Appendix E Anglian Water Records and Correspondence

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Date: 17/09/19 | Scale: 1:1250 | Map Centre: 542651,258436 | Data updated: 02/09/19 | Our Ref: 333447 - 2 | Wastewater Plan A0

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2019 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

mhartley@peterbrett.com
BRLOG

love every drop anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
1701	543154	258709	F	-	-	-
2000	543288	258041	F	10.8	8.4	2.4
2601	543245	258694	F	-	-	-
2901	543294	257968	F	10.58	8.37	2.21
2902	543250	257984	F	11.2	8.1	3.1
3001	543342	258032	F	10.49	8.6	1.89
3601	543339	258684	F	-	-	-
3901	543364	257959	F	9.85	8.67	1.18
1751	543190	258739	S	13.41	12.08	1.33
1752	543186	258717	S	13.29	12	1.29
1753	543177	258719	S	13.46	11.79	1.67
2052	543290	258044	S	10.83	9.49	1.34
2053	543239	258019	S	11.18	9.815	1.365
2751	543204	258799	S	13.89	-	-
2851	543213	258839	S	14.2	12.48	1.72
2951	543253	257982	S	11.124	9.909	1.215
2952	543287	257968	S	10.568	9.398	1.17
2952	543232	258914	S	14.79	12.77	2.02
2953	543242	258912	S	14.62	12.95	1.67
3051	543341	258034	S	10.51	9.18	1.33
3951	543350	257960	S	9.981	8.771	1.21

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

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This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2019 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer		Outfall*		Sewage Treatment Works	
Surface Sewer		Inlet*		Public Pumping Station	
Combined Sewer		Manhole*		Decommissioned Pumping Station	
Final Effluent					
Rising Main*					
Private Sewer*					
Decommissioned Sewer*					

*(Colour denotes effluent type)

mhartley@peterbrett.com
LRLOG 3

love every drop
anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
2601	543299	257671	F	10.17	7.86	2.31
2602	543286	257687	F	10.25	7.64	2.61
2702	543291	257790	F	9.61	6.62	2.99
2703	543282	257769	F	9.85	6.46	3.39
2704	543279	257711	F	9.96	7.43	2.53
2801	543224	257801	F	9.72	7.11	2.61
2802	543224	257879	F	10.86	7.67	3.19
2901	543294	257968	F	10.58	8.37	2.21
2902	543250	257984	F	11.2	8.1	3.1
2903	543264	257901	F	10.63	7.93	2.7
2904	543229	257908	F	11.14	7.78	3.36
3603	543307	257644	F	9.75	7.76	1.99
2751	543294	257798	S	9.646	7.647	1.999
2752	543273	257751	S	9.974	7.703	2.271
2851	543234	257870	S	10.736	9.116	1.62
2852	543232	257809	S	9.883	8.528	1.355
2853	543285	257896	S	10.297	9.097	1.2
2951	543253	257982	S	11.124	9.909	1.215
2952	543287	257968	S	10.568	9.398	1.17
2953	543232	257947	S	11.358	9.493	1.865

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

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Data updated: 02/09/19

Scale: 1:1250 | Date: 17/09/19 | Wastewater Plan A1

Map Centre: 543723,258476 | Our Ref: 333447 - 4 | Powered by digdat

Foul Sewer	Outfall*	Sewage Treatment Works	
Surface Sewer	Inlet*	Public Pumping Station	
Combined Sewer	Manhole*	Decommissioned Pumping Station	
Final Effluent Sewer			
Rising Main*			
Private Sewer*			
Decommissioned Sewer*			

*(Colour denotes effluent type)

mhartley@peterbrett.com

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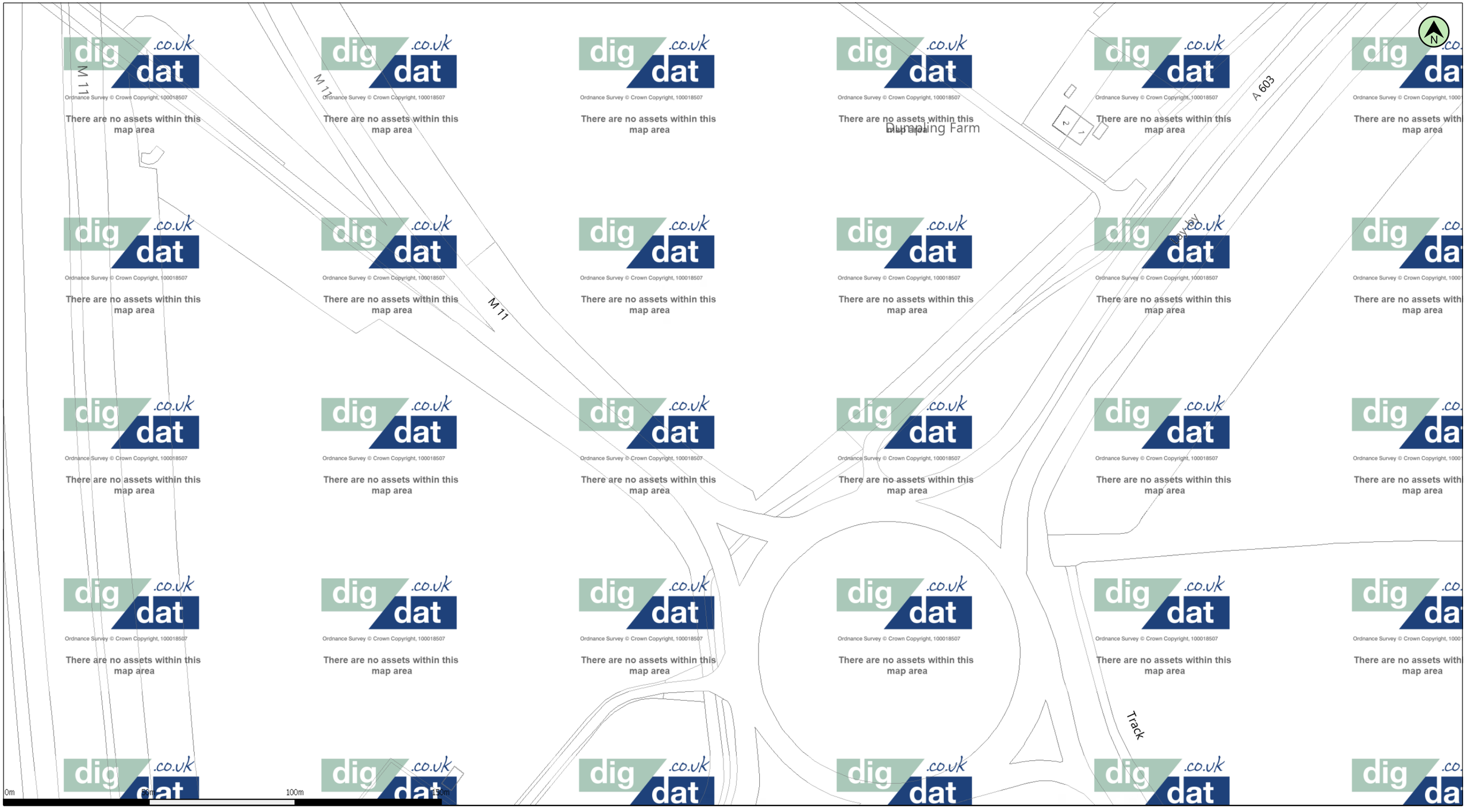
Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0000	544039	258073	F	-	-	-
0001	544023	258074	F	-	-	-
0002	544002	258075	F	-	-	-
0003	544013	258074	F	-	-	-
0004	544049	258073	F	-	-	-
0006	544066	258027	F	-	-	-
0010	544054	258083	F	-	-	-
0011	544054	258073	F	-	-	-
0012	544054	258090	F	-	-	-
0013	544055	258097	F	-	-	-
0101	544074	258140	F	-	-	-
0102	544055	258109	F	-	-	-
0104	544075	258111	F	-	-	-
0601	544007	258634	F	9.3	8.25	1.05
0602	544011	258687	F	9.06	6.57	2.49
0801	544019	258825	F	11.98	6.93	5.05
0802	544013	258848	F	12.24	10.52	1.72
4001	543411	258027	F	10	8.81	1.19
4601	543431	258675	F	-	-	-
5101	543591	258108	F	10.66	9.15	1.51
5501	543520	258587	F	13.868	10.496	3.372
5502	543524	258582	F	13.908	11.814	2.094
5503	543572	258575	F	13.454	-	-
5601	543534	258650	F	12.646	10.428	2.218
5602	543538	258664	F	12.335	9.68	2.655
5603	543522	258662	F	-	-	-
5604	543533	258656	F	10.963	1.663	9.3
5701	543554	258736	F	11.18	9.39	1.79
5702	543561	258762	F	11.449	1.308	10.141
5801	543573	258835	F	11.23	9.02	2.21
5802	543585	258876	F	12.076	0.915	11.161
5902	543597	258930	F	11.732	8.797	2.935
6001	543665	258097	F	10.64	8.61	2.03
6301	543687	258359	F	9.1	7.31	1.79
6501	543622	258565	F	13.115	10.766	2.349
6502	543672	258555	F	12.743	10.247	2.496
6903	543651	258912	F	11.043	8.251	2.792
7001	543739	258085	F	10.63	8.14	2.49
7301	543749	258347	F	8.86	6.94	1.92
7401	543701	258441	F	10.26	8.53	1.73
7501	543717	258522	F	11.762	9.991	1.771
7502	543720	258546	F	12.36	9.821	2.539
7503	543790	258534	F	11.707	9.25	2.457
7504	543722	258523	F	-	-	-
7801	543705	258893	F	10.717	7.809	2.908
8001	543856	258067	F	10.63	7.38	3.25
8301	543887	258323	F	9.89	6.25	3.64
8501	543860	258522	F	10.927	8.793	2.134
8700	543846	258770	F	-	-	-
8801	543811	258856	F	10.63	7.72	2.91
8802	543864	258836	F	10.93	7.641	3.289
8804	543882	258835	F	11.09	7.52	3.57
8805	543825	258853	F	10.69	7.71	2.98
8806	543815	258853	F	10.59	7.73	2.86
8807	543886	258830	F	11.24	7.5	3.74
8808	543853	258831	F	-	-	-
9001	543976	258049	F	10.75	6.42	4.33
9004	543985	258051	F	-	-	-
9007	543986	258075	F	-	-	-
9101	543983	258131	F	10.47	5.02	5.45
9201	543986	258213	F	10.22	5.35	4.87
9301	543995	258399	F	9.17	6.63	2.54
9302	543990	258305	F	9.95	5.5	4.45
9401	543999	258495	F	9.24	7.46	1.78
9402	543997	258440	F	9.07	6.87	2.2
9501	543931	258509	F	9.997	8.221	1.776
9801	543940	258828	F	12.15	7.28	4.87
9802	543938	258826	F	-	-	-
0151	544043	258138	S	9.91	9.14	0.77
0651	544011	258690	S	9.63	7.42	2.21
0652	544009	258639	S	-	-	-
0851	544017	258828	S	11.99	7.93	4.06
4051	543405	258029	S	10.09	8.63	1.46
5651	543533	258632	S	13.03	11.125	1.905
5751	543554	258724	S	11.3	9.833	1.467
5752	543564	258759	S	10.954	9.214	1.74
5851	543590	258879	S	11.431	9.896	1.535
6051	543665	258094	S	10.58	8.44	2.14
6352	543693	258376	S	9.29	7.05	2.24
6551	543656	258556	S	12.86	11.69	1.17
6952	543657	258911	S	11.351	9.891	1.46
7051	543750	258081	S	10.58	8.77	1.81
7351	543759	258344	S	8.99	7.49	1.5
7451	543706	258450	S	-	-	-
7452	543707	258458	S	10.55	9.45	1.1
7551	543717	258543	S	12.4	11.14	1.26
7552	543719	258521	S	11.81	10.68	1.13
7851	543734	258885	S	10.921	9.421	1.5
8051	543837	258068	S	10.54	9.13	1.41
8351	543891	258320	S	9.98	8.87	1.11
8551	543819	258526	S	11.33	10.23	1.1
8552	543862	258519	S	10.78	9.76	1.02
8751	543846	258788	S	11.34	10.72	0.62
8852	543852	258836	S	10.79	8.95	1.84
8853	543806	258859	S	10.64	7.95	2.69
8855	543802	258859	S	10.65	8.88	1.77
8857	543808	258858	S	10.6	9.01	1.59
8858	543852	258842	S	-	-	-
8859	543807	258863	S	10.66	7.89	2.77
8860	543886	258831	S	11.24	7.82	3.42
8861	543819	258853	S	10.6	9.01	1.59
8951	543823	258943	S	11.297	8	3.297
9052	543922	258055	S	10.63	9.53	1.1
9053	543974	258053	S	10.74	9.17	1.57
9054	543978	258028	S	10.534	-	-
9151	543980	258132	S	10.46	8.64	1.82
9251	543984	258220	S	10.19	7.96	2.23
9351	543989	258307	S	9.93	7.37	2.56
9352	543989	258313	S	9.89	7.33	2.56

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert



dig .co.uk dat
Ordnance Survey © Crown Copyright, 100018507
There are no assets within this map area

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This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2019 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

- Foul Sewer
- Surface Sewer
- Combined Sewer
- Final Effluent
- Rising Main*
- Private Sewer*
- Decommissioned Sewer*
- Outfall*
- Inlet*
- Manhole*
- Sewage Treatment Works
- Public Pumping Station
- Decommissioned Pumping Station

*(Colour denotes effluent type)

mhartley@peterbrett.com

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Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Hartley, Michael

From: Planning Liaison <planningliaison@anglianwater.co.uk>
Sent: 23 September 2019 10:45
To: Hartley, Michael
Subject: RE: Request for Flood Data: Land North of Barton Road, Cambridge

Dear Mr Hartley

Thank you for your email for request for Flood Data: Land North of Barton Road, Cambridge

Anglian Water is able to confirm that we have no records of flooding in the vicinity that can be attributed to capacity limitations in the public sewerage system. It is possible that other flooding may have occurred that we do not have records of, other organisations such as the Local Authority, Internal Drainage Board or the Environment Agency may have records

Regards

Sandra Olim
Pre-Development Advisor
Development Services
Anglian Water Services Limited
Telephone Office: 03456066087 Option 1
Thorpe Wood House, Thorpe Wood, Peterborough, PE3 6WT
https://www.anglianwater.co.uk/developers/pre-development.aspx

From: Hartley, Michael [mailto:michael.hartley@stantec.com]
Sent: 11 September 2019 10:02
To: Planning Liaison
Subject: Request for Flood Data: Land North of Barton Road, Cambridge

EXTERNAL MAIL **- Please be aware this mail is from an external sender - THINK BEFORE YOU CLICK**

Dear Sir/Madam

PBA, part of Stantec has been commissioned to undertake a Flood Risk and Drainage Appraisal at Land North of Barton Road, Cambridge (National Grid Ref: 542248E, 257560N). Nearest post code: CB23 7AU. A site location plan is attached.

Could you please provide us with any information in your possession regarding any incidences of, or possible problems with, flooding associated with your foul, surface water and land drainage in the area of the site?

Kind regards,

Michael Hartley
Assistant Engineer

[redacted]
Cambridge

Address: 3rd Floor, 50-60 Station Road, Cambridge, CB1 2JH
Main Tel: 01223 882000

PBA has joined the Stantec family, find out more at peterbrett.com.

--*----*----*----*----*----*----*----*----*----*----*----*----*----*----*---*----*---
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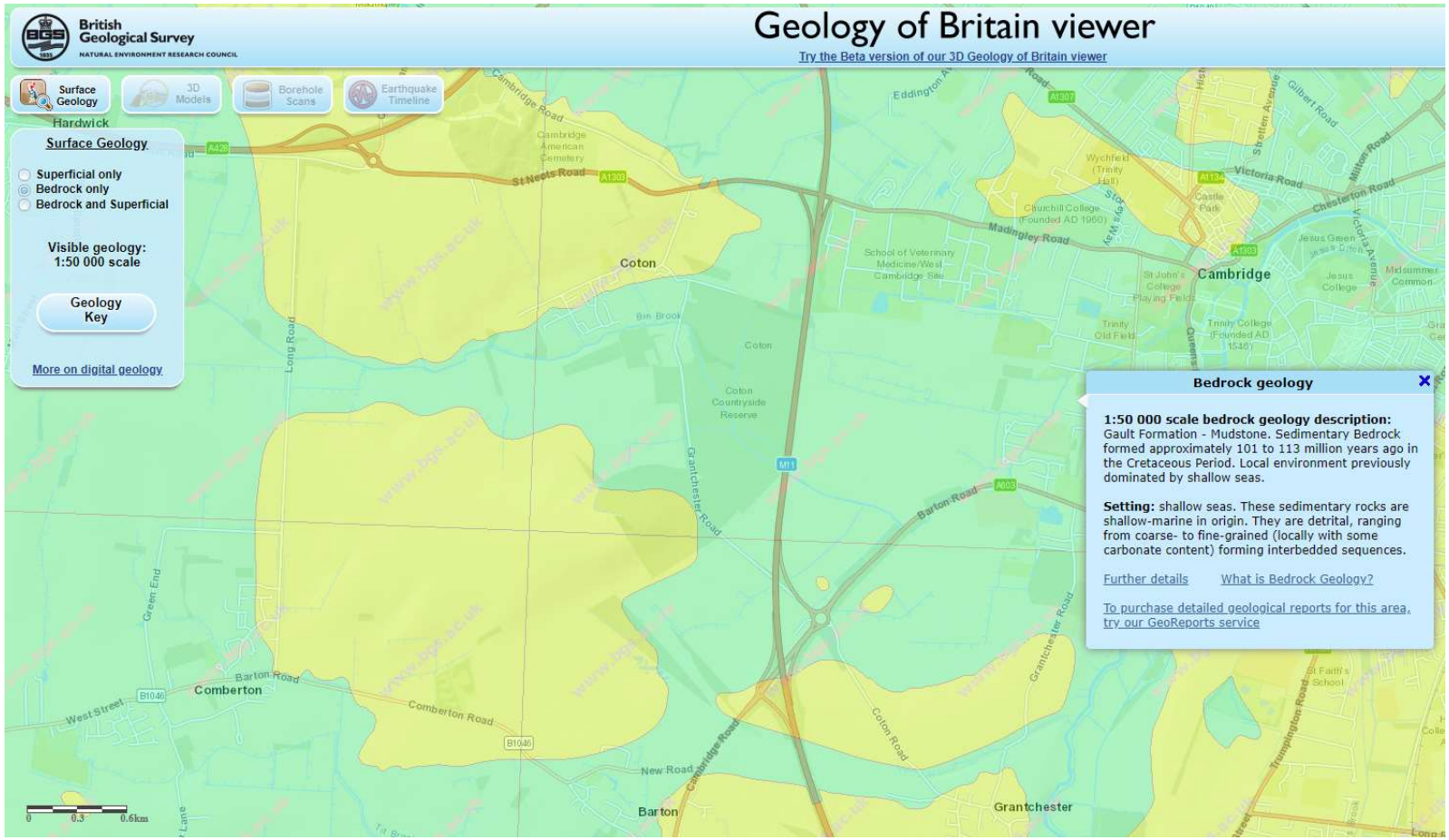
Appendix F Geological Information

