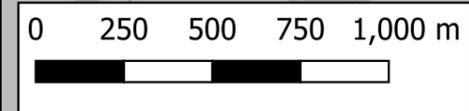
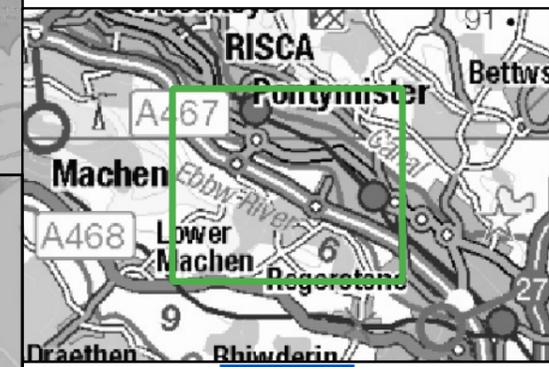


Map Scale At A3: 1:20000



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

- LEGEND**
- Site Boundary
 - Existing NRW Model Extent
 - Existing NRW Risca 2D Domain
 - Existing NRW 1D Network Channel
 - Waterco Proposed Blockage Location



SCHEME:
Land at Pontymister, Risca

PLOT TITLE:
Proposed Model Extent Plan

PLOT STATUS: **FINAL** DATE: **28-02-2024**

DRAWN: RM	CHECKED: AMR	APPROVED: AP	PLOT SCALE AT A3: 1:110000
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PLOT NAME: 15679_Proposed_Model_Extent_Plan REVISION: -

Martha Hughes

From: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>
Sent: 18 September 2024 09:54
To: Martha Hughes
Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good morning Martha

Apologies for the delay in replying I've been on leave and am catching up on emails, our Hydrology team have confirmed that your methodology is suitable.

Kind regards

Richard Derrick

Arweinydd Tim Dadansoddi Perygl Llifogydd/ Team Leader Flood Risk Analysis

Rheoli Llifogydd a Dwr / Flood and Water Management

Rhif ffôn / Phone number 03000 653037

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.

Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.



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From: Martha Hughes <martha.hughes@waterco.co.uk>
Sent: Wednesday, September 18, 2024 9:37 AM
To: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>
Cc: Bethan Lloyd Jones <Bethan.LloydJones@waterco.co.uk>
Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

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Good morning Richard,

I hope you are well.

Is there an update on when we can expect to receive a response from the hydrology team to our proposed methodology?

Kind Regards,

Martha Hughes MSc
Hydraulic Modeller

 martha.hughes@waterco.co.uk

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 Please consider the environment before printing this email.

From: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>
Sent: 29 August 2024 16:47
To: Martha Hughes <martha.hughes@waterco.co.uk>
Cc: Bethan Lloyd Jones <Bethan.LloydJones@waterco.co.uk>
Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good afternoon Martha

Thank you for your email, I have passed it on to our hydrology team for their comments. I'm on leave from tomorrow for two weeks so a member of my team will send on their comments when we receive them.

Kind Regards

Richard Derrick
Arweinydd Tim Dadansoddi Perygl Llifogydd/ Team Leader Flood Risk Analysis
Rheoli Llifogydd a Dwr / Flood and Water Management
Rhif ffôn / Phone number 03000 653037

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.

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From: Martha Hughes <martha.hughes@waterco.co.uk>

