

APPENDIX C

Fluvial Flood Map for Planning

Flood map for planning

Your reference
19/013

Location (easting/northing)
300480/511080

Created
6 Oct 2020 14:20

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

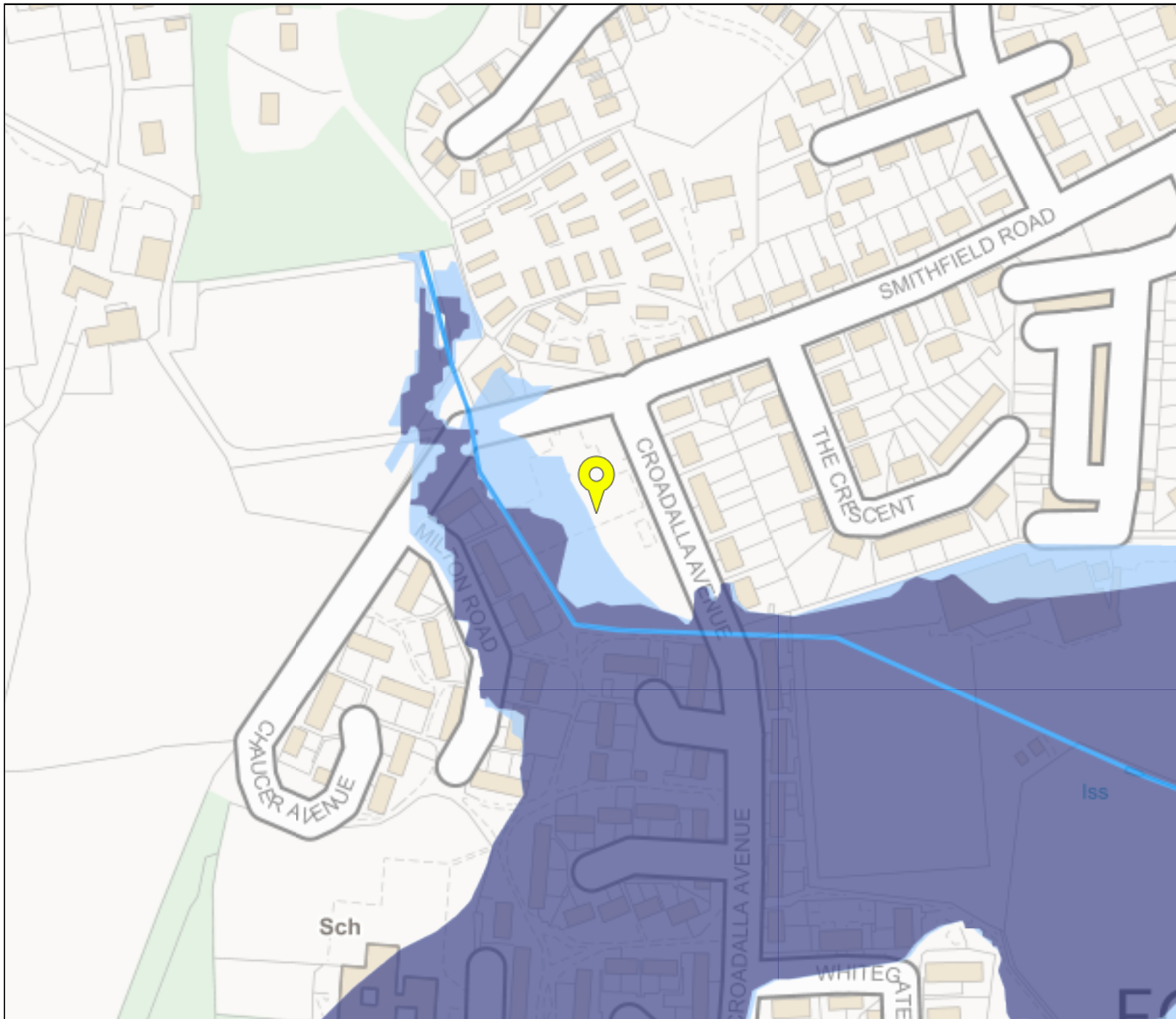
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

Your reference

19/013

Location (easting/northing)









300480/511080

Scale

1:2500

Created

6 Oct 2020 14:20

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 20 40 60m

APPENDIX D

Predicted flood levels provided by the Environment Agency

John O'Connor

From: Stanger, Graham [graham.stanger@environment-agency.gov.uk]
Sent: 22 October 2019 08:22
To: John O'Connor
Cc: Hall, Chris; Scopes, David S; Tom Lawrenson
Subject: FW: Skirting Beck - Information as requested

Hi John,

Please see info below . I am out of the office shortly and will have limited access to my emails, if you need mor model information please contact Chris Hall / David Scopes our design team who will be able to assist with model information.

