

Appendix A

Topographic Survey



Site Grid North

Symbols/Abbreviations (Where Applicable):

- +AV: AIR VALVE
- +BB: BELISHA BEACON
- +BH: BOREHOLE
- +BM: BENCHMARK
- +BOL: BOLLARD
- +BUS: BUS STOP
- +CAM: CAMERA
- +CS: CABLE STAY
- +CCTV: C.C.T.V. INSPECTION CHAMBER
- +CBOX: C.C.T.V. CAMERA
- +CATCH: CATCH PIT
- +EC: ELECTRICITY COVER
- +EP: ELECTRICITY POLE
- +ER: EARTH ROD
- +FH: FIRE HYDRANT
- +FP: FLAG POLE
- +G: GULLY
- +G: GULLY (ROUND)
- +GV: GAS VALVE
- +IC: INSPECTION COVER (SQUARE)
- +IC: INSPECTION COVER (ROUND)
- +IL: INVERT LEVEL
- +KO: KERB OUTLET
- +L: LETTER BOX
- +LC: LIGHTING COLUMN
- +LP: LAMP POST
- +LP/BS: LAMP POST/BUS STOP
- +MH: MANHOLE (SQUARE)
- +MH: MANHOLE (ROUND)
- +MKR: MARKER
- +OP: POST
- +RE: RODDING EYE
- +RS: ROAD SIGN
- +S/P: SIGN POST
- +SNP: STREET NAME PLATE
- +ST: STOP TAP
- +SV: STOP VALVE
- +TCB: TELEPHONE CALL BOX
- +TL: TRAFFIC LIGHT
- +TP: TELEGRAPH POLE
- +TP/EP: TELEGRAPH POLE/ELECTRIC POLE
- +T/C: TELECOM INSPECTION COVER
- +WO: WATER OUTLET
- +WM: WATER METER
- +X: GATE
- +X: DEFINED POINT
- +X: CONTROL POINT
- +X: TREE (CONIFEROUS)
- +X: TREE (DECIDUOUS)
- +X: FOLIAGE
- +X: HEDGE
- +X: DPC 99.99m DAMP PROOF COURSE LEVEL
- +X: EL 99.99m EAVES LEVEL
- +X: FL 99.99m FLOOR LEVEL
- +X: RL 99.99m RIDGE LEVEL
- +X: SL 99.99m SOFFIT LEVEL
- +X: TL 99.99m THRESHOLD LEVEL

FENCE DESCRIPTIONS:

- B/W: BARBED WIRE FENCE
- C/B: CLOSE BOARDED FENCE
- C/L: CHAIN LINK FENCE
- C/P: CHESTNUT PALING FENCE
- CONC/P: CONCRETE PANEL FENCE
- I/R: IRON RAILING FENCE
- P/R: POST AND RAIL FENCE
- P/W: POST AND WIRE FENCE
- P/C: POST AND CHAIN FENCE
- S/PAL: STEEL PALISADE FENCE
- S/B: SAFETY BARRIER
- T/PAL: TIMBER PALISADE FENCE

Revision Information

Rev	Date	Description

INFORMATION

1) Ordnance Survey co-ordinates and level are derived from OSTN02 and OSGB02, transformed from WGS84.

2) Only services located during the site survey are shown on this plan. Further investigation may be required to ascertain the full extent of the site services.

3) Copyright of this drawing remains the property of PM Surveys UK Ltd. Do not scale from this drawing. In the event of any discrepancy, refer only to PM Surveys UK Ltd.