Sent: Thursday, August 29, 2024 4:37 PM

To: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>

Cc: Bethan Lloyd Jones <Bethan.LloydJones@waterco.co.uk>

Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

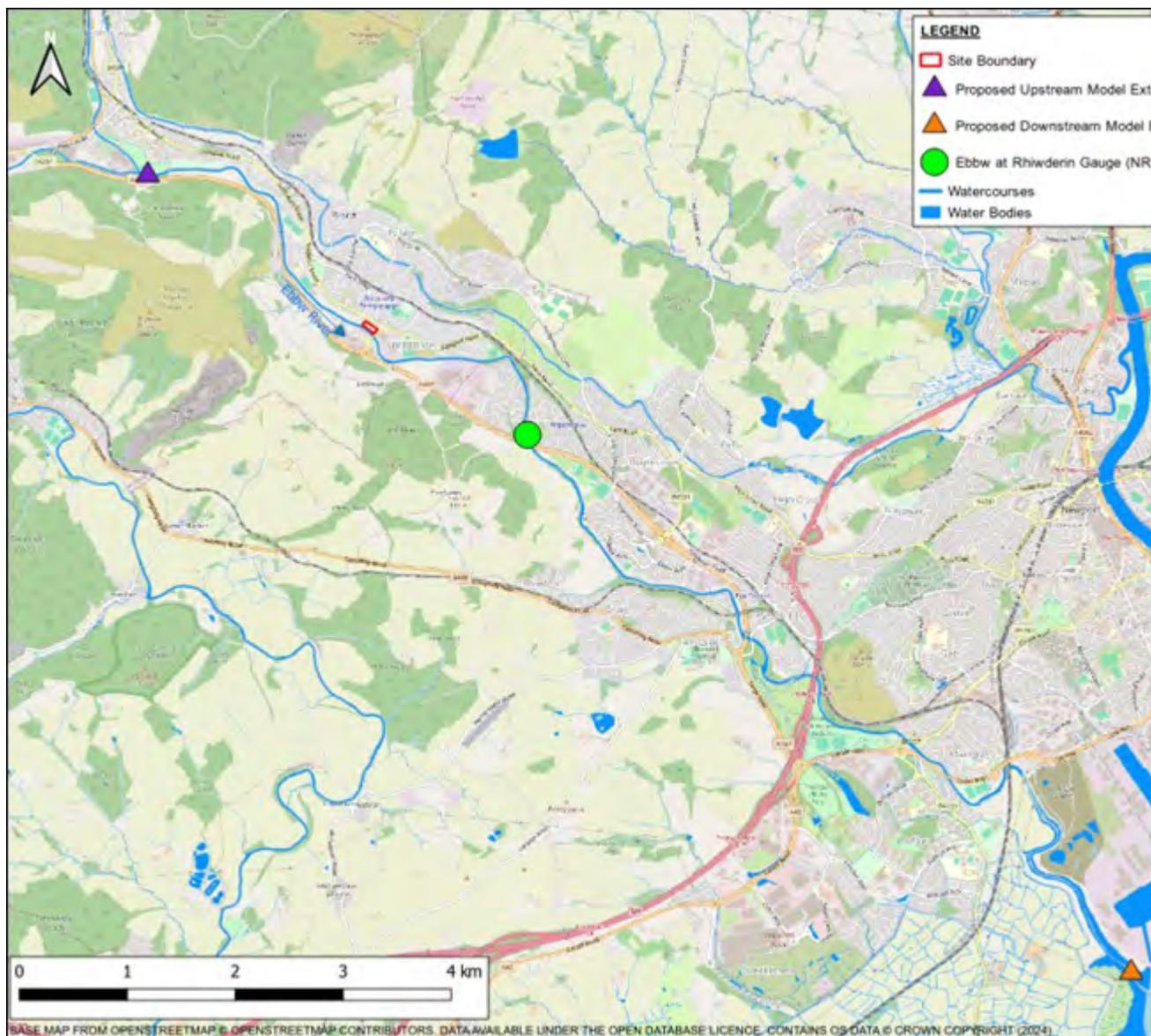
Caution: This email originated from outside of the organisation. Do not click links, open attachments or scan QR Codes unless you recognise the sender and know the content is safe.

Good afternoon Richard,

Further to your email below, we have reviewed the Ebbw River Hydrology Assessment Report provided (Ebbw Baseline Hydrology and Addendum to the Ebbw Baseline Hydrology, 2017) and the hydraulic model (EbbwLowerICM_5_V1.0_2018). Please see below an outline plan for the completion of the updated hydrology for your comment.

Proposed Methodology

- Model extent - the upstream extent of the hydraulic model will be truncated to the confluence between the Ebbw River and the Sirhowy River. The downstream extent of the model is to be maintained as per the NRW model. See extent outlined below.



