

# St Nicholas Church In Wales Primary School (St Nicholas)

Flood Consequence Assessment and Drainage Strategy

Vale of Glamorgan Council

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**List of Acronyms**

AEP	Annual Exceedance Probability
BFI HOST	Baseline Flow Index Hydrology of Soil Types
DAM	Development Advice Map
DS	Drainage Strategy
FCA	Flood Consequences Report
LFRMS	Local Flood Risk Management Strategy
mAOD	Meters above Ordinance Datum
NRW	Natural Resources Wales
PFRA	Preliminary Flood Risk Assessment
SAB	SuDS Approving Body
SFCA	Strategic Flood Consequence Assessment
SPZ	Source Protection Zone
SuDS	Sustainable Drainage System
VoGC	Vale of Glamorgan Council

# 1. Introduction

## 1.1 Commission

AECOM Limited has been commissioned by Vale of Glamorgan Council (VoGC) (hereafter referred to as the 'Client') to undertake a Flood Consequence Assessment (FCA) and conceptual Drainage Strategy (DS) for the development of the existing St Nicholas School in St Nicholas. The FCA and DS is to be issued as part of the tendering process only. Flood risk and the drainage strategy will need to be considered further prior to submission of a planning application.



**Figure 1-1: Site Location Map**

The FCA and DS have been prepared on the basis that the successful contractor will be responsible for the design of the school drainage and for gaining planning permission.

The report has been set out as follows:

- Introduction;
- Site description;
- Planning Policy and guidance section;
- Flood Risk to the site;
- Conceptual Drainage Strategy;
- Flood Risk from the site.

The drainage strategy has been included as shown to enable the flood risk from the site to be assessed assuming implementation of the proposed strategy without repetition.

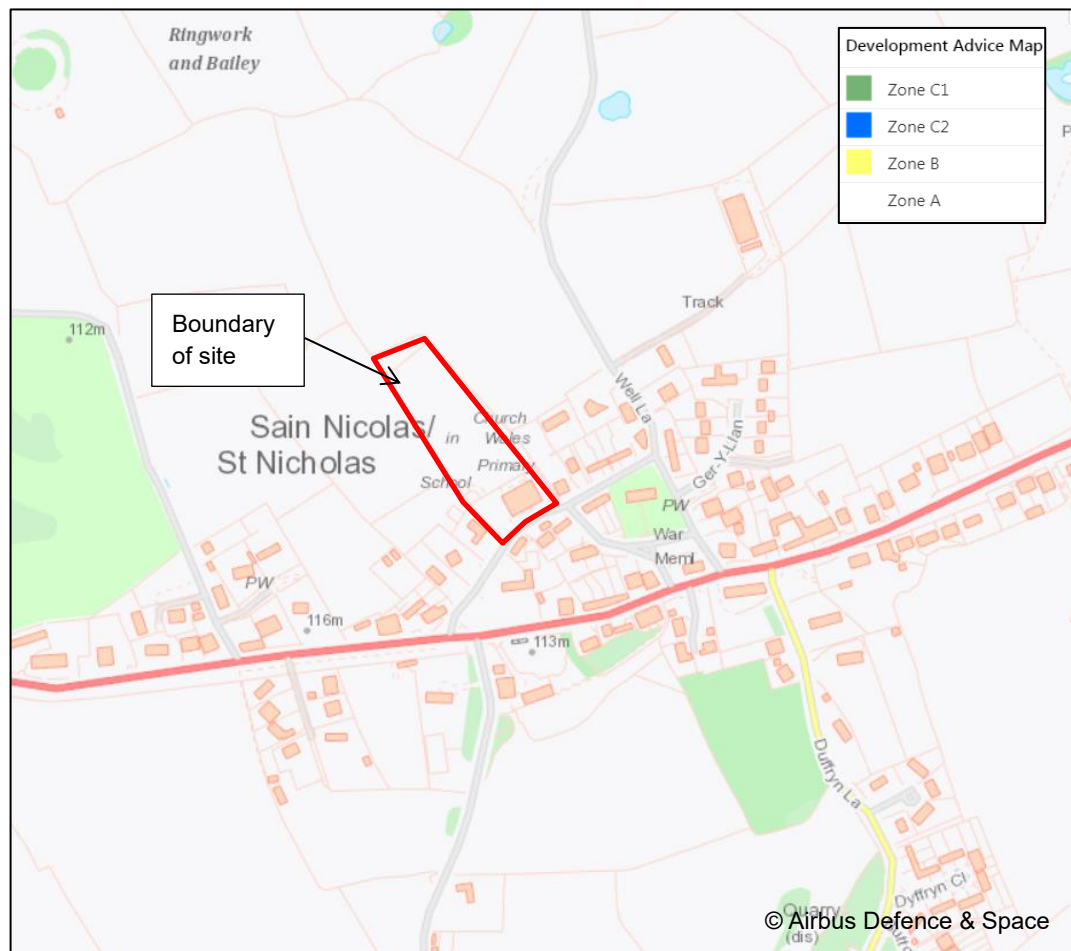
## 1.2 Aims and Objectives

The aim of the FCA is to consider the flood risk posed to and arising from the Proposed Development. In order to achieve this, the following objectives are required to be met:

- Collect and review existing flood risk data including topographic data, surface water drainage, Natural Resources Wales (NRW) information, scheme proposals and the VoGC Strategic Flood Consequence Assessment (SFCA);
- Assess and interpret available information to identify potential sources of flood risk including groundwater, surface water and infrastructure failure;
- Produce an FCA report in full accordance with TAN15 to accompany the planning application and
- Produce a high level DS to inform a SuDS Approving Body (SAB) Pre-Application submission that complies with the Statutory National Standards for SuDS (2018).

## 1.3 Policy Context

The Development Advice Map (DAM), presented on the NRW website, shows that the entire site is located within DAM Zone A. Areas located in DAM Zone A are classified as being at little or no risk of fluvial or coastal/tidal flooding. As the risk of flooding from rivers or seas is classified as low, the principal consideration of this FCA is surface water management.



**Figure 1-2: Natural Resources Wales Flood Map (Source: NRW)**

(Adapted from NRW flood risk maps. Date Accessed: 24/05/19)

This FCA report has been prepared in accordance with the *Technical Advice Note 15 (TAN15): Development and Flood Risk*<sup>1</sup>. The Welsh Government's accompanying TAN15 DAMs, alongside the

<sup>1</sup> Technical Advice Note (TAN 15). Available from: <https://gov.wales/docs/desh/publications/040701tan15en.pdf>. Last Accessed: 09/05/18.

NRW flood maps have also been used to inform this assessment. As the development is situated within DAM Zone A, a justification test is not applicable. However, as the impermeable areas of the Proposed Development could increase, an FCA report and DS has been produced to demonstrate how surface water runoff could be managed.



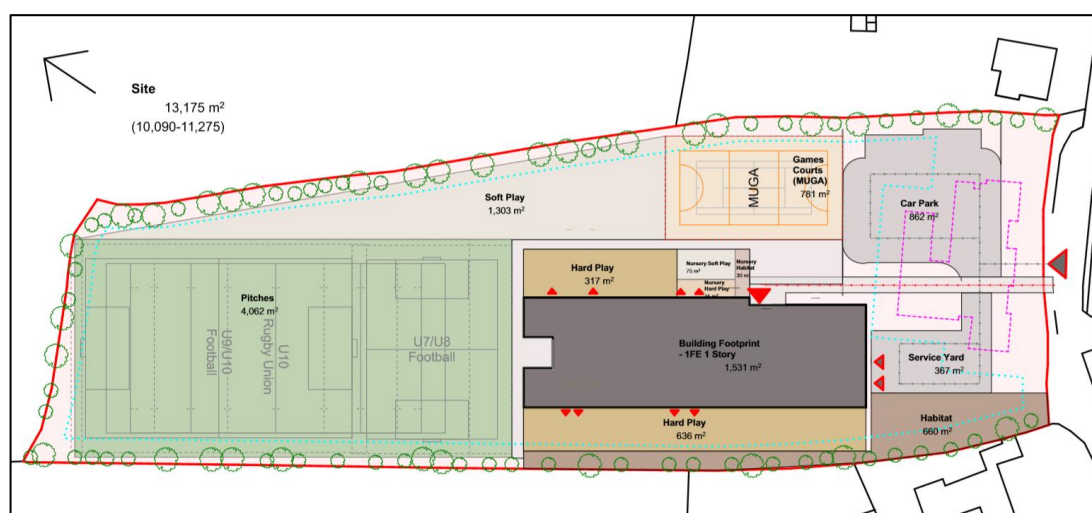
## 2. Site Description

### 2.1 Proposed Development

The total area of the site is approximately 1.32 ha. There is an existing school on the site, however, this school will be demolished on completion of the proposed development.

As shown in Figure 2-1: Proposed New School Layout the Proposed Development will comprise:

- A new larger school footprint;
- Car parking and service area;
- Hard and soft play areas for the school and nursery
- A Games court (MUGA);
- Sports pitches; and
- New habitat area.



**Figure 2-1: Proposed New School Layout**

See Appendix A for the full proposed school layout drawing.

### 2.2 Location

The Proposed Development site is located within St Nicholas. The approximate Ordnance Survey National Grid Reference centred on the application site is ST 08867 74401. The approximate postcode for the site is CF5 6SP.

The site is between approximately 45m and 60m wide and 190m long. It is proposed that the new school be built on the playing fields so that the use of the school can continue throughout the construction.

### 2.3 LIDAR and Topography

LiDAR data (see Figure 2-2 below) shows the elevations on across the site graphically. The levels on the site are relatively consistent, ranging from approximately 117m AOD to the north and rising to approximately 118m AOD in the south, in the vicinity of the current school building.

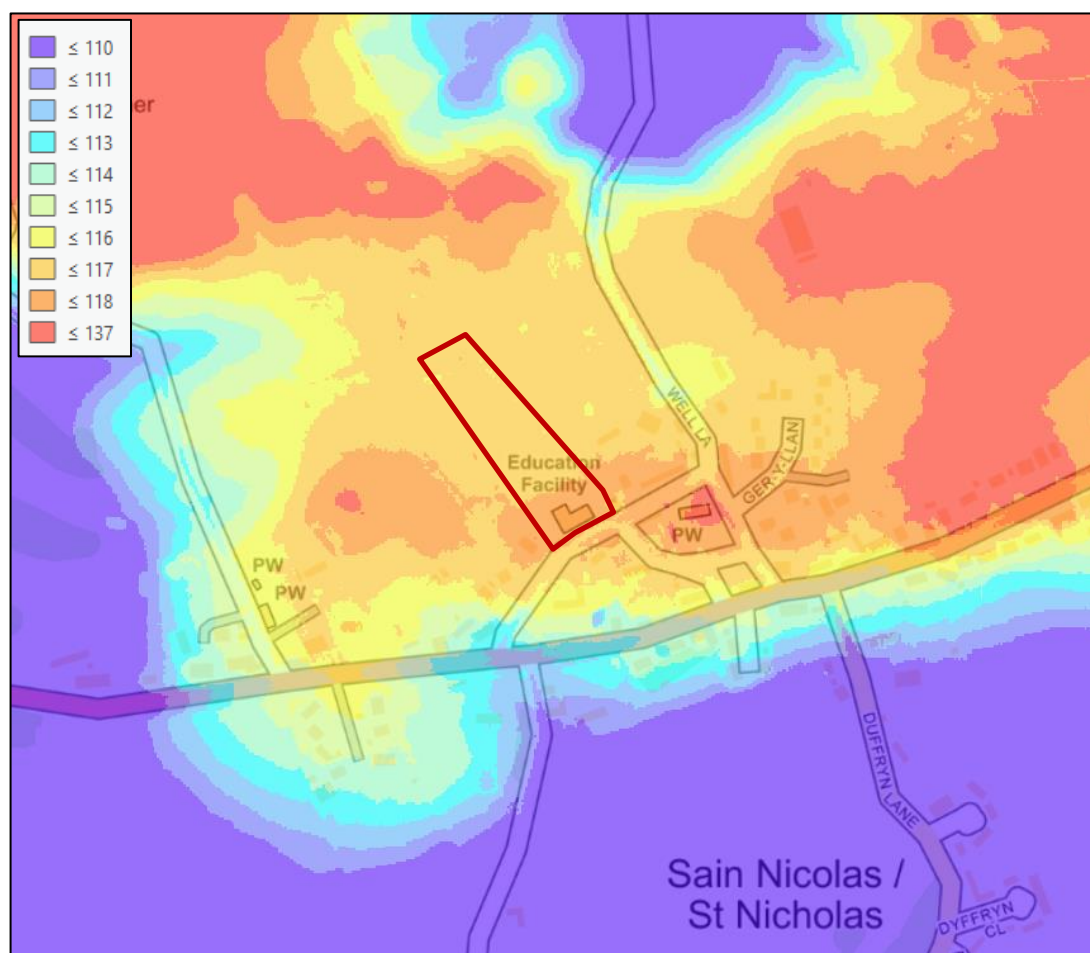


Figure 2-2: Development site LIDAR data

More detailed topographical drawings for the site/s are included in Appendix B.

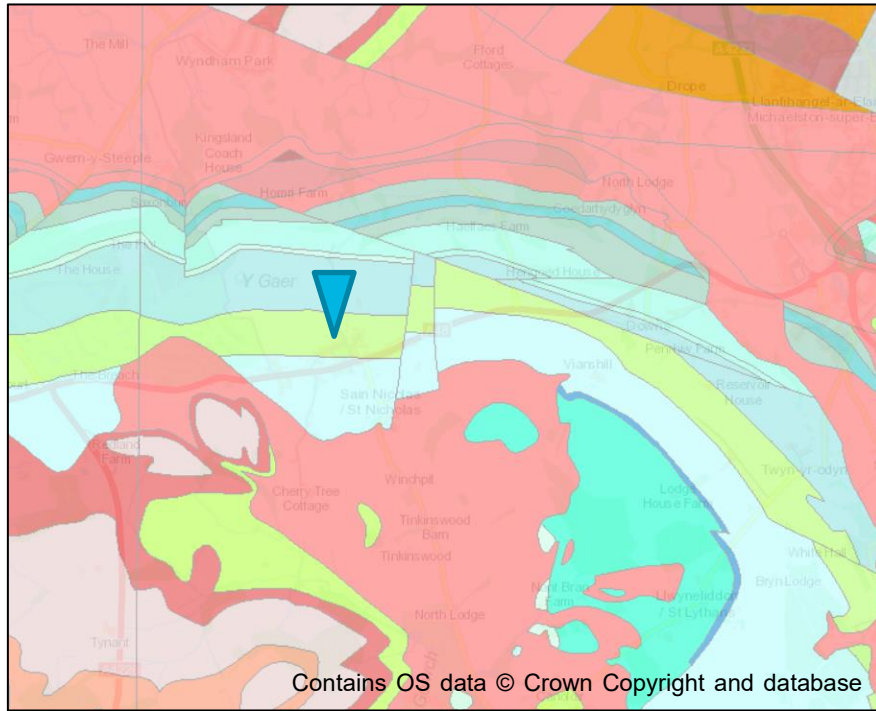
## 2.4 Environmental Setting

As detailed in section 1-2, there is negligible flood risk to the site from fluvial or tidal sources with the site located within DAM Zone A.

A tributary to the Ely River is the nearest watercourse to the site and is located approximately 465m to the north of the proposed school; the tributary flows north towards the River Ely, located approximately 1.9km north west of the site at its closest point. A tributary to the River Waycock is the second nearest watercourse to the site and is located approximately 865m southwest of the site. Due to the distance from the site and the direction of flow in both, it is unlikely that these watercourses would have an impact on the site.

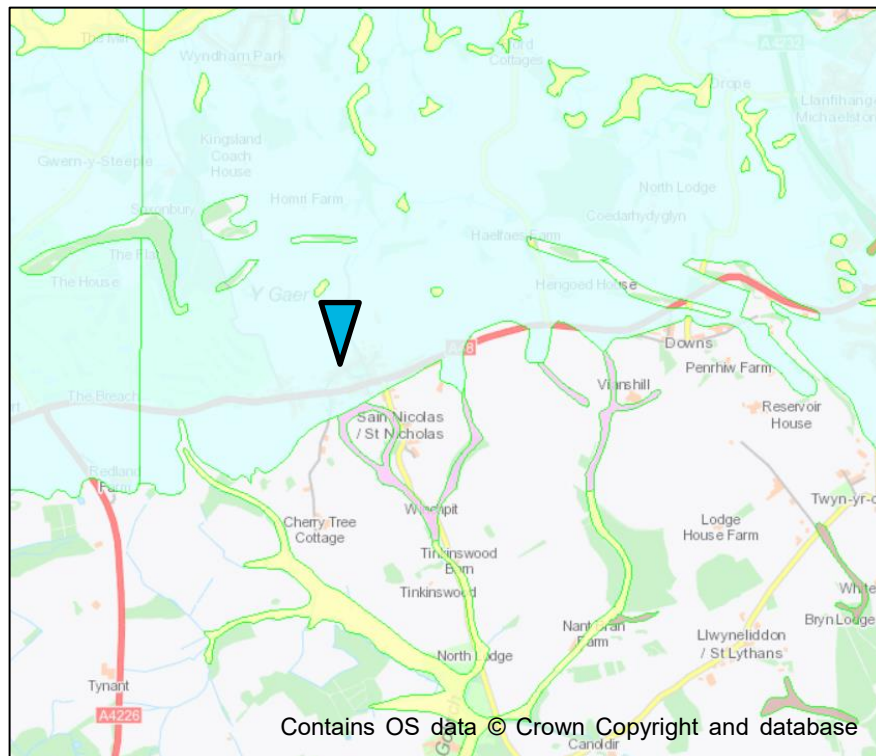
According to the GeoIndex Onshore Map<sup>2</sup> the bedrock geology at the site is made up of Friars Point Limestone Formation, see Figure 2-3 below. The recorded superficial deposits are Till (unsorted glacial sediment), see Figure 2-4 below.

<sup>2</sup> GeoIndex Onshore Map. British Geological Society. Available from: <http://www.bgs.ac.uk/geoindex/>. Last Accessed: 17/05/19.



**FRIARS POINT LIMESTONE FORMATION - DOLOMITISED LIMESTONE AND DOLOMITE**

**Figure 2-3: Bedrock Geology (BGS)**



**TILL, DEVENSIAN - DIAMICTON**

**Figure 2-4: Superficial Deposits (BGS)**

The closest available borehole records<sup>3</sup> are approximately 0.9km away and are too shallow and therefore do not show any groundwater information. There are 4No. deeper borehole records however these are approximately 1.5km away from the site and therefore have been deemed too far from the site to be relevant.

NRW classifies zones around potable groundwater abstraction points as Groundwater Source Protection Zones (SPZ) and these are designed to limit potential pollution activities. The site is approximately 3.5km away from the nearest Groundwater SPZ. In addition, DEFRA's Magic Map<sup>4</sup> shows that the site is within a Principal Aquifer. These are considered to be "layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. This may support water supply and/or river base flow on a strategic scale."<sup>5</sup>

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<sup>3</sup> <sup>3</sup> GeoIndex Onshore Map. British Geological Society. Available from: <http://www.bgs.ac.uk/geoindex/>. Last Accessed: 30/08/19

<sup>4</sup> DEFRA Magic Map. Available from: <http://www.natureonthemap.naturalengland.org.uk/magicmap.aspx>. Last Accessed 17/05/19

<sup>5</sup> Principal Aquifer definition on Environment Agency website: <http://apps.environment-agency.gov.uk/wiyby/117020.aspx>

### 3. Planning Policy & Guidance

#### 3.1 Technical Advice Note 15

Technical Advice Note 15 (TAN15) provides guidance which supplements the policy set out in Planning Policy Wales<sup>6</sup> (PPW) in relation to development and flooding. A precautionary framework is set out which advises caution in respect of new development in areas at high risk of flooding and this is used as a guide for planning decisions. The overall aim of the precautionary framework is to direct new development away from those areas that have a high risk of flooding; and development will only be justified in these areas if it meets the criteria and tests specified in this guidance.

The operation of the precautionary framework is governed by DAMs which are made up of three zones (Table 3-1), used to trigger the appropriate planning test and definitions of vulnerable developments. The DAMs are based on the best available information considered adequate to determine when flood risk needs to be taken into consideration with future development.

**Table 3-1: Flood Zone designations, their associated flood risk definition and use within the precautionary framework (source: TAN 15)**

	Definition	Use within the precautionary framework
A	Little or no risk of fluvial/ tidal flooding	Justification test is not applied and do not need to consider further
B	Areas known to have flooded historically evidenced by sedimentary deposits.	Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% annual probability) flood. No need to consider flood risks further if site levels are greater than the extreme flood level
C	Based on Environment Agency extreme flood outline (0.1% annual probability)	Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA
1	Areas of Zone C which are developed and served by significant infrastructure, including flood defences	Indicates that development can take place subject to the application of the justification test, including acceptability of consequences
2	Areas of Zone C without significant flood defence infrastructure	Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

The precautionary framework identifies the vulnerability of different land uses to flooding and classifies proposed uses accordingly as detailed in Table 3-2. This is because certain flooding consequences may not be acceptable for particular development types.

<sup>6</sup> Planning Policy Wales. Available from: <https://gov.wales/topics/planning/policy/ppw/?lang=en>. Last Accessed: 10/5/18.

**Table 3-2: Development Categories (source: TAN 15)**

Flood Zone Definition	Use within the precautionary framework
Emergency Services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood.
High vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites.
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.

According to TAN 15, new development should be directed away from Zone C and towards more suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will present less risk than Zone C.

Table 3-2 highlights that public developments such as schools (i.e. the Proposed Development) are classified as 'Highly Vulnerable' and are considered acceptable within DAM Zone A (Figure 1-2).

Built development tends to increase the surface area of impermeable ground, thus reducing percolation and increasing rapid surface runoff. This FCA includes a high level DS which demonstrates how runoff will be sustainably managed, preventing increased risk to both the site and surrounding area.

## 3.2 Climate Change

In accordance with TAN15, a FCA must include consideration of the appropriate climate change allowance in line with current government guidance.

The climate change allowance for peak rainfall intensity, based on the Welsh government guidance<sup>7</sup>, is displayed in Table 3-3. It is recommended that an allowance of 40% for peak rainfall climate change be used for the Proposed Development as per the upper estimate of the potential change anticipated for 2080s.

**Table 3-3: Climate change allowance for peak rainfall intensity (compared to a 1961-90 baseline)**

	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

<sup>7</sup> <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> Last accessed 23/05/2019

### 3.3 Local Development Plan

The Local Development Plan<sup>8</sup> provides the local planning policy framework, which was adopted by VoGC on 28<sup>th</sup> June 2017. Local Development Plan policies relevant to water and flood risk are summarised below:

- MD1 – Location of new development: this policy seeks to ensure that development will minimise or avoid areas of flood risk. New development will be expected to avoid unnecessary flood risk and to meet the requirements of TAN 15: Development and Flood Risk. No highly vulnerable development will be permitted within DAM Zone C2 and development will only be considered in areas at risk of flooding where it can be demonstrated that the site can comply with the justification and assessment requirements set out in TAN 15.
- MD7 – Environmental protection: this policy seeks to ensure that development does not increase flood risk. In accordance with TAN15: Development and Flood Risk, no highly vulnerable development will be permitted in DAM Zone C2. Development will only be considered in other areas at high risk of flooding where it can be demonstrated that the site can comply with the justification and assessment requirements of TAN 15.

### 3.4 Strategic Flood Consequence Assessment

No Strategic Flood Consequence Assessment is available from VoGC at the time of writing.

### 3.5 Preliminary Flood Risk Assessment

VoGC developed a Preliminary Flood Risk Assessment (PFRA)<sup>9</sup> in 2011 which examined the areas within the Vale of Glamorgan that have historically suffered from flooding and potential future flood areas to identify significant flood risk areas. No indicative Flood Risk Areas have been identified within the Vale of Glamorgan.

### 3.6 Local Flood Risk Management Strategy

In 2012, VoGC developed a Local Flood Risk Management Strategy (LFRMS)<sup>10</sup>; this document highlights the responsibilities of VoGC as Lead Local Flood Authority (LLFA) with respect to flooding from surface water, ordinary watercourses and groundwater.

The LFRMS encourages effective flood risk management by enabling people, communities, business and the public sector to work together to:

- Ensure a clear understanding of the risks of flooding and erosion, nationally and locally, so that investment in risk management can be prioritised more effectively;
- Set out a clear and consistent plan for risk management so that communities and businesses can make informed decisions about the management of the residual risk;
- Encourage innovative management of flood and coastal erosion risks, taking account of the needs of communities and the environment;
- Form links between the local flood risk management strategy and local spatial planning;
- Ensure that emergency plans and responses to flood incidents are effective and that communities can respond properly to flood warnings; and
- Help communities to recover more quickly and effectively after incidents.

<sup>8</sup> Vale of Glamorgan Local Development Plan (LDP). Available from: [http://www.valeofglamorgan.gov.uk/en/living/planning\\_and\\_building\\_control/Planning/planning\\_policy/local\\_development\\_plan/Local-Development-Plan.aspx](http://www.valeofglamorgan.gov.uk/en/living/planning_and_building_control/Planning/planning_policy/local_development_plan/Local-Development-Plan.aspx). Last Accessed: 23/05/19.

<sup>9</sup> Preliminary Flood Risk Assessment (PFRA) Vale of Glamorgan Council. Available from: <http://www.valeofglamorgan.gov.uk/Documents/Living/Highways%20&%20infrastructure/Exec-Summary-ENG.pdf>. Last Accessed: 09/05/18.

