



**CIVIL ENGINEERING
SOLUTIONS**

**REEDS FARM, LONDON ROAD, HISKSTEAD,
RH17 5LY**

**FLOOD RISK ASSESSMENT & SURFACE WATER
DRAINAGE STRATEGY**

Date August 2024

Version Final

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Revision History

Revision Reference	Date Issued	Amendments	Issued to
Draft Report	31/07/2024		Client
Final Report	30/08/2024	Revised land descriptive text	Client

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1 Introduction

Civil Engineering Solutions Ltd (CES) has been commissioned by MRL Grab & Tip Ltd., to undertake a Flood Risk Assessment and Drainage Strategy report for a landscaping/acoustic bund development at Reeds Farm, London Road, Hickstead, West Sussex, RH17 5LY. NRG: 526824, 120799.

This Flood Risk Assessment has been undertaken in accordance with the NPPF (National Planning Policy Framework).

1.1 Location

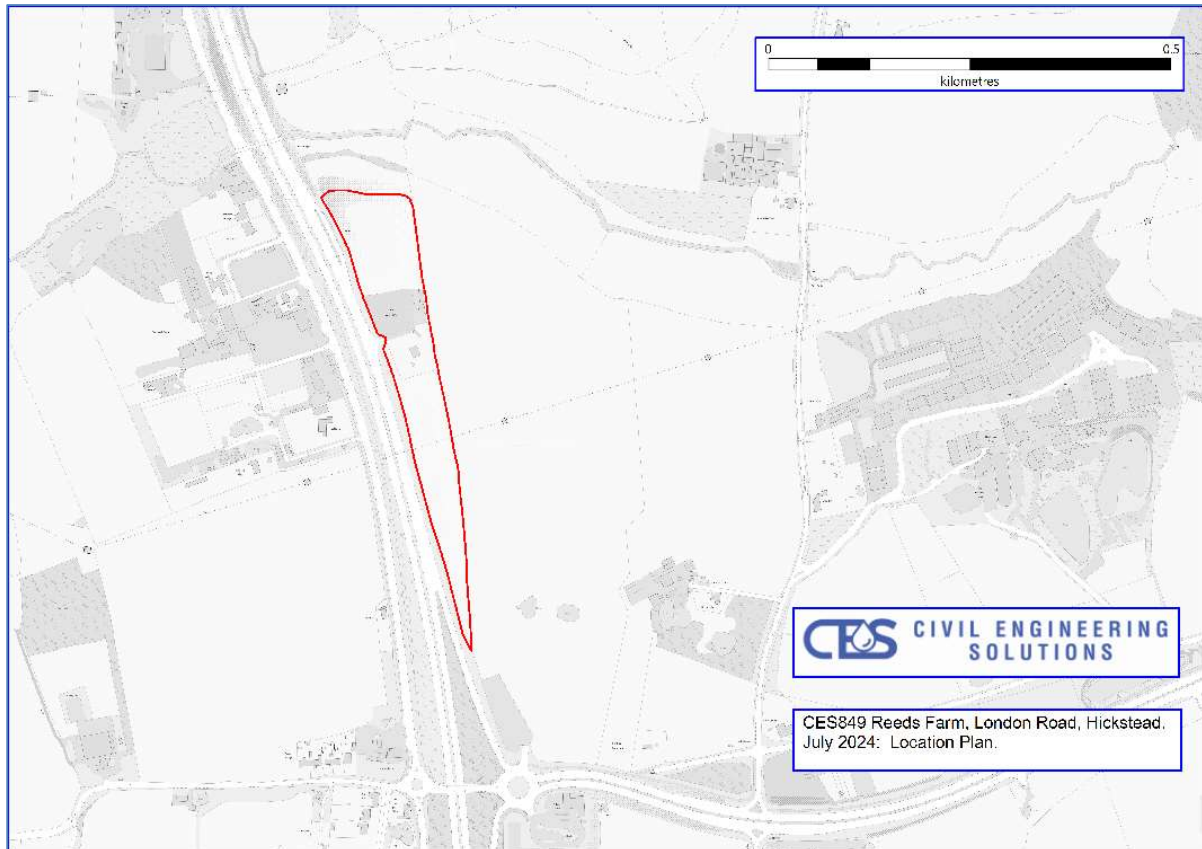


Figure 1: Site Location

2014 commercial LiDAR (Bluesky) provides the latest topography which shows the site slopes from south to north and from west to east. Ground levels at the site range from 23mOD in the south to 12.5m OD in the north.

1.2 Development Proposals

This FRA report is required to support a planning application to fill/landscape existing filled land and provide an acoustic bund to reduce traffic noise from the A23 at Reeds Farm, London Road. The existing site current use is of paddocks use and has been subject to filling in the past. LiDAR data from 2001 identifies two areas of fill to the north and south of the existing access to Reeds Farm off the A29.

The proposal is to raise levels of the existing filled areas with associated landscaping and planting/landscaping to retain the paddock use and form an acoustic barrier to reduce traffic noise from the adjacent A29. To relatively small lengths of new bund at the site access with the A29 are proposed to reduce noise further. These acoustic bunds will be landscaped, and grass seeded.

The land as 'existing' will be classified as 'less vulnerable' development as per NPPF. The 'proposed' use classification will also be classified as 'less vulnerable' development as per NPPF. The proposals retain the vulnerability classification of the site.

The site is not considered to be at risk of fluvial flooding and is outside of both flood zone 2 and 3 areas.

1.3 EA Flood Data

The Environment Agency (EA) flood map seen below in Figure 2 shows that the site is located within Flood Zone 1 with a small section at the northeast corner encroaching into Flood zone 2.

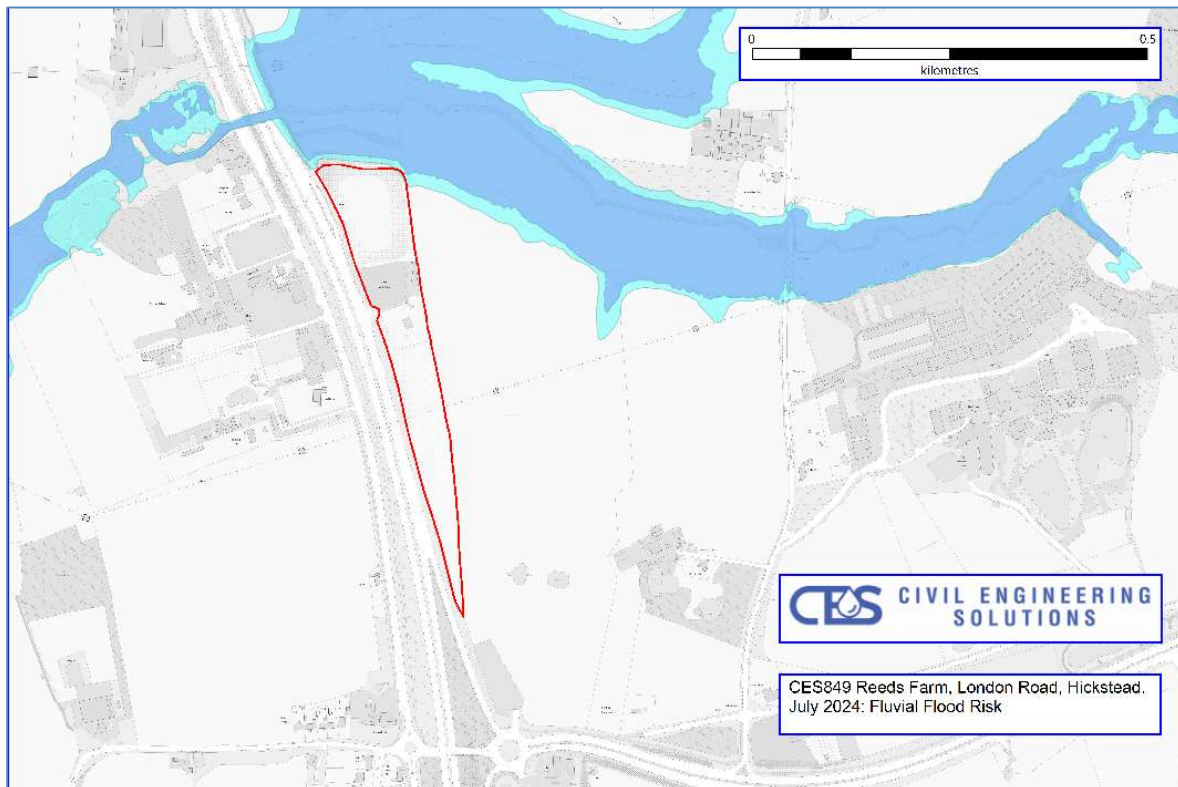


Figure 2: Flood Zone 2 and 3 extents.

1.4 EA Surface Water Flooding

The Pluvial Surface Water online flood mapping identifies the surface water flood zone 2 and 3 classified areas.

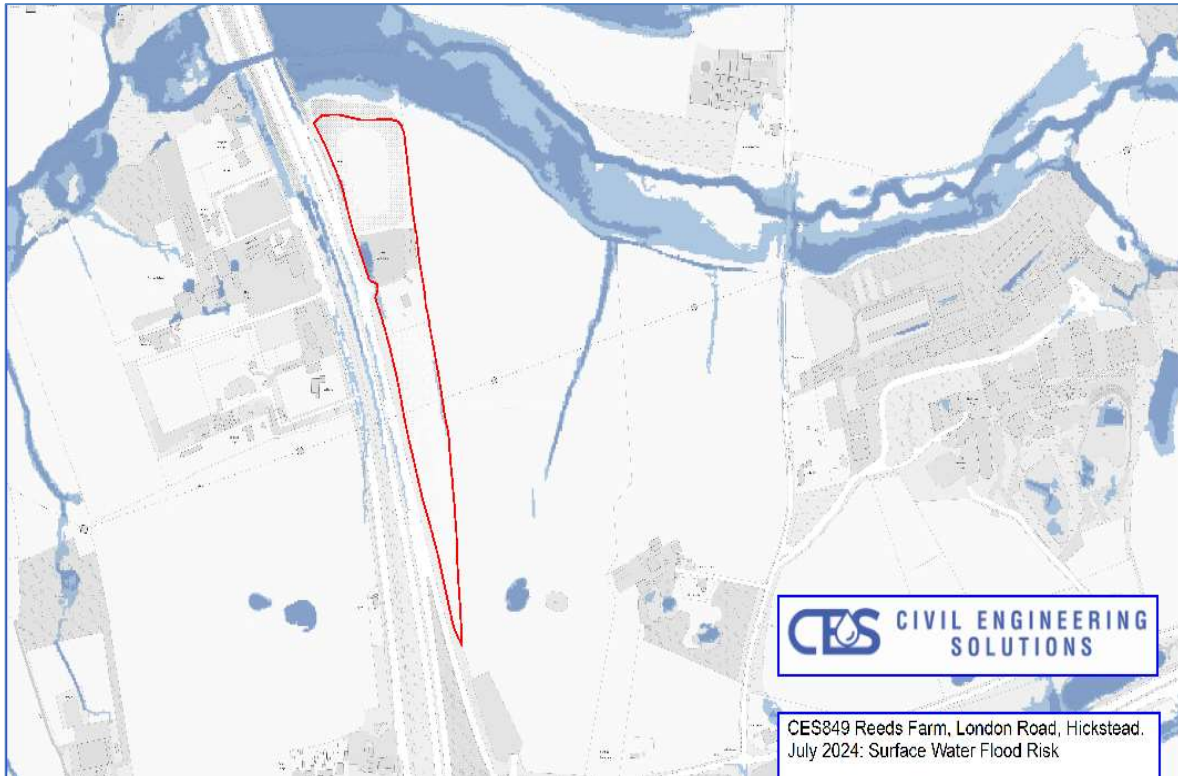


Figure 3: Surface Water Flood Map

Where: the dark blue shaded area denotes high risk of surface water flooding, the light blue denotes low risk with white areas having very low risk of surface water flooding

1.5 EA Flood Warnings

The site is not considered to be within an area benefiting from EA flood warnings.