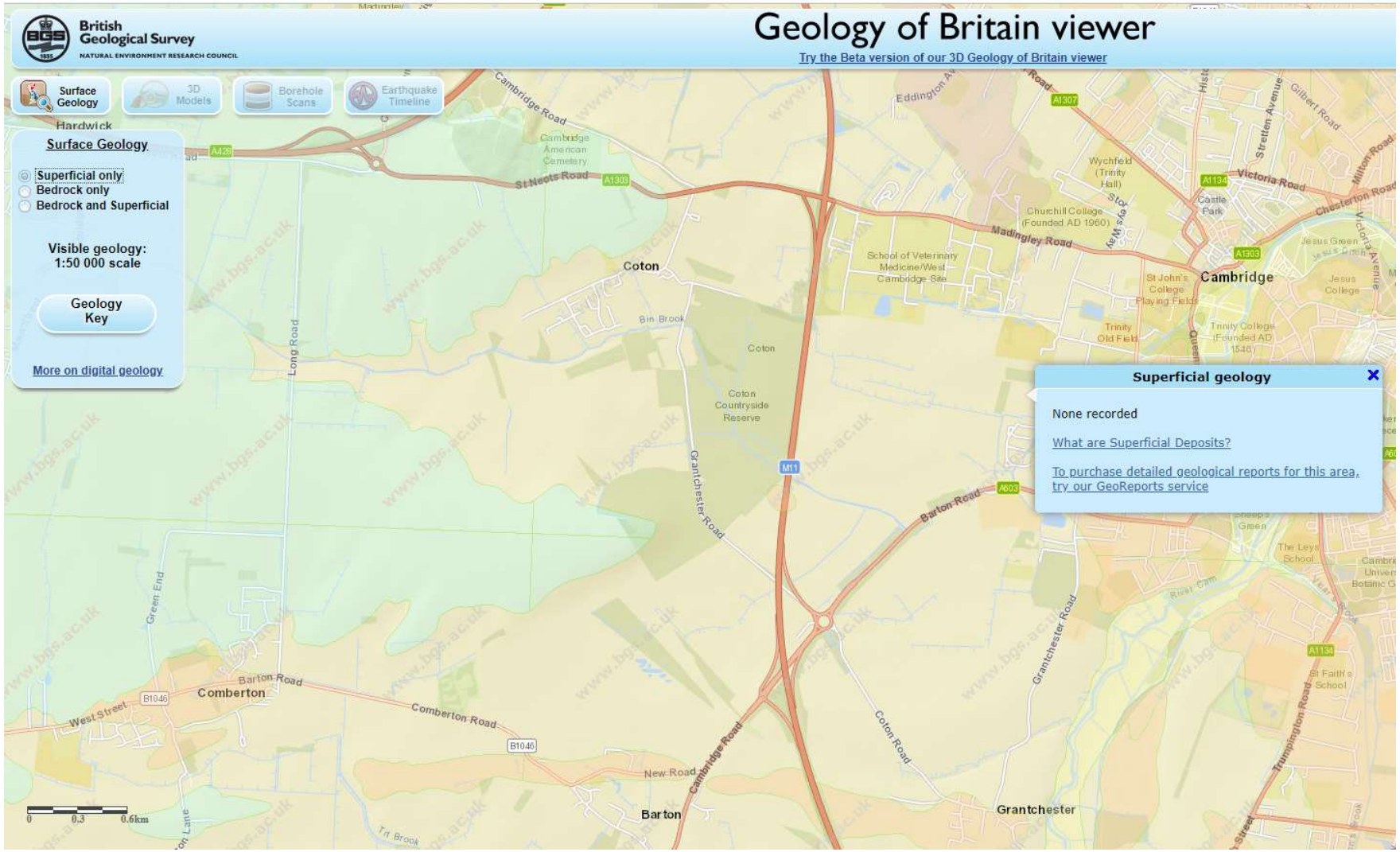
Geology Map Extracts

Extracts taken British Geological Survey website: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Bedrock Geology



Superficial Geological Deposits



Borehole logs

Logs taken British Geological Survey website: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

TL 45NW 181

4319 5829

HOLST & CO. LTD.
SITE INVESTIGATION DEPT.
PARKSIDE LANE
LEEDS LS11 5SX.

Contract No. W3307/F1502. Borehole No. 5.
Location Cambridge. Ground Level
Client Cambridge City Engineer. Date

BOREHOLE LOG

STRATA	Legend	Depth below Ground Level	Thickness of Strata	Type of Sample	c kN/sq.m	ø deg.	m.c %	γ kg/cu m	N
Top Soil.		0.38m	0.38m						
Stiff grey weathered silty fissured clay.			2.82m						
				2.74m					
				[]	96	0	29.0	1920	
		3.20m							

Water Struck at None Encountered. Maximum Observed Water Level

Undisturbed Sample []
Disturbed Sample o
Water Sample á
Penetration Test I

c = Cohesion
ø = Angle of Internal Friction
m.c = Moisture Content
γ = Bulk Density
N = Standard Penetration Value

Water levels are subject to seasonal or tidal variation and should not be taken as constant.

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Version 2.0.0
BGS ID: 542546 : BGS Reference: TL45NW205
British National Grid (27700) : 542000,257000
Report an issue with this borehole
<< < Prev Page 2 of 4 Next > >>

A TL 4200 5711
B TL 420 570

205/318 **Dumpling Farm, Barton Road, Grantchester.** (Disused)

TL 45/22
A & B

(a) Surface +45. Shaft 28½; rest bore. R.W.L. +37. *Date unknown.* Handpump. *Before May 1960.*

G	...	...	120	120
LGS	...	...	touched	

TL 45 NW/139

TL 4196 5674

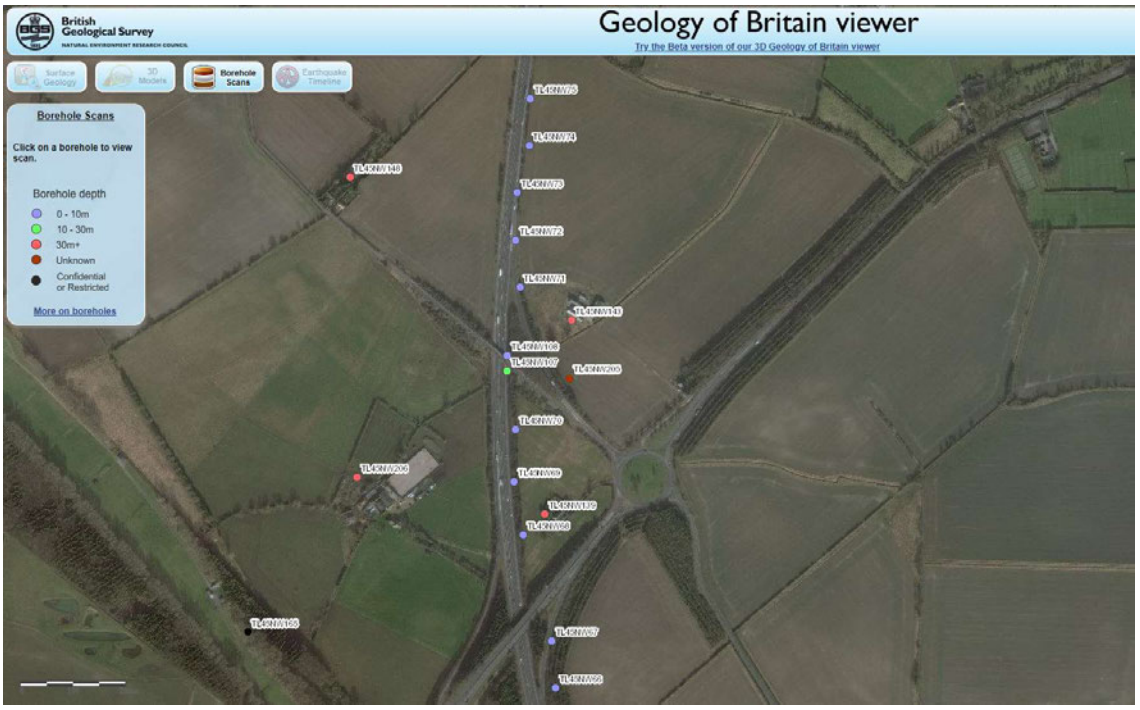
205/118 Haggis Farm Cottages, Barton Road, Grantchester.
(Disused)

Sheet Mem. p. 111. Surface +50. Bore. LGS +76. R.W.L. +42. *Lack, G., Feb. 1928.*
Anal. *Mar. 1928.* Handpump. *Apr. 1942.*

G	...	...	126	126
LGS	...	...	16	142

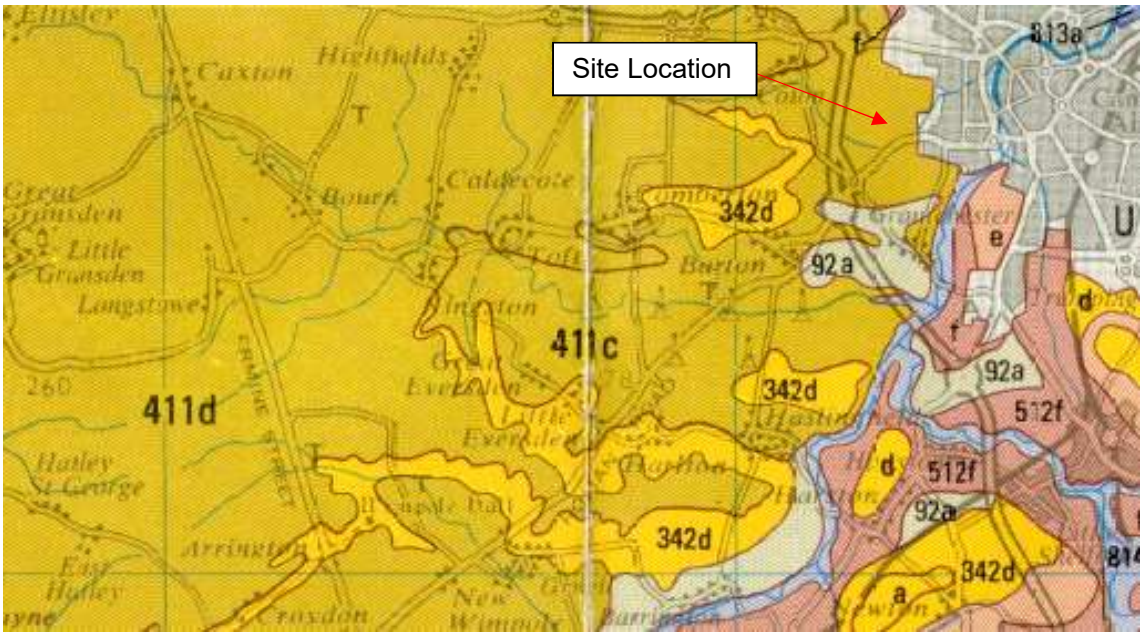
British Geological Survey

W B & L (X)—02588—2000-7-


British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Geology of Britain viewer
Try the Beta version of our 3D Geology of Britain viewer
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Borehole Scans
Click on a borehole to view scan.
Borehole depth
0 - 10m
10 - 30m
30m+
Unknown
Confidential or Restricted
More on boreholes


British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Geology of Britain viewer
Try the Beta version of our 3D Geology of Britain viewer
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Borehole Scans
Click on a borehole to view scan.
Borehole depth
0 - 10m
10 - 30m
30m+
Unknown
Confidential or Restricted
More on boreholes

Soils of South East England Sheet Extract



813a	MIDELNEY	9	83.33
		10	16.67
813b	FLADBURY1	8	15.00
411a	Evesham1	2	29.41
		23	70.59
411b	EVESHAM2	23	52.94
		25	47.06
411c	EVESHAM3	20	23.08
		23	61.54
		25	15.38
411d	HANSLOPE	21	100.00
421a	STOW	16	16.67

Appendix G EA Records and Correspondence

Hartley, Michael

From: Enquiries_EastAnglia <Enquiries_EastAnglia@environment-agency.gov.uk>
Sent: 08 October 2019 14:43
To: Hartley, Michael
Subject: EAN/2019/142269 - land north of Barton Road, Cambridge
Attachments: East_Anglian_External Climate Change Allowances Guidance Oct2016.pdf; Defended Model Flood Outlines_142269.pdf; Modelled Node Points_142269.pdf; Product 4 Datasheet_142269.pdf; Recorded Flood Event Outlines_142269.pdf; Flood Map for planning.jpg; 142269 defence info.pdf; tl45006.csv; 142269 response.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Mr Hartley

Thank you for your enquiry of 11 September 2019 about your site north of Barton Road, Cambridge. Please find our response and information attached.

If we can be of further help, please do contact us.

Regards

[redacted]

Karen Brown
Customers & Engagement Officer, Customers & Engagement Team, East Anglia Area
Environment Agency | Iceni House, Cobham Road, Ipswich IP3 9JD
Environment Agency | Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE

enquiries_eastanglia@environment-agency.gov.uk

Working days: Monday, Tuesday, Wednesday

creating a better place

Environment Agency

Mr M Hartley
Stantec
[redacted]

Our ref EAn/2019/142269

Date 08 October 2019

Dear Mr Hartley

Enquiry regarding Product 4 and other information for Land North of Barton Road, Cambridge.

Thank you for your enquiry which was received on 11 September 2019.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The information we hold for Product 4 and a copy of the Flood Risk Assessment (FRA) advisory note are attached to my email.

The maps provided are to be used in conjunction with the Datasheet. Please read the Datasheet and take note of information contained within the 'Important Information' section.

Further Asset Management Data and Information can be found online using this link: https://environment.data.gov.uk/asset-management/index.html

Name	Product 4
Description	The Flood Map for Planning (Rivers & Sea) can be viewed and downloaded as a Pdf file on Gov.UK by following this link: https://flood-map-for-planning.service.gov.uk
Licence	Open Government Licence
Information Warnings	None
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*

Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Requirements

You will need to assess the impact of climate change on flood risk as part of your FRA for this site. Depending on the scale and type of development proposed, if any built development or ground raising is proposed within or in close proximity to Flood Zone 3 then detailed modelling may be required to assess the impact of climate change on modelled flood levels using appropriate climate change allowances. The attached East Anglia Climate Change Allowances Guidance provides further advice on this.

Any works within 8m of a main river will require a flood risk activity permit from the Environment Agency.

Long Term Flood Risk Information

Long term flood risk mapping including: ***Risk of Flooding from Rivers or the Sea***, ***Flood Risk from Surface Water*** and ***Flood Risk from Reservoirs*** can be viewed on GOV.UK: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

Groundwater flooding

We do not produce flooding reports for groundwater and we do not have any records of flooding at this location. Some groundwater flooding incidents are reported to us and we have recorded them in our files. However, not all incidents are reported therefore there may have been many more incidents of groundwater flooding that we are not aware of. These reports are also uncorroborated and we have not visited the site to confirm the situation on the ground. Groundwater flooding is also confused with poor surface water drainage therefore we cannot guarantee the source of the water is groundwater flooding.

We would suggest that you contact the Lead Local Flood Authority (LLFA) who hold records on reported incidents of groundwater flooding. The LLFA is either the unitary authority or the county council for the area.

Additionally, more information on groundwater flooding can be found on:

- The British Geological Survey website (available at: http://www.bgs.ac.uk/research/groundwater/flooding/groundwaterHomesFAQ.html; and
- The Environment Agency website (available at: https://www.gov.uk/government/publications/flooding-from-groundwater.

Regional Groundwater Levels and Flow Direction

We do not produce Hydrogeological maps. However, there are Hydrogeological maps available from the British Geological Survey which can be found here: http://www.bgs.ac.uk/research/groundwater/datainfo/hydromaps/home.html.

Groundwater level data from the site at TL4166656737 is attached to our email

Data Available Online
Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

What's In Your BackYard (WIYBY) is no longer available
Most of the data is still available via other sharing services such as DATA.GOV.UK, MAGIC map and new GOV.UK digital services. Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click here.

For any other enquiries please send your request to us at:
Enquiries_EastAnglia@environment-agency.gov.uk.

Additional information

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion and email it to our Sustainable Places team at planning.brampton@environment-agency.gov.uk. They will initially provide you with a free response identifying the following:

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our website.

Please note we have published revised climate change allowances, which are available online. These new allowances will need to be reflected in your Flood Risk Assessment. If you want to discuss this please call our Sustainable Places team on 020 8474 5242.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

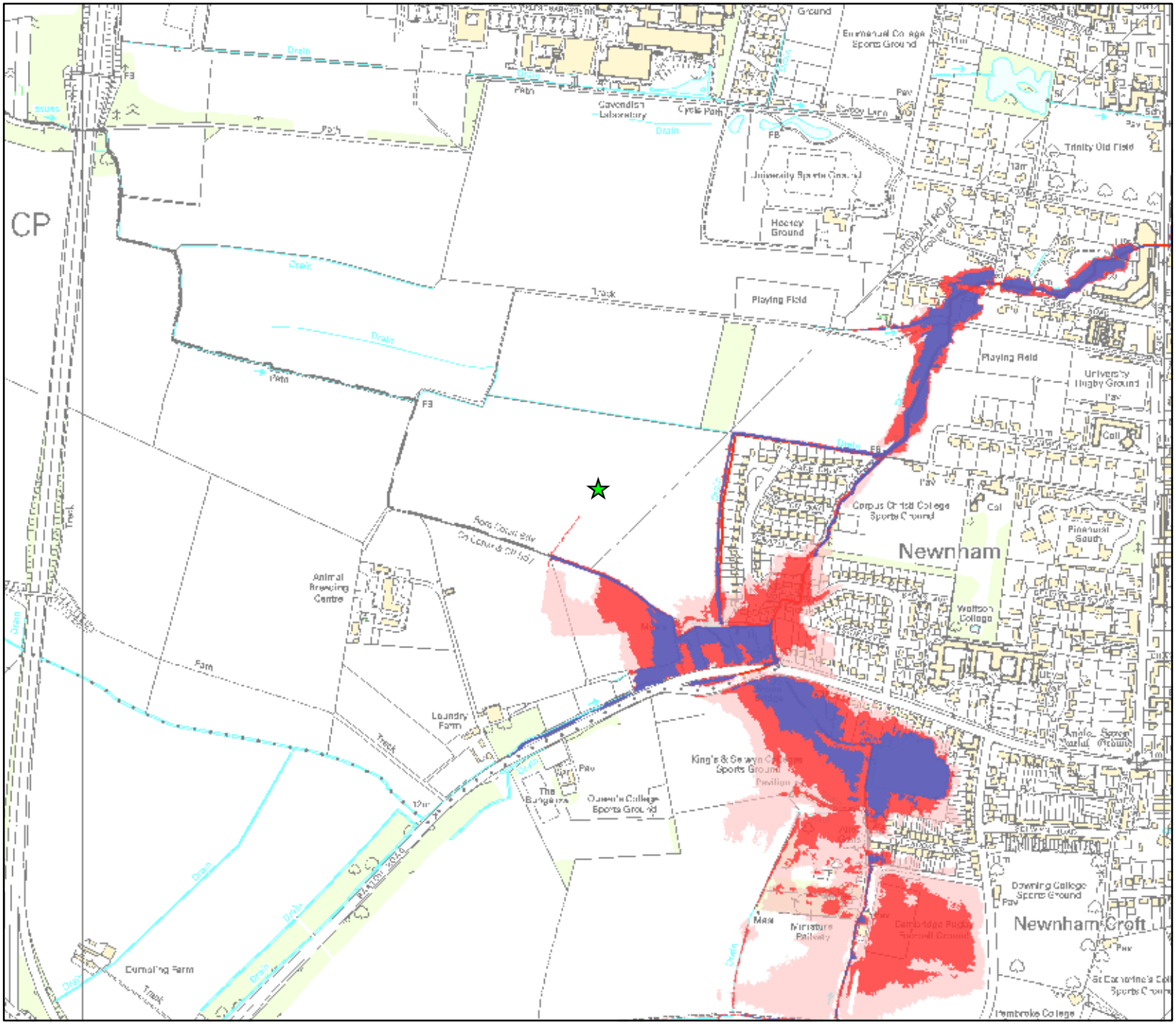
[redacted]

Karen Brown
Customers and Engagement Officer

East Anglia Area
Ipswich Office, Iceni House, Cobham Road, Ipswich, Suffolk, IP3 9JD
Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE
General Enquiries: 03708 506506
Email: enquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Defended Model Flood Outlines centred on Land North of Barton Road, Cambridge

NGR TL1234567890
Ref 142269
Created 18/09/2019



Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE

Environment Agency

Legend

- Site
- 5% AEP
- 1% AEP
- 0.1% AEP
- Main river

0 0.125 0.25 0.5 km

Information

Model Tolerance - Any data included in this product is subject to a standard modelling tollerance of +/- 150mm.The fluvial models used to produce these results are intended for strategic scale use only.

Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

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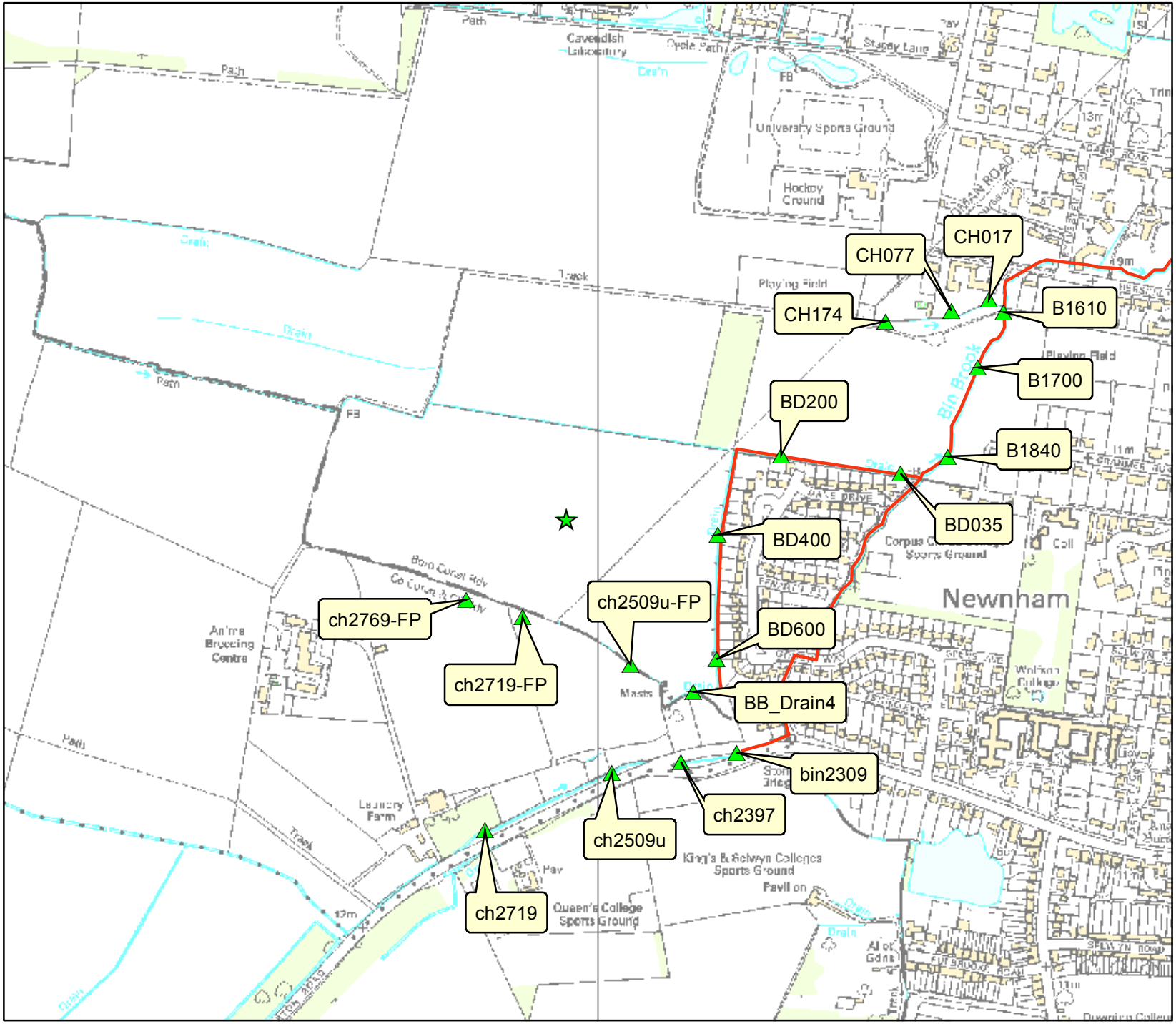
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled Node Point Locations centred on Land North of Barton Road, Cambridge

NGR TL1234567890
Ref 142269
Created 18/09/2019



Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE

Environment Agency

Legend

- Site
- Modelled Node Points
- Main river

0 0.1 0.2 0.4 km

Information

Model Tolerance - Any data included in this product is subject to a standard modelling tollerance of +/- 150mm.The fluvial models used to produce these results are intended for strategic scale use only.

Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Datasheet - Product 4

20 September 2019

Reference Number	142269
Site	Land North of Barton Road, Cambridge
Customer	Michael Hartley
NGR	TL4225257559

This datasheet provides supporting information for your Product 4. It will be clearly indicated if we are unable to provide information to fulfil any part of your request.

Model Summary

Model Name	Model Code
Gough Way Model	EA052383

Important Information

The following information should considered when using the material provided to fulfil this request.

Information	
Limited Modelled Extents Provided	We have only provided a limited number of modelled flood extents for clarity. If you require further extents we will be happy to provide them.
Ordinary Watercourses	Some watercourses in this area are Ordinary Watercourses (non main). Please contact the relevant Lead Local Flood Authority (LLFA) or Internal Drainage Board (IDB) for more information on these.
Flood Risk from Multiple Watercourses	The fluvial flood risk for this location is from multiple watercourses. All sources should be taken into consideration when producing a flood risk assessment.

Modelled Water Levels and Flows

The following tables provide modelled in channel water level and flow values. Values are provided for Annual Exceedence Probability (AEP) events, which is the probability of a given event occurring in any one year. This is not a return period.

The fluvial models used to produce these results are intended for strategic scale use only.

If the tables show a value of -9999, this indicates that we have no level or flow data for that particular AEP or node point.

Level Data

Level values are measured in metres above Ordnance Datum (m aOD).

All level data included are subject to standard modelling tolerance of +/-150 millimetres.

Present Day Levels

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
B1610	EA052383	543600	258301	8.401	8.56	8.65	8.671	8.76	8.803	8.935	8.91	8.998
B1700	EA052383	543562	258219	8.44	8.59	8.668	8.686	8.766	8.814	8.972	8.997	9.163
B1840	EA052383	543518	258088	8.529	8.662	8.733	8.75	8.82	8.865	8.992	9.015	9.176
BB_Drain4	EA052383	543141	257740	9.358	9.56	9.727	9.76	9.915	10.00	10.04	10.08	10.17
BD035	EA052383	543448	258063	8.577	8.704	8.771	8.787	8.854	8.893	9	9.008	9.161
BD200	EA052383	543271	258090	8.932	9.095	9.21	9.234	9.341	9.408	9.453	9.478	9.631
BD400	EA052383	543178	257972	9.181	9.353	9.482	9.508	9.635	9.713	9.748	9.773	10.03
BD600	EA052383	543175	257788	9.298	9.469	9.6	9.627	9.753	9.829	9.861	9.909	10.19
bin2309	EA052383	543205	257650	9.632	9.848	9.959	9.978	10.07	10.12	10.17	10.17	10.25
CH017	EA052383	543579	258320	8.345	8.488	8.585	8.612	8.739	8.792	8.921	8.913	8.996
CH077	EA052383	543523	258303	8.345	8.488	8.585	8.612	8.736	8.788	8.922	8.913	8.999
CH174	EA052383	543425	258288	8.347	8.489	8.585	8.612	8.736	8.787	8.923	8.917	8.997
ch2397	EA052383	543123	257637	9.814	10.14	10.24	10.25	10.29	10.31	10.28	10.33	10.42
ch2509u	EA052383	543021	257620	10.03	10.26	10.35	10.36	10.39	10.40	10.42	10.49	10.65

ch2509u-FP	EA052383	543049	257780	9.81	9.81	9.969	10.03	10.10	10.11	10.11	10.14	10.25
ch2719	EA052383	542833	257536	10.35	10.52	10.62	10.63	10.65	10.67	10.68	10.77	10.99
ch2719-FP	EA052383	542889	257851	10.49	10.49	10.49	10.56	11.05	11.17	11.18	11.23	11.29
ch2769-FP	EA052383	542805	257876	10.63	10.63	10.66	10.77	11.29	11.52	11.59	11.76	12.04

Climate Change Levels

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
B1610	EA052383	543600	258301	-9999	-9999	-9999	-9999	-9999	-9999
B1700	EA052383	543562	258219	-9999	-9999	-9999	-9999	-9999	-9999
B1840	EA052383	543518	258088	-9999	-9999	-9999	-9999	-9999	-9999
BB_Drain4	EA052383	543141	257740	-9999	-9999	-9999	-9999	-9999	-9999
BD035	EA052383	543448	258063	-9999	-9999	-9999	-9999	-9999	-9999
BD200	EA052383	543271	258090	-9999	-9999	-9999	-9999	-9999	-9999
BD400	EA052383	543178	257972	-9999	-9999	-9999	-9999	-9999	-9999
BD600	EA052383	543175	257788	-9999	-9999	-9999	-9999	-9999	-9999
bin2309	EA052383	543205	257650	-9999	-9999	-9999	-9999	-9999	-9999
CH017	EA052383	543579	258320	-9999	-9999	-9999	-9999	-9999	-9999
CH077	EA052383	543523	258303	-9999	-9999	-9999	-9999	-9999	-9999
CH174	EA052383	543425	258288	-9999	-9999	-9999	-9999	-9999	-9999
ch2397	EA052383	543123	257637	-9999	-9999	-9999	-9999	-9999	-9999
ch2509u	EA052383	543021	257620	-9999	-9999	-9999	-9999	-9999	-9999
ch2509u-FP	EA052383	543049	257780	-9999	-9999	-9999	-9999	-9999	-9999
ch2719	EA052383	542833	257536	-9999	-9999	-9999	-9999	-9999	-9999
ch2719-FP	EA052383	542889	257851	-9999	-9999	-9999	-9999	-9999	-9999
ch2769-FP	EA052383	542805	257876	-9999	-9999	-9999	-9999	-9999	-9999

Flow Data

Flow values are measured in cubic metres per second (cumecs - m3/s).

Present Day Flows

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
B1610	EA052383	543600	258301	3.167	3.38	3.431	3.443	3.45	3.458	3.468	3.463	3.427
B1700	EA052383	543562	258219	3.165	3.608	3.802	3.852	4.102	4.466	4.653	6.073	8.747
B1840	EA052383	543518	258088	3.17	3.64	4.012	4.091	4.539	5.041	5.879	7.686	11.87
BB_Drain4	EA052383	543141	257740	0.19	0.19	0.441	0.514	1.081	1.135	1.011	1.298	1.812
BD035	EA052383	543448	258063	1.325	1.667	1.958	2.02	2.341	2.571	2.654	2.764	3.471
BD200	EA052383	543271	258090	1.277	1.61	1.894	1.954	2.27	2.493	2.563	2.641	3.109
BD400	EA052383	543178	257972	1.277	1.61	1.894	1.954	2.27	2.492	2.564	2.641	4.127
BD600	EA052383	543175	257788	1.279	1.611	1.896	1.955	2.252	2.411	2.463	2.996	7.071
bin2309	EA052383	543205	257650	2.356	2.763	2.851	2.854	2.886	2.89	2.913	2.887	2.876
CH017	EA052383	543579	258320	0.017	0.018	0.02	0.02	0.488	0.668	0.639	0.975	1.065
CH077	EA052383	543523	258303	0.017	0.015	0.014	0.014	0.029	0.062	0.025	0.176	0.203
CH174	EA052383	543425	258288	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
ch2397	EA052383	543123	257637	2.358	3.373	3.933	3.96	4	4.045	3.659	4.066	4.079
ch2509u	EA052383	543021	257620	2.361	2.789	3.243	3.306	3.41	3.496	3.483	4.019	5.231
ch2509u-FP	EA052383	543049	257780	0.333	0.333	0.333	0.333	0.342	0.348	0.345	0.349	0.489
ch2719	EA052383	542833	257536	2.33	2.751	3.177	3.226	3.315	3.38	3.399	3.92	6.042
ch2719-FP	EA052383	542889	257851	0.116	0.117	0.121	0.145	0.505	0.803	0.89	1.218	1.693
ch2769-FP	EA052383	542805	257876	0.116	0.117	0.121	0.145	0.518	0.862	1.055	7.039	17.46

Climate Change Flows

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
B1610	EA052383	543600	258301	-9999	-9999	-9999	-9999	-9999	-9999
B1700	EA052383	543562	258219	-9999	-9999	-9999	-9999	-9999	-9999
B1840	EA052383	543518	258088	-9999	-9999	-9999	-9999	-9999	-9999
BB_Drain4	EA052383	543141	257740	-9999	-9999	-9999	-9999	-9999	-9999
BD035	EA052383	543448	258063	-9999	-9999	-9999	-9999	-9999	-9999
BD200	EA052383	543271	258090	-9999	-9999	-9999	-9999	-9999	-9999
BD400	EA052383	543178	257972	-9999	-9999	-9999	-9999	-9999	-9999
BD600	EA052383	543175	257788	-9999	-9999	-9999	-9999	-9999	-9999
bin2309	EA052383	543205	257650	-9999	-9999	-9999	-9999	-9999	-9999
CH017	EA052383	543579	258320	-9999	-9999	-9999	-9999	-9999	-9999
CH077	EA052383	543523	258303	-9999	-9999	-9999	-9999	-9999	-9999
CH174	EA052383	543425	258288	-9999	-9999	-9999	-9999	-9999	-9999
ch2397	EA052383	543123	257637	-9999	-9999	-9999	-9999	-9999	-9999
ch2509u	EA052383	543021	257620	-9999	-9999	-9999	-9999	-9999	-9999
ch2509u-FP	EA052383	543049	257780	-9999	-9999	-9999	-9999	-9999	-9999
ch2719	EA052383	542833	257536	-9999	-9999	-9999	-9999	-9999	-9999
ch2719-FP	EA052383	542889	257851	-9999	-9999	-9999	-9999	-9999	-9999
ch2769-FP	EA052383	542805	257876	-9999	-9999	-9999	-9999	-9999	-9999

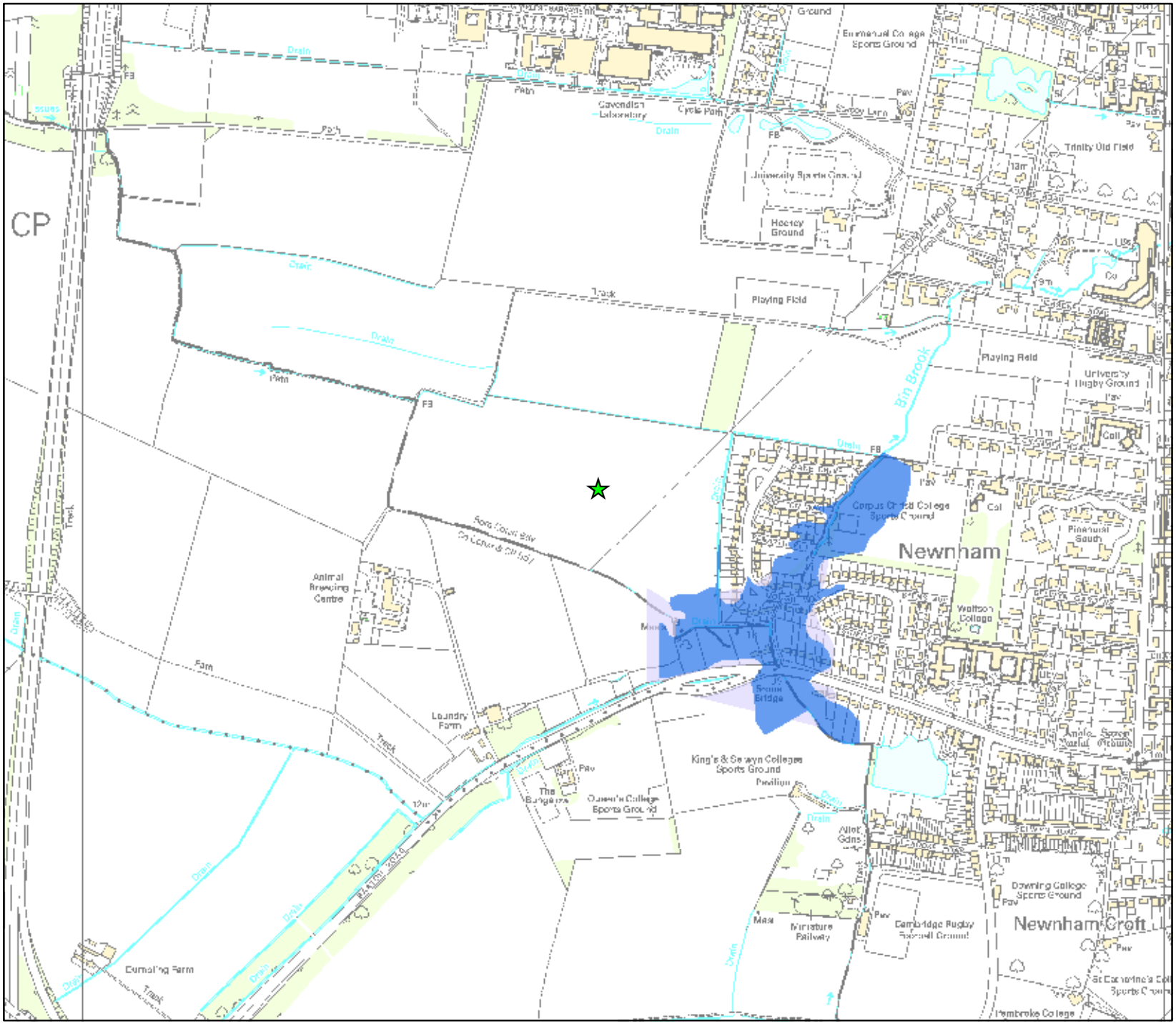
Recorded Flood Events

Where included, the Recorded Flood Event Outlines map provides an indication of areas which have flooded. Not all properties shown to be within the outline will have flooded.

Flood Event	Start	End	Source	Cause
Oct 2001	21/10/2001	24/10/2001	Main River	Channel Capacity Exceeded (no raised defences)
May 1978	05/05/1978	08/05/1978	Main River	Channel Capacity Exceeded (no raised defences) / Local Drainage/Surface Water / Obstruction/Blockage - Bridge

Recorded Flood Event Outlines centred on Land North of Barton Road, Cambridge

NGR TL1234567890
Ref 142269
Created 18/09/2019



Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE

Environment Agency

Legend

- Site
- October 2001
- May 1978

0 0.125 0.25 0.5 km

Information

Recorded Outlines - The recorded flood outlines provided are only indicative and may not accurately represent the area that flooded in the named events. Our historic flood event outlines do not provide a definitive record of flooding. It is possible that there will be an absence of datail places where we have not been able to record the extent of flooding. It is also possible for errors occur in the digitisation of historic records of flooding.

Recorded Outlines - There may be other flood events that have occurred that we have not been able to produce an outline for.

Recorded Outlines - The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.

