGL
Elevation of Borehole		mAOD
Groundwater Level	3.00	mBGL

Operator	RS	
Date	30/08/2019	
Time	11.00	
Weather	Dry	
Input volume of water	c.8	litres
Test Zone	2.00	m

TEST CALCULATION

Intake Factor (F)

$$F = \frac{2\pi L}{\text{Log}_e\left[(L/D) + \sqrt{\{1+(L/D)^2\}}\right]} \quad \text{(i)}$$

(From BS 5930:2015 for standpipes)

L=length of test zone
D=diameter of standpipe

Permeability (k)

$$k = \frac{A}{F(t_2 - t_1)} \times \text{Log}_e\,(H_1/H_2) \quad \text{(ii)}$$

or

$$k = \frac{A}{FT} \quad \text{(iii)}$$

Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37

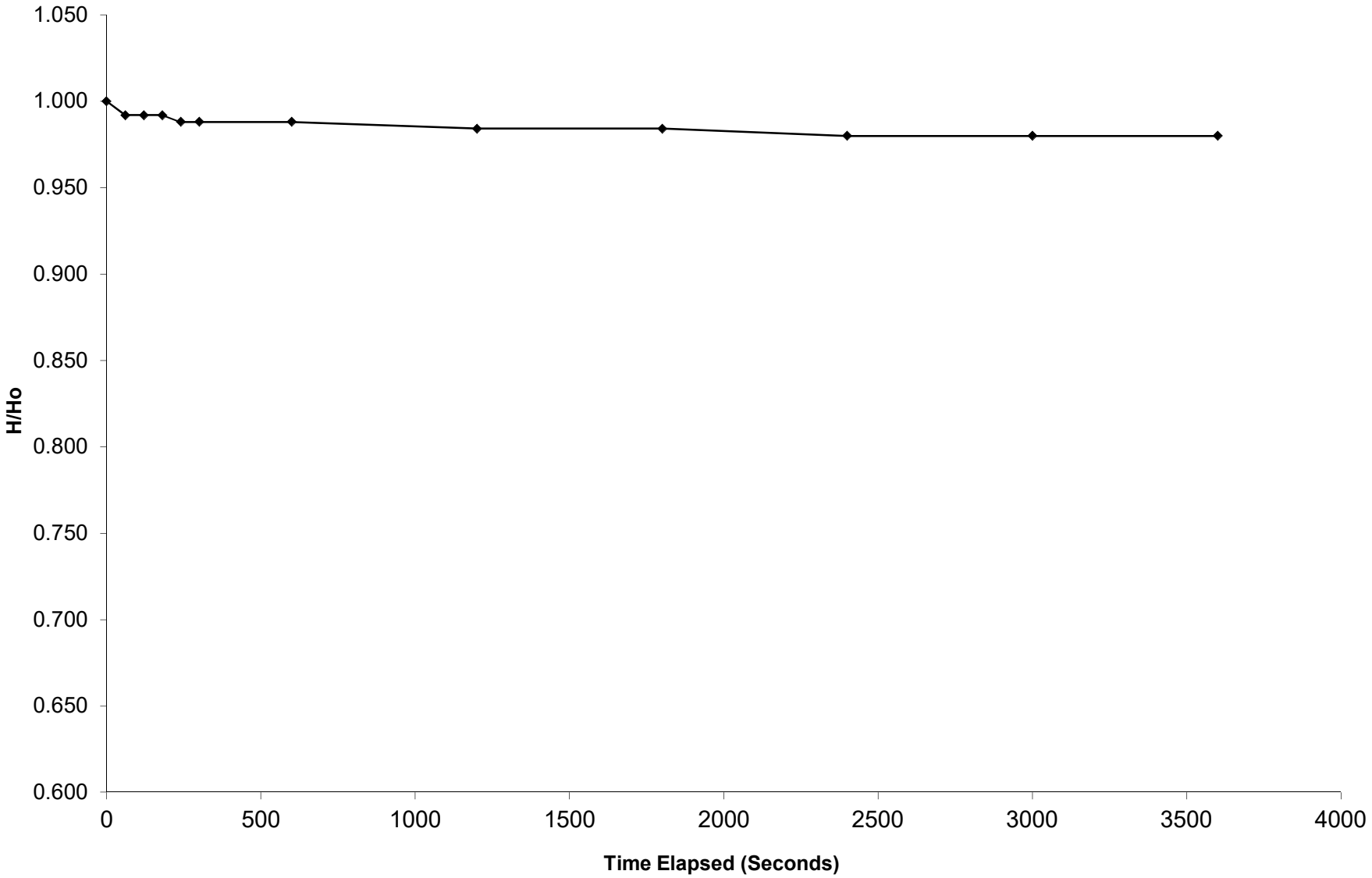
L=	2.00	m	
D=	0.050	m	
L/D=	40.00		
t_1=	0	s	
t_2=	3600	s	
H_1=	2.50	m	
H_2=	2.45	m	
A=	0.00196	m^2	
F=	2.8676		From (i)
T=		s	
k=	3.84253E-09	ms^{-1}	From (ii)