1.6 Groundsure Flood Report

The GroundSure flood report purchased for this FRA, included in Appendix B, uses a variety of sources, some of which are inherently imprecise, to assess the flood vulnerability of the site. The main findings are:

- A low overall risk of flooding has been identified.
- A negligible risk of pluvial flooding.
- The risk from groundwater flooding is moderate.
- The chance of fluvial and tidal (from rivers and the sea) flooding is considered very low.

1.7 Historic Flooding

The 'Groundsure' flood report failed to identify any historical flood events for the site.

2 Requirements of National Planning Policy Framework

This site has been assessed against the requirements of National Planning Policy Framework (NPPF). This section explains the steps required for the development to comply with current legislation. The site is in Flood Zone 1 and is classified as Less Vulnerable; Less Vulnerable developments are typically permissible in Flood Zone 1.

2.1 Fluvial Flood Risk

The 'Groundsure' flood report and the EA flood mapping identify the site to be at a 'very low' risk from fluvial sources.

2.2 Tidal Flood Risk

The site is not considered at risk of tidal flooding.

2.3 Pluvial & Surface Water

A small portion of the site is at risk from surface water flooding according to EA mapping. The 'Groundsure' flood report identifies the site to be at a 'negligible' risk.

The development proposes landscaping to pre-filled/profiled paddock land alongside the A23, which will result in changes to existing slopes and topography. As part of this commission, CES were tasked with the modelling of the site, including the 'existing' and 'proposed' model scenarios. A summary of the model findings can be seen in Section 5: Pluvial Flood Modelling Summary.

2.4 Access & Egress

Site access is not expected to be at a significant flood risk.

2.5 Flood Compensation

The proposed development is not expected to displace water in extreme events. The development may cause small, localised effects by altering flow routes through the site, but these would be brief in nature and will not affect storage.

2.6 Groundwater Flooding

The site is expected to be at a moderate risk of groundwater flooding as per the Groundsure flood report however there is a significant fall across the development site and groundwater is not considered to manifest a risk to either owner/occupier or third parties.

2.7 Surface Water Drainage

Pluvial flood modelling undertaken as part of this commission has identified flow pathways from pluvial events for the existing and proposed site topography. The development does not result in an increase in impermeable surface but does modify existing ground slopes to land given over to paddock use. A review of the flood modelling outputs demonstrates post development and pre-development runoff from permeable surfaces do not increase although small, isolated fluctuations in runoff would occur within the development boundary. These fluctuations normalise quickly and do not affect third party land.

A small swale is required along the northeastern limb of the proposed acoustic bund close to the access to Reeds Farm to reduce ponding of pluvial water. And direct rainfall back into the western boundary ditch which accepts this water in the pre-development case.

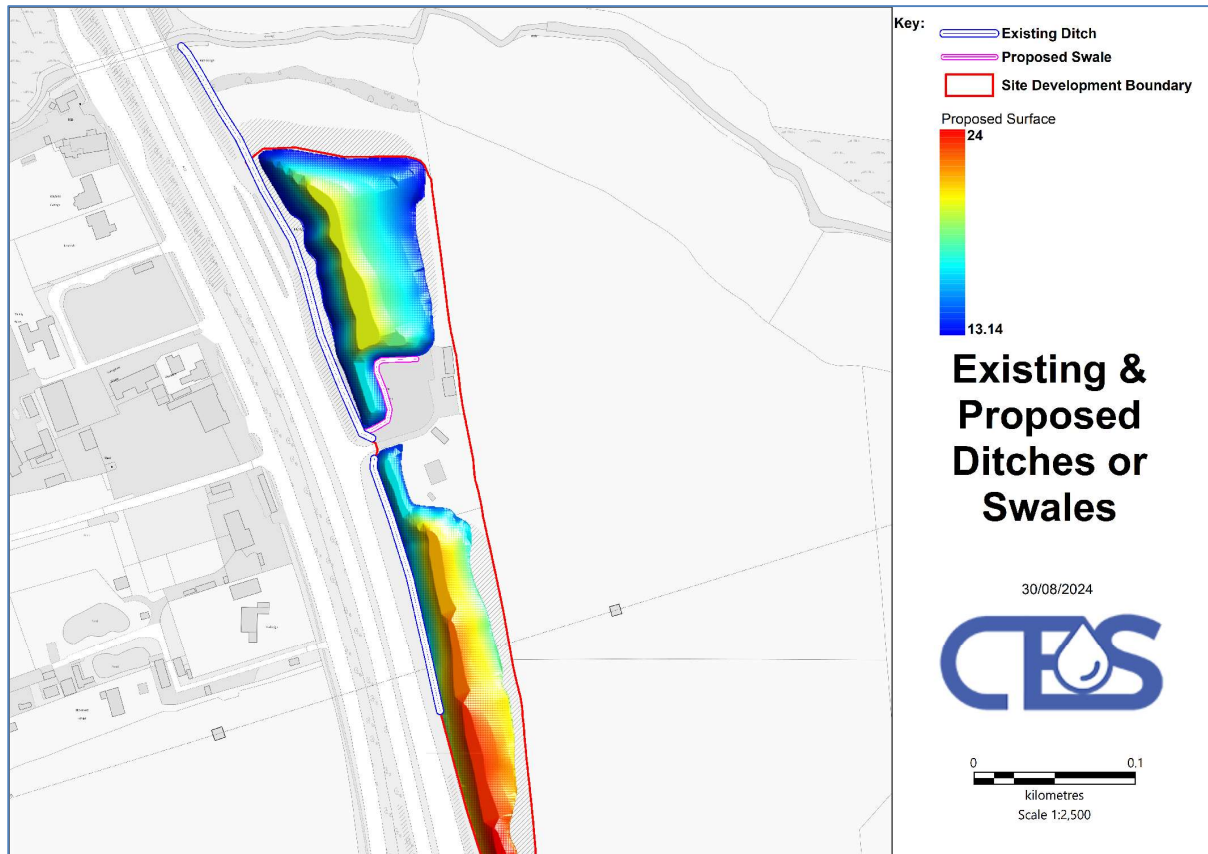


Figure 4: Existing Ditches & Proposed Swale Location.

2.8 Awareness of Flood Risk

Whilst the site is generally at a low risk of flooding the developer should be aware that the site is not immune from flooding. It is recommended the site owner manages surface water swales to ensure they are operational to reduce potential for surface flooding.

2.9 Reservoir & Infrastructure Flood Risk

The site is within an area considered not to be at risk from reservoir flooding.

2.10 Sequential Test

Not Applicable

2.11 Exception Test

Not Applicable

3 Pluvial Flood Modelling Summary and Drainage Strategy

3.1 Model Brief

As part of this commission, CES were tasked with the hydraulic pluvial flood modelling of the site to consider surface water flow pathways and to prepare a surface water drainage strategy/design. The brief included understanding the 'existing' pluvial flood risk and determining if the 'proposed' site layout would have a detrimental impact on third parties.

3.2 Existing Flood Model

The 'Existing' pluvial flood model has been constructed to form a baseline model, to which the 'proposed' layout will be assessed against.

3.2.1 Catchment.

To investigate flood risk to development site, CES has prepared a TuFLOW two-dimensional pluvial flood model. The catchment area has been assessed using the FEH webservice identifier tool. The catchment is poorly defined by the FEH webservice portal as there are no formally recognised watercourses in close proximity to the site which have a contributing area of 0.5km² or greater.

We therefore developed the TuFLOW pluvial flood model to include a 41.25Ha area which extended beyond the natural slopes/catchment area for the development site to ensure surface flows/extents were adequately represented by the flood model.