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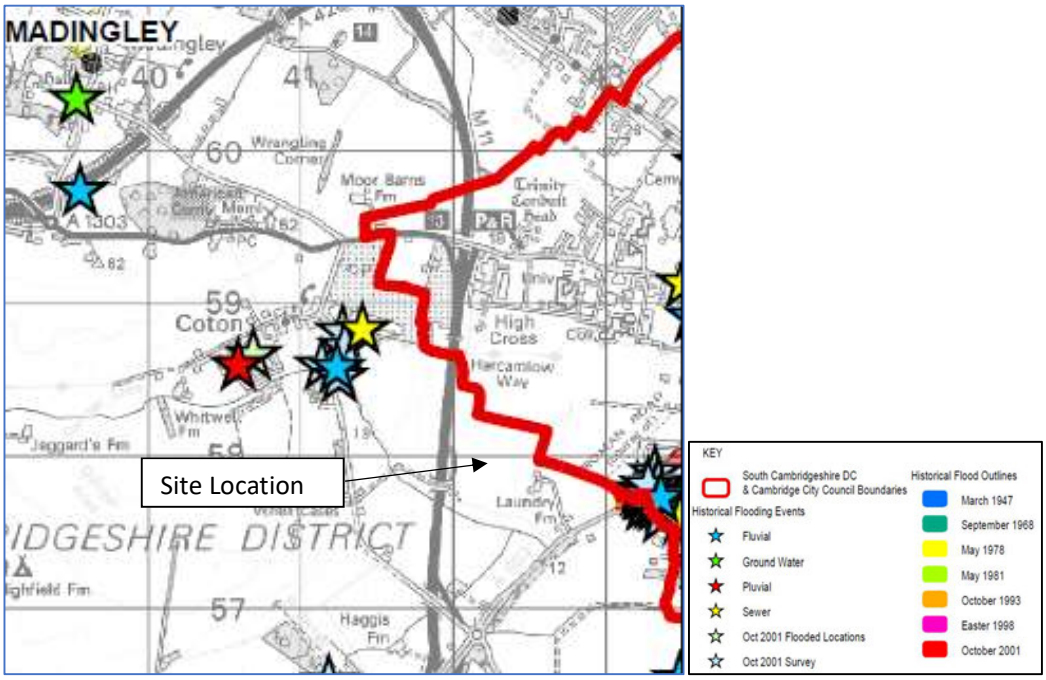
Product 4 Request							
Unique ID (Label)	Easting	Northing	Standard of Protection (Return Period)	Overall Condition Grade	Statutory Defence Level	Upstream Crest Level	Downstream Crest Level
142269							
Bin Brook							
123555	543267	257673	1 in 40 (2.5%)	3	Not known	9.83	9.54
123554	543281	257678	1 in 40 (2.5%)	3	Not known	9.54	9.98
124138	543271	257710	1 in 40 (2.5%)	3	Not known	9.98	9.69
125106	543199	257739	1 in 40 (2.5%)	3	Not known	9.57	9.64
125105	543181	257994	1 in 40 (2.5%)	3	Not known	9.64	10.35

Appendix H SFRA Historical Flood Map

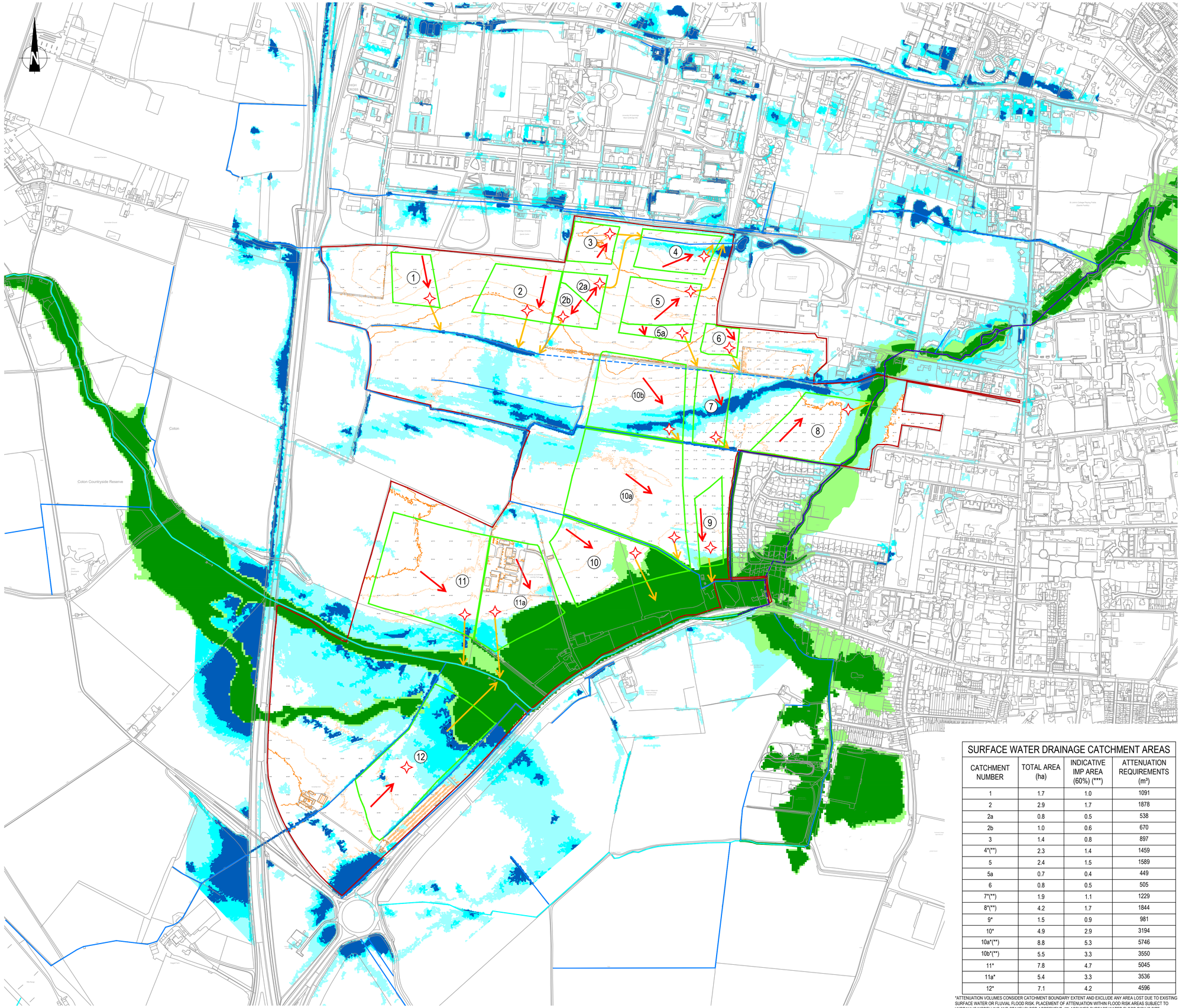
SFRA historical flood map



Extract from SFRA

05/05/1978	Cambridge	Barton Road, Newnham Terrace	Bin Brook, River Cam	EA
2000 21/10/2001	Cambridge	Herschel Road, Gough Way, Grange Road	Bin Brook	Cambridge Federation of Residents' Association and EA

Appendix I High Level Drainage Strategy Drawing



NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN UNLESS NOTED OTHERWISE.
3. ALL COORDINATES ARE IN METRES RELATIVE TO ORDNANCE SURVEY NATIONAL GRID.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS AND ARCHITECTS DRAWINGS AND SPECIFICATIONS.
5. THE LOCATIONS OF THE ATTENUATION BASINS ARE INDICATIVE ONLY AND WILL NEED TO BE REVIEWED AGAINST A TOPOGRAPHIC SURVEY AND DETAILED MODELLING OF THE WATERCOURSES. FURTHER ATTENUATION BASINS ARE LIKELY TO BE REQUIRED.
6. UPSTREAM SUDS WILL NEED TO BE PROVIDED IN ACCORDANCE WITH CURRENT GUIDANCE.
7. ATTENUATION REQUIREMENTS HAVE BEEN CALCULATED USING QUICK STORAGE ESTIMATES WITHIN MICRODRAINAGE SOFTWARE.
8. OUTFALL LEVELS TO DITCHES ARE UNKNOWN AND DESIGN ASSUMES GRAVITY DRAINAGE CAN BE ACHIEVED.
9. SIZING OF BASINS/ATTENUATION FEATURES WITH CORRESPONDING EARTHWORKS IS EXCLUDED.

LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- (2) CATCHMENT NUMBER
- OVERLAND FLOW ROUTE
- INDICATIVE ATTENUATION BASIN LOCATIONS
- INDICATIVE OUTFALL LOCATIONS
- 1 IN 30 YEAR SURFACE WATER FLOOD EXTENT
- 1 IN 100 YEAR SURFACE WATER FLOOD EXTENT
- 1 IN 1000 YEAR SURFACE WATER FLOOD EXTENT
- FLOOD ZONE 3
- FLOOD ZONE 2
- MAJOR CONTOUR
- MINOR CONTOUR
- EA MAIN RIVER
- AWARDED WATERCOURSE
- ORDINARY WATERCOURSE
- CULVERTED EA MAIN RIVER
- CULVERTED ORDINARY WATERCOURSE

SURFACE WATER DRAINAGE CATCHMENT AREAS

CATCHMENT NUMBER	TOTAL AREA (ha)	INDICATIVE IMP AREA (60%) (***)	ATTENUATION REQUIREMENTS (m^3)
1	1.7	1.0	1091
2	2.9	1.7	1878
2a	0.8	0.5	538
2b	1.0	0.6	670
3	1.4	0.8	897
4*(**)	2.3	1.4	1459
5	2.4	1.5	1589
5a	0.7	0.4	449
6	0.8	0.5	505
7*(**)	1.9	1.1	1229
8*(**)	4.2	1.7	1844
9*	1.5	0.9	981
10*	4.9	2.9	3194
10a*(**)	8.8	5.3	5746
10b*(**)	5.5	3.3	3550
11*	7.8	4.7	5045
11a*	5.4	3.3	3536
12*	7.1	4.2	4596

*ATTENUATION VOLUMES CONSIDER CATCHMENT BOUNDARY EXTENT AND EXCLUDE ANY AREA LOST DUE TO EXISTING SURFACE WATER OR FLUVIAL FLOOD RISK. PLACEMENT OF ATTENUATION WITHIN FLOOD RISK AREAS SUBJECT TO HYDRAULIC MODELLING AND STAKEHOLDER AGREEMENT. (**) ASSUMES SURFACE WATER FLOOD RISK IS SITE GENERATED -THIS IS SUBJECT TO AGREEMENT WITH RELEVANT STAKEHOLDERS. (***) PLOT 8 (SCHOOL SITE) ASSUMED TO HAVE 40% IMPERMEABLE AREA.

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale from this drawing. If in doubt, ask.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status
PRELIMINARY

LAND NORTH OF BARTON ROAD,CAMBRIDGE

SURFACE WATER DRAINAGE AND FLOOD RISK HIGH LEVEL REVIEW

Client
NORTH BARTON LAND LANDOWNERS GROUP

Date of 1st Issue	Design	Drawn
24.10.19	MH	DF
A1 Scale	Checked	Approved
1:5000	ACS	-
Drawing Number		Revision
47115/2001/001		P0

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Tel: 01223 882 000

DRAFT

Appendix J Greenfield Calcs

Soils BFI Calculation

Whole site excluding north-east area

Telford House
Fulbourn
Cambridge
Cambridgeshire
CB21 5HB

Client	North BRLOG
Job Title	Land North of Barton Road, Cambridge
Job No.	47115

Method (1): From Soil Association map:

Look up HOST classes for each Soil Association Type in Appendix B of IH126

	Fraction of site area	SOIL class	HOST classes	% in each HOST clas	BFI value
Soil Association 1:	1	411c	20	23.08	0.524
			23	61.54	0.218
			25	15.38	0.17
			0	0	0
				Total =	0.2812424

	Fraction of site area	SOIL class	HOST classes	% in each HOST clas	BFI value
Soil Association 2:	0	0	0	0	0
			0	0	0
			0	0	0
			0	0	0
				Total =	0

	Fraction of site area	SOIL class	HOST classes	% in each HOST clas	BFI value
Soil Association 3:	0	0	0	0	0
			0	0	0
			0	0	0
			0	0	0
				Total =	0

Total = 1 ***Must add to one***

BFI = 0.28

DOCUMENT ISSUE RECORD

Calculation Ref	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
47115/4001/001	-	13.09.2019	MJH	CW		

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E-Mail cambridge@peterbrett.com
http:/www.peterbrett.com

FEH Greenfield Runoff
Per Hectare
Using 2008 QMED Equation

Project Title	Land North of Barton Road, Cambridge
Project No	47115

Methodology as set out in SuDS Manual 24.3.2 — SUDS Manual Chapter 24

1 Retrieve FEH Catchment Information

Export catchment data from FEH CDROM as .csv file and save in FEH data export

Catchment Descriptors	**BFIHOST**	0.280		*see note 1*
	SAAR	538.0		*see note 1*
	FARL	1.0		*see note 2*

2 Derive QBAR (mean annual flood)

Define area	**Site Area**	1.0	ha	
	Applied Area	50.0	ha	*see note 3*
FEH Index Flood (SuDS Manual Equation 24.2)	**QMED (Q_2)**	2.2	l/s	*see note 4*
Calculate QBAR by dividing QMED by 2yr growth factor	**QBAR**	2.5	l/s	*see note 5*

3 Select appropriate growth factors

FSR Hydrological Region		5	*(refer to FSR Hydrological Region tab)*
100yr Growth Curve Factor	**GQ_{100}**	3.56	
30yr Growth Curve Factor	**GQ_{30}**	2.55	
10yr Growth Curve Factor	**GQ_{10}**	1.65	
2yr Growth Curve Factor	**GQ_2**	0.89	
1yr Growth Curve Factor	**GQ_1**	0.87	

4 Derive Flood Frequency

Greenfield Runoff per 1ha

100yr Peak Runoff Rate	**Q_{100}**	8.9	l/s	**Q_{100}**	8.9	l/s/ha
30yr Peak Runoff Rate	**Q_{30}**	6.4	l/s	**Q_{30}**	6.4	l/s/ha
10yr Growth Curve Factor	**Q_{10}**	4.1	l/s	**Q_{10}**	4.1	l/s/ha
QBAR Peak Runoff Rate	**QBAR**	2.5	l/s	**Q_{BAR}**	2.5	l/s/ha
2yr Peak Runoff Rate	**Q_2**	2.2	l/s	**Q_2**	2.2	l/s/ha
1yr Peak Runoff Rate	**Q_1**	2.2	l/s	**Q_1**	2.2	l/s/ha

Location of FEH Data (as Hyperlink)

DOCUMENT ISSUE RECORD

Rev	Comments	Prepared	Date	Checked	Date
	Main Site excluding north-east area	MJH	17.09.19	CW	18.09.19

Sheet created by Alex Bearne

Last updated 03.01.18 Recommended Review 01.07.18

Notes This spreadsheet has been created to allow derivation of greenfield runoff rates using the FEH statistical method applied in a manner consistent with the recommendations of the SuDS Manual. If you have recommendations to improve this spreadsheet please contact the owner.

Note 1 FEH Web version 3 allows extraction of BFIHOST and SAAR values for each square kilometre grid If you do not think the BFIHOST value is representative of your site then it is possible to derive it manually. This should only very occasionally be necessary. BFI can be derived manually using the the methodology set out in the Flood Estimation Handbook (see *Manual Derivation of BFIHOST tab).*

Note 2 FARL value is a measure of attenuation from reservoirs and lakes for the majority of studies this should be set to 1 (representing no attenuation). If your site includes a large water body with an attenuating affect on runoff please consult a hydrologist.
FARL is a measurement of studies water bodies in the catchment so that their attenuation effects so this term becomes 1.0 and therefore drops out. (see page 23 of the Preliminary rainfall runoff management for developments EA/Defra 2013)
Rainfall runoff management for developments.pdf

Note 3 If the site area is less than 50 hectare the spreadsheet will calculate QMED for 50ha and scale the results automatically to the defined Site Area

Note 4 QMED is calculated using the statistical equation as revised by Kjeldsen in 2008

$$Q_{MED} = 8.3062AREA^{0.8510} .0.1536^{(1000/SAAR)} .FARL^{3.4451} .0.0460^{BFIHOST\wedge 2}$$

Rainfall runoff management for developments.pdf
It is reproduced as Equation 24.2 in the SUDS Manual (pg 512)

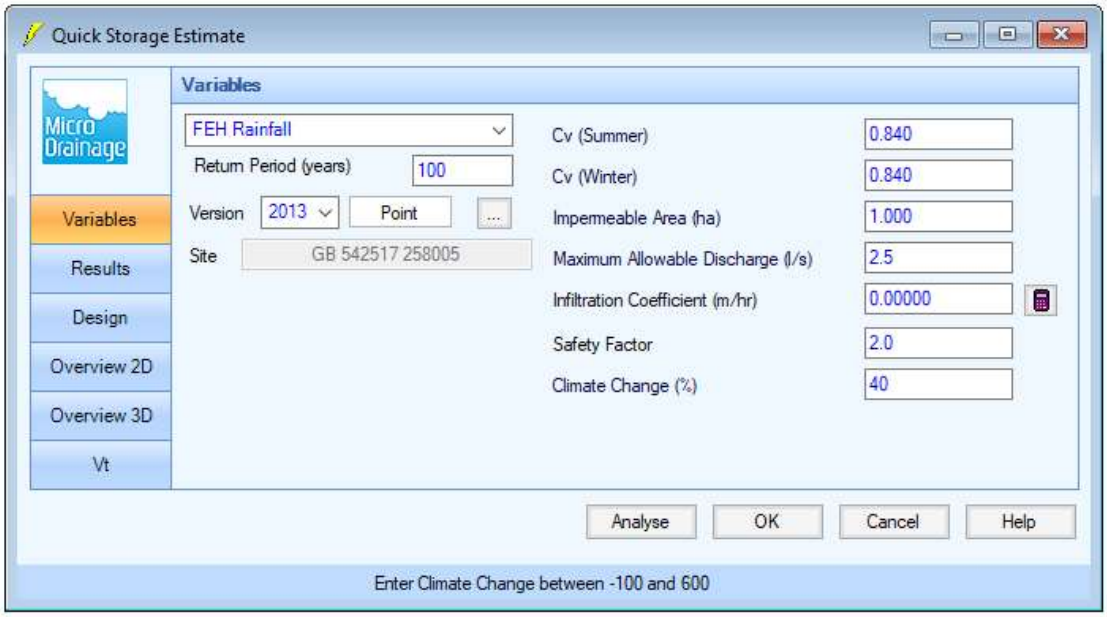
Note 5 QBAR is calculated by dividing QMED by the growth factor for the 2 year event, as per the methodology set out in paragraph 6.2.2 of 'Rainfall runoff management for developments' . QBAR is then used as the index flood for the basis of applying the growth factors.