NOTES

Ordnance Survey Bench Mark Used

Location	Type	Value (m)
1		
2		

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Project Ipsen Biopharm

Project No	Sheet: A0	Surveyed By: DJ AL
PMS17120	Scale: 1:200	Drawn By: JW
		Approved By: PM

Dwg	PMS17120-A	Issued: 27/09/17
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Appendix B

Catchment Descriptors

VERSION	"FEH CD-R Version	3 exported a	10:37:19 GMT	Wed	04-Oct-17
CATCHMEN	GB	336600	350450 SJ 36600 50450		
CENTROID	GB	336065	350672 SJ 36065 50672		
AREA	0.5075				
ALTBAR	67				
ASPBAR	118				
ASPVAR	0.69				
BFIHOST	0.689				
DPLBAR	0.7				
DPSBAR	37.1				
FARL	1				
FPEXT	0.0049				
FPDBAR	0.02				
FPLOC	-999999				
LDP	1.55				
PROPWET	0.51				
RMED-1H	9.6				
RMED-1D	29.8				
RMED-2D	36.6				
SAAR	721				
SAAR4170	730				
SPRHOST	25.31				
URBCONC1	-999999				
URBEXT199	0				
URBLOC199	-999999				
URBCONC2	-999999				
URBEXT200	0				
URBLOC200	-999999				
C	-0.02417				
D1	0.31767				
D2	0.38726				
D3	0.31524				
E	0.28493				
F	2.40732				
C(1 km)	-0.025				
D1(1 km)	0.314				
D2(1 km)	0.395				
D3(1 km)	0.319				
E(1 km)	0.284				
F(1 km)	2.395				

Appendix C

FEH Calculation Record

Introduction

This document provides a record of the calculations and decisions made during flood estimation. It will often be complemented by more general hydrological information given in a project report. The information given here should enable the work to be reproduced in the future.

Contents

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Approval

	Signature	Name and qualifications	For Natural Resources Wales staff: Competence level (see below)
Calculations prepared by:		Alejandro Ortiz MSc	Hydrology and Hydraulic Modeller
Calculations checked by:		Richard Curtis BEng Msc	Senior Hydraulic Modeller
Calculations approved by:			

Competence levels:

- Level 1 – Hydrologist with minimum approved experience in flood estimation
- Level 2 – Senior Hydrologist
- Level 3 – Senior Hydrologist with extensive experience of flood estimation

ABBREVIATIONS

AM	Annual Maximum
AREA	Catchment area (km ²)
BFI	Base Flow Index
BFIHOST	Base Flow Index derived using the HOST soil classification
CFMP	Catchment Flood Management Plan
CPRE	Council for the Protection of Rural England
FARL	FEH index of flood attenuation due to reservoirs and lakes
FEH	Flood Estimation Handbook
FSR	Flood Studies Report
HOST	Hydrology of Soil Types
NRFA	National River Flow Archive
POT	Peaks Over a Threshold
QMED	Median Annual Flood (with return period 2 years)
ReFH	Revitalised Flood Hydrograph method
SAAR	Standard Average Annual Rainfall (mm)
SPR	Standard percentage runoff
SPRHOST	Standard percentage runoff derived using the HOST soil classification
Tp(o)	Time to peak of the instantaneous unit hydrograph
URBAN	Flood Studies Report index of fractional urban extent
URBEXT2000	Revised index of urban extent
WINFAP-FEH	Windows Frequency Analysis Package – used for FEH statistical method

1 Method statement

1.1 Overview of requirements for flood estimates

Item	Comments
Give an overview which includes: - Purpose of study - Approx. no. of flood estimates required - Peak flows or hydrographs? - Range of return periods and locations - Approx. time available	Flood frequency analysis of a unnamed river tributary of the Redwither Brook is necessary to inform the potential flood risks associated with the culvert beneath the site and its capacities, possible blockage scenarios its flood zones and flowpaths. Peak flows will be produced via statistical method to fit the peak, hydrographs will be derived from ReFH.