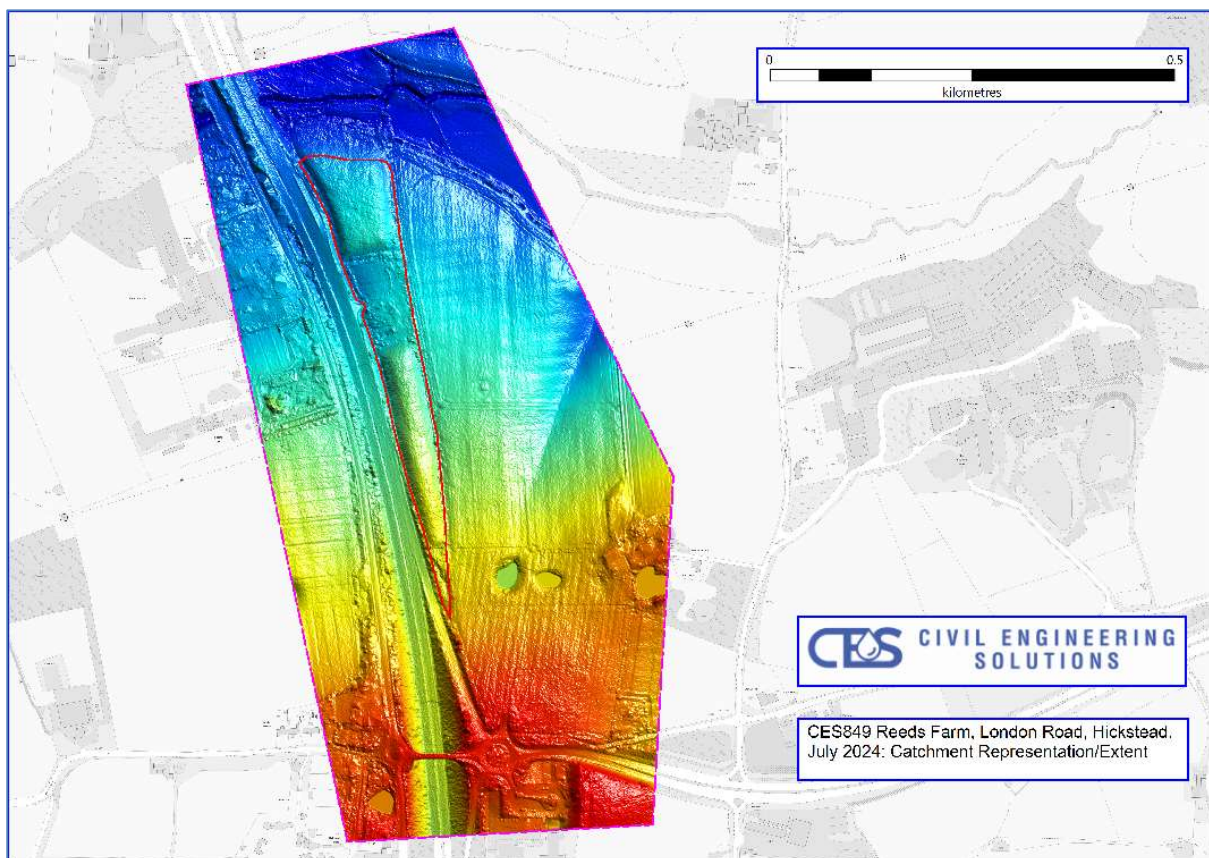


Figure 5: Modelled Catchment Extents and LiDAR Coverage

3.2.2 Hydrology.

A rainfall analysis using ReFH2.3 methodology was used to generate the design rainfall intensities to be applied to the catchment. The flood modelling tested a 1-hour, 3-hour and 6-hour rainfall event scenario to identify the critical rainfall duration causing the maximum flood depths at the site. Timesteps and durations were adjusted for all rainfall events to ensure they met the design criteria. All other ReFH defaults were accepted. The ReFH2 output reports are provided in Appendix C. The design rainfall depths modelled for the 1-hour 100y event are provided in Table 1 for reference. For modelling stability reasons, the first rainfall timestep has zero rainfall specified, with the rainfall profile commencing after 4 minutes of the start of the simulations.

Table 1: Modelled ReFH2 Rainfall Depths for the 100y 1Hr event.

Time (Hrs)	Design Rainfall (mm)								
	1y	2y	5y	10y	30y	50y	75y	100y	1000y
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.07	0.09	0.11	0.17	0.22	0.29	0.32	0.35	0.37	0.55
0.13	0.13	0.16	0.25	0.32	0.42	0.47	0.51	0.54	0.81
0.20	0.20	0.24	0.37	0.46	0.61	0.69	0.74	0.79	1.18
0.27	0.28	0.34	0.54	0.68	0.89	1.00	1.08	1.14	1.71
0.33	0.41	0.50	0.78	0.98	1.29	1.44	1.57	1.66	2.48
0.40	0.59	0.72	1.12	1.41	1.86	2.08	2.25	2.38	3.56
0.47	0.84	1.02	1.59	1.99	2.64	2.94	3.19	3.37	5.05
0.53	1.05	1.27	1.99	2.49	3.29	3.68	3.99	4.22	6.31
0.60	0.84	1.02	1.59	1.99	2.64	2.94	3.19	3.37	5.05
0.67	0.59	0.72	1.12	1.41	1.86	2.08	2.25	2.38	3.56
0.73	0.41	0.50	0.78	0.98	1.29	1.44	1.57	1.66	2.48
0.80	0.28	0.34	0.54	0.68	0.89	1.00	1.08	1.14	1.71
0.87	0.20	0.24	0.37	0.46	0.61	0.69	0.74	0.79	1.18
0.93	0.13	0.16	0.25	0.32	0.42	0.47	0.51	0.54	0.81
1.00	0.09	0.11	0.17	0.22	0.29	0.32	0.35	0.37	0.55
1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.2.3 Topography and roughness coefficients.

Commercial (BlueSky) LiDAR downloaded on the 22nd of July 2024, suggests that 'existing' site levels range from 23mOD to 12.5mOD. DTM (bare Earth) LiDAR data overing the whole of the catchment model was available at 1m resolution. All LiDAR is dated as of 2014 and represents the latest available dataset for the study area.

Manning roughness coefficients were based on OS MasterMap land use classifications for the whole of the modelled catchment area.

Table 2: manning Roughness Coefficients.

MasterMap Code	Manning's value	Description
10021	0.080	Buildings
10053	0.040	Gardens and mixed surfaces
10056	0.035	Fields and open land
10062	0.035	Glasshouse
10089	0.010	Inland Water
10111	0.050	Scrub land
10123	0.035	Footpaths
10167	0.040	Railways
10172	0.030	Roads tracks and paths
10183	0.035	Roadside paths
10203	0.010	Tidal water
10217	0.040	Unclassified land
10185	0.080	Structures
10054	0.050	Land steps
10210	0.010	Water general

MasterMap Code	Manning's value	Description
10096	0.035	Slopes
10119	0.035	Steps
10193	0.080	Pylon

Table 2 identifies the relationship between land use codes contained within the OS Master mapping dataset and manning roughness coefficients employed within the pluvial flood model.

3.3 Mapped Outputs and pluvial flood depths.

The maximum modelled pluvial flood depth grids for the 100yCC 1hr, 3hr and 6hr storm events was processed in TuFLOW and MapInfo professional to analyse potential flood depths for the site. Of the three storm durations simulated, the one-hour storm yielded the deepest pluvial depths indicating the small catchment has a quick response to rainfall.

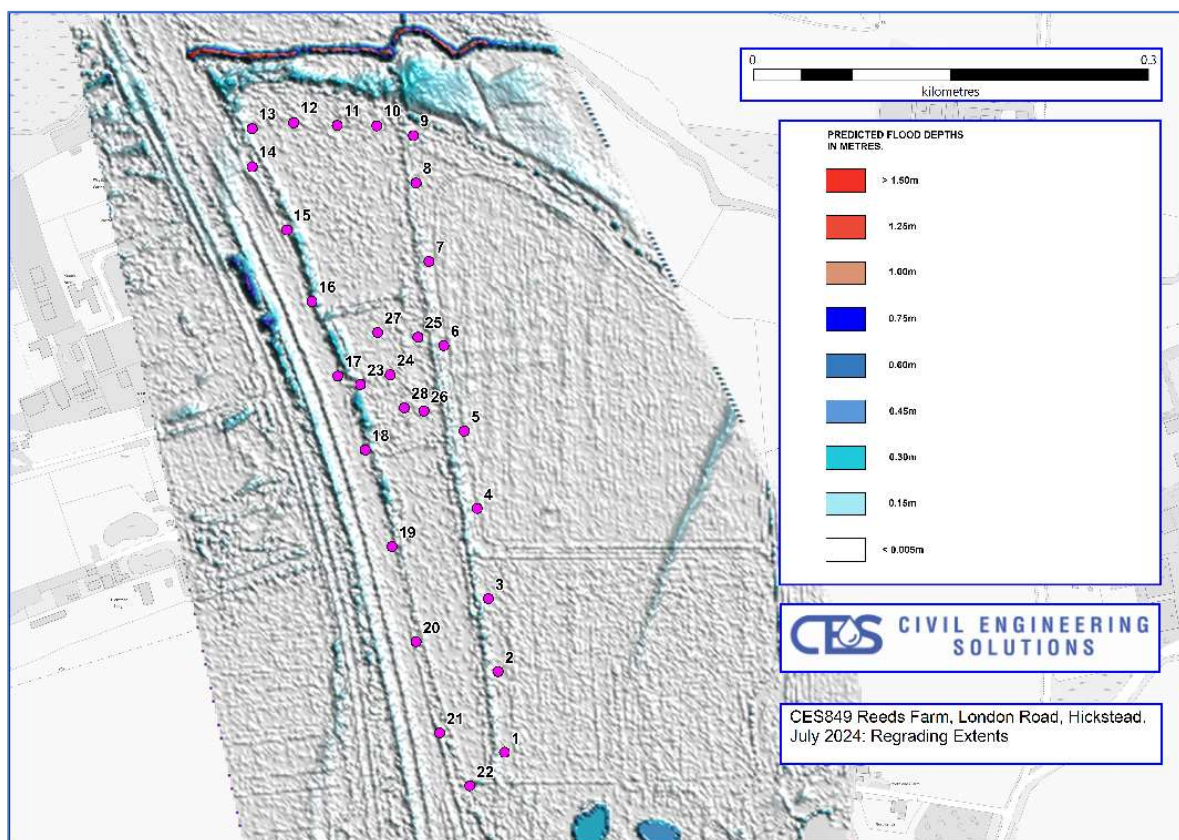


Figure 6: 100yCC 1Hr Maximum Pluvial Flood Depths and Point Inspection Locations

3.4 Proposed Flood Model

The 'proposed' model scenario was simulated with the same input files as the 'Existing' scenario, with the exception of a revised surface topography profile to represent the proposed development. Contours of the proposed surface profile were processed in specialist survey and ground modeling software to provide an Esri ASC (LiDAR) file of the proposed surface. This was read into TuFLOW to modify the representation of the existing surface profile to take account of the development proposal.

