Client: Merrow Wood

Flood Risk Assessment for the Proposed Development at Land at Burleigh Lane, Crawley Down

June 2025

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Flood Risk Assessment for the Proposed Development at Land at Burleigh Lane, Crawley Down, West Sussex

Contents Amendment Record

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1 Background and Scope of Appraisal

Flooding is a major issue in the United Kingdom. The impacts can be devastating in terms of the cost of repairs, replacement of damaged property and loss of business. The objectives of the Flood Risk Assessment (FRA) are therefore to establish the following:

- whether a proposed development is likely to be affected by current or future flooding from any source.
- whether the development will increase flood risk elsewhere within the floodplain.
- whether the measures proposed to address these effects and risks are appropriate.
- whether the site will pass Part B of the Exception Test (where applicable).

Herrington Consulting has been commissioned by **Merrow Wood** to prepare a Flood Risk Assessment (FRA) for the proposed development at **Land at Burleigh Lane, Crawley Down, Mid Sussex, RH10 4AN.**

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2024) and the National Planning Practice Guidance Suite (August 2022) that has been published by the Department for Communities and Local Government. The *Flood Risk and Coastal Change* planning practice guidance included within the Suite represents the most contemporary technical guidance on preparing FRAs. In addition, reference has also been made to Local Planning Policy. To ensure that due account is taken of industry best practice, this FRA has been carried out in line with the CIRIA Report C624 'Development and flood risk - guidance for the construction industry'.

New developments are also required to undertake an assessment to identify how the foul water from the site will be managed. This assessment considers how foul water is expected to be discharged from the proposed development and whether there are any appropriate connection points, such as nearby sewers or treatment plants.

This report has been prepared to accompany an outline planning application and has been prepared in accordance with the requirements of both national and local planning policy. To ensure that due account is taken of industry best practice, reference has also been made to, CIRIA Report C753 'The SuDS Manual' and any relevant local planning policy guidance. The surface water management strategy included within this report is not intended to constitute a detailed drainage design.

2 Development Description and Planning Context

2.1 Site Location and Existing Use

The site is located at OS coordinates 535047, 137264 off Burleigh Lane in Crawley Down. The site covers an area of approximately 2.3 hectares and currently comprises two open fields with an intersecting Ordinary River. The easterly field also currently contains some existing buildings. The location of the site in relation to the surrounding area is shown in Figure 2-1.

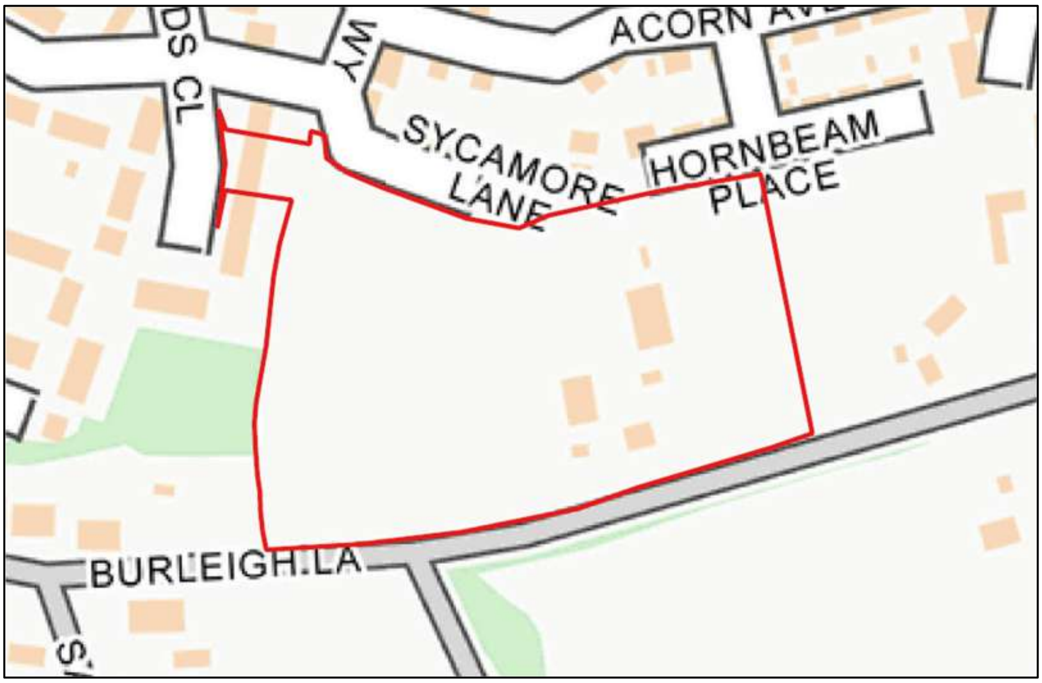

Figure 2-1 – Location map (contains Ordnance Survey data © Crown copyright and database right 2025).

The site plan included in Appendix A.1 of this report provides more detail in relation to the site location and layout.

2.2 Proposed Development

The proposals for development comprise the development of 48no. dwellings and associated green spaces (Figure 2-2).

Figure 2-2 – Proposed site layout.

Drawings of the proposed scheme are included in Appendix A.1 of this report.

2.3 Planning Context

The National Planning Policy Framework (NPPF) requires the Sequential Test to be applied at all stages of the planning process and generally the starting point is the Environment Agency's (EA) 'Flood Map for Planning' (Figure 2-3). These maps and the associated information are intended for guidance and cannot provide details for individual properties. They do not take into account other considerations such as existing flood defences, alternative flooding mechanisms and detailed site-based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any particular area of the country. The Flood Zones are classified as follows:

Zone 1 – *Low probability of flooding* – This zone is assessed as having less than a 1 in 1000 annual probability of river or sea flooding in any one year.

Zone 2 – *Medium probability of flooding* – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between 1 in 200 and 1 in 1000 annual probability of sea flooding in any one year.

Zone 3a – *High probability of flooding* - This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding in any one year.

Zone 3b – *The Functional Floodplain* – This zone comprises land where water has to flow or be stored in times of flood and can be defined as land which would flood during an event having an annual probability of 1 in 30 or greater. This zone can also represent areas that are designed to flood in an extreme event as part of a flood alleviation or flood storage scheme.

Figure 2-3 – EA's 'Flood Map for Planning' (© Environment Agency, mapping contains Ordnance Survey Data © Crown copyright and database right 2025).

Figure 2-3 shows the development site is located within Flood Zone 1. However, the NPPF requires a flood risk assessment to be prepared to accompany all planning applications for sites greater than 1 hectare, so that the risk of flooding from other sources such as surface water runoff, overland flow and groundwater flooding can also be appraised. This ensures that the development is not only safe, but that it does not increase flood risk elsewhere. Consequently, appraising the risk from these sources is therefore the primary focus of this document.

2.4 Site Specific Information

Information from a wide range of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

Site specific flood level data provided by the EA – The publicly available 'Risk of Flooding from Surface Water' (RoFSW) GIS dataset has been studied to provide additional information regarding this source of flooding. The EA also confirmed no modelling has been undertaken for the central watercourse.

Information contained within the Strategic Flood Risk Assessment (SFRA) – The Mid Sussex District Council SFRA (2024) contains detailed mapping showing historic flood records for a wide range of sources. This document has been referenced as part of this site-specific FRA.

Information provided by Southern Water – Southern Water has provided the results of an asset location search for the site. The response is included in Appendix A.3.

Site specific topographic surveys – A site-specific topographic survey has been undertaken on site, and this shows that the land levels on site vary between 120m and 128m Above Ordnance

Datum Newlyn (AODN), with land levels falling towards the northern boundary of the site. The below figure has been created using the EA's 1m resolution aerial height data (LiDAR) to highlight the onsite and surrounding land levels.

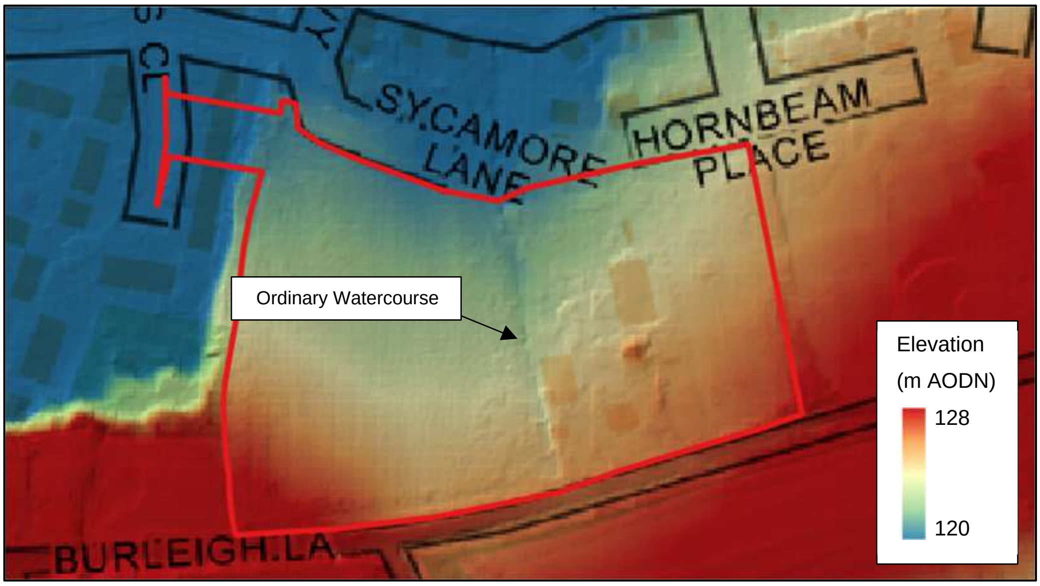

Figure 2-4 – EA's 1m resolution LiDAR data presented over OS Mapping, site boundary in red (© Environment Agency - contains Ordnance Survey data © Crown copyright and database right 2025).

Geology – Reference to the British Geological Survey (BGS) mapping shows that the underlying solid geology in the location of the subject site is predominantly interbedded sandstone and siltstone from the Upper part of the Tunbridge Wells Sands Formation. A layer of Mudstone (also part of the Upper Tunbridge Wells Sands) is mapped crossing the eastern part of the site.

Site specific ground investigations have been undertaken and are included within the Appendix of this report. The geology on site was confirmed by these investigations to be predominantly a sandy clay bedrock Tunbridge Wells Sands.

Historic flooding – No information on historic flooding in this area has been provided or revealed through desktop searches. Furthermore, the EA have confirmed with the following statement: *'We can confirm that we have no record of flooding (from rivers and/or the sea) for this location*.'

3 Climate Change

The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present, and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall could be expected.

These effects will tend to increase the size of Flood Zones associated with rivers, and the amount of flooding experienced from other inland sources. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels. It will also increase the extent of the area at risk should sea defences fail. Changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events are also predicted.

3.1 Planning Horizon

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on the extreme flood level that is commensurate with the planning horizon for the proposed development. The NPPF and supporting Planning Practice Guidance Suite state that residential development should be considered for a minimum of 100 years, but that the lifetime of a non-residential development depends on the characteristics of the development. For commercial development, a 75-year design life is typically assumed. The development that is the subject of this FRA is classified as residential therefore a design life of 100 years has been assumed.

3.2 Potential Changes in Climate

Peak River Flow

Recognising that the impact of climate change will vary across the UK, the allowances show the anticipated changes to peak flow by management catchment. Management catchments are sub-catchments of river basin districts. The proposed development site is covered by the **South East River Basin District**, as defined by the EA 'River Basin District' maps, and is located in the **Medway Management Catchment**, as defined on the EA's 'Peak River Flow' map.

For each Management Catchment, a range of climate change allowances are provided for three different time epochs. For each epoch there are three climate change allowances defined. These represent different levels of statistical confidence in the possible emissions scenarios on which they are calculated. The three levels of allowance are as follows:

- Central: based on the 50th percentile
- Higher Central: based on the 70th percentile
- Upper End: based on the 95th percentile

The EA has provided guidance regarding the application of the climate change allowances and how they should be applied in the planning process. The range of allowance for the Management Catchment in which the development site is located are shown in Table 3.1 below.

Management Catchment Name (River Basin District)	Allowance Category	2020s	2050s	2080s
Medway	Upper End	29%	37%	62%
	Higher Central	19%	21%	37%
	Central	14%	15%	27%

Table 3.1 – Recommended peak river flow allowances for each epoch for the Medway Management Catchment (1981 to 2000 baseline).

Whilst the site is not located within Flood Zone 2 or 3, the climate change allowances in Table 3.1 above for the 2080s epoch have been considered when appraising the risk of flooding from the watercourse in more detail.

Peak Rainfall Intensity

Recognising that the impact of climate change will vary across the UK, the allowances were updated in May 2022 to show the anticipated changes to peak rainfall across a series of management catchments. The proposed development site is located in the **Medway Management Catchment**, as defined by the 'Peak Rainfall Allowance' maps, hosted by the Department for Environment, Food and Rural Affairs. Guidance provided by the EA states that this mapping should be used for site-scale applications (e.g. drainage design), in small catchments (less than 5km^2), or urbanised drainage catchments. For large rural catchments, the peak river flow allowances should be used.

The proposed development will include a surface water management strategy and the Peak Rainfall Allowances for the Medway Management Catchment should be applied to the hydraulic calculations undertaken as part of this.

For each Management Catchment, a range of climate change allowances are provided for two time epochs and for each epoch, there are two climate change allowances defined. These represent different levels of statistical confidence in the possible scenarios on which they are calculated. The two levels are as follows:

- Central: based on the 50th percentile
- Upper End: based on the 90th percentile

The EA has provided guidance regarding the application of the climate change allowances and how they should be applied in the planning process. The range of allowances for the Management Catchment in which the development site is located are shown in Table 3.2 below.

Management Catchment Name	Annual exceedance probability	Allowance Category	2050s	2070s
Medway	3.3 %	Central	20%	20%
		Upper End	35%	35%
	1 %	Central	20%	20%
		Upper End	45%	40%

Table 3.2 – Recommended peak rainfall intensity allowances for each epoch for the Medway Management Catchment.

For a development with a design life of 100 years the Upper End climate change allowance is recommended to assess whether:

- there is no increase in flood risk elsewhere, and;
- the development will be safe from surface water flooding.

From Table 3.2 above, it can be seen that the recommended climate change allowance for this site is a 45% increase in peak rainfall. Therefore, this increase has been applied to the hydraulic drainage model constructed to inform the surface water management strategy. Where this allowance has been applied the abbreviation "+45%cc" has been used.

4 Potential Sources of Flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table 4.1 at the end of this section summarises the risks associated with each of the sources of flooding.

4.1 Flooding from Rivers, Ordinary or Man-Made Watercourses

Although this site is located within Flood Zone 1, an Ordinary Watercourse runs through the centre of the site. The EA have not undertaken modelling for this watercourse, due to the scale of the feature not being a Main River. Nonetheless, as a precautionary approach within this FRA, the risk of flooding from the watercourse has been appraised in more detail in the following paragraphs.

In this case, a basic hydrological analysis has been undertaken to determine the flow generated by the catchment which drains towards the site. Using 1m aerial height data, a catchment delineation has been undertaken which yields a total catchment of approximately 0.06km^2. This is considered to be relatively small and therefore, point data has been obtained from the Flood Estimation Web service as catchment descriptors are only available for catchments greater than 0.5km^2.

To obtain estimates of peak flows from the catchment for a range of return periods, the point data has been put into a rainfall runoff modelling software (i.e. ReFH2.3) and the plot-scale equations have been used. The rainfall runoff method was considered appropriate as the catchment is considered to be predominantly rural and the BFIHOST19 was 0.398 which is considered to be representative of a more impermeable catchment. The catchment outputs for a range of return periods have been included in Appendix A.2.

Once the hydrological estimates were complete, the manning's *n* open channel equation has been used to determine whether the central channel is of sufficient capacity to convey the flows generated by the catchment. A survey of the watercourse was undertaken to help identify the channel banks and depths, as well as the wider characteristics of the channel through the site. The full site topographic and watercourse survey is included within Appendix A.1.

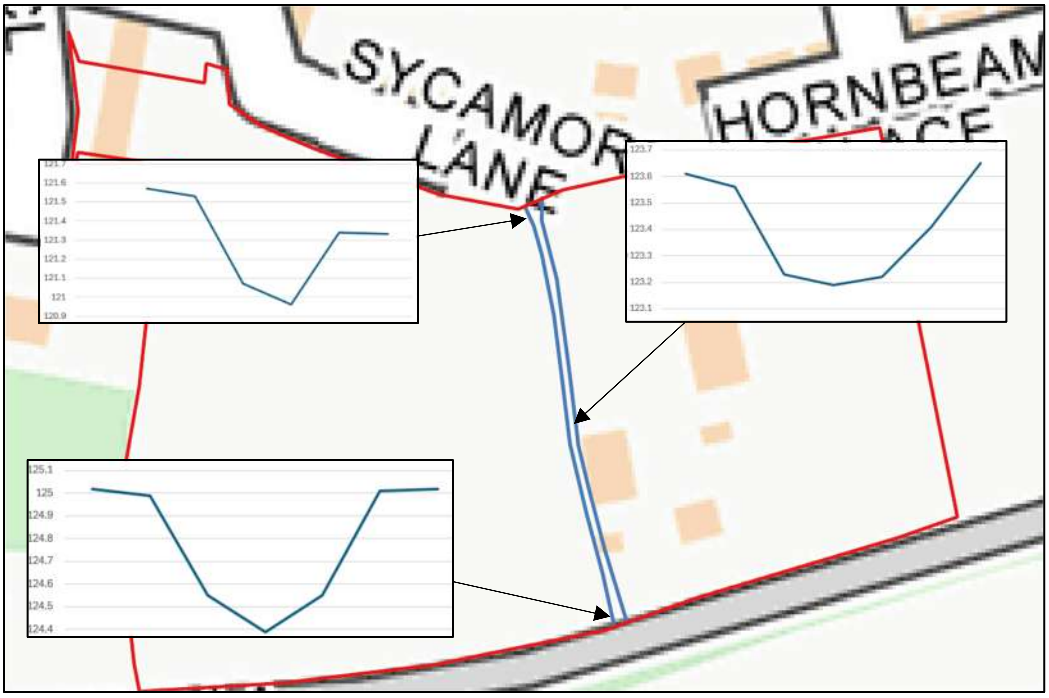

Figure 4-1 – Spatial mapping of the undertaken watercourse survey locations and recorded channel cross-sections (contains Ordnance Survey data © Crown copyright and database right 2025).

To account for the impacts of climate change as outlined in Section 3.2, the peak flow obtained for the 1 in 100 year return period has been multiplied by 1.27 to represent an increase in peak river flow of 27%.

Inspection of the results shows that the ditch has sufficient capacity to contain the expected volumes of water from the catchment, up to and including the design flood event (see Section 3.2). Even if an increase of the manning's n roughness coefficient of 20% is applied, water is not expected to encroach onto the site under design event conditions.

Whilst the ditch is shown to have sufficient capacity, inflows from the area to the south of the site are limited by an existing pipe. Further review of the pipe dimension and estimated gradient would suggest that the pipe can facilitate flows up to the 1 in 2 year return period. However, for any greater events, the pipe is likely to become surcharged, resulting in water to back up to the south of the Burleigh Lane road. Once the backed up water reaches the road level, water could flow over the road and into the site where it is captured by the existing channel. Consequently, the risk of flooding to the site is considered to remain low. Nevertheless, a precautionary approach has been adopted, and the flood mechanism has been considered further as part of the flood mitigation measures.

4.2 Flooding from the Sea

The site is located a significant distance inland and is elevated well above predicted extreme tide levels. Consequently, the risk of flooding from this source is considered to be low.

4.3 *Flooding from Surface Water*

Surface water, or overland flooding, typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This mechanism of flooding can occur almost anywhere but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions. The EA's 'Flood Risk from Surface Water' map (Figure 4.2) shows that the entire site is shown to be situated in an area mostly at 'very low' risk of flooding from surface water.

Parts of the central area are shown to be at 'low' to 'medium' risk of flooding, however, the extent is limited to the central watercourse channel. The modelling undertaken to derive the maps represents the central watercourse as a dry ditch and therefore, when an extreme rainfall event is applied to the model, the model shows water to accumulate within these ditches without accounting for any potential flows. Notwithstanding this, inspection of the site survey has identified that the ditches are approximately 0.5m deep. Consequently, following an extreme rainfall event, water would have to rise by over 0.5m before exceeding the bank heights.

Probability of Flooding

High – Extent of flooding from surface water that has a 3.3% (1 in 30) or greater chance of happening each year.

Medium - Extent of flooding from surface water that has between a 3.3% (1 in 30) and 1% (1 in 100) chance of happening each year.

Low - Extent of flooding from surface water that has between a 1% (1 in 100) and 0.1% (1 in 1000) chance of happening each year.

Location of Development Site

Figure 4-2 – EA's 'Flood Risk from Surface Water' map (© Environment Agency, mapping contains Ordnance Survey Data © Crown copyright and database right 2025).

When the impact of climate change is also considered, the extent of surface water flooding on site remains confined to the watercourse. The same explanation is therefore applied for this scenario too, whereby the mapping assumes the feature is static and would allow surface water to accumulate within the channel. In addition, the more detailed review undertaken in Section 4.1 concludes that the channel is of sufficient capacity to convey surface water runoff from the surrounding area. Consequently, the overall risk of flooding from this source is considered to be *low.*

Furthermore, it is recognised that a sustainable drainage system is proposed to be included within the design of the scheme, to ensure that surface water runoff is managed appropriately and does not increase the risk of flooding to the existing development to the north. Consequently, the risk of flooding to the site and surrounding area from this source will not increase as a result of the proposed development.

4.4 *Flooding from Groundwater*

Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year).

