

JBA Project Code 2019s0897
Client Environment Agency
Date 23 April 2021
Author Ben Gibson, Jeremy Benn Associates Limited
Subject Public Inquiry: Revision to Appendix 3 to Ben Gibson's proof of evidence

Revision to Appendix 3 to the modelling proof of evidence

1. In the course preparing for this inquiry it has become apparent that Appendix 3 to the proof of evidence submitted by Ben Gibson needs to be revised. The document reference for this on the inquiry library is "CD.4.4.3.3".
2. Updated mapping, referred to as Appendix 3A, which should replace the information previously provided in Appendix 3 to Ben Gibson's proof of evidence, is provided in Section 2 of this document.
3. Appendix 3 (and now 3A) to Ben Gibson's proof of evidence presents mapping of flood extents between Penshurst and Leigh FSA embankment for two scenarios: 1) the current scheme at Leigh FSA and 2) the undefended case, in which Leigh FSA is not present and other defences in the catchment are removed. The flood extents presented within the mapping are prepared from peak water level information extracted the River Medway Model 1 flood risk mapping model, which are processed in spreadsheet format. Paragraphs 35 to 39 of Ben Gibson's proof of evidence explain this process of preparing flood mapping outputs from the model (document reference "CD.4.4.1" on the inquiry library).
4. I have identified that the data values extracted from the model and delivered in spreadsheet format for the undefended case at the time of completing the RMMMP (2015) did not represent the values recorded by the model itself. This difference was identified on reviewing the data in final preparation for the inquiry on 09/04/2021. I investigated this further and have identified that there has been a data 'copy and paste' error. This has resulted in the data from an incorrect model output zone (of which there are eight in the Model 1 flood risk mapping model) being used to populate values in certain parts of the spreadsheet that should have actually contained different values. This meant that the data originally presented for the model output zone which covers the catchment from Penshurst to Leigh FSA (zone 8) was using data from zone 4 and so it is not representative of the actual results obtained from the model for this scenario. The output zones applicable to Model 1 are shown on Figure 7-1 within the RMMMP (2015) "CD1.18".

NOTE ON ADDITIONAL MODELLING INFORMATION
Revised Scheme for the Leigh Barrier inquiry
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5. The copy and paste errors identified reflects the differences resulting from the graphical post-processing procedures used in the presentation of the model results, and they do not involve any differences in the results actually obtained from model simulations performed at the time.
6. Given that the spreadsheet format data described above is used in preparation of the flood extent information, the undefended case flood extents presented in Appendix 3 to Ben Gibson's proof of evidence are not representative of the results actually obtained from the model.
7. Therefore, a revision to the undefended flood extent information has been prepared and is presented in the revised Appendix 3A mapping presented in Section 2 of this document. For clarity, the modelled flood events presented are the 1% AEP residual risk event discussed within the proof of evidence.
8. To show how the references in the spreadsheet relate to the flood mapping, I have produced in Section 3 of this document two maps displaying the location of the model cross-sections and reservoir units for the zone 8 area.
9. Sections 4 and 5 of this document present the tables of data for the current scheme and undefended case simulations for this zone (there are 656 nodes in total for the whole of Model 1). The data contained within these tables is the corrected data, and this is the information which informs my Appendix 3A flood extent mapping.

Name: Ben Gibson BSc MSc MCIWEM C.WEM

Signature:



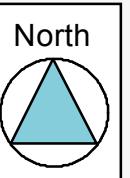
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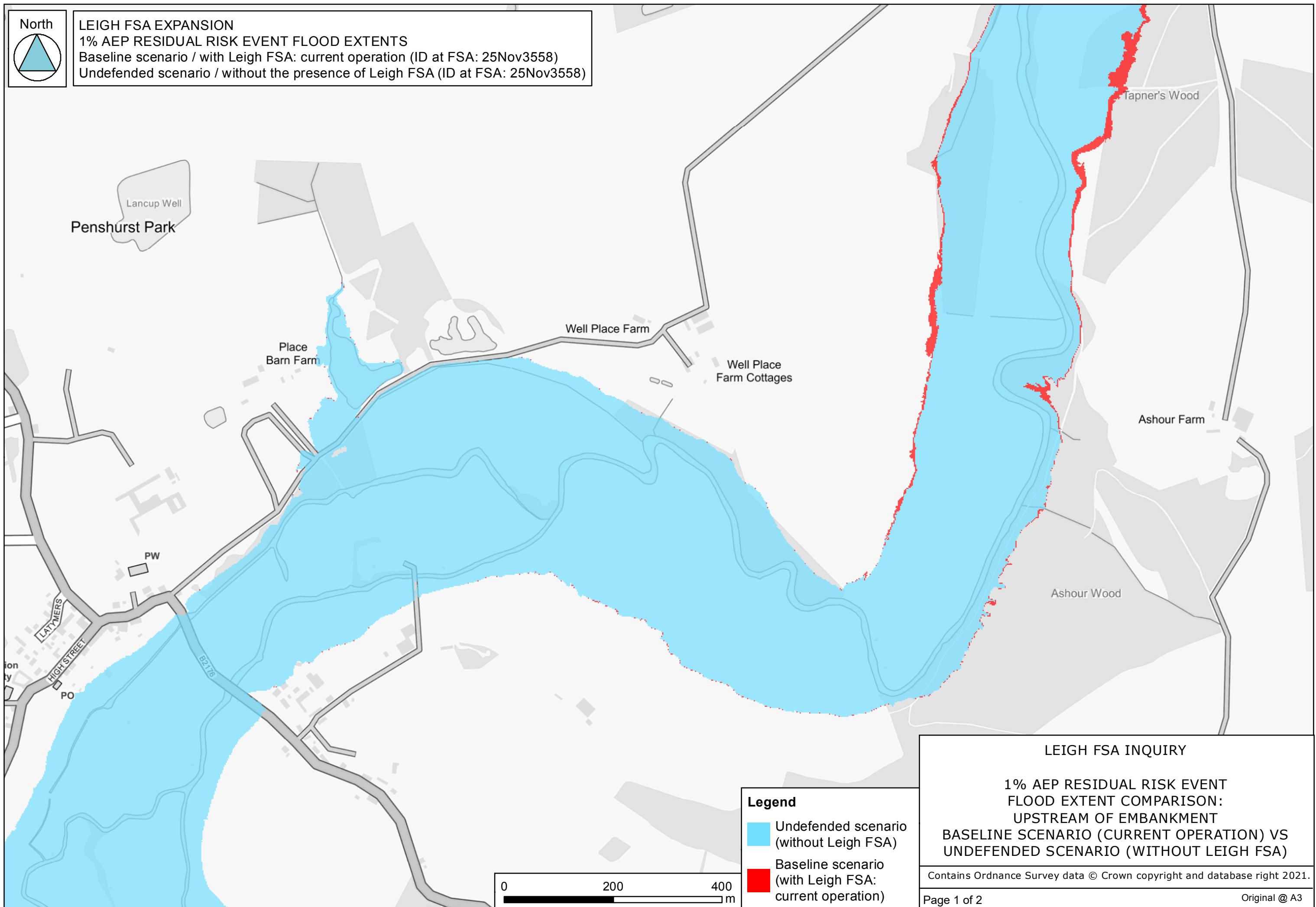
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2. Appendix 3A: Replacement for Appendix 3 to the proof of evidence submitted by Ben Gibson

Refer to the maps provided on the next two pages of this document.