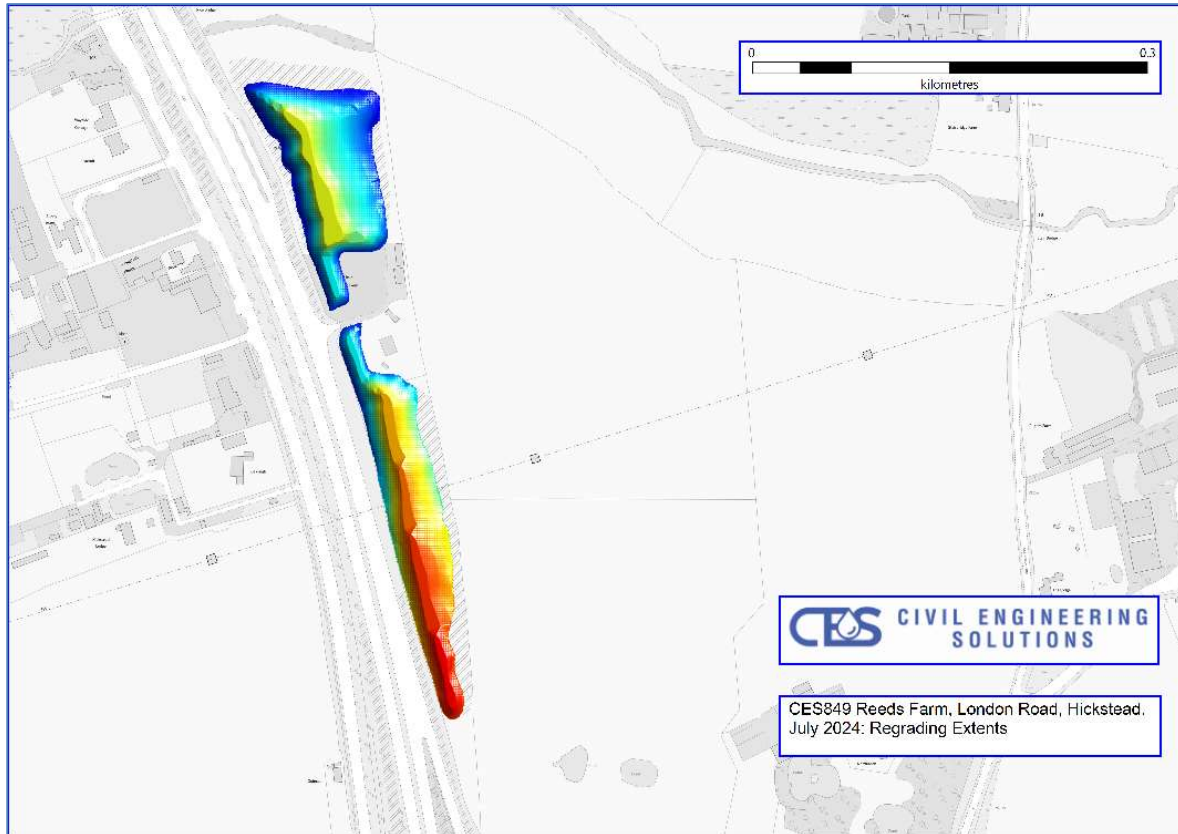


Figure 7: Proposed regrading extent.

3.5 Review of modelled outputs

A review of flood modelling outputs identifies there are no significant changes to flood depths reported within the development area, with the exception of a small area to the north of the existing access road to Reeds Farm where surface water flows are interrupted by the new acoustic bund. This area shows a maximum predicted 200mm depth of pluvial ponding.

The pluvial ponding adjacent to the northern acoustic bund can be alleviated using a 500mm deep swale to discharge into the existing western boundary ditch. The flood modelling identified there is no increase in flows associated with this discharge of water.

Otherwise, all other point inspection locations identify no increased flood depths to third party land ownership/interests.

Table 3: Modelled Flood Depth Comparison

X	Y	Ref	Modelled Flood Depths (m)						
			Existing LiDAR Surface m OD	Existing 30y1HrCC dMax	Proposed 30y1HrCC dMax	30yCC Difference	Existing 100y1HrCC dMax	Proposed 100y1HrCC dMax	100yCC Difference
526945.281	120562.169	1	22.14	0.00	0.00	0.00	0.00	0.00	0.00
526940.367	120623.291	2	20.66	0.00	0.00	0.00	0.00	0.00	0.00
526932.988	120678.445	3	19.57	0.00	0.00	0.00	0.00	0.00	0.00

X	Y	Ref	Modelled Flood Depths (m)						
			Existing LIDAR Surface m OD	Existing 30y1HrCC dMax	Proposed 30y1HrCC dMax	30yCC Difference	Existing 100y1HrCC dMax	Proposed 100y1HrCC dMax	100yCC Difference
526924.561	120746.606	4	17.91	0.00	0.00	0.00	0.01	0.01	0.00
526914.725	120805.279	5	17.03	0.01	0.01	-0.00	0.02	0.02	-0.00
526899.265	120869.911	6	16.15	0.01	0.01	-0.00	0.01	0.01	-0.00
526888.027	120933.502	7	15.12	0.01	0.01	-0.00	0.02	0.02	-0.00
526878.183	120992.865	8	13.58	0.00	0.00	-0.00	0.00	0.00	-0.00
526876.072	121028.695	9	12.38	0.01	0.02	-0.00	0.02	0.02	-0.00
526848.319	121036.073	10	12.40	0.00	0.00	0.00	0.00	0.00	0.00
526818.464	121036.423	11	12.52	0.01	0.01	0.00	0.01	0.01	0.00
526785.442	121038.532	12	12.62	0.00	0.00	0.00	0.00	0.00	0.00
526753.823	121033.964	13	12.85	0.00	0.00	0.00	0.00	0.00	0.00
526753.823	121005.162	14	13.89	0.00	0.00	0.00	0.00	0.00	0.00
526780.174	120957.386	15	14.64	0.01	0.01	0.00	0.01	0.01	0.01
526799.137	120903.281	16	15.05	0.02	0.01	0.01	0.03	0.02	0.01
526818.810	120846.717	17	16.00	0.03	0.03	0.00	0.03	0.03	0.00
526839.546	120790.873	18	16.78	0.00	0.00	0.00	0.00	0.00	0.00
526859.920	120717.804	19	17.79	0.00	0.00	0.00	0.00	0.00	0.00
526878.183	120645.775	20	19.34	0.02	0.02	0.00	0.02	0.02	0.00
526896.099	120576.924	21	20.68	0.05	0.05	0.00	0.05	0.05	0.00
526918.938	120536.876	22	22.54	0.00	0.00	0.00	0.00	0.00	0.00
526836.026	120840.399	23	15.49	0.03	0.02	0.01	0.03	0.02	0.01

4 Discussion

This report assesses that the proposed development is located within Flood Zone 1 and is affected in parts by pluvial flood risk. The proposals include the reprofiling of land to provide an acoustic bund to reduce traffic noise to Reeds Farm off the A29. This report has been informed by site specific pluvial flood modelling which has identified there will be no impacts to the existing and third party land interests resulting from the development proposals.

The proposed development does not increase impermeable surfaces, and the proposed filling/landscaping will be reinstated as paddock land on completion. As a result, there will be no increase in surface water flows resulting from the development.

A short section (65m) of new swale should be constructed to the north of Reeds Farm access track to drain the potential area of ponding located to the northeast of the proposed new acoustic bund.

5 Conclusions

The development proposes reprofiling of ground levels to provide an acoustic bund. The land as 'existing' is classified as 'less vulnerable' development as per NPPF. The 'proposed' use classification will also be classified as 'less vulnerable' development as per NPPF. The proposals retain the vulnerability classification of the site.

The 'proposed' pluvial flood model scenario resulted in no increase in flood depths off site.

6 Appendices

Appendix A: Development Proposal

Appendix B: Groundsure Flood Report

Appendix C: ReFH2 Rainfall Outputs

APPENDIX A: DEVELOPMENT PROPOSAL



Project Name: Little Reeds Acoustic & Visual Screen	Drawn By: DW	Checked By: BW	Rev:
Project No: 1234	Scale: 1:1000 @ A1	Rev A 13/02/2025 - Addition of swale	
Drawing Name: Layout & Grading	Date: 13/02/2025		
Drawing No: 1234.02 Rev A	Client: Little Reeds Farm		

- Proposed Contours (1m Intervals)
- Existing Contours (1m Intervals)
- Retained Mature Trees / Hedgerow

APPENDIX B: GROUNDSURE FLOOD REPORT

Little Reeds Farm, London Road, Hickstead, West Sussex, RH17 5LY

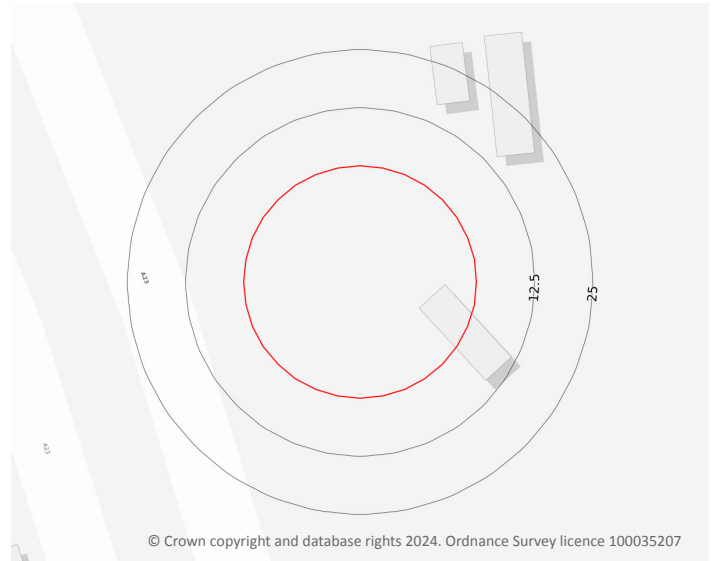
Overall Flood Risk



LOW

Groundsure Flood complies with relevant Law Society practice notes on flood risk in property transactions.

Site plan



Search Results



Rivers and the Sea

Very Low



Surface Water

Negligible



Groundwater

Moderate

[page 3 >](#)



Historic Flood

Not identified



Flood Defences

No



FloodScore™ insurance rating

Very Low

[page 5 >](#)

Full assessments for other environmental risks are available in additional Groundsure searches including the Groundsure Avista 7 in 1 report. Contact Groundsure or your search provider for further details.

Overview of findings and recommendations

To save you time when assessing the report, we only provide maps and data tables of features within the search radius that we have identified to be of note. These relate to environmental risks that may have liability implications, affect insurance premiums, property values and/or a lender's willingness to lend.

You can view the fully comprehensive library of information we have searched on [page 4](#) >.