- Due to the locations of the upstream and downstream boundaries of the hydraulic model and the large catchment area (>200km²), a single inflow will be required for the hydraulic model.
- A single inflow is also recommended by our hydrology team due to the presence of a reliable gauging station 2.2km downstream of the subject site (Ebbw at Rhiwderin, NRFA ID 56002). There is a small catchment area difference between the catchment adjacent to the subject site and the catchment at the gauging station. The catchment area adjacent to the site is 207.34km² and at the gauging station is 211km², a difference in catchment area of 2%.
- A single catchment assessment will be carried out at the Ebbw at Rhiwderin gauging station using the enhanced single site analysis method. Gauged data has been requested from NRW for this station. The data will be used for two purposes, the first is to ensure that the number of AMAX years includes the most recent data and the second is to use the 15 minute gauge data for the AMAX floods to compare the real hydrograph shape with that of REFH2 and then possibly to use the real shape as the shape of the design hydrograph. **Please advise if you have any concerns about us using this particular station.**
- The results will be compared with historical flood records and the AMAX data on record.
- The two methods investigated will be RefH2 and FEH Statistical Enhanced Single Site. RefH2 will unlikely be the chosen method to produce the final peak flows due to the seemingly reliable gauge near to the site.
- Given the size of the model extent further downstream of our proposed calculation point, we propose to maintain the existing NRW hydrology within the hydraulic model downstream of our calculation point. Given the distance (~2.2km) from the site this will have negligible impact on water levels at the site. The reason for including the hydrology is to ensure the model still simulates.
- Gauged data for the three gauging stations located within the catchment (Ebbw at Rhiwderin, Sirhowy at Wattsville and Ebbw at Aberbeeg), any rain gauges and historical flood information has been requested.

If you do have any comments on the details above, please do not hesitate to let us know.

Kind Regards,

Martha Hughes MSc

Hydraulic Modeller

 martha.hughes@waterco.co.uk

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From: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>

Sent: 23 August 2024 13:36

To: Martha Hughes <martha.hughes@waterco.co.uk>

Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good afternoon Martha

Sorry for the delay in replying, I have spoken to our Hydrology team and they have confirmed that the updated hydrology is required and they will reject any modelling based on the existing hydrology.

Hope this clarifies the position, please come back to me if there's anything else I can do to help.

Kind Regards
Rich

Richard Derrick

Arweinydd Tim Dadansoddi Perygl Llifogydd/ Team Leader Flood Risk Analysis

Rheoli Llifogydd a Dwr / Flood and Water Management

Rhif ffôn / Phone number 03000 653037

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.

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From: Martha Hughes <martha.hughes@waterco.co.uk>

Sent: Friday, August 16, 2024 3:22 PM

To: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>

Subject: FW: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

You don't often get email from martha.hughes@waterco.co.uk. [Learn why this is important](#)

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

Caution: This email originated from outside of the organisation. Do not click links, open attachments or scan QR Codes unless you recognise the sender and know the content is safe.

Good afternoon Richard,

Please can you advise on my previous email and confirm whether the hydrology update is advisable or are the updates necessary to ensure that the model is suitable to support a planning application (are NRW likely object to a planning application if the hydrology in the model was not updated?).

Kind Regards,

Martha Hughes MSc
Hydraulic Modeller

 martha.hughes@waterco.co.uk

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From: Martha Hughes

Sent: 09 August 2024 15:47

To: 'Derrick, Richard' <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>

Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Hi Richard,

Thank you for your reply. In terms of the hydrology, please could you confirm whether these are recommended (advisable), or are the updates necessary to ensure the model is suitable to support a planning application i.e. would NRW likely object to a planning application if the hydrology in the model was not updated.

Kind Regards,

Martha Hughes MSc
Hydraulic Modeller

 martha.hughes@waterco.co.uk

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 Please consider the environment before printing this email.

From: Derrick, Richard <Richard.Derrick@cyfoethnaturiolcymru.gov.uk>
Sent: 08 August 2024 12:21
To: Martha Hughes <martha.hughes@waterco.co.uk>
Subject: RE: 15679 - Land at Pontymister, Risca - Proposed Hydraulic Modelling Methodology

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good afternoon Martha

Thank you for your email outlining your methodology for a proposed hydraulic modelling study for Risca, please accept my sincere apologies for the delay in replying to you.

With regards to using the existing hydrology, our Hydrology team make the following comment:

1) there have been a number of dataset and software changes since 2019 and so revised hydrology would be recommended.

With regards to your methodology it is acceptable, however, I make the following comments:

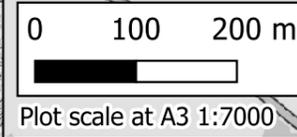
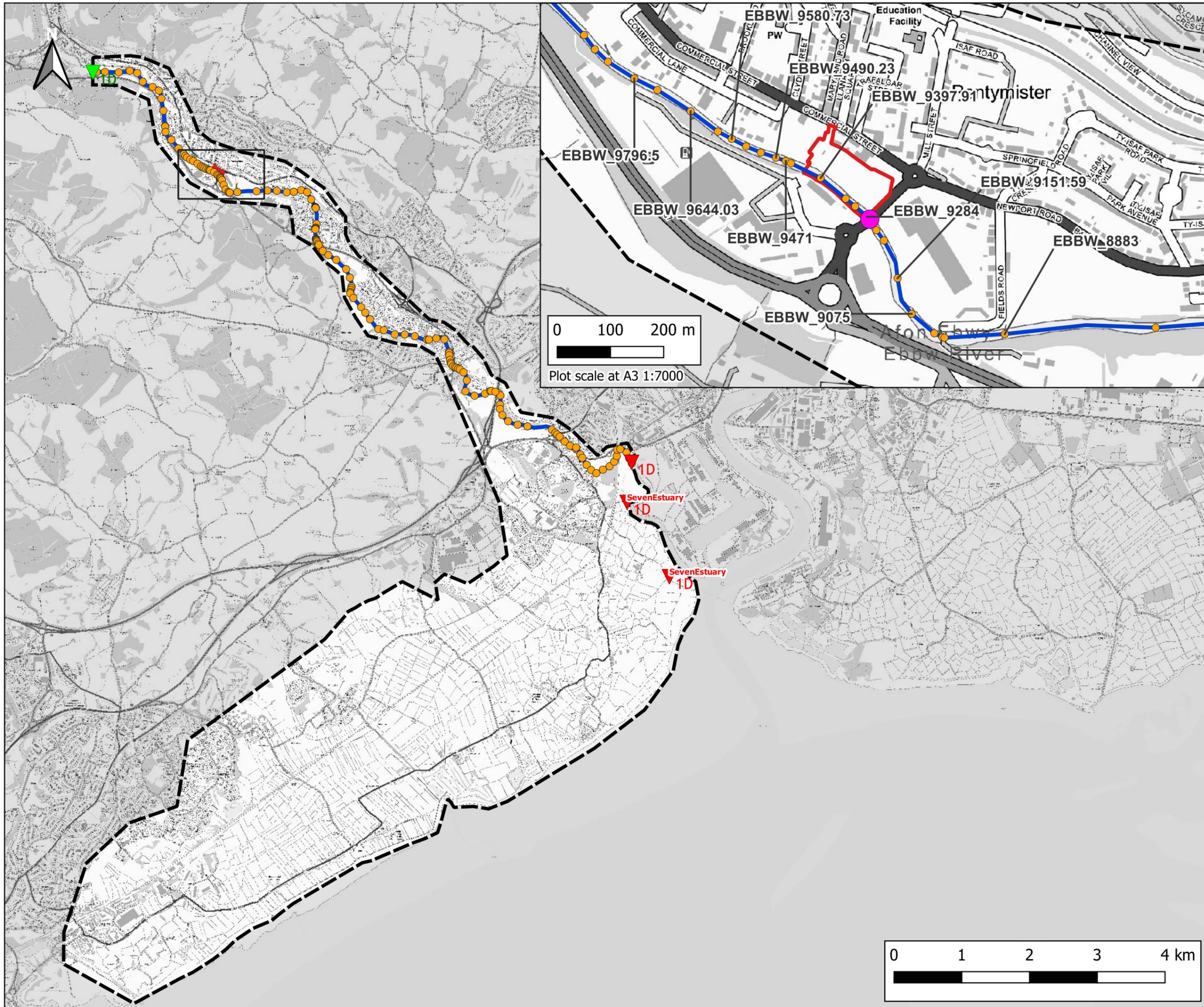
- 1) We are not aware of any pre-existing issues with the model
- 2) There is new LiDAR available flown between 2020 and 2022 which is available from [DataMapWales](#)
- 3) If the model is to be truncated then we would recommend carrying out sensitivity analysis on the downstream boundary.

I hope this is of assistance to you but do please get in touch if I can be of further assistance.

Kind Regards

Richard Derrick

Appendix E 1D/2D Model Extent



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

- LEGEND**
- Site Boundary
 - 2D Model Extent
 - 1D Network
 - 1D Cross Sections
 - 1D Flow Boundary (QT)
 - 1D Water Level Boundary (HT)
 - Blockage Location 1 (BL1) - B4591 Bridge