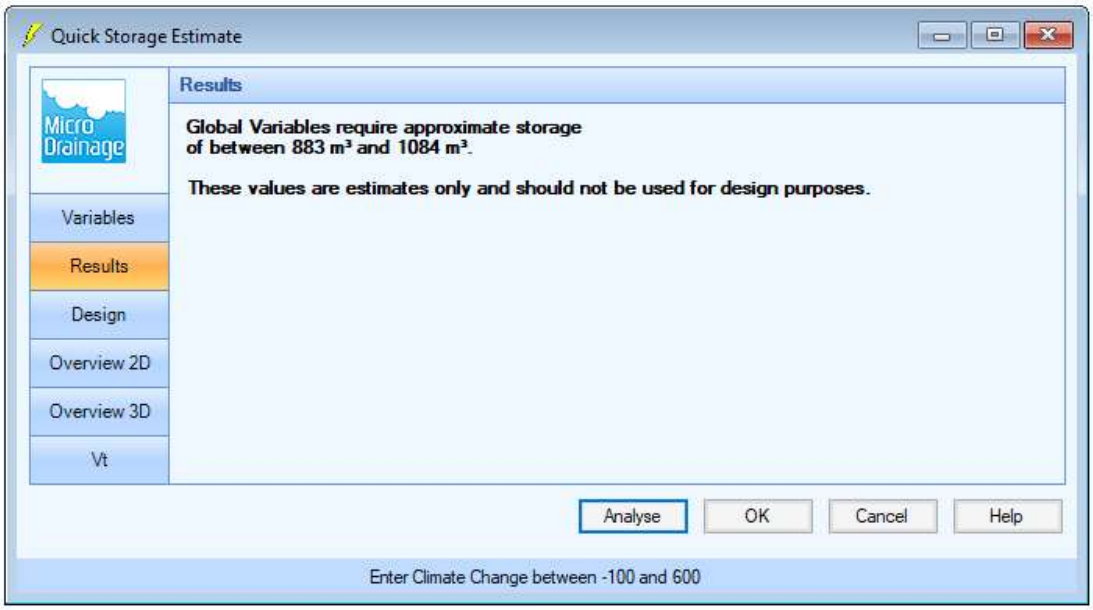
Checked by Natasha Vaughan, Clare Waller, David Collis

Appendix K Quick Storage Calcs

Quick Storage Calcs

Attenuation requirement per impermeable hectare

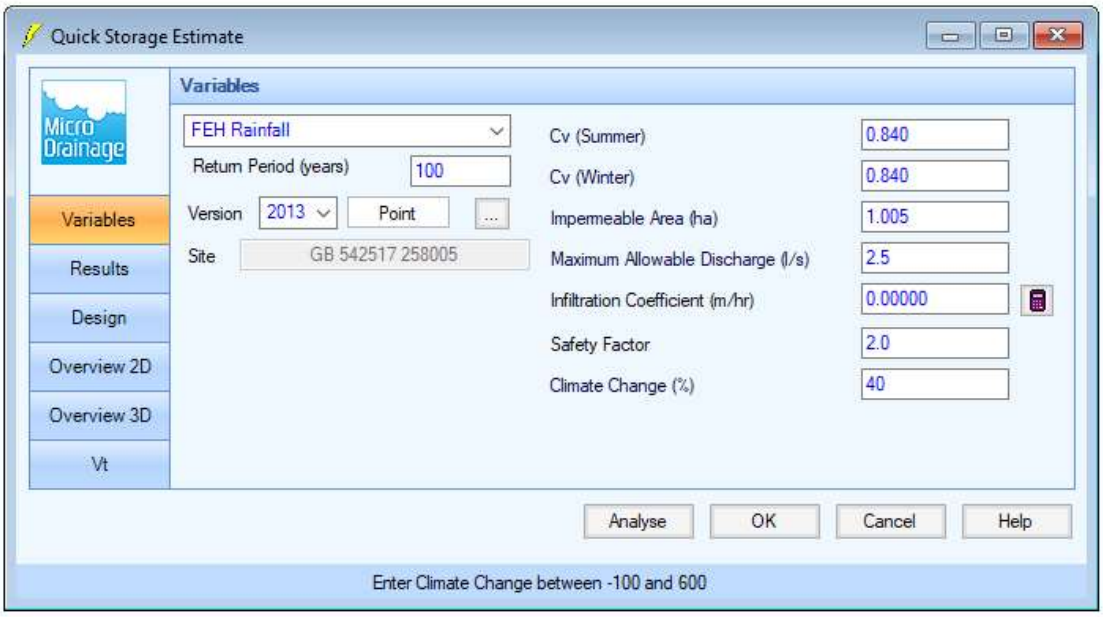


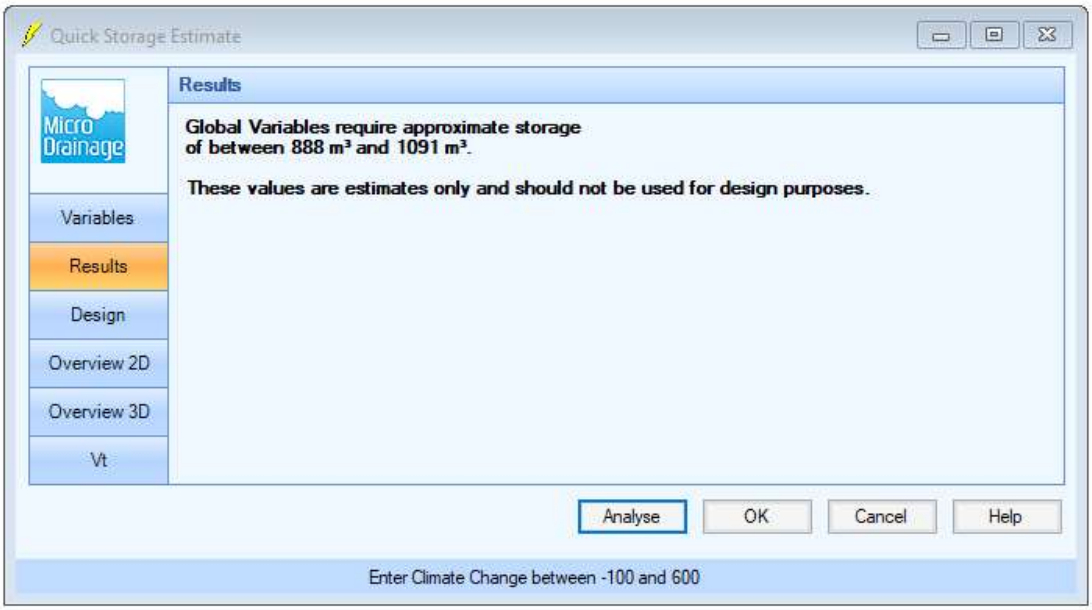


Quick Storage Calculations by development parcel

See Drawing No: 47115/2001/001 for locations of Parcels

Parcel 1





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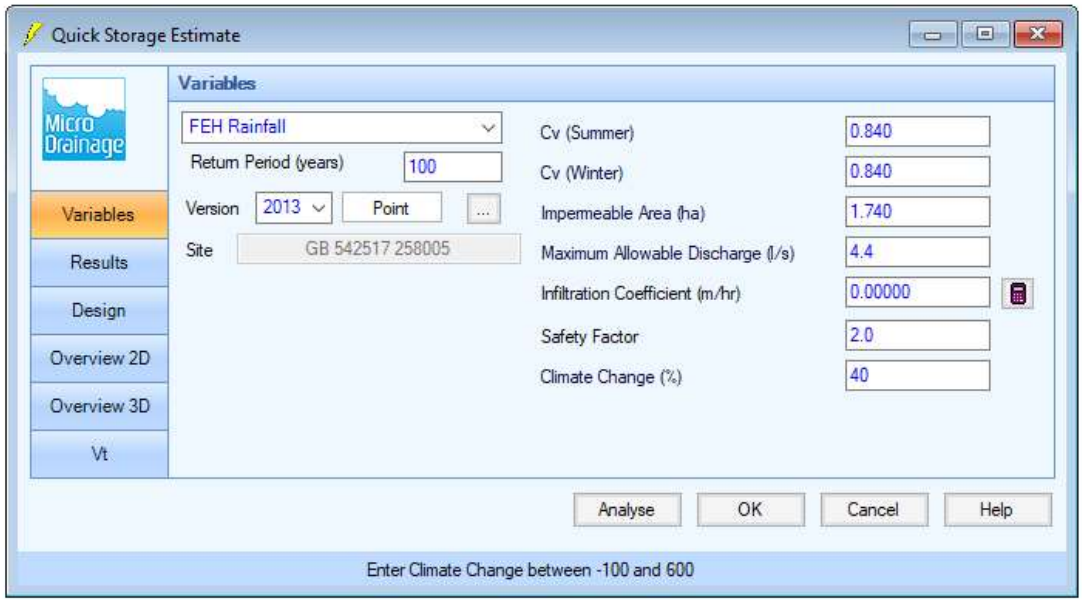
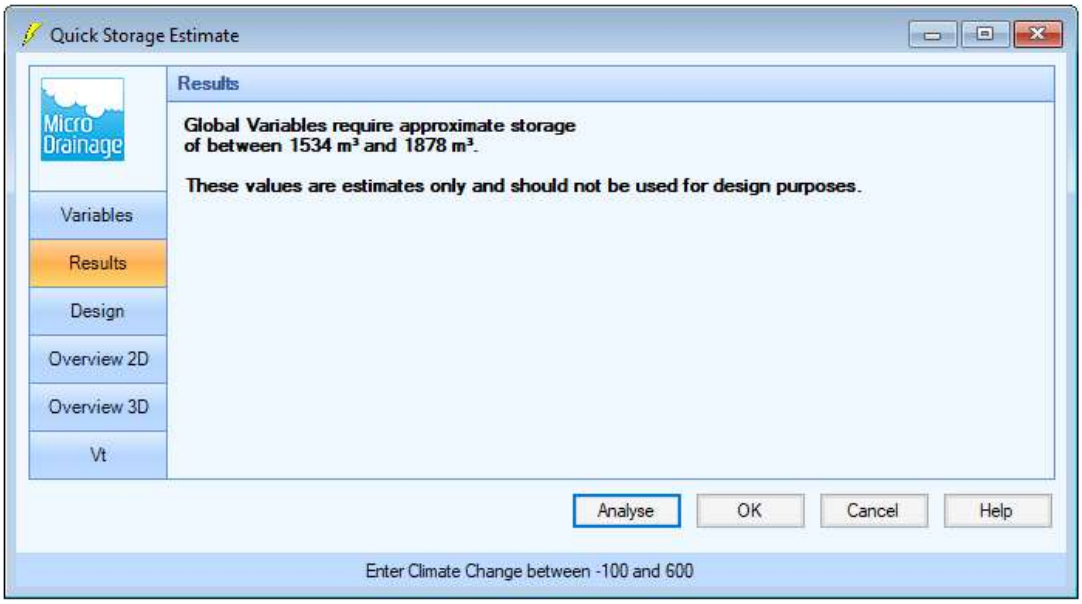

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 1.740
Maximum Allowable Discharge (l/s) 4.4
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600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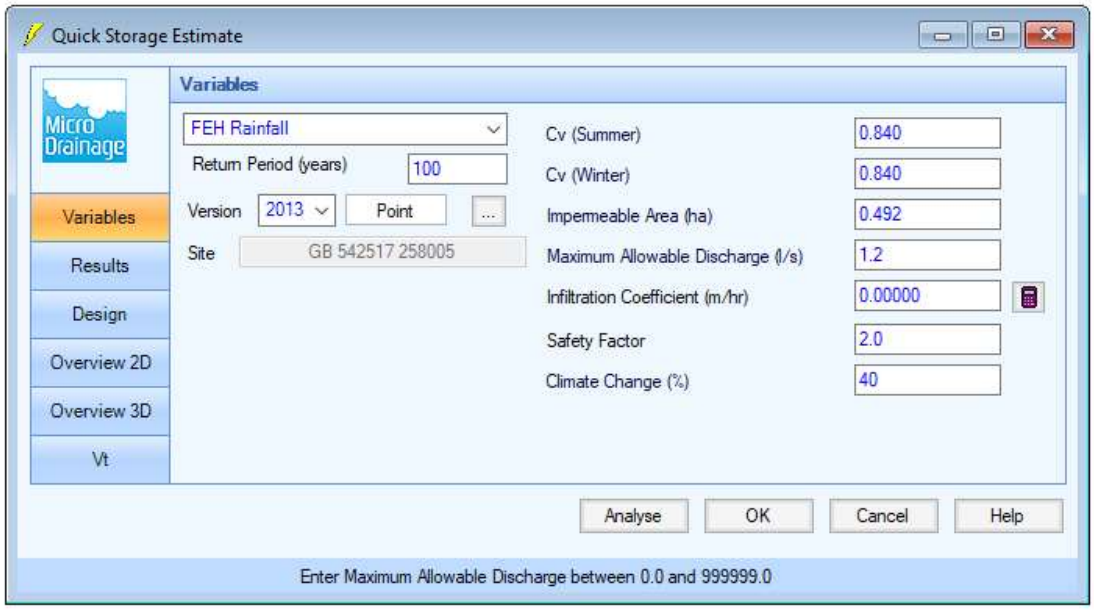
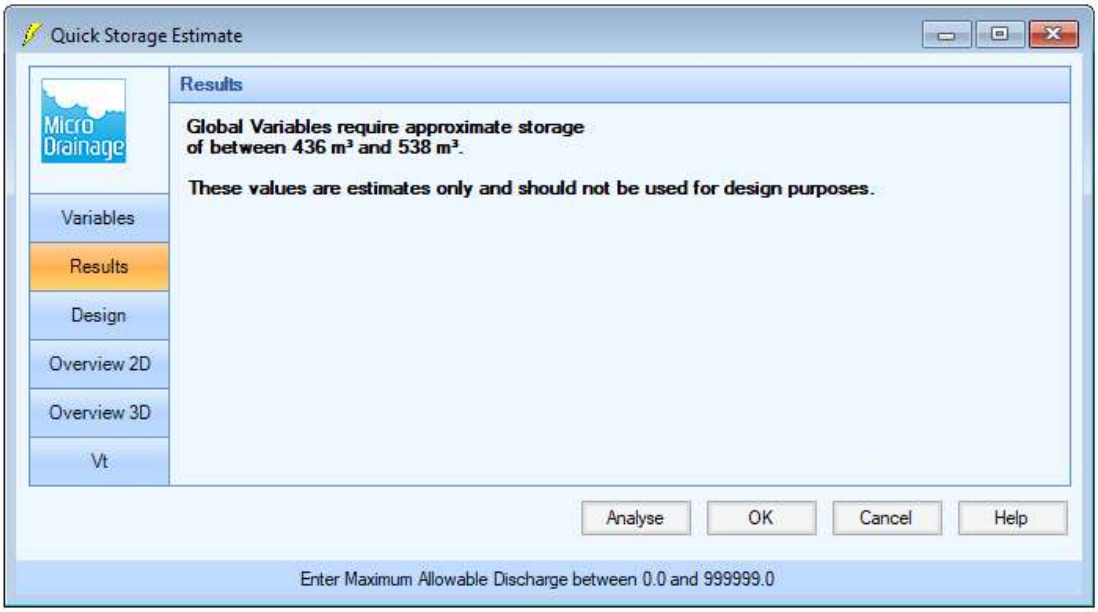
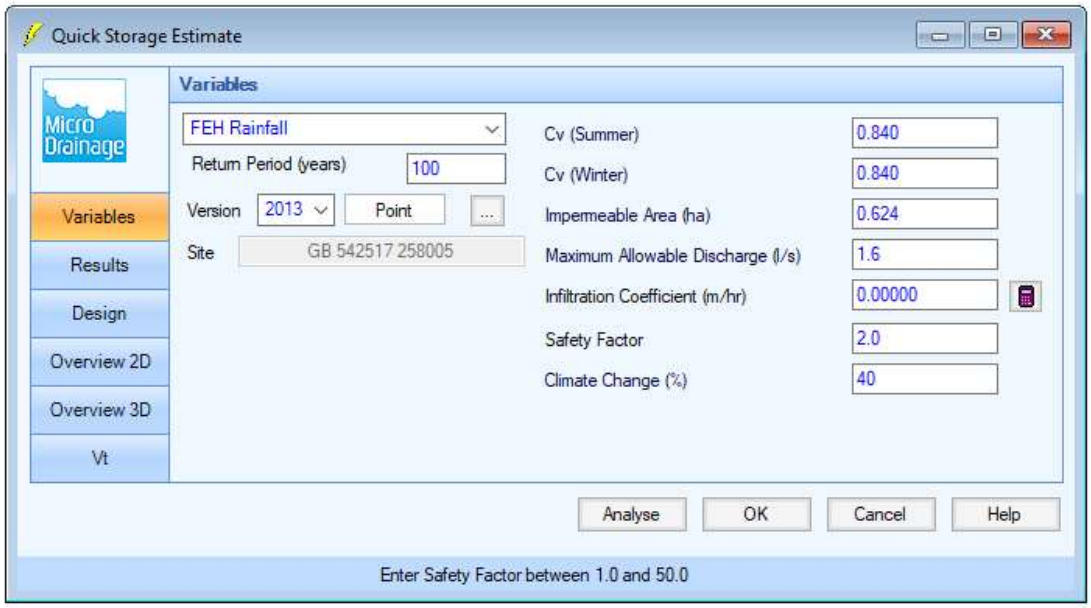
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 1534 m³ and 1878 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600

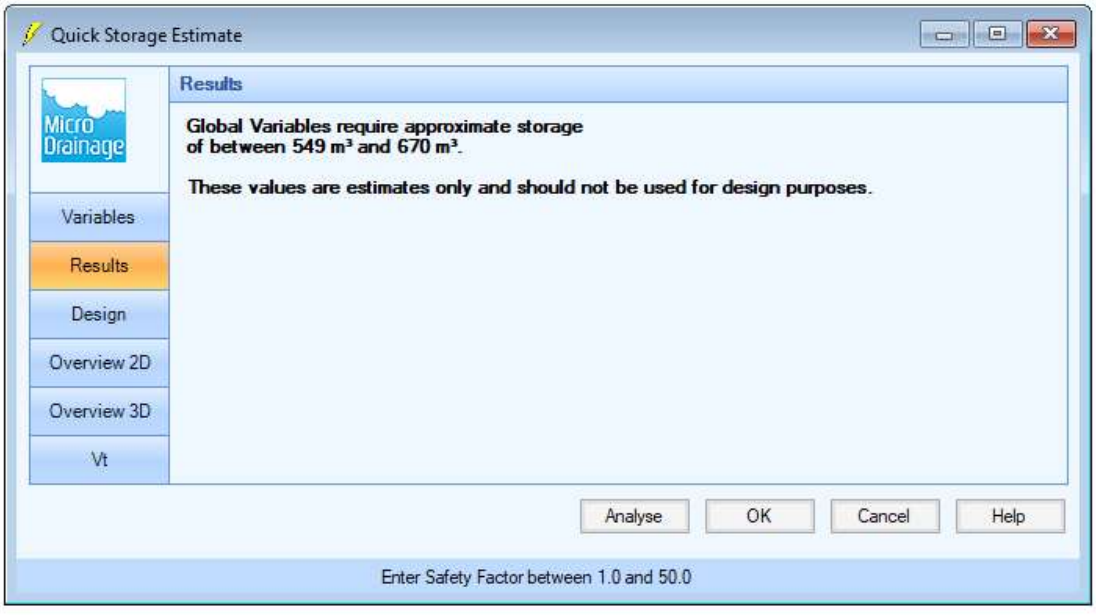
Parcel 2a


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.492
Maximum Allowable Discharge (l/s) 1.2
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 436 m³ and 538 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

Parcel 2b


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.624
Maximum Allowable Discharge (l/s) 1.6
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Safety Factor between 1.0 and 50.0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Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
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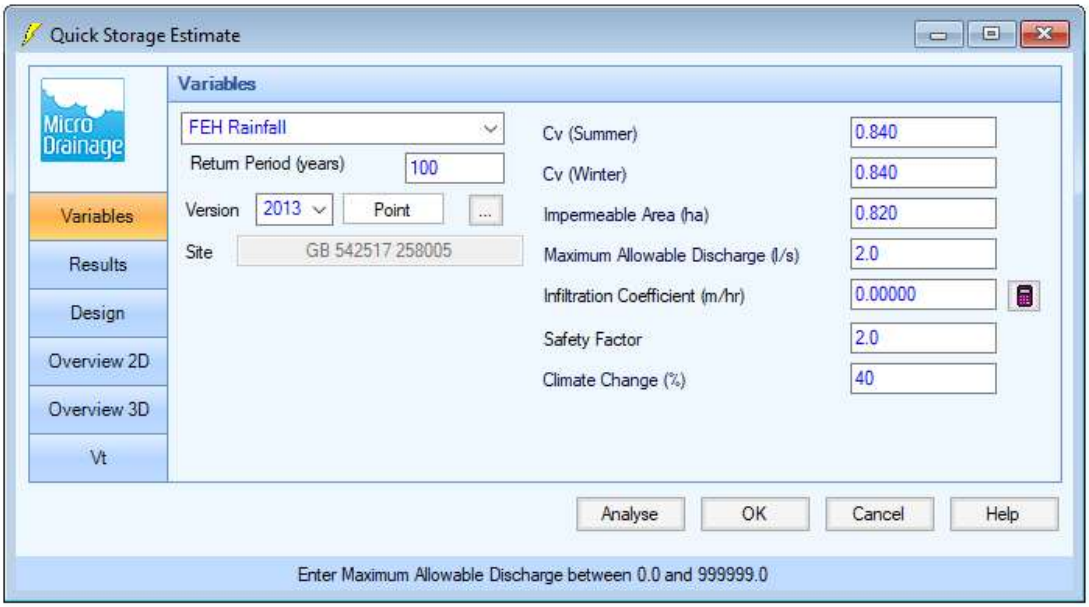
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Safety Factor between 1.0 and 50.0