Flooding

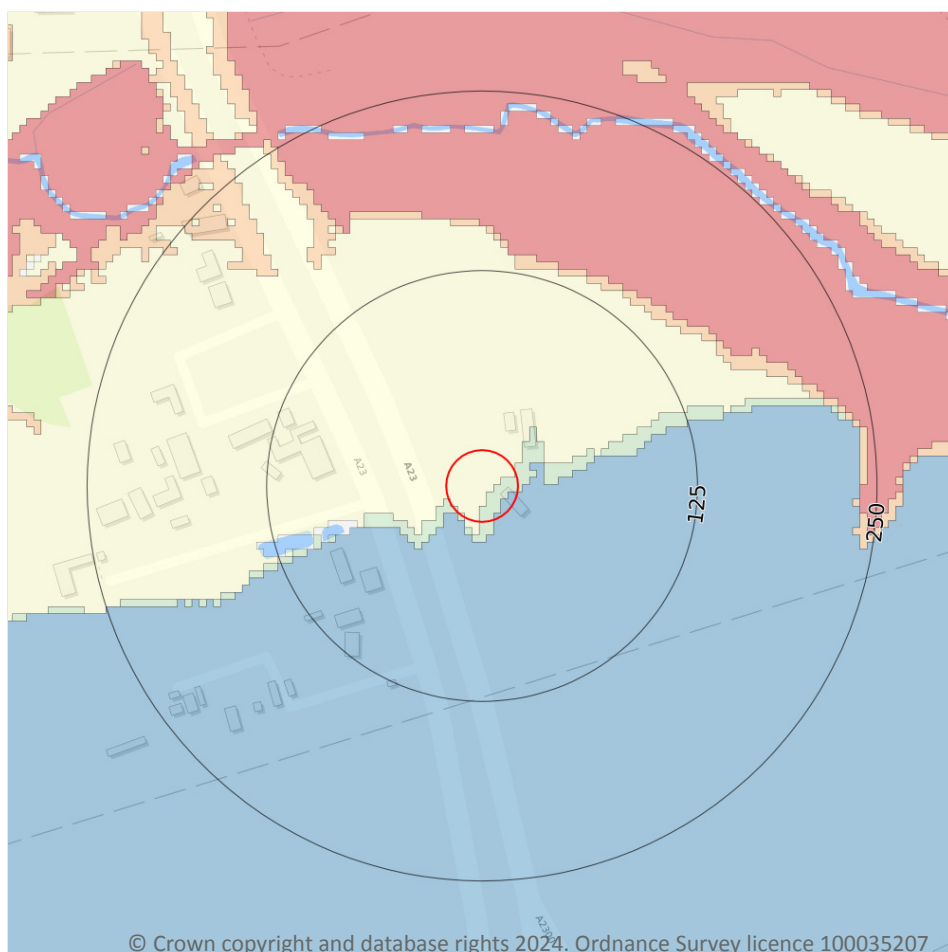
Groundwater Flooding

A risk of groundwater flooding has been identified at the site. This will be more of an issue for properties with a basement or other section below ground. Further guidance on groundwater flooding has been produced by the Environment Agency and can be found at <https://www.gov.uk/guidance/groundwater-flooding> ↗

Please note this report has been run on a point location buffered to 25m to account for uncertainties of the size of the property. Therefore some risk assessments and measurements may be overestimated.



Flooding / Groundwater flooding



- Site Outline
- Search buffers in metres (m)
- High
 - Moderate - High
 - Moderate
 - Low
 - Negligible

Ambiental data indicates that the property is in an area with a moderate risk of groundwater flooding. Should a 1 in 100-year groundwater flood event occur, groundwater levels may affect basement areas. Properties without basements are not considered to be at risk from this level of groundwater flooding.

Some of the responses contained in this report are based on data and information provided by the Natural Environment Research Council (NERC) or its component body British Geological Survey (BGS). Your use of any information contained in this report which is derived from or based upon such data and information is at your own risk. Neither NERC nor BGS gives any warranty, condition or representation as to the quality, accuracy or completeness of such information and all liability (including for negligence) arising from its use is excluded to the fullest extent permitted by law. Your use of the data/report/assessment constitutes your agreement to bring no claim against NERC or BGS in connection with it.



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info@groundsure.com 
01273 257 755

Ref: CMAPS-CM-1176948-7559-240724
Your ref: CMAPS-CM-1176948-7559-240724
Grid ref: 526847 120844

Datasets searched

This is a full list of the data searched in this report. If we have found results of note we will state "Identified". If no results of note are found, we will state "Not identified". Our intelligent filtering will hide "Not identified" sections to speed up your workflow.

Flooding	
Risk of flooding from rivers and the sea	Not identified
Flood storage areas: part of floodplain	Not identified
Historical flood areas	Not identified
Reduction in Risk of Flooding from Rivers and Sea due to Defences	Not identified
Flood defences	Not identified
Proposed flood defences	Not identified
Surface water flood risk	Not identified
Groundwater flooding	Identified



Methodologies and limitations

Groundsure's methodologies and limitations are available here: knowledge.groundsure.com/methodologies-and-limitations ↗.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information in your Flood report. To find out who they are and their areas of expertise see www.groundsure.com/sources-reference ↗.

Conveyancing Information Executive and our terms & conditions

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- a charity with an annual income of less than £3 million;
- a Trust with a net asset value of less than £3 million.

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- liaise, at your request, with anyone acting formally on your behalf

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Operations Director, Groundsure Ltd, Nile House, Nile Street, Brighton, BN1 1HW. Tel: 01273 257 755. Email: info@groundsure.com

↗ If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk ↗ We will co-operate fully with the Ombudsman during an investigation and comply with their final decision.

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APPENDIX C: REFH2 RAINFALL OUTPUTS

UK Design Flood Estimation

Generated on 23 July 2024 13:01:20 by mark
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

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

Site detailsChecksum: 9E4B-873D

Site name: FEH_Point_Descriptors_526879_120879_v5_0_1

Easting: 526879

Northing: 120879

Country: England, Wales or Northern Ireland

Catchment Area (km²): 1

Using plot scale calculations: Yes

Model: 2.3

Site description:None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	58.04	Total runoff (ML):	31.94
Total Rainfall (mm):	38.11	Total flow (ML):	38.10
Peak Rainfall (mm):	6.50	Peak flow (m³/s):	2.43

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 - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:00:00 [03:30:00]	Yes
Timestep (hh:mm:ss)	00:12:00 [00:30:00]	Yes
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.76	No
Cmax (mm)	203.81	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.04	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0.06	No
BL (hr)	25.18	No
BR	0.19	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m ³ /s)	0	No
Exporting drained area (km ²)	0	No
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	0.5696	0.0000	0.4250	0.0000	0.0641	0.0641
00:12:00	0.8324	0.0000	0.6239	0.0018	0.0636	0.0654
00:24:00	1.2135	0.0000	0.9156	0.0082	0.0631	0.0713
00:36:00	1.7635	0.0000	1.3434	0.0213	0.0626	0.0839
00:48:00	2.5520	0.0000	1.9711	0.0441	0.0622	0.106
01:00:00	3.6687	0.0000	2.8896	0.0813	0.0618	0.143
01:12:00	5.2019	0.0000	4.2104	0.1395	0.0614	0.201
01:24:00	6.5015	0.0000	5.4489	0.2284	0.0612	0.29
01:36:00	5.2019	0.0000	4.5091	0.3592	0.0612	0.42
01:48:00	3.6687	0.0000	3.2600	0.5331	0.0614	0.594
02:00:00	2.5520	0.0000	2.3066	0.7406	0.0619	0.802
02:12:00	1.7635	0.0000	1.6126	0.9704	0.0627	1.03
02:24:00	1.2135	0.0000	1.1185	1.2106	0.0639	1.27
02:36:00	0.8324	0.0000	0.7714	1.4529	0.0654	1.52
02:48:00	0.5696	0.0000	0.5299	1.6891	0.0673	1.76
03:00:00	0.0000	0.0000	0.0000	1.9099	0.0695	1.98
03:12:00	0.0000	0.0000	0.0000	2.1022	0.072	2.17
03:24:00	0.0000	0.0000	0.0000	2.2495	0.0748	2.32
03:36:00	0.0000	0.0000	0.0000	2.3341	0.0777	2.41
03:48:00	0.0000	0.0000	0.0000	2.3484	0.0807	2.43
04:00:00	0.0000	0.0000	0.0000	2.3058	0.0836	2.39
04:12:00	0.0000	0.0000	0.0000	2.2223	0.0864	2.31
04:24:00	0.0000	0.0000	0.0000	2.1110	0.089	2.2
04:36:00	0.0000	0.0000	0.0000	1.9814	0.0914	2.07
04:48:00	0.0000	0.0000	0.0000	1.8404	0.0936	1.93
05:00:00	0.0000	0.0000	0.0000	1.6937	0.0956	1.79
05:12:00	0.0000	0.0000	0.0000	1.5478	0.0973	1.65
05:24:00	0.0000	0.0000	0.0000	1.4103	0.0988	1.51
05:36:00	0.0000	0.0000	0.0000	1.2848	0.1	1.38
05:48:00	0.0000	0.0000	0.0000	1.1740	0.101	1.28
06:00:00	0.0000	0.0000	0.0000	1.0755	0.102	1.18
06:12:00	0.0000	0.0000	0.0000	0.9860	0.103	1.09
06:24:00	0.0000	0.0000	0.0000	0.9030	0.103	1.01
06:36:00	0.0000	0.0000	0.0000	0.8244	0.104	0.928
06:48:00	0.0000	0.0000	0.0000	0.7490	0.104	0.853

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
07:00:00	0.0000	0.0000	0.0000	0.6757	0.105	0.78
07:12:00	0.0000	0.0000	0.0000	0.6037	0.105	0.708
07:24:00	0.0000	0.0000	0.0000	0.5319	0.105	0.637
07:36:00	0.0000	0.0000	0.0000	0.4608	0.105	0.566
07:48:00	0.0000	0.0000	0.0000	0.3910	0.105	0.496
08:00:00	0.0000	0.0000	0.0000	0.3231	0.104	0.427
08:12:00	0.0000	0.0000	0.0000	0.2581	0.104	0.362
08:24:00	0.0000	0.0000	0.0000	0.1972	0.103	0.301
08:36:00	0.0000	0.0000	0.0000	0.1424	0.103	0.245
08:48:00	0.0000	0.0000	0.0000	0.0964	0.102	0.199
09:00:00	0.0000	0.0000	0.0000	0.0619	0.102	0.163
09:12:00	0.0000	0.0000	0.0000	0.0380	0.101	0.139
09:24:00	0.0000	0.0000	0.0000	0.0220	0.1	0.122
09:36:00	0.0000	0.0000	0.0000	0.0117	0.0993	0.111
09:48:00	0.0000	0.0000	0.0000	0.0054	0.0985	0.104
10:00:00	0.0000	0.0000	0.0000	0.0019	0.0978	0.0997
10:12:00	0.0000	0.0000	0.0000	0.0003	0.097	0.0973
10:24:00	0.0000	0.0000	0.0000	0.0000	0.0962	0.0962
10:36:00	0.0000	0.0000	0.0000	0.0000	0.0954	0.0954
10:48:00	0.0000	0.0000	0.0000	0.0000	0.0947	0.0947
11:00:00	0.0000	0.0000	0.0000	0.0000	0.0939	0.0939
11:12:00	0.0000	0.0000	0.0000	0.0000	0.0932	0.0932
11:24:00	0.0000	0.0000	0.0000	0.0000	0.0925	0.0925
11:36:00	0.0000	0.0000	0.0000	0.0000	0.0917	0.0917
11:48:00	0.0000	0.0000	0.0000	0.0000	0.091	0.091
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0903	0.0903
12:12:00	0.0000	0.0000	0.0000	0.0000	0.0896	0.0896
12:24:00	0.0000	0.0000	0.0000	0.0000	0.0889	0.0889
12:36:00	0.0000	0.0000	0.0000	0.0000	0.0882	0.0882
12:48:00	0.0000	0.0000	0.0000	0.0000	0.0875	0.0875
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0868	0.0868
13:12:00	0.0000	0.0000	0.0000	0.0000	0.0861	0.0861
13:24:00	0.0000	0.0000	0.0000	0.0000	0.0854	0.0854
13:36:00	0.0000	0.0000	0.0000	0.0000	0.0847	0.0847
13:48:00	0.0000	0.0000	0.0000	0.0000	0.0841	0.0841
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0834	0.0834