1.2 Overview of catchment

Item	Comments
Brief description of catchment, or reference to section in accompanying report	As the unnamed watercourse of interest for this study is quite small and it's a tributary of the Redwither Brook, none characteristics in FEH Web service for this particular site where located, therefore the analysis has been undertaken on an adjacent catchment with similar characteristics with flows ratio to the catchment size to develop this study and the FCA

1.3 Source of flood peak data

Was the NRFA Peak Flows dataset used? If so, which version? If not, why not? Record any changes made	Yes – Version 5 No modifications were made to the dataset
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1.4 Gauging stations (flow or level)

(at the sites of flood estimates or nearby at potential donor sites)

Water-course	Station name	Gauging auth #	NRFA #	Grid ref	Catch area (km ²)	Type	Start & end of record
Dee (Cheshire)	Clywedog at Bowling Bank		67025	SJ395482	98.6	Simple Crump	10/'75
Dee (Cheshire)	Alyn at Pont-y-Capel		67008	SJ335540	227.1	Asymmetrical compound crump	01/'65
Conway and Clwyd	Clwyd at Ruthin Weir		66005	SJ121592	95.3	Non-standar concrete weir	01/'70
Dee (Cheshire)	Dee at Erbistock Rectory		67002	SJ356413	1028	Velocity-area	01/'32 – 12/'70
Dee (Cheshire)	Dee at Manley Hall		67015	SJ348414	1013.2	Compound Crump weir	10/'37

1.5 Data available at each flow gauging station

Station name	Start and end of data on NRFA Peak Flows	Update for this study?	Suitable for QMED?	Suitable for pooling ?	Data quality check needed?	Other comments on station and flow data quality – e.g. information from NRFA Peak Flows, trends in flood peaks, outliers.
67025	10/'75		No	No		Not suitable for pooling
67008	01/'65		Yes	Yes		Unsuitable Area and SAAR
66005	01/'70		Yes	Yes		Unsuitable Area and SAAR
67002	01/'32 – 12/'70		No	No		Not suitable for pooling
67015	10/'37		No	Yes		Unsuitable for Area, SAAR, FARL, BFHOST and SPRHOST
Give link/reference to any further data quality checks carried out			http://nrfa.ceh.ac.uk/data/station/info/			

1.6 Rating equations

Station name	Type of rating e.g. theoretical, empirical; degree of extrapolation	Rating review needed?	Reasons – e.g. availability of recent flow gaugings, amount of scatter in the rating.
Give link/reference to any rating reviews carried out			

1.7 Other data available and how it has been obtained

Type of data	Data relevant to this study?	Data available?	Source of data and licence reference.	Date obtained	Details
Check flow gaugings (if planned to review ratings)					
Historic flood data – give link to historic review if carried out.					
Flow data for events					
Rainfall data for events					
Results from previous studies					
Other data or information (e.g. groundwater, tides)					

1.8 Initial choice of approach

Is FEH appropriate? (it may not be for very small, heavily urbanised or complex	FEH statistical method to obtain peak flows, although catchment is too small to be identified in the CEH
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catchments) If not, describe other methods to be used.	catchment descriptors, this method of transfer is considered more suitable (e.g. than IoH124) in accordance with SC090031										
Outline the conceptual model, addressing questions such as: - Where are the main sites of interest? - What is likely to cause flooding at those locations? (peak flows, flood volumes, combinations of peaks, groundwater, snowmelt, tides...) - Might those locations flood from runoff generated on part of the catchment only, e.g. downstream of a reservoir? - Is there a need to consider temporary debris dams that could collapse?	Ipsen Biopharm at Wrexham Industrial Estate is main site of interest. The site is crossed by a small –unnamed- watercourse which is stored in a pond and then transported through a culvert to the Redwither Brook downstream, therefore any possible blockage will reduce the conveyance. Site is approximately 36 m AOD, therefore not tidal.										
Any unusual catchment features to take into account? e.g. - highly permeable (BFIHOST>0.65) – consider permeable catchment adjustment for statistical method if SPRHOST<20% - highly urbanised – consider FEH Statistical or other alternatives; consider method that can account for differing sewer and topographic catchments - pumped watercourse – consider lowland catchment version of rainfall-runoff method - major reservoir influence (FARL<0.90) – consider flood routing - extensive floodplain storage – consider choice of method carefully	<table> <tr> <td></td><td>Calculated</td></tr> <tr> <td>BFIHOST >0.65</td><td>(0.6890)</td></tr> <tr> <td>SPRHOST > 20</td><td>(25.31%)</td></tr> <tr> <td>URBEXT2000 < 0.125</td><td>(0.000)</td></tr> <tr> <td>FARL > 0.9</td><td>(1.000)</td></tr> </table> No known pumps Unlikely extensive FP One small pond (likely not accounted for in FARL) could be rated down to 0.99, but is included in model simulation. Whilst BFIHost is > 0.65 SPRHost is > 20.		Calculated	BFIHOST >0.65	(0.6890)	SPRHOST > 20	(25.31%)	URBEXT2000 < 0.125	(0.000)	FARL > 0.9	(1.000)
	Calculated										
BFIHOST >0.65	(0.6890)										
SPRHOST > 20	(25.31%)										
URBEXT2000 < 0.125	(0.000)										
FARL > 0.9	(1.000)										
Initial choice of method(s) and reasons Will the catchment be split into subcatchments? If so, how?											
Software to be used (with version numbers)	WINFAP-FEH version 3.0.003										