Site specific ground investigations have been undertaken and encountered a geology of Upper Tunbridge Wells Sand (to depths of 4.0mbgl) with a thin overlying layer of topsoil. The composition of this strata was identified as sandy, silty clay, which is not typically associated with groundwater flooding. The deepest boreholes, undertaken to depths of 4m below the ground level, did not encounter groundwater.

Mapping on groundwater emergence provided as part of the Defra Groundwater Flood Scoping Study (May 2004) shows that no groundwater flooding events were recorded during the very wet periods of 2000/01 or 2002/03.

As a result, based on the geology and historic flooding data, the risk of flooding from groundwater is considered to be *low*.

4.5 *Flooding from Sewers*

In urban areas, rainwater is typically drained into surface water sewers or sewers containing both surface and wastewater known as "combined sewers". Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

Inspection of the asset location mapping provided by Southern Water (Figure 4-3) identifies that the sewers in this area are foul only.

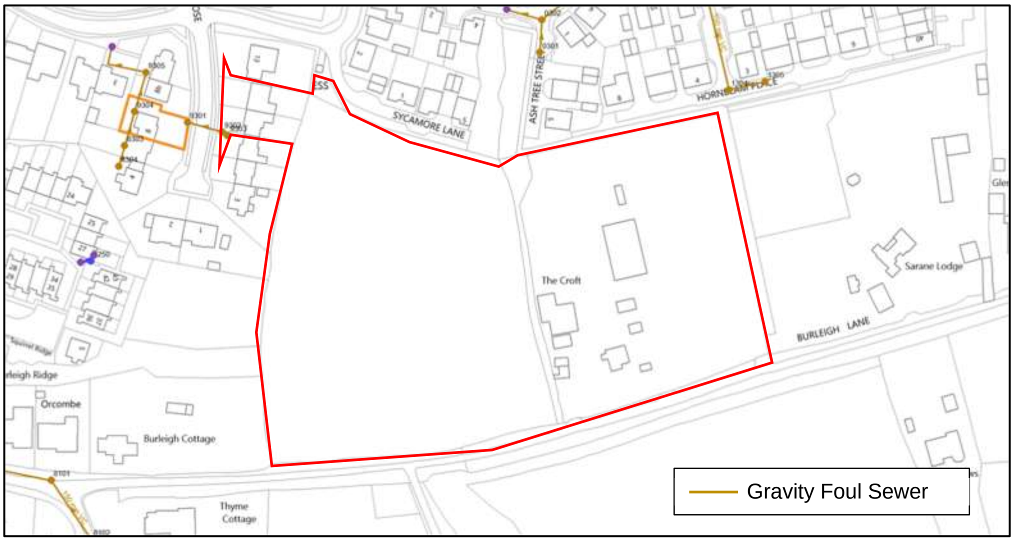

Figure 4-3 - Asset location mapping provided by Southern Water (a full-scale copy can be found in Appendix A.3).

A gravity foul sewer can be seen at the northwest entrance into the site; however, this manhole is located at the start of the network, reducing the potential volume of water which could surcharge. Furthermore, there are no known records of flooding from sewers in this area. As shown in Figure 2.4, the topography of the land within the site and the surrounding area suggests that any above ground flooding that might occur as a result of a surcharged sewer would not pond at the site and continue to flow north away from the development. The risk of flooding from this source is therefore considered to be low.

As a precautionary measure, it is also recommended that new sewers are fitted with non-return valves to help prevent the backflow of water into the new dwellings, helping to maintain low risk post development.

4.6 *Flooding from Reservoirs, Canals and Other Artificial Sources*

Non-natural or artificial sources of flooding can include reservoirs, canals, and lakes, where water is retained above natural ground level. In addition, operational and redundant industrial processes including mining, quarrying, and sand or gravel extraction, may also increase the depth of floodwater in areas adjacent to these features.

The potential effects of flood risk management infrastructure and other structures also needs to be considered. For example, reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

Inspection of the OS mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the EA's 'Flood Risk from Reservoirs' map shows that the site is not within an area considered to be at risk of flooding from reservoirs. Therefore, the risk of flooding from this source is considered to be *low.*

4.7 Summary of Flood Risk

A summary of the overall risk of flooding from each source is provided in Table 4.1 below.

Source of Flooding	Initial Level of Risk	Appraisal method applied at the initial flood risk assessment stage
Rivers, Ordinary and Man-Made Watercourses	Low	OS mapping, aerial height data and undertaken site-specific hydraulic modelling.
Sea	Low	OS mapping and the EA's 'Flood Map for Planning'
Surface Water	Low	EA's 'Flood Risk from Surface Water' map, and historic records contained within the SFRA, aerial height data, OS mapping and site-specific topographic survey
Groundwater	Low	BGS groundwater flood hazard maps, Defra Groundwater Flood Scoping Study, site-specific geological data, aerial height data, OS mapping, site-specific topographic survey and BGS Borehole survey records.
Sewers	Low	Aerial height data, OS mapping, site-specific topographic survey, asset location data provided by Southern Water and historic sewer records contained within the SFRA
Artificial Sources	Low	OS mapping and EA's 'Flood Risk from Reservoirs' map

Table 4.1 – Summary of flood sources and risks.

In summary, the risk of flooding from all the above sources is considered to be low. Nonetheless, as the proposed scheme comprises residential development, mitigation measures have been recommended. Section 6 explains these measures in further detail.

5 Offsite Impacts and Other Considerations

5.1 Displacement of Floodwater

The construction of a new building(s) within the floodplain has the potential to displace water and to increase the risk elsewhere by raising flood levels. A compensatory flood storage scheme can be used to mitigate this impact, ensuring the volume of water displaced is minimised.

The proposed development has been shown to remain unaffected under design flood conditions and is not at significant risk of flooding from any source. Consequently, the development will not displace floodwater, and compensatory flood storage will not be necessary.

5.2 Public Safety and Access

The NPPF states that safe access and escape should be available to/from new developments located within areas at risk of flooding. The Practice Guide goes on to state that access routes should enable occupants to safely access and exit their dwellings during design flood conditions and that vehicular access should be available to allow the emergency services to safely reach the development.

The risk of flooding from all sources has been shown to be *low*. Consequently, safe access/egress to/from the proposed site can be achieved and, on both foot, and by vehicle. Furthermore, mitigation measures have been recommended in Section 6 to help keep the residents of the site informed of any extreme rainfall events. During times of heightened rainfall, it is recommended that residents avoid the southern footpath away from the site as the offsite southern ditch has not been surveyed as part of this assessment and the risks are unknown. However, safe access to and from the site is still achievable to the north and around the site itself.

5.3 Proximity to Watercourse

An Ordinary Watercourse is any ditch, stream or similar that is not designated as a Main River. Works affecting an Ordinary Watercourse require permission from the Lead Local Flood Authority which for Mid Sussex is West Sussex County Council.

All Ordinary Watercourse Consent applications are now managed directly by West Sussex County Council. Guidance and access to the application form is available on the below page: Ordinary watercourse land drainage consent - West Sussex County Council . As the proposed layout scheme includes a bridge over the watercourse, it is required for the development to obtain the Ordinary Watercourse Consent. Furthermore, as a precautionary measure, a 4m buffer from the Ordinary Watercourse has been given to all development as part of the proposed scheme.

6 Flood Mitigation Measures

Whilst the overall risk of flooding to the site is low, the sequential approach has been applied where possible. For example, no dwellings have been proposed within 4m of the watercourse, and outside the modelled extent of surface water flooding.

Given the previously mentioned risk from offsite overflow north of Burleigh Lane, it is recommended that the southernmost dwellings floor levels are raised to 100mm above the land level of the adjacent Burleigh Lane. This will provide precautionary protection to the residents of these dwellings, in the event that water does breach the road level and flow north from the southern ditch offsite.

In addition, the land within the 4m buffer within the southern section of the watercourse is to remain sloping gradually down towards the watercourse, to help provide further protection to the nearest dwellings, should the flows offsite breach the site boundary and flow into the watercourse.

Although the risk of flooding has been concluded to be low, the likelihood of an extreme weather event is always possible. As such, examples of flood resilience measures which may be appropriate for the development site include (but are not limited to) the following:

- Raising floor slab level further.
- Bringing the electrical supply in at first floor.
- Placing boilers and meter cupboards on the first floor.
- Water-resistant plaster/tiles on the walls of the ground floor.
- Solid stone or concrete floors with no voids underneath.
- Covers for doors and airbricks.
- Non-return valves on new plumbing works.
- Avoidance of studwork partitions on the ground floor.

Details of flood resilience and flood resistance construction techniques can be found in the document '*Improving the Flood Performance of New Buildings; Flood Resilient Construction'*, which can be downloaded from www.gov.uk.

A Code of Practice (CoP) for Property Flood Resilience (PFR) has been put in place to provide a standardised approach for the delivery and management of PFR. Further information on the CoP and guidance on how to make a property more flood resilient can be accessed, and downloaded, from the Construction Industry Research and Information Association (CIRIA) Website: https://www.ciria.org/Resources/Free_publications/CoP_for_PFR_resource.aspx

Finally, as inspection of the EA's 'Flood Risk from Surface Water' map (Figure 4-2) suggests that the wider area to the north could experience surface water flooding following an extreme weather event. Occupants of the dwellings are therefore recommended to monitor the Met Office's Weather Warnings to provide forewarning of weather conditions which could result in surface water flooding offsite: www.metoffice.gov.uk/weather/uk/uk_forecast_warnings.html.

7 Existing Drainage

7.1 Existing Surface Water Drainage

The existing site is assumed to drain informally, with rain landing on the site running off the surface into the watercourse which passes through the site. A water course bisects the site into two distinct drainage catchments, the greenfield runoff rates have been calculated for the West and East catchments either side of the watercourse.

Due to the gradient of the site sloping into the watercourse, an area of the site has been excluded from the drainage assessment and hydraulic drainage calculations. It is assumed that runoff falling in this area will flow directly into the watercourse at an unattenuated rate as it does currently. Figure 7.1 below shows the approximate area excluded from the drainage assessment. It should be accouraged that this area is entirely greenfield pre and post development and is located topographically lower than any of the proposed SuDS (discussed below).

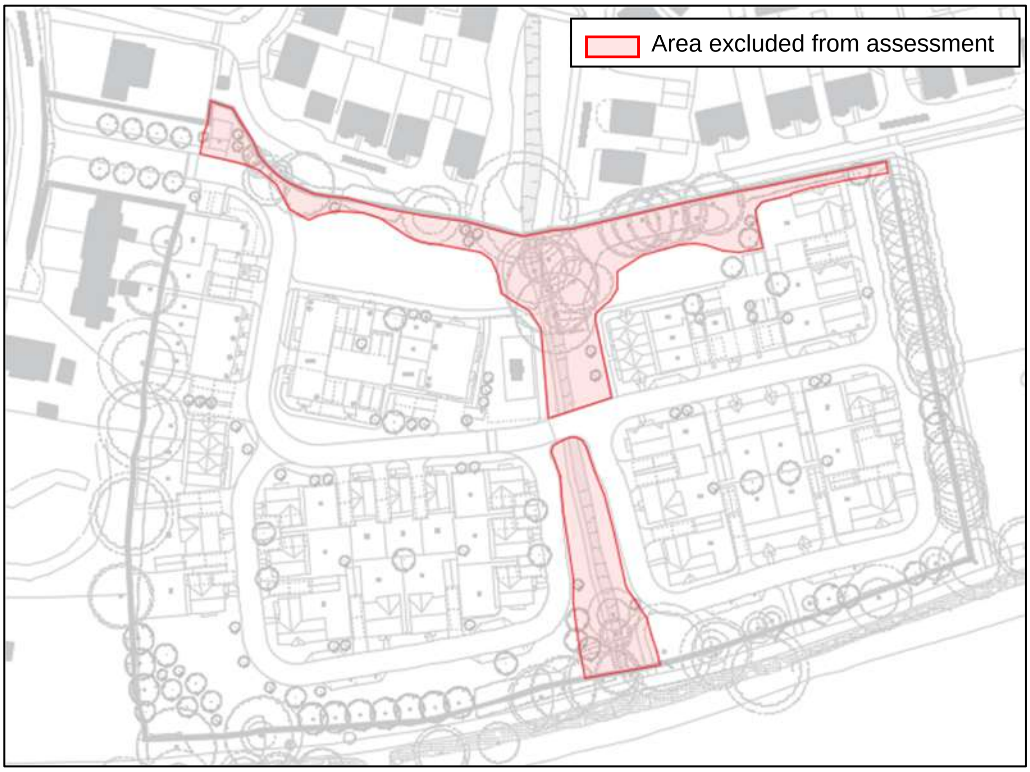

Figure 7.1 – Area excluded from (greenfield and post development calculations).

Greenfield runoff rates for area considered in the drainage assessment have been calculated using the FEH statistical methodology and are outlined in Table 7.1 below. The online HR Wallingford Greenfield runoff rate estimation calculator has been used to calculate these pre-development runoff rates and a copy of the results from this analysis are included in the appendix.

Return Period (years)	Peak greenfield runoff from the existing West catchment (l/s)	Peak greenfield runoff from the existing East catchment (l/s)
1	7.6	4.4
Qbar	8.9	5.2
30	20.4	12
100	28.3	16.6

Table 7.1 – Summary of peak greenfield runoff rates for the existing site.

Southern Water has provided sewer mapping as part of their asset location data for the site and surrounding area. An extract of this mapping is provided in Figure 4-3 above and shows the location of the foul sewers near the site. From this mapping it can be decerned that no sewers currently serve the development site.

8 Sustainable Drainage Assessment

8.1 Site Characteristics

The important characteristics of the site, which have the potential to influence the surface water drainage strategy, are summarised in Table 8.1 below.

Site Characteristic	**Development Site**	
Total area of site	~2.3 ha	
Area assessed in drainage assessment	~2.0 ha	
Current site condition	Mostly greenfield. Site contains some small buildings and an access track.	
	West Catchment	East Catchment
Greenfield runoff rates (based on the FEH statistical methodology)	1:1 yr = 7.6 l/s Qbar = 8.9 l/s 1:30 yr = 20.4 l/s 1:100 yr = 28.3 l/s	1:1 yr = 4.4 l/s Qbar = 5.2 l/s 1:30 yr = 12 l/s 1:100 yr = 16.6 l/s
Infiltration	Negligible (confirmed from site specific infiltration testing)	
Current surface water discharge method	Assumed to drain unattenuated into watercourse which bisects the site	
Is there a watercourse nearby?	Yes (Unnamed watercourse, tributary of the River Medway)	
Impermeable area	**Existing** **~550 m^2**	**Proposed** **~ 1 ha**

Table 8.1 – *Site characteristics affecting rainfall runoff.*

Reference to the tables above show the proposed development will increase the percentage of impermeable area within the boundaries of the site. Consequently, this will increase the rate and volume of surface water runoff discharged from the site. It will therefore be necessary to provide mitigation measures to ensure the rate of runoff discharged from the site is not increased as a result of the proposed development.

Furthermore, the potential use of SuDS within the proposed development will be considered to assess the practicality of better replicating greenfield behaviour, in accordance with Local Planning Policy, and S3 and S5 of the NTSS.

8.2 Opportunities to Discharge Surface Water Runoff

Part H of the Building Regulations summarises a hierarchy of options for discharging surface water runoff from developments. The preferred option is to **infiltrate** water into the ground, as this deals with the water at source and serves to replenish groundwater. If this option is not viable, the next option is for the runoff to be discharged into a **watercourse**. The water should only be conducted into the **public sewer** system if neither of the previous options are possible.

The following opportunities for managing the surface water runoff discharged from the development site are listed in order of preference:

Water Re-Use – Water re-use systems should ideally be considered to reduce the reliance on the demand for potable water. However, such systems can rarely manage 100% of the surface water runoff discharged from a development, as this requires the yield from the building and hardstanding area to balance perfectly with the demand from the proposed development. Consequently, whilst rainwater recycling systems can be considered for inclusion within the scheme, an alternative solution for attenuating storm water will still be required.

Infiltration – The soil and underlying geology of the site is made up of sandy silty clay from the Upper Tunbridge Wells Sand bedrock. Site specific ground investigations have been undertaken at the site, which found that the soils and geology at the site has negligible infiltration. Consequently, infiltration will not be a suitable method for discharging surface water runoff from the site and this option has therefore been discounted.

Discharge to Watercourses – There is a watercourse which passes through the site and as a result a direct connection to this watercourse will be possible. Consequently, a connection to this watercourse is likely to be the most sustainable solution for draining surface water runoff from the proposed development.

Discharge to Public Sewer System – A public sewer runs along Woodlands Cresent, near the proposed entrance to the site, and along Ash Tree Street to the north of the site. These sewers and could be used to drain surface water runoff from the development if no alternative solution was available. As a more sustainable option to discharge surface water is available at this site (connection to a watercourse), discharge to the public sewer system will not be required and this option has therefore been discounted.

8.3 Constraints and Further Considerations

The key constraints that are relevant to this development are listed below:

- Due to the gradient across the site, it may be necessary to incorporate check dams within the sub-base of any permeable paving systems, or swales.

- If connections to the watercourse crossing the site are to be constructed, it will be necessary to obtain ordinary watercourse consent from the LLFA before construction can commence.

- Flood risk from the watercourse should be considered as a constraint for the SuDS design with SuDS ideally located outside of the extent of flooding expected should the watercourse overflow during the design pluvial / fluvial flood event.

- SuDS should be designed to provide additional benefits to water quality, local biodiversity, and the sites amenity space in accordance with best practice guidance (C753) and the 4 Pillars of SuDS design.

8.4 Proposed Surface Water Management Strategy

The drainage strategy set out below discusses each of the different elements of the proposed scheme, along with the results from a hydraulic drainage model constructed for the site, which can be used to demonstrate how the overall objectives can be achieved. This does not represent a detailed surface water drainage design; it is simply an assessment to demonstrate that the objectives and requirements of the NPPF and NTSS can be met at the planning stage.

Water Butts

To reduce the developments reliance on potable water supplies for external use, there is the potential to incorporate water butts within the rear garden areas. Typical sizes and dimensions of water butts are outlined below.

Typical house water butt options	Dimensions of a typical house water butt	Volume of storage provided (litres)
Type 1 (wall mounted – small)	1.22m high x 0.46m x 0.23m	100
Type 2 (standard house water butt)	0.9m high x 0.68m diameter	210
Type 3 (large house water butt)	1.26m high x 1.24m x 0.8m	510
Type 4 (column tank – very large)	2.23m high x 1.28m diameter	2,000

Table 8.2 – *Estimated storage capacity of available water butts.*

In this case, the demand for potable water from each of the gardens is likely to be relatively small and as a result, either; standard house water butts (~210 litre) or small wall mounted water butts (~100 litre) are likely to be the most appropriate size for inclusion within the scheme.

It is recognised that each of the water butts will need to overflow into the main drainage system for the site, to ensure that in the event the water butt is full prior to the onset of the design rainfall event, water can be discharged away from the properties without increasing the risk of flooding.

Permeable Surfacing

Rain landing on the hardstanding surfaces across the site, and directed off the roofs of buildings via underground pipes will drain into a layer of geocellular storage crates, located beneath permeable surfacing. This permeable surfacing will be used for the hardstanding across the site and should if possible, extend to the private driveways and patios etc, nonetheless for these calculations the extent of permeable surfacing has been restricted to the main access roads.

The subbase of the paving will comprise a crate based system to provide a significant volume of storage within the sub-base layer. The rate at which runoff is permitted to exit the permeable surfacing system will be restricted through the use of an orifice plate. Due to the slope of the site, it has been assumed that only half of the permeable paving is available to store runoff. A summary of the Causeway Flow+ analysis for permeable surfacing is shown in Table 8.3 below.

Parameter	**Value (1:100yr+45%cc event)**	
SuDS	West Catchment Permeable Surfacing	East Catchment Permeable Surfacing
Total area draining to permeable surfacing including a 10% allowance for urban creep	~ 6700 m^2	~ 4546 m^2
Area of permeable surfacing	~ 2000 m^2	~ 1364 m^2
Infiltration	Negligible	
Sub-base depth	0.75 m	
Porosity	0.95	
Flow control device	86 mm orifice plate	61 mm orifice plate
Critical storm duration	1440 minutes	
Overflow device	Pipe *Connects directly to the attenuation basins*	

Table 8.3 – *Summary of permeable surfacing SuDS.*

Attenuation Basin(s)

Surface water runoff from each part of the permeable surfacing systems will be discharged into 2 attenuation basins where it will be stored and discharged into the watercourse. These basins will provide additional storage for stormwater before it is discharged to the watercourse. The rate at which runoff is discharged from the attenuation basin to the watercourse will be restricted to Qbar, using a vortex flow control device (e.g., hydro-brake or similar).

The basin area will contain a wide variety of additional features in order to provide additional benefits these will include but are not limited to:

- Ponds and depressions could be used to capture silt and contaminants as they enter the basin area via the inlets from the permeable paving system. These natural sediment traps will minimise maintenance requirements by reducing the spread of silt across the entire basin area.

- Vegetated channels conveying small volumes of runoff from the inlets directly to the outlet and flow control device (low flow channels). This approach will minimise the risk of unwanted scour and channelling within the pond area.
- Boundary planting to restrict and limit public access to the basins.

The Causeway Flow+ calculations for the basins are summarised in Table 8.4.