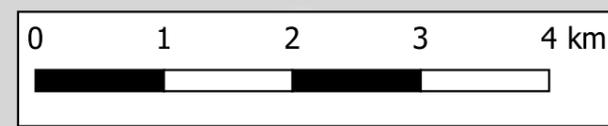
SCHEME:
Land at Pontymister, Risca

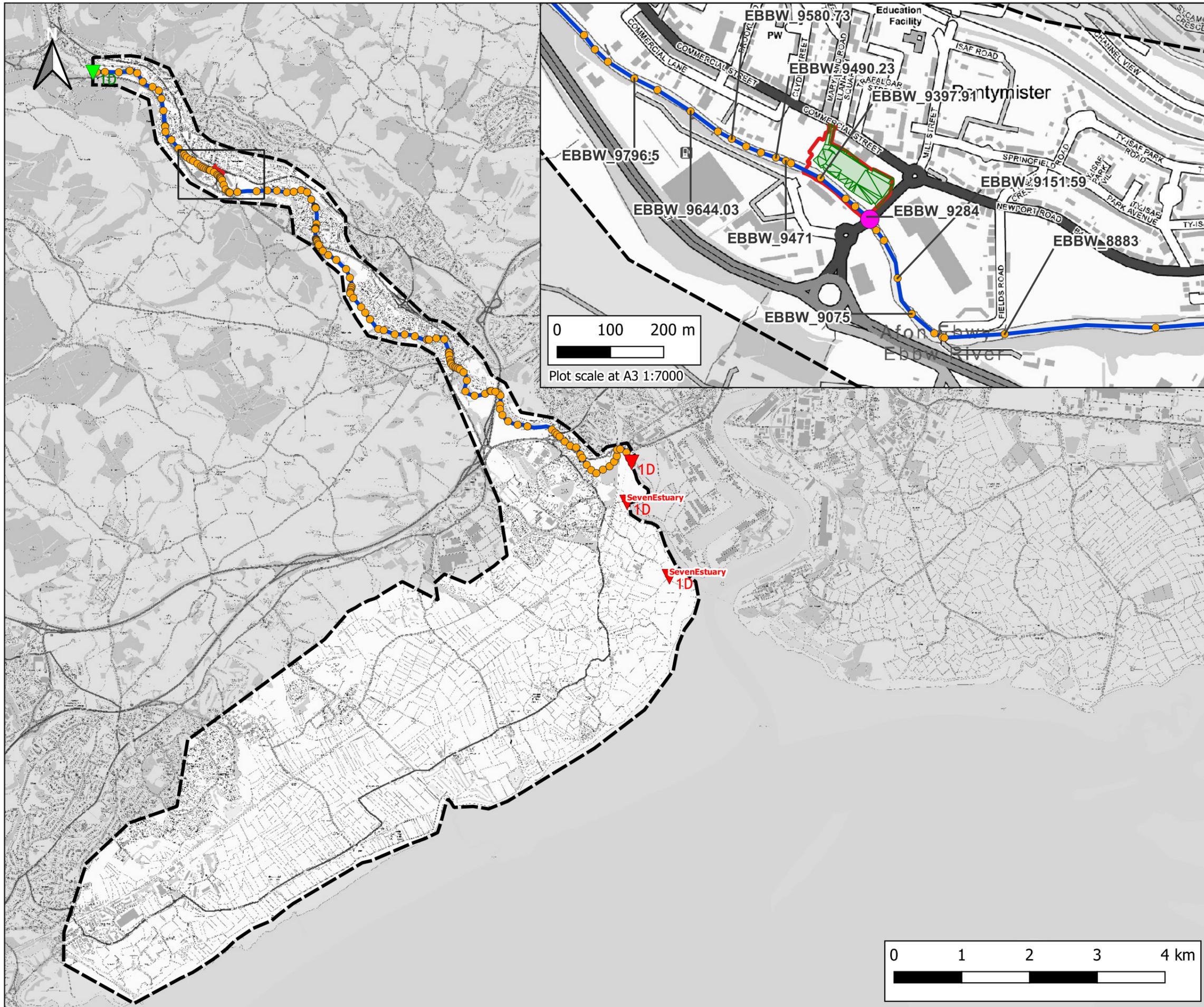
PLOT TITLE:
Model Extent Existing Scenario

PLOT STATUS: **FINAL** DATE: **26-11-2024**

DRAWN: MH	CHECKED: AA	APPROVED: LS	PLOT SCALE AT A3: 1:55000
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PLOT NAME: 15679_Model_Extent_Existing_Scenario	REVISION: -
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Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- 2D Model Extent
- 1D Network
- 1D Cross Sections
- 1D Flow Boundary (QT)
- 1D Water Level Boundary (HT)
- Blockage Location 1 (BL1) - B4591 Bridge
- Proposed Development Layout 2D Z-shape