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
14:12:00	0.0000	0.0000	0.0000	0.0000	0.0827	0.0827
14:24:00	0.0000	0.0000	0.0000	0.0000	0.0821	0.0821
14:36:00	0.0000	0.0000	0.0000	0.0000	0.0814	0.0814
14:48:00	0.0000	0.0000	0.0000	0.0000	0.0808	0.0808
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0801	0.0801
15:12:00	0.0000	0.0000	0.0000	0.0000	0.0795	0.0795
15:24:00	0.0000	0.0000	0.0000	0.0000	0.0789	0.0789
15:36:00	0.0000	0.0000	0.0000	0.0000	0.0783	0.0783
15:48:00	0.0000	0.0000	0.0000	0.0000	0.0776	0.0776
16:00:00	0.0000	0.0000	0.0000	0.0000	0.077	0.077
16:12:00	0.0000	0.0000	0.0000	0.0000	0.0764	0.0764
16:24:00	0.0000	0.0000	0.0000	0.0000	0.0758	0.0758
16:36:00	0.0000	0.0000	0.0000	0.0000	0.0752	0.0752
16:48:00	0.0000	0.0000	0.0000	0.0000	0.0746	0.0746
17:00:00	0.0000	0.0000	0.0000	0.0000	0.074	0.074
17:12:00	0.0000	0.0000	0.0000	0.0000	0.0734	0.0734
17:24:00	0.0000	0.0000	0.0000	0.0000	0.0729	0.0729
17:36:00	0.0000	0.0000	0.0000	0.0000	0.0723	0.0723
17:48:00	0.0000	0.0000	0.0000	0.0000	0.0717	0.0717
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0711	0.0711
18:12:00	0.0000	0.0000	0.0000	0.0000	0.0706	0.0706
18:24:00	0.0000	0.0000	0.0000	0.0000	0.07	0.07
18:36:00	0.0000	0.0000	0.0000	0.0000	0.0695	0.0695
18:48:00	0.0000	0.0000	0.0000	0.0000	0.0689	0.0689
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0684	0.0684
19:12:00	0.0000	0.0000	0.0000	0.0000	0.0678	0.0678
19:24:00	0.0000	0.0000	0.0000	0.0000	0.0673	0.0673
19:36:00	0.0000	0.0000	0.0000	0.0000	0.0668	0.0668
19:48:00	0.0000	0.0000	0.0000	0.0000	0.0662	0.0662
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0657	0.0657
20:12:00	0.0000	0.0000	0.0000	0.0000	0.0652	0.0652
20:24:00	0.0000	0.0000	0.0000	0.0000	0.0647	0.0647

Appendix

Catchment descriptors

Name	Value	User-defined value used?
BFIHOST	0.24	No
BFIHOST19	0.24	No
PROPWET	0.36	No
SAAR (mm)	800	No

UK Design Flood Estimation

Generated on 23 July 2024 13:02:15 by mark
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

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

Site detailsChecksum: 36C2-5289

Site name: FEH_Point_Descriptors_526879_120879_v5_0_1

Easting: 526879

Northing: 120879

Country: England, Wales or Northern Ireland

Catchment Area (km²): 1

Using plot scale calculations: Yes

Model: 2.3

Site description:None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	69.07	Total runoff (ML):	42.38
Total Rainfall (mm):	49.55	Total flow (ML):	49.55
Peak Rainfall (mm):	8.45	Peak flow (m³/s):	2.62

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 - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:00:00 [03:30:00]	Yes
Timestep (hh:mm:ss)	00:24:00 [00:30:00]	Yes
SCF (Seasonal correction factor)	0.73	No
ARF (Areal reduction factor)	0.98	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.76	No
Cmax (mm)	203.81	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.04	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0.06	No
BL (hr)	25.18	No
BR	0.15	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m ³ /s)	0	No
Exporting drained area (km ²)	0	No
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	0.7407	0.0000	0.5529	0.0000	0.0641	0.0641
00:24:00	1.0824	0.0000	0.8128	0.0048	0.0631	0.0679
00:48:00	1.5780	0.0000	1.1952	0.0214	0.0621	0.0835
01:12:00	2.2932	0.0000	1.7588	0.0554	0.0613	0.117
01:36:00	3.3186	0.0000	2.5908	0.1150	0.0606	0.176
02:00:00	4.7707	0.0000	3.8192	0.2122	0.0601	0.272
02:24:00	6.7644	0.0000	5.6067	0.3589	0.0601	0.419
02:48:00	8.4543	0.0000	7.3229	0.5692	0.0606	0.63
03:12:00	6.7644	0.0000	6.1118	0.8650	0.0619	0.927
03:36:00	4.7707	0.0000	4.2578	1.2382	0.0643	1.3
04:00:00	3.3186	0.0000	3.0277	1.6439	0.0678	1.71
04:24:00	2.2932	0.0000	2.1238	2.0291	0.0725	2.1
04:48:00	1.5780	0.0000	1.4764	2.3381	0.0779	2.42
05:12:00	1.0824	0.0000	1.0198	2.5111	0.0837	2.59
05:36:00	0.7407	0.0000	0.7012	2.5259	0.0895	2.62
06:00:00	0.0000	0.0000	0.0000	2.4192	0.0946	2.51
06:24:00	0.0000	0.0000	0.0000	2.2317	0.0991	2.33
06:48:00	0.0000	0.0000	0.0000	1.9952	0.103	2.1
07:12:00	0.0000	0.0000	0.0000	1.7419	0.106	1.85
07:36:00	0.0000	0.0000	0.0000	1.4923	0.108	1.6
08:00:00	0.0000	0.0000	0.0000	1.2520	0.109	1.36
08:24:00	0.0000	0.0000	0.0000	1.0262	0.11	1.14
08:48:00	0.0000	0.0000	0.0000	0.8216	0.11	0.932
09:12:00	0.0000	0.0000	0.0000	0.6365	0.11	0.747
09:36:00	0.0000	0.0000	0.0000	0.4716	0.11	0.581
10:00:00	0.0000	0.0000	0.0000	0.3303	0.109	0.439
10:24:00	0.0000	0.0000	0.0000	0.2182	0.108	0.326
10:48:00	0.0000	0.0000	0.0000	0.1374	0.106	0.244
11:12:00	0.0000	0.0000	0.0000	0.0828	0.105	0.188
11:36:00	0.0000	0.0000	0.0000	0.0468	0.103	0.15
12:00:00	0.0000	0.0000	0.0000	0.0239	0.102	0.125
12:24:00	0.0000	0.0000	0.0000	0.0102	0.1	0.11
12:48:00	0.0000	0.0000	0.0000	0.0030	0.0984	0.101
13:12:00	0.0000	0.0000	0.0000	0.0002	0.0969	0.0971
13:36:00	0.0000	0.0000	0.0000	0.0000	0.0954	0.0954

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0939	0.0939
14:24:00	0.0000	0.0000	0.0000	0.0000	0.0924	0.0924
14:48:00	0.0000	0.0000	0.0000	0.0000	0.0909	0.0909
15:12:00	0.0000	0.0000	0.0000	0.0000	0.0895	0.0895
15:36:00	0.0000	0.0000	0.0000	0.0000	0.0881	0.0881
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0867	0.0867
16:24:00	0.0000	0.0000	0.0000	0.0000	0.0853	0.0853
16:48:00	0.0000	0.0000	0.0000	0.0000	0.084	0.084
17:12:00	0.0000	0.0000	0.0000	0.0000	0.0827	0.0827
17:36:00	0.0000	0.0000	0.0000	0.0000	0.0813	0.0813
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0801	0.0801
18:24:00	0.0000	0.0000	0.0000	0.0000	0.0788	0.0788
18:48:00	0.0000	0.0000	0.0000	0.0000	0.0776	0.0776
19:12:00	0.0000	0.0000	0.0000	0.0000	0.0763	0.0763
19:36:00	0.0000	0.0000	0.0000	0.0000	0.0751	0.0751
20:00:00	0.0000	0.0000	0.0000	0.0000	0.074	0.074
20:24:00	0.0000	0.0000	0.0000	0.0000	0.0728	0.0728
20:48:00	0.0000	0.0000	0.0000	0.0000	0.0716	0.0716
21:12:00	0.0000	0.0000	0.0000	0.0000	0.0705	0.0705
21:36:00	0.0000	0.0000	0.0000	0.0000	0.0694	0.0694
22:00:00	0.0000	0.0000	0.0000	0.0000	0.0683	0.0683
22:24:00	0.0000	0.0000	0.0000	0.0000	0.0672	0.0672
22:48:00	0.0000	0.0000	0.0000	0.0000	0.0662	0.0662
23:12:00	0.0000	0.0000	0.0000	0.0000	0.0651	0.0651

Appendix

Catchment descriptors

Name	Value	User-defined value used?
BFIHOST	0.24	No
BFIHOST19	0.24	No
PROPWET	0.36	No
SAAR (mm)	800	No

UK Design Flood Estimation

Generated on 23 July 2024 12:53:31 by mark
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

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

Site detailsChecksum: F72A-4CE2

Site name: FEH_Point_Descriptors_526879_120879_v5_0_1

Easting: 526879

Northing: 120879

Country: England, Wales or Northern Ireland

Catchment Area (km²): 1

Using plot scale calculations: Yes

Model: 2.3

Site description:None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	43.19	Total runoff (ML):	19.90
Total Rainfall (mm):	24.71	Total flow (ML):	24.69
Peak Rainfall (mm):	4.22	Peak flow (m³/s):	1.74