Regards

Graham Stanger – Project Manager
Programme & Contract Management (PCM)
part of Operations Assets & Programme Management

Environment Agency

✉ Richard Fairclough House, Knutsford Road, Latchford, Warrington WA4 1HT
Mobile: 07771 51 3115

📧 graham.stanger@environment-agency.gov.uk

🌳 Please consider the environment before printing this email

From: Hall, Chris [mailto:Chris.Hall2@atkinsglobal.com]
Sent: 21 October 2019 17:05
To: Stanger, Graham <graham.stanger@environment-agency.gov.uk>
Cc: Scopes, David S <David.Scopes@atkinsglobal.com>
Subject: Skirting Beck - Information as requested

Hi Graham,

As requested, the planning application reference is 4/19/2044/0F1

I have included information below, showing overtopping events at the various reservoirs.

	Event	Overtopping Volume (m3)	Peak Overtopping Flow (m3/s)	Peak Level (mAOD)	Notes
How Bank	Q5+CC			65.56	No overtopping for during Q100+CC and below
67.65	Q10+CC			65.62	
	Q20+CC			65.68	
	Q30+CC			65.96	
	Q50+CC			66.65	
	Q75+CC			67.12	
	Q100+CC			67.48	
Whangs Upper	Q5+CC			77.23	
78	Q10+CC			77.97	
	Q20+CC	2621	0.7	78.07	Overtopping flow into Whangs Lower
	Q30+CC	4284	0.92	78.08	
	Q50+CC	6700	1.2	78.09	
	Q75+CC	8400	1.35	78.12	
	Q100+CC	9900	1.44	78.12	
Whangs Lower	Q5+CC	-		65.8	
69.8	Q10+CC	-		66.23	
	Q20+CC	-		68.79	
	Q30+CC	-		69.67	
	Q50+CC	2,300	0.8	69.87	Overtopping flow down Baybarrow road, through school and eventually into WLA
	Q75+CC	4,300	1.1	69.89	
	Q100+CC	5,900	1.3	69.9	
WLA	Q5+CC			48.87	

49.7	Q10+CC			49.1	
	Q20+CC			49.31	
	Q30+CC			49.41	
	Q50+CC	-		49.59	
	Q75+CC	700	0.6	49.72	
	Q100+CC	6,000	1.3	49.73	

Please let me know if you require anything further.

Chris Hall
 Graduate Civil Engineer, Infrastructure
 UK & Europe
 Engineering, Design and Project Management