Parameter	**Value (1:100yr+45%cc event)**	
SuDS	West Catchment Attenuation Basin	East Catchment Attenuation Basin
Total area draining to permeable surfacing including a 10% allowance for urban creep	~ 6700 m^2	~ 4546 m^2
Top area of basin	~ 446 m^2	~ 216 m^2
Depth	1.3 m	1.49 m
Side slopes	1:3	
Limiting discharge rate	8.9 l/s	5.2 l/s
Infiltration	Negligible	
Flow control device	Hydro-brake	
Critical storm duration	2160 minutes	
Overflow device	Overflow channel and weir *Flows directly watercourse*	

Table 8.4 – *Summary of attenuation basin SuDS.*

Runoff rates for the pre and post development situation have been calculated for a range of annual return probabilities, including the 100-year return period event with a 45% increase in rainfall intensity, to account for future climatic changes. These values are summarised below in Table 8.5 for a range of return periods.

Return Period	Greenfield Runoff Rate		Proposed Runoff Rate	
	West Catchment (l/s)	**East Catchment (l/s)**	**West Basin (l/s)**	**East Basin (l/s)**
1 in 1 yr	7.6	4.4	3.7	2.2
QBar/1 in 2yr	8.9	5.2	4.4	2.6
1 in 30yr	20.4	12	7.2	4.0
1 in 30yr +45%cc	*20.4*	*12*	8.7	4.9
1 in 100yr	28.3	16.6	8.5	4.8
1 in 100yr +45%cc	*28.3*	*16.6*	8.9	5.1

Table 8.5 – *Summary of peak discharge rates for a range of return period events.*

From the data included in Table 8.5 above It is evident that with the inclusion of the proposed storage in the SuDS, there is the potential to accommodate all the surface water runoff from the site, up to and including, the design rainfall event and ensure that runoff is attenuated to rates comparable with the greenfield 1:2 year return period event. This reduction in discharge rates for all rainfall events up to and including the design event will reduce the risk of off-site flooding. In addition to storing surface water runoff, the proposed drainage basins will act as natural filters, helping to remove pollutants before the water is discharged into the watercourse. The basins will also enhance biodiversity by creating habitats for local wildlife. As a result, it is concluded that runoff can be managed sustainably in accordance with the requirements of the NTSS.

8.5 Indicative Drainage Layout Plan

Figure 8.1 below is an indicative drainage layout plan delineating how the proposed SuDS can be incorporated into the scheme proposals.

Figure 8.1 - Indicative drainage layout plan showing the proposed location of SuDS.

A full-scale copy of this layout is located in Appendix A.5 of this report.

8.6 Management and Maintenance

For any surface water drainage system to operate as originally designed, it is necessary to ensure that it is adequately maintained throughout its lifetime. Therefore, over the lifetime of a development there is a possibility that the performance of the system could be reduced or could fail if it is not correctly maintained. This is even more important when SuDS form a part of the surface water management system, as these require a more onerous maintenance regime than a typical piped network.

The key requirements of any management regime are routine inspection and maintenance. When the development is taken forward to the detailed design stage, an 'owner's manual' will need to be prepared. This should include:

- A description of the drainage scheme.
- A location plan showing all of the SuDS and equipment, such as flow control devices etc.
- Maintenance requirements for each element, including any manufacturer-specific requirements.
- An explanation of the consequences of not carrying out the specified maintenance.
- Details of who will be responsible for the ongoing maintenance of the drainage system.

For the SuDS recommended by this assessment, the most obvious maintenance tasks will be cleaning and removal of litter (leaves and debris) from the surface of the permeable surfacing and general landscaping, desilting, and vegetation management of the drainage basin(s). General maintenance schedules for water butts, ponds, basins, and permeable surfacing have been included within the appendices of this report, which demonstrate the maintenance requirements of the proposed SuDS.

For the communal SuDS (Permeable surfacing and Basins) it is likely that the management company responsible for maintaining the rest of the site will be tasked with the inspection and maintenance of these features. In addition, the regular inspection and desilting of the flow control devices and manholes will need to be carried out and may require specialist contractors or technical staff trained in the operation of the proposed flow control devices.

Further details of the maintenance and management strategy should be confirmed, following the completion of a detailed drainage design for the development.

8.7 Sensitivity Testing and Residual Risk

When considering residual risk, it is necessary to consider the impact of a flood event that exceeds the design event, or the implications if the proposed drainage system was to become blocked.

For the water butts there is the potential for a small amount of localised flooding to occur if the overflows from these features were to become blocked. Given the small catchment area draining to each of these features, the volume of floodwater will be relatively small, and it is unlikely to present a risk to the properties or occupants.

For the site as a whole, if flooding was to occur as a result of an extreme rainfall event or if the drainage system becomes blocked, most of the site runoff will flow towards the watercourse in the middle of the site, as indicated by the exceedance flow plan in the figure below. A small part of the west catchment will flow towards the entrance of the site and onto the road however, it is likely that runoff draining from this area would be intercepted by the highway drainage for the adjacent area.

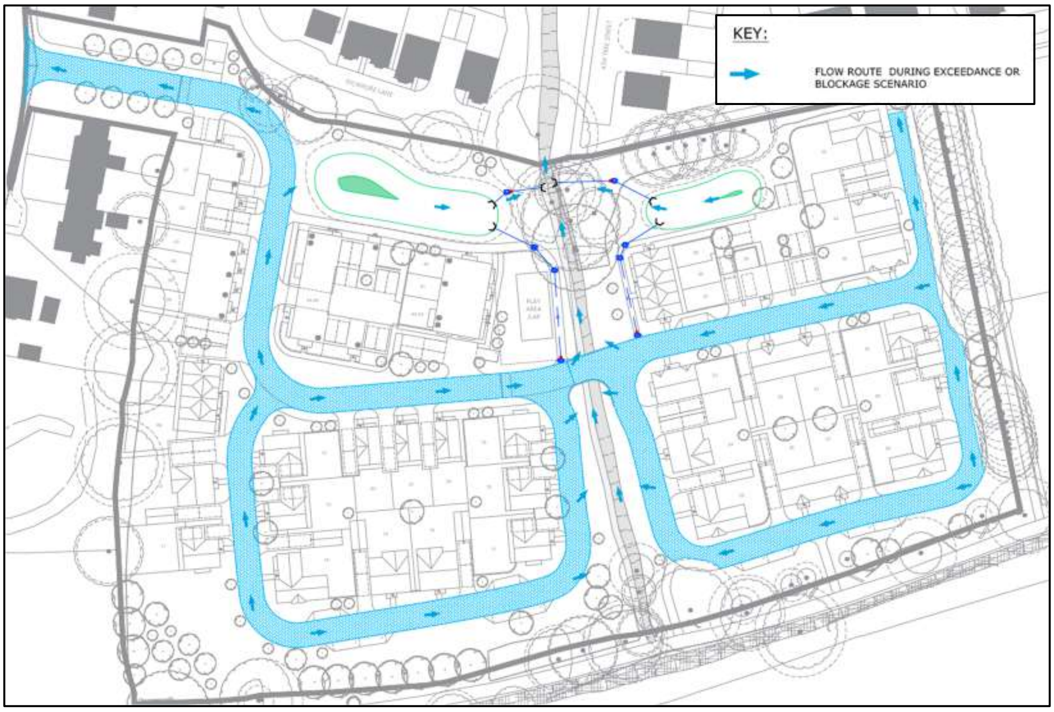

Figure 8.2. Exceedance flow plan.

To minimise the risk of the uncontrolled discharge of floodwater from the permeable surfacing system, an overflow pipe can be incorporated into the design of this drainage feature. If the primary flow control device becomes blocked, this pipe will be used to bypass the flow control device, allowing excess water to drain directly to the drainage basins at an unattenuated rate.

Each drainage basin has at least 300mm freeboard incorporated into the design, so if there is an extreme rainfall event there will be some extra storage space within the basins before they overtop. If the outlet from the basin(s) was to become blocked, water would overtop the bank and flow over the bank into the water course. A weir and overflow channel can be used to ensure that this runoff is directed safely overland into the watercourse although informal discharge is still likely in the areas where water would pass through the existing trees adjacent to the watercourse. Scour protection is recommended for all overflow control structurers to prevent potential erosion to the banks of the SuDS features.

Based on the analysis above it is therefore concluded that the proposed drainage system outlined within this strategy will not result in an increased risk of flooding to properties at the site or within the surrounding area.

9 Foul Water Management Strategy

9.1 Background

The objective of this foul water drainage strategy is to ensure a viable solution is available for managing foul effluent discharged from the proposed development site.

In general, there are two methods for draining effluent from proposed developments. The preferred solution is a connection to the public sewer network, which is controlled by the sewerage undertaker. Nonetheless, if there are no sewers near to the development site or there are particular reasons why a connection to the public sewer system would not be possible i.e., topography, cost, environmental concerns, then the use of package treatment systems or cesspits is permitted.

The Environment Agency's "Binding Rules" control the use of package treatment systems and require the development to connect to the public sewer system if the site boundary is located within 30m of an existing sewer (plus an additional 30 meters for every proposed unit). In this case, the proposed development, is located within close proximity of a public foul sewer and there is an existing connection. Therefore, the use of package treatment systems is unlikely to be considered appropriate for this development.

9.2 Sewer Connection

As indicated in Figure 4-3, there is an existing public foul sewer near the entrance of the site and a public foul sewer to the north of the site. It is anticipated that the proposed development will connect into the existing sewer network, as shown in Figure 9.1 below. It is proposed that the west catchment will connect into the sewer near the entrance of the site, and the east catchment will connect to the sewer connection to the north of the site.

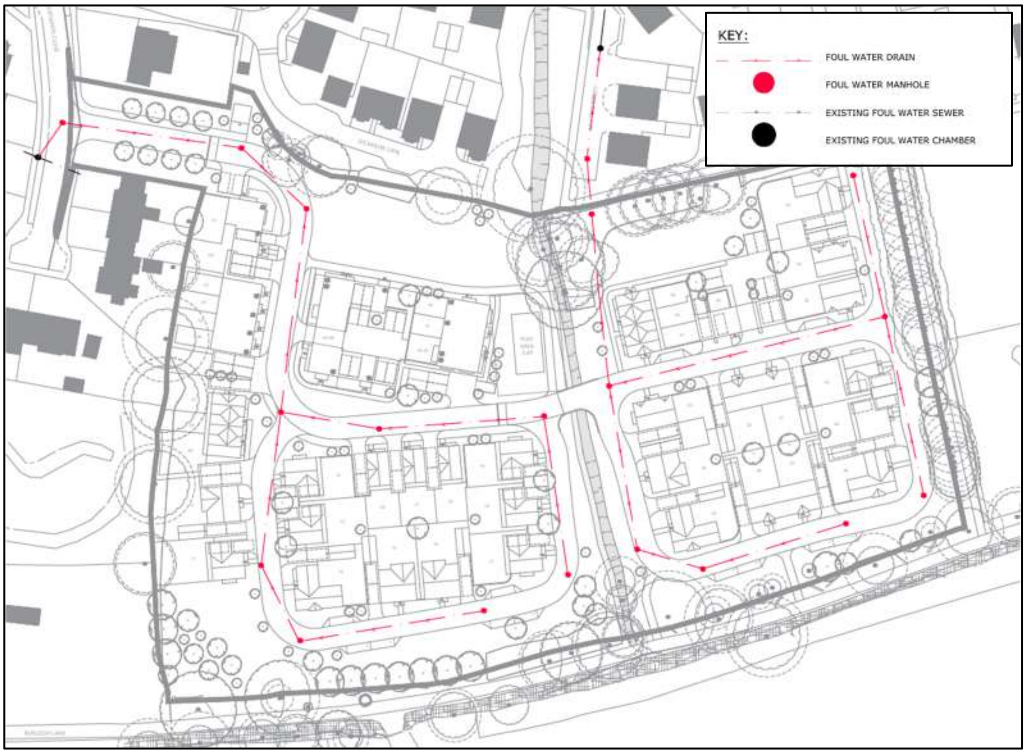

Figure 9.1 - Proposed connection to the foul sewer network.

9.3 The Water Industry Act

The Water Industry Act 1991 provides developers with a mechanism for connecting to the public sewerage infrastructure. The type of connection depends on the type and location of the sewers in relation to the site and third-party land.

As the nearest sewers to the site are located outside of the development site boundary, the developer must requisition a new length of sewer from the sewerage undertaker, through a Section 98 application.

As part of the Section 98 process, it is necessary to determine whether the existing sewer network requires any upgrades to accommodate effluent from the development site. If upgrades to the sewerage system are required these will be requisitioned under the same Section 98 application. In this case, it is likely additional offsite works will be required and these will therefore be included within the Section 98 application. It is acknowledged that the cost of a new connection and any additional works which are required to upgrade the public sewer system (to accommodate the additional foul effluent from the development) can be charged to the developer.

Under Section 101, the sewerage undertaker must undertake any works as part of this process within a reasonable timeframe, which is typically 6 months following the agreement being made. Mitigating circumstances and Grampian planning conditions can, however, result in different timescales.

9.4 Summary

The opportunities for managing foul effluent discharged from the development site have been analysed and it is concluded that two connections to the public sewer system - one near the entrance of the site and the other to the north of the site will be the most viable solution.

Following the award of planning permission, a full detailed design of the site layout and foul drainage system will be required and if necessary, upgrades made to the public sewer system. Notwithstanding this, it is recognised that a solution for managing foul wastewater from the proposed development will be available and the requirements of this foul water management strategy are therefore met.

10 The Sequential and Exception Test

10.1 The Sequential Test

Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for development in or affecting flood risk areas through the application of the Sequential Test. The objectives of this test are to steer new development away from high-risk areas towards those areas at lower risk of flooding. However, in some locations where developable land is in short supply there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that the lower risk sites are developed before the higher risk ones.

This requires a comprehensive knowledge of development sites within the district and is generally applied as part of the Local Plan process. However, when applying the Sequential Test to sites that have not been assessed as part of the Local Plan it is necessary to apply a bespoke test, and the Flood Risk Assessment can help to provide additional evidence to better quantify the true risk of flooding, enabling an informed judgement to be made.

In line with Paragraph 175 of the NPPF, this FRA has demonstrated that all built development is outside of areas at risk of flooding from all sources, both now and in the future when climate change is considered. The Sequential Test is therefore not considered to be required.

10.2 The Exception Test

As the site is situated within Flood Zone 1, the development falls into a classification that does not require the Exception Test to be applied. Notwithstanding this, Paragraph 181 of the NPPF requires all development over 1 hectare in size be subject to a FRA and to meet the requirements for flood risk reduction. This has therefore been the primary focus of this document.

11 Conclusions

The overarching objective of this report is to appraise the risk of flooding at Land Burleigh Lane, Crawley Down to ensure that the proposals for development are acceptable and that any risk of flooding to the occupants of the proposed residential units is appropriately mitigated. In addition, the NPPF also requires the risk of flooding offsite to be managed, to prevent any increase in flood risk as a result of the development proposals. This report has therefore been prepared to appraise the risk of flooding from all sources and to provide a sustainable solution for managing the surface water runoff discharged from the development site, in accordance with the NPPF and local planning policy.

In line with Paragraph 175 of the NPPF, this FRA has demonstrated that all built development is outside of areas at risk of flooding from all sources, both now and in the future when climate change is considered. The Sequential Test is therefore not considered to be required.

The proposed development is situated within Flood Zone 1 and is a development type that is classified as being ‘more vulnerable’. For such a combination of risk and vulnerability, the NPPF does not require the Exception Test to be applied. However, given the size of the development, it has been necessary to examine the impact of all sources of flood risk on the development.

The risk of flooding has therefore been considered across a wide range of sources and it is concluded that the site is not exposed to any significant risks of flooding. However, should water from external sources offsite (un-modelled ditches to the south) flow over the Burleigh Lane Road and onto the site, mitigation measures have been recommended:

- Applying the Sequential Approach by maintaining the 4m buffer from the Ordinary Watercourse
- Raising the floor levels in the southernmost dwellings to that of 100mm more than the Burleigh Lane road surface
- Maintaining a gradual slope towards the Ordinary Watercourse within the 4m buffer land in the southern section of the site
- Flood resistance and resilience measures
- Met Office weather warnings

Furthermore, this FRA has demonstrated that the development will not increase flood risk elsewhere and by incorporating appropriate mitigation measures and SuDS features within the design of the surface water drainage system, it will be possible to limit the impact with respect to surface water runoff.

Section 8 of this report demonstrates how the peak discharge rate from the site can be reduced in line with Local Policies and the NTSS. The preferred solution that has been identified comprises the use of permeable paving and drainage basins, which discharges to the watercourse in a way which mimics the greenfield site conditions.

It is therefore evident from the findings of this appraisal that with the inclusion of the aforementioned SuDS measures the risk of flooding to the site and to the adjacent properties can be further reduced. This report therefore presents a sustainable drainage solution for the development which is both achievable and in line with local policies.

The opportunities for discharging foul effluent from the site have also been considered and the appraisal demonstrates that the most viable solution is to connect into the existing foul sewer network near the entrance to the site and the existing foul sewer to the north of the site.

In conclusion, following the recommendations of this report, the occupants of the development will be safe and the development will not increase the risk of flooding elsewhere. Consequently, it has been demonstrated that the development will therefore meet the requirements of the NPPF.

12 Appendices

Appendix A.1 – Drawings

Appendix A.2 - ReFH 2 Return Period Outputs

Appendix A.3 – Southern Water Asset Location Data

Appendix A.4 – Surface Water Management Calculations

Appendix A.5 – Indicative Drainage Layout

Appendix A.6 – Maintenance Schedules

Appendix A.7 – Site Investigations

Appendix A.8 – Greenfield Runoff Calculations

Appendix A.1 – Drawings

Notes:
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Revisions:

Description:		Date:
A	Amended layout following council meeting & drainage comments	15/01/2025
B	Amended layout following internal review & client comments	31/01/2025
C	Revised layout following updates to tree survey, drainage suds & badger relocation	23/04/2025
D	Revised layout following client comments	08/05/2025
E	Final tweaks to layout before freezing	16/05/2025

LAND NORTH OF

Burleigh Lane
Crawley Down
West Sussex

MERROW WOOD

Drg No	FL24-2191-045
Title	Illustrative Site Layout
Revision	E
Scale at A1	1:500
Status	
Date	Oct 2024

RIBA
Chartered Practice

Title: **Topographic Survey**

Client: Merrow Wood Projects Ltd

Project: Burleigh Lane Return, Woodlands Close,

Date:	13/03/25	Postcode:	RH10 4JZ
Surveyed:	HL	Scale:	1:200 (A1 Sheet)
Drawn:	NF		
Checked:	HL		

Job No:	Sheet:	Rev:
SUMO-19601	01	A

Rev	Notes	Drawn	Date
A	Sections and Culvert information added	SG	01/04

Notes:

Previous Sumo Survey SOR018723 has been inserted into this model for reference.

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GENERAL NOTES

Irrespective of the information provided by a utility survey and statutory plans, excavation work should be undertaken with extreme caution and in accordance with HSE Guidelines - HSG47 Avoiding Danger from Underground Services

Utilities may continue outside of the survey area. Any paint marks outside of the area are for investigative purposes only and may not represent the full extent of the sub-surface utilities.

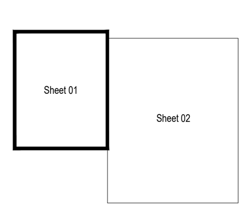
Where logic indicates a utility exists but which cannot be positively confirmed with the technology, an assumed route (ASR) is recorded. All assumed service routes (ASR) have been highlighted with a background yellow colour for visual enhancement.

GPR is utilised across the site in all accessible areas where ground conditions, obstructions allow. Areas of dense vegetation, unclear areas, marsh land, steep banks etc. will not be covered by GPR.

Vertical & Horizontal Position - Vertical position (depth) is indicative to the top of the utility/feature and should not be taken as exact, as this could be the surround to the service rather than the service itself. Where depth information from the technology is unclear, depth is not shown.

Warranty
This drawing does not provide an absolute representation of the sub-surface. Utilities have been detected using non-invasive technologies only and the performance can be adversely affected by ground, weather and site conditions outside of SUMO's control, therefore, some utilities may be undetectable. While SUMO uses reasonable endeavours to detect all utilities, it does not warrant that 100% detection will be achieved and that approximate depth penetration of the technologies SUMO uses will not be greater than two metres.