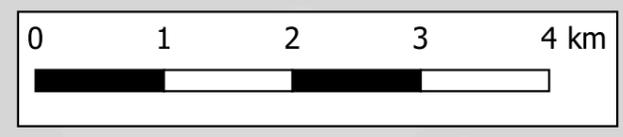
SCHEME:
Land at Pontymister, Risca

PLOT TITLE:
**Model Extent
Proposed Development Scenario**

PLOT STATUS: **FINAL** DATE: **26-11-2024**

DRAWN: MH	CHECKED: AA	APPROVED: LS	PLOT SCALE AT A3: 1:55000
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PLOT NAME: 15679_Model_Extent_Proposed-Development_Scenario	REVISION: -
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Appendix F Flood Estimation Calculation (FEC) Record

Flood estimation calculations record

Project

Job No

Date:

Revision

Prepared by

Checked by

Approved by

Watercourse name:

Catchment NGR:

River Basin		
District		

INTRODUCTION

CONTENTS

ABBREVIATIONS

1 SUMMARY OF ASSESSMENT

1.1 Summary

1.2 Note on flood frequencies

Annual exceedance probability (AEP) and related return period reference table

2 METHOD STATEMENT

2.1 Overview of requirements for flood estimates

Item	Comments
Overview:	

Project scope:

'River Ebbw Integrated Catchment Model'

2.2 Overview of the catchment

Description:

--	--

2.3 Source of flood peak data

--	--

2.4 Gauging stations (flow or level)

Within, or near to, the study area. Most stations will be included on National River Flow Archive (NRFA), but other station data may also be available.

Watercourse	Station Name	Gauging Authority Number	NRFA number (used in FEH)	Grid Reference	Catchment Area (km ²)	BFIHOST	Location relative to study area (e.g. within); note any significant differences in catchments (e.g. URBEXT)	Start and end of flow record

2.5 Data available at each flow gauging station in Table 2.4

Station Name	Start and end of data on NRFA	Update for this study?	OK for QMED?	OK for pooling?	Data quality check needed?	Comments on data availability and quality

2.6 Rating equations

Station Name	Type of rating	Rating review needed?	Reasons

2.7 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 if from NRW	Date obtained	Details
					<p>River Ebbw at Rhiwderin</p> <p>Sirhowy @ Wattsville</p>

					<u>Ebbw Baseline Hydrology 2017</u>
					<u>Addendum to the Ebbw Baseline Hydrology 2017</u>

	Ebbw Baseline Hydrology Derived Peak Flows (m ³ s ⁻¹)	Ebbw Baseline Hydrology Catchment Model Peak Flows (m ³ s ⁻¹)
2	103.3	103.2
25	183.2	
30	208.2	180
50		
100	236.3	220.8
1000	383.6	357.2

2.8 Initial choice of approach

	2

3 LOCATIONS WHERE FLOOD ESTIMATES REQUIRED

3.1 Map of study area, including subject site(s) and gauging stations (where applicable)

3.2 Summary of subject sites

Site code	Watercourse	Site name (description)	Easting	Northing	AREA on FEH Web Service (km ²)	Revised AREA if altered (km ²)

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

Site code	AREA (km ²)	FARL	PROPWET	SAAR (mm)	BFIHOST	DPSBAR (m/km)	DPLBAR (km)	BFIHOST19	URBEXT ₂₀₀₀	FPEXT
									0.0981	

3.4 Checking catchment descriptors

4 STATISTICAL METHOD

4.1 Search for donor sites for QMED (if applicable)

--	--

4.2 Donor sites chosen and QMED adjustment factors

NRFA no. and Station Name	Reasons for choosing or rejecting	Record Length	QMED from flow data (gauged)	QMED from flow data with urban influence removed (A)	QMED from catchment descriptors (B)	Adjustment ratio (A/B)
N/A		N/A	N/A	N/A	N/A	N/A

4.3 Overview of estimation of QMED at each subject site

Site code	QMED (rural) from CDs (m ³ /s)	Method	Data transfer							Final estimate of QMED rural (m ³ /s)	Final estimate of QMED (m ³ /s)
			NRFA numbers for donor sites used (see 4.2)	Distance between centroids d _{ij} (km)	Power term, a	Adjustment ratio (A/B)	Moderated QMED adjustment factor, (A/B) ^a	If more than one donor			
								Weight (if WINFAP4 (or later versions) method not used)	Weighted average adjustment		
S01	92.98									97.67	

Notes

4.4 Derivation of pooling groups

The composition of the pooling groups is given in the Annex 8.4. Additional information on the WINFAP procedure is reported in Annex 8.4.