Parcel 3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Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
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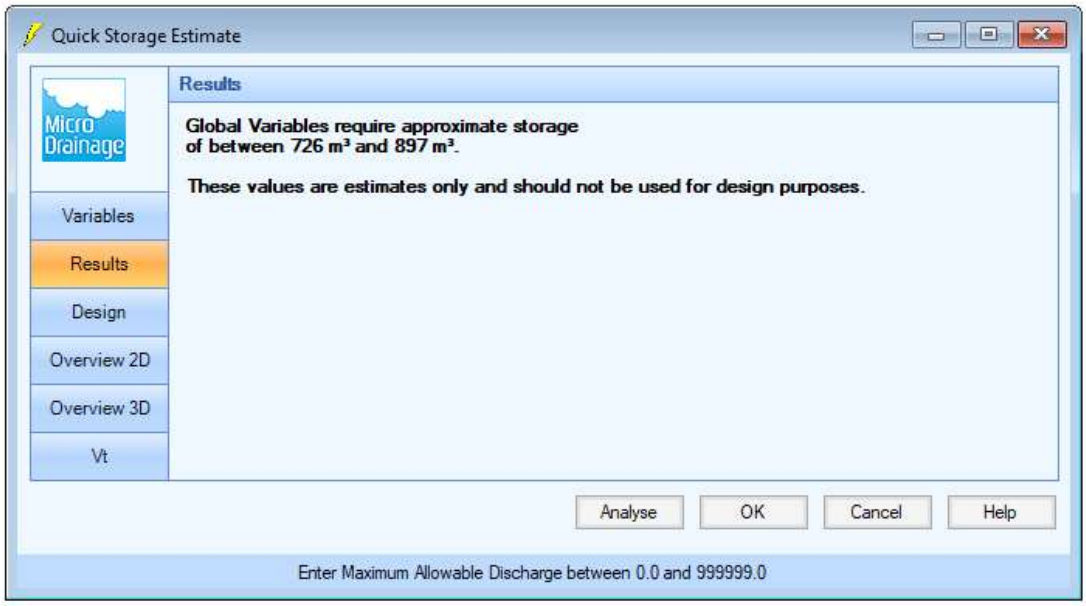
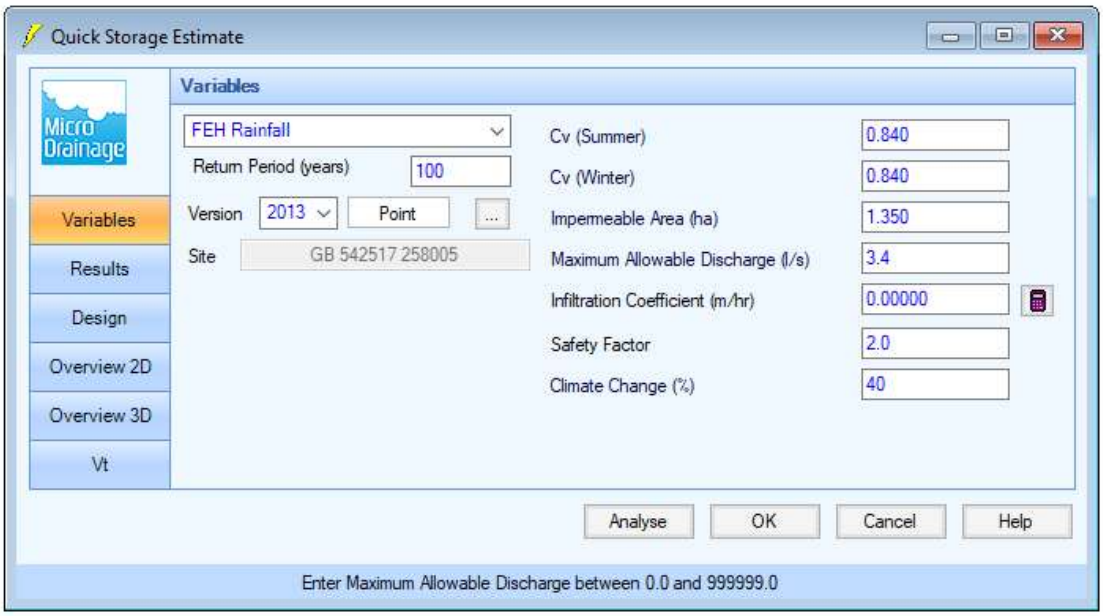
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.820
Maximum Allowable Discharge (l/s) 2.0
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 726 m³ and 897 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

Parcel 4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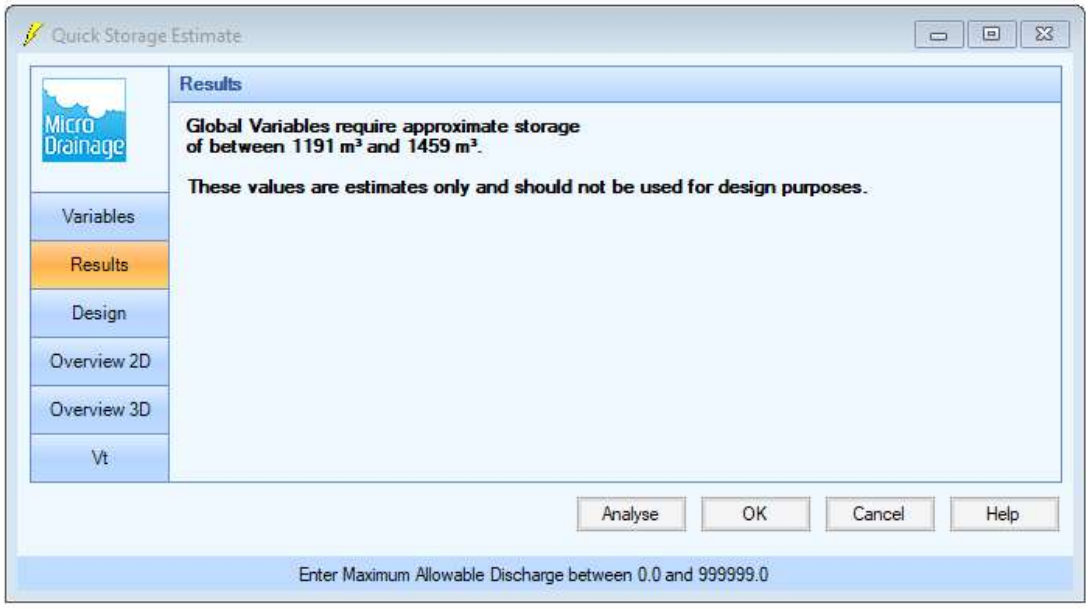
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 1.350
Maximum Allowable Discharge (l/s) 3.4
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0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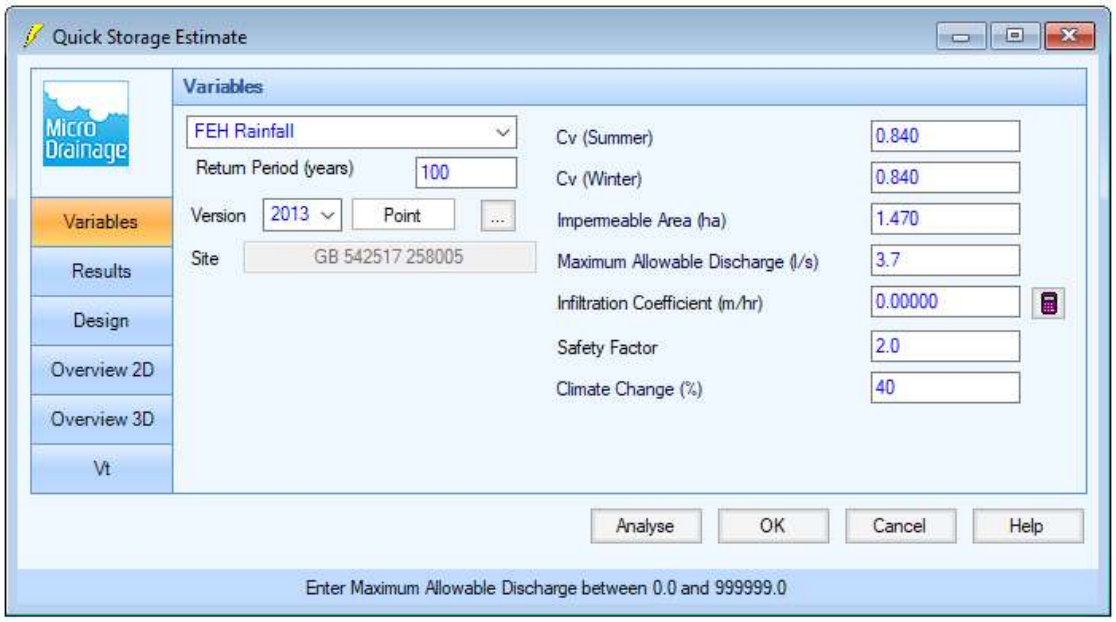
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 1191 m³ and 1459 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

Parcel 5


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 1.470
Maximum Allowable Discharge (l/s) 3.7
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
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Cancel
Help
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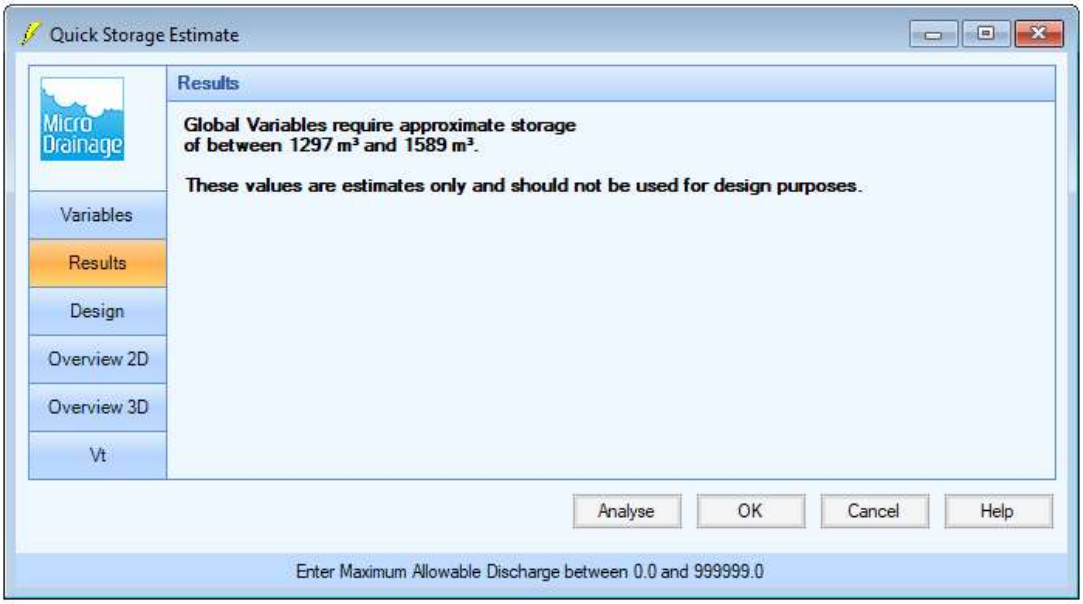
Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 1297 m³ and 1589 m³.
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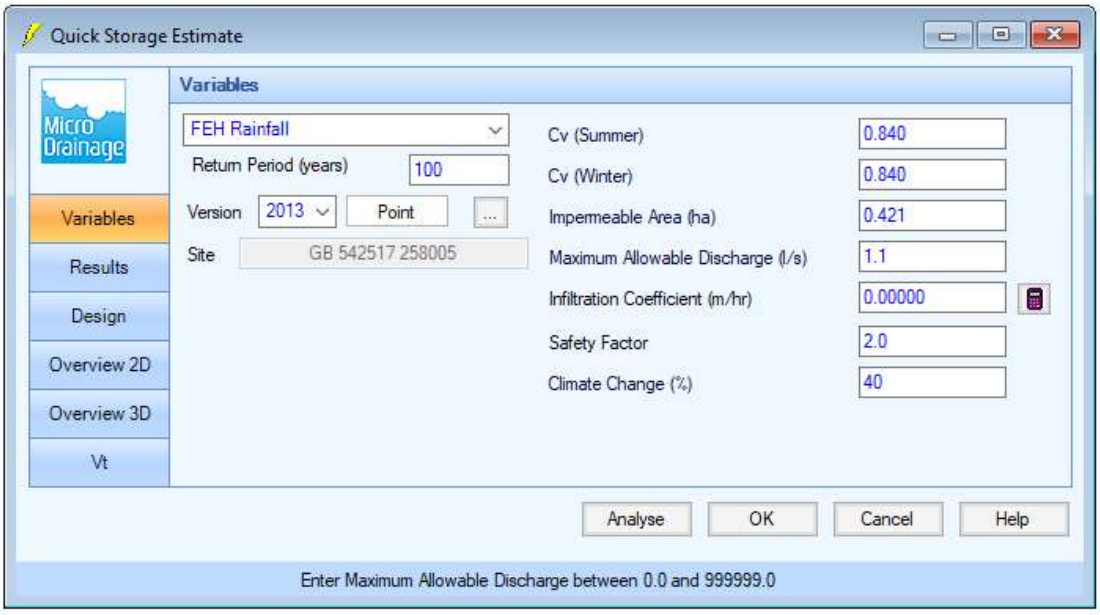
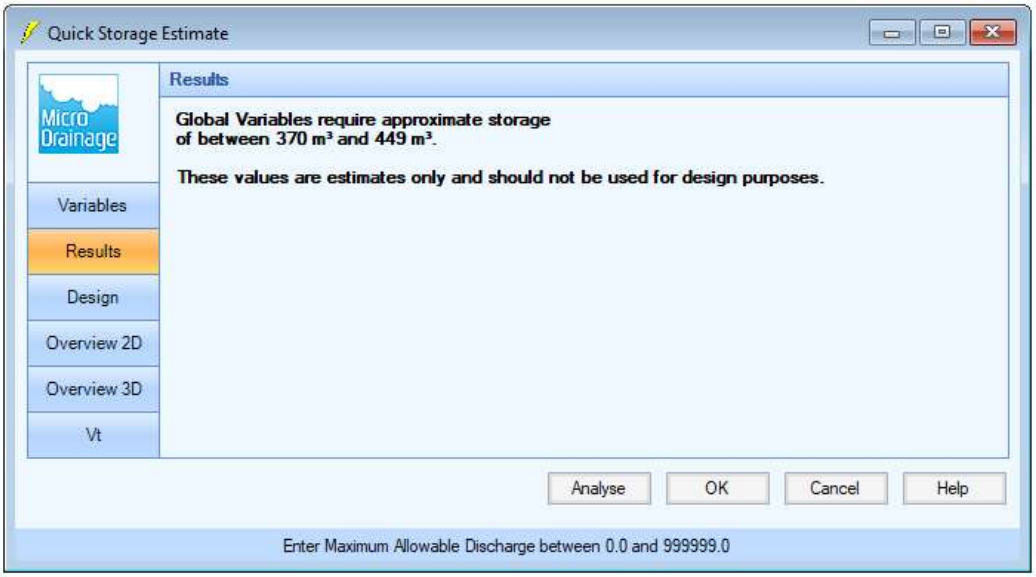
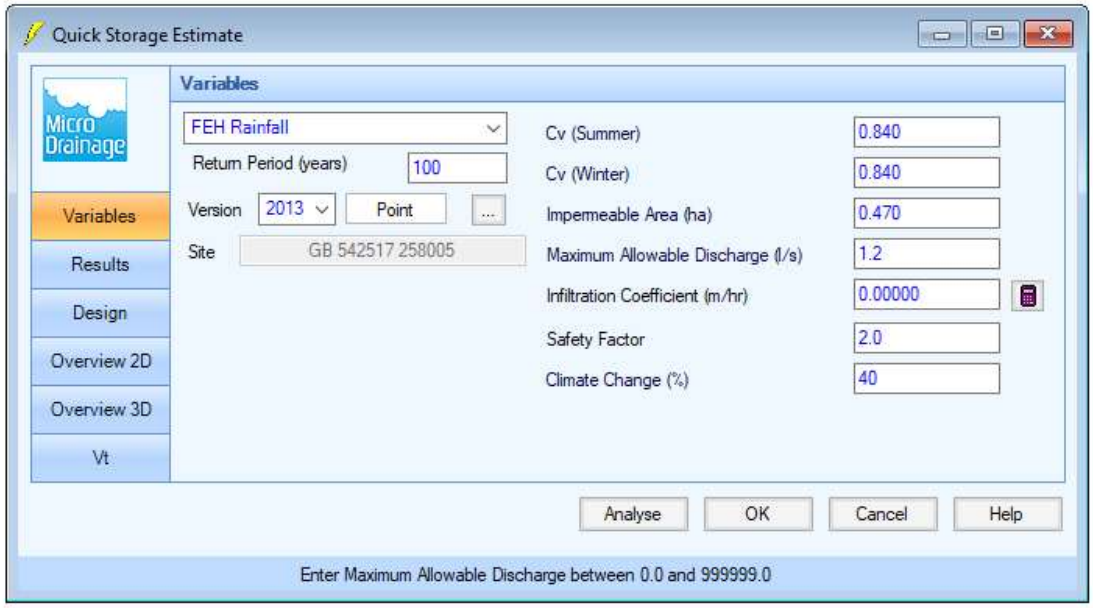
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

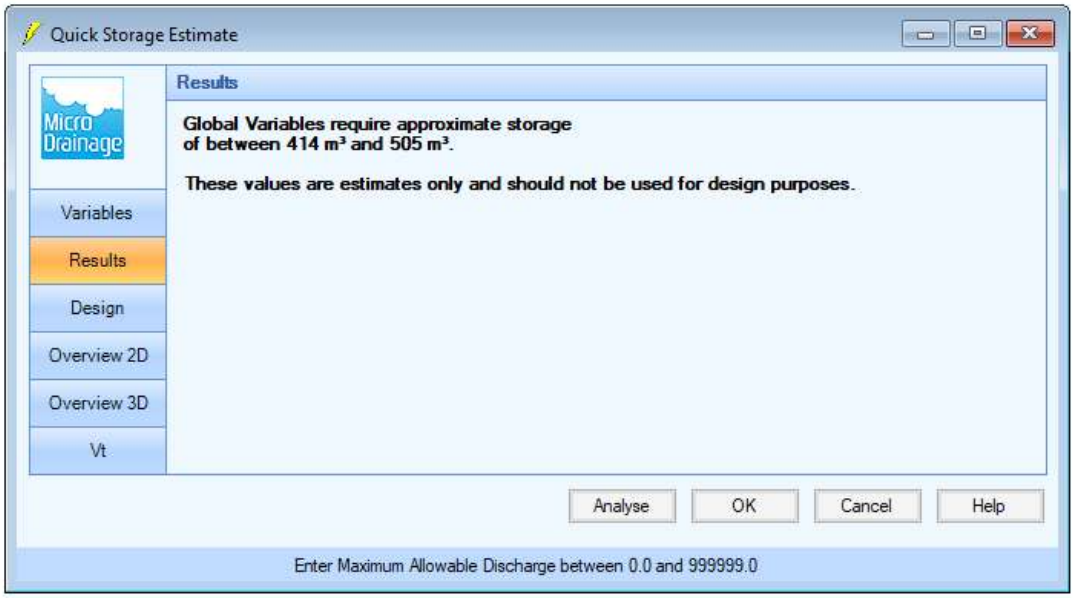
Parcel 5a


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.421
Maximum Allowable Discharge (l/s) 1.1
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