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Company ☐☐☐☐

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APPENDIX E

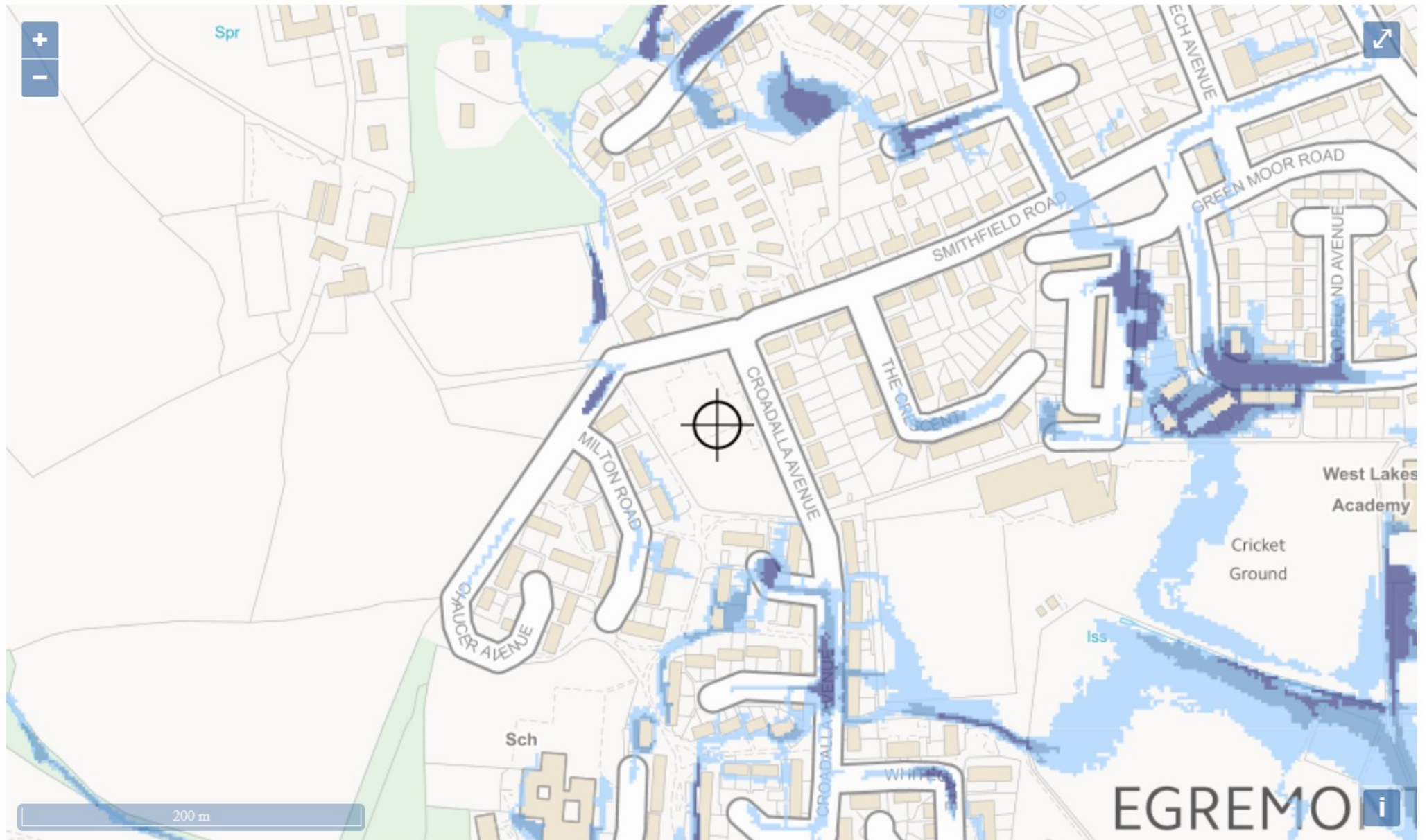
Updated Surface Water Flood Map

Flood risk

Location

Extent of flooding

Enter a place or postcode



Extent of flooding from surface water

● [High](#) ● [Medium](#) ● [Low](#) ○ [Very low](#) ⊕ Location you selected

APPENDIX F

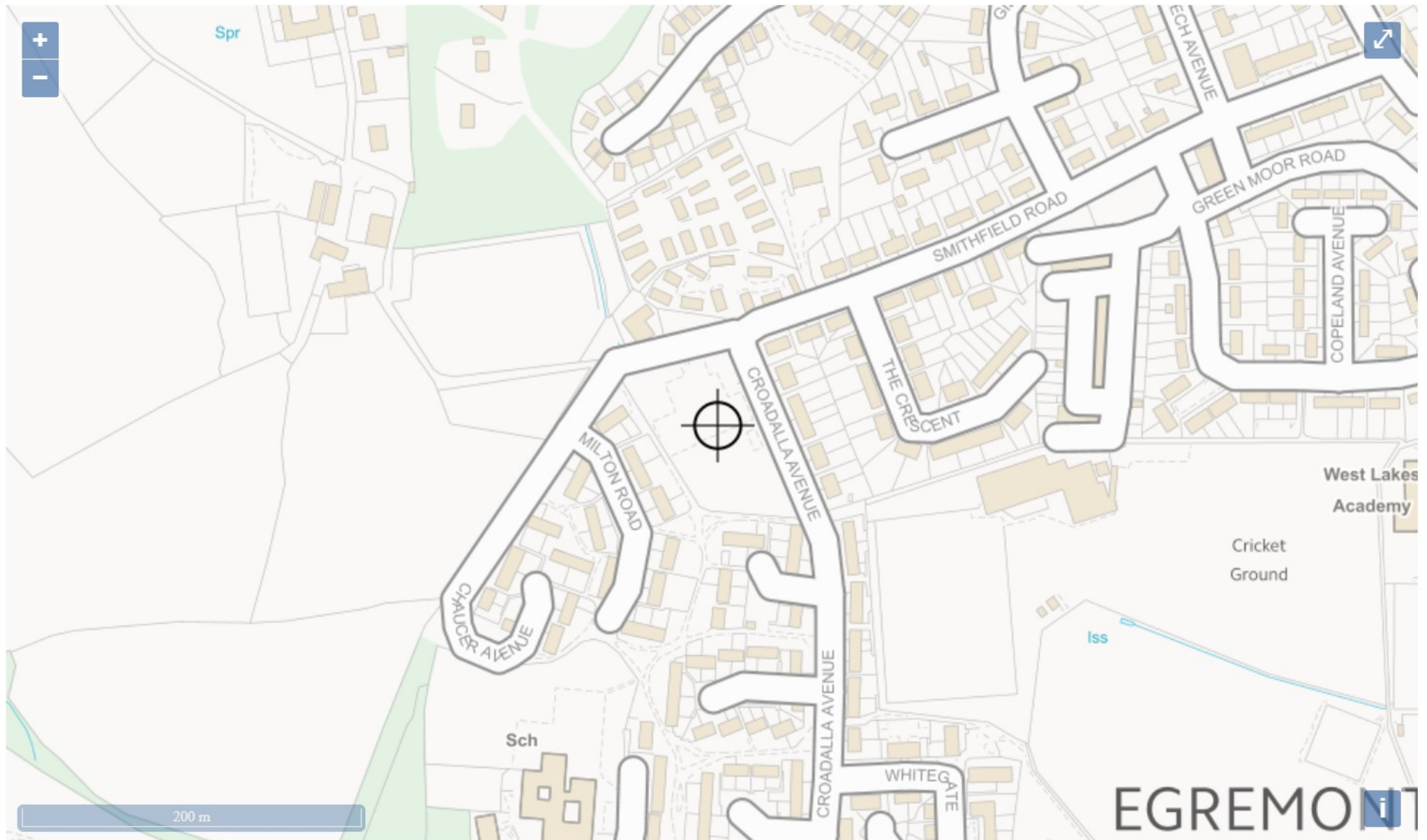
Reservoirs Flood Map

Flood risk

Location

Extent of flooding

Enter a place or postcode



Extent of flooding from reservoirs

● Maximum extent of flooding ⊕ Location you selected

APPENDIX G

ReFH 2 estimates of peak surface water runoff rates and volumes

19/013: Orgill School, Egremont

REFH2 estimates of surface water runoff rates and volumes

Description	Return period (yrs)	Urbanised peak flow (l/s)	Urbanised direct runoff (m ³)	As-rural peak flow (l/s)	As-rural direct runoff (m ³)	% increase in peak flow rate	% increase in volume
1 year	1	6.07	35.70	0.86	5.08	605.5%	603.0%
2 year	2	6.84	40.22	0.97	5.82	602.8%	591.3%
5 year	5	9.39	55.46	1.37	8.46	584.8%	555.2%
10 year	10	11.26	66.57	1.69	10.54	568.0%	531.5%
30 year	30	14.54	86.21	2.28	14.51	536.7%	494.1%
50 year	50	16.34	97.02	2.64	16.85	519.8%	475.7%
75 year	75	17.94	106.61	2.96	19.02	505.3%	460.4%
100 year	100	19.17	114.03	3.23	20.76	494.3%	449.3%
100 year 1.2 CC	100	23.10	137.70	4.12	26.64	460.9%	416.9%
100 year 1.4 CC	100	27.05	161.66	5.10	33.09	430.8%	388.5%
200 year	200	22.56	134.48	3.99	25.81	465.3%	421.1%
1000 year	1000	31.99	191.66	6.43	41.86	397.6%	357.9%
Average:						514.3%	478.7%