<sup>10</sup> Local Flood Risk Management Strategy, December 2013. Vale of Glamorgan Council. Available from: <https://www.valeofglamorgan.gov.uk/en/living/Flooding/Flood-and-Coastal-Erosion/Local-Flood-Risk-Management-Strategy.aspx>. Last Accessed: 23/05/19.

“The PFRA refers to two major historic flooding incidents in October 1998 and July 2007, these were classified as ‘locally significant harmful consequences’.”<sup>8</sup>

“On 20<sup>th</sup> July 2007... a number of locations in the Vale of Glamorgan, were subject to intense rainfall. Significant flooding of properties and roads were reported as watercourses and land drainage systems were unable to cope with the intensity of the event.”<sup>8</sup>

Detailed analysis has been carried out on the potential impacts of surface water flooding for areas within the Vale of Glamorgan. The results show that St Nicholas has been identified as a medium priority investigation area, however this is primarily due to the services/environmental assets in the area (substation and SSSI). There are no noted historic flooding incidents included for St Nicholas in the data. Maps have also been produced highlighting areas affected by a 1 in 200yr surface water event. St Nicholas is not shown to be affected.

The LFRMS states that the flood risk from groundwater flooding in the Vale of Glamorgan is poorly understood and there is very limited historic data available for this type of flooding.

### 3.7 SuDS Guidance

From 7<sup>th</sup> January 2019, all new developments of more than 1no. dwelling house or where the construction area is 100m<sup>2</sup> or more, will require Sustainable Drainage Systems (SuDS) for surface water. From this date, SuDS on new developments must be designed and built in accordance with the Statutory SuDS Standards published by Welsh Ministers and SuDS schemes must be approved by the local authority (Vale of Glamorgan Council) acting in its SAB role, before construction work begins.

For more information regarding surface water design criteria and the methodology applied to the design of the surface water DS for this development see section 5 of this report.



## 4. Flood Risk – To Development

### 4.1 Overview

TAN15 requires that all potential flood sources that could affect the Proposed Development be considered. This chapter includes flooding from rivers and the sea, directly from rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems. Flooding from reservoirs, canals, lakes and other artificial sources should also be considered. There should be demonstration of how these should be managed so that the development remains safe throughout its lifetime, taking into account climate change.

### 4.2 Tidal / Fluvial

As discussed in Section 1.2, the Proposed Development is located within DAM Zone A, which are areas classified as having little or no risk of tidal/ fluvial flooding. Given the DAM Zone designation, the level of the site and distance from the coast, tidal and fluvial flood risk are considered to be very low.

### 4.3 Surface Water

Overland flow routes can form from rainfall that fails to infiltrate the surface and travels over ground; this is exacerbated where the permeability of the ground is low due to the type of soil/ geology (such as clayey soils) or urban development. Surface water is also promoted in areas of steep topography which can rapidly convey water that has failed to penetrate the surface.

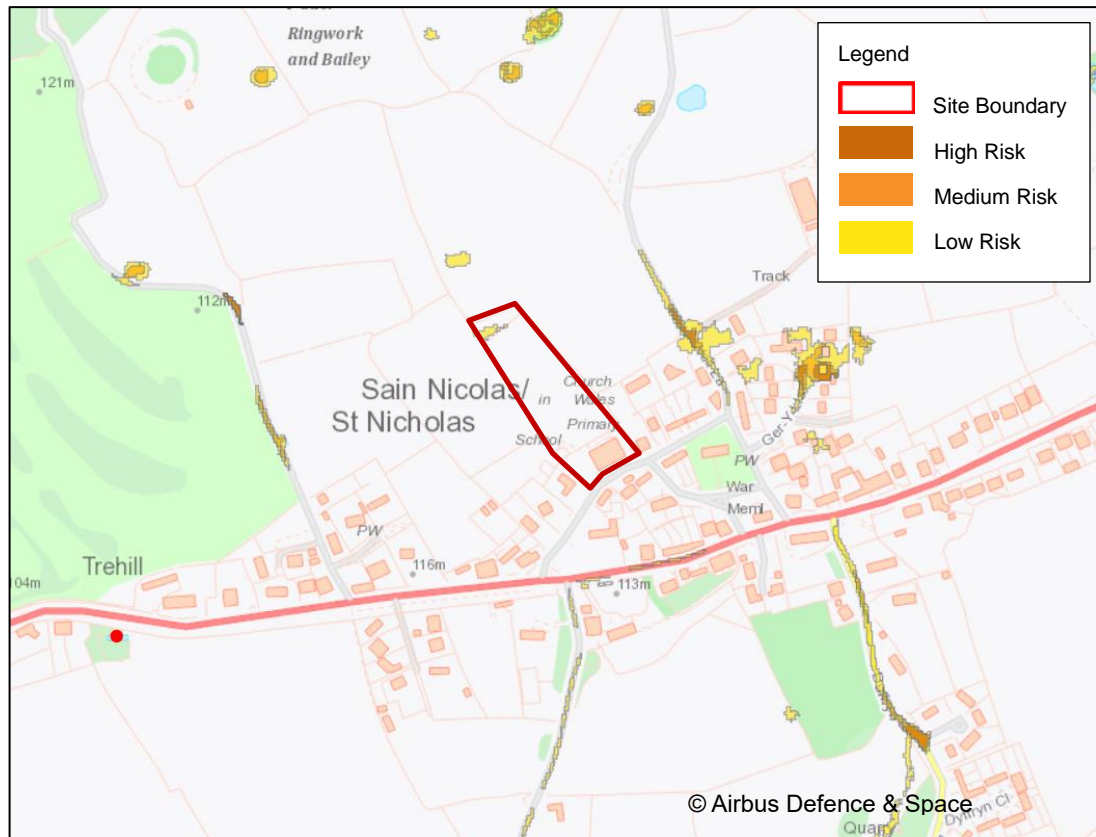
Figure 4-1 below shows NRW's Surface Water Flood Risk Map<sup>11</sup>. The dark orange shading (high risk) shows areas that have a chance of flooding of greater than 3.33% Annual Exceedance Probability (AEP). The light orange shading (medium risk) shows areas that have a chance of flooding between 1% AEP and 3.33% AEP. The yellow shading (low risk) shows areas that have a chance of flooding between 0.1% AEP and 1% AEP.

According to NRW's Surface Water Flood Risk Map, the majority of the site is not considered to be at risk from surface water flooding. A small section of the site at the north east end is shown to be at low risk.

Overall it is considered that the flood risk from surface water is low at the Proposed Development site.

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<sup>11</sup> Source: Natural Resources Wales Flood Map for Surface Water. Available from: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>. Last accessed 09/05/18.



**Figure 4-1: Flood Map for Surface Water** (source: NRW)

(Adapted from NRW flood risk maps Last Accessed 17/05/19)

## 4.4 Groundwater

Groundwater flooding occurs where groundwater levels rise above ground surface levels. The geology has a major influence on where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks.

The bedrock is Limestone and the superficial deposits are Till. Limestone has a low infiltration rate, however depending on its formation it can be quite permeable if it is caustic or has fissures. In addition, artesian springs may occur however these are more likely to occur in lower lying areas.

The site is on an area of high ground, the ground slopes away to the north and west of the site as shown in Figure 2-2. If any groundwater flooding was to occur there are flow paths to take the water away from the site.

DEFRA's Magic Map<sup>12</sup> shows that the site is within a Principal Aquifer. These are considered to be "layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. This may support water supply and/or river base flow on a strategic scale."<sup>13</sup>

<sup>12</sup> DEFRA Magic Map. Available from: <http://www.natureonthemap.naturalengland.org.uk/magicmap.aspx>. Last Accessed 17/05/19

<sup>13</sup> Principal Aquifer definition on Environment Agency website: <http://apps.environment-agency.gov.uk/wiyby/117020.aspx>

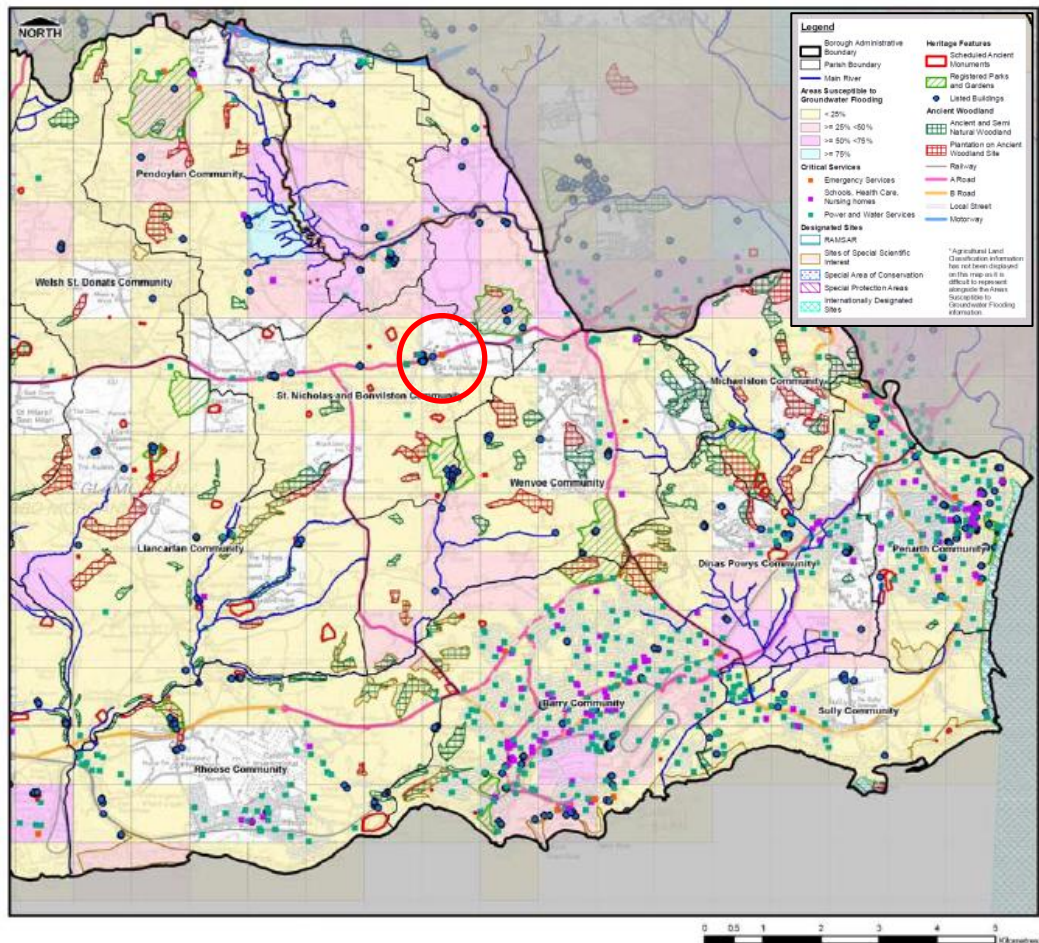


Figure 4-2: Area susceptible to groundwater flooding<sup>14</sup>

According to the Area Susceptible to Groundwater Flooding map (Figure 4-2), the school is in an area where there is no data available.

No ground water flooding incident data was made available at the time of writing the FCA.

Based on the topography of the site the risk from groundwater is considered to be low.

## 4.5 Sewers

Flooding can occur as a result of infrastructure failure e.g. blocked sewers or failed pumping stations. Sewer flooding can occur when the system surcharges due to the volume or intensity of rainfall exceeding the capacity of the sewer, or if the system becomes blocked by debris or sediment.

No sewer flooding records were made available at the time of writing this FCA.

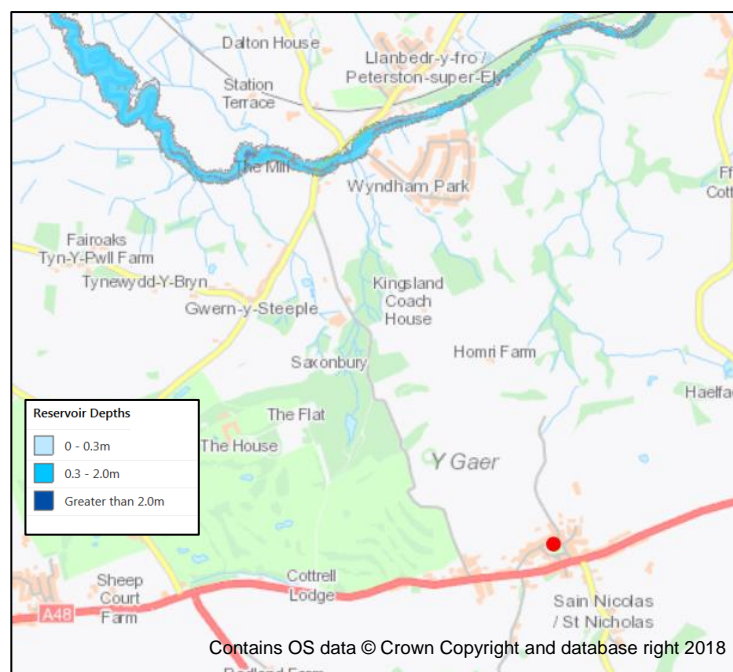
The public sewer records (presented in Appendix C) show that there are two foul sewer manholes near the school. One north and one south but both between approximately 10 and 30m from the site. These are the upstream ends of the sewers, and the sewers flow away from the site. In addition, if sewer flooding did occur, the topography around the school indicates that sewage would flow away from the site not into it.

For these reasons the flood risk from sewers is considered to be low.

<sup>14</sup> Map taken from Local Flood Risk Management Strategy, December 2013. Vale of Glamorgan Council. Available from: <https://www.valeofglamorgan.gov.uk/en/living/Flooding/Flood-and-Coastal-Erosion/Local-Flood-Risk-Management-Strategy.aspx> . Last Accessed: 23/05/19.

## 4.6 Artificial Sources

Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs.



**Figure 4-3: Reservoir Flood Risk Mapping**

There are a few small ponds within 2.5km of the development site; the largest is adjacent to the Nant Y Drope river about 2.3km away from the development site. The ponds are not considered to be of sufficient size to pose a risk to the site. In addition, in the event of a breach, water would flow away from the proposed site.

The NRW Flood Risk from Reservoirs Map<sup>15</sup> (Figure 4-3) indicates that the nearest reservoir flooding extents are approximately 1.9km north west of the Proposed Development. The flooding stems from Hensol Lake approximately 6.3km north west of the Proposed Development.

Due to the distance from the reservoir flooding extents and flow path direction from the smaller ponds, the risk from artificial sources is considered to be very low.

<sup>15</sup> Natural Resources Wales Flood Map. Available from: <https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en>. Last Accessed: 04/06/19.

## 4.7 Summary of Flood Risk to the Development

The flood risk to the development is summarised in Table 4.1.

**Table 4-1: Summary of Existing Flood Risk**

Type of Flooding	Source of Flooding	Existing Flood Risk
Fluvial and Tidal	None	Very Low
Surface Water	Runoff from surrounding land	Low
Sewers	Surrounding public drainage system	Low
Groundwater	Underlying geology and groundwater levels	Low
Artificial Sources	None	Very Low

## 5. Surface Water Drainage Strategy

### 5.1.1 Overview

This section of the report sets out a conceptual drainage strategy for the site. However it should be noted that the strategy is issued only as part of the tender process, and is not suitable for submission for planning application without further consideration and drainage investigation.

A conceptual design has been put forward that could work, based on precautionary assumptions. It has been assumed that infiltration is not viable, and discharge will be to a combined sewer, however the priority should be to determine if infiltration can be used on the site. If infiltration is viable the strategy will need to be redesigned to use infiltration techniques. An indicative drawing of how infiltration could be included on the site is included in Appendix D.

The DS provides a conceptual design however also presents options and recommendations that the successful Contractor should consider which are likely to help in drainage design and planning application process.

### 5.1.2 Information Base

The drainage strategy has been based on the following information,

- Concept site layout drawing (HLM Architects, July 2019, Document Ref: 15-1094-01-SK-001) – see Appendix A;
- Topographical survey drawing (Alpine Land Surveyors Ltd, May 2019, Document Ref: AEC/SNP/T01) – see Appendix B;
- Public Sewer Records (Welsh Water, May 2019) – see Appendix C;

Where any information is missing, precautionary assumptions have been made in order to progress the DS.

### 5.1.3 SuDS Drainage Hierarchy / Runoff destination (S1)

The Statutory Standards for Sustainable Drainage Systems published by the Welsh Government sets out five priority levels regarding the destination of runoff from sites, these are as follows:

- Priority Level 1: Surface water runoff is collected for use;
- Priority Level 2: Surface water runoff is infiltrated to ground;
- Priority Level 3: Surface water runoff is discharged to a surface water body;
- Priority Level 4: Surface water runoff is discharged to a surface water sewer. Highway drain, or another drainage system;
- Priority Level 5: Surface water runoff is discharged to a combined sewer.

Priority 1 level 1 is preferred, 4 and 5 are only acceptable in exceptional circumstances.

The DS seeks to implement the above drainage hierarchy where possible, and where not possible justification is given.

#### 5.1.3.1 Priority Level 1: Surface water runoff is collected for use

It is a requirement of the Welsh Statutory National Standards for Sustainable Drainage Systems that as far as possible there will be no discharge from the site for the majority of rainfall events of less than 5mm. The following has been suggested as a way to manage this rainfall within the boundaries of the site.

Collecting the surface water runoff for use should be considered in the design. The following SuDS techniques could be incorporated in the design:

- **Rainwater Harvesting** - There is an opportunity to incorporate rainwater harvesting into the design due to regular demand of non-potable water on site;
- **Installing a green roof** - A green roof can assist with retaining additional runoff within the boundaries of the site. Collaboration with the wider design team at a later stage will be needed to assess the viability of this option with regard to the intended roof pitch alongside the biodiversity, amenity and educational benefits;
- **Rain gardens** – Rain gardens can be used to collect runoff from storms for the purposes of irrigation to help reduce potable water use for landscape maintenance as well as reducing surface water runoff from the site. Rain gardens implemented with means to overflow to other SuDS features can enable a varied runoff management system which provides benefits to pollution control and biodiversity;
- **Water detention** - Infiltration/detention basins can be designed with capacity to retain the initial 5mm of runoff from the impermeable areas of the site, providing design and site constraints allow, This can give the water the opportunity to evaporate off over time and pollutants to be retained.

The use of green roofs and rainwater harvesting provides good opportunities for runoff to be managed as close to source as possible.

#### 5.1.3.2 **Priority Level 2: Surface water runoff is infiltrated to ground**

No surface water or combined sewers are located in the vicinity of the site according to the Welsh Water sewer records, presented in Appendix C. Therefore, the existing site either drains through infiltration, or it discharges into the foul sewer.

No ground investigation or infiltration rates have been made available for the site. In addition the Baseline flow index hydrology of soil types (BFI HOST) number for the site indicated that the site and the surrounding area are not considered to be very permeable. The BFI Host is a catchment descriptor used in the calculation of run off rates and volumes. The descriptor is the measure of catchment responsiveness, i.e. if there is a storm, how quickly the water that fell reaches a receptor, derived from the 29-class Hydrology of Soil Types classification<sup>16</sup>. Further information on the BFI Host can be found in the 'Flood Estimate Handbook', issued by the Institute of Hydrology, and the 'Hydrology of Soil Types: a hydrologically-based classification of soils in the United Kingdom' also issued by the Institute of Hydrology.

Therefore, as a precautionary approach, it is assumed that the water drains to the foul sewer and that infiltration is not a suitable method to discharge run off for this site.

Infiltration testing should be undertaken to determine if infiltration techniques are feasible at the detailed design stage. If the strata beneath the site are found to support infiltration drainage, the designs should be updated accordingly.

#### 5.1.3.3 **Priority Level 3: Surface water runoff is discharged to a surface water body**

There are no watercourses within the vicinity of the site, the nearest watercourse is a tributary to the Ely River, located approximately 425m to the north east. Therefore, this method of discharge is not feasible for the proposed development.

#### 5.1.3.4 **Priority Level 4: Surface water runoff is discharged to a surface water sewer. Highway drain, or another drainage system**

Figure 5-1 shows the public sewer records for the area. A full version of the drawing is included in Appendix C.

The nearest surface water sewer is approximately 160m south-east of the site. The distance to the sewer may be prohibitive to its use.

<sup>16</sup> <https://nrfa.ceh.ac.uk/feh-catchment-descriptors> . Accessed 28/08/2019

The discharge location will have to be agreed with VoGC and Welsh Water.

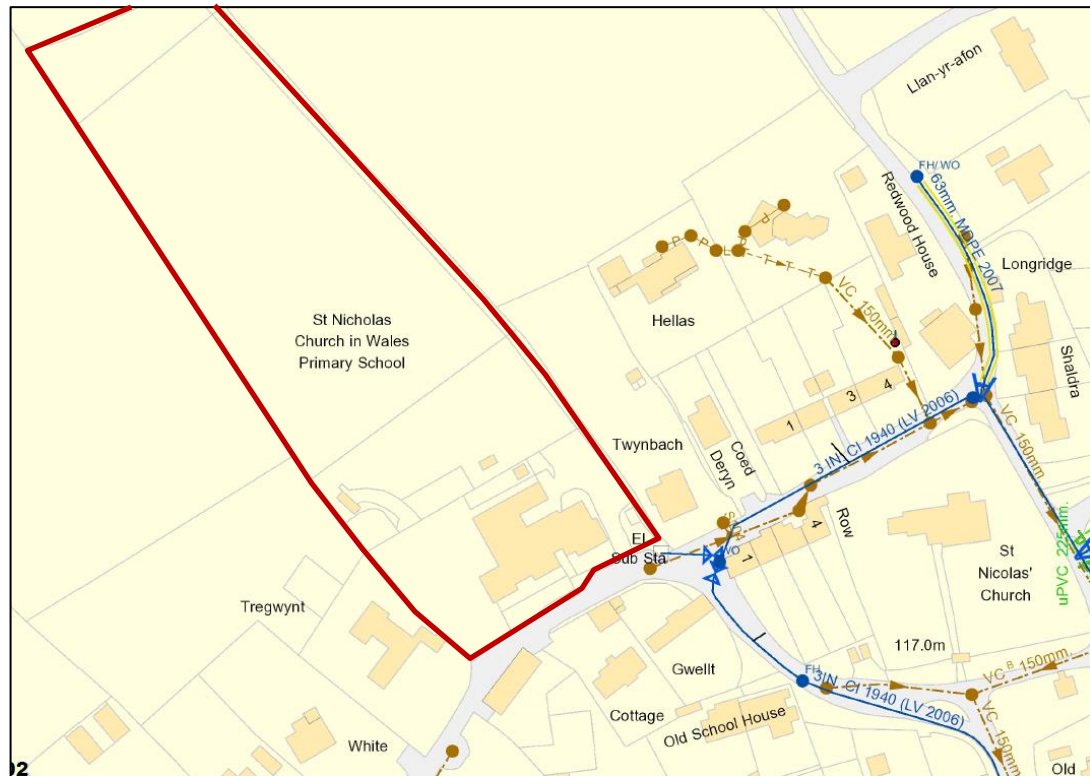


Figure 5-1: Extract from Welsh Water sewer records centred on grid reference 308888, 174402

#### 5.1.3.5 Priority Level 5: Surface water runoff is discharged to a combined sewer

Discharging surface water into a foul sewer, makes it a combined sewer. This is the least favourable option however, the distance to the surface water sewer and the impact to the community during construction of a connection could lead to an agreement to discharge surface water to the combined sewer.

The discharge location will have to be agreed with VoGC and Welsh Water.

#### 5.1.3.6 SuDS Drainage Hierarchy / Runoff destination (S1) Summary

The priority should be to determine if infiltration can be used on the site, if not discussions will be required with the VoGC and Welsh Water to determine the best discharge location given the constraints on the site.

The nearest sewer to the site is a foul sewer in School Lane, south of the site. The nearest surface water sewer is approximately 160m to the south-east of the site.

For the purposes of this DS it is assumed that infiltration into the ground is not feasible and that the runoff will be discharged into the foul water sewer. This is the worst case scenario. Invert levels for the sewers in the vicinity of the site are not currently available. These levels would be required to complete the detailed design of the drainage systems for the proposed development.

As the invert level of the foul sewer is not known, as a precaution it has been assumed that the existing foul sewer pipe is 300mm diameter, and that the minimum cover to the pipe is 1.2m. Therefore the assumed invert level is 1.5m bgl.



#### 5.1.4 Surface water runoff hydraulic control (S2)

The proposed school is made up of hardstanding area (building, hard play areas, car parking and a service yard) which is impermeable and soft landscaped areas including soft play areas, pitches, and allocated habitat areas. The proposed layout of the school is presented in Appendix A.

The total site area within the site boundary is approximately 1.32ha. Currently, approximately 0.2ha is developed and impermeable (school, hardstanding and parking area).

The proposed development drawing has categorised land use within the site boundary. Any areas without a specific designated category have been assumed to be impermeable for the purpose of this drainage strategy.

Approximately 0.615ha will be developed as part of this proposal. This is made up of the school building, car parking, service yard, hard play areas, MUGA games court, pedestrian areas and the non-allocated area highlighted on the proposed layout drawing.

The existing and proposed permeable and impermeable land within the developable area has been assessed and is compared in Table 5-1.

**Table 5-1 Existing and Proposed Permeable and Impermeable Land Assessment**

	Permeable Area (ha)	Impermeable Area (ha)
Existing	1.11 (84.8%*)	~0.2 (15.2%*)
Proposed	~0.7025 (53.3%*)	~0.615 (46.7%*)

\*Percentage of the total area of the site

##### 5.1.4.1 Greenfield Runoff Rates

All of the run off rates and volumes in this report were calculated using ReFH2. ReFH2 is an industry standard software which was chosen for its ability to calculate run off rates and volumes for sites that have both brown field and greenfield elements.