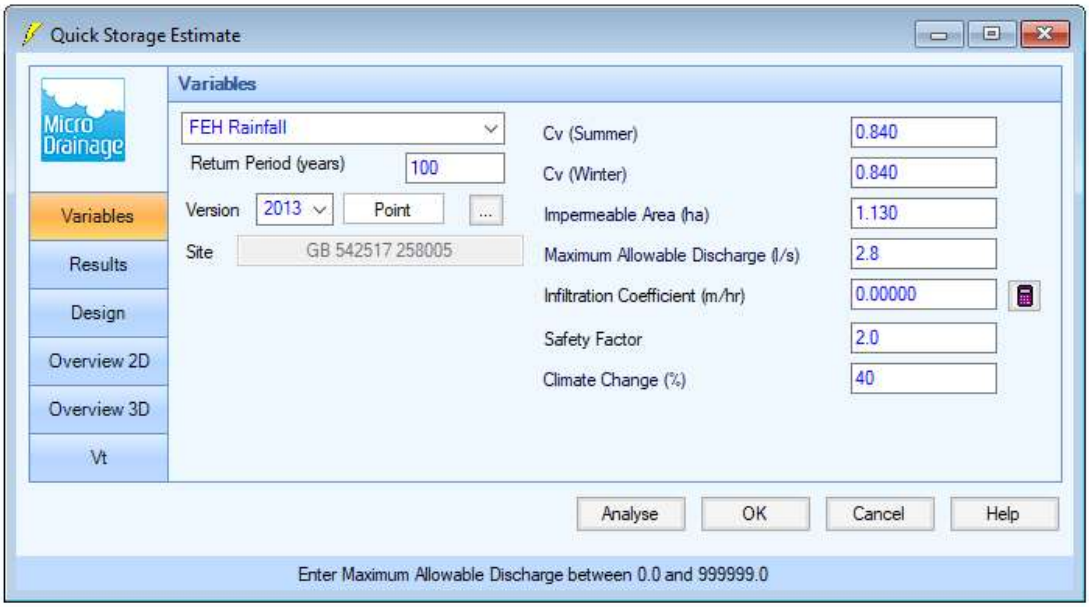

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 370 m³ and 449 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

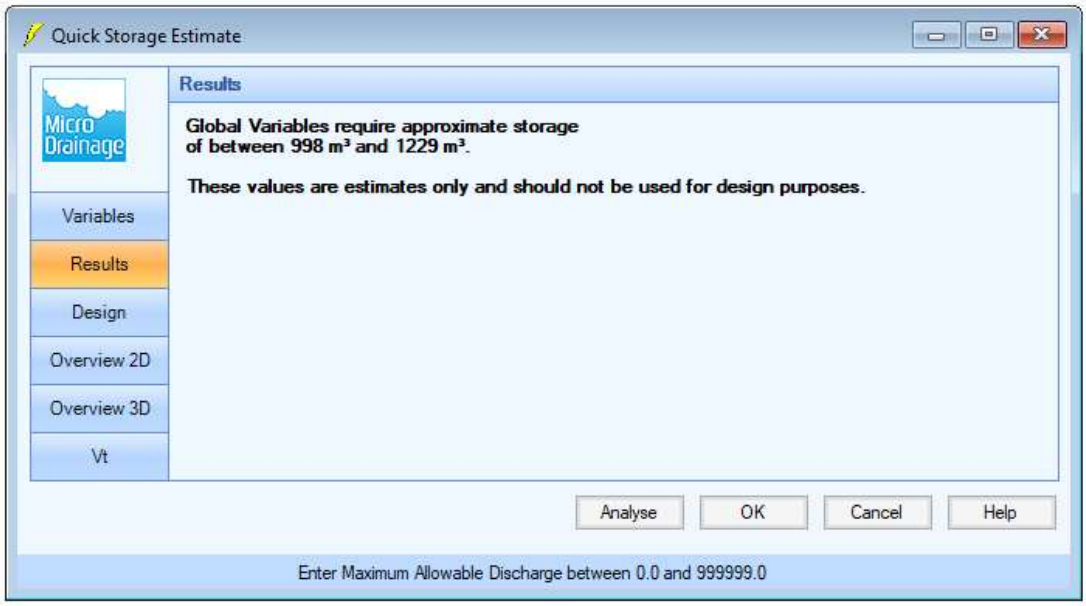
Parcel 6


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.470
Maximum Allowable Discharge (l/s) 1.2
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

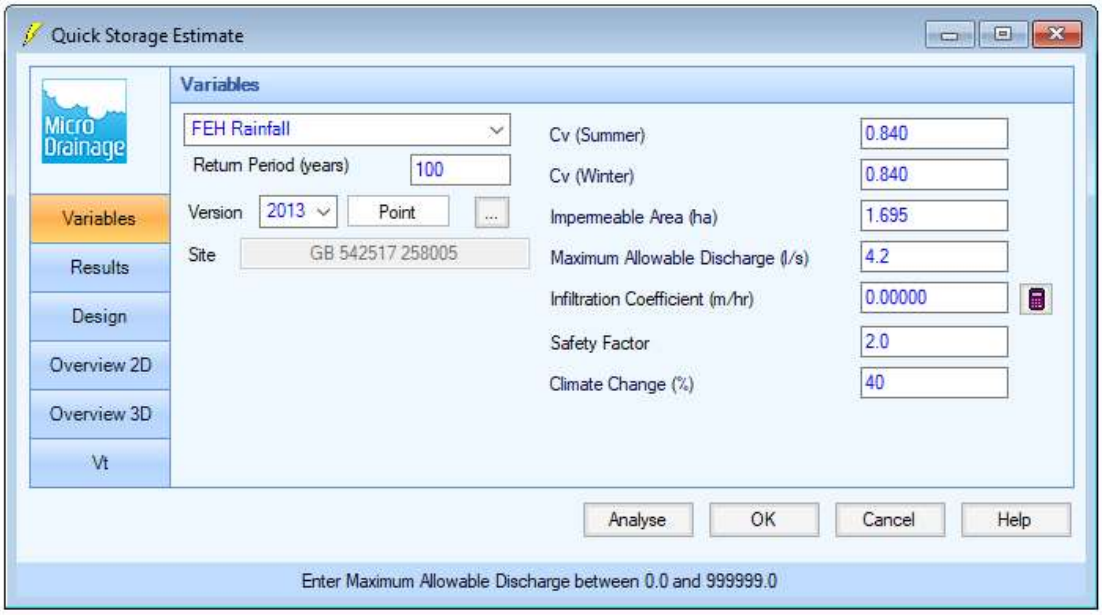

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 414 m³ and 505 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

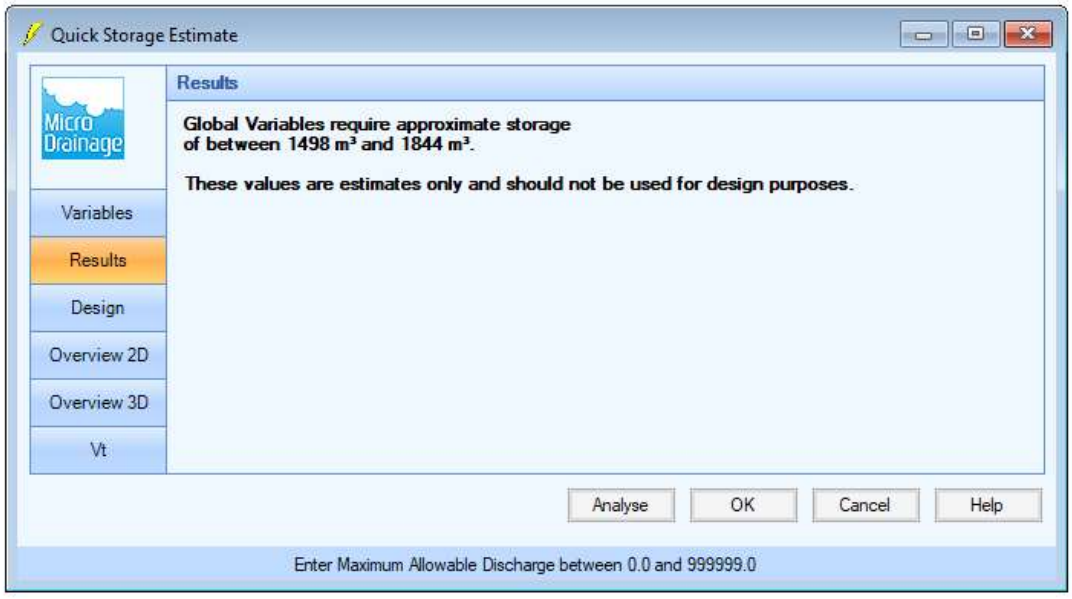
Parcel 7


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 1.130
Maximum Allowable Discharge (l/s) 2.8
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

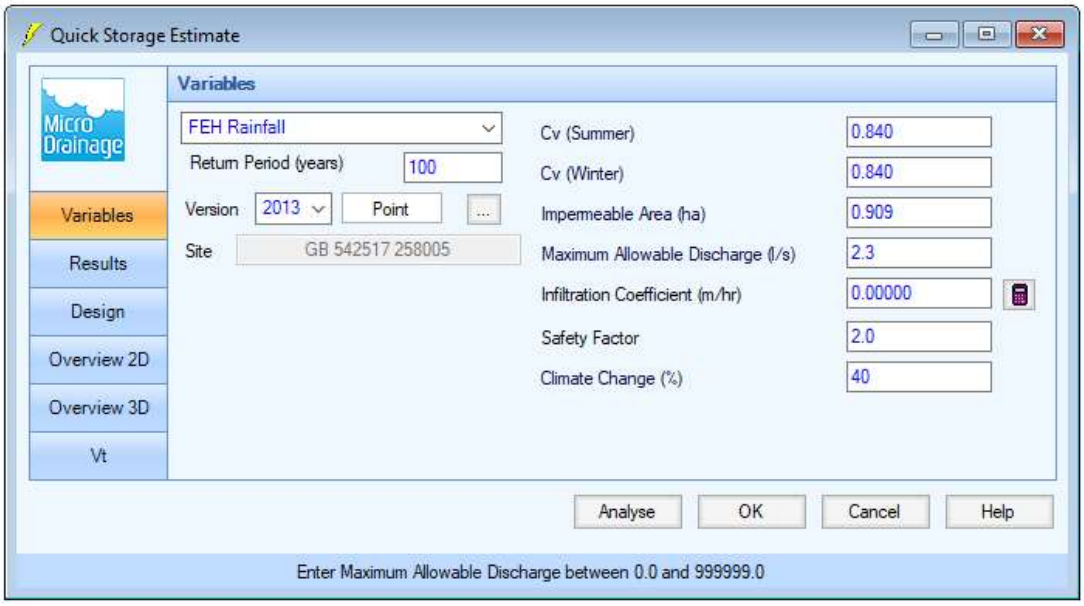

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 998 m³ and 1229 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

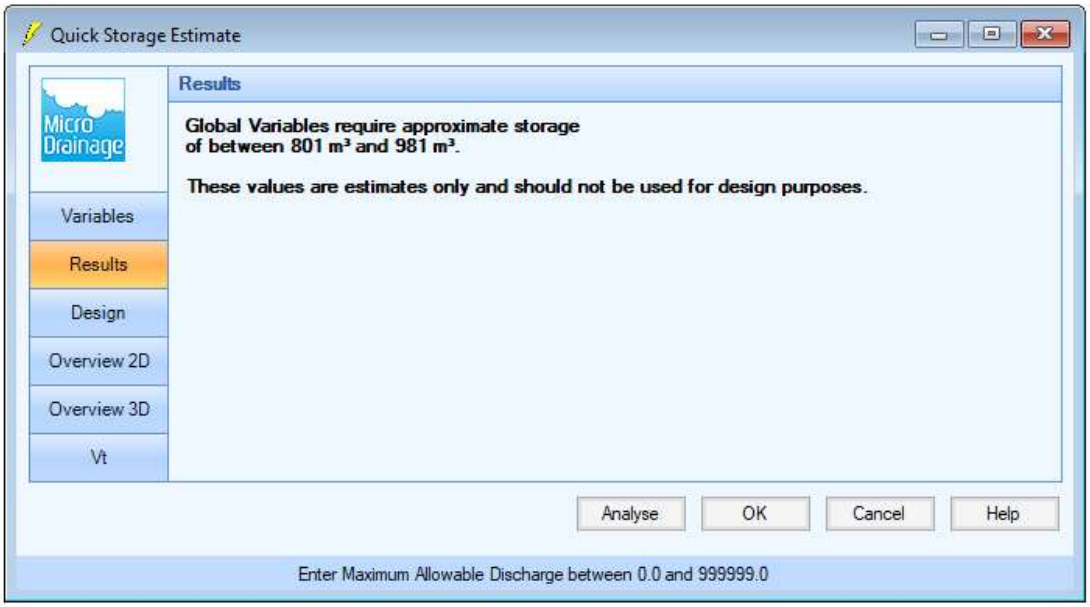
Parcel 8


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 1.695
Maximum Allowable Discharge (l/s) 4.2
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

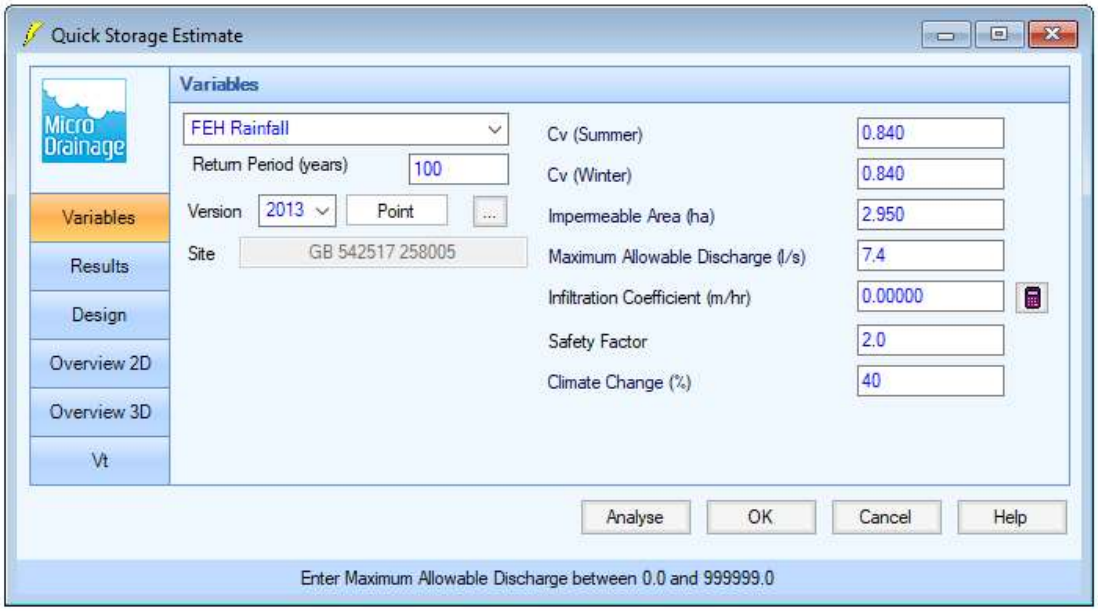

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 1498 m³ and 1844 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

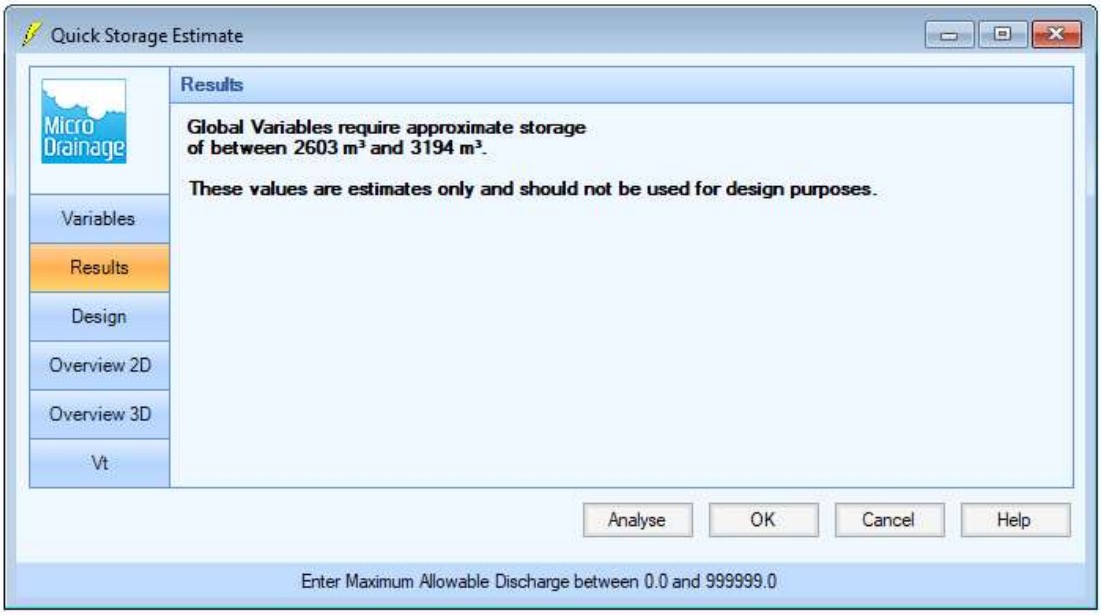
Parcel 9


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 0.909
Maximum Allowable Discharge (l/s) 2.3
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

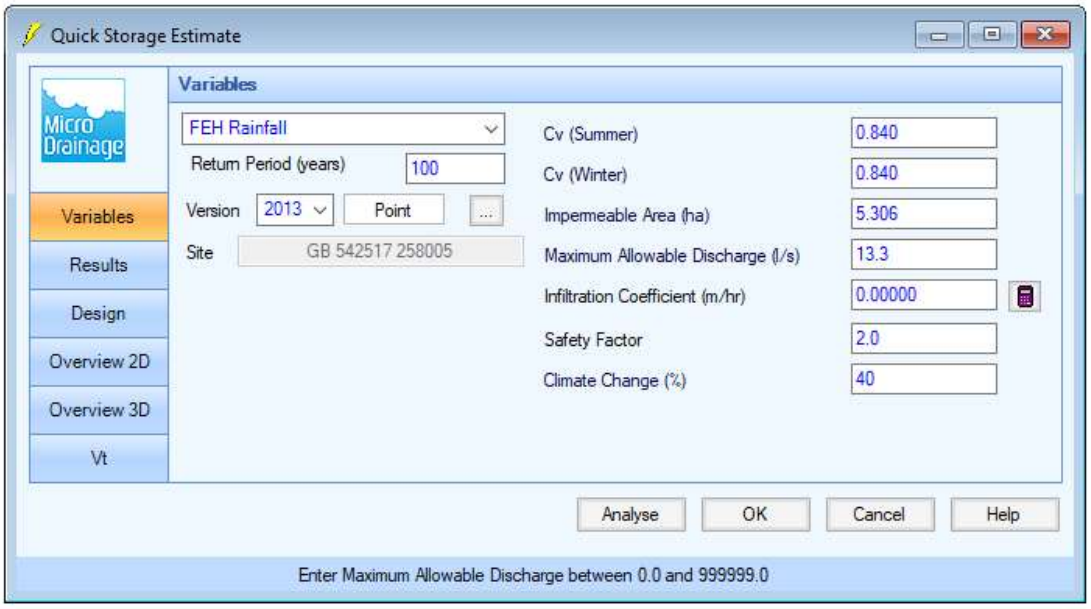

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 801 m³ and 981 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