Sheet Layout



ABBREVIATIONS

ACU	Air Conditioning Unit	FL	Flood Light	SIG	Service in Ground
BB	Belisha Beacon	GV	Gas Valve	SP	Sign Post
B	Bollard	GU	Gully	SC	Stop Cock
BH	Borehole	IC	Inspection Chamber	SV	Sluice Valve
CAB	Cabinet	LB	Lighting Bollard	TP	Telegraph Pole
CL	Cover Level	LP	Lamp Post	TL	Traffic Light
CPS	Concrete Paving Slabs	LIG	Light in Ground	TM	Ticket Machine
CTV	Cable Television	MH	Manhole Cover	VP	Vent Pipe
EVCP	Charging Point	MKR	Marker Post	UV	Unknown Valve
DP	Down Pipe	PB	Post Box	WP	Waste Pipe
EP	Electric Pole	PM	Phone Mast	WM	Water Meter
ER	Earth Rod	P	Post	WV	Water Valve
FFL	Finished Floor Level	RE	Rodding Eye		
FP	Feeder Pillar	RS	Road Sign		
FH	Fire Hydrant	RWP	Rain Water Pipe		

TOPOGRAPHIC LEGEND

Building	Embankment Slope
Bank Bottom	Fence (/)
Bank Top	Heras Fence (/HF/)
Canopy	Kerb Channel
Concrete	Kerb Top
Cover with Chamber Extents	Levels (+ 10.00)
Crash Barrier	Overhead Service
Drainage Channel	Tree
Drop Kerb	Wall
Edge Detail	

Bottom Top

UTILITY LEGEND

BT	British Telecom	GPR	Unknown GPR Target	AREA	Contracted Survey Area		
CATV	Cable Television	GPR	Possible Service (PAS only)	AREA	Previous Survey Area		
CCTV	Closed Circuit Television	HP	Heating Pipes	AREA	GPR Data Collection Area		
C	Unidentified Telecoms	HV	High Voltage Cable	(0.60d)	Depth to Top of Service		
DR	Unidentified Drainage	MS	Multiple Service Route	(~0.60d)	Approximate Depth to Top of Service		
CW	Combined Water	O	Oil Pipeline	(NDA)	No Depth Attainable		
FW	Foul Water	SL	Street Lighting	IL 10.00	Invert Level (Drainage)		
SW	Storm Water	TC	Traffic Controls	PE	Polyethylene Pipe Material		
ER	Earth	U	Unknown Service	UTL	Unable to Lift (Cover)		
E	Electric Cable	UC	Unknown Cable	UTS	Unable to Survey		
ED	Empty Duct	UP	Unknown Pipeline	UTT	Unable to Trace (Service)		
FO	Fibre Optic	W	Water Main	UVI	Unable to Visually Inspect (Within Cover)		
FM	Fire Hydrant Main			WL	Water Level (Within Cover)		
FUEL	Fuel Pipeline			B	Unable to Trace (Due to Blockage)		
G	Gas Pipe			F	Unable to Trace Further		
				E	End of Trace		
				U	Unable to Trace		
				C	Unable to Trace (Capped Port)		

Assumed Service Route highlighted yellow (Example BT) — BT

Anomalous Ground

Unable to Survey

NOT COMMISSIONED

PAS128 SURVEYS

(0.65d B2P) 0.65d = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels	
Quality Level	Definition
D	Undefined (Stats, desktop records search)
B4	Suspected to exist, not detected by GPR or EML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position located by multiple techniques
A	Horizontal and vertical position verified visually of the service

Title: Topographic Survey

Surveyed:	HL	Scale: 1:200 (A0 Sheet)
Drawn:	NF	
Checked:	HL	

Client: Merrow Wood Projects Ltd

Job No: SUMO-19601 | **Sheet:** 2 | **Rev:** A

Rev	Notes	Drawn	Date
A	Sections and Culvert information added	SG	01/04

Notes:

Previous Sumo Survey SOR018723 has been inserted into this model for reference.

Project: Burleigh Lane Return, Woodlands Close

Date: 13/03/25 | **Postcode:** RH10 4JZ

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Utilities may continue outside of the survey area. Any paint marks outside of the area are for investigative purposes only and may not represent the full extent of the sub-surface utilities.

Where logic indicates a utility exists but which cannot be positively confirmed with the technology, an assumed route (ASR) is recorded. All assumed service routes (ASR) have been highlighted with a background yellow colour for visual enhancement.

GPR is utilised across the site in all accessible areas where ground conditions, obstructions allow. Areas of dense vegetation, unclear areas, marsh land, steep banks etc. will not be covered by GPR.

Vertical & Horizontal Position - Vertical position (depth) is indicative to the top of the utility/feature and should not be taken as exact, as this could be the surround to the service rather than the service itself. Where depth information from the technology is unclear, depth is not shown.

Warranty
This drawing does not provide an absolute representation of the sub-surface. Utilities have been detected using non-invasive technologies only and the performance can be adversely affected by ground, weather and site conditions outside of SUMO's control, therefore, some utilities may be undetectable. While SUMO uses reasonable endeavours to detect all utilities, it does not warrant that 100% detection will be achieved and that approximate depth penetration of the technologies SUMO uses will not be greater than two metres.

Sheet Layout

Sheet 01
Sheet 02

ABBREVIATIONS

ACU	Air Conditioning Unit	FL	Flood Light	SIG	Service in Ground
BB	Belisha Beacon	GV	Gas Valve	SP	Sign Post
B	Bollard	GU	Gully	SC	Stop Cock
BH	Borehole	IC	Inspection Chamber	SV	Sluice Valve
CAB	Cabinet	LB	Lighting Bollard	TP	Telegraph Pole
CL	Cover Level	LP	Lamp Post	TL	Traffic Light
CPS	Concrete Paving Slabs	LIG	Light in Ground	TM	Ticket Machine
CTV	Cable Television	MH	Manhole Cover	VP	Vent Pipe
EVCP	Charging Point	MKR	Marker Post	UV	Unknown Valve
DP	Down Pipe	PB	Post Box	WP	Waste Pipe
EP	Electric Pole	PM	Phone Mast	WM	Water Meter
ER	Earth Rod	P	Post	WV	Water Valve
FFL	Finished Floor Level	RE	Rodding Eye		
FP	Feeder Pillar	RS	Road Sign		
FH	Fire Hydrant	RWP	Rain Water Pipe		

TOPOGRAPHIC LEGEND

Building
Bank Bottom
Bank Top
Canopy
Concrete
Cover with Chamber Extents
Crash Barrier
Drainage Channel
Drop Kerb
Edge Detail
Embankment Slope (Bottom, Top)
Fence (/)
Heras Fence (/HF/)
Kerb Channel
Kerb Top
Levels (+ 10.00)
Overhead Service
Tree
Wall

PAS128 SURVEYS

(0.65d B2P) 0.65d = Depth in metres, B2 = Quality Level, P = Post processed GPR

Key to Quality Levels	
Quality Level	Definition
D	Undefined (Stats, desktop records search)
B4	Suspected to exist, not detected by GPR or EML
B3	Horizontal position located by one technique only
B2	Horizontal and vertical position located by one technique only
B1	Horizontal and vertical position located by multiple techniques
A	Horizontal and vertical position verified visually of the service

UTILITY LEGEND

BT	British Telecom	G	Gas Pipe
CATV	Cable Television	GPR	Unknown GPR Target
CCTV	Closed Circuit Television	GPR	Possible Service (PAS only)
C	Unidentified Telecoms	HP	Heating Pipes
DR	Unidentified Drainage	HV	High Voltage Cable
CW	Combined Water	MS	Multiple Service Route
FW	Foul Water	O	Oil Pipeline
SW	Storm Water	SL	Street Lighting
ER	Earth	TC	Traffic Controls
E	Electric Cable	U	Unknown Service
ED	Empty Duct	UC	Unknown Cable
FO	Fibre Optic	UP	Unknown Pipeline
FM	Fire Hydrant Main	W	Water Main
FUEL	Fuel Pipeline		

Assumed Route Service highlighted yellow (Example BT) BT

AREA	Contracted Survey Area	UTS	Unable to Survey
AREA	Previous Survey Area	UTT	Unable to Trace (Service)
AREA	GPR Data Collection Area	UVI	Unable to Visually Inspect (Within Cover)
(0.60d)	Depth to Top of Service	WL	Water Level (Within Cover)
(~0.60d)	Approximate Depth to Top of Service	B	Unable to Trace (Due to Blockage)
(NDA)	No Depth Attainable	F	Unable to Trace Further
IL 10.00	Invert Level (Drainage)	E	End of Trace
PE	Polyethylene Pipe Material	U	Unable to Trace
UTL	Unable to Lift (Cover)	C	Unable to Trace (Capped Port)

Anomalous Ground
Unable to Survey

NOT COMMISSIONED

Appendix A.2 - ReFH 2 Return Period Outputs

UK Design Flood Estimation

Generated on 30 May 2025 08:16:15 by HerringtonConsulting
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 4C83-2D1F

Site name: FEH_Point_Descriptors_535036_137262_v5_0_1

Easting: 535036

Northing: 137262

Country: England, Wales or Northern Ireland

Catchment Area (km^2): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH22 (mm):	22.58	Total runoff (ML):	0.38
Total Rainfall (mm):	15.57	Total flow (ML):	0.93
Peak Rainfall (mm):	3.04	Peak flow (m^3/s):	0.04

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:15:00*	No
Timestep (hh:mm:ss)	00:15:00*	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	116.64	No
Cmax (mm)	304.85	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.65 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	32.88 [27.99]	Yes
BR	1.45	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.2771	0.0000	0.1062	0.0000	0.00262	0.00262
00:15:00	0.4291	0.0000	0.1649	0.0001	0.0026	0.00265
00:30:00	0.6622	0.0000	0.2556	0.0002	0.00258	0.00282
00:45:00	1.0172	0.0000	0.3955	0.0006	0.00256	0.0032
01:00:00	1.5513	0.0000	0.6096	0.0014	0.00256	0.00392
01:15:00	2.3314	0.0000	0.9310	0.0026	0.00256	0.00515
01:30:00	3.0364	0.0000	1.2393	0.0046	0.00258	0.00716
01:45:00	2.3314	0.0000	0.9721	0.0076	0.00263	0.0103
02:00:00	1.5513	0.0000	0.6567	0.0117	0.00271	0.0144
02:15:00	1.0172	0.0000	0.4349	0.0162	0.00284	0.0191
02:30:00	0.6622	0.0000	0.2850	0.0210	0.00303	0.024
02:45:00	0.4291	0.0000	0.1854	0.0254	0.00326	0.0287
03:00:00	0.2771	0.0000	0.1201	0.0292	0.00353	0.0327
03:15:00	0.0000	0.0000	0.0000	0.0317	0.00384	0.0355
03:30:00	0.0000	0.0000	0.0000	0.0324	0.00416	0.0365
03:45:00	0.0000	0.0000	0.0000	0.0315	0.00448	0.036
04:00:00	0.0000	0.0000	0.0000	0.0297	0.00479	0.0345
04:15:00	0.0000	0.0000	0.0000	0.0272	0.00506	0.0323
04:30:00	0.0000	0.0000	0.0000	0.0244	0.00531	0.0297
04:45:00	0.0000	0.0000	0.0000	0.0215	0.00552	0.027
05:00:00	0.0000	0.0000	0.0000	0.0188	0.0057	0.0244
05:15:00	0.0000	0.0000	0.0000	0.0163	0.00585	0.0222
05:30:00	0.0000	0.0000	0.0000	0.0142	0.00597	0.0202
05:45:00	0.0000	0.0000	0.0000	0.0123	0.00607	0.0183
06:00:00	0.0000	0.0000	0.0000	0.0105	0.00615	0.0166
06:15:00	0.0000	0.0000	0.0000	0.0088	0.00621	0.015
06:30:00	0.0000	0.0000	0.0000	0.0071	0.00625	0.0134
06:45:00	0.0000	0.0000	0.0000	0.0056	0.00627	0.0119
07:00:00	0.0000	0.0000	0.0000	0.0042	0.00628	0.0105
07:15:00	0.0000	0.0000	0.0000	0.0029	0.00627	0.00919
07:30:00	0.0000	0.0000	0.0000	0.0019	0.00625	0.00811
07:45:00	0.0000	0.0000	0.0000	0.0011	0.00622	0.00733
08:00:00	0.0000	0.0000	0.0000	0.0006	0.00618	0.0068
08:15:00	0.0000	0.0000	0.0000	0.0003	0.00614	0.00646

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:30:00	0.0000	0.0000	0.0000	0.0001	0.0061	0.00624
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00605	0.0061
09:00:00	0.0000	0.0000	0.0000	0.0000	0.006	0.00601
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00596	0.00596
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00591	0.00591
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00587	0.00587
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00582	0.00582
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00578	0.00578
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00574	0.00574
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00569	0.00569
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00565	0.00565
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00561	0.00561
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00557	0.00557
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00552	0.00552
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00548	0.00548
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00544	0.00544
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0054	0.0054
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00536	0.00536
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00532	0.00532
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00528	0.00528
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00524	0.00524
13:45:00	0.0000	0.0000	0.0000	0.0000	0.0052	0.0052
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00516	0.00516
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00512	0.00512
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00508	0.00508
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00504	0.00504
15:00:00	0.0000	0.0000	0.0000	0.0000	0.005	0.005
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00497	0.00497
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00493	0.00493
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00489	0.00489
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00485	0.00485
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00482	0.00482
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00478	0.00478
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00474	0.00474
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00471	0.00471

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00467	0.00467
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00464	0.00464
17:45:00	0.0000	0.0000	0.0000	0.0000	0.0046	0.0046
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00457	0.00457
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00453	0.00453
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0045	0.0045
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00446	0.00446
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00443	0.00443
19:15:00	0.0000	0.0000	0.0000	0.0000	0.0044	0.0044
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00436	0.00436
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00433	0.00433
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0043	0.0043
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00426	0.00426
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00423	0.00423
20:45:00	0.0000	0.0000	0.0000	0.0000	0.0042	0.0042
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00417	0.00417
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00414	0.00414
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00411	0.00411
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00407	0.00407
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00404	0.00404
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00401	0.00401
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00398	0.00398
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00395	0.00395
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00389	0.00389
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00386	0.00386
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00383	0.00383
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00381	0.00381
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00378	0.00378
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00375	0.00375
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00372	0.00372
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00369	0.00369
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00364	0.00364
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00361	0.00361

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00355	0.00355
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
26:45:00	0.0000	0.0000	0.0000	0.0000	0.0035	0.0035
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00345	0.00345
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00339	0.00339
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00337	0.00337
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00334	0.00334
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00329	0.00329
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00327	0.00327
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00322	0.00322
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00315	0.00315
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
30:45:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00305	0.00305
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00301	0.00301
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00294	0.00294
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00283	0.00283
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00279	0.00279
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
35:15:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.43	No
BFIHOST19	0.39	No
PROPWET	0.36	No
SAAR (mm)	835	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 30 May 2025 08:17:31 by HerringtonConsulting
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 4C83-2D1F

Site name: FEH_Point_Descriptors_535036_137262_v5_0_1

Easting: 535036

Northing: 137262

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH22 (mm):	48.14	Total runoff (ML):	0.87
Total Rainfall (mm):	33.20	Total flow (ML):	1.99
Peak Rainfall (mm):	6.47	Peak flow (m³/s):	0.08

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:15:00*	No
Timestep (hh:mm:ss)	00:15:00*	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	116.64	No
Cmax (mm)	304.85	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.65 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	32.88 [27.99]	Yes
BR	1.29	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.5908	0.0000	0.2266	0.0000	0.00262	0.00262
00:15:00	0.9148	0.0000	0.3532	0.0001	0.0026	0.00271
00:30:00	1.4118	0.0000	0.5504	0.0005	0.00258	0.0031
00:45:00	2.1685	0.0000	0.8581	0.0014	0.00257	0.00394
01:00:00	3.3070	0.0000	1.3384	0.0029	0.00257	0.0055
01:15:00	4.9699	0.0000	2.0788	0.0056	0.00259	0.00817
01:30:00	6.4729	0.0000	2.8290	0.0099	0.00265	0.0126
01:45:00	4.9699	0.0000	2.2654	0.0167	0.00276	0.0195
02:00:00	3.3070	0.0000	1.5523	0.0257	0.00295	0.0287
02:15:00	2.1685	0.0000	1.0373	0.0361	0.00323	0.0393
02:30:00	1.4118	0.0000	0.6836	0.0469	0.00361	0.0505
02:45:00	0.9148	0.0000	0.4465	0.0572	0.00409	0.0613
03:00:00	0.5908	0.0000	0.2898	0.0660	0.00466	0.0707
03:15:00	0.0000	0.0000	0.0000	0.0720	0.00529	0.0773
03:30:00	0.0000	0.0000	0.0000	0.0739	0.00597	0.0799
03:45:00	0.0000	0.0000	0.0000	0.0723	0.00663	0.079
04:00:00	0.0000	0.0000	0.0000	0.0683	0.00727	0.0755
04:15:00	0.0000	0.0000	0.0000	0.0627	0.00785	0.0705
04:30:00	0.0000	0.0000	0.0000	0.0563	0.00837	0.0647
04:45:00	0.0000	0.0000	0.0000	0.0497	0.00883	0.0585
05:00:00	0.0000	0.0000	0.0000	0.0433	0.00921	0.0525
05:15:00	0.0000	0.0000	0.0000	0.0377	0.00954	0.0473
05:30:00	0.0000	0.0000	0.0000	0.0328	0.00981	0.0427
05:45:00	0.0000	0.0000	0.0000	0.0284	0.01	0.0384
06:00:00	0.0000	0.0000	0.0000	0.0242	0.0102	0.0344
06:15:00	0.0000	0.0000	0.0000	0.0203	0.0104	0.0307
06:30:00	0.0000	0.0000	0.0000	0.0166	0.0105	0.0271
06:45:00	0.0000	0.0000	0.0000	0.0131	0.0105	0.0237
07:00:00	0.0000	0.0000	0.0000	0.0098	0.0106	0.0204
07:15:00	0.0000	0.0000	0.0000	0.0069	0.0106	0.0174
07:30:00	0.0000	0.0000	0.0000	0.0044	0.0105	0.015
07:45:00	0.0000	0.0000	0.0000	0.0027	0.0105	0.0131
08:00:00	0.0000	0.0000	0.0000	0.0015	0.0104	0.0119
08:15:00	0.0000	0.0000	0.0000	0.0008	0.0104	0.0111

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:30:00	0.0000	0.0000	0.0000	0.0003	0.0103	0.0106
08:45:00	0.0000	0.0000	0.0000	0.0001	0.0102	0.0103
09:00:00	0.0000	0.0000	0.0000	0.0000	0.0101	0.0102
09:15:00	0.0000	0.0000	0.0000	0.0000	0.0101	0.0101
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00998	0.00998
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00991	0.00991
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00983	0.00983
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00976	0.00976
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00968	0.00968
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00961	0.00961
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00954	0.00954
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00947	0.00947
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00939	0.00939
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00932	0.00932
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00925	0.00925
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00918	0.00918
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00911	0.00911
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00904	0.00904
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00897	0.00897
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00891	0.00891
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00884	0.00884
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00877	0.00877
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00871	0.00871
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00864	0.00864
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00857	0.00857
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00851	0.00851
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00845	0.00845
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00838	0.00838
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00832	0.00832
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00825	0.00825
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00819	0.00819
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00813	0.00813
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00807	0.00807
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00801	0.00801
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00795	0.00795

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00789	0.00789
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00783	0.00783
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00777	0.00777
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00771	0.00771
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00765	0.00765
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00759	0.00759
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00753	0.00753
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00748	0.00748
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00742	0.00742
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00736	0.00736
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00731	0.00731
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00725	0.00725
20:15:00	0.0000	0.0000	0.0000	0.0000	0.0072	0.0072
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00714	0.00714
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00709	0.00709
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00704	0.00704
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00698	0.00698
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00693	0.00693
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00688	0.00688
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00683	0.00683
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00677	0.00677
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00672	0.00672
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00667	0.00667
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00662	0.00662
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00657	0.00657
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00652	0.00652
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00647	0.00647
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00642	0.00642
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00637	0.00637
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00633	0.00633
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00628	0.00628
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00623	0.00623
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00618	0.00618
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00614	0.00614
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00609	0.00609

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00604	0.00604
26:15:00	0.0000	0.0000	0.0000	0.0000	0.006	0.006
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00595	0.00595
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00591	0.00591
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00586	0.00586
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00582	0.00582
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00577	0.00577
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00573	0.00573
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00569	0.00569
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00564	0.00564
28:30:00	0.0000	0.0000	0.0000	0.0000	0.0056	0.0056
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00556	0.00556
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00552	0.00552
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00547	0.00547
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00543	0.00543
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00539	0.00539
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00535	0.00535
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00531	0.00531
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00527	0.00527
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00523	0.00523
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00519	0.00519
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00515	0.00515
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00511	0.00511
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00507	0.00507
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00504	0.00504
32:15:00	0.0000	0.0000	0.0000	0.0000	0.005	0.005
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00496	0.00496
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00492	0.00492
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00488	0.00488
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00485	0.00485
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00481	0.00481
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00477	0.00477
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00474	0.00474
34:15:00	0.0000	0.0000	0.0000	0.0000	0.0047	0.0047
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00467	0.00467

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00463	0.00463
35:00:00	0.0000	0.0000	0.0000	0.0000	0.0046	0.0046
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00456	0.00456
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00453	0.00453
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00449	0.00449
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00446	0.00446
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00443	0.00443
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00439	0.00439
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00436	0.00436
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00433	0.00433
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00429	0.00429
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00426	0.00426
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00423	0.00423
38:00:00	0.0000	0.0000	0.0000	0.0000	0.0042	0.0042
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00416	0.00416
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00413	0.00413
38:45:00	0.0000	0.0000	0.0000	0.0000	0.0041	0.0041
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00407	0.00407
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00404	0.00404
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00401	0.00401
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00398	0.00398
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00395	0.00395
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00389	0.00389
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00386	0.00386
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00383	0.00383
41:15:00	0.0000	0.0000	0.0000	0.0000	0.0038	0.0038
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00377	0.00377
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00374	0.00374
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00372	0.00372
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00369	0.00369
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
43:00:00	0.0000	0.0000	0.0000	0.0000	0.0036	0.0036
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00355	0.00355
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00352	0.00352
44:00:00	0.0000	0.0000	0.0000	0.0000	0.0035	0.0035
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00344	0.00344
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00339	0.00339
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00337	0.00337
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00334	0.00334
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00331	0.00331
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00329	0.00329
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00326	0.00326
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00322	0.00322
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00314	0.00314
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
48:00:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00307	0.00307
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00305	0.00305
48:45:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
49:00:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00293	0.00293
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00291	0.00291
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00283	0.00283
51:15:00	0.0000	0.0000	0.0000	0.0000	0.0028	0.0028
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
51:45:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
52:15:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
52:30:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.43	No
BFIHOST19	0.39	No
PROPWET	0.36	No
SAAR (mm)	835	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 30 May 2025 08:18:06 by HerringtonConsulting
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 4C83-2D1F

Site name: FEH_Point_Descriptors_535036_137262_v5_0_1

Easting: 535036

Northing: 137262

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year 1.3 CC

Summary of results

Rainfall - FEH22 (mm):	77.99	Total runoff (ML):	1.52
Total Rainfall (mm):	53.78	Total flow (ML):	3.23
Peak Rainfall (mm):	10.49	Peak flow (m³/s):	0.14