Remarks

Drainage Characteristics: POOR / PRACTICALLY IMPERVIOUS
Permeability Classification: VERY LOW

Elapsed (minutes)	Elapsed (seconds)	Total seconds	Water Depth (m)	Head (metres)	H/Ho
0	0	0	0.500	2.500	1.000
1	0	60	0.520	2.480	0.992
2	0	120	0.520	2.480	0.992
3	0	180	0.520	2.480	0.992
4	0	240	0.530	2.470	0.988
5	0	300	0.530	2.470	0.988
10	0	600	0.530	2.470	0.988
20	0	1200	0.540	2.460	0.984
30	0	1800	0.540	2.460	0.984
40	0	2400	0.550	2.450	0.980
50	0	3000	0.550	2.450	0.980
60	0	3600	0.550	2.450	0.980

Variable Head (Falling) Permeability Test at BH02



Geol Consultants Limited

VARIABLE HEAD (FALLING) PERMEABILITY TEST

SITE DETAILS: Land at Hawthorne Farm, Hawthorne Place, Clitheroe BOREHOLE: BH06 at 3.00mBGL

Bottom of Borehole	2.00	mBGL
Base of casing	1.00	mBGL
Diameter of casing	50.00	mm
Height of casing	0.00	mAGL
Elevation of Borehole		mAOD
Groundwater Level	2.00	mBGL

Operator	RS	
Date	30/08/2019	
Time	11.10	
Weather	Dry	
Input volume of water	c.5	litres
Test Zone	1.00	m

TEST CALCULATION

Intake Factor (F)

$$F = \frac{2\pi L}{\log_e [(L/D) + \sqrt{\{1+(L/D)^2\}}]} \quad \text{(i)}$$

(From BS 5930:2015 for standpipes)

L=length of test zone
D=diameter of standpipe

Permeability (k)

$$k = \frac{A}{F(t_2 - t_1)} \times \log_e (H_1/H_2) \quad \text{(ii)}$$

or

$$k = \frac{A}{FT} \quad \text{(iii)}$$

Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37

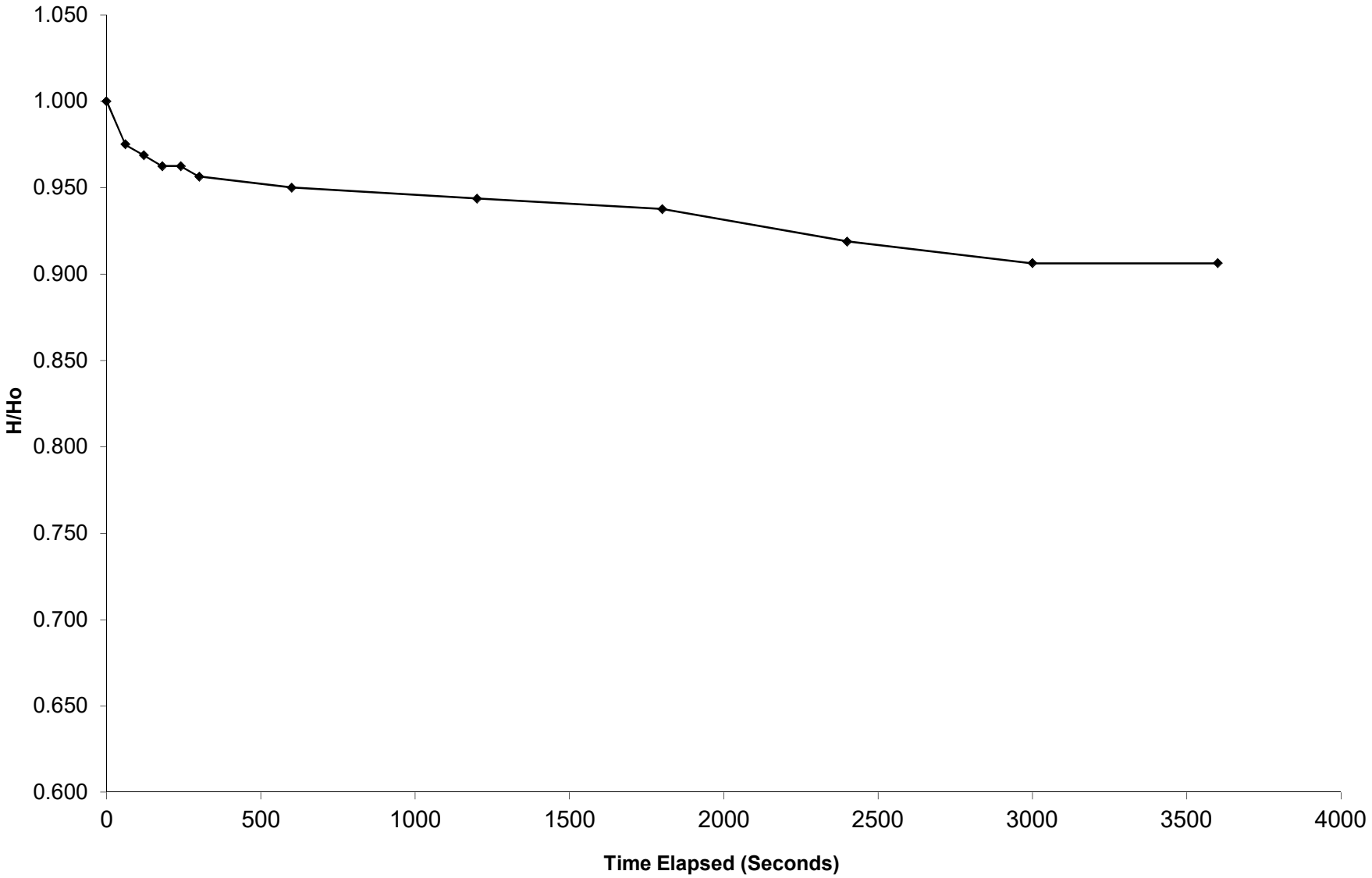
L=	1.00	m	
D=	0.050	m	
L/D=	20.00		
t_1=	0	s	
t_2=	3600	s	
H_1=	1.60	m	
H_2=	1.45	m	
A=	0.00196	m^2	
F=	1.7030		From (i)
T=		s	
k=	3.15273E-08	ms^{-1}	From (ii)