The peak flow values for the greenfield runoff rate have been taken from the ReFH2 rural model. The greenfield runoff rates calculated from the peak flow values are displayed in Table 5-2 for the required return periods. This is based on the total site area of 1.32ha. The input data is presented in Appendix E and resultant calculations for the greenfield, existing and proposed runoff rates and volumes are presented in Appendix F.

**Table 5-2 Greenfield Runoff Rates**

Return Period	Runoff Rate (l/s)
$Q_{BAR}$	2.76
1-year (100% AEP)	2.42
30-year (3.3% AEP)	6.32
100-year (1% AEP) + climate change (40%)	11.83

##### 5.1.4.2 Greenfield Runoff volume

The total flow volume calculated in ReFH2 for each of the return periods has been taken from the rural model for the greenfield scenario. This is based on the total site area of 1.32ha. The volumes have then been converted to m<sup>3</sup> with the results shown in Table 5-3. Relevant calculations are presented in Appendix F.

**Table 5-3: Greenfield total flow volume results**

Return Period	Runoff Volume (m <sup>3</sup> )
QBAR	99
1-year	90
30-year	181
100-year + 40%cc	328

#### 5.1.4.3 Existing and Proposed Runoff Rates

For the existing and proposed scenarios, an urbanisation adjustment was used.

The calculated total peak flows were taken from the urban ReFH2 model with the consequent runoff rate calculated using the calculation described in Appendix E.

This existing rate is based on the total site area of 1.32ha, of which 0.2ha is impermeable. The proposed rate is based on the total site area of 1.32ha of which 0.615ha is impermeable. The results of these calculations do not take into account any attenuation or restrictions to flow. The results can be seen in Table 5-4 below.

**Table 5-4 Existing Runoff Rates**

	Site Runoff Rates (l/s)		
	1 in 1 year	1 in 30 year	1 in 100 year plus 40% cc
Existing	6.21	15.61	28.29
Proposed (unrestricted)	15.41	17.61	69.61
Proposed (restricted)	2 (32.2%*)	2 (12.8%*)	2 (7.1%*)

\*compared to the existing runoff rate

#### 5.1.4.4 Existing and Proposed Runoff Volumes

The existing and proposed total flow volumes calculated in ReFH2 for each of the return periods have been taken from the urban model using the same parameters described above for the existing and proposed runoff rates. The output calculations for the existing and proposed run off volumes are presented in Appendix F. The volumes are shown in m<sup>3</sup> with the results shown in Table 5-5 below.

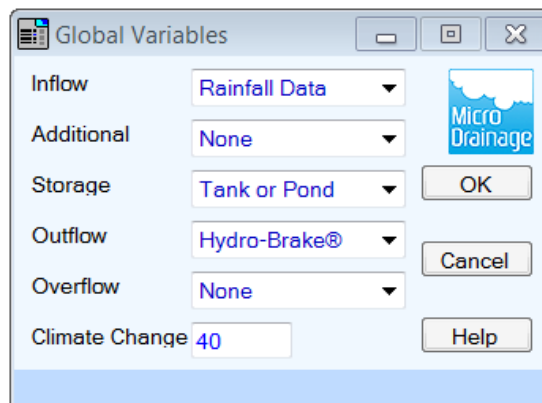
**Table 5-5 Existing and Proposed Runoff Volumes (1 in 100 year +40% climate change)**

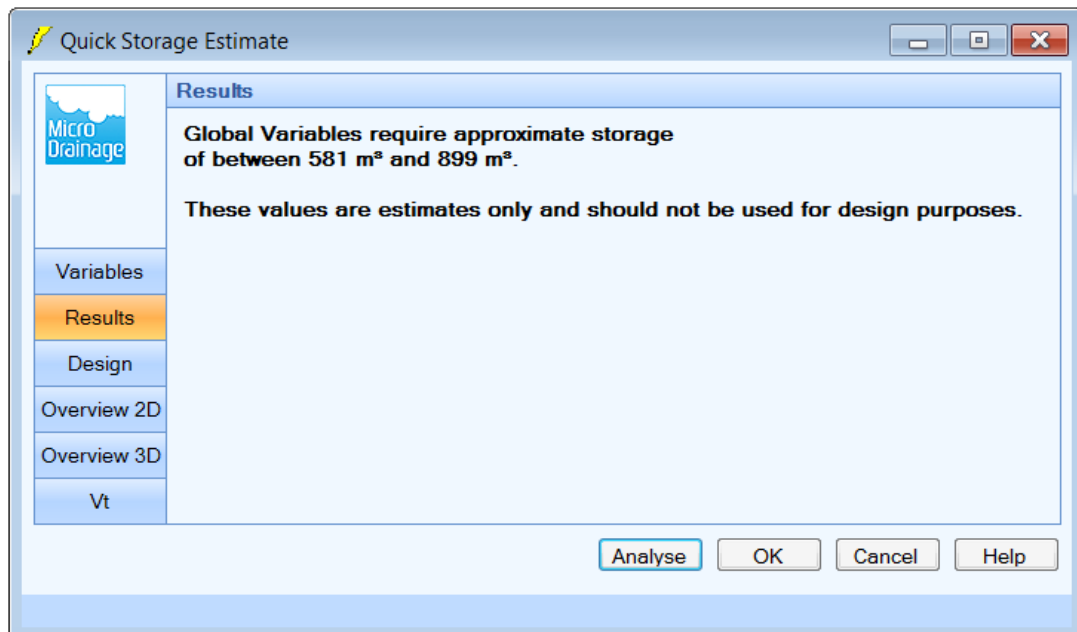
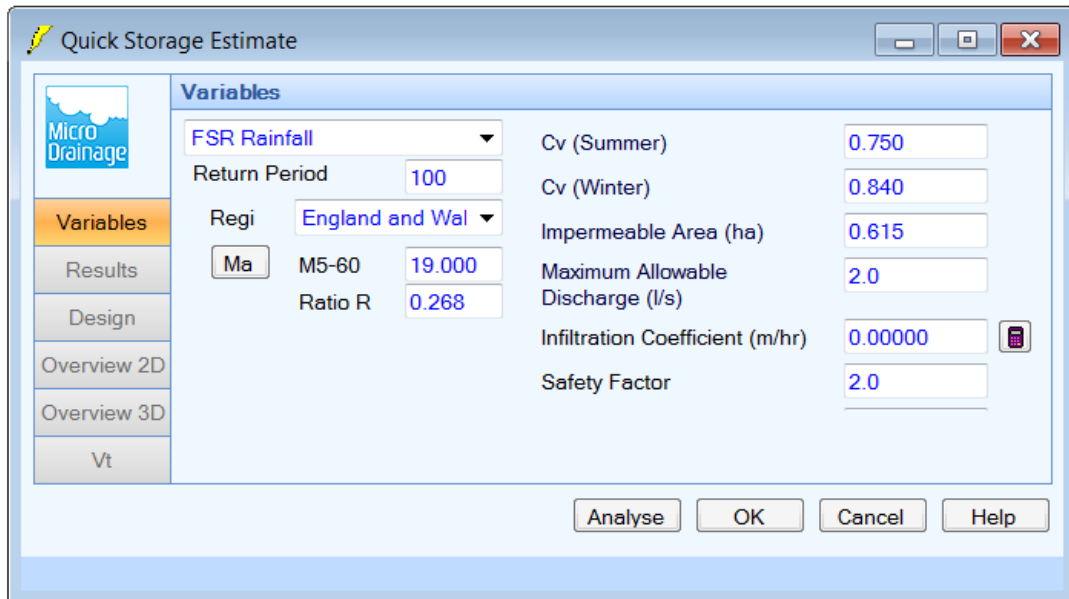
Runoff Volumes (m3)	
Existing	441 (134.5% of greenfield runoff volume)
Proposed	675 (206% of greenfield runoff volume)

**5.1.4.5 Proposed storage**

For the purposes of the DS a quick storage calculation has been carried out to indicate the volume of attenuation that is required on this site. The calculation is based on the following:

- No rainwater harvesting contribution is included;
- No green roof contribution is included;
- Any storage volume in swales and rainwater garden has not been included in the volume of storage provided;
- The runoff from the site is discharged into the foul sewer and there is no calculated infiltration present on the site;
- The discharge rate will be restricted using a HydroBrake, limiting flows to 2l/s to minimise risk of flooding beyond the boundaries of the site;
- 40% uplift for climate change;
- No invert level information is currently available for the existing foul sewer network in located in School Lane, south of the site. It is assumed that the existing foul sewer pipe is 300mm diameter, and that the minimum cover to the pipe is 1.2m. Therefore the assumed invert level is 1.5m;
- Invert levels for receiving sewers will need to be confirmed before detailed design commences;
- The impermeable area use for the calculations is 0.62ha.





**Figure 5-2: Quick storage estimate**

The proposed conceptual DS layout drawing is included in Appendix H.

The quick storage estimate (Figure 5-2) indicates an approximate storage requirement of up to 900m<sup>3</sup>. An attenuation volume of slightly more than 900m<sup>3</sup> has been illustrated in the DS drawing.

The Welsh Government Statutory Standards for Sustainable Drainage Systems indicates a preference for above ground attenuation, therefore the use of a basin has been selected over underground storage where possible given assumed invert levels and constrained available space. For the conveyance of water, swales have been included in preference over pipes where possible. Permeable paving has been selected for the parking and service areas to provide water quality treatment for run off. Additional storage has been provided under the parking and service areas so as to ensure that there is sufficient attenuation for a 1 in 100 year storm plus 40% climate change.

There is also a requirement in the Welsh Government Statutory Standards for Sustainable Drainage Systems that in summer 80% of the water falling onto the site needs to be intercepted, in winter 50% of the water falling on to the site needs to be intercepted. Providing storage to manage the runoff from a 1 in 100 year storm plus 40% climate will achieve this.

Due to the constrained available areas provided on site, a small basin has been included. The basin will have a maximum water depth of 1m in line with recommendations in the SuDS Manual, with 300mm freeboard allowance. The area of the basin has been maximised leaving a 1m gap to the edge of the habitat area and avoiding the tree canopies in order to avoid root protection zones. It is assumed that all of the trees will be retained. These constraints mean that the volume of the basin is approximately 159m<sup>3</sup>. The upper estimate of storage is 900m<sup>3</sup>, which means that 741m<sup>3</sup> will need to be provided under the car park and service area. The design would allow run-off from all of the impermeable areas on the site to back up in to the storage under the car park and service area as required. The breakdown of storage provided as shown in Table 5-6:

**Table 5-6: Storage Volume Provision Breakdown**

Storage Location	Storage Volume Provided (m <sup>3</sup> )	Design Details
Attenuation Basin	159	
Under car parking area	547	Calculated as 0.6m deep geocellular storage, extended beyond extents of car park (see drainage layout – Appendix H)
Under service yard area	209	Calculated as 0.6m deep geocellular storage under the service yard area
Swales, pipework and manholes	Volume not included	
Total Storage volume provided	915	

Due to the assumption that the invert level of the foul sewer at the proposed discharge location is 1.5m bgl, the storage under the car park and service area would need to be provided using geocellular units which have a void ratio of 95%. Use of geocellular units means that the benefits of treatment within the subbase of permeable paving are lost, however this can be mitigated through use of a horizontal geotextile above the units.

The roof and hard play areas are indicated to drain to the swales and a rain garden in the allocated nursery habitat area.

#### 5.1.4.6 Volume to be retained on site (first 5mm)

It is a requirement of the Welsh Statutory National Standards for Sustainable Drainage Systems that as far as possible there will be no discharge from the site for the majority of rainfall events of less than 5mm.

The total impermeable area is estimated as 6150m<sup>2</sup>. The volume to be retained within the site boundary in all storms is 30.75m<sup>3</sup> based on a 5mm falling on the whole impermeable area. The calculation for this is included in Appendix G. It is proposed that the invert level of the outlet pipe from the basin will be located at a level to enable first 5mm of rainfall to be retained. This is shown conservatively as 40m<sup>3</sup> on the drainage layout drawing included in Appendix H. The provision is approximately 33% more than required, however, this will provide a buffer if the basin hasn't evaporated or infiltrated prior to the start of a new storm.

#### 5.1.4.7 Long term storage

Consideration of the need for long term storage may be required on sites where the total volume of run off will be increased due to the development.

The total run off for the proposed site has been calculated in section 6.1.3.5. The proposed development will increase the volume of runoff from the site, for the 1 in 100 year + 40% climate event, by 206% in

comparison to the greenfield runoff volume. Therefore long term storage requirements will need to be considered.

Long term storage has been managed through the application of a maximum discharge rate of the trickle rate which is 2l/s/ha in line with the SuDS Manual. The site is 1.32ha therefore equates to 2.62l/s. The proposed discharge rate is 2l/s.

#### 5.1.4.8 Design for exceedance

Design for exceedance has been considered and a drawing showing indicative flow routes through the site has been produced and is presented in Appendix I.

Runoff from storms larger than the 1 in 100 year + 40% climate change will flow towards the north of the site, over the school pitches. The surrounding areas to the site are fields therefore exceedance flows pose no risk to neighbouring properties.

Exceedance flows will need to be reassessed if the layout of the school is amended.

#### 5.1.5 Water Quality (S3)

The site will be used for a school. Runoff from the roof and playground areas is expected to contain minimal pollutants. However, there is a greater potential for pollutants from car parking or trafficked areas and the service yard.

The table below (Table 5-7) is extracted from the SuDS Manual Table 26.217. The numbers in the table are pollution hazard indices.

“The indices range from 0 (no pollution hazard for this contaminant type) to 1 (high pollution hazard for this contamination type).”

**Table 5-7: Pollution hazard indices for different land use classifications<sup>18</sup>**

Land Use	Pollution hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g schools, offices i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contamination type). Indicative SuDS mitigation indices are given in Table 5-8 below.

**Table 5-8: Indicative SuDS mitigation indices for discharges to surface waters<sup>19</sup>**

Type of SuDS component	TSS	Metals	Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4

<sup>17</sup> <http://www.scotsnet.org.uk/documents/NRDG/CIRIA-report-C753-the-SuDS-manual-v6.pdf>

<sup>18</sup> <http://www.scotsnet.org.uk/documents/NRDG/CIRIA-report-C753-the-SuDS-manual-v6.pdf>

<sup>19</sup> <http://www.scotsnet.org.uk/documents/NRDG/CIRIA-report-C753-the-SuDS-manual-v6.pdf>

Swale	0.5	0.6	0.6
Bio-retention system	0.8	0.8	0.8
Permeable Pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period even, for inflow concentrations relevant to the contributing drainage area.		

The proposed development has the opportunity to treat contaminants through the inclusion of a basins, swales and permeable paving. The mitigation indices are greater than the hazard indices, therefore a single stage treatment in any of the proposed features will be sufficient to treat contaminants in the runoff.

The requirement to retain the first 5mm of run off on the site is for pollution management. It is proposed that the first 5mm will be retained through installing the outlet pipe from the basin above the base of the basin, so that the required volume (30.75m<sup>3</sup>) will not be discharged to the sewer.

Permeable pavement should be used for the parking area and service yard. It is proposed to use geocellular storage under the permeable paving. This would replace the standard granular subbase usually used so that additional storage volume can be provided. Loss of the granular subbase reduces the effectiveness of permeable paving to treat pollutants. A horizontal geotextile will need to be installed under the permeable paving and above the geocellular storage to ensure that an adequate level of treatment is achieved.

Runoff from the roof could be piped into a swale along the road and into the attenuation basin.

These proposals could provide adequate treatment for the parking area and the roof runoff.

### 5.1.6 Amenity (S4)

This FCA and DS is being submitted for tender stage only; amenity benefits can be meaningfully built into the DS at a more robust design stage.

However, in order to achieve planning permission, amenity benefits will need to be considered and incorporated into the design where possible. It is recommended that through early meetings with landscape architects and the wider design team amenity benefits can be built into the DS bringing social, environmental and wellbeing benefits to those who frequent the school.

There is potential for providing:

- Educational opportunities including regarding water management and the water cycle, habitats, biodiversity flora and fauna;
- Improved wellbeing through play appeal in green areas;

### 5.1.7 Biodiversity (S5)

This FCA and DS is being submitted for tender stage only; as with amenity benefits, biodiversity can be meaningfully built into the DS at a more robust design stage.

In order to achieve planning permission, biodiversity will need to be considered and incorporated into the design where possible.

Use of a number of different SuDS options including green roofs, infiltration and detention basins, swales and rain gardens provide an opportunity to increase the biodiversity in the area. Biodiversity should be specified to use native fauna and flora avoiding the introduction of invasive species into the area.

### 5.1.8 Design for Construction, Maintenance and Structural Integrity (S6)

The following will need consideration before construction commences:

#### 5.1.8.1 Construction

The method of construction should be taken into account in the design, including specific programming requirements, in order to minimise the potential for poor construction of any part of the drainage network. For phased developments, which the St Nicholas Primary School could be, in order to retain the functionality of the existing school while the new one is being built, the design should indicate how SuDS features will be managed, protected and commissioned, through the construction process. Detailed guidance on planning a SuDS scheme can be found in the SuDS Manual (CIRIA C753).

The design team need to take account of the health and safety risks associated with the construction of the drainage system in line with the requirements of the Construction (Design and Management) Regulations 2015. Risks to health and safety need to be minimised as far as reasonably practicable.

A construction plan should be produced to advise those responsible for construction of the SuDS. Guidance on how to produce a construction plan can be found in the SuDS Manual.

The materials specified by the detailed design need to be suitable and of high enough quality for their intended use. Care is to be taken to preserve natural resources and to ensure that there are no negative health and safety impacts presented by the specified materials.

#### 5.1.8.2 Maintenance

Maintenance plans for the SuDS elements of the drainage system should be in line with, or more stringent than, those presented in the SuDS Manual. Additional maintenance plans should be included for maintenance of the HydroBrake, if runoff is to be discharged off-site as well as all of the features on the proposed drainage layout.

#### 5.1.8.3 Structural Integrity

All materials and components used in the design and construction are to have a minimum design life equivalent to the design life of the development and be suitable for all imposed design loadings including an appropriate factor of safety. Any required rehabilitation throughout the design life will be included in the Maintenance Plan.

Control structures are to be located on the surface (protected from blockage and damage) or within easily accessible chambers.



## 6. Flood Risk – From the Development

### 6.1 Overview

National policy highlights how built development tends to increase the risk of flooding by increasing surface water runoff. Development often increases the area of impermeable surfaces thereby promoting rapid runoff to surface water sewers or watercourses rather than percolation into the ground. The effect has potential to lead to an increase in both total volume and peak water flows, contributing to flooding.

### 6.2 Tidal / Fluvial

The proposed development would not have any impact on Tidal or Fluvial flood risk.

Risk of flooding from tidal and fluvial sources remains low.

### 6.3 Surface Water Management

AECOM has produced a DS for the Proposed Development in line with national policy. The DS is presented in Section 5.

Subject to implementation of an effective DS, surface water flood risk from the development continues to be considered as low.

### 6.4 Groundwater Flood Risk

The building footprint of the new school is larger than that of the existing school, however there are no basements or underground structures that will impede groundwater. The risk of ground water flooding has been assessed as low due to the topography of the site and the flow paths around the site. The effect of the larger footprint on groundwater flows, if there was an event, would be negligible as there are open, undeveloped areas surrounding the site and water would flow unimpeded away from the site.

It has been stated that the priority is to assess whether infiltration techniques can be used on site. The impact on ground water in the area would need to be reassessed if infiltration is found to be a viable method of discharging water.

It is considered that the risk of ground water flooding from the proposed development is low.

### 6.5 Sewer Flood risk

Due to the increased capacity of the school after construction, there will be additional foul sewer discharge.

Relevant permissions would need to be sought from Welsh Water to discharge additional foul flow into the existing sewer to ensure that the current network has capacity to manage the flows. This will reduce the impact of additional flows on the system.

As highlighted in section 6 of this Report, if infiltration is not feasible and the distance to the existing surface water sewer is deemed too onerous, it may be required to discharge surface water runoff into the foul sewer. If this is the case, agreement with Welsh Water for the proposed sewer location and discharge rate will be required. This is to ensure that the receiving sewer has capacity for the designed flows and this connection would not increase the risk of sewer flooding to the proposed development or properties within the vicinity.

Subject to implementation of an effective DS and required assessment and agreement from the relevant authorities, flood risk from the proposed development is still considered low.

### 6.6 Artificial Flood Risk

The site is not in an area affected by artificial flood risk. The proposed development will not affect any artificial sources themselves. The conceptual DS includes the construction of a basin on the site. The

basin and additional storage is designed to contain the 100 year design storm plus 40% climate change. Exceedance flows have been considered as part of the DS. Exceedance flows will need to be reconsidered in the design of the new school if the proposed school layout and/or DS changes.

Taking this into account the risk from the site from artificial sources is considered to be low.

## 6.7 Summary of Flood Risk from the Site

The flood risk from the development is summarised in Table 6-1.

**Table 6-1: Summary of Flood Risk from the Development**

Type of Flooding	Source of Flooding risk	Flood Risk from development
Fluvial and Tidal	None	Very Low
Surface Water	Increased run off caused by increase in impermeable area.	Low (subject to implementation of effective DS)
Sewers	Increase foul discharge due to increased school capacity	Low (subject to agreement with Welsh Water)
Groundwater	Larger building footprint	Low
Artificial Sources	None	Very Low

## 7. Conclusion

### 7.1 Overview

This FCA and DS has been prepared for the purposes of submission as part of a tender process. Further consideration and investigation will be required prior to submission for planning permission.

This FCA has assessed flood sources to and from the Proposed Development, which is classified as a 'highly vulnerable development'; however, the site is located within DAM Zone A.

### 7.2 Flood Sources

The following potential sources of flooding which could affect the Proposed Development have been considered and assessed as follows:

- The current risk from fluvial and tidal sources is considered to be very low with the site located within DAM Zone A;
- The risk of groundwater flooding is considered to be very low;
- The risk of surface water flooding on site is considered to be low (subject to implementation of an effective DS)
- The risk of sewer flooding is considered to be low (subject to capacity checks and surface water discharge approval at the proposed rate and location); and
- The risk of flooding from other sources is considered to be very low.

### 7.3 Surface Water Management

A conceptual DS has been designed in line with the Welsh Government Statutory Standards for sustainable drainage systems - which utilises sustainable drainage options to manage runoff from the Proposed Development. The strategy has been designed to retain runoff on site up to a 1% AEP rainfall event with an allowance of 40% for climate change.

The DS shows the run-off discharging to the combined sewer as a worst case scenario, however infiltration testing should be a priority to determine if infiltration is viable, if it is redesign of the drainage will be required in order to achieve planning permission.

The DS includes advice and recommendations that the successful Contractor should consider in the process of designing the drainage and applying for planning permission.

## Appendix A - Site Red Line Boundary

Notes

Check all dimensions on site. Do not scale from this drawing  
 Report any discrepancies and omissions to HLM Architects  
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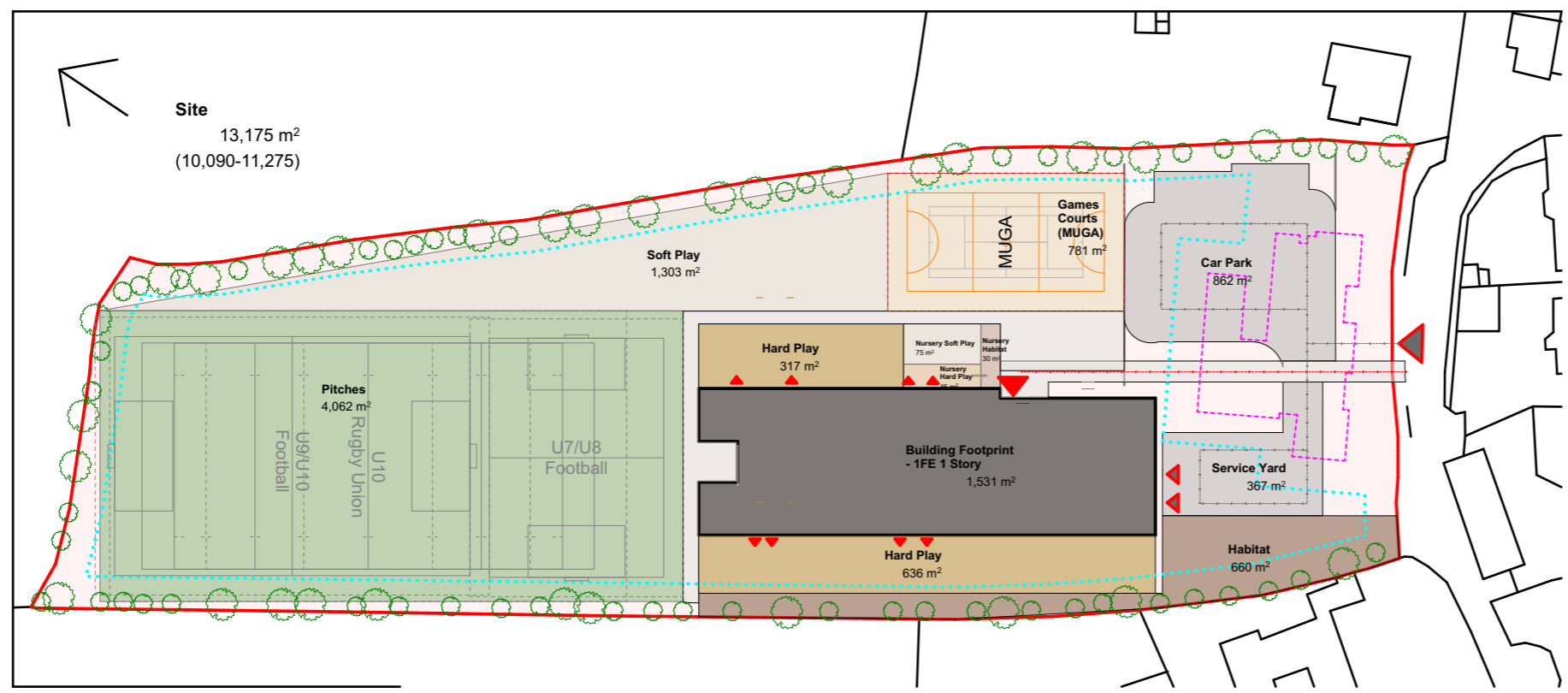
DESIGN/SKETCH DESIGN  
 Unless stated otherwise the designs shown are subject to detailed site survey investigations and legal definition the CDM Regulations and the comments and / or approval of the various relevant Local Authority Officers Statutory Undertakers - Fire Officers Engineers and the like. They are copyright project specific and confidential and no part is to be used or copied in any way without the express prior consent of HLM Architects.