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:15:00*	No
Timestep (hh:mm:ss)	00:15:00*	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No
Climate change factor	1.30	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	116.64	No
Cmax (mm)	304.85	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.65 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	32.88 [27.99]	Yes
BR	1.12	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	0.9571	0.0000	0.3677	0.0000	0.00262	0.00262
00:15:00	1.4821	0.0000	0.5753	0.0002	0.0026	0.00278
00:30:00	2.2871	0.0000	0.9019	0.0008	0.00258	0.00342
00:45:00	3.5131	0.0000	1.4188	0.0022	0.00258	0.00481
01:00:00	5.3576	0.0000	2.2417	0.0048	0.00259	0.00737
01:15:00	8.0516	0.0000	3.5460	0.0092	0.00263	0.0118
01:30:00	10.4864	0.0000	4.9371	0.0164	0.00271	0.0191
01:45:00	8.0516	0.0000	4.0356	0.0279	0.00288	0.0308
02:00:00	5.3576	0.0000	2.8031	0.0433	0.00316	0.0465
02:15:00	3.5131	0.0000	1.8892	0.0612	0.00359	0.0648
02:30:00	2.2871	0.0000	1.2517	0.0801	0.00416	0.0843
02:45:00	1.4821	0.0000	0.8203	0.0983	0.00489	0.103
03:00:00	0.9571	0.0000	0.5336	0.1141	0.00576	0.12
03:15:00	0.0000	0.0000	0.0000	0.1251	0.00673	0.132
03:30:00	0.0000	0.0000	0.0000	0.1291	0.00776	0.137
03:45:00	0.0000	0.0000	0.0000	0.1268	0.00879	0.136
04:00:00	0.0000	0.0000	0.0000	0.1200	0.00978	0.13
04:15:00	0.0000	0.0000	0.0000	0.1104	0.0107	0.121
04:30:00	0.0000	0.0000	0.0000	0.0993	0.0115	0.111
04:45:00	0.0000	0.0000	0.0000	0.0877	0.0122	0.0999
05:00:00	0.0000	0.0000	0.0000	0.0765	0.0128	0.0893
05:15:00	0.0000	0.0000	0.0000	0.0667	0.0133	0.08
05:30:00	0.0000	0.0000	0.0000	0.0580	0.0138	0.0718
05:45:00	0.0000	0.0000	0.0000	0.0502	0.0141	0.0643
06:00:00	0.0000	0.0000	0.0000	0.0429	0.0144	0.0573
06:15:00	0.0000	0.0000	0.0000	0.0360	0.0146	0.0507
06:30:00	0.0000	0.0000	0.0000	0.0296	0.0148	0.0444
06:45:00	0.0000	0.0000	0.0000	0.0234	0.0149	0.0383
07:00:00	0.0000	0.0000	0.0000	0.0177	0.015	0.0326
07:15:00	0.0000	0.0000	0.0000	0.0124	0.015	0.0274
07:30:00	0.0000	0.0000	0.0000	0.0080	0.015	0.023
07:45:00	0.0000	0.0000	0.0000	0.0048	0.0149	0.0197
08:00:00	0.0000	0.0000	0.0000	0.0027	0.0148	0.0175
08:15:00	0.0000	0.0000	0.0000	0.0014	0.0147	0.0161

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:30:00	0.0000	0.0000	0.0000	0.0006	0.0146	0.0153
08:45:00	0.0000	0.0000	0.0000	0.0002	0.0145	0.0147
09:00:00	0.0000	0.0000	0.0000	0.0000	0.0144	0.0144
09:15:00	0.0000	0.0000	0.0000	0.0000	0.0143	0.0143
09:30:00	0.0000	0.0000	0.0000	0.0000	0.0142	0.0142
09:45:00	0.0000	0.0000	0.0000	0.0000	0.0141	0.0141
10:00:00	0.0000	0.0000	0.0000	0.0000	0.014	0.014
10:15:00	0.0000	0.0000	0.0000	0.0000	0.0139	0.0139
10:30:00	0.0000	0.0000	0.0000	0.0000	0.0138	0.0138
10:45:00	0.0000	0.0000	0.0000	0.0000	0.0137	0.0137
11:00:00	0.0000	0.0000	0.0000	0.0000	0.0136	0.0136
11:15:00	0.0000	0.0000	0.0000	0.0000	0.0135	0.0135
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0133	0.0133
11:45:00	0.0000	0.0000	0.0000	0.0000	0.0132	0.0132
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0131	0.0131
12:15:00	0.0000	0.0000	0.0000	0.0000	0.013	0.013
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0129	0.0129
12:45:00	0.0000	0.0000	0.0000	0.0000	0.0129	0.0129
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0128	0.0128
13:15:00	0.0000	0.0000	0.0000	0.0000	0.0127	0.0127
13:30:00	0.0000	0.0000	0.0000	0.0000	0.0126	0.0126
13:45:00	0.0000	0.0000	0.0000	0.0000	0.0125	0.0125
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0124	0.0124
14:15:00	0.0000	0.0000	0.0000	0.0000	0.0123	0.0123
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0122	0.0122
14:45:00	0.0000	0.0000	0.0000	0.0000	0.0121	0.0121
15:00:00	0.0000	0.0000	0.0000	0.0000	0.012	0.012
15:15:00	0.0000	0.0000	0.0000	0.0000	0.0119	0.0119
15:30:00	0.0000	0.0000	0.0000	0.0000	0.0118	0.0118
15:45:00	0.0000	0.0000	0.0000	0.0000	0.0117	0.0117
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0116	0.0116
16:15:00	0.0000	0.0000	0.0000	0.0000	0.0116	0.0116
16:30:00	0.0000	0.0000	0.0000	0.0000	0.0115	0.0115
16:45:00	0.0000	0.0000	0.0000	0.0000	0.0114	0.0114
17:00:00	0.0000	0.0000	0.0000	0.0000	0.0113	0.0113

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:15:00	0.0000	0.0000	0.0000	0.0000	0.0112	0.0112
17:30:00	0.0000	0.0000	0.0000	0.0000	0.0111	0.0111
17:45:00	0.0000	0.0000	0.0000	0.0000	0.011	0.011
18:00:00	0.0000	0.0000	0.0000	0.0000	0.011	0.011
18:15:00	0.0000	0.0000	0.0000	0.0000	0.0109	0.0109
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0108	0.0108
18:45:00	0.0000	0.0000	0.0000	0.0000	0.0107	0.0107
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0106	0.0106
19:15:00	0.0000	0.0000	0.0000	0.0000	0.0105	0.0105
19:30:00	0.0000	0.0000	0.0000	0.0000	0.0105	0.0105
19:45:00	0.0000	0.0000	0.0000	0.0000	0.0104	0.0104
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0103	0.0103
20:15:00	0.0000	0.0000	0.0000	0.0000	0.0102	0.0102
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0102	0.0102
20:45:00	0.0000	0.0000	0.0000	0.0000	0.0101	0.0101
21:00:00	0.0000	0.0000	0.0000	0.0000	0.01	0.01
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00992	0.00992
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00985	0.00985
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00977	0.00977
22:00:00	0.0000	0.0000	0.0000	0.0000	0.0097	0.0097
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00963	0.00963
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00955	0.00955
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00948	0.00948
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00941	0.00941
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00934	0.00934
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00927	0.00927
23:45:00	0.0000	0.0000	0.0000	0.0000	0.0092	0.0092
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00913	0.00913
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00906	0.00906
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00899	0.00899
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00892	0.00892
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00885	0.00885
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00879	0.00879
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00872	0.00872
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00865	0.00865

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00859	0.00859
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00852	0.00852
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00846	0.00846
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00839	0.00839
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00833	0.00833
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00827	0.00827
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00821	0.00821
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00814	0.00814
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00808	0.00808
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00802	0.00802
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00796	0.00796
28:45:00	0.0000	0.0000	0.0000	0.0000	0.0079	0.0079
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00784	0.00784
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00778	0.00778
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00772	0.00772
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00766	0.00766
30:00:00	0.0000	0.0000	0.0000	0.0000	0.0076	0.0076
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00755	0.00755
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00749	0.00749
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00743	0.00743
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00738	0.00738
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00732	0.00732
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00727	0.00727
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00721	0.00721
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00716	0.00716
32:15:00	0.0000	0.0000	0.0000	0.0000	0.0071	0.0071
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00705	0.00705
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00699	0.00699
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00694	0.00694
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00689	0.00689
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00684	0.00684
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00679	0.00679
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00673	0.00673
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00668	0.00668
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00663	0.00663

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00658	0.00658
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00653	0.00653
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00648	0.00648
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00643	0.00643
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00638	0.00638
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00634	0.00634
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00629	0.00629
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00624	0.00624
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00619	0.00619
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00615	0.00615
37:15:00	0.0000	0.0000	0.0000	0.0000	0.0061	0.0061
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00605	0.00605
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00601	0.00601
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00596	0.00596
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00592	0.00592
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00587	0.00587
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00583	0.00583
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00578	0.00578
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00574	0.00574
39:30:00	0.0000	0.0000	0.0000	0.0000	0.0057	0.0057
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00565	0.00565
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00561	0.00561
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00557	0.00557
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00553	0.00553
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00548	0.00548
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00544	0.00544
41:15:00	0.0000	0.0000	0.0000	0.0000	0.0054	0.0054
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00536	0.00536
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00532	0.00532
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00528	0.00528
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00524	0.00524
42:30:00	0.0000	0.0000	0.0000	0.0000	0.0052	0.0052
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00516	0.00516
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00512	0.00512
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00508	0.00508

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00504	0.00504
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00501	0.00501
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00497	0.00497
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00493	0.00493
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00489	0.00489
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00486	0.00486
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00482	0.00482
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00478	0.00478
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00475	0.00475
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00471	0.00471
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00467	0.00467
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00464	0.00464
46:30:00	0.0000	0.0000	0.0000	0.0000	0.0046	0.0046
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00457	0.00457
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00453	0.00453
47:15:00	0.0000	0.0000	0.0000	0.0000	0.0045	0.0045
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00447	0.00447
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00443	0.00443
48:00:00	0.0000	0.0000	0.0000	0.0000	0.0044	0.0044
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00437	0.00437
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00433	0.00433
48:45:00	0.0000	0.0000	0.0000	0.0000	0.0043	0.0043
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00427	0.00427
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00423	0.00423
49:30:00	0.0000	0.0000	0.0000	0.0000	0.0042	0.0042
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00417	0.00417
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00414	0.00414
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00411	0.00411
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00408	0.00408
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00405	0.00405
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00402	0.00402
51:15:00	0.0000	0.0000	0.0000	0.0000	0.00398	0.00398
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00395	0.00395
51:45:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00389	0.00389

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
52:15:00	0.0000	0.0000	0.0000	0.0000	0.00387	0.00387
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00384	0.00384
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00381	0.00381
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00378	0.00378
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00375	0.00375
53:30:00	0.0000	0.0000	0.0000	0.0000	0.00372	0.00372
53:45:00	0.0000	0.0000	0.0000	0.0000	0.00369	0.00369
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
54:15:00	0.0000	0.0000	0.0000	0.0000	0.00364	0.00364
54:30:00	0.0000	0.0000	0.0000	0.0000	0.00361	0.00361
54:45:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00356	0.00356
55:15:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
55:30:00	0.0000	0.0000	0.0000	0.0000	0.0035	0.0035
55:45:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00345	0.00345
56:15:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
56:30:00	0.0000	0.0000	0.0000	0.0000	0.0034	0.0034
56:45:00	0.0000	0.0000	0.0000	0.0000	0.00337	0.00337
57:00:00	0.0000	0.0000	0.0000	0.0000	0.00335	0.00335
57:15:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
57:30:00	0.0000	0.0000	0.0000	0.0000	0.00329	0.00329
57:45:00	0.0000	0.0000	0.0000	0.0000	0.00327	0.00327
58:00:00	0.0000	0.0000	0.0000	0.0000	0.00325	0.00325
58:15:00	0.0000	0.0000	0.0000	0.0000	0.00322	0.00322
58:30:00	0.0000	0.0000	0.0000	0.0000	0.0032	0.0032
58:45:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
59:00:00	0.0000	0.0000	0.0000	0.0000	0.00315	0.00315
59:15:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
59:30:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
59:45:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
60:00:00	0.0000	0.0000	0.0000	0.0000	0.00305	0.00305
60:15:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
60:30:00	0.0000	0.0000	0.0000	0.0000	0.00301	0.00301
60:45:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
61:00:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
61:15:00	0.0000	0.0000	0.0000	0.0000	0.00294	0.00294
61:30:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
61:45:00	0.0000	0.0000	0.0000	0.0000	0.0029	0.0029
62:00:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
62:15:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
62:30:00	0.0000	0.0000	0.0000	0.0000	0.00283	0.00283
62:45:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
63:00:00	0.0000	0.0000	0.0000	0.0000	0.00279	0.00279
63:15:00	0.0000	0.0000	0.0000	0.0000	0.00277	0.00277
63:30:00	0.0000	0.0000	0.0000	0.0000	0.00275	0.00275
63:45:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
64:00:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
64:15:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
64:30:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
64:45:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.43	No
BFIHOST19	0.39	No
PROPWET	0.36	No
SAAR (mm)	835	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 30 May 2025 08:18:36 by HerringtonConsulting
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 4C83-2D1F

Site name: FEH_Point_Descriptors_535036_137262_v5_0_1

Easting: 535036

Northing: 137262

Country: England, Wales or Northern Ireland

Catchment Area (km^2): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 1000 year

Summary of results

Rainfall - FEH22 (mm):	90.23	Total runoff (ML):	1.81
Total Rainfall (mm):	62.23	Total flow (ML):	3.73
Peak Rainfall (mm):	12.13	Peak flow (m^3/s):	0.16

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:15:00*	No
Timestep (hh:mm:ss)	00:15:00*	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	116.64	No
Cmax (mm)	304.85	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.65 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	32.88 [27.99]	Yes
BR	1.06	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	1.1074	0.0000	0.4257	0.0000	0.00262	0.00262
00:15:00	1.7147	0.0000	0.6671	0.0002	0.0026	0.00281
00:30:00	2.6461	0.0000	1.0484	0.0010	0.00258	0.00355
00:45:00	4.0645	0.0000	1.6551	0.0026	0.00258	0.00516
01:00:00	6.1985	0.0000	2.6284	0.0055	0.00259	0.00814
01:15:00	9.3153	0.0000	4.1870	0.0107	0.00264	0.0133
01:30:00	12.1324	0.0000	5.8800	0.0192	0.00274	0.0219
01:45:00	9.3153	0.0000	4.8424	0.0326	0.00292	0.0356
02:00:00	6.1985	0.0000	3.3799	0.0509	0.00324	0.0541
02:15:00	4.0645	0.0000	2.2847	0.0722	0.00371	0.0759
02:30:00	2.6461	0.0000	1.5165	0.0947	0.00435	0.099
02:45:00	1.7147	0.0000	0.9950	0.1165	0.00517	0.122
03:00:00	1.1074	0.0000	0.6477	0.1354	0.00615	0.142
03:15:00	0.0000	0.0000	0.0000	0.1488	0.00724	0.156
03:30:00	0.0000	0.0000	0.0000	0.1538	0.00841	0.162
03:45:00	0.0000	0.0000	0.0000	0.1512	0.00957	0.161
04:00:00	0.0000	0.0000	0.0000	0.1433	0.0107	0.154
04:15:00	0.0000	0.0000	0.0000	0.1320	0.0117	0.144
04:30:00	0.0000	0.0000	0.0000	0.1187	0.0126	0.131
04:45:00	0.0000	0.0000	0.0000	0.1049	0.0134	0.118
05:00:00	0.0000	0.0000	0.0000	0.0915	0.0141	0.106
05:15:00	0.0000	0.0000	0.0000	0.0797	0.0147	0.0944
05:30:00	0.0000	0.0000	0.0000	0.0694	0.0152	0.0846
05:45:00	0.0000	0.0000	0.0000	0.0600	0.0156	0.0756
06:00:00	0.0000	0.0000	0.0000	0.0513	0.0159	0.0673
06:15:00	0.0000	0.0000	0.0000	0.0432	0.0162	0.0594
06:30:00	0.0000	0.0000	0.0000	0.0355	0.0164	0.0519
06:45:00	0.0000	0.0000	0.0000	0.0281	0.0165	0.0447
07:00:00	0.0000	0.0000	0.0000	0.0212	0.0166	0.0378
07:15:00	0.0000	0.0000	0.0000	0.0150	0.0166	0.0316
07:30:00	0.0000	0.0000	0.0000	0.0097	0.0166	0.0263
07:45:00	0.0000	0.0000	0.0000	0.0059	0.0165	0.0224
08:00:00	0.0000	0.0000	0.0000	0.0033	0.0164	0.0197
08:15:00	0.0000	0.0000	0.0000	0.0017	0.0163	0.018

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:30:00	0.0000	0.0000	0.0000	0.0008	0.0162	0.017
08:45:00	0.0000	0.0000	0.0000	0.0003	0.0161	0.0164
09:00:00	0.0000	0.0000	0.0000	0.0000	0.016	0.016
09:15:00	0.0000	0.0000	0.0000	0.0000	0.0159	0.0159
09:30:00	0.0000	0.0000	0.0000	0.0000	0.0157	0.0157
09:45:00	0.0000	0.0000	0.0000	0.0000	0.0156	0.0156
10:00:00	0.0000	0.0000	0.0000	0.0000	0.0155	0.0155
10:15:00	0.0000	0.0000	0.0000	0.0000	0.0154	0.0154
10:30:00	0.0000	0.0000	0.0000	0.0000	0.0153	0.0153
10:45:00	0.0000	0.0000	0.0000	0.0000	0.0152	0.0152
11:00:00	0.0000	0.0000	0.0000	0.0000	0.015	0.015
11:15:00	0.0000	0.0000	0.0000	0.0000	0.0149	0.0149
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0148	0.0148
11:45:00	0.0000	0.0000	0.0000	0.0000	0.0147	0.0147
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0146	0.0146
12:15:00	0.0000	0.0000	0.0000	0.0000	0.0145	0.0145
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0144	0.0144
12:45:00	0.0000	0.0000	0.0000	0.0000	0.0143	0.0143
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0141	0.0141
13:15:00	0.0000	0.0000	0.0000	0.0000	0.014	0.014
13:30:00	0.0000	0.0000	0.0000	0.0000	0.0139	0.0139
13:45:00	0.0000	0.0000	0.0000	0.0000	0.0138	0.0138
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0137	0.0137
14:15:00	0.0000	0.0000	0.0000	0.0000	0.0136	0.0136
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0135	0.0135
14:45:00	0.0000	0.0000	0.0000	0.0000	0.0134	0.0134
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0133	0.0133
15:15:00	0.0000	0.0000	0.0000	0.0000	0.0132	0.0132
15:30:00	0.0000	0.0000	0.0000	0.0000	0.0131	0.0131
15:45:00	0.0000	0.0000	0.0000	0.0000	0.013	0.013
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0129	0.0129
16:15:00	0.0000	0.0000	0.0000	0.0000	0.0128	0.0128
16:30:00	0.0000	0.0000	0.0000	0.0000	0.0127	0.0127
16:45:00	0.0000	0.0000	0.0000	0.0000	0.0126	0.0126
17:00:00	0.0000	0.0000	0.0000	0.0000	0.0125	0.0125

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:15:00	0.0000	0.0000	0.0000	0.0000	0.0124	0.0124
17:30:00	0.0000	0.0000	0.0000	0.0000	0.0123	0.0123
17:45:00	0.0000	0.0000	0.0000	0.0000	0.0122	0.0122
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0122	0.0122
18:15:00	0.0000	0.0000	0.0000	0.0000	0.0121	0.0121
18:30:00	0.0000	0.0000	0.0000	0.0000	0.012	0.012
18:45:00	0.0000	0.0000	0.0000	0.0000	0.0119	0.0119
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0118	0.0118
19:15:00	0.0000	0.0000	0.0000	0.0000	0.0117	0.0117
19:30:00	0.0000	0.0000	0.0000	0.0000	0.0116	0.0116
19:45:00	0.0000	0.0000	0.0000	0.0000	0.0115	0.0115
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0114	0.0114
20:15:00	0.0000	0.0000	0.0000	0.0000	0.0113	0.0113
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0113	0.0113
20:45:00	0.0000	0.0000	0.0000	0.0000	0.0112	0.0112
21:00:00	0.0000	0.0000	0.0000	0.0000	0.0111	0.0111
21:15:00	0.0000	0.0000	0.0000	0.0000	0.011	0.011
21:30:00	0.0000	0.0000	0.0000	0.0000	0.0109	0.0109
21:45:00	0.0000	0.0000	0.0000	0.0000	0.0108	0.0108
22:00:00	0.0000	0.0000	0.0000	0.0000	0.0108	0.0108
22:15:00	0.0000	0.0000	0.0000	0.0000	0.0107	0.0107
22:30:00	0.0000	0.0000	0.0000	0.0000	0.0106	0.0106
22:45:00	0.0000	0.0000	0.0000	0.0000	0.0105	0.0105
23:00:00	0.0000	0.0000	0.0000	0.0000	0.0104	0.0104
23:15:00	0.0000	0.0000	0.0000	0.0000	0.0104	0.0104
23:30:00	0.0000	0.0000	0.0000	0.0000	0.0103	0.0103
23:45:00	0.0000	0.0000	0.0000	0.0000	0.0102	0.0102
24:00:00	0.0000	0.0000	0.0000	0.0000	0.0101	0.0101
24:15:00	0.0000	0.0000	0.0000	0.0000	0.01	0.01
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00997	0.00997
24:45:00	0.0000	0.0000	0.0000	0.0000	0.0099	0.0099
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00982	0.00982
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00975	0.00975
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00967	0.00967
25:45:00	0.0000	0.0000	0.0000	0.0000	0.0096	0.0096