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 - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	01:00:00 [03:30:00]	Yes
Timestep (hh:mm:ss)	00:04:00 [00:30:00]	Yes
SCF (Seasonal correction factor)	0.6	No
ARF (Areal reduction factor)	0.96	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	151.76	No
Cmax (mm)	203.81	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.04	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0.06	No
BL (hr)	25.18	No
BR	0.24	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m ³ /s)	0	No
Exporting drained area (km ²)	0	No
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	0.3695	0.0000	0.2754	0.0000	0.0641	0.0641
00:04:00	0.5399	0.0000	0.4037	0.0004	0.0639	0.0643
00:08:00	0.7870	0.0000	0.5911	0.0018	0.0637	0.0655
00:12:00	1.1438	0.0000	0.8644	0.0046	0.0636	0.0682
00:16:00	1.6552	0.0000	1.2623	0.0095	0.0634	0.0729
00:20:00	2.3794	0.0000	1.8382	0.0175	0.0633	0.0807
00:24:00	3.3738	0.0000	2.6540	0.0299	0.0631	0.093
00:28:00	4.2167	0.0000	3.3955	0.0489	0.063	0.112
00:32:00	3.3738	0.0000	2.7796	0.0765	0.0628	0.139
00:36:00	2.3794	0.0000	1.9939	0.1131	0.0627	0.176
00:40:00	1.6552	0.0000	1.4034	0.1566	0.0626	0.219
00:44:00	1.1438	0.0000	0.9777	0.2050	0.0626	0.268
00:48:00	0.7870	0.0000	0.6765	0.2568	0.0626	0.319
00:52:00	0.5399	0.0000	0.4658	0.3110	0.0626	0.374
00:56:00	0.3695	0.0000	0.3196	0.3668	0.0626	0.429
01:00:00	0.0000	0.0000	0.0000	0.4238	0.0627	0.487
01:04:00	0.0000	0.0000	0.0000	0.4812	0.0629	0.544
01:08:00	0.0000	0.0000	0.0000	0.5387	0.063	0.602
01:12:00	0.0000	0.0000	0.0000	0.5961	0.0632	0.659
01:16:00	0.0000	0.0000	0.0000	0.6535	0.0634	0.717
01:20:00	0.0000	0.0000	0.0000	0.7110	0.0637	0.775
01:24:00	0.0000	0.0000	0.0000	0.7684	0.064	0.832
01:28:00	0.0000	0.0000	0.0000	0.8258	0.0644	0.89
01:32:00	0.0000	0.0000	0.0000	0.8833	0.0647	0.948
01:36:00	0.0000	0.0000	0.0000	0.9407	0.0651	1.01
01:40:00	0.0000	0.0000	0.0000	0.9982	0.0656	1.06
01:44:00	0.0000	0.0000	0.0000	1.0556	0.0661	1.12
01:48:00	0.0000	0.0000	0.0000	1.1130	0.0666	1.18
01:52:00	0.0000	0.0000	0.0000	1.1705	0.0672	1.24
01:56:00	0.0000	0.0000	0.0000	1.2279	0.0677	1.3
02:00:00	0.0000	0.0000	0.0000	1.2853	0.0684	1.35
02:04:00	0.0000	0.0000	0.0000	1.3427	0.069	1.41
02:08:00	0.0000	0.0000	0.0000	1.3990	0.0697	1.47
02:12:00	0.0000	0.0000	0.0000	1.4535	0.0704	1.52
02:16:00	0.0000	0.0000	0.0000	1.5054	0.0712	1.58

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
02:20:00	0.0000	0.0000	0.0000	1.5535	0.072	1.63
02:24:00	0.0000	0.0000	0.0000	1.5960	0.0728	1.67
02:28:00	0.0000	0.0000	0.0000	1.6303	0.0737	1.7
02:32:00	0.0000	0.0000	0.0000	1.6531	0.0745	1.73
02:36:00	0.0000	0.0000	0.0000	1.6611	0.0754	1.74
02:40:00	0.0000	0.0000	0.0000	1.6562	0.0762	1.73
02:44:00	0.0000	0.0000	0.0000	1.6415	0.0771	1.72
02:48:00	0.0000	0.0000	0.0000	1.6201	0.0779	1.7
02:52:00	0.0000	0.0000	0.0000	1.5938	0.0787	1.67
02:56:00	0.0000	0.0000	0.0000	1.5643	0.0795	1.64
03:00:00	0.0000	0.0000	0.0000	1.5325	0.0803	1.61
03:04:00	0.0000	0.0000	0.0000	1.4992	0.0811	1.58
03:08:00	0.0000	0.0000	0.0000	1.4655	0.0818	1.55
03:12:00	0.0000	0.0000	0.0000	1.4319	0.0825	1.51
03:16:00	0.0000	0.0000	0.0000	1.3983	0.0832	1.48
03:20:00	0.0000	0.0000	0.0000	1.3647	0.0839	1.45
03:24:00	0.0000	0.0000	0.0000	1.3311	0.0845	1.42
03:28:00	0.0000	0.0000	0.0000	1.2975	0.0851	1.38
03:32:00	0.0000	0.0000	0.0000	1.2639	0.0857	1.35
03:36:00	0.0000	0.0000	0.0000	1.2303	0.0863	1.32
03:40:00	0.0000	0.0000	0.0000	1.1967	0.0868	1.28
03:44:00	0.0000	0.0000	0.0000	1.1630	0.0874	1.25
03:48:00	0.0000	0.0000	0.0000	1.1294	0.0879	1.22
03:52:00	0.0000	0.0000	0.0000	1.0958	0.0884	1.18
03:56:00	0.0000	0.0000	0.0000	1.0622	0.0888	1.15
04:00:00	0.0000	0.0000	0.0000	1.0286	0.0892	1.12
04:04:00	0.0000	0.0000	0.0000	0.9950	0.0897	1.08
04:08:00	0.0000	0.0000	0.0000	0.9614	0.09	1.05
04:12:00	0.0000	0.0000	0.0000	0.9282	0.0904	1.02
04:16:00	0.0000	0.0000	0.0000	0.8953	0.0908	0.986
04:20:00	0.0000	0.0000	0.0000	0.8631	0.0911	0.954
04:24:00	0.0000	0.0000	0.0000	0.8318	0.0914	0.923
04:28:00	0.0000	0.0000	0.0000	0.8018	0.0917	0.893
04:32:00	0.0000	0.0000	0.0000	0.7737	0.0919	0.866
04:36:00	0.0000	0.0000	0.0000	0.7483	0.0922	0.84
04:40:00	0.0000	0.0000	0.0000	0.7259	0.0924	0.818

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
04:44:00	0.0000	0.0000	0.0000	0.7059	0.0926	0.798
04:48:00	0.0000	0.0000	0.0000	0.6876	0.0928	0.78
04:52:00	0.0000	0.0000	0.0000	0.6706	0.093	0.764
04:56:00	0.0000	0.0000	0.0000	0.6544	0.0932	0.748
05:00:00	0.0000	0.0000	0.0000	0.6389	0.0933	0.732
05:04:00	0.0000	0.0000	0.0000	0.6237	0.0935	0.717
05:08:00	0.0000	0.0000	0.0000	0.6088	0.0936	0.702
05:12:00	0.0000	0.0000	0.0000	0.5938	0.0938	0.688
05:16:00	0.0000	0.0000	0.0000	0.5789	0.0939	0.673
05:20:00	0.0000	0.0000	0.0000	0.5640	0.094	0.658
05:24:00	0.0000	0.0000	0.0000	0.5491	0.0941	0.643
05:28:00	0.0000	0.0000	0.0000	0.5341	0.0942	0.628
05:32:00	0.0000	0.0000	0.0000	0.5192	0.0943	0.614
05:36:00	0.0000	0.0000	0.0000	0.5043	0.0944	0.599
05:40:00	0.0000	0.0000	0.0000	0.4894	0.0945	0.584
05:44:00	0.0000	0.0000	0.0000	0.4744	0.0945	0.569
05:48:00	0.0000	0.0000	0.0000	0.4595	0.0946	0.554
05:52:00	0.0000	0.0000	0.0000	0.4446	0.0946	0.539
05:56:00	0.0000	0.0000	0.0000	0.4296	0.0946	0.524
06:00:00	0.0000	0.0000	0.0000	0.4147	0.0947	0.509
06:04:00	0.0000	0.0000	0.0000	0.3998	0.0947	0.494
06:08:00	0.0000	0.0000	0.0000	0.3849	0.0947	0.48
06:12:00	0.0000	0.0000	0.0000	0.3699	0.0947	0.465
06:16:00	0.0000	0.0000	0.0000	0.3550	0.0946	0.45
06:20:00	0.0000	0.0000	0.0000	0.3401	0.0946	0.435
06:24:00	0.0000	0.0000	0.0000	0.3252	0.0946	0.42
06:28:00	0.0000	0.0000	0.0000	0.3102	0.0945	0.405
06:32:00	0.0000	0.0000	0.0000	0.2953	0.0945	0.39
06:36:00	0.0000	0.0000	0.0000	0.2804	0.0944	0.375
06:40:00	0.0000	0.0000	0.0000	0.2655	0.0943	0.36
06:44:00	0.0000	0.0000	0.0000	0.2505	0.0942	0.345
06:48:00	0.0000	0.0000	0.0000	0.2356	0.0942	0.33
06:52:00	0.0000	0.0000	0.0000	0.2207	0.094	0.315
06:56:00	0.0000	0.0000	0.0000	0.2057	0.0939	0.3
07:00:00	0.0000	0.0000	0.0000	0.1908	0.0938	0.285
07:04:00	0.0000	0.0000	0.0000	0.1759	0.0937	0.27

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
07:08:00	0.0000	0.0000	0.0000	0.1610	0.0935	0.255
07:12:00	0.0000	0.0000	0.0000	0.1460	0.0934	0.239
07:16:00	0.0000	0.0000	0.0000	0.1311	0.0932	0.224
07:20:00	0.0000	0.0000	0.0000	0.1162	0.0931	0.209
07:24:00	0.0000	0.0000	0.0000	0.1013	0.0929	0.194
07:28:00	0.0000	0.0000	0.0000	0.0867	0.0927	0.179
07:32:00	0.0000	0.0000	0.0000	0.0724	0.0925	0.165
07:36:00	0.0000	0.0000	0.0000	0.0587	0.0923	0.151
07:40:00	0.0000	0.0000	0.0000	0.0457	0.0921	0.138
07:44:00	0.0000	0.0000	0.0000	0.0338	0.0919	0.126
07:48:00	0.0000	0.0000	0.0000	0.0235	0.0917	0.115
07:52:00	0.0000	0.0000	0.0000	0.0153	0.0914	0.107
07:56:00	0.0000	0.0000	0.0000	0.0096	0.0912	0.101
08:00:00	0.0000	0.0000	0.0000	0.0057	0.091	0.0966
08:04:00	0.0000	0.0000	0.0000	0.0031	0.0907	0.0939
08:08:00	0.0000	0.0000	0.0000	0.0016	0.0905	0.092
08:12:00	0.0000	0.0000	0.0000	0.0006	0.0902	0.0909
08:16:00	0.0000	0.0000	0.0000	0.0002	0.09	0.0902
08:20:00	0.0000	0.0000	0.0000	0.0000	0.0898	0.0898
08:24:00	0.0000	0.0000	0.0000	0.0000	0.0895	0.0895
08:28:00	0.0000	0.0000	0.0000	0.0000	0.0893	0.0893
08:32:00	0.0000	0.0000	0.0000	0.0000	0.0891	0.0891
08:36:00	0.0000	0.0000	0.0000	0.0000	0.0888	0.0888
08:40:00	0.0000	0.0000	0.0000	0.0000	0.0886	0.0886
08:44:00	0.0000	0.0000	0.0000	0.0000	0.0884	0.0884
08:48:00	0.0000	0.0000	0.0000	0.0000	0.0881	0.0881
08:52:00	0.0000	0.0000	0.0000	0.0000	0.0879	0.0879
08:56:00	0.0000	0.0000	0.0000	0.0000	0.0877	0.0877
09:00:00	0.0000	0.0000	0.0000	0.0000	0.0874	0.0874
09:04:00	0.0000	0.0000	0.0000	0.0000	0.0872	0.0872
09:08:00	0.0000	0.0000	0.0000	0.0000	0.087	0.087
09:12:00	0.0000	0.0000	0.0000	0.0000	0.0867	0.0867
09:16:00	0.0000	0.0000	0.0000	0.0000	0.0865	0.0865
09:20:00	0.0000	0.0000	0.0000	0.0000	0.0863	0.0863
09:24:00	0.0000	0.0000	0.0000	0.0000	0.086	0.086
09:28:00	0.0000	0.0000	0.0000	0.0000	0.0858	0.0858