PHOTOCOPIED/SCANNED INFORMATION  
 NB This drawing is based on photocopied / scanned information liable to distortion in scale.

1:100

- Site Boundary - Existing / Potential School
- Site Boundary - Community Hall
- Existing Building Footprint - to Be Retained
- Existing Building Footprint - to Be Demolished
- 6m 'no build zone' - proximity to existing building or boundary.
- Potential 'secure line'
- Entrance Route - Pedestrian
- Entrance Route - Vehicle / Delivery access
- Pedestrian / Vehicle flows conflict - crossing point required.
- Existing Tree  
As per 2006 School car park planning application

Category (& BB99 Brief Area)	Measured Area (m <sup>2</sup> )
<b>Nicholas Standard 1 Storey</b>	
Sports Pitches (4,200)	4,062
Games Courts (1,020)	781
Soft Play (1,325)	1,303
Soft Play - Nursery (75)	75
Hard Play (715)	953
Hard Play - Nursery (45)	45
Habitat (410)	660
Habitat - Nursery (30)	30
Non Net site - Vehicular	1,229
Non Net site - Pedestrians	638




Rev	Description	Date	By	Chk
P02	Building Footprint Amended	12.07.19	AMS	GW
P01	ISSUE FOR COMMENT - Test Fit amended to show standard footprint	02.07.20	AMS	GW

Revisions

Project

**15-1094-01**  
**St Nicholas**  
**School**



Client

Title

**Site Zoning - 1 Storey - Standard Footprint**

Drawing No.	Revision
<b>15-1094-01-SK-001</b>	<b>P02</b>

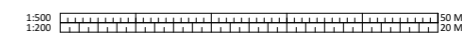
Scale @ A1	Drawn
<b>1:500</b>	AMS
Date	Checked
12.07.19	GW



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 cardiff@hlmarchitects.com



## Appendix B - Topography Drawings

**NOTES:**  
 1. SITE GRIDS AND LEVELS ARE BASED UPON NETWORK  
 2. SEE DRAWING FOR THE ACTIVE DIS

Do not scale this drawing

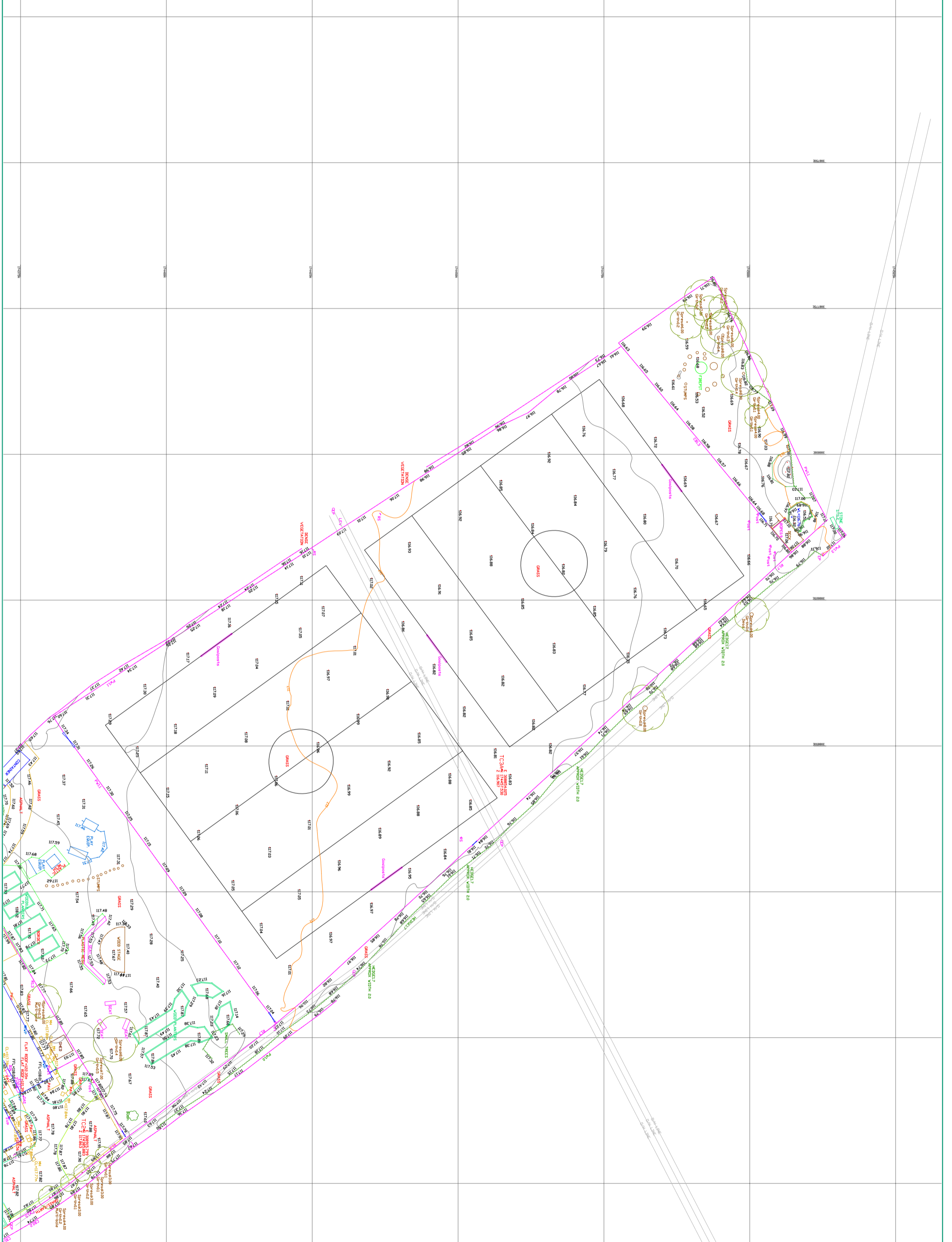
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**Alpha Land Services Ltd**  
 Tower Business Centre, Hinman  
 Altonham, Cumbria, LA1 1JF  
 Telephone: 01753 616444 Mobile:  
 07590 041 232  
 jsteele@alphalandservices.com

**AECOM**

**PROJECT:**  
 TOPOGRAPHICAL SURVEY  
 STINICHOLAS PRIMARY,  
 VALE OF GLAMORGAN.

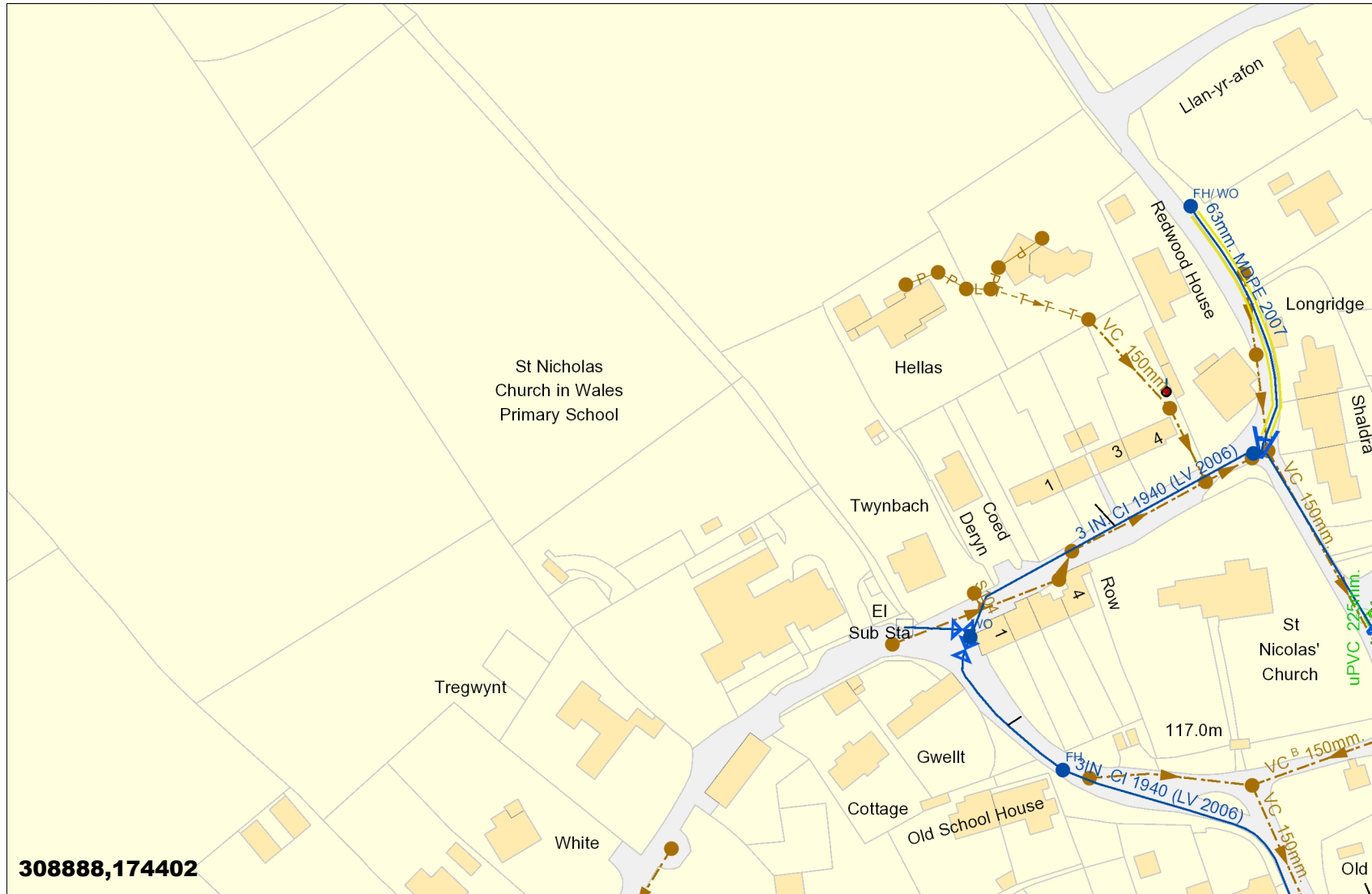
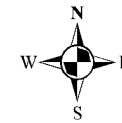
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**Date:** 01.02.19  
**Drawn by:** TC  
**Checked by:** AJ  
**Project Reference No.:** ALS/022994  
**Sheet Number:** AEC/SWP/101







## Appendix C - Public Sewer information



**Clean Water**

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

**Sewerage External**

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

**308888,174402**

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the company, is done so in accordance with statutory requirements of sections 198 and 199 of the water industry Act 1991 based upon the best information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

**EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE**

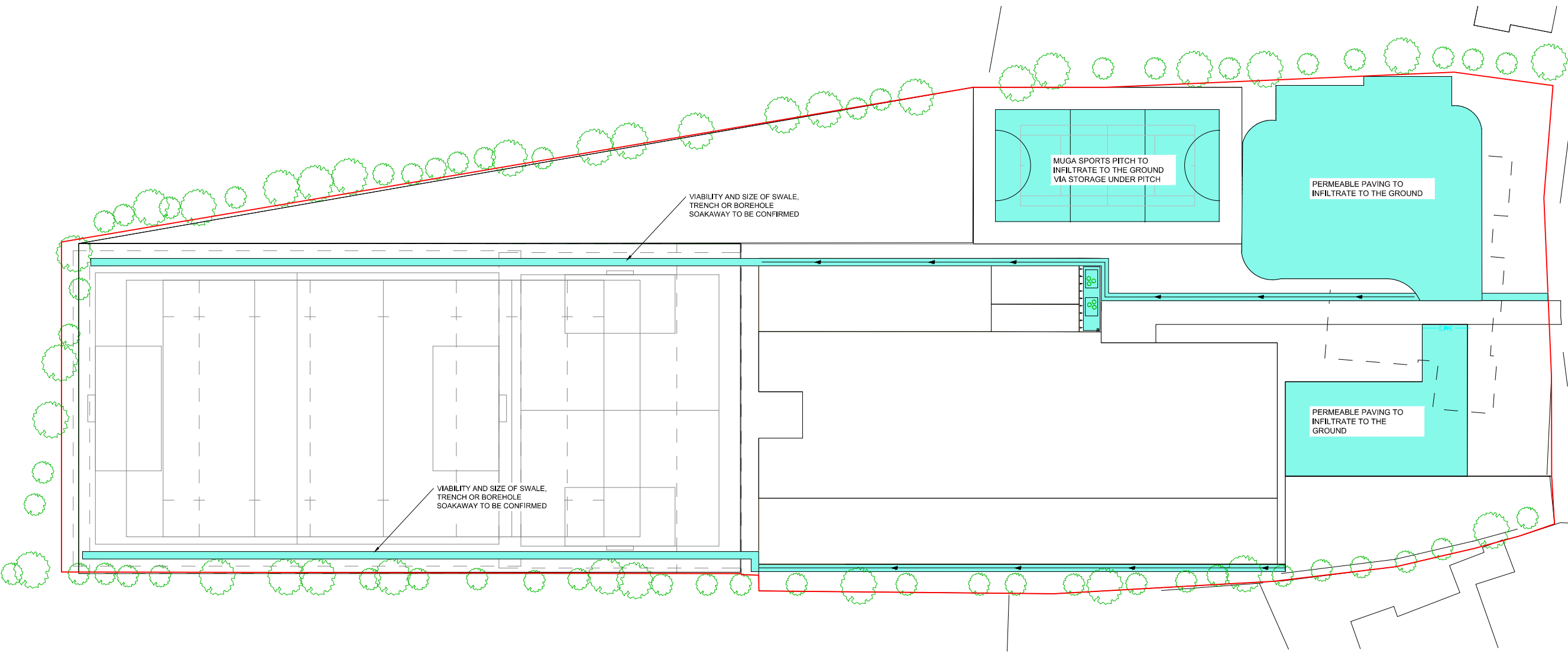
Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

## Appendix D – Indicative Drainage Layout using Infiltration Techniques

VGP-ACM-XX-05-DR-DR-00003 – Indicative Drainage Layout – Infiltration techniques

ISO A1 594mm x 841mm  
 Approved: RP  
 Checked: RP  
 Designer: MH  
 Project Management Initials:  
 Last saved by: JENNIFER.WALTERS(2019-06-29) Last Plotted: 2019-06-29  
 Filename: \BA-WP-03\700 - WATERWATER NEW4 - PROJECTS\6060\60607807 ST NICHOLAS SCHOOL FRA AND DS\CADDRAWINGS\GVP-ACM-XX-05-DR-DR-00004.DWG



1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS AND SPECIFICATION.
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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. DO NOT SCALE THIS DRAWING.

**KEY**

- INFILTRATION TECHNIQUE AREAS
- RED LINE BOUNDARY

NOT TO SCALE

**ISSUE/REVISION**

I/R	DATE	DESCRIPTION
P01	30.08.2019	FOR ISSUE

**PROJECT NUMBER**

60607807

**SHEET TITLE**

INDICATIVE DRAINAGE LAYOUT -  
INFILTRATION TECHNIQUES

**SHEET NUMBER**

VGP-ACM-XX-05-DR-DR-00001

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## Appendix E - Greenfield Runoff Rate Calculation Inputs

### Runoff calculations

The greenfield, existing and proposed runoff rates and existing and proposed runoff volumes have been calculated using the revitalised Flood Hydrograph Model, ReFH2. ReFH2 is one of the recommended methods within the current CIRIA SuDS Manual (C753) for undertaking the estimation of greenfield runoff rates. It is also a recommended method for undertaking the estimation of post development (existing and proposed) runoff rates and volumes for simple developments. For assessing the runoff from development sites it is anticipated that the usual route would be to use a point export from the FEH Webservice. The software uses plot scale equations at the point of import to calculate Time to Peak and Baseflow Lag.

The runoff rate for both the greenfield and post-development scenarios can be calculated based on the peak flow exported from ReFH2 using the following equation:

$$\text{Runoff Rate} = \frac{10 \times \text{Peak Flow}}{\text{Area}}$$

The unit for the runoff rate is l/s/ha, the peak flow is m<sup>3</sup>/s and the catchment area is km<sup>2</sup>.

### Catchment descriptors

The catchment descriptors exported from the Flood Estimation Handbook (FEH) Webservice for the development location are listed in Table 1 below.

**Table App E-1: Point location catchment descriptors**

Catchment Descriptor	Value
X Coordinate	308859
Y Coordinate	174456
BFIHOST	0.75
PROPWET	0.47
SAAR	1121

According to the GeoIndex Onshore Map<sup>20</sup> the bedrock geology at the site is made up of Friars Point Limestone Formation. The recorded superficial deposits are Till (unsorted glacial sediment). This correlates with the BFIHOST (0.75) that indicates that the site is of low permeability. A medium PROPWET of 0.47 indicates that this catchment is defined as wet for approximately 50% of the year. The value correlates with Standard Average Annual Rainfall (SAAR) of 1121 which is a moderate value.

The following parameters detailed in Table App E-2 have been calculated within the ReFH2 software. These parameters have not been altered from the default figures in the software. As the catchment is less than 0.5km<sup>2</sup>, the Time to Peak (T<sub>p</sub>) and Base Flow Lag (BL) have been taken from the calculations based on an area of 0.5km<sup>2</sup> as recommended in the technical guidance

<sup>20</sup> GeoIndex Onshore Map. British Geological Society. Available from: <http://www.bgs.ac.uk/geoindex/>. Last Accessed: 17/05/19.

**Table App E-2: Parameters calculated in ReFH2**

ReFH2 Parameter	Calculated Value
Cmax (mm)	734.18
Cini (mm)	67.48
Tp (Hr)	1
BL	33.81
BR	2.24

The runoff rate calculations use the critical storm duration of 2 hours and 15 minutes and a time step of 15 minutes. These are automatically calculated in the ReFH2 software. For the volume calculations, a storm duration of 6 hours and a time step of 40 minutes has been used.

For the post-development calculations an urban adjustment has been applied in accordance with the technical guidance document<sup>21</sup>**Error! Bookmark not defined.**. The following parameters have been used.

- Impervious Runoff Factor (IRF) = 1.0
- Imperviousness factor = 1.0

---

<sup>21</sup> The Revitalised Flood Hydrograph Model ReFH 2.2: Technical Guidance. Issue 2.0.3 (Wallingford Hydrosolutions Limited)

## Appendix F - ReFH2 Calculation outputs

Greenfield Run off Rate Calculations

Greenfield Run off Volume Calculations

Existing Run off Rate Calculations

Existing Run off Volume Calculations

Proposed Run off Rate Calculations

Proposed Run off Volume Calculations

# UK Design Flood Estimation

Generated on Tuesday, August 13, 2019 2:31:05 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 9964-0397

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	16.46	Total runoff (ML):	0.04
Total Rainfall (mm):	12.08	Total flow (ML):	0.07
Peak Rainfall (mm):	3.29	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters



Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

**Baseflow model parameters**

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

**Urbanisation parameters**

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3452	0.0000	0.0800	0.0000	0.000365	0.000365
00:15:00	0.6477	0.0000	0.1505	0.0001	0.000363	0.000425
00:30:00	1.2043	0.0000	0.2812	0.0003	0.000361	0.000664
00:45:00	2.2000	0.0000	0.5179	0.0008	0.00036	0.00117
01:00:00	3.2853	0.0000	0.7838	0.0017	0.00036	0.00206
01:15:00	2.2000	0.0000	0.5318	0.0032	0.000363	0.00352
01:30:00	1.2043	0.0000	0.2935	0.0048	0.000369	0.00519
01:45:00	0.6477	0.0000	0.1585	0.0058	0.00038	0.00621
02:00:00	0.3452	0.0000	0.0847	0.0058	0.000395	0.00618
02:15:00	0.0000	0.0000	0.0000	0.0051	0.000413	0.00552
02:30:00	0.0000	0.0000	0.0000	0.0041	0.000431	0.00457
02:45:00	0.0000	0.0000	0.0000	0.0031	0.000449	0.00352
03:00:00	0.0000	0.0000	0.0000	0.0021	0.000464	0.00257
03:15:00	0.0000	0.0000	0.0000	0.0014	0.000476	0.00191
03:30:00	0.0000	0.0000	0.0000	0.0010	0.000486	0.0015
03:45:00	0.0000	0.0000	0.0000	0.0007	0.000493	0.00123
04:00:00	0.0000	0.0000	0.0000	0.0005	0.000498	0.00105
04:15:00	0.0000	0.0000	0.0000	0.0004	0.000501	0.000906
04:30:00	0.0000	0.0000	0.0000	0.0003	0.000503	0.000782
04:45:00	0.0000	0.0000	0.0000	0.0002	0.000503	0.000673
05:00:00	0.0000	0.0000	0.0000	0.0001	0.000501	0.000589
05:15:00	0.0000	0.0000	0.0000	0.0000	0.000499	0.000539
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000497	0.000512
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000498
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000492	0.000492
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000486	0.000486
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000483	0.000483
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000481	0.000481
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000478	0.000478
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
08:00:00	0.0000	0.0000	0.0000	0.0000	0.00047	0.00047
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000467	0.000467
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000462	0.000462
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00046	0.00046
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000457	0.000457
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000454	0.000454
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000447	0.000447
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000435	0.000435
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00043	0.00043
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000423	0.000423
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000418	0.000418
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000411	0.000411
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000409	0.000409
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000402	0.000402
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000393	0.000393
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000391	0.000391
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00038	0.00038

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000376	0.000376
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000367	0.000367

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:31:39 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 9964-0397

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	18.90	Total runoff (ML):	0.04
Total Rainfall (mm):	13.87	Total flow (ML):	0.08
Peak Rainfall (mm):	3.77	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3964	0.0000	0.0919	0.0000	0.000365	0.000365
00:15:00	0.7438	0.0000	0.1729	0.0001	0.000363	0.000434
00:30:00	1.3830	0.0000	0.3232	0.0003	0.000362	0.000709
00:45:00	2.5263	0.0000	0.5962	0.0009	0.00036	0.00129
01:00:00	3.7727	0.0000	0.9040	0.0020	0.000361	0.00231
01:15:00	2.5263	0.0000	0.6145	0.0036	0.000364	0.00399
01:30:00	1.3830	0.0000	0.3395	0.0055	0.000372	0.00592
01:45:00	0.7438	0.0000	0.1835	0.0067	0.000384	0.00709
02:00:00	0.3964	0.0000	0.0981	0.0067	0.000402	0.00706
02:15:00	0.0000	0.0000	0.0000	0.0059	0.000423	0.00631
02:30:00	0.0000	0.0000	0.0000	0.0048	0.000445	0.00522
02:45:00	0.0000	0.0000	0.0000	0.0035	0.000466	0.00401
03:00:00	0.0000	0.0000	0.0000	0.0024	0.000484	0.00292
03:15:00	0.0000	0.0000	0.0000	0.0017	0.000498	0.00217
03:30:00	0.0000	0.0000	0.0000	0.0012	0.00051	0.00169
03:45:00	0.0000	0.0000	0.0000	0.0009	0.000518	0.00138
04:00:00	0.0000	0.0000	0.0000	0.0006	0.000525	0.00116
04:15:00	0.0000	0.0000	0.0000	0.0005	0.000529	0.001
04:30:00	0.0000	0.0000	0.0000	0.0003	0.000531	0.000857
04:45:00	0.0000	0.0000	0.0000	0.0002	0.000531	0.00073
05:00:00	0.0000	0.0000	0.0000	0.0001	0.00053	0.000632
05:15:00	0.0000	0.0000	0.0000	0.0000	0.000528	0.000574
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000525	0.000543
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000522	0.000527
06:00:00	0.0000	0.0000	0.0000	0.0000	0.00052	0.00052
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000517	0.000517
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000514	0.000514
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000511	0.000511
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000508	0.000508
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000505	0.000505
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000502	0.000502
07:45:00	0.0000	0.0000	0.0000	0.0000	0.0005	0.0005
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000497	0.000497
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000494
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000491	0.000491



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000486	0.000486
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000483	0.000483
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00048	0.00048
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000478	0.000478
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000472	0.000472
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00047	0.00047
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000467	0.000467
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000464	0.000464
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000462	0.000462
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000459	0.000459
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000457	0.000457
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000454	0.000454
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000447	0.000447
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000434
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000429
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000411	0.000411
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000393	0.000393
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00038	0.00038
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:32:39 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 9964-0397

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	41.80	Total runoff (ML):	0.10
Total Rainfall (mm):	30.67	Total flow (ML):	0.18
Peak Rainfall (mm):	8.34	Peak flow (m <sup>3</sup> /s):	0.02