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00953	0.00953
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00946	0.00946
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00938	0.00938
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00931	0.00931
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00924	0.00924
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00917	0.00917
27:30:00	0.0000	0.0000	0.0000	0.0000	0.0091	0.0091
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00903	0.00903
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00897	0.00897
28:15:00	0.0000	0.0000	0.0000	0.0000	0.0089	0.0089
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00883	0.00883
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00876	0.00876
29:00:00	0.0000	0.0000	0.0000	0.0000	0.0087	0.0087
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00863	0.00863
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00857	0.00857
29:45:00	0.0000	0.0000	0.0000	0.0000	0.0085	0.0085
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00844	0.00844
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00837	0.00837
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00831	0.00831
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00825	0.00825
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00818	0.00818
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00812	0.00812
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00806	0.00806
31:45:00	0.0000	0.0000	0.0000	0.0000	0.008	0.008
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00794	0.00794
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00788	0.00788
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00782	0.00782
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00776	0.00776
33:00:00	0.0000	0.0000	0.0000	0.0000	0.0077	0.0077
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00764	0.00764
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00758	0.00758
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00753	0.00753
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00747	0.00747
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00741	0.00741
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00736	0.00736

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:45:00	0.0000	0.0000	0.0000	0.0000	0.0073	0.0073
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00725	0.00725
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00719	0.00719
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00714	0.00714
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00708	0.00708
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00703	0.00703
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00698	0.00698
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00692	0.00692
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00687	0.00687
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00682	0.00682
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00677	0.00677
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00672	0.00672
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00667	0.00667
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00661	0.00661
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00656	0.00656
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00651	0.00651
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00647	0.00647
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00642	0.00642
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00637	0.00637
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00632	0.00632
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00627	0.00627
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00622	0.00622
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00618	0.00618
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00613	0.00613
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00608	0.00608
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00604	0.00604
41:15:00	0.0000	0.0000	0.0000	0.0000	0.00599	0.00599
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00595	0.00595
41:45:00	0.0000	0.0000	0.0000	0.0000	0.0059	0.0059
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00586	0.00586
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00581	0.00581
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00577	0.00577
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00572	0.00572
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00568	0.00568
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00564	0.00564

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
43:30:00	0.0000	0.0000	0.0000	0.0000	0.0056	0.0056
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00555	0.00555
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00551	0.00551
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00547	0.00547
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00543	0.00543
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00539	0.00539
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00535	0.00535
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00531	0.00531
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00527	0.00527
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00523	0.00523
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00519	0.00519
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00515	0.00515
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00511	0.00511
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00507	0.00507
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00503	0.00503
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00499	0.00499
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00495	0.00495
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00492	0.00492
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00488	0.00488
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00484	0.00484
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00481	0.00481
48:45:00	0.0000	0.0000	0.0000	0.0000	0.00477	0.00477
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00473	0.00473
49:15:00	0.0000	0.0000	0.0000	0.0000	0.0047	0.0047
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00466	0.00466
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00463	0.00463
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00459	0.00459
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00456	0.00456
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00452	0.00452
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00449	0.00449
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00445	0.00445
51:15:00	0.0000	0.0000	0.0000	0.0000	0.00442	0.00442
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00439	0.00439
51:45:00	0.0000	0.0000	0.0000	0.0000	0.00435	0.00435
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00432	0.00432

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
52:15:00	0.0000	0.0000	0.0000	0.0000	0.00429	0.00429
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00426	0.00426
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00422	0.00422
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00419	0.00419
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00416	0.00416
53:30:00	0.0000	0.0000	0.0000	0.0000	0.00413	0.00413
53:45:00	0.0000	0.0000	0.0000	0.0000	0.0041	0.0041
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00407	0.00407
54:15:00	0.0000	0.0000	0.0000	0.0000	0.00404	0.00404
54:30:00	0.0000	0.0000	0.0000	0.0000	0.004	0.004
54:45:00	0.0000	0.0000	0.0000	0.0000	0.00397	0.00397
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00394	0.00394
55:15:00	0.0000	0.0000	0.0000	0.0000	0.00391	0.00391
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00388	0.00388
55:45:00	0.0000	0.0000	0.0000	0.0000	0.00386	0.00386
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00383	0.00383
56:15:00	0.0000	0.0000	0.0000	0.0000	0.0038	0.0038
56:30:00	0.0000	0.0000	0.0000	0.0000	0.00377	0.00377
56:45:00	0.0000	0.0000	0.0000	0.0000	0.00374	0.00374
57:00:00	0.0000	0.0000	0.0000	0.0000	0.00371	0.00371
57:15:00	0.0000	0.0000	0.0000	0.0000	0.00368	0.00368
57:30:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
57:45:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
58:00:00	0.0000	0.0000	0.0000	0.0000	0.0036	0.0036
58:15:00	0.0000	0.0000	0.0000	0.0000	0.00357	0.00357
58:30:00	0.0000	0.0000	0.0000	0.0000	0.00355	0.00355
58:45:00	0.0000	0.0000	0.0000	0.0000	0.00352	0.00352
59:00:00	0.0000	0.0000	0.0000	0.0000	0.00349	0.00349
59:15:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
59:30:00	0.0000	0.0000	0.0000	0.0000	0.00344	0.00344
59:45:00	0.0000	0.0000	0.0000	0.0000	0.00341	0.00341
60:00:00	0.0000	0.0000	0.0000	0.0000	0.00339	0.00339
60:15:00	0.0000	0.0000	0.0000	0.0000	0.00336	0.00336
60:30:00	0.0000	0.0000	0.0000	0.0000	0.00334	0.00334
60:45:00	0.0000	0.0000	0.0000	0.0000	0.00331	0.00331

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
61:00:00	0.0000	0.0000	0.0000	0.0000	0.00329	0.00329
61:15:00	0.0000	0.0000	0.0000	0.0000	0.00326	0.00326
61:30:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
61:45:00	0.0000	0.0000	0.0000	0.0000	0.00321	0.00321
62:00:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
62:15:00	0.0000	0.0000	0.0000	0.0000	0.00316	0.00316
62:30:00	0.0000	0.0000	0.0000	0.0000	0.00314	0.00314
62:45:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
63:00:00	0.0000	0.0000	0.0000	0.0000	0.00309	0.00309
63:15:00	0.0000	0.0000	0.0000	0.0000	0.00307	0.00307
63:30:00	0.0000	0.0000	0.0000	0.0000	0.00305	0.00305
63:45:00	0.0000	0.0000	0.0000	0.0000	0.00302	0.00302
64:00:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
64:15:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
64:30:00	0.0000	0.0000	0.0000	0.0000	0.00295	0.00295
64:45:00	0.0000	0.0000	0.0000	0.0000	0.00293	0.00293
65:00:00	0.0000	0.0000	0.0000	0.0000	0.00291	0.00291
65:15:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
65:30:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
65:45:00	0.0000	0.0000	0.0000	0.0000	0.00284	0.00284
66:00:00	0.0000	0.0000	0.0000	0.0000	0.00282	0.00282
66:15:00	0.0000	0.0000	0.0000	0.0000	0.0028	0.0028
66:30:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
66:45:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
67:00:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
67:15:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
67:30:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
67:45:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
68:00:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
68:15:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264

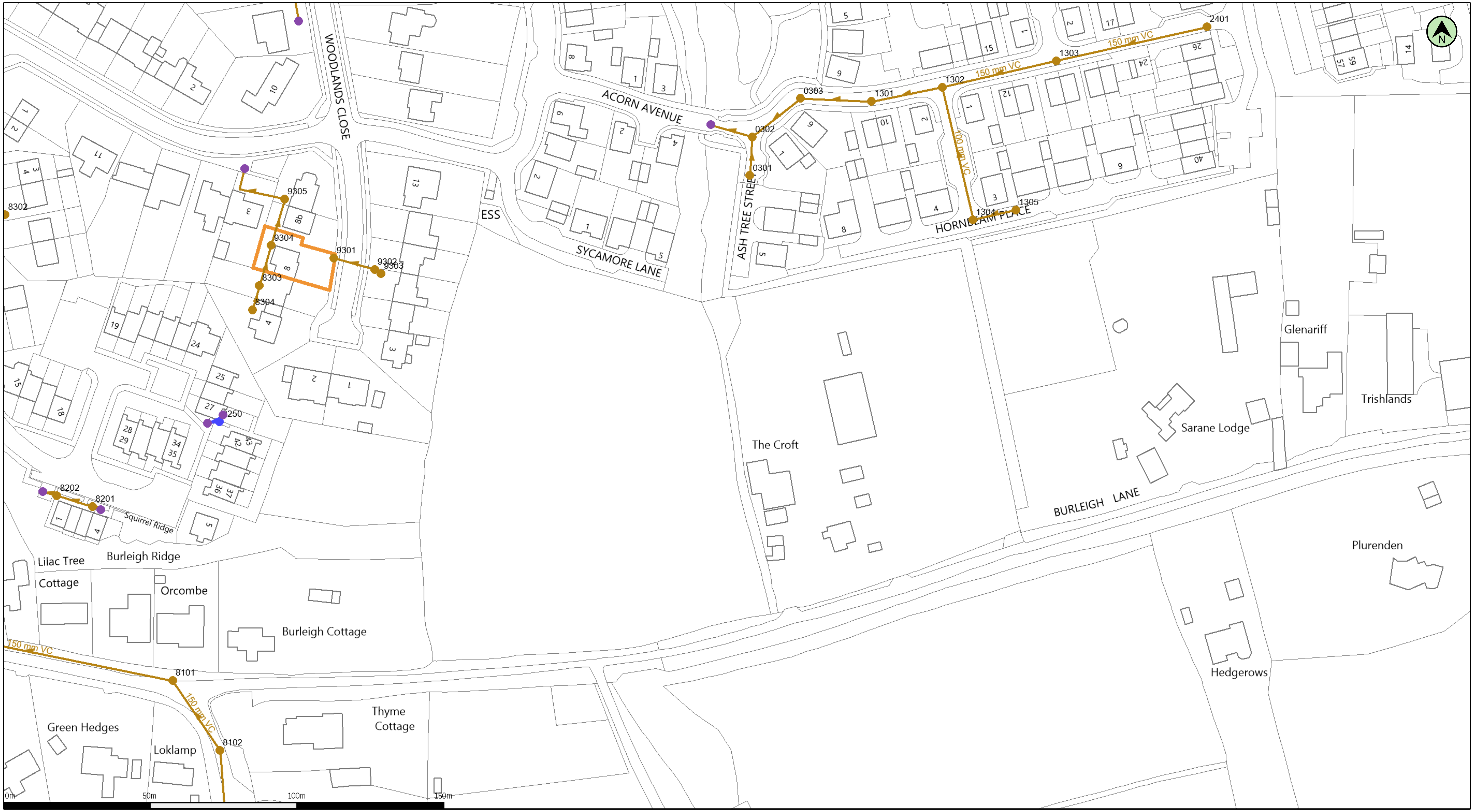
Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.43	No
BFIHOST19	0.39	No
PROPWET	0.36	No
SAAR (mm)	835	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

Appendix A.3 – Southern Water Asset Location Data



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122	Date: 21/05/25	Scale: 1:1250	Map Centre: 535059,137273	Data updated: 20/03/25	Our Ref: 1776080 - 1	Wastewater Plan A3 Powered by digdat

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway

flood@herringtonconsulting.co.uk

3071/JA

Water for Life from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	F	119.95	118.40	
0302	F	119.55	0.00	
0303	F	120.10	118.27	
1301	F	121.00	118.57	
1302	F	122.10	120.80	
1303	F	123.00	121.25	
1304	F	123.75	123.37	
1305	F	124.15	123.50	
2401	F	123.47	121.60	
8101	F	130.01	128.58	
8102	F	130.88	129.08	
8201	F	0.00	0.00	
8202	F	0.00	0.00	
8302	F	117.69	0.00	
8303	F	0.00	0.00	
8304	F	0.00	0.00	
9301	F	0.00	0.00	
9302	F	0.00	0.00	
9303	F	0.00	0.00	
9304	F	0.00	0.00	
9305	F	0.00	0.00	
8250	S	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix A.4 – Surface Water Management Calculations

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.200
Return Period (years)	100	Maximum Rainfall (mm/hr)	200.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Inverts		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
West Impermeable Area	0.409	4.00	125.170	1350	-11.844	-23.156	2.170
West Permeable Pavings (Roads)	0.201	4.00	123.240		-11.745	-11.996	1.200
West Pond			122.302		-11.861	3.018	1.302
East Impermeable Area	0.258	4.00	125.170	1200	14.116	-22.361	0.870
East Permeable Paving (Roads)	0.155	4.00	124.590		14.125	-11.710	1.100
East Pond			122.550		14.217	1.409	1.490
Out into river			121.500	1200	1.280	14.009	0.600
Out			120.960	1200	1.077	23.736	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	West Impermeable Area	West Permeable Pavings (Roads)	11.160	0.600	123.000	122.040	0.960	11.6	375	4.03	170.4
1.001	West Permeable Pavings (Roads)	West Pond	15.014	0.600	122.040	121.000	1.040	14.4	375	4.09	170.4
1.002	West Pond	Out into river	17.131	0.600	121.060	120.960	0.100	171.3	150	4.46	170.4
2.000	East Impermeable Area	East Permeable Paving (Roads)	10.651	0.600	124.300	123.490	0.810	13.1	300	4.04	170.4
2.001	East Permeable Paving (Roads)	East Pond	13.119	0.600	123.490	122.000	1.490	8.8	300	4.08	170.4
2.002	East Pond	Out into river	18.059	0.600	121.060	120.960	0.100	180.6	150	4.49	170.4
1.003	Out into river	Out	9.729	0.600	120.900	120.460	0.440	22.1	300	4.53	170.4

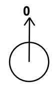
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	5.338	589.6	251.9	1.795	0.825	0.409	0.0	171	5.137
1.001	4.789	528.9	375.7	0.825	0.927	0.610	0.0	234	5.178
1.002	0.765	13.5	375.7	1.092	0.390	0.610	0.0	150	0.779
2.000	4.358	308.0	158.9	0.570	0.800	0.258	0.0	153	4.388
2.001	5.328	376.6	254.3	0.800	0.250	0.413	0.0	181	5.702
2.002	0.744	13.2	254.3	1.340	0.390	0.413	0.0	150	0.758
1.003	3.357	237.3	630.0	0.300	0.200	1.023	0.0	300	3.400

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	11.160	11.6	375	Circular	125.170	123.000	1.795	123.240	122.040	0.825
1.001	15.014	14.4	375	Circular	123.240	122.040	0.825	122.302	121.000	0.927
1.002	17.131	171.3	150	Circular	122.302	121.060	1.092	121.500	120.960	0.390
2.000	10.651	13.1	300	Circular	125.170	124.300	0.570	124.590	123.490	0.800
2.001	13.119	8.8	300	Circular	124.590	123.490	0.800	122.550	122.000	0.250
2.002	18.059	180.6	150	Circular	122.550	121.060	1.340	121.500	120.960	0.390
1.003	9.729	22.1	300	Circular	121.500	120.900	0.300	120.960	120.460	0.200

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	West Impermeable Area	1350	Manhole	Adoptable	West Permeable Pavings (Roads)		Junction	
1.001	West Permeable Pavings (Roads)		Junction		West Pond		Junction	
1.002	West Pond		Junction		Out into river	1200	Manhole	Adoptable
2.000	East Impermeable Area	1200	Manhole	Adoptable	East Permeable Paving (Roads)		Junction	
2.001	East Permeable Paving (Roads)		Junction		East Pond		Junction	
2.002	East Pond		Junction		Out into river	1200	Manhole	Adoptable
1.003	Out into river	1200	Manhole	Adoptable	Out	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
West Impermeable Area	-11.844	-23.156	125.170	2.170	1350					
							0	1.000	123.000	375
West Permeable Pavings (Roads)	-11.745	-11.996	123.240	1.200			1	1.000	122.040	375
							0	1.001	122.040	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
West Pond	-11.861	3.018	122.302	1.302		1	1.001	121.000	375
						0	1.002	121.060	150
East Impermeable Area	14.116	-22.361	125.170	0.870	1200	0	2.000	124.300	300
East Permeable Paving (Roads)	14.125	-11.710	124.590	1.100		1	2.000	123.490	300
						0	2.001	123.490	300
East Pond	14.217	1.409	122.550	1.490		1	2.001	122.000	300
						0	2.002	121.060	150
Out into river	1.280	14.009	121.500	0.600	1200	1	2.002	120.960	150
						2	1.002	120.960	150
						0	1.003	120.900	300
Out	1.077	23.736	120.960	0.500	1200	1	1.003	120.460	300

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	10080	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	45	10	0
2	0	0	0	50	0	0	0
10	0	0	0	100	0	0	0
30	0	0	0	100	45	10	0

Node West Pond Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	121.000	Product Number	CTL-SHE-0134-8900-1302-8900
Design Depth (m)	1.302	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.9	Min Node Diameter (mm)	1500

Node East Pond Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	121.000	Product Number	CTL-SHE-0099-5200-1550-5200
Design Depth (m)	1.550	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.2	Min Node Diameter (mm)	1200

Node West Permeable Pavings (Roads) Online Orifice Control

Flap Valve	x	Invert Level (m)	122.040	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.086		

Node East Permeable Paving (Roads) Online Orifice Control

Flap Valve	x	Invert Level (m)	123.490	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.061		

Node West Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	121.060
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	600

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	152.1	0.0	0.300	206.2	0.0	0.600	268.5	0.0	0.900	339.0	0.0	1.200	417.6	0.0
0.100	169.2	0.0	0.400	226.0	0.0	0.700	291.0	0.0	1.000	364.3	0.0	1.300	445.6	0.0
0.200	187.5	0.0	0.500	246.9	0.0	0.800	314.5	0.0	1.100	390.4	0.0			

Node East Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	121.060
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	900

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	45.3	0.0	0.300	69.5	0.0	0.600	98.8	0.0	0.900	133.2	0.0	1.200	172.8	0.0	1.490	216.0	0.0
0.100	52.8	0.0	0.400	78.7	0.0	0.700	109.7	0.0	1.000	145.8	0.0	1.300	187.1	0.0			
0.200	60.9	0.0	0.500	88.5	0.0	0.800	121.2	0.0	1.100	159.1	0.0	1.400	202.1	0.0			

Node West Permeable Pavings (Roads) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Pit Width (m)	10.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	122.040	Pit Length (m)	100.000	Number Required	1
Safety Factor	2.0	Time to half empty (mins)	750	Depth (m)	0.750		

Node East Permeable Paving (Roads) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Pit Width (m)	6.820	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	123.490	Pit Length (m)	100.000	Number Required	1
Safety Factor	2.0	Time to half empty (mins)	1020	Depth (m)	0.750		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.092	0.092	53.5	0.1320	0.0000	OK
720 minute summer	West Permeable Pavings (Roads)	465	122.148	0.108	14.2	102.6744	0.0000	OK
960 minute summer	West Pond	705	121.198	0.198	3.9	22.6578	0.0000	OK
15 minute summer	East Impermeable Area	9	124.381	0.081	33.8	0.0914	0.0000	OK
960 minute summer	East Permeable Paving (Roads)	630	123.601	0.111	8.0	72.1120	0.0000	OK
960 minute summer	East Pond	660	121.174	0.114	2.2	5.6819	0.0000	OK
960 minute summer	Out into river	705	120.934	0.034	5.8	0.0379	0.0000	OK
960 minute summer	Out	705	120.492	0.032	5.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	53.6	5.632	0.091	0.1261	
720 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	3.9	0.212	0.007	0.4580	
960 minute summer	West Pond	1.002	Out into river	3.7	0.650	0.271	0.0966	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	33.9	4.764	0.110	0.0889	
960 minute summer	East Permeable Paving (Roads)	2.001	East Pond	2.2	1.463	0.006	0.0198	
960 minute summer	East Pond	2.002	Out into river	2.2	0.554	0.167	0.0716	
960 minute summer	Out into river	1.003	Out	5.8	1.400	0.025	0.0406	297.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.114	0.114	82.6	0.1631	0.0000	OK
720 minute summer	West Permeable Pavings (Roads)	480	122.178	0.138	18.2	130.9429	0.0000	OK
720 minute summer	West Pond	585	121.215	0.215	4.8	25.6953	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.400	0.100	52.2	0.1129	0.0000	OK
720 minute summer	East Permeable Paving (Roads)	495	123.633	0.143	12.3	92.5701	0.0000	OK
720 minute summer	East Pond	540	121.187	0.127	2.6	6.3678	0.0000	OK
720 minute summer	Out into river	585	120.937	0.037	7.0	0.0414	0.0000	OK
720 minute summer	Out	585	120.495	0.035	7.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	82.8	6.128	0.140	0.1753	
720 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	4.8	0.217	0.009	0.5126	
720 minute summer	West Pond	1.002	Out into river	4.4	0.685	0.329	0.1113	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	52.3	5.155	0.170	0.1242	
720 minute summer	East Permeable Paving (Roads)	2.001	East Pond	2.6	1.539	0.007	0.0222	
720 minute summer	East Pond	2.002	Out into river	2.6	0.580	0.196	0.0805	
720 minute summer	Out into river	1.003	Out	7.0	1.474	0.030	0.0463	349.6