Effect of CCA on 1% AEP event

	Peak flow rural increase	Runoff volume rural increase	Peak flow post development increase	Runoff volume post development increase
20% CCA increase	27.6%	40.0%		
40% CCA increase	58.0%	74.0%		

APPENDIX H

UK SuDS estimate of attenuation storage



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site characteristics

Total site area (ha):	<input type="text" value="0.65"/>
Significant public open space (ha):	<input type="text" value="0"/>
Area positively drained (ha):	<input type="text" value="0.65"/>
Impermeable area (ha):	<input type="text" value="0.325"/>
Percentage of drained area that is impermeable (%):	<input type="text" value="50"/>
Impervious area drained via infiltration (ha):	<input type="text" value="0"/>
Return period for infiltration system design (year):	<input type="text" value="10"/>
Impervious area drained to rainwater harvesting (ha):	<input type="text" value="0"/>
Return period for rainwater harvesting system (year):	<input type="text" value="10"/>
Compliance factor for rainwater harvesting system (%):	<input type="text" value="66"/>
Net site area for storage volume design (ha):	<input type="text" value="0.65"/>
Net impermeable area for storage volume design (ha):	<input type="text" value="0.37"/>
Pervious area contribution to runoff (%):	<input type="text" value="30"/>

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	<input type="text" value="1.4"/>
Urban creep allowance factor:	<input type="text" value="1.1"/>
Volume control approach	<input type="text" value="Use long term storage"/>
Interception rainfall depth (mm):	<input type="text" value="5"/>
Minimum flow rate (l/s):	<input type="text" value="3.5"/>

Methodology

esti	<input type="text" value="IH124"/>
Q_{BAR} estimation method:	<input type="text" value="Calculate from SPR and SAAR"/>
SPR estimation method:	<input type="text" value="Calculate from SOIL type"/>

Soil characteristics

	Default	Edited
SOIL type:	<input type="text" value="4"/>	<input type="text" value="4"/>
SPR:	<input type="text" value="0.47"/>	<input type="text" value="0.47"/>

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	<input type="text" value="--"/>	<input type="text" value="70"/>
Rainfall 100 yrs 12 hrs:	<input type="text" value="--"/>	<input type="text" value="84"/>
FEH / FSR conversion factor:	<input type="text" value="1"/>	<input type="text" value="1"/>
SAAR (mm):	<input type="text" value="1169"/>	<input type="text" value="1169"/>
M5-60 Rainfall Depth (mm):	<input type="text" value="20"/>	<input type="text" value="20"/>
'r' Ratio M5-60/M5-2 day:	<input type="text" value="0.3"/>	<input type="text" value="0.3"/>
Hydrological region:	<input type="text" value="10"/>	<input type="text" value="10"/>
Growth curve factor 1 year:	<input type="text" value="0.87"/>	<input type="text" value="0.87"/>
Growth curve factor 10 year:	<input type="text" value="1.38"/>	<input type="text" value="1.38"/>
Growth curve factor 30 year:	<input type="text" value="1.7"/>	<input type="text" value="1.7"/>
Growth curve factor 100 years:	<input type="text" value="2.08"/>	<input type="text" value="2.08"/>
Q_{BAR} for total site area (l/s):	<input type="text" value="5.72"/>	<input type="text" value="5.72"/>
Q_{BAR} for net site area (l/s):	<input type="text" value="5.72"/>	<input type="text" value="5.72"/>

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	<input type="text" value="5"/>	<input type="text" value="5"/>
1 in 30 years (l/s):	<input type="text" value="9.7"/>	<input type="text" value="9.7"/>
1 in 100 year (l/s):	<input type="text" value="11.9"/>	<input type="text" value="11.9"/>

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	<input type="text" value="222"/>	<input type="text" value="222"/>
Long term storage 1/100 years (m^3):	<input type="text" value="0"/>	<input type="text" value="0"/>
Total storage 1/100 years (m^3):	<input type="text" value="222"/>	<input type="text" value="222"/>

This report was produced using the storage estimation tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://www.uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

End of Report