2 Locations where flood estimates required

The table below lists the locations of subject sites. The site codes listed below are used in all subsequent tables to save space.

2.1 Summary of subject sites

Site code	Watercourse	Site	Easting	Northin g	AREA on FEH Web Service (km ²)	Revised AREA if altered
RC6472	Unnamed	Ipsen Biopharm	336065	350672	0.51	
Reasons for choosing above locations		Site of interest				

2.2 Important catchment descriptors at each subject site (incorporating any changes made)

Site code	FA RL	PROPWE T	BFIHOS T	DPLBA R (km)	DPSBA R (m/km)	SAA R (mm)	SPRHOS T	URBE XT	FPEXT
RC6472	1	0.51	0.689	0.70	37.1	721	25.31	0.000	0.0049

2.3 Checking catchment descriptors

Record how catchment boundary was checked and describe any changes (refer to maps if needed)	Catchment compared against Terrain 50 contouring
Record how other catchment descriptors (especially soils) were checked and describe any changes. Include before/after table if necessary.	According to the British Geological Survey and Landis Soilscales, the catchment is composed by two different soil types, upstream the catchment by Freely draining slightly acid sandy soils and lower catchment is composed by slowly permeable seasonally wet loamy and clayey soils
Source of URBEXT	FEH webservice 2000 listed in document
Method for updating of URBEXT	N/A

3 Statistical method

3.1 Search for donor sites for QMED (if applicable)

Comment on potential donor sites Mention: • Number of potential donor sites available • Distances from subject site • Similarity in terms of AREA, BFIHOST, FARL and other catchment descriptors • Quality of flood peak data Include a map if necessary. Note that donor catchments should usually be rural.	Detailed in S 1.4
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3.2 Donor sites chosen and QMED adjustment factors

NRFA no.	Reasons for choosing or rejecting	Method (AM or POT)	Adjustment for climatic variation?	QMED from flow data (A)	QMED from catchment descriptors (B)	Adjustment ratio (A/B)
Which version of the urban adjustment was used for QMED at donor sites, and why? Note: The guidelines recommend great caution in urban adjustment of QMED on catchments that are also highly permeable (BFIHOST>0.8).						

3.3 Overview of estimation of QMED at each subject site

Site code	Method	Initial estimate of QMED (m ³ /s)	Data transfer						Final estimate of QMED (m ³ /s)
			NRFA numbers for donor sites used (see 3.3)	Distance between centroid s d _{ij} (km)	Power term, a	Moderated QMED adjustment factor, (A/B) ^a	If more than one donor		
							Weight	Weighted average adjustment	
RC6472		0.080							0.080
Are the values of QMED consistent, for example at successive points along the watercourse and at confluences?									