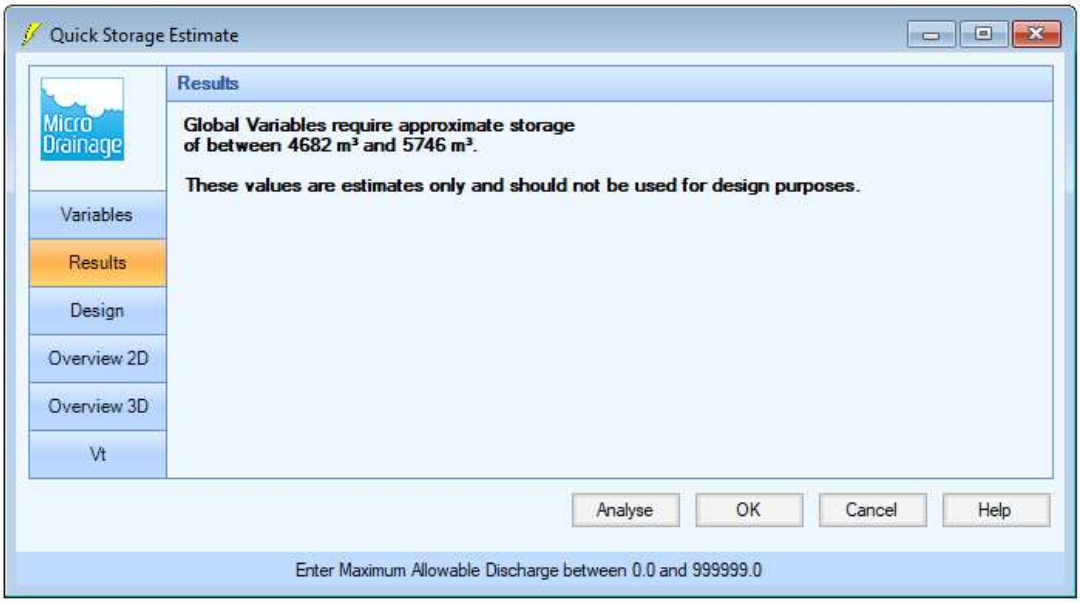
Parcel 10


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years)
100
Version
2013
Point
...
Site
GB 542517 258005
Cv (Summer)
0.840
Cv (Winter)
0.840
Impermeable Area (ha)
2.950
Maximum Allowable Discharge (l/s)
7.4
Infiltration Coefficient (m/hr)
0.00000
Safety Factor
2.0
Climate Change (%)
40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

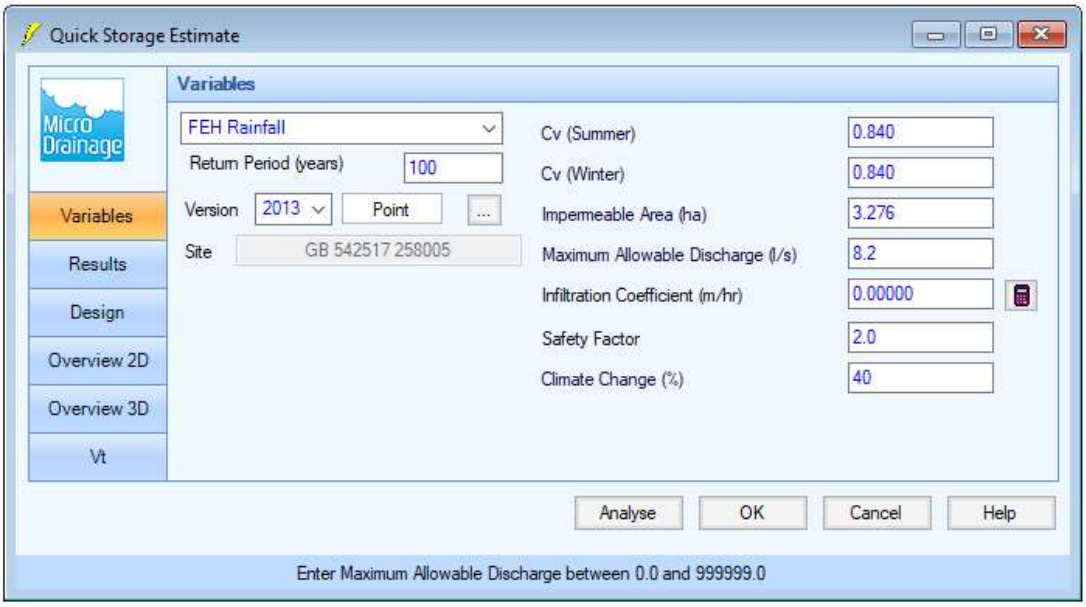

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 2603 m³ and 3194 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

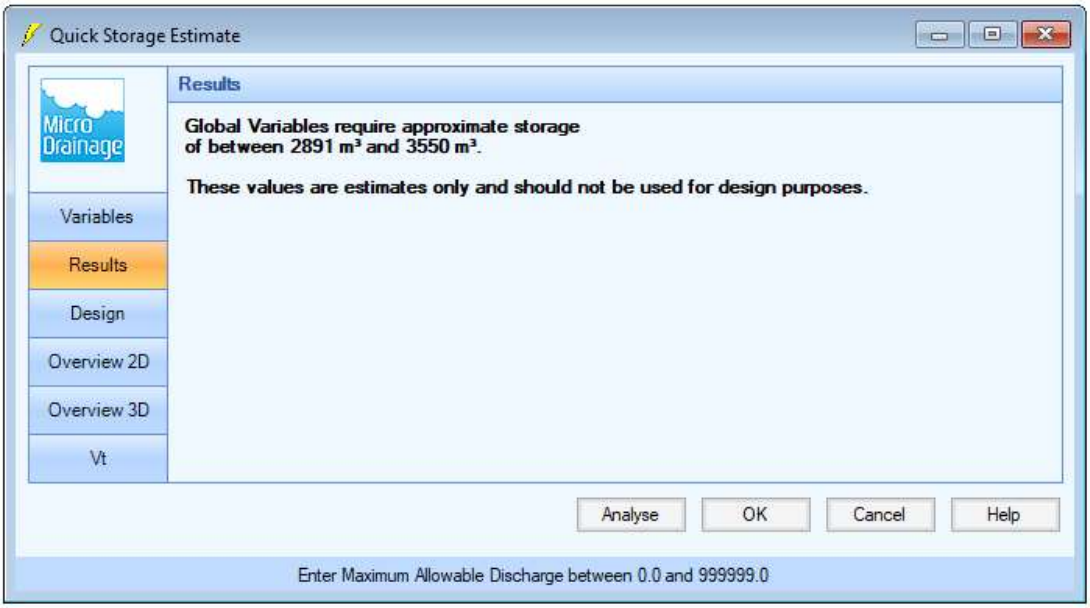
Parcel 10a


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 5.306
Maximum Allowable Discharge (l/s) 13.3
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

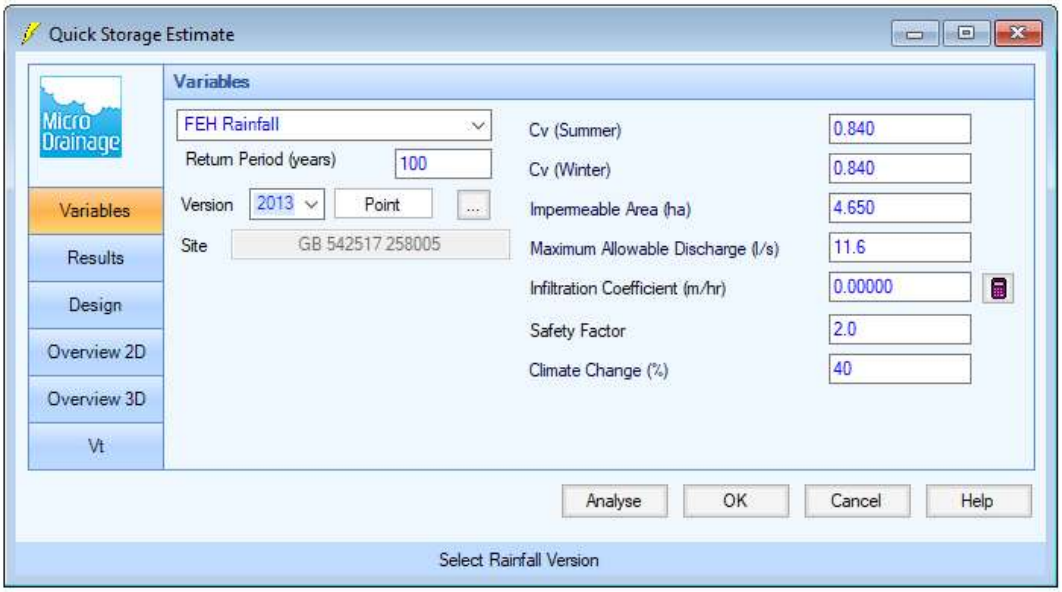

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 4682 m³ and 5746 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

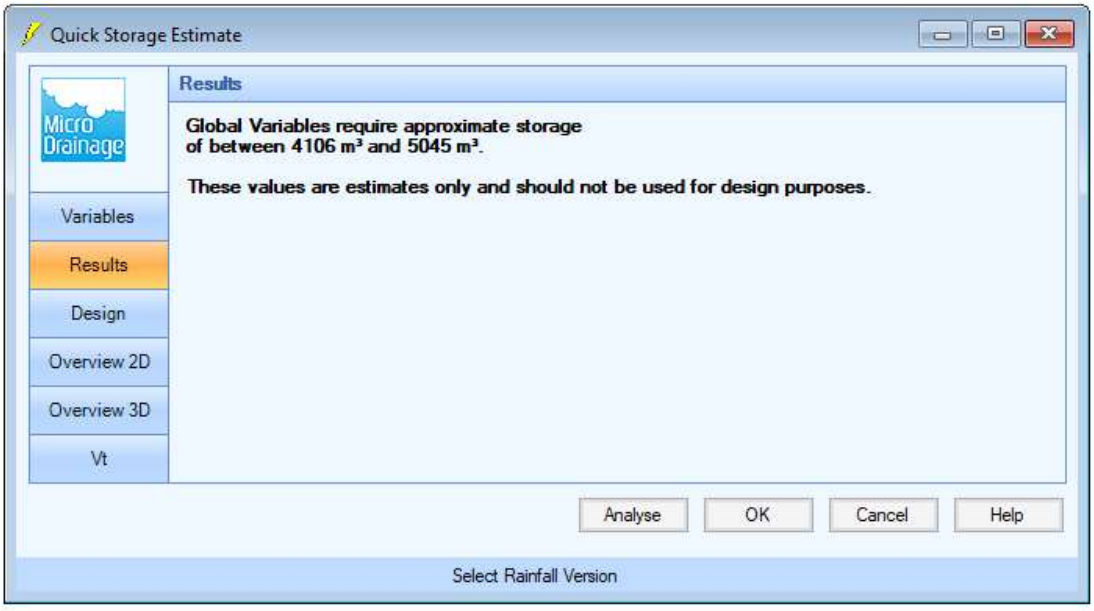
Parcel 10b


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years)
100
Version
2013
Point
...
Site
GB 542517 258005
Cv (Summer)
0.840
Cv (Winter)
0.840
Impermeable Area (ha)
3.276
Maximum Allowable Discharge (l/s)
8.2
Infiltration Coefficient (m/hr)
0.00000
Safety Factor
2.0
Climate Change (%)
40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

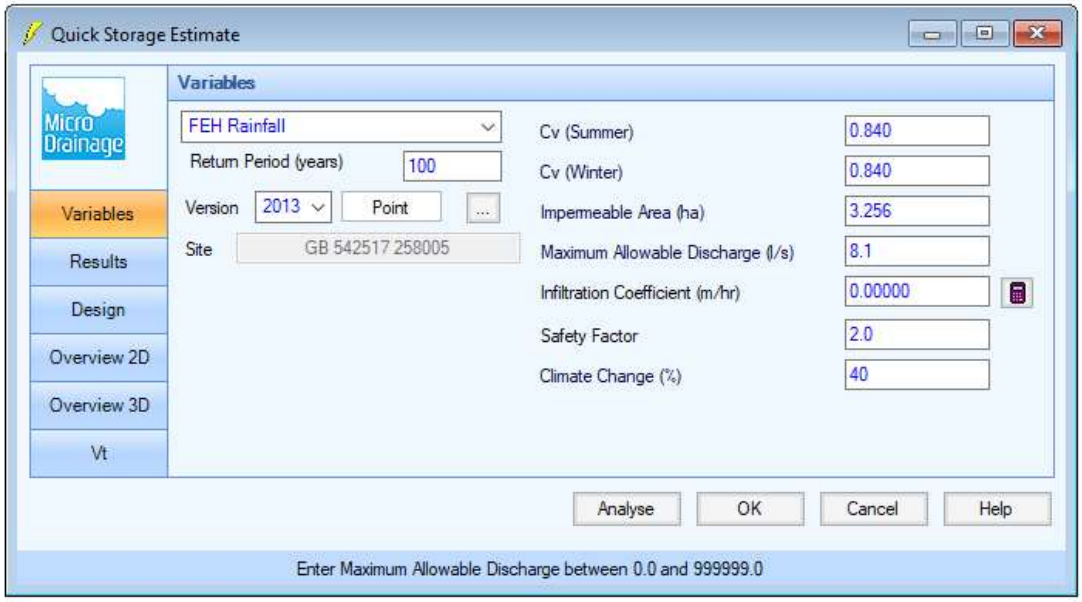

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 2891 m³ and 3550 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

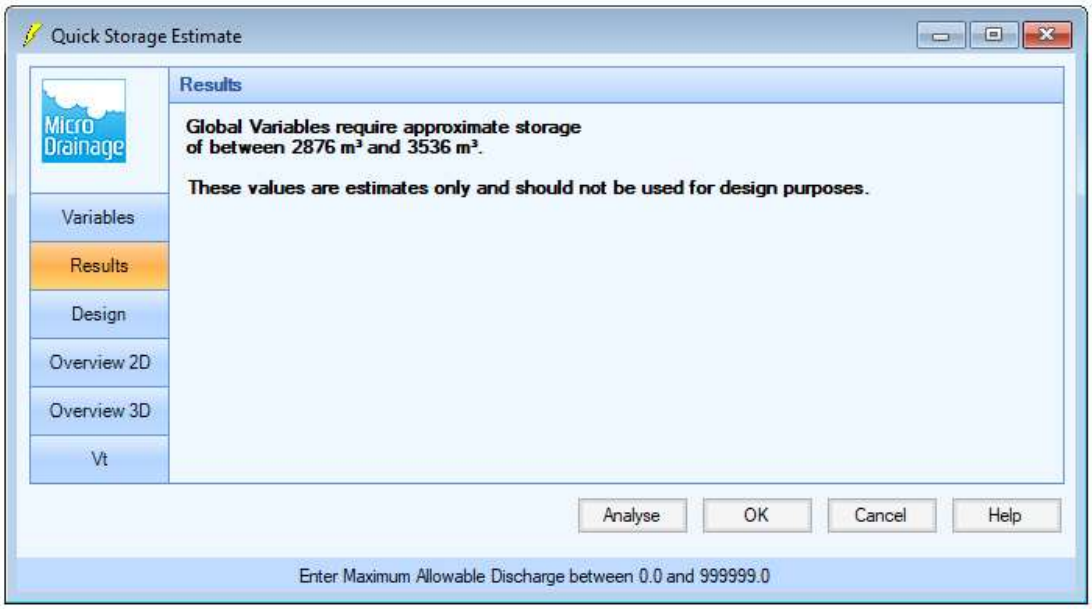
Parcel 11


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years)
100
Version
2013
Point
Site
GB 542517 258005
Cv (Summer)
0.840
Cv (Winter)
0.840
Impermeable Area (ha)
4.650
Maximum Allowable Discharge (l/s)
11.6
Infiltration Coefficient (m/hr)
0.00000
Safety Factor
2.0
Climate Change (%)
40
Analyse
OK
Cancel
Help
Select Rainfall Version

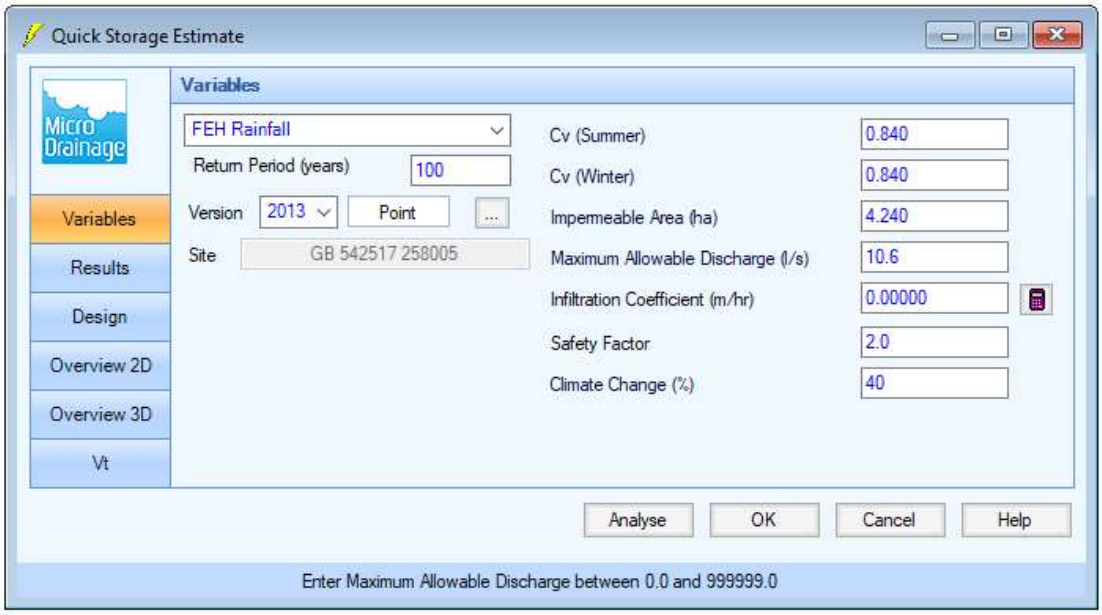

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 4106 m³ and 5045 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Select Rainfall Version

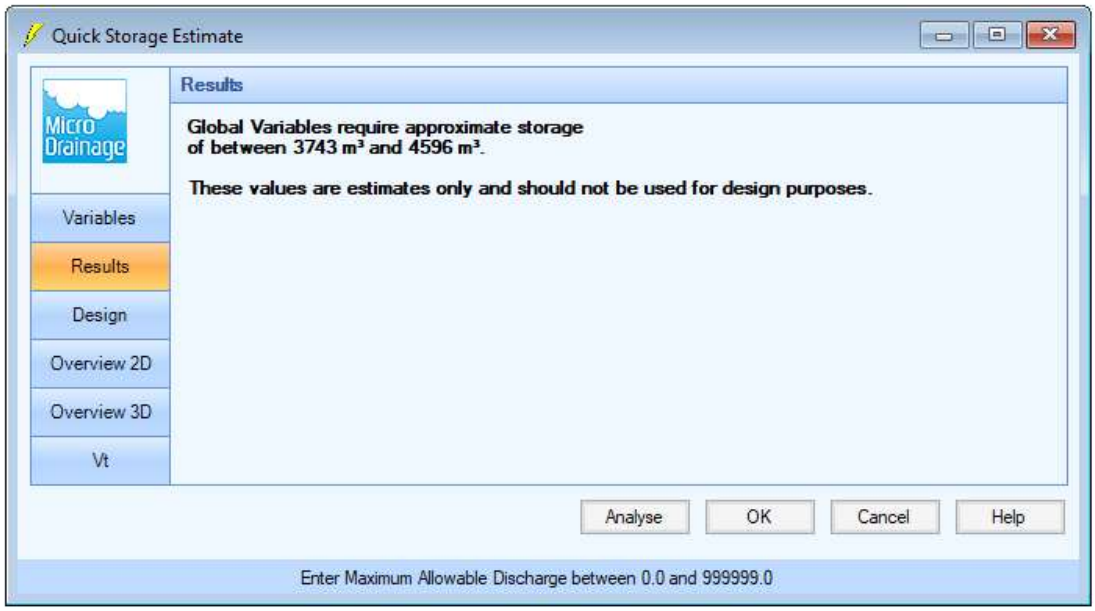
Parcel 11a


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 3.256
Maximum Allowable Discharge (l/s) 8.1
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 2876 m³ and 3536 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0

Parcel 12


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 2013
Point
Site GB 542517 258005
Cv (Summer) 0.840
Cv (Winter) 0.840
Impermeable Area (ha) 4.240
Maximum Allowable Discharge (l/s) 10.6
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 3743 m³ and 4596 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Maximum Allowable Discharge between 0.0 and 999999.0