Name of group	Site code from which pooling group was derived	Site codes to which it is applied	Changes made to default pooling group, with reasons	Method:

4.5 Derivation of flood growth curves at subject sites

Site code	Method (SS, P, ESS, J)	If P, ESS or J, name of pooling group	Distribution used and reason for choice	Note any urban adjustment or permeable adjustment	Parameters of distribution	Growth factor for 100-year return period
						2.15

4.7 Flood estimates from the statistical method

Site code	Flood peak (m ³ /s) for the following return periods (in years)												
	1 in 2	1 in 5	1 in 10	1 in 20	1 in 30	1 in 50	1 in 100	1 in 100 (+CCA1)	1 in 100 (+CCA2)	1 in 200	1 in 1000	1 in 1000 (+CCA1)	1 in 1000 (+CCA2)
	Flood peak (m ³ /s) for the following AEP (%) events												
	50%	20%	10%	5%	3.33%	2%	1%	1%+25%	1%+70%	0.5%	0.1%	0.1%+25%	0.1%+70%

5 REVITALISED FLOOD HYDROGRAPH (REFH2) METHOD FOR PEAK FLOW ESTIMATION

5.1 Parameters for ReFH2 model for peak flow estimation

Site code	Details of method:				Tp (hours)	C _{max} (mm)	BL (hours)	BR
S01	CD				4.89	377.2	55.52	1.6-2.44

5.2 Design events for ReFH2 method for peak flow estimation

Site Code	Season of design event	Recommended storm duration (hours)	Storm area for ARF	Record any adjustment to default parameters
Source of design rainfall statistic				

5.3 Peak flow estimates from the ReFH2 method

Site code	Flood peak (m ³ /s) for the following return periods (in years)												
	1 in 2	1 in 5	1 in 10	1 in 20	1 in 30	1 in 50	1 in 100	1 in 100 (+CCA1)	1 in 100 (+CCA2)	1 in 200	1 in 1000	1 in 1000 (+CCA1)	1 in 1000 (+CCA2)
	Flood peak (m ³ /s) for the following AEP (%) events												
	50%	20%	10%	5%	3.33%	2%	1%	1%+25%	1%+70%	0.5%	0.1%	0.1%+25%	0.1%+70%

5.4 Calibrated (where relevant)

Site code	Flood peak (m ³ /s) for the following return periods (in years)												
	1 in 2	1 in 5	1 in 10	1 in 20	1 in 30	1 in 50	1 in 100	1 in 100 (+CCA1)	1 in 100 (+CCA2)	1 in 200	1 in 1000	1 in 1000 (+CCA1)	1 in 1000 (+CCA2)
	Flood peak (m ³ /s) for the following AEP (%) events												
	50%	20%	10%	5%	3.33%	2%	1%	1%+25%	1%+70%	0.5%	0.1%	0.1%+25%	0.1%+70%

6 REVITALISED FLOOD HYDROGRAPH (REFH2) METHOD FOR MODEL INFLOW HYDROGRAPH

6.1 Parameters for ReFH2 model for model inflow hydrographs

Site code	Details of method	Tp (hours)	Tp (hours)	C _{max} (mm)	PR _{imp}	BL (hours)	BR
							1.6-2.44
Brief description of any flood event analysis carried out							
Methods:							

6.2 Design events for ReFH2 method for model inflow hydrographs

Site code	Season of design event	Storm duration	Source of Storm Duration and ARF	Why Chosen