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.8766	0.0000	0.2035	0.0000	0.000365	0.000365
00:15:00	1.6446	0.0000	0.3841	0.0002	0.000363	0.000521
00:30:00	3.0580	0.0000	0.7225	0.0008	0.000362	0.00113
00:45:00	5.5861	0.0000	1.3477	0.0021	0.000362	0.00242
01:00:00	8.3419	0.0000	2.0795	0.0043	0.000365	0.0047
01:15:00	5.5861	0.0000	1.4374	0.0081	0.000375	0.00845
01:30:00	3.0580	0.0000	0.8021	0.0124	0.000396	0.0128
01:45:00	1.6446	0.0000	0.4358	0.0151	0.000428	0.0155
02:00:00	0.8766	0.0000	0.2336	0.0151	0.000474	0.0156
02:15:00	0.0000	0.0000	0.0000	0.0135	0.000528	0.014
02:30:00	0.0000	0.0000	0.0000	0.0111	0.000585	0.0117
02:45:00	0.0000	0.0000	0.0000	0.0083	0.00064	0.00898
03:00:00	0.0000	0.0000	0.0000	0.0058	0.000688	0.00652
03:15:00	0.0000	0.0000	0.0000	0.0041	0.000727	0.00478
03:30:00	0.0000	0.0000	0.0000	0.0029	0.000759	0.00367
03:45:00	0.0000	0.0000	0.0000	0.0022	0.000783	0.00293
04:00:00	0.0000	0.0000	0.0000	0.0016	0.000802	0.00241
04:15:00	0.0000	0.0000	0.0000	0.0012	0.000815	0.00201
04:30:00	0.0000	0.0000	0.0000	0.0008	0.000823	0.00166
04:45:00	0.0000	0.0000	0.0000	0.0005	0.000827	0.00134
05:00:00	0.0000	0.0000	0.0000	0.0003	0.000827	0.0011
05:15:00	0.0000	0.0000	0.0000	0.0001	0.000825	0.000946
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000821	0.000867
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000817	0.000829
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000813	0.000813
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000808	0.000808
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000803	0.000803
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000799	0.000799
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000795	0.000795
07:15:00	0.0000	0.0000	0.0000	0.0000	0.00079	0.00079
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000786	0.000786
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000781	0.000781
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000777	0.000777
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000773	0.000773
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000768	0.000768

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000764	0.000764
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00076	0.00076
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000755	0.000755
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000751	0.000751
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000747	0.000747
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000743	0.000743
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000739	0.000739
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000734	0.000734
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00073	0.00073
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000726	0.000726
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000722	0.000722
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000718	0.000718
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000714	0.000714
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00071	0.00071
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000706	0.000706
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000702	0.000702
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000698	0.000698
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000694	0.000694
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000691	0.000691
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000687	0.000687
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000683	0.000683
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000679	0.000679
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000675	0.000675
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000671	0.000671
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000668	0.000668
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000664	0.000664
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00066	0.00066
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000657	0.000657
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000653	0.000653
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000649	0.000649
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000646	0.000646
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000642	0.000642
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000638	0.000638
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000635	0.000635
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000631	0.000631
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000628	0.000628

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000624	0.000624
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000621	0.000621
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000617	0.000617
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000614	0.000614
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00061	0.00061
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000607	0.000607
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000604	0.000604
19:30:00	0.0000	0.0000	0.0000	0.0000	0.0006	0.0006
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000597	0.000597
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000593	0.000593
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00059	0.00059
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000587	0.000587
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000584	0.000584
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00058	0.00058
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000577	0.000577
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000574	0.000574
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000571	0.000571
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000567	0.000567
22:15:00	0.0000	0.0000	0.0000	0.0000	0.000564	0.000564
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000561	0.000561
22:45:00	0.0000	0.0000	0.0000	0.0000	0.000558	0.000558
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000555	0.000555
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000552	0.000552
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000549	0.000549
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000546	0.000546
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000543	0.000543
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000539	0.000539
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000536	0.000536
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000533	0.000533
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00053	0.00053
25:15:00	0.0000	0.0000	0.0000	0.0000	0.000528	0.000528
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000525	0.000525
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000522	0.000522
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000519	0.000519
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000516	0.000516
26:30:00	0.0000	0.0000	0.0000	0.0000	0.000513	0.000513



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00051	0.00051
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000507	0.000507
27:15:00	0.0000	0.0000	0.0000	0.0000	0.000504	0.000504
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000502	0.000502
27:45:00	0.0000	0.0000	0.0000	0.0000	0.000499	0.000499
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000496	0.000496
28:15:00	0.0000	0.0000	0.0000	0.0000	0.000493	0.000493
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00049	0.00049
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000488	0.000488
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000485	0.000485
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000482	0.000482
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00048	0.00048
29:45:00	0.0000	0.0000	0.0000	0.0000	0.000477	0.000477
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000474	0.000474
30:15:00	0.0000	0.0000	0.0000	0.0000	0.000472	0.000472
30:30:00	0.0000	0.0000	0.0000	0.0000	0.000469	0.000469
30:45:00	0.0000	0.0000	0.0000	0.0000	0.000466	0.000466
31:00:00	0.0000	0.0000	0.0000	0.0000	0.000464	0.000464
31:15:00	0.0000	0.0000	0.0000	0.0000	0.000461	0.000461
31:30:00	0.0000	0.0000	0.0000	0.0000	0.000458	0.000458
31:45:00	0.0000	0.0000	0.0000	0.0000	0.000456	0.000456
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000453	0.000453
32:15:00	0.0000	0.0000	0.0000	0.0000	0.000451	0.000451
32:30:00	0.0000	0.0000	0.0000	0.0000	0.000448	0.000448
32:45:00	0.0000	0.0000	0.0000	0.0000	0.000446	0.000446
33:00:00	0.0000	0.0000	0.0000	0.0000	0.000443	0.000443
33:15:00	0.0000	0.0000	0.0000	0.0000	0.000441	0.000441
33:30:00	0.0000	0.0000	0.0000	0.0000	0.000438	0.000438
33:45:00	0.0000	0.0000	0.0000	0.0000	0.000436	0.000436
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000433	0.000433
34:15:00	0.0000	0.0000	0.0000	0.0000	0.000431	0.000431
34:30:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000429
34:45:00	0.0000	0.0000	0.0000	0.0000	0.000426	0.000426
35:00:00	0.0000	0.0000	0.0000	0.0000	0.000424	0.000424
35:15:00	0.0000	0.0000	0.0000	0.0000	0.000421	0.000421
35:30:00	0.0000	0.0000	0.0000	0.0000	0.000419	0.000419

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000414	0.000414

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:33:20 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 9964-0397

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	53.72	Total runoff (ML):	0.13
Total Rainfall (mm):	39.42	Total flow (ML):	0.22
Peak Rainfall (mm):	10.72	Peak flow (m <sup>3</sup> /s):	0.02

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.1266	0.0000	0.2617	0.0000	0.000365	0.000365
00:15:00	2.1139	0.0000	0.4949	0.0002	0.000363	0.000566
00:30:00	3.9304	0.0000	0.9339	0.0010	0.000362	0.00135
00:45:00	7.1798	0.0000	1.7520	0.0027	0.000363	0.00301
01:00:00	10.7219	0.0000	2.7269	0.0056	0.000368	0.00595
01:15:00	7.1798	0.0000	1.9001	0.0104	0.000382	0.0108
01:30:00	3.9304	0.0000	1.0653	0.0160	0.000409	0.0165
01:45:00	2.1139	0.0000	0.5803	0.0196	0.000453	0.02
02:00:00	1.1266	0.0000	0.3114	0.0197	0.000515	0.0202
02:15:00	0.0000	0.0000	0.0000	0.0177	0.000589	0.0182
02:30:00	0.0000	0.0000	0.0000	0.0146	0.000667	0.0153
02:45:00	0.0000	0.0000	0.0000	0.0110	0.000742	0.0118
03:00:00	0.0000	0.0000	0.0000	0.0078	0.000808	0.0086
03:15:00	0.0000	0.0000	0.0000	0.0055	0.000863	0.00632
03:30:00	0.0000	0.0000	0.0000	0.0039	0.000906	0.00485
03:45:00	0.0000	0.0000	0.0000	0.0029	0.00094	0.00387
04:00:00	0.0000	0.0000	0.0000	0.0022	0.000966	0.00317
04:15:00	0.0000	0.0000	0.0000	0.0016	0.000985	0.00262
04:30:00	0.0000	0.0000	0.0000	0.0011	0.000997	0.00214
04:45:00	0.0000	0.0000	0.0000	0.0007	0.001	0.00171
05:00:00	0.0000	0.0000	0.0000	0.0004	0.001	0.00138
05:15:00	0.0000	0.0000	0.0000	0.0002	0.001	0.00117
05:30:00	0.0000	0.0000	0.0000	0.0001	0.000997	0.00106
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000992	0.00101
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000987	0.000988
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000981	0.000981
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000976	0.000976
06:45:00	0.0000	0.0000	0.0000	0.0000	0.00097	0.00097
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000965	0.000965
07:15:00	0.0000	0.0000	0.0000	0.0000	0.00096	0.00096
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000954	0.000954
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000949	0.000949
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000944	0.000944
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000938	0.000938
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000933	0.000933

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000928	0.000928
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000923	0.000923
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000918	0.000918
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000912	0.000912
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000907	0.000907
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000902	0.000902
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000897	0.000897
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000892	0.000892
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000887	0.000887
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000882	0.000882
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000877	0.000877
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000872	0.000872
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000867	0.000867
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000863	0.000863
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000858	0.000858
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000853	0.000853
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000848	0.000848
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000843	0.000843
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000839	0.000839
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000834	0.000834
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000829	0.000829
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000825	0.000825
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00082	0.00082
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000816	0.000816
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000811	0.000811
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000806	0.000806
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000802	0.000802
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000797	0.000797
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000793	0.000793
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000789	0.000789
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000784	0.000784
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00078	0.00078
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000775	0.000775
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000771	0.000771
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000767	0.000767
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000762	0.000762

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000758	0.000758
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000754	0.000754
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00075	0.00075
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000746	0.000746
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000741	0.000741
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000737	0.000737
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000733	0.000733
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000729	0.000729
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000725	0.000725
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000721	0.000721
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000717	0.000717
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000713	0.000713
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000709	0.000709
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000705	0.000705
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000701	0.000701
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000697	0.000697
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000693	0.000693
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000689	0.000689
22:15:00	0.0000	0.0000	0.0000	0.0000	0.000685	0.000685
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000682	0.000682
22:45:00	0.0000	0.0000	0.0000	0.0000	0.000678	0.000678
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000674	0.000674
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00067	0.00067
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000666	0.000666
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000663	0.000663
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000659	0.000659
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000655	0.000655
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000652	0.000652
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000648	0.000648
25:00:00	0.0000	0.0000	0.0000	0.0000	0.000644	0.000644
25:15:00	0.0000	0.0000	0.0000	0.0000	0.000641	0.000641
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000637	0.000637
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000634	0.000634
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00063	0.00063
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000627	0.000627
26:30:00	0.0000	0.0000	0.0000	0.0000	0.000623	0.000623



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00062	0.00062
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000616	0.000616
27:15:00	0.0000	0.0000	0.0000	0.0000	0.000613	0.000613
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000609	0.000609
27:45:00	0.0000	0.0000	0.0000	0.0000	0.000606	0.000606
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000602	0.000602
28:15:00	0.0000	0.0000	0.0000	0.0000	0.000599	0.000599
28:30:00	0.0000	0.0000	0.0000	0.0000	0.000596	0.000596
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000592	0.000592
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000589	0.000589
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000586	0.000586
29:30:00	0.0000	0.0000	0.0000	0.0000	0.000582	0.000582
29:45:00	0.0000	0.0000	0.0000	0.0000	0.000579	0.000579
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000576	0.000576
30:15:00	0.0000	0.0000	0.0000	0.0000	0.000573	0.000573
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00057	0.00057
30:45:00	0.0000	0.0000	0.0000	0.0000	0.000566	0.000566
31:00:00	0.0000	0.0000	0.0000	0.0000	0.000563	0.000563
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00056	0.00056
31:30:00	0.0000	0.0000	0.0000	0.0000	0.000557	0.000557
31:45:00	0.0000	0.0000	0.0000	0.0000	0.000554	0.000554
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000551	0.000551
32:15:00	0.0000	0.0000	0.0000	0.0000	0.000548	0.000548
32:30:00	0.0000	0.0000	0.0000	0.0000	0.000545	0.000545
32:45:00	0.0000	0.0000	0.0000	0.0000	0.000541	0.000541
33:00:00	0.0000	0.0000	0.0000	0.0000	0.000538	0.000538
33:15:00	0.0000	0.0000	0.0000	0.0000	0.000535	0.000535
33:30:00	0.0000	0.0000	0.0000	0.0000	0.000532	0.000532
33:45:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000527	0.000527
34:15:00	0.0000	0.0000	0.0000	0.0000	0.000524	0.000524
34:30:00	0.0000	0.0000	0.0000	0.0000	0.000521	0.000521
34:45:00	0.0000	0.0000	0.0000	0.0000	0.000518	0.000518
35:00:00	0.0000	0.0000	0.0000	0.0000	0.000515	0.000515
35:15:00	0.0000	0.0000	0.0000	0.0000	0.000512	0.000512
35:30:00	0.0000	0.0000	0.0000	0.0000	0.000509	0.000509

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000503	0.000503

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:37:46 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 638F-EEB6

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	24.86	Total runoff (ML):	0.06
Total Rainfall (mm):	20.11	Total flow (ML):	0.12
Peak Rainfall (mm):	5.47	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.5748	0.0000	0.1333	0.0000	0.000365	0.000365
00:40:00	1.0784	0.0000	0.2512	0.0003	0.00036	0.00062
01:20:00	2.0052	0.0000	0.4706	0.0008	0.000358	0.00113
02:00:00	3.6630	0.0000	0.8716	0.0016	0.000361	0.00193
02:40:00	5.4700	0.0000	1.3303	0.0029	0.000372	0.00331
03:20:00	3.6630	0.0000	0.9101	0.0049	0.000399	0.00528
04:00:00	2.0052	0.0000	0.5048	0.0055	0.000444	0.00593
04:40:00	1.0784	0.0000	0.2734	0.0044	0.000498	0.00489
05:20:00	0.5748	0.0000	0.1463	0.0029	0.000546	0.00349
06:00:00	0.0000	0.0000	0.0000	0.0018	0.00058	0.00242
06:40:00	0.0000	0.0000	0.0000	0.0009	0.0006	0.00152
07:20:00	0.0000	0.0000	0.0000	0.0003	0.000606	0.000949
08:00:00	0.0000	0.0000	0.0000	0.0001	0.000604	0.000718
08:40:00	0.0000	0.0000	0.0000	0.0000	0.000598	0.000634
09:20:00	0.0000	0.0000	0.0000	0.0000	0.00059	0.000595
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000581	0.000581
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000572	0.000572
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000564	0.000564
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000555	0.000555
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000547	0.000547
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000539	0.000539
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000531	0.000531
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000523	0.000523
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000515	0.000515
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000508	0.000508
16:40:00	0.0000	0.0000	0.0000	0.0000	0.0005	0.0005
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000493	0.000493
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000485	0.000485
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000478	0.000478
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000471	0.000471
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000464	0.000464
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000457	0.000457
21:20:00	0.0000	0.0000	0.0000	0.0000	0.00045	0.00045
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000431	0.000431
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000424	0.000424
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000418	0.000418
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000412	0.000412
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
26:40:00	0.0000	0.0000	0.0000	0.0000	0.0004	0.0004
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000394	0.000394
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000376	0.000376
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:36:56 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 638F-EEB6

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	27.66	Total runoff (ML):	0.07
Total Rainfall (mm):	22.38	Total flow (ML):	0.13
Peak Rainfall (mm):	6.09	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.6395	0.0000	0.1484	0.0000	0.000365	0.000365
00:40:00	1.1999	0.0000	0.2796	0.0003	0.00036	0.000649
01:20:00	2.2311	0.0000	0.5243	0.0009	0.000358	0.00122
02:00:00	4.0755	0.0000	0.9726	0.0017	0.000362	0.0021
02:40:00	6.0861	0.0000	1.4881	0.0033	0.000376	0.00365
03:20:00	4.0755	0.0000	1.0204	0.0054	0.000406	0.00585
04:00:00	2.2311	0.0000	0.5667	0.0061	0.000457	0.00658
04:40:00	1.1999	0.0000	0.3071	0.0049	0.000518	0.00543
05:20:00	0.6395	0.0000	0.1644	0.0033	0.000574	0.00389
06:00:00	0.0000	0.0000	0.0000	0.0021	0.000614	0.00268
06:40:00	0.0000	0.0000	0.0000	0.0010	0.000637	0.00168
07:20:00	0.0000	0.0000	0.0000	0.0004	0.000645	0.00103
08:00:00	0.0000	0.0000	0.0000	0.0001	0.000643	0.000773
08:40:00	0.0000	0.0000	0.0000	0.0000	0.000636	0.000678
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000627	0.000634
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000618	0.000618
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000609	0.000609
11:20:00	0.0000	0.0000	0.0000	0.0000	0.0006	0.0006
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000591	0.000591
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000582	0.000582
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000574	0.000574
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000565	0.000565
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000557	0.000557
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000548	0.000548
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00054	0.00054
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000532	0.000532
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000524	0.000524
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000517	0.000517
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000509	0.000509
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000501	0.000501
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000494
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000487	0.000487
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000479	0.000479
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000472	0.000472
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000458	0.000458
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000445	0.000445
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000438	0.000438
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000419	0.000419
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000407	0.000407
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000389	0.000389
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000383	0.000383
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000372	0.000372

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:36:31 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 638F-EEB6

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	54.13	Total runoff (ML):	0.15
Total Rainfall (mm):	43.79	Total flow (ML):	0.25
Peak Rainfall (mm):	11.91	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.2515	0.0000	0.2908	0.0000	0.000365	0.000365
00:40:00	2.3482	0.0000	0.5504	0.0006	0.000361	0.000927
01:20:00	4.3662	0.0000	1.0404	0.0017	0.000362	0.00205
02:00:00	7.9758	0.0000	1.9572	0.0034	0.000375	0.0038
02:40:00	11.9105	0.0000	3.0592	0.0065	0.000408	0.00688
03:20:00	7.9758	0.0000	2.1400	0.0109	0.000477	0.0114
04:00:00	4.3662	0.0000	1.2025	0.0125	0.000593	0.013
04:40:00	2.3482	0.0000	0.6558	0.0102	0.000736	0.011
05:20:00	1.2515	0.0000	0.3521	0.0071	0.000868	0.00792
06:00:00	0.0000	0.0000	0.0000	0.0045	0.000967	0.00547
06:40:00	0.0000	0.0000	0.0000	0.0023	0.00103	0.00336
07:20:00	0.0000	0.0000	0.0000	0.0009	0.00105	0.00196
08:00:00	0.0000	0.0000	0.0000	0.0003	0.00106	0.00137
08:40:00	0.0000	0.0000	0.0000	0.0001	0.00105	0.00115
09:20:00	0.0000	0.0000	0.0000	0.0000	0.00103	0.00105
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
10:40:00	0.0000	0.0000	0.0000	0.0000	0.001	0.001
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000989	0.000989
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000974	0.000974
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000959	0.000959
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000945	0.000945
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000931	0.000931
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000917	0.000917
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000904	0.000904
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00089	0.00089
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000877	0.000877
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000864	0.000864
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000851	0.000851
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000839	0.000839
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000826	0.000826
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000814	0.000814
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000802	0.000802
21:20:00	0.0000	0.0000	0.0000	0.0000	0.00079	0.00079
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000778	0.000778
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000767	0.000767



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000755	0.000755
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000744	0.000744
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000733	0.000733
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000722	0.000722
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000711	0.000711
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000701	0.000701
27:20:00	0.0000	0.0000	0.0000	0.0000	0.00069	0.00069
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00068	0.00068
28:40:00	0.0000	0.0000	0.0000	0.0000	0.00067	0.00067
29:20:00	0.0000	0.0000	0.0000	0.0000	0.00066	0.00066
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00065	0.00065
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000641	0.000641
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000631	0.000631
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000622	0.000622
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000613	0.000613
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000603	0.000603
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000594	0.000594
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000586	0.000586
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000577	0.000577
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000568	0.000568

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:35:45 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 638F-EEB6

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	68.94	Total runoff (ML):	0.19
Total Rainfall (mm):	55.77	Total flow (ML):	0.32
Peak Rainfall (mm):	15.17	Peak flow (m <sup>3</sup> /s):	0.02

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0 [0]	Yes
Urbext 2000	0.1 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.5939	0.0000	0.3706	0.0000	0.000365	0.000365
00:40:00	2.9905	0.0000	0.7033	0.0007	0.000361	0.00108
01:20:00	5.5604	0.0000	1.3351	0.0022	0.000364	0.00252
02:00:00	10.1574	0.0000	2.5308	0.0044	0.000382	0.00476
02:40:00	15.1683	0.0000	4.0007	0.0083	0.000426	0.00871
03:20:00	10.1574	0.0000	2.8273	0.0140	0.00052	0.0145
04:00:00	5.5604	0.0000	1.5981	0.0162	0.000677	0.0169
04:40:00	2.9905	0.0000	0.8742	0.0134	0.000872	0.0143
05:20:00	1.5939	0.0000	0.4702	0.0094	0.00106	0.0104
06:00:00	0.0000	0.0000	0.0000	0.0061	0.00119	0.00725
06:40:00	0.0000	0.0000	0.0000	0.0032	0.00128	0.00446
07:20:00	0.0000	0.0000	0.0000	0.0013	0.00132	0.00258
08:00:00	0.0000	0.0000	0.0000	0.0004	0.00133	0.00177
08:40:00	0.0000	0.0000	0.0000	0.0001	0.00132	0.00146
09:20:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.00132
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128
10:40:00	0.0000	0.0000	0.0000	0.0000	0.00126	0.00126
11:20:00	0.0000	0.0000	0.0000	0.0000	0.00124	0.00124
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00122	0.00122
12:40:00	0.0000	0.0000	0.0000	0.0000	0.00121	0.00121
13:20:00	0.0000	0.0000	0.0000	0.0000	0.00119	0.00119
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00117	0.00117
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00115	0.00115
15:20:00	0.0000	0.0000	0.0000	0.0000	0.00114	0.00114
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00112	0.00112
16:40:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011
17:20:00	0.0000	0.0000	0.0000	0.0000	0.00109	0.00109
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
18:40:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
19:20:00	0.0000	0.0000	0.0000	0.0000	0.00104	0.00104
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
20:40:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000993	0.000993
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000978	0.000978
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000963	0.000963

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000949	0.000949
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000935	0.000935
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000921	0.000921
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000907	0.000907
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000894	0.000894
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000881	0.000881
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000868	0.000868
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000855	0.000855
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000842	0.000842
29:20:00	0.0000	0.0000	0.0000	0.0000	0.00083	0.00083
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000817	0.000817
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000805	0.000805
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000793	0.000793
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000781	0.000781
32:40:00	0.0000	0.0000	0.0000	0.0000	0.00077	0.00077
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000758	0.000758
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000747	0.000747
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000736	0.000736
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000725	0.000725
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000714	0.000714

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:21:05 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 8A89-B109

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	16.46	Total runoff (ML):	0.02
Total Rainfall (mm):	12.08	Total flow (ML):	0.05
Peak Rainfall (mm):	3.29	Peak flow (m <sup>3</sup> /s):	0.00

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters



Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3452	0.0000	0.0318	0.0000	0.000365	0.000365
00:15:00	0.6477	0.0000	0.0601	0.0000	0.000363	0.000371
00:30:00	1.2043	0.0000	0.1133	0.0000	0.000362	0.000402
00:45:00	2.2000	0.0000	0.2121	0.0001	0.00036	0.000478
01:00:00	3.2853	0.0000	0.3290	0.0003	0.000361	0.00064
01:15:00	2.2000	0.0000	0.2285	0.0006	0.000364	0.000937
01:30:00	1.2043	0.0000	0.1279	0.0010	0.000372	0.00135
01:45:00	0.6477	0.0000	0.0696	0.0014	0.000385	0.0018
02:00:00	0.3452	0.0000	0.0373	0.0018	0.000403	0.0022
02:15:00	0.0000	0.0000	0.0000	0.0020	0.000424	0.00242
02:30:00	0.0000	0.0000	0.0000	0.0020	0.000447	0.00242
02:45:00	0.0000	0.0000	0.0000	0.0018	0.000468	0.00226
03:00:00	0.0000	0.0000	0.0000	0.0015	0.000486	0.00203
03:15:00	0.0000	0.0000	0.0000	0.0013	0.000501	0.00177
03:30:00	0.0000	0.0000	0.0000	0.0010	0.000513	0.00154
03:45:00	0.0000	0.0000	0.0000	0.0008	0.000522	0.00134
04:00:00	0.0000	0.0000	0.0000	0.0006	0.000528	0.00117
04:15:00	0.0000	0.0000	0.0000	0.0005	0.000532	0.00101
04:30:00	0.0000	0.0000	0.0000	0.0003	0.000534	0.000864
04:45:00	0.0000	0.0000	0.0000	0.0002	0.000534	0.000735
05:00:00	0.0000	0.0000	0.0000	0.0001	0.000533	0.000637
05:15:00	0.0000	0.0000	0.0000	0.0000	0.000531	0.000578
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000546
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000526	0.00053
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000523	0.000523
06:15:00	0.0000	0.0000	0.0000	0.0000	0.00052	0.00052
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000517	0.000517
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000514	0.000514
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000511	0.000511
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000508	0.000508
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000503	0.000503
08:00:00	0.0000	0.0000	0.0000	0.0000	0.0005	0.0005
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000497	0.000497
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000494