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
09:32:00	0.0000	0.0000	0.0000	0.0000	0.0856	0.0856
09:36:00	0.0000	0.0000	0.0000	0.0000	0.0854	0.0854
09:40:00	0.0000	0.0000	0.0000	0.0000	0.0851	0.0851
09:44:00	0.0000	0.0000	0.0000	0.0000	0.0849	0.0849
09:48:00	0.0000	0.0000	0.0000	0.0000	0.0847	0.0847
09:52:00	0.0000	0.0000	0.0000	0.0000	0.0845	0.0845
09:56:00	0.0000	0.0000	0.0000	0.0000	0.0842	0.0842
10:00:00	0.0000	0.0000	0.0000	0.0000	0.084	0.084
10:04:00	0.0000	0.0000	0.0000	0.0000	0.0838	0.0838
10:08:00	0.0000	0.0000	0.0000	0.0000	0.0836	0.0836
10:12:00	0.0000	0.0000	0.0000	0.0000	0.0834	0.0834
10:16:00	0.0000	0.0000	0.0000	0.0000	0.0831	0.0831
10:20:00	0.0000	0.0000	0.0000	0.0000	0.0829	0.0829
10:24:00	0.0000	0.0000	0.0000	0.0000	0.0827	0.0827
10:28:00	0.0000	0.0000	0.0000	0.0000	0.0825	0.0825
10:32:00	0.0000	0.0000	0.0000	0.0000	0.0823	0.0823
10:36:00	0.0000	0.0000	0.0000	0.0000	0.082	0.082
10:40:00	0.0000	0.0000	0.0000	0.0000	0.0818	0.0818
10:44:00	0.0000	0.0000	0.0000	0.0000	0.0816	0.0816
10:48:00	0.0000	0.0000	0.0000	0.0000	0.0814	0.0814
10:52:00	0.0000	0.0000	0.0000	0.0000	0.0812	0.0812
10:56:00	0.0000	0.0000	0.0000	0.0000	0.081	0.081
11:00:00	0.0000	0.0000	0.0000	0.0000	0.0807	0.0807
11:04:00	0.0000	0.0000	0.0000	0.0000	0.0805	0.0805
11:08:00	0.0000	0.0000	0.0000	0.0000	0.0803	0.0803
11:12:00	0.0000	0.0000	0.0000	0.0000	0.0801	0.0801
11:16:00	0.0000	0.0000	0.0000	0.0000	0.0799	0.0799
11:20:00	0.0000	0.0000	0.0000	0.0000	0.0797	0.0797
11:24:00	0.0000	0.0000	0.0000	0.0000	0.0795	0.0795
11:28:00	0.0000	0.0000	0.0000	0.0000	0.0793	0.0793
11:32:00	0.0000	0.0000	0.0000	0.0000	0.0791	0.0791
11:36:00	0.0000	0.0000	0.0000	0.0000	0.0788	0.0788
11:40:00	0.0000	0.0000	0.0000	0.0000	0.0786	0.0786
11:44:00	0.0000	0.0000	0.0000	0.0000	0.0784	0.0784
11:48:00	0.0000	0.0000	0.0000	0.0000	0.0782	0.0782
11:52:00	0.0000	0.0000	0.0000	0.0000	0.078	0.078

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
11:56:00	0.0000	0.0000	0.0000	0.0000	0.0778	0.0778
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0776	0.0776
12:04:00	0.0000	0.0000	0.0000	0.0000	0.0774	0.0774
12:08:00	0.0000	0.0000	0.0000	0.0000	0.0772	0.0772
12:12:00	0.0000	0.0000	0.0000	0.0000	0.077	0.077
12:16:00	0.0000	0.0000	0.0000	0.0000	0.0768	0.0768
12:20:00	0.0000	0.0000	0.0000	0.0000	0.0766	0.0766
12:24:00	0.0000	0.0000	0.0000	0.0000	0.0764	0.0764
12:28:00	0.0000	0.0000	0.0000	0.0000	0.0762	0.0762
12:32:00	0.0000	0.0000	0.0000	0.0000	0.076	0.076
12:36:00	0.0000	0.0000	0.0000	0.0000	0.0758	0.0758
12:40:00	0.0000	0.0000	0.0000	0.0000	0.0756	0.0756
12:44:00	0.0000	0.0000	0.0000	0.0000	0.0754	0.0754
12:48:00	0.0000	0.0000	0.0000	0.0000	0.0752	0.0752
12:52:00	0.0000	0.0000	0.0000	0.0000	0.075	0.075
12:56:00	0.0000	0.0000	0.0000	0.0000	0.0748	0.0748
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0746	0.0746
13:04:00	0.0000	0.0000	0.0000	0.0000	0.0744	0.0744
13:08:00	0.0000	0.0000	0.0000	0.0000	0.0742	0.0742
13:12:00	0.0000	0.0000	0.0000	0.0000	0.074	0.074
13:16:00	0.0000	0.0000	0.0000	0.0000	0.0738	0.0738
13:20:00	0.0000	0.0000	0.0000	0.0000	0.0736	0.0736
13:24:00	0.0000	0.0000	0.0000	0.0000	0.0734	0.0734
13:28:00	0.0000	0.0000	0.0000	0.0000	0.0732	0.0732
13:32:00	0.0000	0.0000	0.0000	0.0000	0.073	0.073
13:36:00	0.0000	0.0000	0.0000	0.0000	0.0728	0.0728
13:40:00	0.0000	0.0000	0.0000	0.0000	0.0726	0.0726
13:44:00	0.0000	0.0000	0.0000	0.0000	0.0724	0.0724
13:48:00	0.0000	0.0000	0.0000	0.0000	0.0722	0.0722
13:52:00	0.0000	0.0000	0.0000	0.0000	0.0721	0.0721
13:56:00	0.0000	0.0000	0.0000	0.0000	0.0719	0.0719
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0717	0.0717
14:04:00	0.0000	0.0000	0.0000	0.0000	0.0715	0.0715
14:08:00	0.0000	0.0000	0.0000	0.0000	0.0713	0.0713
14:12:00	0.0000	0.0000	0.0000	0.0000	0.0711	0.0711
14:16:00	0.0000	0.0000	0.0000	0.0000	0.0709	0.0709

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m ³ /s)	Net Rain (mm)	Runoff (m ³ /s)	Baseflow (m ³ /s)	Total Flow (m ³ /s)
14:20:00	0.0000	0.0000	0.0000	0.0000	0.0707	0.0707
14:24:00	0.0000	0.0000	0.0000	0.0000	0.0705	0.0705
14:28:00	0.0000	0.0000	0.0000	0.0000	0.0704	0.0704
14:32:00	0.0000	0.0000	0.0000	0.0000	0.0702	0.0702
14:36:00	0.0000	0.0000	0.0000	0.0000	0.07	0.07
14:40:00	0.0000	0.0000	0.0000	0.0000	0.0698	0.0698
14:44:00	0.0000	0.0000	0.0000	0.0000	0.0696	0.0696
14:48:00	0.0000	0.0000	0.0000	0.0000	0.0694	0.0694
14:52:00	0.0000	0.0000	0.0000	0.0000	0.0692	0.0692
14:56:00	0.0000	0.0000	0.0000	0.0000	0.0691	0.0691
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0689	0.0689
15:04:00	0.0000	0.0000	0.0000	0.0000	0.0687	0.0687
15:08:00	0.0000	0.0000	0.0000	0.0000	0.0685	0.0685
15:12:00	0.0000	0.0000	0.0000	0.0000	0.0683	0.0683
15:16:00	0.0000	0.0000	0.0000	0.0000	0.0682	0.0682
15:20:00	0.0000	0.0000	0.0000	0.0000	0.068	0.068
15:24:00	0.0000	0.0000	0.0000	0.0000	0.0678	0.0678
15:28:00	0.0000	0.0000	0.0000	0.0000	0.0676	0.0676
15:32:00	0.0000	0.0000	0.0000	0.0000	0.0674	0.0674
15:36:00	0.0000	0.0000	0.0000	0.0000	0.0673	0.0673
15:40:00	0.0000	0.0000	0.0000	0.0000	0.0671	0.0671
15:44:00	0.0000	0.0000	0.0000	0.0000	0.0669	0.0669
15:48:00	0.0000	0.0000	0.0000	0.0000	0.0667	0.0667
15:52:00	0.0000	0.0000	0.0000	0.0000	0.0666	0.0666
15:56:00	0.0000	0.0000	0.0000	0.0000	0.0664	0.0664
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0662	0.0662
16:04:00	0.0000	0.0000	0.0000	0.0000	0.066	0.066
16:08:00	0.0000	0.0000	0.0000	0.0000	0.0659	0.0659
16:12:00	0.0000	0.0000	0.0000	0.0000	0.0657	0.0657
16:16:00	0.0000	0.0000	0.0000	0.0000	0.0655	0.0655
16:20:00	0.0000	0.0000	0.0000	0.0000	0.0653	0.0653
16:24:00	0.0000	0.0000	0.0000	0.0000	0.0652	0.0652
16:28:00	0.0000	0.0000	0.0000	0.0000	0.065	0.065
16:32:00	0.0000	0.0000	0.0000	0.0000	0.0648	0.0648
16:36:00	0.0000	0.0000	0.0000	0.0000	0.0646	0.0646
16:40:00	0.0000	0.0000	0.0000	0.0000	0.0645	0.0645

Appendix

Catchment descriptors

Name	Value	User-defined value used?
BFIHOST	0.24	No
BFIHOST19	0.24	No
PROPWET	0.36	No
SAAR (mm)	800	No