Results for 10 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.162	0.162	164.9	0.2313	0.0000	OK
480 minute summer	West Permeable Pavings (Roads)	344	122.259	0.219	39.4	208.4616	0.0000	OK
720 minute summer	West Pond	615	121.253	0.253	6.5	32.6779	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.442	0.142	104.0	0.1606	0.0000	OK
600 minute summer	East Permeable Paving (Roads)	450	123.719	0.229	21.6	148.3914	0.0000	OK
600 minute summer	East Pond	510	121.218	0.158	3.5	8.1276	0.0000	SURCHARGED
720 minute summer	Out into river	600	120.943	0.043	9.6	0.0484	0.0000	OK
720 minute summer	Out	600	120.501	0.041	9.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	165.1	6.865	0.280	0.3053	
480 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	6.5	0.262	0.012	0.6210	
720 minute summer	West Pond	1.002	Out into river	6.2	0.745	0.456	0.1416	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	104.1	5.762	0.338	0.2186	
600 minute summer	East Permeable Paving (Roads)	2.001	East Pond	3.5	1.681	0.009	0.0270	
600 minute summer	East Pond	2.002	Out into river	3.4	0.627	0.261	0.0990	
720 minute summer	Out into river	1.003	Out	9.6	1.611	0.040	0.0578	545.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.187	0.187	215.7	0.2674	0.0000	OK
600 minute summer	West Permeable Pavings (Roads)	420	122.319	0.279	40.3	265.1970	0.0000	OK
960 minute summer	West Pond	750	121.279	0.279	7.5	37.6175	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.465	0.165	136.0	0.1863	0.0000	OK
720 minute summer	East Permeable Paving (Roads)	525	123.785	0.295	24.2	190.8494	0.0000	OK
720 minute summer	East Pond	600	121.241	0.181	4.0	9.4820	0.0000	SURCHARGED
960 minute summer	Out into river	750	120.946	0.046	11.1	0.0522	0.0000	OK
960 minute summer	Out	750	120.504	0.044	11.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	216.0	7.139	0.366	0.3840	
600 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	7.5	0.236	0.014	0.6906	
960 minute summer	West Pond	1.002	Out into river	7.2	0.774	0.531	0.1590	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	136.3	5.970	0.442	0.2766	
720 minute summer	East Permeable Paving (Roads)	2.001	East Pond	4.0	1.756	0.011	0.0298	
720 minute summer	East Pond	2.002	Out into river	4.0	0.651	0.300	0.1096	
960 minute summer	Out into river	1.003	Out	11.1	1.681	0.047	0.0644	742.8

Results for 30 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.247	0.246	344.2	0.3527	0.0000	OK
720 minute summer	West Permeable Pavings (Roads)	510	122.502	0.462	57.1	439.0798	0.0000	SURCHARGED
960 minute summer	West Pond	1005	121.429	0.429	10.0	68.3028	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.521	0.221	217.1	0.2503	0.0000	OK
960 minute summer	East Permeable Paving (Roads)	690	123.982	0.492	31.7	318.4806	0.0000	SURCHARGED
960 minute summer	East Pond	1005	121.426	0.365	5.3	21.8804	0.0000	SURCHARGED
960 minute summer	Out into river	1005	120.951	0.051	13.7	0.0581	0.0000	OK
960 minute summer	Out	1005	120.509	0.049	13.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	344.5	7.505	0.584	0.5849	
720 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	10.0	0.230	0.019	0.8670	
960 minute summer	West Pond	1.002	Out into river	8.7	0.815	0.647	0.1837	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	217.3	6.215	0.705	0.4263	
960 minute summer	East Permeable Paving (Roads)	2.001	East Pond	5.3	1.917	0.014	0.0361	
960 minute summer	East Pond	2.002	Out into river	4.9	0.691	0.375	0.1290	
960 minute summer	Out into river	1.003	Out	13.7	1.778	0.058	0.0748	1186.6

Results for 50 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.198	0.198	238.5	0.2828	0.0000	OK
960 minute summer	West Permeable Pavings (Roads)	630	122.360	0.320	33.6	303.5939	0.0000	OK
960 minute summer	West Pond	780	121.298	0.298	8.1	41.2371	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.475	0.175	150.4	0.1975	0.0000	OK
1440 minute summer	East Permeable Paving (Roads)	960	123.833	0.343	16.8	222.0013	0.0000	SURCHARGED
1440 minute summer	East Pond	1080	121.272	0.212	4.3	11.3566	0.0000	SURCHARGED
1440 minute summer	Out into river	1050	120.948	0.048	12.0	0.0543	0.0000	OK
1440 minute summer	Out	1050	120.506	0.046	12.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	238.8	7.232	0.405	0.4193	
960 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	8.1	0.208	0.015	0.7383	
960 minute summer	West Pond	1.002	Out into river	7.8	0.788	0.575	0.1688	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	150.7	6.037	0.489	0.3028	
1440 minute summer	East Permeable Paving (Roads)	2.001	East Pond	4.3	1.802	0.012	0.0316	
1440 minute summer	East Pond	2.002	Out into river	4.3	0.664	0.323	0.1157	
1440 minute summer	Out into river	1.003	Out	12.0	1.717	0.051	0.0681	961.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
15 minute summer	West Impermeable Area	9	123.213	0.213	271.7	0.3049	0.0000	OK
1440 minute summer	West Permeable Pavings (Roads)	930	122.444	0.404	31.2	384.2054	0.0000	SURCHARGED
1440 minute summer	West Pond	1200	121.373	0.373	9.3	56.4013	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.489	0.189	171.4	0.2137	0.0000	OK
1440 minute summer	East Permeable Paving (Roads)	960	123.931	0.441	21.1	285.6286	0.0000	SURCHARGED
1440 minute summer	East Pond	1200	121.363	0.303	5.0	17.3665	0.0000	SURCHARGED
1440 minute summer	Out into river	1200	120.951	0.051	13.2	0.0571	0.0000	OK
1440 minute summer	Out	1200	120.508	0.048	13.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	271.9	7.342	0.461	0.4709	
1440 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	9.3	0.201	0.018	0.8625	
1440 minute summer	West Pond	1.002	Out into river	8.5	0.808	0.628	0.1798	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	171.6	6.115	0.557	0.3411	
1440 minute summer	East Permeable Paving (Roads)	2.001	East Pond	5.0	1.882	0.013	0.0347	
1440 minute summer	East Pond	2.002	Out into river	4.8	0.684	0.362	0.1256	
1440 minute summer	Out into river	1.003	Out	13.2	1.763	0.056	0.0731	1206.2

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	West Impermeable Area	9	123.290	0.290	433.3	0.4152	0.0000	OK
1440 minute summer	West Permeable Pavings (Roads)	960	122.727	0.687	49.8	652.1929	0.0000	SURCHARGED
2160 minute summer	West Pond	2400	121.948	0.948	12.1	211.5013	0.0000	SURCHARGED
15 minute summer	East Impermeable Area	9	124.573	0.273	273.3	0.3091	0.0000	OK
1440 minute summer	East Permeable Paving (Roads)	990	124.238	0.748	33.8	484.3127	0.0000	SURCHARGED
2160 minute summer	East Pond	2580	122.249	1.189	6.5	120.9274	0.0000	SURCHARGED
480 minute winter	Out into river	640	120.952	0.052	13.9	0.0587	0.0000	OK
480 minute winter	Out	640	120.509	0.049	13.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	West Impermeable Area	1.000	West Permeable Pavings (Roads)	433.7	7.595	0.736	0.7285	
1440 minute summer	West Permeable Pavings (Roads)	1.001	West Pond	12.4	0.212	0.023	0.8739	
480 minute winter	West Pond	1.002	Out into river	8.9	0.819	0.658	0.1859	
15 minute summer	East Impermeable Area	2.000	East Permeable Paving (Roads)	273.7	6.216	0.889	0.5370	
1440 minute summer	East Permeable Paving (Roads)	2.001	East Pond	6.6	2.052	0.017	0.3288	
480 minute summer	East Pond	2.002	Out into river	5.1	0.695	0.384	0.1313	
480 minute winter	Out into river	1.003	Out	13.9	1.787	0.059	0.0759	1293.8

Appendix A.5 – Indicative Drainage Layout

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.
2. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, EUROPEAN NORMS, CODES OF PRACTICE AND BUILDING PRACTICE.
3. ALL DIMENSIONS ARE TO BE CHECKED BY THE CONTRACTOR PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
4. ALL DRAINAGE SYSTEMS WILL NEED TO BE INSTALLED AND DESIGNED FOR SUITABLE LOADING REQUIREMENTS.
5. THE CONTRACTOR SHALL OBTAIN PRIOR APPROVAL AND ALL NECESSARY LICENCES FROM THE THE HIGHWAY AUTHORITY AND/OR SEWERAGE UNDERTAKER BEFORE CARRYING OUT ANY WORKS.
6. THIS DRAWING WAS PRODUCED FOR USE IN CONJUNCTION WITH A PLANNING SUBMISSION AND SHOULD NOT BE USED FOR OTHER PURPOSES. A MORE DETAILED DESIGN INCLUDING PRODUCT SPECIFICATIONS WILL NEED TO BE PRODUCED PRIOR TO CONSTRUCTION.

KEY:

- PERMEABLE PAVING
- DRAINAGE BASIN
- SURFACE WATER DRAIN
- SURFACE WATER MANHOLE
- FLOW CONTROL DEVICE
- BASIN INLET/OUTLET

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Rev	Description	Author	Checked	Date
P1	First Issue	DB	SAH	30/05/25
P0	Constraints Plan	DB	SAH	15/04/25

CLIENT
Merrow Wood

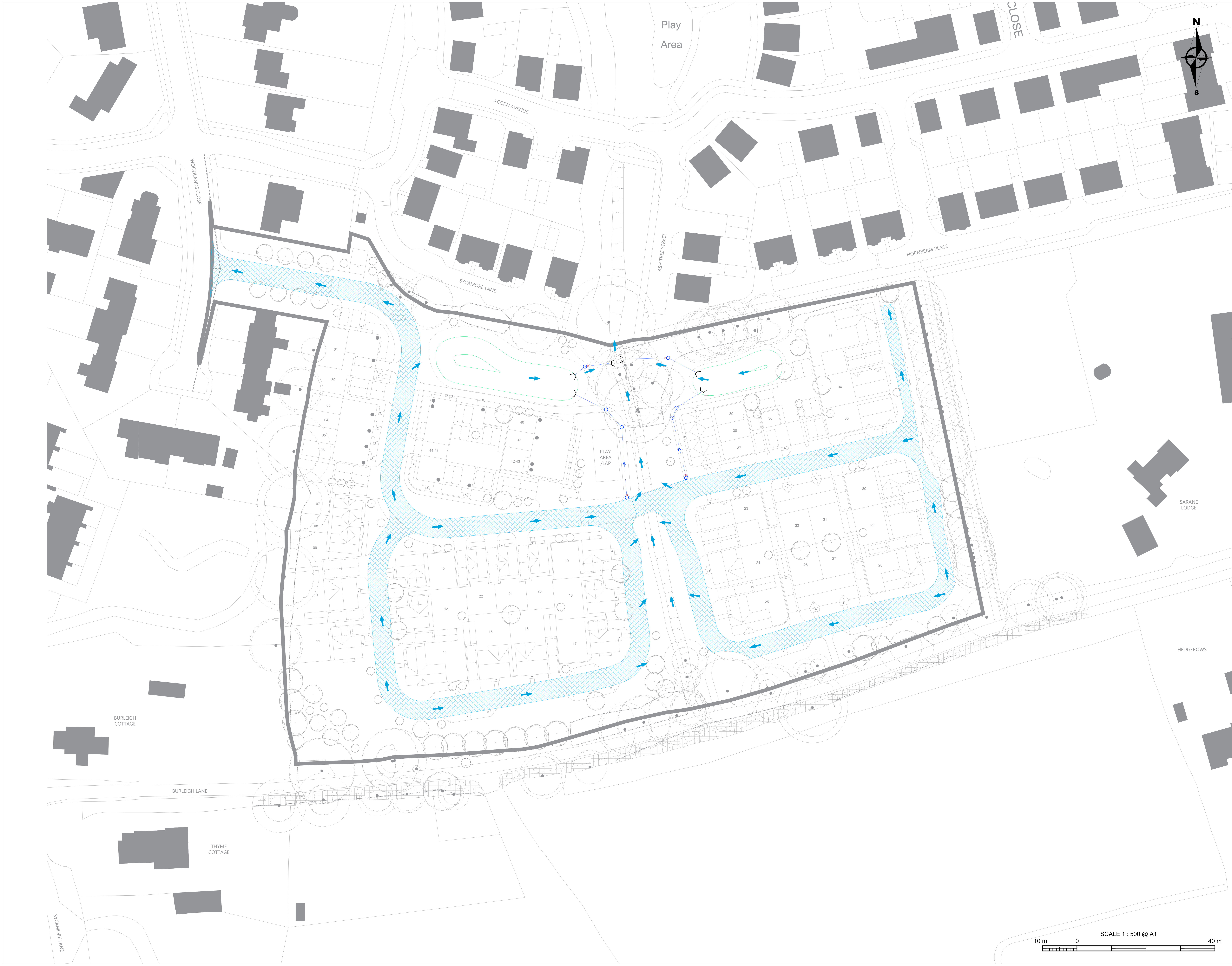
PROJECT
Burleigh Lane, Crawley Down

SCALE: 1:500
PROJ REF: 3071
ORIGINATOR: DB
CHECKED BY: SAH

HC DWG REF.
3071_DWG_r1

DWG TITLE
INDICATVE SURFACE WATER DRAINAGE LAYOUT PLAN

DWG No.
HC-3071-501



GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS, ARCHITECTS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.
2. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, EUROPEAN NORMS, CODES OF PRACTICE AND BUILDING PRACTICE.
3. ALL DIMENSIONS ARE TO BE CHECKED BY THE CONTRACTOR PRIOR TO STARTING THE WORKS ON SITE. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
4. ALL DRAINAGE SYSTEMS WILL NEED TO BE INSTALLED AND DESIGNED FOR SUITABLE LOADING REQUIREMENTS.
5. THE CONTRACTOR SHALL OBTAIN PRIOR APPROVAL AND ALL NECESSARY LICENCES FROM THE THE HIGHWAY AUTHORITY AND/OR SEWERAGE UNDERTAKER BEFORE CARRYING OUT ANY WORKS.
6. THIS DRAWING WAS PRODUCED FOR USE IN CONJUNCTION WITH A PLANNING SUBMISSION AND SHOULD NOT BE USED FOR OTHER PURPOSES. A MORE DETAILED DESIGN INCLUDING PRODUCT SPECIFICATIONS WILL NEED TO BE PRODUCED PRIOR TO CONSTRUCTION.

KEY:

→ FLOW ROUTE DURING EXCEEDANCE OR BLOCKAGE SCENARIO

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Rev	Description	Author	Checked	Date
P0	First Issue	DB	SAH	30/05/25

CLIENT
Merrow Wood

PROJECT
Burleigh Lane, Crawley Down

SCALE	PROJ REF	ORIGINATOR	CHECKED BY
1:500	3071	DB	SAH

HC DWG REF.
3071_DWG_r1

DWG TITLE
EXCEEDANCE PLAN

DWG No.
HC-3071-502

Appendix A.6 – Maintenance Schedules

Operation and Maintenance Schedule – Basins		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Routine maintenance	Remove debris and litter from within and around the basin area.	Monthly
	Cut grass for landscaped areas within the basin	Monthly, although should be adjusted to be most frequent during the growing season.
	Cut grass around the basin	Half yearly (spring and autumn), should be undertaken before the start of the nesting season.
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required.
	Inspect siltation rates and establish program for silt removal.	Inspection should be at annually and adjusted based recorded siltation rates.
Occasional Maintenance	Reseed areas with poor vegetation growth or where scouring is detected	As required following the detection of an issue during inspection.
	Prune and manage trees and nuisance plants in and around the basin.	
	Remove sediment from pre-treatment system when it is 50% full.	
Remedial Actions (Following Storms or scheduled inspections)	Repair erosion of other damage by reseeding or turfing damaged areas.	As required following the detection of an issue during inspection.
	Realign rip rap on inlets and outlets.	
	Repair inlet, outlet, and overflow structurers if damaged	
	Scarify basin surface especially if the performance of the basin has deteriorated.	
	Relevel areas which have settled or become eroded and ensure the land levels across the basin still match the design specifications.	
Monitoring and inspections	Inspect inlets, outlets and overflows for blockages. Clear blockages if detected.	At least monthly.
	Inspect pipework, and the base and banks of the feature for damage. Repair if detected	At least monthly.
	Inspect sediment traps, and the inlet structure for silt. Remove silt if necessary and adjust inspection frequencies to minimise the potential for a large build-up of silt to occur between inspections.	At least Half Yearly
	Inspect basin surfaces for silt, compaction, and ponding. Remediate areas (e.g. scarify grass) when detected	At least monthly.

General Operation and Maintenance Table for Basins.

Operation and Maintenance Schedule – Pervious paving / surfacing		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Brushing and vacuuming (for driveways this can be a standard cosmetic sweep over whole surface).	At minimum once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – particular attention must be payed to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using a suitable weed killer which will not adversely affect water quality. Weed killer should be applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving / surfacing.	As required when damage or erosion is detected following inspection. For block paving systems jointing material to be replaced shortly after installation and subsequently when required.
	Remedial work to any depressions. Rutting and cracked or broken blocks and replace lost jointing material (where block paving is used).	
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

General Maintenance Requirements for Permeable Surfacing (additional requirements may apply depending on type of surfacing material used).

Appendix A.7 – Site Investigations

Ground Investigation Report

Land at Burleigh Lane
Crawley Down
West Sussex
RH10 4LF

Prepared for:

Burleigh Lane Crawley Down Ltd.
85 Great Portland Street
London
W1W 7LT

EPS Project Reference:	UK25.7340
Date Issued:	3rd April 2025
Report Status:	Issue 1

LAND AT BURLEIGH LANE, CRAWLEY DOWN

NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a Ground Investigation undertaken to investigate the underlying ground conditions and to assess the permeability of the underlying soils for use in drainage design to support potential future development. Pertinent findings and conclusions may be summarised as follows:

- The site is located adjacent to Burleigh Lane in the south of the village of Crawley Down, with some dilapidated buildings present in the centre of the area which is primarily occupied by two undeveloped fields.

- Intrusive investigations involved the formation of five windowless sample boreholes to depth ranging between 3m and 4m.

- Ground conditions were recorded as topsoil followed by the soft to very stiff mottled light grey and orangish brown sandy silty clay with some mudstone lenses. Groundwater was not encountered during the drilling of the boreholes.

- 'Falling head' infiltration testing was attempted at three of the boreholes and a negligible amount of water added to facilitate these tests was recorded to drain. The primary reason for the lack of observed infiltration is likely to be the cohesive nature of the natural soil profile which is of very low permeability.

The above points represent a simplified summary of the findings of this assessment and **must not** form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

Project Reference:	UK25.7340
Title:	Ground Investigation Report – Land at Burleigh Lane, Crawley Down
Client:	Burleigh Lane Crawley Down Ltd.
Date:	3rd April 2025
EPS Contact Details:	7B Caxton House Broad Street Cambourne Cambridge CB23 6JN T: 01954 710666 E: info@epstrategies.co.uk W: www.epstrategies.co.uk
Status:	Issue 1

Author:	**Reviewed:**	**Authorised:**
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Oliver Calderbank	Tom Androsiuk	Steve Bullock
Consultant	Principal Consultant	Director

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

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1 INTRODUCTION

In March 2025, Environmental Protection Strategies Ltd (EPS) was commissioned by Merrow Wood on behalf of Burleigh Lane Crawley Down Ltd to complete ground investigation works at Land at of Burleigh Lane, Crawley Down, West Sussex, RH10 4LF ('the site'). A site location plan is presented as Figure 1 and selected site photographs are included as Appendix A.

The aim of these works was to gather information on the ground conditions and groundwater levels throughout the area and to also provide an initial indication of the permeability of the soils to support future development of the site.

It should be noted that a Phase I Desk Study or formal contamination assessment did not form part of the brief for the works undertaken.

1.1 Scope of Works

To perform an initial exploratory assessment of the site in accordance with the principles and requirements of BS 5930:2015+A1:2020 *'Code of practice for ground investigations'* the following tasks were undertaken:

<u>Intrusive Investigation:</u>

- Site walkover, inspection and obtaining photographic records.
- Health and safety briefing / site supervision.
- Drilling of five windowless sample boreholes to a maximum depth of 4.0m below ground level (bgl) using a track mounted, dynamic (drop-weight) percussive drilling rig and undertaking of subsequent 'falling head' infiltration testing at selected borehole locations.
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination (on a precautionary basis).

<u>Reporting:</u>

- Data collection and interpretation.
- Reporting

The findings of these investigations and their conclusions are presented in the following sections.

1.2 Limitations and Constraints

The purpose of this report is to present the findings of a ground investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all the ground conditions that might be present beneath a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes / trial pits to recover soil samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface. However, it should be appreciated that ground conditions are naturally variable. For this reason, it is possible that samples collected during the investigation may not represent the conditions across the entire site.

No visible evidence of Japanese Knotweed was identified during the site walkover. However, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its' presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

This report does not include specific investigation for the presence of Potential Asbestos Containing Material (PACM). Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

Whilst it is recognised that information contained within this report may assist relevant and suitably qualified professionals, this report does not provide a geotechnical appraisal of ground conditions with respect to suitability of foundations or future structures, nor does it intend to identify a need for any associated geotechnical ground improvement works.

2 SITE CHARACTERISATION

The following information has been obtained from publicly available records to characterise the site and setting.