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000492	0.000492
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000486	0.000486
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000483	0.000483
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000481	0.000481
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000478	0.000478
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00047	0.00047
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000467	0.000467
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000462	0.000462
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00046	0.00046
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000457	0.000457
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000455	0.000455
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000447	0.000447
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000435	0.000435
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00043	0.00043
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000423	0.000423
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000418	0.000418
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000411	0.000411
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000409	0.000409
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000402	0.000402
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000393	0.000393
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000391	0.000391
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00038	0.00038
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000376	0.000376
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000367	0.000367

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:21:29 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 8A89-B109

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	18.90	Total runoff (ML):	0.02
Total Rainfall (mm):	13.87	Total flow (ML):	0.06
Peak Rainfall (mm):	3.77	Peak flow (m <sup>3</sup> /s):	0.00

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3964	0.0000	0.0365	0.0000	0.000365	0.000365
00:15:00	0.7438	0.0000	0.0691	0.0000	0.000363	0.000373
00:30:00	1.3830	0.0000	0.1306	0.0000	0.000362	0.000408
00:45:00	2.5263	0.0000	0.2452	0.0001	0.000361	0.000496
01:00:00	3.7727	0.0000	0.3824	0.0003	0.000362	0.000682
01:15:00	2.5263	0.0000	0.2669	0.0007	0.000366	0.00103
01:30:00	1.3830	0.0000	0.1498	0.0011	0.000375	0.00151
01:45:00	0.7438	0.0000	0.0816	0.0016	0.00039	0.00203
02:00:00	0.3964	0.0000	0.0438	0.0021	0.000411	0.00249
02:15:00	0.0000	0.0000	0.0000	0.0023	0.000437	0.00276
02:30:00	0.0000	0.0000	0.0000	0.0023	0.000463	0.00276
02:45:00	0.0000	0.0000	0.0000	0.0021	0.000488	0.00258
03:00:00	0.0000	0.0000	0.0000	0.0018	0.00051	0.00231
03:15:00	0.0000	0.0000	0.0000	0.0015	0.000527	0.00201
03:30:00	0.0000	0.0000	0.0000	0.0012	0.000541	0.00174
03:45:00	0.0000	0.0000	0.0000	0.0010	0.000552	0.00151
04:00:00	0.0000	0.0000	0.0000	0.0007	0.000559	0.00131
04:15:00	0.0000	0.0000	0.0000	0.0006	0.000564	0.00112
04:30:00	0.0000	0.0000	0.0000	0.0004	0.000567	0.000952
04:45:00	0.0000	0.0000	0.0000	0.0002	0.000568	0.000803
05:00:00	0.0000	0.0000	0.0000	0.0001	0.000567	0.000688
05:15:00	0.0000	0.0000	0.0000	0.0001	0.000565	0.000619
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000562	0.000583
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000559	0.000564
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000556	0.000556
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000553	0.000553
06:30:00	0.0000	0.0000	0.0000	0.0000	0.00055	0.00055
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000547	0.000547
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000544	0.000544
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000541	0.000541
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000538	0.000538
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000535	0.000535
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000532	0.000532
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000526	0.000526



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000523	0.000523
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00052	0.00052
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000517	0.000517
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000514	0.000514
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000511	0.000511
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000508	0.000508
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000505	0.000505
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000503	0.000503
10:45:00	0.0000	0.0000	0.0000	0.0000	0.0005	0.0005
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000497	0.000497
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000494
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000491	0.000491
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000486	0.000486
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000483	0.000483
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000481	0.000481
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000478	0.000478
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00047	0.00047
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000467	0.000467
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000462	0.000462
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000459	0.000459
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000457	0.000457
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000454	0.000454
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000447	0.000447
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000434
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00043	0.00043

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000418	0.000418
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000411	0.000411
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000402	0.000402
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000393	0.000393
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
22:15:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
22:45:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00038	0.00038
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000367	0.000367

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:21:56 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 8A89-B109

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	41.80	Total runoff (ML):	0.04
Total Rainfall (mm):	30.67	Total flow (ML):	0.13
Peak Rainfall (mm):	8.34	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.8766	0.0000	0.0811	0.0000	0.000365	0.000365
00:15:00	1.6446	0.0000	0.1550	0.0000	0.000363	0.000384
00:30:00	3.0580	0.0000	0.2979	0.0001	0.000362	0.000465
00:45:00	5.5861	0.0000	0.5771	0.0003	0.000363	0.000665
01:00:00	8.3419	0.0000	0.9409	0.0007	0.000367	0.0011
01:15:00	5.5861	0.0000	0.6831	0.0015	0.000379	0.00191
01:30:00	3.0580	0.0000	0.3919	0.0027	0.000403	0.00307
01:45:00	1.6446	0.0000	0.2161	0.0039	0.000442	0.00438
02:00:00	0.8766	0.0000	0.1167	0.0050	0.000496	0.00554
02:15:00	0.0000	0.0000	0.0000	0.0057	0.000561	0.00626
02:30:00	0.0000	0.0000	0.0000	0.0057	0.000629	0.00632
02:45:00	0.0000	0.0000	0.0000	0.0052	0.000694	0.00591
03:00:00	0.0000	0.0000	0.0000	0.0045	0.000751	0.00524
03:15:00	0.0000	0.0000	0.0000	0.0037	0.000798	0.00451
03:30:00	0.0000	0.0000	0.0000	0.0030	0.000836	0.00384
03:45:00	0.0000	0.0000	0.0000	0.0024	0.000865	0.00327
04:00:00	0.0000	0.0000	0.0000	0.0019	0.000887	0.00277
04:15:00	0.0000	0.0000	0.0000	0.0014	0.000903	0.00231
04:30:00	0.0000	0.0000	0.0000	0.0010	0.000913	0.0019
04:45:00	0.0000	0.0000	0.0000	0.0006	0.000917	0.00152
05:00:00	0.0000	0.0000	0.0000	0.0003	0.000918	0.00123
05:15:00	0.0000	0.0000	0.0000	0.0001	0.000916	0.00106
05:30:00	0.0000	0.0000	0.0000	0.0001	0.000912	0.000966
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000907	0.000921
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000902	0.000903
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000897	0.000897
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000892	0.000892
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000887	0.000887
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000882	0.000882
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000877	0.000877
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000872	0.000872
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000867	0.000867
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000863	0.000863
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000858	0.000858
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000853	0.000853

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000848	0.000848
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000843	0.000843
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000839	0.000839
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000834	0.000834
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000829	0.000829
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000825	0.000825
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00082	0.00082
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000816	0.000816
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000811	0.000811
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000806	0.000806
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000802	0.000802
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000797	0.000797
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000793	0.000793
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000789	0.000789
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000784	0.000784
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00078	0.00078
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000775	0.000775
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000771	0.000771
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000767	0.000767
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000762	0.000762
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000758	0.000758
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000754	0.000754
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00075	0.00075
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000746	0.000746
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000741	0.000741
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000737	0.000737
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000733	0.000733
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000729	0.000729
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000725	0.000725
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000721	0.000721
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000717	0.000717
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000713	0.000713
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000709	0.000709
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000705	0.000705
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000701	0.000701
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000697	0.000697

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000693	0.000693
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000689	0.000689
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000685	0.000685
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000682	0.000682
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000678	0.000678
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000674	0.000674
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00067	0.00067
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000666	0.000666
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000663	0.000663
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000659	0.000659
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000655	0.000655
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000652	0.000652
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000648	0.000648
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000644	0.000644
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000641	0.000641
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000637	0.000637
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000634	0.000634
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00063	0.00063
22:15:00	0.0000	0.0000	0.0000	0.0000	0.000627	0.000627
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000623	0.000623
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00062	0.00062
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000616	0.000616
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000613	0.000613
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000609	0.000609
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000606	0.000606
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000602	0.000602
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000599	0.000599
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000596	0.000596
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000592	0.000592
25:00:00	0.0000	0.0000	0.0000	0.0000	0.000589	0.000589
25:15:00	0.0000	0.0000	0.0000	0.0000	0.000586	0.000586
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000582	0.000582
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000579	0.000579
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000576	0.000576
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000573	0.000573
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00057	0.00057



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.000566	0.000566
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000563	0.000563
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00056	0.00056
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000557	0.000557
27:45:00	0.0000	0.0000	0.0000	0.0000	0.000554	0.000554
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000551	0.000551
28:15:00	0.0000	0.0000	0.0000	0.0000	0.000548	0.000548
28:30:00	0.0000	0.0000	0.0000	0.0000	0.000545	0.000545
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000542	0.000542
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000538	0.000538
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000535	0.000535
29:30:00	0.0000	0.0000	0.0000	0.0000	0.000532	0.000532
29:45:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000527	0.000527
30:15:00	0.0000	0.0000	0.0000	0.0000	0.000524	0.000524
30:30:00	0.0000	0.0000	0.0000	0.0000	0.000521	0.000521
30:45:00	0.0000	0.0000	0.0000	0.0000	0.000518	0.000518
31:00:00	0.0000	0.0000	0.0000	0.0000	0.000515	0.000515
31:15:00	0.0000	0.0000	0.0000	0.0000	0.000512	0.000512
31:30:00	0.0000	0.0000	0.0000	0.0000	0.000509	0.000509
31:45:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000503	0.000503
32:15:00	0.0000	0.0000	0.0000	0.0000	0.000501	0.000501
32:30:00	0.0000	0.0000	0.0000	0.0000	0.000498	0.000498
32:45:00	0.0000	0.0000	0.0000	0.0000	0.000495	0.000495
33:00:00	0.0000	0.0000	0.0000	0.0000	0.000492	0.000492
33:15:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
33:30:00	0.0000	0.0000	0.0000	0.0000	0.000487	0.000487
33:45:00	0.0000	0.0000	0.0000	0.0000	0.000484	0.000484
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000481	0.000481
34:15:00	0.0000	0.0000	0.0000	0.0000	0.000479	0.000479
34:30:00	0.0000	0.0000	0.0000	0.0000	0.000476	0.000476
34:45:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
35:00:00	0.0000	0.0000	0.0000	0.0000	0.000471	0.000471
35:15:00	0.0000	0.0000	0.0000	0.0000	0.000468	0.000468
35:30:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.000463	0.000463
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00046	0.00046

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:22:20 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 8A89-B109

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	53.72	Total runoff (ML):	0.06
Total Rainfall (mm):	39.42	Total flow (ML):	0.17
Peak Rainfall (mm):	10.72	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.1266	0.0000	0.1044	0.0000	0.000365	0.000365
00:15:00	2.1139	0.0000	0.2006	0.0000	0.000363	0.00039
00:30:00	3.9304	0.0000	0.3891	0.0001	0.000362	0.000495
00:45:00	7.1798	0.0000	0.7651	0.0004	0.000364	0.000756
01:00:00	10.7219	0.0000	1.2733	0.0010	0.00037	0.00132
01:15:00	7.1798	0.0000	0.9402	0.0020	0.000386	0.0024
01:30:00	3.9304	0.0000	0.5444	0.0035	0.000419	0.00396
01:45:00	2.1139	0.0000	0.3015	0.0053	0.000472	0.00573
02:00:00	1.1266	0.0000	0.1632	0.0068	0.000545	0.00733
02:15:00	0.0000	0.0000	0.0000	0.0077	0.000632	0.00834
02:30:00	0.0000	0.0000	0.0000	0.0077	0.000726	0.00845
02:45:00	0.0000	0.0000	0.0000	0.0071	0.000814	0.00791
03:00:00	0.0000	0.0000	0.0000	0.0061	0.000893	0.00702
03:15:00	0.0000	0.0000	0.0000	0.0051	0.000958	0.00602
03:30:00	0.0000	0.0000	0.0000	0.0041	0.00101	0.00511
03:45:00	0.0000	0.0000	0.0000	0.0033	0.00105	0.00434
04:00:00	0.0000	0.0000	0.0000	0.0026	0.00108	0.00366
04:15:00	0.0000	0.0000	0.0000	0.0019	0.0011	0.00304
04:30:00	0.0000	0.0000	0.0000	0.0014	0.00112	0.00247
04:45:00	0.0000	0.0000	0.0000	0.0008	0.00113	0.00196
05:00:00	0.0000	0.0000	0.0000	0.0004	0.00113	0.00157
05:15:00	0.0000	0.0000	0.0000	0.0002	0.00112	0.00132
05:30:00	0.0000	0.0000	0.0000	0.0001	0.00112	0.0012
05:45:00	0.0000	0.0000	0.0000	0.0000	0.00111	0.00113
06:00:00	0.0000	0.0000	0.0000	0.0000	0.00111	0.00111
06:15:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011
06:30:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011
06:45:00	0.0000	0.0000	0.0000	0.0000	0.00109	0.00109
07:00:00	0.0000	0.0000	0.0000	0.0000	0.00108	0.00108
07:15:00	0.0000	0.0000	0.0000	0.0000	0.00108	0.00108
07:30:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
07:45:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
08:00:00	0.0000	0.0000	0.0000	0.0000	0.00106	0.00106
08:15:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
08:30:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00104	0.00104
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00104	0.00104
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00103	0.00103
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
10:30:00	0.0000	0.0000	0.0000	0.0000	0.001	0.001
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000996	0.000996
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000991	0.000991
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000985	0.000985
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00098	0.00098
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000974	0.000974
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000969	0.000969
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000963	0.000963
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000958	0.000958
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000953	0.000953
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000947	0.000947
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000942	0.000942
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000937	0.000937
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000931	0.000931
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000926	0.000926
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000921	0.000921
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000916	0.000916
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000911	0.000911
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000906	0.000906
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000901	0.000901
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000896	0.000896
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000891	0.000891
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000886	0.000886
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000881	0.000881
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000876	0.000876
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000871	0.000871
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000866	0.000866
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000861	0.000861
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000856	0.000856

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000851	0.000851
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000847	0.000847
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000842	0.000842
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000837	0.000837
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000833	0.000833
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000828	0.000828
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000823	0.000823
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000819	0.000819
19:45:00	0.0000	0.0000	0.0000	0.0000	0.000814	0.000814
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00081	0.00081
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000805	0.000805
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0008	0.0008
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000796	0.000796
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000792	0.000792
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000787	0.000787
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000783	0.000783
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000778	0.000778
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000774	0.000774
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00077	0.00077
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000765	0.000765
22:45:00	0.0000	0.0000	0.0000	0.0000	0.000761	0.000761
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000757	0.000757
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000753	0.000753
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000748	0.000748
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000744	0.000744
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00074	0.00074
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000736	0.000736
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000732	0.000732
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000728	0.000728
25:00:00	0.0000	0.0000	0.0000	0.0000	0.000724	0.000724
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00072	0.00072
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000716	0.000716
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000712	0.000712
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000708	0.000708
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000704	0.000704
26:30:00	0.0000	0.0000	0.0000	0.0000	0.0007	0.0007



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.000696	0.000696
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000692	0.000692
27:15:00	0.0000	0.0000	0.0000	0.0000	0.000688	0.000688
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000684	0.000684
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00068	0.00068
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000676	0.000676
28:15:00	0.0000	0.0000	0.0000	0.0000	0.000673	0.000673
28:30:00	0.0000	0.0000	0.0000	0.0000	0.000669	0.000669
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000665	0.000665
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000661	0.000661
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000658	0.000658
29:30:00	0.0000	0.0000	0.0000	0.0000	0.000654	0.000654
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00065	0.00065
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000647	0.000647
30:15:00	0.0000	0.0000	0.0000	0.0000	0.000643	0.000643
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00064	0.00064
30:45:00	0.0000	0.0000	0.0000	0.0000	0.000636	0.000636
31:00:00	0.0000	0.0000	0.0000	0.0000	0.000632	0.000632
31:15:00	0.0000	0.0000	0.0000	0.0000	0.000629	0.000629
31:30:00	0.0000	0.0000	0.0000	0.0000	0.000625	0.000625
31:45:00	0.0000	0.0000	0.0000	0.0000	0.000622	0.000622
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000618	0.000618
32:15:00	0.0000	0.0000	0.0000	0.0000	0.000615	0.000615
32:30:00	0.0000	0.0000	0.0000	0.0000	0.000612	0.000612
32:45:00	0.0000	0.0000	0.0000	0.0000	0.000608	0.000608
33:00:00	0.0000	0.0000	0.0000	0.0000	0.000605	0.000605
33:15:00	0.0000	0.0000	0.0000	0.0000	0.000601	0.000601
33:30:00	0.0000	0.0000	0.0000	0.0000	0.000598	0.000598
33:45:00	0.0000	0.0000	0.0000	0.0000	0.000595	0.000595
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000591	0.000591
34:15:00	0.0000	0.0000	0.0000	0.0000	0.000588	0.000588
34:30:00	0.0000	0.0000	0.0000	0.0000	0.000585	0.000585
34:45:00	0.0000	0.0000	0.0000	0.0000	0.000581	0.000581
35:00:00	0.0000	0.0000	0.0000	0.0000	0.000578	0.000578
35:15:00	0.0000	0.0000	0.0000	0.0000	0.000575	0.000575
35:30:00	0.0000	0.0000	0.0000	0.0000	0.000572	0.000572

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.000569	0.000569
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000565	0.000565

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:26:57 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 7C2A-95F0

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	24.86	Total runoff (ML):	0.03
Total Rainfall (mm):	20.11	Total flow (ML):	0.09
Peak Rainfall (mm):	5.47	Peak flow (m <sup>3</sup> /s):	0.00

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.5748	0.0000	0.0531	0.0000	0.000365	0.000365
00:40:00	1.0784	0.0000	0.1008	0.0000	0.00036	0.000397
01:20:00	2.0052	0.0000	0.1915	0.0002	0.000359	0.000529
02:00:00	3.6630	0.0000	0.3640	0.0004	0.000363	0.000764
02:40:00	5.4700	0.0000	0.5777	0.0008	0.000377	0.00118
03:20:00	3.6630	0.0000	0.4096	0.0015	0.00041	0.00189
04:00:00	2.0052	0.0000	0.2320	0.0021	0.000464	0.00258
04:40:00	1.0784	0.0000	0.1270	0.0022	0.000528	0.00271
05:20:00	0.5748	0.0000	0.0683	0.0018	0.000586	0.00237
06:00:00	0.0000	0.0000	0.0000	0.0013	0.000628	0.00188
06:40:00	0.0000	0.0000	0.0000	0.0007	0.000652	0.0014
07:20:00	0.0000	0.0000	0.0000	0.0003	0.00066	0.00101
08:00:00	0.0000	0.0000	0.0000	0.0001	0.000659	0.000793
08:40:00	0.0000	0.0000	0.0000	0.0000	0.000652	0.000695
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000643	0.00065
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000633	0.000633
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000624	0.000624
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000615	0.000615
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000606	0.000606
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000597	0.000597
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000588	0.000588
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000579	0.000579
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00057	0.00057
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000562	0.000562
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000554	0.000554
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000545	0.000545
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000537	0.000537
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000522	0.000522
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000514	0.000514
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000499	0.000499
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000491	0.000491
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000484	0.000484
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000477	0.000477

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.00047	0.00047
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000463	0.000463
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000456	0.000456
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000436	0.000436
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000429
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000423	0.000423
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
29:20:00	0.0000	0.0000	0.0000	0.0000	0.00041	0.00041
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000398	0.000398
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000392	0.000392
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000387	0.000387
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000381	0.000381
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00037	0.00037

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:26:20 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 7C2A-95F0

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	27.66	Total runoff (ML):	0.03
Total Rainfall (mm):	22.38	Total flow (ML):	0.10
Peak Rainfall (mm):	6.09	Peak flow (m <sup>3</sup> /s):	0.00

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

**Baseflow model parameters**

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

**Urbanisation parameters**

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.6395	0.0000	0.0591	0.0000	0.000365	0.000365
00:40:00	1.1999	0.0000	0.1123	0.0000	0.00036	0.000401
01:20:00	2.2311	0.0000	0.2140	0.0002	0.000359	0.000548
02:00:00	4.0755	0.0000	0.4085	0.0004	0.000364	0.000812
02:40:00	6.0861	0.0000	0.6521	0.0009	0.000381	0.00128
03:20:00	4.0755	0.0000	0.4649	0.0017	0.000418	0.00208
04:00:00	2.2311	0.0000	0.2641	0.0024	0.000479	0.00287
04:40:00	1.1999	0.0000	0.1448	0.0025	0.000553	0.00302
05:20:00	0.6395	0.0000	0.0780	0.0020	0.000619	0.00264
06:00:00	0.0000	0.0000	0.0000	0.0014	0.000667	0.00209
06:40:00	0.0000	0.0000	0.0000	0.0008	0.000695	0.00154
07:20:00	0.0000	0.0000	0.0000	0.0004	0.000706	0.0011
08:00:00	0.0000	0.0000	0.0000	0.0002	0.000704	0.000858
08:40:00	0.0000	0.0000	0.0000	0.0000	0.000697	0.000746
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000688	0.000695
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000678	0.000678
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000668	0.000668
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000658	0.000658
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000648	0.000648
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000638	0.000638
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000629	0.000629
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000619	0.000619
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00061	0.00061
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000601	0.000601
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000592	0.000592
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000583	0.000583
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000575	0.000575
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000566	0.000566
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000558	0.000558
19:20:00	0.0000	0.0000	0.0000	0.0000	0.00055	0.00055
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000541	0.000541
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000533	0.000533
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000525	0.000525
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000518	0.000518
22:40:00	0.0000	0.0000	0.0000	0.0000	0.00051	0.00051

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000502	0.000502
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000495	0.000495
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000488	0.000488
25:20:00	0.0000	0.0000	0.0000	0.0000	0.00048	0.00048
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000466	0.000466
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000459	0.000459
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000446	0.000446
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000433	0.000433
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000426	0.000426
31:20:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000414	0.000414
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000407	0.000407
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
34:40:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:25:54 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 7C2A-95F0

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	54.13	Total runoff (ML):	0.07
Total Rainfall (mm):	43.79	Total flow (ML):	0.18
Peak Rainfall (mm):	11.91	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.2515	0.0000	0.1161	0.0000	0.000365	0.000365
00:40:00	2.3482	0.0000	0.2236	0.0001	0.000361	0.000441
01:20:00	4.3662	0.0000	0.4357	0.0004	0.000363	0.000738
02:00:00	7.9758	0.0000	0.8629	0.0009	0.000379	0.00127
02:40:00	11.9105	0.0000	1.4499	0.0018	0.000419	0.00226
03:20:00	7.9758	0.0000	1.0789	0.0035	0.000502	0.00401
04:00:00	4.3662	0.0000	0.6273	0.0052	0.00064	0.00587
04:40:00	2.3482	0.0000	0.3481	0.0055	0.00081	0.00634
05:20:00	1.2515	0.0000	0.1886	0.0046	0.000966	0.00559
06:00:00	0.0000	0.0000	0.0000	0.0033	0.00108	0.00441
06:40:00	0.0000	0.0000	0.0000	0.0020	0.00116	0.00316
07:20:00	0.0000	0.0000	0.0000	0.0009	0.00119	0.00213
08:00:00	0.0000	0.0000	0.0000	0.0004	0.00119	0.00156
08:40:00	0.0000	0.0000	0.0000	0.0001	0.00118	0.0013
09:20:00	0.0000	0.0000	0.0000	0.0000	0.00117	0.00119
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00115	0.00115
10:40:00	0.0000	0.0000	0.0000	0.0000	0.00113	0.00113
11:20:00	0.0000	0.0000	0.0000	0.0000	0.00112	0.00112
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011
12:40:00	0.0000	0.0000	0.0000	0.0000	0.00108	0.00108
13:20:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00104	0.00104
15:20:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000991	0.000991
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000976	0.000976
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000962	0.000962
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000947	0.000947
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000933	0.000933
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000919	0.000919
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000906	0.000906
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000892	0.000892
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000879	0.000879
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000866	0.000866



Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000853	0.000853
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000841	0.000841
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000828	0.000828
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000816	0.000816
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000804	0.000804
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000792	0.000792
27:20:00	0.0000	0.0000	0.0000	0.0000	0.00078	0.00078
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000768	0.000768
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000757	0.000757
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000746	0.000746
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000735	0.000735
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000724	0.000724
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000713	0.000713
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000702	0.000702
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000692	0.000692
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000682	0.000682
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000672	0.000672
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000662	0.000662
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000652	0.000652
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000642	0.000642

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:24:54 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 7C2A-95F0

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	68.94	Total runoff (ML):	0.09
Total Rainfall (mm):	55.77	Total flow (ML):	0.23
Peak Rainfall (mm):	15.17	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