Site code	Method	Initial estimate of QMED (m ³ /s)	Data transfer						Final estimate of QMED (m ³ /s)
			NRFA numbers for donor sites used (see 3.3)	Distance between centroids s _{dij} (km)	Power term, a	Moderated QMED adjustment factor, (A/B) ^a	If more than one donor		
							Weight	Weighted average adjustment	
Which version of the urban adjustment was used for QMED, and why?				No urban adjustment needed					
Notes Methods: AM – Annual maxima; POT – Peaks over threshold; DT – Data transfer; CD – Catchment descriptors alone. When QMED is estimated from POT data, it should also be adjusted for climatic variation. Details should be added. When QMED is estimated from catchment descriptors, the revised 2008 equation from Science Report SC050050 Error! Bookmark not defined. should be used. If the original FEH equation has been used, say so and give the reason why. The guidelines recommend great caution in urban adjustment of QMED on catchments that are also highly permeable (BFIHOST>0.8). The adjustment method used in WINFAP-FEH v3.0.003 is likely to overestimate adjustment factors for such catchments. In this case the only reliable flood estimates are likely to be derived from local flow data. The data transfer procedure is from Science Report SC050050. The QMED adjustment factor A/B for each donor site is given in Table 3.3. This is moderated using the power term, a, which is a function of the distance between the centroids of the subject catchment and the donor catchment. The final estimate of QMED is (A/B) ^a times the initial estimate from catchment descriptors. If more than one donor has been used, use multiple rows for the site and give the weights used in the averaging. Record the weighted average adjustment factor in the penultimate column.									

3.4 Derivation of pooling groups

The composition of the pooling groups is given in the Annex. Several subject sites may use the same pooling group.

Name of group	Site code from whose descriptors group was derived	Subject site treated as gauged? (enhanced single site analysis)	Changes made to default pooling group, with reasons Note also any sites that were investigated but retained in the group.	Weighted average L-moments, L-CV and L-skew, (before urban adjustment)
RC6472	RC6472		49006 Camel @ Camelford – Short record, only eight years long, resulting in discordancy; hence removed. 49005 Bollingey @ Bolingey Cocks Bridge – Short record, only 5 years of data, result in discordancy; hence removed. 47022 Tory Brook @ Newnham Park – no major concerns other than China Works affecting FARL. Although suitable this site was removed to Lower Z values and improve homogeneity. 206006 Annalong @ Recorder – Only recommended for pooling given representative curve, relatively high SPR. Although suitable this site was removed to Lower Z values and improve homogeneity. 27073 Brompton @ Snainton Ings - Heterogeneous & Discordant due to the unusually low SPRHost	L-moments 0.236 L-skewness 0.291
Notes Pooling groups were derived using the revised procedures from Science Report SC050050 (2008). Amend if not applicable. The weighted average L-moments, before urban adjustment, can be found at the bottom of the Pooling-group details window in WINFAP-FEH.				

3.5 Derivation of flood growth curves at subject sites

Site code	Method (SS, P, ESS, J)	If P, ESS or J, name of pooling group (3.4)	Distribution used and reason for choice	Note any urban adjustment or permeable adjustment	Parameters of distribution (location, scale and shape) after adjustments	Growth factor for 100-year return period
RC6472	P	RC6472	GL (preferred to GEV)			3.209

Notes

Methods: SS – Single site; P – Pooled; ESS – Enhanced single site; J – Joint analysis

A pooling group (or ESS analysis) derived at one gauge can be applied to estimate growth curves at a number of ungauged sites. Each site may have a different urban adjustment, and therefore different growth curve parameters.

Urban adjustments to growth curves should use the version 3 option in WINFAP-FEH: Kjeldsen (2010).

Growth curves were derived using the revised procedures from Science Report SC050050 (2008). **Amend if not applicable.**

Any relevant frequency plots from WINFAP-FEH, particularly showing any comparisons between single-site and pooled growth curves (including flood peak data on the plot), should be shown here or in a project report.