2.1 Site Location and Context

Detail	Description
Location	The site is located in the south of the village of Crawley Down, approximately 4.5km east of the town of Crawley in Mid Sussex.
National Grid Reference	534976, 137211
Topographic Elevation	Levels across the study area are variable sloping down from approximately 126m above ordnance datum (AOD) in the south west and south east corners to approximately 123m AOD in the north.
Description of Site	As part of this ground investigation which took place in March 2025, the site was accessed through some heras fencing along the southern boundary on Burleigh Lane. This access point opens up into an area of poorly maintained hardstanding in front of several dilapidated buildings in the central site area which are understood to have been previously used for commercial and industrial purposes. To the west of these buildings on a north / south trend is a small gulley which was dry at the time of the investigation and slightly overgrown with weeds and brambles with a number of semi mature to mature trees present along the length of the gulley. A small land bridge crosses over the gully in the centre of the site leading towards a large open field in the western half of the site. This field had been recently cleared of overgrown vegetation and was covered with a hummocky grassy terrain. A large stockpile of the cleared vegetation was located in the centre of the western field. East of the buildings is a slightly smaller field which had also been recently cleared of vegetation, with the exception of a single semi-mature tree in the centre. Large pine trees marked the boundary between the eastern field and the buildings in the centre of the site. The eastern boundary of the site area is defined by several medium to large coniferous trees and shrubs while the northern boundary is defined by a small wooden fence with chicken wire and barbed wire along with semi-mature medium to large trees and shrubs also separating the site from adjacent residential properties, similar trees and vegetation define the western boundary of the area.
Geology	Geological mapping indicates the site is underlain by interbedded sandstone and siltstone of the bedrock Upper Tunbridge Wells Sand

	with and a band of mudstone (also designated as part of the Upper Tunbridge Wells Sand) is mapped through the western half of the site.

3 SUMMARY OF INVESTIGATIONS

The intrusive investigation was undertaken on the 20th March 2025, in accordance with EPS standard operating procedures, copies of which will be made available on request.

3.1 Borehole Locations

The locations of the windowless sample boreholes (WS01 – WS05) were selected to provide suitable coverage of the area and to meet the requirements of the drainage engineers (Herrington Consulting) involved in the project. The location of below and above ground utilities as well as operational health and safety considerations also factored into the positioning of the boreholes.

The wider objective in terms of borehole locations was to specifically focus on the presence / absence of groundwater and to initially assess the permeability of the encountered soils.

The boreholes were formed in accordance with standard EPS methodologies and all sub-contractors were supervised by an EPS engineer throughout the works. On completion, all boreholes were backfilled to the surface with soil arisings.

A borehole location plan is presented as Figure 2.

3.2 In-Situ Testing & Soil Sampling

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids (on a purely precautionary basis).

Furthermore, a 'falling head' infiltration test was attempted at WS01, WS03 and WS04 in order to provide an initial assessment of the permeability of the soil profile and the feasibility for the potential use of infiltration drainage features as part of future development proposals.

4 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

4.1 Ground Conditions

Five windowless sample boreholes have been drilled throughout the area and the ground conditions, encountered from surface level have been interpreted to comprise:

- Topsoil
- Upper Tunbridge Wells Sands

Site specific borehole logs are presented as Appendix B and a summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub-sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Range of Strata Thickness (m)
Topsoil	0.4	0.2 - 0.4
Upper Tunbridge Wells Sand	Not Proven (>4.0)	Not Proven

4.1.1 Topsoil

Topsoil was encountered from the surface of each borehole to a maximum depth of 0.4m and was described as a brown, silty sandy clay with common rootlets.

4.1.2 Upper Tunbridge Wells Sands

The natural soils encountered beneath the topsoil have been interpreted as representative of the bedrock Upper Tunbridge Wells Sands. At WS01, WS03 and WS05 this consisted of an initial layer of soft to firm brown sandy silty clay and at WS01 & WS05 this was followed by firm to very stiff and stiff to very stiff mottled grey and orangish brown sandy silty clay with thin mudstone lenses to at least 4.0m. Similar material (firm to very stiff silty sandy clay with thin mudstone lenses) made up the entire soil profile at WS02. At WS03 a similar layer of firm orangish brown very sandy silty clay was recorded to the base of the borehole with fewer mudstone fragments.

4.2 Groundwater

During the drilling of the boreholes, groundwater was not encountered within the soil profile of the boreholes which were drilled to depths ranging from 3.0m to 4.0m.

4.3 Physical Evidence of Contamination

No palpable evidence of contamination was encountered at any of the borehole locations formed during the ground investigation. The soils did not include any notable evidence of waste or putrefiable material, with hydrocarbon staining / odours also absent.

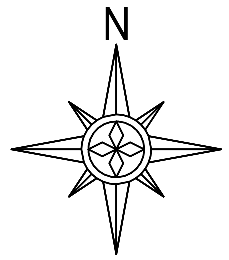
4.4 'Falling Head' Infiltration Testing

A 'falling head' infiltration test was attempted at WS01, WS03 & WS05 (which were drilled to depths of 4.0m & 3.0m) to give an initial indication of the permeability of the underlying soils. However, a negligible volume of water was found to drain away from the open boreholes over the duration of the 'falling head' infiltration tests which exceeded approximately 1.5 – 2 hours).

The negligible amount of water that drained during the testing period suggests the soils are likely to be 'practically impermeable', which is not unexpected due to the generally fine clayey (cohesive) nature of the encountered soils. While a slightly increased drop of the water level was recorded during the test undertaken at WS03 (compared to that observed at WS01 & WS05), this is suspected to be because the borehole collapsed to a depth of approximately 2.1m during the test, initially raising the water level in the borehole while also increasing the effective area of the soil profile for water to drain through thereby resulting in a marginally increased drop of the water level over the testing period. The increased granular content of the soil profile at WS03 is also likely to have contributed to slightly more of the water added to the borehole draining at this location compared to the tests at boreholes WS01 & WS03). Nonetheless, the volume of water that drained was still insufficient to allow for an infiltration rate to be calculated with the soil profile at WS03.

Given that this investigation has found that the soil profile present to depths of at least 4m comprise mainly cohesive materials, the use of infiltration drainage features such as soakaways is likely to be limited. Should the client wish to substantiate this further, consideration could be given to undertaking 'soakaway' infiltration testing in general accordance with the BRE Digest 365 guidance.

FIGURES



Rev	Date	Drawn	Description	Ch'k'd

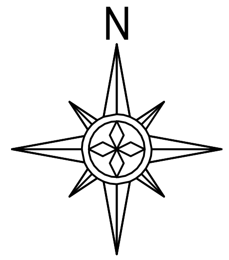
The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site
Land south of Burleigh Lane, Crawley Down
West Sussex, RH10 4AN

Client
Herrington Consulting

Title
Figure 1 - Site Location Plan

Surveyed:		Drawn by:	OC
Checked by:	OC	Date:	March 2025
Scale [A4 Sheet]	Not to Scale	Drawing Reference	UK25.7340_01
Job No	UK25.7340	Rev	01



KEY:

SITE BOUNDARY

EPS WINDOWLESS SAMPLE BOREHOLE

Rev	Date	Drawn	Description	Ch'k'd

eps

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site

Land south of Burleigh Lane, Crawley Down
West Sussex, RH10 4AN

Client

Herrington Consulting

Title

Figure 2 - Borehole Location Plan

Surveyed:		Drawn by:	OC
Checked by:	OC	Date:	March 2025
Scale [A4 Sheet]	Not to Scale	Drawing Reference	UK25.7340_01
Job No	UK25.7340	Rev	01

APPENDICES

APPENDIX A

Selected Site Photographs

N

KEY:

- SITE BOUNDARY
- DIRECTION OF SITE PHOTOGRAPH
- SITE PHOTOGRAPH NUMBER

Rev	Date	Drawn	Description	Ch'k'd

eps

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site
Land south of Burleigh Lane, Crawley Down
West Sussex, RH10 4AN

Client
Herrington Consulting

Title
Appendix A - Photograph Location Plan

Surveyed:		Drawn by:	OC
Checked by:	OC	Date:	March 2025
Scale [A4 Sheet]	Not to Scale	Drawing Reference	UK25.7340_A
Job No	UK25.7340	Rev	01

Photo 1: Photo of the western field looking east.	Photo 2: Photo showing the dilapidated buildings and the entrance from Burleigh Lane.
	
Photo 3: Photo showing the eastern field.	Photo 4: Photo showing the location and drilling of WS03.
	
Photo 5: Photo showing the soil recovered from WS01.	Photo 6: Photo showing the soil recovered from WS03.
	

APPENDIX B

Site Specific Borehole Logs

Dynamic (Windowless) Sampler

WS01
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS	534976.00	137211.00		1:25

Project Name	Project No.	Start Date	End Date
Land at Burleigh Lane	UK25.7340	2025-03-20	2025-03-20

Client	Contractor	Consultant
Burleigh Lane Crawley Down Ltd.		OC

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.20) 0.20		Brown silty sandy clay TOPSOIL with common rootlets under grass.
						(0.70) 0.90		Soft to firm brown and mottled grey slightly sandy silty CLAY. [Upper Tunbridge Wells Sand]
						(3.10) 4.00		Firm to very stiff mottled grey and orangish brown silty sandy CLAY with thin mudstone lenses. [Upper Tunbridge Wells Sand]
								End of Borehole at 4.00m

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Remarks
Groundwater not encountered. Refusal at 4.0m.

Method, Plant, Stability, Dimensions

Logger

Checked By: OC **Approved By:** OC **Status:** FINAL

Dynamic (Windowless) Sampler

WS02
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS	535010.00	137258.00		1:25

Project Name	Project No.	Start Date	End Date
Land at Burleigh Lane	UK25.7340	2025-03-20	2025-03-20

Client	Contractor	Consultant
Burleigh Lane Crawley Down Ltd.		OC

Inst/ Backfill	Water Levels	Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Description
						(0.40) 0.40		Brown silty sandy clay TOPSOIL with common rootlets under grass.
						(3.60) 4.00		Firm to very stiff mottled grey and orangish brown silty sandy CLAY with thin mudstone lenses. [Upper Tunbridge Wells Sand]
								End of Borehole at 4.00m

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Remarks
Groundwater not encountered.

Method, Plant, Stability, Dimensions **Logger**

Checked By: OC **Approved By:** OC **Status:** FINAL

Dynamic (Windowless) Sampler

WS03
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS	535046.00	137290.00		1:25

Project Name	Project No.	Start Date	End Date
Land at Burleigh Lane	UK25.7340	2025-03-20	2025-03-20

Client	Contractor	Consultant
Burleigh Lane Crawley Down Ltd.		OC

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Strata: Description
						0.20 (0.20)		Brown silty sandy clay TOPSOIL with common rootlets under grass.
						1.10 (0.90)		Firm brown sandy silty CLAY. [Upper Tunbridge Wells Sand]
						3.00 (1.90)		Firm orangish brown very sandy silty CLAY. [Upper Tunbridge Wells Sand]
								End of Borehole at 3.00m

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Remarks
Groundwater not encountered. Hole collapsed to 2.10m.

Method, Plant, Stability, Dimensions

Logger

Checked By: OC **Approved By:** OC **Status:** FINAL

Dynamic (Windowless) Sampler

WS04
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS	535139.00	137230.00		1:25

Project Name	Project No.	Start Date	End Date
Land at Burleigh Lane	UK25.7340	2025-03-20	2025-03-20

Client	Contractor	Consultant
Burleigh Lane Crawley Down Ltd.		OC

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.20) 0.20		Brown silty sandy clay TOPSOIL with common rootlets under grass.
						(2.80) 3.00		Soft to very stiff mottled orangish brown and grey sandy silty CLAY with mudstone. [Upper Tunbridge Wells Sand]
								End of Borehole at 3.00m

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Remarks
Groundwater not encountered. Refusal at 3.0m.

Method, Plant, Stability, Dimensions | **Logger**

Checked By: OC **Approved By:** OC **Status:** FINAL

Dynamic (Windowless) Sampler

WS05
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS	535118.00	137313.00		1:25

Project Name	Project No.	Start Date	End Date
Land at Burleigh Lane	UK25.7340	2025-03-20	2025-03-20

Client	Contractor	Consultant
Burleigh Lane Crawley Down Ltd.		OC

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Description
						0.20 (0.20)	Brown silty sandy clay TOPSOIL with common rootlets under grass.
						1.80 (1.60)	Soft to firm brown silty sandy CLAY. [Upper Tunbridge Wells Sand]
						3.00 (1.20)	Stiff to very stiff mottled orangish brown and grey slightly sandy silty CLAY with mudstone. [Upper Tunbridge Wells Sand]
							End of Borehole at 3.00m

Remarks
Groundwater not encountered. Refusal at 3.0m.

Method, Plant, Stability, Dimensions | **Logger**

Checked By: OC **Approved By:** OC **Status:** FINAL

Created using Pebble Geo

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Appendix A.8 – Greenfield Runoff Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

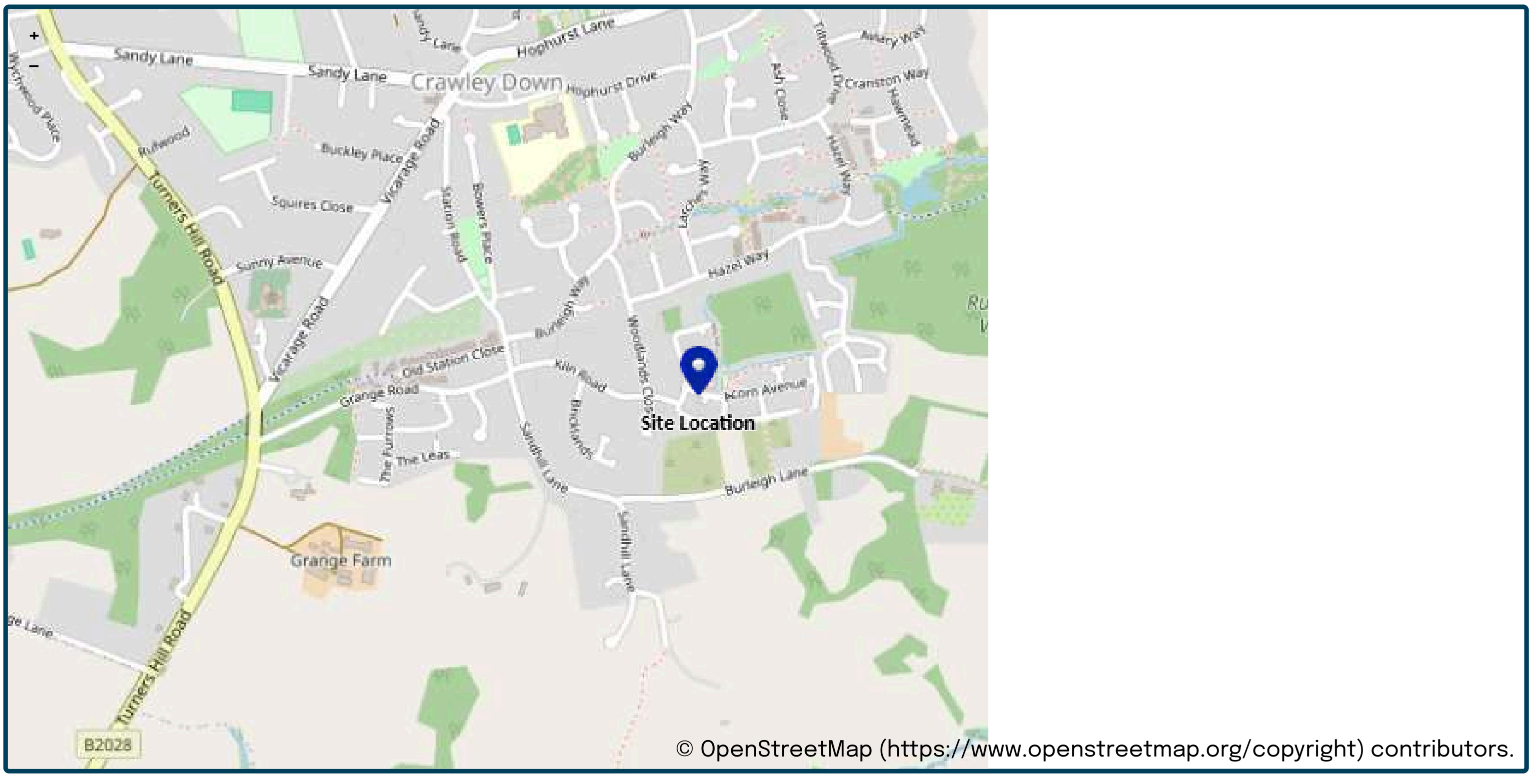
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	27/05/2025
Calculated by	Dayle
Reference	3071 EAST
Model version	2.0.1

Location

Site name	
Site location	



Site easting	535019
Site northing	137331

Site details

Total site area (ha)	0.7516	ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value
SAAR (mm)	835	mm	839
BFIHOST	0.392		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	4.57	l/s	
QBar (FEH statistical) (l/s)	5.2	l/s	

Growth curve factors

	My value	Map value
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	4.4	l/s
Flow rate 2 year (l/s)	4.6	l/s
Flow rate 10 years (l/s)	8.4	l/s
Flow rate 30 years (l/s)	12	l/s
Flow rate 100 years (l/s)	16.6	l/s
Flow rate 200 years (l/s)	19.4	l/s

Disclaimer

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

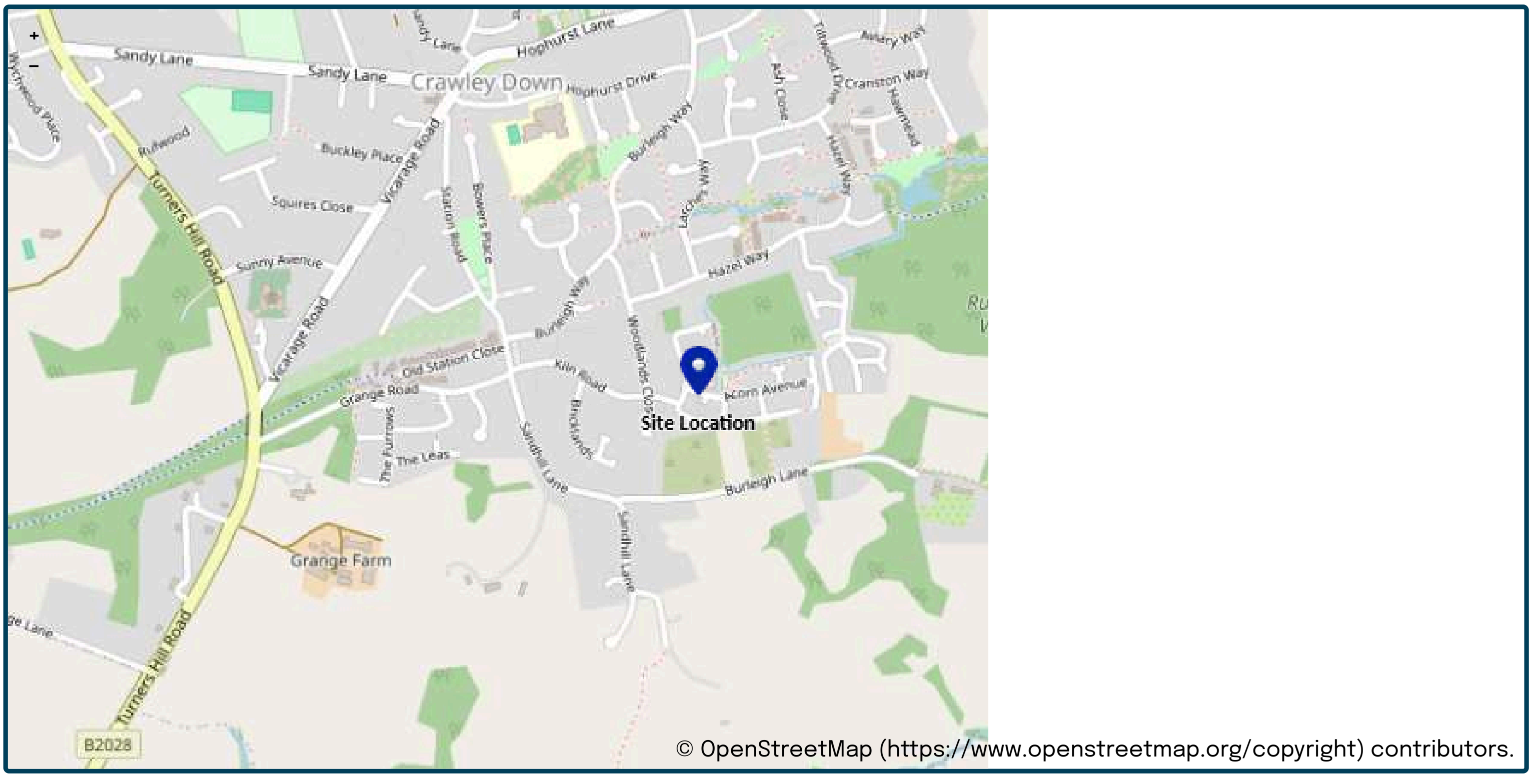
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	27/05/2025
Calculated by	Dayle
Reference	3071 WEST
Model version	2.0.1

Location

Site name	
Site location	



Site easting	535019
Site northing	137331

Site details

Total site area (ha)	1.2851 ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value
SAAR (mm)	835	mm	839
BFIHOST	0.392		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	7.82	l/s	
QBar (FEH statistical) (l/s)	8.9	l/s	

Growth curve factors

	My value	Map value
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	7.6	l/s
Flow rate 2 year (l/s)	7.8	l/s
Flow rate 10 years (l/s)	14.4	l/s
Flow rate 30 years (l/s)	20.4	l/s
Flow rate 100 years (l/s)	28.3	l/s
Flow rate 200 years (l/s)	33.2	l/s

Disclaimer