**Baseflow model parameters**

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

**Urbanisation parameters**

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.5939	0.0000	0.1482	0.0000	0.000365	0.000365
00:40:00	2.9905	0.0000	0.2874	0.0001	0.000362	0.000464
01:20:00	5.5604	0.0000	0.5668	0.0005	0.000366	0.000845
02:00:00	10.1574	0.0000	1.1441	0.0012	0.000388	0.00154
02:40:00	15.1683	0.0000	1.9702	0.0024	0.000441	0.00285
03:20:00	10.1574	0.0000	1.4945	0.0047	0.000552	0.00522
04:00:00	5.5604	0.0000	0.8777	0.0071	0.000739	0.0078
04:40:00	2.9905	0.0000	0.4894	0.0076	0.000971	0.00853
05:20:00	1.5939	0.0000	0.2658	0.0064	0.00119	0.00756
06:00:00	0.0000	0.0000	0.0000	0.0046	0.00135	0.00596
06:40:00	0.0000	0.0000	0.0000	0.0028	0.00146	0.00425
07:20:00	0.0000	0.0000	0.0000	0.0013	0.0015	0.00283
08:00:00	0.0000	0.0000	0.0000	0.0005	0.00151	0.00203
08:40:00	0.0000	0.0000	0.0000	0.0002	0.0015	0.00167
09:20:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00151
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
10:40:00	0.0000	0.0000	0.0000	0.0000	0.00144	0.00144
11:20:00	0.0000	0.0000	0.0000	0.0000	0.00142	0.00142
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0014	0.0014
12:40:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
13:20:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00131	0.00131
15:20:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.0013
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128
16:40:00	0.0000	0.0000	0.0000	0.0000	0.00126	0.00126
17:20:00	0.0000	0.0000	0.0000	0.0000	0.00124	0.00124
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00122	0.00122
18:40:00	0.0000	0.0000	0.0000	0.0000	0.0012	0.0012
19:20:00	0.0000	0.0000	0.0000	0.0000	0.00118	0.00118
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00117	0.00117
20:40:00	0.0000	0.0000	0.0000	0.0000	0.00115	0.00115
21:20:00	0.0000	0.0000	0.0000	0.0000	0.00113	0.00113
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00112	0.00112
22:40:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.00108	0.00108
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
24:40:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
25:20:00	0.0000	0.0000	0.0000	0.0000	0.00103	0.00103
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
26:40:00	0.0000	0.0000	0.0000	0.0000	0.001	0.001
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000989	0.000989
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000975	0.000975
28:40:00	0.0000	0.0000	0.0000	0.0000	0.00096	0.00096
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000946	0.000946
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000932	0.000932
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000918	0.000918
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000904	0.000904
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000891	0.000891
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000878	0.000878
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000865	0.000865
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000852	0.000852
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000839	0.000839
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000827	0.000827
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000815	0.000815

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:40:27 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 33FC-576D

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	16.46	Total runoff (ML):	0.08
Total Rainfall (mm):	12.08	Total flow (ML):	0.10
Peak Rainfall (mm):	3.29	Peak flow (m <sup>3</sup> /s):	0.02

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters



Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3452	0.0000	0.1801	0.0000	0.000365	0.000365
00:15:00	0.6477	0.0000	0.3381	0.0002	0.000363	0.000537
00:30:00	1.2043	0.0000	0.6294	0.0008	0.000361	0.00121
00:45:00	2.2000	0.0000	1.1525	0.0022	0.00036	0.00261
01:00:00	3.2853	0.0000	1.7275	0.0047	0.000359	0.00501
01:15:00	2.2000	0.0000	1.1612	0.0085	0.00036	0.00887
01:30:00	1.2043	0.0000	0.6371	0.0128	0.000363	0.0132
01:45:00	0.6477	0.0000	0.3431	0.0150	0.000369	0.0154
02:00:00	0.3452	0.0000	0.1830	0.0141	0.000377	0.0144
02:15:00	0.0000	0.0000	0.0000	0.0115	0.000388	0.0119
02:30:00	0.0000	0.0000	0.0000	0.0086	0.000399	0.00902
02:45:00	0.0000	0.0000	0.0000	0.0057	0.000409	0.00611
03:00:00	0.0000	0.0000	0.0000	0.0033	0.000418	0.00369
03:15:00	0.0000	0.0000	0.0000	0.0018	0.000425	0.0022
03:30:00	0.0000	0.0000	0.0000	0.0010	0.00043	0.00142
03:45:00	0.0000	0.0000	0.0000	0.0006	0.000434	0.001
04:00:00	0.0000	0.0000	0.0000	0.0004	0.000436	0.000793
04:15:00	0.0000	0.0000	0.0000	0.0003	0.000437	0.000689
04:30:00	0.0000	0.0000	0.0000	0.0002	0.000438	0.000611
04:45:00	0.0000	0.0000	0.0000	0.0001	0.000437	0.000543
05:00:00	0.0000	0.0000	0.0000	0.0001	0.000435	0.00049
05:15:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000458
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000431	0.00044
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000431
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000424	0.000424
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000419	0.000419
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000412	0.000412
07:45:00	0.0000	0.0000	0.0000	0.0000	0.00041	0.00041
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000403	0.000403

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000394	0.000394
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000392	0.000392
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000383	0.000383
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000381	0.000381
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000379	0.000379
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:41:14 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 33FC-576D

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	18.90	Total runoff (ML):	0.09
Total Rainfall (mm):	13.87	Total flow (ML):	0.12
Peak Rainfall (mm):	3.77	Peak flow (m <sup>3</sup> /s):	0.02

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

**Baseflow model parameters**

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

**Urbanisation parameters**

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.3964	0.0000	0.2068	0.0000	0.000365	0.000365
00:15:00	0.7438	0.0000	0.3883	0.0002	0.000363	0.000563
00:30:00	1.3830	0.0000	0.7231	0.0010	0.000361	0.00133
00:45:00	2.5263	0.0000	1.3244	0.0026	0.00036	0.00294
01:00:00	3.7727	0.0000	1.9862	0.0053	0.000359	0.0057
01:15:00	2.5263	0.0000	1.3358	0.0098	0.000361	0.0101
01:30:00	1.3830	0.0000	0.7332	0.0147	0.000365	0.0151
01:45:00	0.7438	0.0000	0.3949	0.0172	0.000372	0.0176
02:00:00	0.3964	0.0000	0.2106	0.0162	0.000382	0.0165
02:15:00	0.0000	0.0000	0.0000	0.0133	0.000394	0.0137
02:30:00	0.0000	0.0000	0.0000	0.0099	0.000407	0.0103
02:45:00	0.0000	0.0000	0.0000	0.0066	0.00042	0.00698
03:00:00	0.0000	0.0000	0.0000	0.0038	0.00043	0.0042
03:15:00	0.0000	0.0000	0.0000	0.0021	0.000439	0.00249
03:30:00	0.0000	0.0000	0.0000	0.0011	0.000445	0.00159
03:45:00	0.0000	0.0000	0.0000	0.0007	0.00045	0.00111
04:00:00	0.0000	0.0000	0.0000	0.0004	0.000453	0.000868
04:15:00	0.0000	0.0000	0.0000	0.0003	0.000454	0.000748
04:30:00	0.0000	0.0000	0.0000	0.0002	0.000455	0.000658
04:45:00	0.0000	0.0000	0.0000	0.0001	0.000455	0.000578
05:00:00	0.0000	0.0000	0.0000	0.0001	0.000453	0.000517
05:15:00	0.0000	0.0000	0.0000	0.0000	0.000451	0.00048
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.00046
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000446	0.000449
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000434
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000432	0.000432
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000429
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
08:30:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000413	0.000413
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00041	0.00041
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000392	0.000392
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000379	0.000379
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000369	0.000369



## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:42:23 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 33FC-576D

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	41.80	Total runoff (ML):	0.21
Total Rainfall (mm):	30.67	Total flow (ML):	0.27
Peak Rainfall (mm):	8.34	Peak flow (m <sup>3</sup> /s):	0.04

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.8766	0.0000	0.4574	0.0000	0.000365	0.000365
00:15:00	1.6446	0.0000	0.8597	0.0004	0.000363	0.000804
00:30:00	3.0580	0.0000	1.6036	0.0022	0.000362	0.00251
00:45:00	5.5861	0.0000	2.9467	0.0057	0.000361	0.00607
01:00:00	8.3419	0.0000	4.4421	0.0118	0.000362	0.0122
01:15:00	5.5861	0.0000	3.0026	0.0217	0.000368	0.022
01:30:00	3.0580	0.0000	1.6532	0.0326	0.00038	0.033
01:45:00	1.6446	0.0000	0.8919	0.0382	0.000399	0.0386
02:00:00	0.8766	0.0000	0.4761	0.0360	0.000427	0.0364
02:15:00	0.0000	0.0000	0.0000	0.0296	0.00046	0.0301
02:30:00	0.0000	0.0000	0.0000	0.0223	0.000495	0.0228
02:45:00	0.0000	0.0000	0.0000	0.0148	0.000528	0.0154
03:00:00	0.0000	0.0000	0.0000	0.0086	0.000557	0.00917
03:15:00	0.0000	0.0000	0.0000	0.0048	0.000581	0.00535
03:30:00	0.0000	0.0000	0.0000	0.0027	0.0006	0.00331
03:45:00	0.0000	0.0000	0.0000	0.0016	0.000615	0.00223
04:00:00	0.0000	0.0000	0.0000	0.0010	0.000625	0.00167
04:15:00	0.0000	0.0000	0.0000	0.0007	0.000633	0.00138
04:30:00	0.0000	0.0000	0.0000	0.0005	0.000637	0.00116
04:45:00	0.0000	0.0000	0.0000	0.0003	0.000639	0.000958
05:00:00	0.0000	0.0000	0.0000	0.0002	0.000638	0.000805
05:15:00	0.0000	0.0000	0.0000	0.0001	0.000636	0.000712
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000633	0.000662
05:45:00	0.0000	0.0000	0.0000	0.0000	0.00063	0.000637
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000626	0.000627
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000623	0.000623
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000619	0.000619
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000616	0.000616
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000613	0.000613
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000609	0.000609
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000606	0.000606
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000602	0.000602
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000599	0.000599
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000596	0.000596
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000592	0.000592

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000589	0.000589
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000586	0.000586
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000582	0.000582
09:30:00	0.0000	0.0000	0.0000	0.0000	0.000579	0.000579
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000576	0.000576
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000573	0.000573
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000569	0.000569
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000566	0.000566
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000563	0.000563
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00056	0.00056
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000557	0.000557
11:30:00	0.0000	0.0000	0.0000	0.0000	0.000554	0.000554
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000551	0.000551
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000548	0.000548
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000544	0.000544
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000541	0.000541
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000538	0.000538
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000535	0.000535
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000532	0.000532
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000526	0.000526
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000523	0.000523
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000521	0.000521
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000518	0.000518
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000515	0.000515
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000512	0.000512
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000509	0.000509
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000503	0.000503
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000501	0.000501
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000498	0.000498
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000495	0.000495
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000492	0.000492
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000489	0.000489
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000487	0.000487
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000484	0.000484

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000481	0.000481
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000479	0.000479
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000476	0.000476
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000471	0.000471
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000468	0.000468
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000463	0.000463
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00046	0.00046
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000458	0.000458
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000455	0.000455
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000452	0.000452
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00045	0.00045
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000447	0.000447
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000445	0.000445
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000442	0.000442
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00044	0.00044
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000437	0.000437
22:15:00	0.0000	0.0000	0.0000	0.0000	0.000435	0.000435
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000433	0.000433
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00043	0.00043
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000428	0.000428
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000423	0.000423
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000421	0.000421
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000418	0.000418
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000416	0.000416
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000414	0.000414
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000411	0.000411
25:00:00	0.0000	0.0000	0.0000	0.0000	0.000409	0.000409
25:15:00	0.0000	0.0000	0.0000	0.0000	0.000407	0.000407
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000404	0.000404
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000402	0.000402
26:00:00	0.0000	0.0000	0.0000	0.0000	0.0004	0.0004
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000398	0.000398
26:30:00	0.0000	0.0000	0.0000	0.0000	0.000395	0.000395

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.000393	0.000393
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000391	0.000391
27:15:00	0.0000	0.0000	0.0000	0.0000	0.000389	0.000389
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000387	0.000387
27:45:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000382	0.000382
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00038	0.00038
28:30:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000376	0.000376
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000374	0.000374
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000372	0.000372
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00037	0.00037
29:45:00	0.0000	0.0000	0.0000	0.0000	0.000368	0.000368

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:43:03 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 33FC-576D

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	53.72	Total runoff (ML):	0.27
Total Rainfall (mm):	39.42	Total flow (ML):	0.35
Peak Rainfall (mm):	10.72	Peak flow (m <sup>3</sup> /s):	0.05

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.1266	0.0000	0.5880	0.0000	0.000365	0.000365
00:15:00	2.1139	0.0000	1.1057	0.0006	0.000363	0.00093
00:30:00	3.9304	0.0000	2.0644	0.0028	0.000362	0.00313
00:45:00	7.1798	0.0000	3.7998	0.0073	0.000361	0.0077
01:00:00	10.7219	0.0000	5.7432	0.0152	0.000364	0.0156
01:15:00	7.1798	0.0000	3.8920	0.0279	0.000372	0.0282
01:30:00	3.9304	0.0000	2.1463	0.0420	0.000388	0.0424
01:45:00	2.1139	0.0000	1.1589	0.0492	0.000415	0.0497
02:00:00	1.1266	0.0000	0.6190	0.0464	0.000452	0.0468
02:15:00	0.0000	0.0000	0.0000	0.0383	0.000498	0.0388
02:30:00	0.0000	0.0000	0.0000	0.0288	0.000546	0.0294
02:45:00	0.0000	0.0000	0.0000	0.0193	0.000592	0.0199
03:00:00	0.0000	0.0000	0.0000	0.0113	0.000632	0.0119
03:15:00	0.0000	0.0000	0.0000	0.0063	0.000665	0.00695
03:30:00	0.0000	0.0000	0.0000	0.0036	0.000692	0.0043
03:45:00	0.0000	0.0000	0.0000	0.0022	0.000712	0.00289
04:00:00	0.0000	0.0000	0.0000	0.0014	0.000728	0.00215
04:15:00	0.0000	0.0000	0.0000	0.0010	0.000738	0.00176
04:30:00	0.0000	0.0000	0.0000	0.0007	0.000745	0.00146
04:45:00	0.0000	0.0000	0.0000	0.0004	0.000748	0.00119
05:00:00	0.0000	0.0000	0.0000	0.0002	0.000748	0.00098
05:15:00	0.0000	0.0000	0.0000	0.0001	0.000746	0.000852
05:30:00	0.0000	0.0000	0.0000	0.0000	0.000743	0.000783
05:45:00	0.0000	0.0000	0.0000	0.0000	0.000739	0.000749
06:00:00	0.0000	0.0000	0.0000	0.0000	0.000735	0.000736
06:15:00	0.0000	0.0000	0.0000	0.0000	0.000731	0.000731
06:30:00	0.0000	0.0000	0.0000	0.0000	0.000727	0.000727
06:45:00	0.0000	0.0000	0.0000	0.0000	0.000723	0.000723
07:00:00	0.0000	0.0000	0.0000	0.0000	0.000719	0.000719
07:15:00	0.0000	0.0000	0.0000	0.0000	0.000715	0.000715
07:30:00	0.0000	0.0000	0.0000	0.0000	0.000711	0.000711
07:45:00	0.0000	0.0000	0.0000	0.0000	0.000707	0.000707
08:00:00	0.0000	0.0000	0.0000	0.0000	0.000703	0.000703
08:15:00	0.0000	0.0000	0.0000	0.0000	0.000699	0.000699
08:30:00	0.0000	0.0000	0.0000	0.0000	0.000695	0.000695

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.000691	0.000691
09:00:00	0.0000	0.0000	0.0000	0.0000	0.000687	0.000687
09:15:00	0.0000	0.0000	0.0000	0.0000	0.000683	0.000683
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00068	0.00068
09:45:00	0.0000	0.0000	0.0000	0.0000	0.000676	0.000676
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000672	0.000672
10:15:00	0.0000	0.0000	0.0000	0.0000	0.000668	0.000668
10:30:00	0.0000	0.0000	0.0000	0.0000	0.000664	0.000664
10:45:00	0.0000	0.0000	0.0000	0.0000	0.000661	0.000661
11:00:00	0.0000	0.0000	0.0000	0.0000	0.000657	0.000657
11:15:00	0.0000	0.0000	0.0000	0.0000	0.000653	0.000653
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00065	0.00065
11:45:00	0.0000	0.0000	0.0000	0.0000	0.000646	0.000646
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000642	0.000642
12:15:00	0.0000	0.0000	0.0000	0.0000	0.000639	0.000639
12:30:00	0.0000	0.0000	0.0000	0.0000	0.000635	0.000635
12:45:00	0.0000	0.0000	0.0000	0.0000	0.000632	0.000632
13:00:00	0.0000	0.0000	0.0000	0.0000	0.000628	0.000628
13:15:00	0.0000	0.0000	0.0000	0.0000	0.000625	0.000625
13:30:00	0.0000	0.0000	0.0000	0.0000	0.000621	0.000621
13:45:00	0.0000	0.0000	0.0000	0.0000	0.000618	0.000618
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000614	0.000614
14:15:00	0.0000	0.0000	0.0000	0.0000	0.000611	0.000611
14:30:00	0.0000	0.0000	0.0000	0.0000	0.000607	0.000607
14:45:00	0.0000	0.0000	0.0000	0.0000	0.000604	0.000604
15:00:00	0.0000	0.0000	0.0000	0.0000	0.000601	0.000601
15:15:00	0.0000	0.0000	0.0000	0.0000	0.000597	0.000597
15:30:00	0.0000	0.0000	0.0000	0.0000	0.000594	0.000594
15:45:00	0.0000	0.0000	0.0000	0.0000	0.000591	0.000591
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000587	0.000587
16:15:00	0.0000	0.0000	0.0000	0.0000	0.000584	0.000584
16:30:00	0.0000	0.0000	0.0000	0.0000	0.000581	0.000581
16:45:00	0.0000	0.0000	0.0000	0.0000	0.000577	0.000577
17:00:00	0.0000	0.0000	0.0000	0.0000	0.000574	0.000574
17:15:00	0.0000	0.0000	0.0000	0.0000	0.000571	0.000571
17:30:00	0.0000	0.0000	0.0000	0.0000	0.000568	0.000568

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.000565	0.000565
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000562	0.000562
18:15:00	0.0000	0.0000	0.0000	0.0000	0.000558	0.000558
18:30:00	0.0000	0.0000	0.0000	0.0000	0.000555	0.000555
18:45:00	0.0000	0.0000	0.0000	0.0000	0.000552	0.000552
19:00:00	0.0000	0.0000	0.0000	0.0000	0.000549	0.000549
19:15:00	0.0000	0.0000	0.0000	0.0000	0.000546	0.000546
19:30:00	0.0000	0.0000	0.0000	0.0000	0.000543	0.000543
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00054	0.00054
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000537	0.000537
20:15:00	0.0000	0.0000	0.0000	0.0000	0.000534	0.000534
20:30:00	0.0000	0.0000	0.0000	0.0000	0.000531	0.000531
20:45:00	0.0000	0.0000	0.0000	0.0000	0.000528	0.000528
21:00:00	0.0000	0.0000	0.0000	0.0000	0.000525	0.000525
21:15:00	0.0000	0.0000	0.0000	0.0000	0.000522	0.000522
21:30:00	0.0000	0.0000	0.0000	0.0000	0.000519	0.000519
21:45:00	0.0000	0.0000	0.0000	0.0000	0.000516	0.000516
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000513	0.000513
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00051	0.00051
22:30:00	0.0000	0.0000	0.0000	0.0000	0.000508	0.000508
22:45:00	0.0000	0.0000	0.0000	0.0000	0.000505	0.000505
23:00:00	0.0000	0.0000	0.0000	0.0000	0.000502	0.000502
23:15:00	0.0000	0.0000	0.0000	0.0000	0.000499	0.000499
23:30:00	0.0000	0.0000	0.0000	0.0000	0.000496	0.000496
23:45:00	0.0000	0.0000	0.0000	0.0000	0.000494	0.000494
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000491	0.000491
24:15:00	0.0000	0.0000	0.0000	0.0000	0.000488	0.000488
24:30:00	0.0000	0.0000	0.0000	0.0000	0.000485	0.000485
24:45:00	0.0000	0.0000	0.0000	0.0000	0.000483	0.000483
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00048	0.00048
25:15:00	0.0000	0.0000	0.0000	0.0000	0.000477	0.000477
25:30:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
25:45:00	0.0000	0.0000	0.0000	0.0000	0.000472	0.000472
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000469	0.000469
26:15:00	0.0000	0.0000	0.0000	0.0000	0.000467	0.000467
26:30:00	0.0000	0.0000	0.0000	0.0000	0.000464	0.000464

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.000461	0.000461
27:00:00	0.0000	0.0000	0.0000	0.0000	0.000459	0.000459
27:15:00	0.0000	0.0000	0.0000	0.0000	0.000456	0.000456
27:30:00	0.0000	0.0000	0.0000	0.0000	0.000454	0.000454
27:45:00	0.0000	0.0000	0.0000	0.0000	0.000451	0.000451
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000449	0.000449
28:15:00	0.0000	0.0000	0.0000	0.0000	0.000446	0.000446
28:30:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
28:45:00	0.0000	0.0000	0.0000	0.0000	0.000441	0.000441
29:00:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
29:15:00	0.0000	0.0000	0.0000	0.0000	0.000436	0.000436
29:30:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000434
29:45:00	0.0000	0.0000	0.0000	0.0000	0.000431	0.000431
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000429	0.000429
30:15:00	0.0000	0.0000	0.0000	0.0000	0.000427	0.000427
30:30:00	0.0000	0.0000	0.0000	0.0000	0.000424	0.000424
30:45:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
31:00:00	0.0000	0.0000	0.0000	0.0000	0.000419	0.000419
31:15:00	0.0000	0.0000	0.0000	0.0000	0.000417	0.000417
31:30:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415
31:45:00	0.0000	0.0000	0.0000	0.0000	0.000412	0.000412
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00041	0.00041
32:15:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
32:30:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
32:45:00	0.0000	0.0000	0.0000	0.0000	0.000403	0.000403
33:00:00	0.0000	0.0000	0.0000	0.0000	0.000401	0.000401
33:15:00	0.0000	0.0000	0.0000	0.0000	0.000399	0.000399
33:30:00	0.0000	0.0000	0.0000	0.0000	0.000397	0.000397
33:45:00	0.0000	0.0000	0.0000	0.0000	0.000394	0.000394
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000392	0.000392
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
34:30:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
34:45:00	0.0000	0.0000	0.0000	0.0000	0.000386	0.000386
35:00:00	0.0000	0.0000	0.0000	0.0000	0.000383	0.000383
35:15:00	0.0000	0.0000	0.0000	0.0000	0.000381	0.000381
35:30:00	0.0000	0.0000	0.0000	0.0000	0.000379	0.000379

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000375	0.000375

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:47:14 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 45AE-240C

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 1 year

### Summary of results

Rainfall - FEH 2013 (mm):	24.86	Total runoff (ML):	0.14
Total Rainfall (mm):	20.11	Total flow (ML):	0.17
Peak Rainfall (mm):	5.47	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.5748	0.0000	0.2999	0.0000	0.000365	0.000365
00:40:00	1.0784	0.0000	0.5633	0.0007	0.00036	0.00108
01:20:00	2.0052	0.0000	1.0495	0.0020	0.000357	0.00239
02:00:00	3.6630	0.0000	1.9247	0.0040	0.000356	0.00434
02:40:00	5.4700	0.0000	2.8921	0.0074	0.000362	0.00771
03:20:00	3.6630	0.0000	1.9487	0.0119	0.000376	0.0123
04:00:00	2.0052	0.0000	1.0708	0.0125	0.000402	0.0129
04:40:00	1.0784	0.0000	0.5771	0.0090	0.000434	0.00941
05:20:00	0.5748	0.0000	0.3079	0.0054	0.000462	0.00583
06:00:00	0.0000	0.0000	0.0000	0.0030	0.000482	0.00353
06:40:00	0.0000	0.0000	0.0000	0.0013	0.000492	0.00178
07:20:00	0.0000	0.0000	0.0000	0.0003	0.000495	0.000825
08:00:00	0.0000	0.0000	0.0000	0.0001	0.000491	0.000562
08:40:00	0.0000	0.0000	0.0000	0.0000	0.000486	0.000508
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000479	0.000482
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000472	0.000472
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000465	0.000465
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000458	0.000458
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000451	0.000451
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000444	0.000444
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000438	0.000438
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000431	0.000431
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000425	0.000425
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000419	0.000419
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000412	0.000412
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000406	0.000406
17:20:00	0.0000	0.0000	0.0000	0.0000	0.0004	0.0004
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000394	0.000394
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000388	0.000388
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000383	0.000383
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000377	0.000377
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000371	0.000371



## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:46:35 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 45AE-240C

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 2 year

### Summary of results

Rainfall - FEH 2013 (mm):	27.66	Total runoff (ML):	0.15
Total Rainfall (mm):	22.38	Total flow (ML):	0.19
Peak Rainfall (mm):	6.09	Peak flow (m <sup>3</sup> /s):	0.01

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	0.6395	0.0000	0.3337	0.0000	0.000365	0.000365
00:40:00	1.1999	0.0000	0.6268	0.0008	0.00036	0.00116
01:20:00	2.2311	0.0000	1.1682	0.0023	0.000357	0.00262
02:00:00	4.0755	0.0000	2.1433	0.0044	0.000357	0.00479
02:40:00	6.0861	0.0000	3.2228	0.0082	0.000364	0.00855
03:20:00	4.0755	0.0000	2.1730	0.0133	0.000381	0.0137
04:00:00	2.2311	0.0000	1.1946	0.0139	0.000411	0.0143
04:40:00	1.1999	0.0000	0.6440	0.0100	0.000447	0.0104
05:20:00	0.6395	0.0000	0.3436	0.0060	0.00048	0.00647
06:00:00	0.0000	0.0000	0.0000	0.0034	0.000503	0.00391
06:40:00	0.0000	0.0000	0.0000	0.0014	0.000515	0.00196
07:20:00	0.0000	0.0000	0.0000	0.0004	0.000518	0.000891
08:00:00	0.0000	0.0000	0.0000	0.0001	0.000515	0.000596
08:40:00	0.0000	0.0000	0.0000	0.0000	0.00051	0.000535
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000502	0.000507
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000495	0.000495
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000488	0.000488
11:20:00	0.0000	0.0000	0.0000	0.0000	0.00048	0.00048
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000473	0.000473
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000466	0.000466
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000459	0.000459
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000453	0.000453
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000446	0.000446
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000439	0.000439
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000433	0.000433
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000426	0.000426
17:20:00	0.0000	0.0000	0.0000	0.0000	0.00042	0.00042
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000414	0.000414
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000408	0.000408
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000402	0.000402
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000396	0.000396
20:40:00	0.0000	0.0000	0.0000	0.0000	0.00039	0.00039
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000384	0.000384
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000378	0.000378
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000373	0.000373





## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:45:59 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 45AE-240C

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 30 year

### Summary of results

Rainfall - FEH 2013 (mm):	54.13	Total runoff (ML):	0.31
Total Rainfall (mm):	43.79	Total flow (ML):	0.38
Peak Rainfall (mm):	11.91	Peak flow (m <sup>3</sup> /s):	0.03

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

**Baseflow model parameters**

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

**Urbanisation parameters**

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.2515	0.0000	0.6532	0.0000	0.000365	0.000365
00:40:00	2.3482	0.0000	1.2287	0.0016	0.000361	0.00193
01:20:00	4.3662	0.0000	2.2951	0.0044	0.000359	0.00478
02:00:00	7.9758	0.0000	4.2278	0.0087	0.000365	0.00904
02:40:00	11.9105	0.0000	6.3986	0.0161	0.000384	0.0164
03:20:00	7.9758	0.0000	4.3417	0.0262	0.000425	0.0266
04:00:00	4.3662	0.0000	2.3961	0.0275	0.000495	0.0279
04:40:00	2.3482	0.0000	1.2943	0.0199	0.000582	0.0205
05:20:00	1.2515	0.0000	0.6915	0.0121	0.000663	0.0127
06:00:00	0.0000	0.0000	0.0000	0.0069	0.000722	0.00767
06:40:00	0.0000	0.0000	0.0000	0.0030	0.000758	0.00377
07:20:00	0.0000	0.0000	0.0000	0.0008	0.000773	0.00159
08:00:00	0.0000	0.0000	0.0000	0.0002	0.000773	0.000968
08:40:00	0.0000	0.0000	0.0000	0.0001	0.000766	0.000828
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000755	0.000765
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000744	0.000744
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000733	0.000733
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000722	0.000722
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000712	0.000712
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000701	0.000701
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000691	0.000691
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000681	0.000681
14:40:00	0.0000	0.0000	0.0000	0.0000	0.00067	0.00067
15:20:00	0.0000	0.0000	0.0000	0.0000	0.00066	0.00066
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000651	0.000651
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000641	0.000641
17:20:00	0.0000	0.0000	0.0000	0.0000	0.000631	0.000631
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000622	0.000622
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000613	0.000613
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000604	0.000604
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000595	0.000595
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000586	0.000586
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000577	0.000577
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000569	0.000569
22:40:00	0.0000	0.0000	0.0000	0.0000	0.00056	0.00056

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000552	0.000552
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000544	0.000544
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000536	0.000536
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000528	0.000528
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00052	0.00052
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000512	0.000512
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000505	0.000505
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000497	0.000497
28:40:00	0.0000	0.0000	0.0000	0.0000	0.00049	0.00049
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000482	0.000482
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000475	0.000475
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000468	0.000468
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000461	0.000461
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000454	0.000454
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000448	0.000448
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000441	0.000441
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000434	0.000434
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000428	0.000428
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000422	0.000422
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000415	0.000415

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	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 Tuesday, August 13, 2019 2:45:18 PM by Laura.Soothill  
Printed from the ReFH Flood Modelling software package, version 2.2.6589.25305

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

### Site details

Checksum: 45AE-240C

Site name: FEH\_Point\_Descriptors\_308859\_174456

Easting: 308859

Northing: 174456

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.01 [0.5]\*

Using plot scale calculations: Yes

Site description: None

## Model run: 100 year

### Summary of results

Rainfall - FEH 2013 (mm):	68.94	Total runoff (ML):	0.39
Total Rainfall (mm):	55.77	Total flow (ML):	0.48
Peak Rainfall (mm):	15.17	Peak flow (m <sup>3</sup> /s):	0.04

### Parameters

*Where the user has overridden 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 - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [02:15:00]	Yes
Timestep (hh:mm:ss)	00:40:00 [00:15:00]	Yes
SCF (Seasonal correction factor)	0.81	No
ARF (Areal reduction factor)	1 [1]	Yes
Seasonality	Winter	n/a

#### Loss model parameters

Name	Value	User-defined?
Cini (mm)	67.48	No
Cmax (mm)	734.18	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

#### Routing model parameters



Name	Value	User-defined?
Tp (hr)	1.06 [1]	Yes
Up	0.65	No
Uk	0.8	No

#### Baseflow model parameters

Name	Value	User-defined?
BFO (m <sup>3</sup> /s)	0	No
BL (hr)	44.56 [33.77]	Yes
BR	2.24	No

#### Urbanisation parameters

Name	Value	User-defined?
Urban area (km <sup>2</sup> )	0.01 [0]	Yes
Urbext 2000	0.3 [0]	Yes
Impervious runoff factor	1 [0.7]	Yes
Imperviousness factor	1 [0.3]	Yes
Tp scaling factor	0.5	No
Sewered area (km <sup>2</sup> )	0.00	Yes
Sewer capacity (m <sup>3</sup> /s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
00:00:00	1.5939	0.0000	0.8321	0.0000	0.000365	0.000365
00:40:00	2.9905	0.0000	1.5662	0.0020	0.000361	0.00236
01:20:00	5.5604	0.0000	2.9292	0.0056	0.00036	0.006
02:00:00	10.1574	0.0000	5.4081	0.0111	0.000369	0.0114
02:40:00	15.1683	0.0000	8.2139	0.0205	0.000395	0.0209
03:20:00	10.1574	0.0000	5.5927	0.0334	0.000451	0.0339
04:00:00	5.5604	0.0000	3.0930	0.0352	0.000547	0.0357
04:40:00	2.9905	0.0000	1.6726	0.0257	0.000667	0.0263
05:20:00	1.5939	0.0000	0.8941	0.0156	0.000779	0.0164
06:00:00	0.0000	0.0000	0.0000	0.0090	0.000864	0.00991
06:40:00	0.0000	0.0000	0.0000	0.0040	0.000916	0.00488
07:20:00	0.0000	0.0000	0.0000	0.0011	0.000939	0.00205
08:00:00	0.0000	0.0000	0.0000	0.0003	0.000941	0.00121
08:40:00	0.0000	0.0000	0.0000	0.0001	0.000933	0.00102
09:20:00	0.0000	0.0000	0.0000	0.0000	0.000921	0.000934
10:00:00	0.0000	0.0000	0.0000	0.0000	0.000907	0.000907
10:40:00	0.0000	0.0000	0.0000	0.0000	0.000894	0.000894
11:20:00	0.0000	0.0000	0.0000	0.0000	0.000881	0.000881
12:00:00	0.0000	0.0000	0.0000	0.0000	0.000867	0.000867
12:40:00	0.0000	0.0000	0.0000	0.0000	0.000855	0.000855
13:20:00	0.0000	0.0000	0.0000	0.0000	0.000842	0.000842
14:00:00	0.0000	0.0000	0.0000	0.0000	0.000829	0.000829
14:40:00	0.0000	0.0000	0.0000	0.0000	0.000817	0.000817
15:20:00	0.0000	0.0000	0.0000	0.0000	0.000805	0.000805
16:00:00	0.0000	0.0000	0.0000	0.0000	0.000793	0.000793
16:40:00	0.0000	0.0000	0.0000	0.0000	0.000781	0.000781
17:20:00	0.0000	0.0000	0.0000	0.0000	0.00077	0.00077
18:00:00	0.0000	0.0000	0.0000	0.0000	0.000758	0.000758
18:40:00	0.0000	0.0000	0.0000	0.0000	0.000747	0.000747
19:20:00	0.0000	0.0000	0.0000	0.0000	0.000736	0.000736
20:00:00	0.0000	0.0000	0.0000	0.0000	0.000725	0.000725
20:40:00	0.0000	0.0000	0.0000	0.0000	0.000714	0.000714
21:20:00	0.0000	0.0000	0.0000	0.0000	0.000704	0.000704
22:00:00	0.0000	0.0000	0.0000	0.0000	0.000693	0.000693
22:40:00	0.0000	0.0000	0.0000	0.0000	0.000683	0.000683

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m <sup>3</sup> /s)	Baseflow (m <sup>3</sup> /s)	Total Flow (m <sup>3</sup> /s)
23:20:00	0.0000	0.0000	0.0000	0.0000	0.000673	0.000673
24:00:00	0.0000	0.0000	0.0000	0.0000	0.000663	0.000663
24:40:00	0.0000	0.0000	0.0000	0.0000	0.000653	0.000653
25:20:00	0.0000	0.0000	0.0000	0.0000	0.000643	0.000643
26:00:00	0.0000	0.0000	0.0000	0.0000	0.000634	0.000634
26:40:00	0.0000	0.0000	0.0000	0.0000	0.000624	0.000624
27:20:00	0.0000	0.0000	0.0000	0.0000	0.000615	0.000615
28:00:00	0.0000	0.0000	0.0000	0.0000	0.000606	0.000606
28:40:00	0.0000	0.0000	0.0000	0.0000	0.000597	0.000597
29:20:00	0.0000	0.0000	0.0000	0.0000	0.000588	0.000588
30:00:00	0.0000	0.0000	0.0000	0.0000	0.000579	0.000579
30:40:00	0.0000	0.0000	0.0000	0.0000	0.000571	0.000571
31:20:00	0.0000	0.0000	0.0000	0.0000	0.000562	0.000562
32:00:00	0.0000	0.0000	0.0000	0.0000	0.000554	0.000554
32:40:00	0.0000	0.0000	0.0000	0.0000	0.000546	0.000546
33:20:00	0.0000	0.0000	0.0000	0.0000	0.000537	0.000537
34:00:00	0.0000	0.0000	0.0000	0.0000	0.000529	0.000529
34:40:00	0.0000	0.0000	0.0000	0.0000	0.000522	0.000522
35:20:00	0.0000	0.0000	0.0000	0.0000	0.000514	0.000514
36:00:00	0.0000	0.0000	0.0000	0.0000	0.000506	0.000506

## Appendix

### Catchment descriptors \*

Name	Value	User-defined value used?
BFIHOST	0.75	No
PROPWET (mm)	0.47	No
SAAR (mm)	1121	No

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

## Appendix G - 5mm Retained Volume Calculation

Total impermeable area = 0.615ha

Total impermeable area = 6150m<sup>2</sup>

5mm of each storm to be retained on site. 5mm = 0.005m

Volume required to be retained on site = 6150m<sup>2</sup> x 0.005m = 30.75m<sup>3</sup>

## Appendix H - Surface Water Drainage Strategy Drawing

VGP-ACM-XX-05-DR-DR-00002 – Drainage Strategy Layout Sheet 1

VGP-ACM-XX-05-DR-DR-00003 – Drainage Strategy Layout Sheet 2

**PROJECT**

Vale of Glamorgan -  
St Nicholas School

**CLIENT**

Vale of Glamorgan  
Council






**CONSULTANT**

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**KEY**

-  FLOW DIRECTION ARROW
-  SURFACE WATER PIPE
-  FOUL SEWER PIPE
-  SUDS TRAIN
-  SWALE

**ISSUE/REVISION**

I/R	DATE	DESCRIPTION
P01	30.08.2019	FIRST ISSUE

**PROJECT NUMBER**

60607807

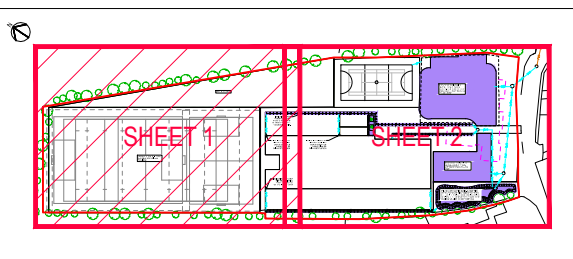
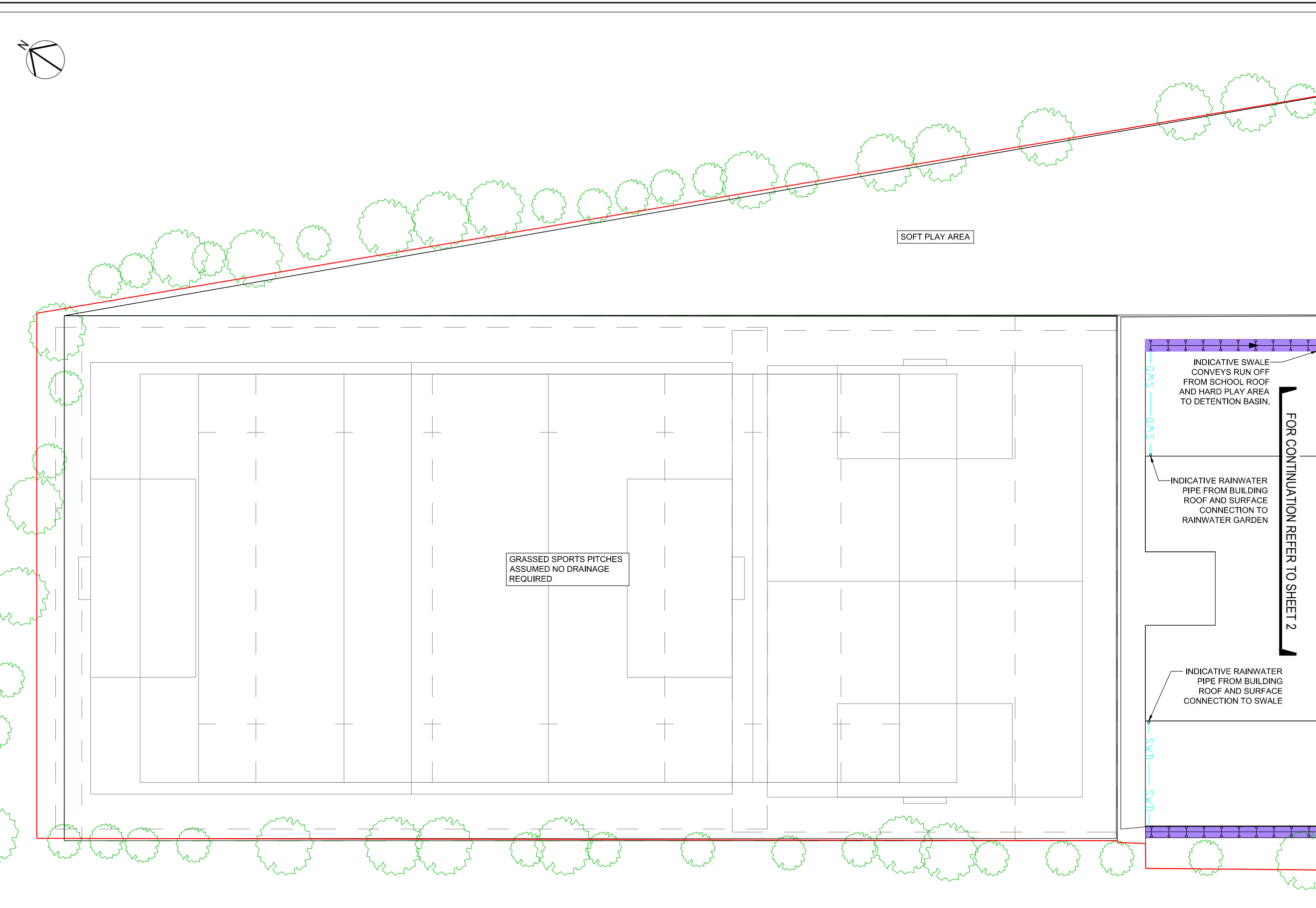
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DRAINAGE STRATEGY LAYOUT  
SHEET 1

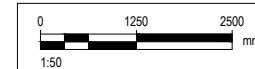
**SHEET NUMBER**

VGP-ACM-XX-05-DR-DR-00002

ISO A1 594mm x 841mm  
 Approved: RP  
 Checked: RP  
 Designer: MH  
 Project Management Initials:  
 Last saved by: JENNIFER.WALTERS(2019-06-29) Last Plotted: 2019-06-29  
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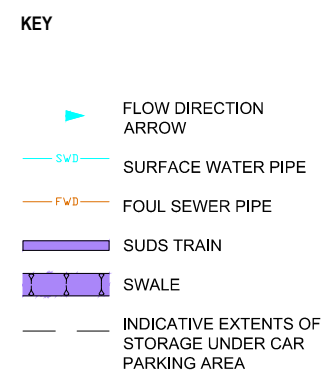


KEY PLAN



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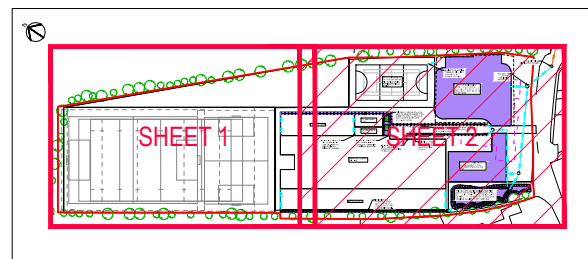
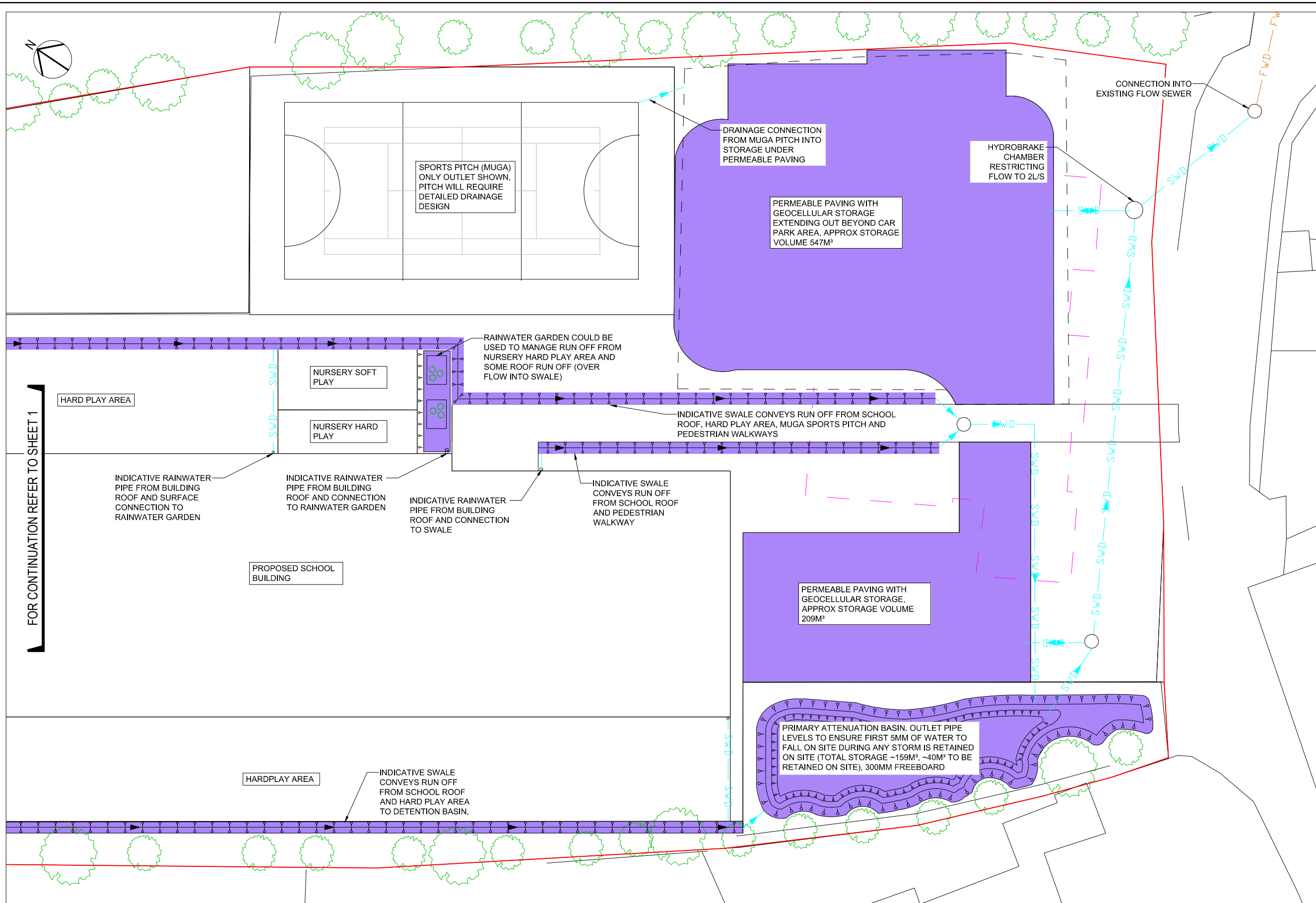
**ISSUE/REVISION**

NO	DATE	DESCRIPTION
P01	30.08.2019	FOR ISSUE
I/R	DATE	DESCRIPTION

**PROJECT NUMBER**  
60607807

**SHEET TITLE**  
DRAINAGE STRATEGY LAYOUT  
SHEET 2

**SHEET NUMBER**  
VGP-ACM-XX-05-DR-DR-00003



KEY PLAN



ISO A1 594mm x 841mm  
 Approved: RP  
 Checked: RP  
 Designer: MH  
 Project Management Initials:  
 Last saved by: JENNIFER WALTERS(2019-06-29)  
 Last Plotted: 2019-06-29  
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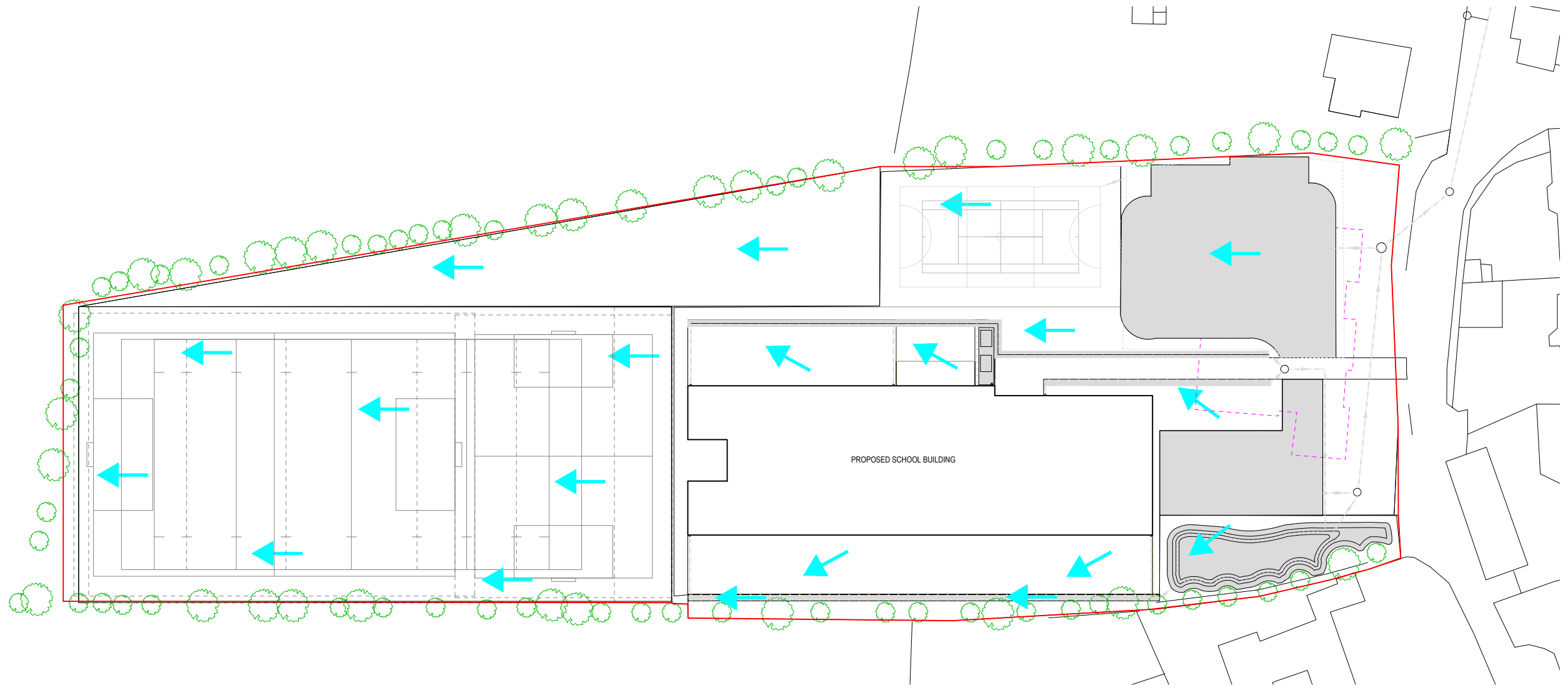
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## Appendix I – Exceedance Flows Drawing

VGP-ACM-XX-05-DR-DR-00004 – Exceedance Flows Drawing

ISO A1 594mm x 841mm  
 Approved: RP  
 Checked: RP  
 Designer: MH  
 Project Management Initials:  
 Last saved by: JENNIFER.WALTERS(2019-06-30) Last Plotted: 2019-06-30  
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**PROJECT**

Vale of Glamorgan -  
 St Nicholas School

**CLIENT**

Vale of Glamorgan  
 Council

**CONSULTANT**

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**KEY**

- EXCEEDANCE FLOW DIRECTION ARROW
- RED LINE BOUNDARY

NOT TO SCALE

**ISSUE/REVISION**

I/R	DATE	DESCRIPTION
P01	30.08.2019	FOR ISSUE

**PROJECT NUMBER**

60607807

**SHEET TITLE**

EXCEEDANCE FLOWS DRAWING

**SHEET NUMBER**

VGP-ACM-XX-05-DR-DR-00004

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