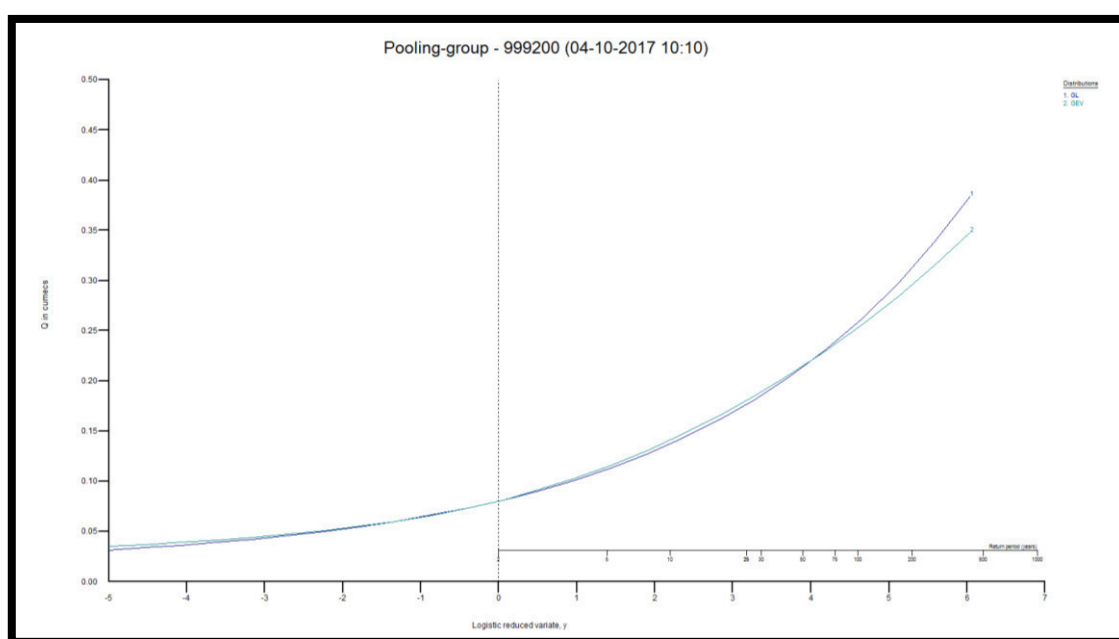


Figure 1 Flood Frequency Cruves – GL (Black) and GEV (Blue). Source: Winfap-FEH 3