7 FINAL PEAK FLOWS AND HYDROGRAPH ESTIMATES

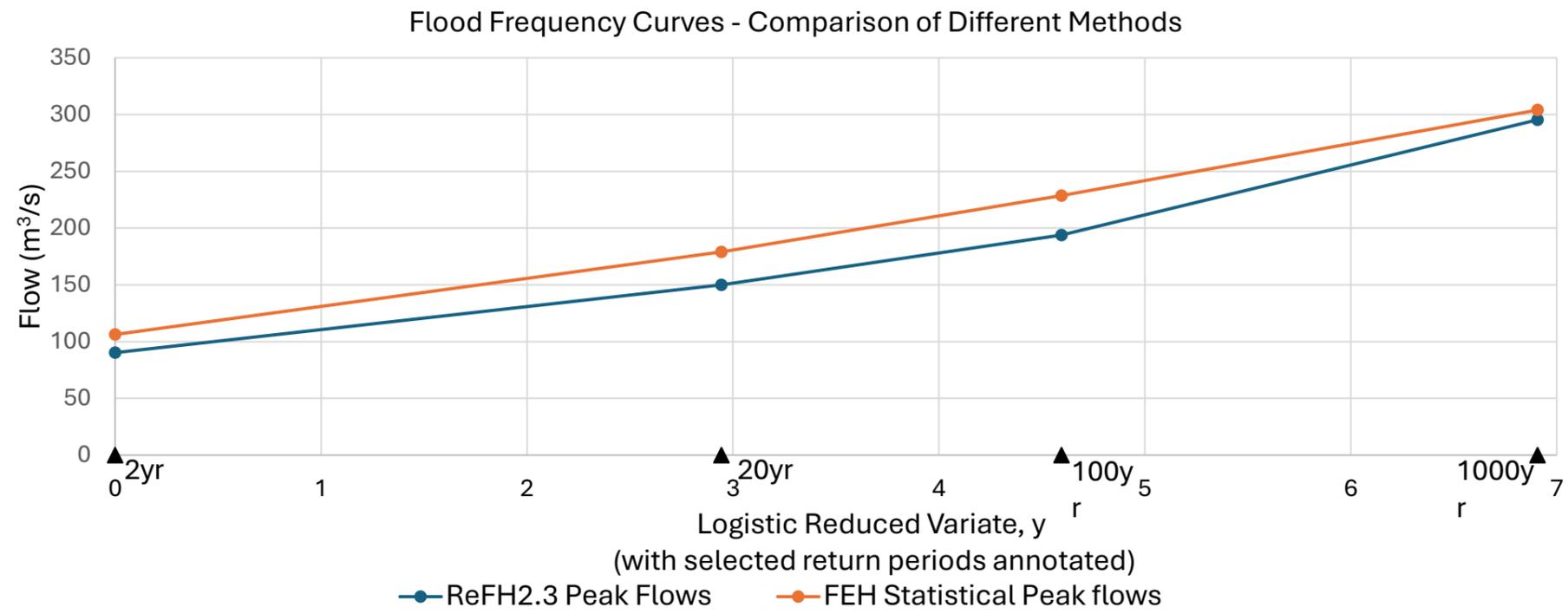
7.1 Comparison of peak flow estimates from different methods

This table compares peak flows from the ReFH method, FEH Statistical method and any available previous study at each site for two key return periods.

Site code	Ratio of peak flow to FEH Statistical peak						Comments
	QMED - Return period 2 years / 50% AEP			Return period 100 years / 1% AEP			
	ReFH	ReFH2	Previous Study	ReFH	ReFH2	Previous Study	

7.2 Final Peak Flow Estimates

Site code	Flood peak (m ³ /s) for the following return periods (in years)												
	1 in 2	1 in 5	1 in 10	1 in 20	1 in 30	1 in 50	1 in 100	1 in 100 (+CCA1)	1 in 100 (+CCA2)	1 in 200	1 in 1000	1 in 1000 (+CCA1)	1 in 1000 (+CCA2)
	Flood peak (m ³ /s) for the following AEP (%) events												
	50%	20%	10%	5%	3.33%	2%	1%	1%+25%	1%+70%	0.5%	0.1%	0.1%+25%	0.1%+70%



Q1000 adjusted statistical peak = 348.16m³/s

7.3 Hydrographs for modelling

How were these calculated, for example by scaling ReFH hydrographs to final flow estimates?

How will the flows be applied to a hydraulic model?

7.4 Checks

Are the results consistent, for example at confluences?

What do the results imply regarding the return periods / frequency of floods during the period of record?

What is the range of 100-year / 1% AEP growth factors? Is this realistic?

If 1000-year / 0.1% AEP flows have been derived, what is the range of ratios for 1000-year / 0.1% AEP flow over 100-year / 1% AEP flow?

How do the results compare with those of other studies?

Peak Flow Comparison			
	Waterco 2024 Assessment (m ³ s ⁻¹)	Ebbw Baseline Hydrology Derived Peak Flows (m ³ s ⁻¹)	Ebbw Baseline Hydrology Catchment Model Peak Flows (m ³ s ⁻¹)
2	106.3	103.3	103.2
25	-	183.2	
30	191.423	208.2	180
50	207.033		
100	228.58	236.3	220.8
1000	348.16	383.6	357.2

Are the results compatible with the longer-term flood history?

3

Describe any other checks on the results

7.5 Assumptions, limitations and uncertainty

List the main assumptions made (specific to this study)

Discuss any particular limitations

Provide information on the uncertainty in the design peak flow estimates and the methodology used	
Comment on the suitability of the results for future studies	
Give any other comments on the study	