Remarks

Drainage Characteristics: POOR
Permeability Classification: VERY LOW

Elapsed (minutes)	Elapsed (seconds)	Total seconds	Water Depth (m)	Head (metres)	H/Ho
0	0	0	0.400	1.600	1.000
1	0	60	0.440	1.560	0.975
2	0	120	0.450	1.550	0.969
3	0	180	0.460	1.540	0.963
4	0	240	0.460	1.540	0.963
5	0	300	0.470	1.530	0.956
10	0	600	0.480	1.520	0.950
20	0	1200	0.490	1.510	0.944
30	0	1800	0.500	1.500	0.938
40	0	2400	0.530	1.470	0.919
50	0	3000	0.550	1.450	0.906
60	0	3600	0.550	1.450	0.906

Variable Head (Falling) Permeability Test at BH06



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VARIABLE HEAD (FALLING) PERMEABILITY TEST

SITE DETAILS: Land at Hawthorne Farm, Hawthorne Place, Clitheroe BOREHOLE: BH15 at 2.72mBGL

Bottom of Borehole	2.72	mBGL
Base of casing	0.72	mBGL
Diameter of casing	50.00	mm
Height of casing	0.00	mAGL
Elevation of Borehole		mAOD
Groundwater Level	2.72	mBGL

Operator	RS	
Date	30/08/2019	
Time	11.20	
Weather	Dry	
Input volume of water	c.8	litres
Test Zone	2.00	m

TEST CALCULATION

Intake Factor (F)

$$F = \frac{2\pi L}{\log_e [(L/D) + \sqrt{\{1+(L/D)^2\}}]} \quad \text{(i)}$$

(From BS 5930:2015 for standpipes)

L=length of test zone
D=diameter of standpipe

Permeability (k)

$$k = \frac{A}{F(t_2 - t_1)} \times \log_e (H_1/H_2) \quad \text{(ii)}$$

or

$$k = \frac{A}{FT} \quad \text{(iii)}$$

Where T is the Basic Time Lag Factor corresponding to an H/Ho value of 0.37

L=	2.00	m	
D=	0.050	m	
L/D=	40.00		
t_1=	0	s	
t_2=	3600	s	
H_1=	2.42	m	
H_2=	2.37	m	
A=	0.00196	m^2	
F=	2.8676		From (i)
T=		s	
k=	3.97089E-09	ms^{-1}	From (ii)

Remarks

Drainage Characteristics: POOR / PRACTICALLY IMPERVIOUS
Permeability Classification: VERY LOW

Elapsed (minutes)	Elapsed (seconds)	Total seconds	Water Depth (m)	Head (metres)	H/Ho
0	0	0	0.300	2.420	1.000
1	0	60	0.320	2.400	0.992
2	0	120	0.320	2.400	0.992
3	0	180	0.320	2.400	0.992
4	0	240	0.320	2.400	0.992
5	0	300	0.320	2.400	0.992
10	0	600	0.330	2.390	0.988
20	0	1200	0.330	2.390	0.988
30	0	1800	0.340	2.380	0.983
40	0	2400	0.340	2.380	0.983
50	0	3000	0.350	2.370	0.979
60	0	3600	0.350	2.370	0.979

Variable Head (Falling) Permeability Test at BH15