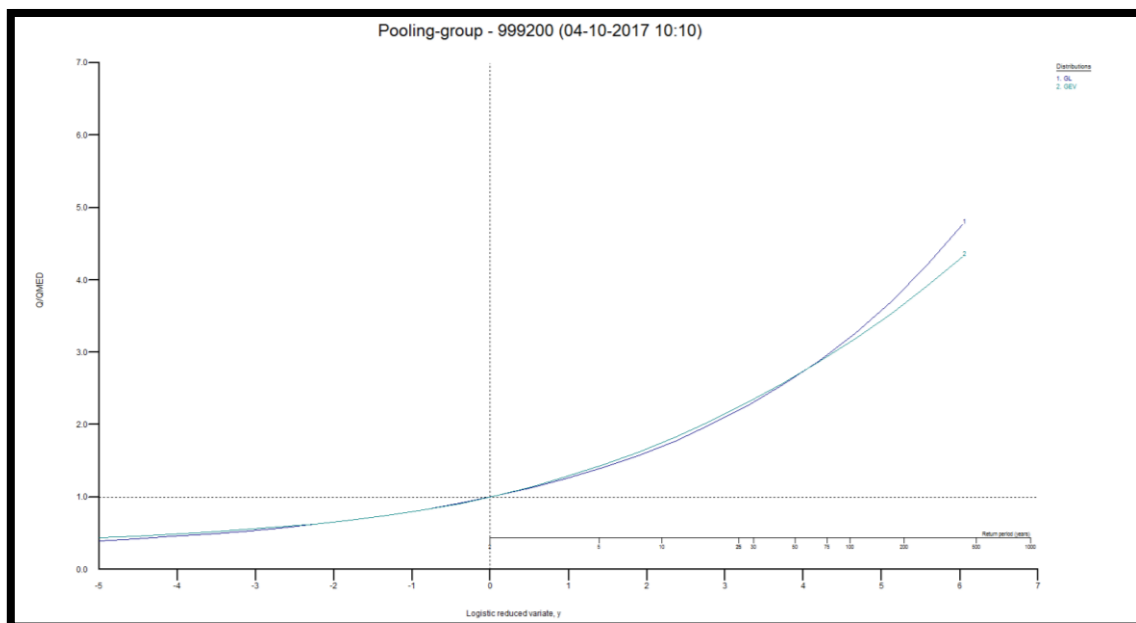


Figure 2 Growth curve Q/Q_{med} GL (Black), GEV (Blue). Source: Winfap-FEH 3

3.6 Flood estimates from the statistical method

Site code	Flood peak (m ³ /s) for the following return periods (in years)								
	2	10	25	30	50	100	200	500	1000
RC6472	.070	0.137	0.177	0.186	0.214	0.258	0.312	0.403	0.489

4 Revitalised flood hydrograph (ReFH) method

4.1 Parameters for ReFH model

Note: If parameters are estimated from catchment descriptors, they are easily reproducible so it is not essential to enter them in the table.

Site code	Method: OPT: Optimisation BR: Baseflow recession fitting CD: Catchment descriptors DT: Data transfer (give details)	T _p (hours) Time to peak	C _{max} (mm) Maximum storage capacity	BL (hours) Baseflow lag	BR Baseflow recharge
RC6472	CD	0.956	492.320	28.343	1.969
Brief description of any flood event analysis carried out (further details should be given below or in a project report)					

4.2 Design events for ReFH method

Site code	Urban or rural	Season of design event (summer or winter)	Storm duration (hours)	Storm area for ARF (if not catchment area)
RC6472	R	Winter	1.649	
Are the storm durations likely to be changed in the next stage of the study, e.g. by optimisation within a hydraulic model?			No change to durations expected. Scaled to stat analysis also for Morris	

4.3 Flood estimates from the ReFH method

Site code	Flood peak (m ³ /s) for the following return periods (in years)				Flood Modeller Pro
	2	30	100	1000	
RC6472	0.176	1.676	0.484	0.875	

5 Discussion and summary of results

5.1 Comparison of results from different methods

This table compares peak flows from the ReFH method with those from the FEH Statistical method at each site for two key return periods.

Site code	Return period 2 years			Return period 100 years		
	Statistical	ReFH	Ratio (ReFH / Statistical)	Statistical	ReFH	Ratio (ReFH / Statistical)
RC6472	0.080	0.176	2.2	0.258	0.484	1.876

5.2 Final choice of method

Choice of method and reasons – include reference to type of study, nature of catchment and type of data available.	Statistical peak flow estimates are typically preferred to the ReFH methods. The Generalised Logistic (GL) extrapolation is preferred over GEV. Catchment though small with high BFIHost is considered acceptable for statistical method.
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5.3 Assumptions, limitations and uncertainty

List the main assumptions made (specific to this study)	Catchment descriptors have initially been used to estimate the value of Qmed based on the updated method for determining Qmed provided in Science Report SC050050/SR and Environment Agency Operational Instruction document 940_08 issued on 14 th April 2008. Assumes statistical method is suitable for small catchment
Discuss any particular limitations, e.g. applying methods outside the range of catchment types or return periods for which they were developed	Although Stat estimates for 200 and 500 years have been listed pooling group was (~500 yrs) and should therefore be used with caution if required. 1000yr estimate is derived from Morris method in final results.
Give what information you can on uncertainty in the results – e.g. confidence limits for the QMED estimates using FEH 3 12.5 or the factorial standard error from Science Report SC050050 (2008).	
Comment on the suitability of the results for future studies, e.g. at nearby locations or for different purposes.	Results have been derived from detailed investigation and therefore should be suitable for other studies in the area. The determination of the 1000 year flood peak flow needs further calibration data to be valuable to future studies. Care needs to be taken with the high BFIHost and this should be considered in future studies
Give any other comments on the study, for example suggestions for additional work.	

5.4 Checks

Are the results consistent, for example at confluences?	
What do the results imply regarding the return periods of floods during the period of record?	
What is the 100-year growth factor? Is this realistic? (The guidance suggests a typical range of 2.1 to 4.0)	Yes see S 3.5 Growth factor of 3.209
If 1000-year flows have been derived, what is the range of ratios for 1000-year flow over 100-year flow?	
What range of specific runoffs (l/s/ha) do the results equate to? Are there any inconsistencies?	100 yr stat = (258 l/s)/(51ha) = l/s/ha = 5.06 l/s/ha
How do the results compare with those of other studies? Explain any differences and conclude which results should be preferred.	
Are the results compatible with the longer-term flood history?	N/A
Describe any other checks on the results	Natural Resources Wales for North Wales determines climate change allowances (c = 30%, u = 75%)

5.5 Final results

Discuss here how you have ratioed down (by how much) and why to create the final results for the catchment of interest

Site code	Flood peak (m ³ /s) for the following return periods (in years)								
	2	25	30	50	100	100+30%	100+75%	200	Morris
RC6472	0.070	0.163	0.163	0.188	0.207	0.269	0.362	0.275	0.412

If flood hydrographs are needed for the next stage of the study, where are they provided? (e.g. give filename of spreadsheet, name of hydraulic model, or reference to table below)

Separate .ied files in modelling folder

6 Annex - supporting information

6.1 Pooling group composition

Station	Distance	Years of data	QMED AM	L-CV	L-SKEW	Discordancy
76011 (<i>Coal Burn @ Coalburn</i>)	1.972	38	1.84	0.165	0.331	1.144
45816 (<i>Haddeo @ Upton</i>)	3.762	22	3.489	0.314	0.415	0.73
27051 (<i>Crimple @ Burn Bridge</i>)	3.898	43	4.514	0.219	0.154	1.157
28033 (<i>Dove @ Hollinsclough</i>)	4.021	36	4.225	0.24	0.415	1.038
91802 (<i>Allt Leachdach @ Intake</i>)	4.314	34	6.35	0.153	0.257	0.798
54022 (<i>Severn @ Plynlimon Flume</i>)	4.628	38	14.988	0.156	0.171	1.726
71003 (<i>Croasdale Beck @ Croasdale Flume</i>)	4.641	37	10.9	0.212	0.323	0.238
25011 (<i>Langdon Beck @ Langdon</i>)	4.709	28	15.878	0.238	0.318	1.191
25003 (<i>Trout Beck @ Moor House</i>)	4.746	42	15.142	0.172	0.293	0.433
25019 (<i>Leven @ Easby</i>)	4.751	37	4.989	0.342	0.39	1.007
26802 (<i>Gypsy Race @ Kirby Grindalythe</i>)	4.819	16	0.112	0.274	0.274	0.557
49005 (<i>Bollingey Stream @ Bolingey Cocks Bridge</i>)	4.886	5	5.777	0.288	0.256	0.901
27010 (<i>Hodge Beck @ Bransdale Weir</i>)	5.085	41	9.42	0.224	0.293	0.057
44008 (<i>South Winterbourne @ Winterbourne Steepleton</i>)	5.189	36	0.434	0.418	0.344	2.3
22003 (<i>Usway Burn @ Shillmoor</i>)	5.310	13	16.17	0.282	0.311	1.105
203046 (<i>Rathmore Burn @ Rathmore Bridge</i>)	5.399	33	10.77	0.136	0.104	1.617
Total		499				
Weighted means		499		0.236	0.291	

6.2 Additional supporting information