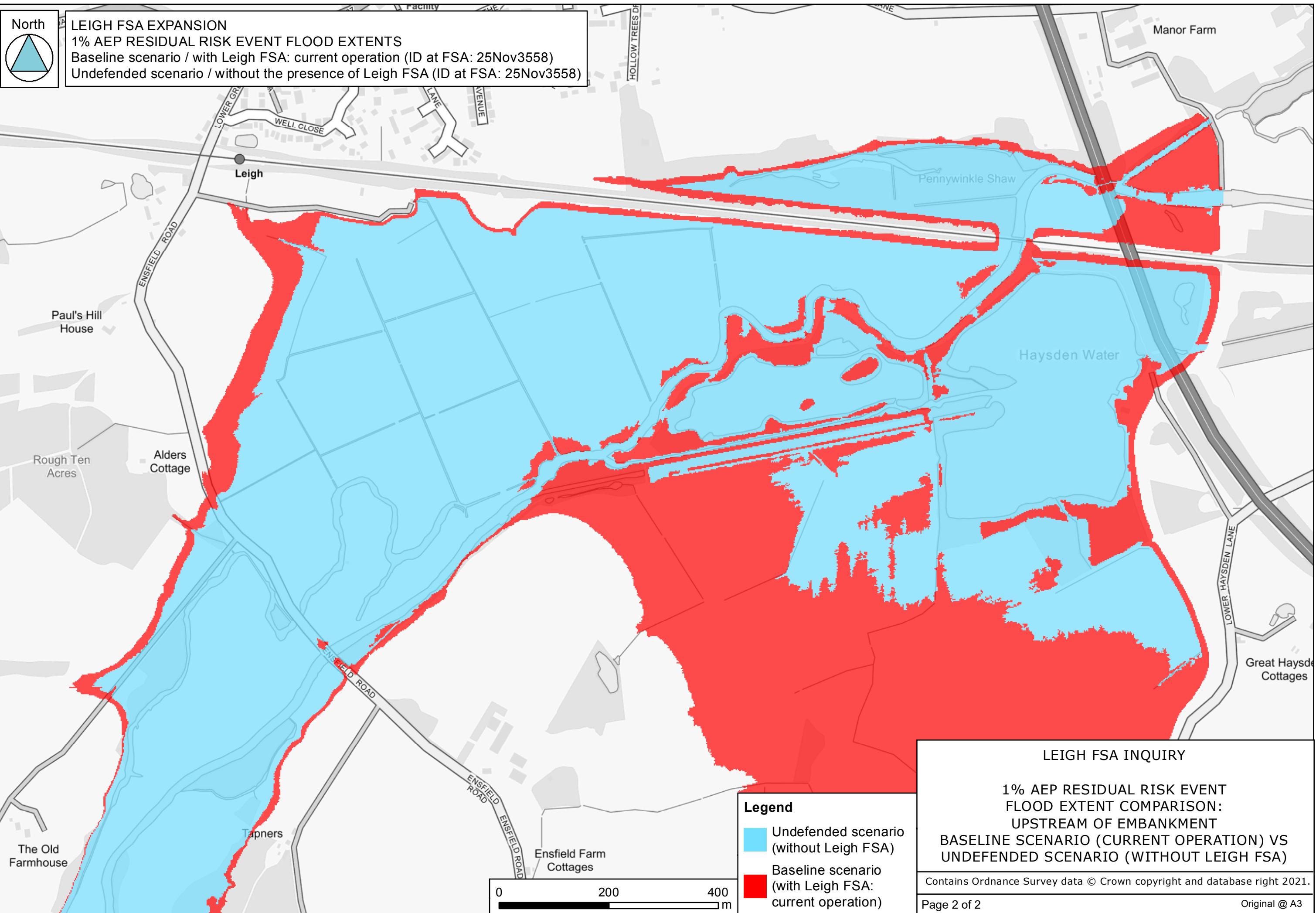
LEIGH FSA EXPANSION
1% AEP RESIDUAL RISK EVENT FLOOD EXTENTS
Baseline scenario / with Leigh FSA: current operation (ID at FSA: 25Nov3558)
Undefended scenario / without the presence of Leigh FSA (ID at FSA: 25Nov3558)



LEIGH FSA INQUIRY

1% AEP RESIDUAL RISK EVENT
FLOOD EXTENT COMPARISON:
UPSTREAM OF EMBANKMENT
BASELINE SCENARIO (CURRENT OPERATION) VS
UNDEFENDED SCENARIO (WITHOUT LEIGH FSA)

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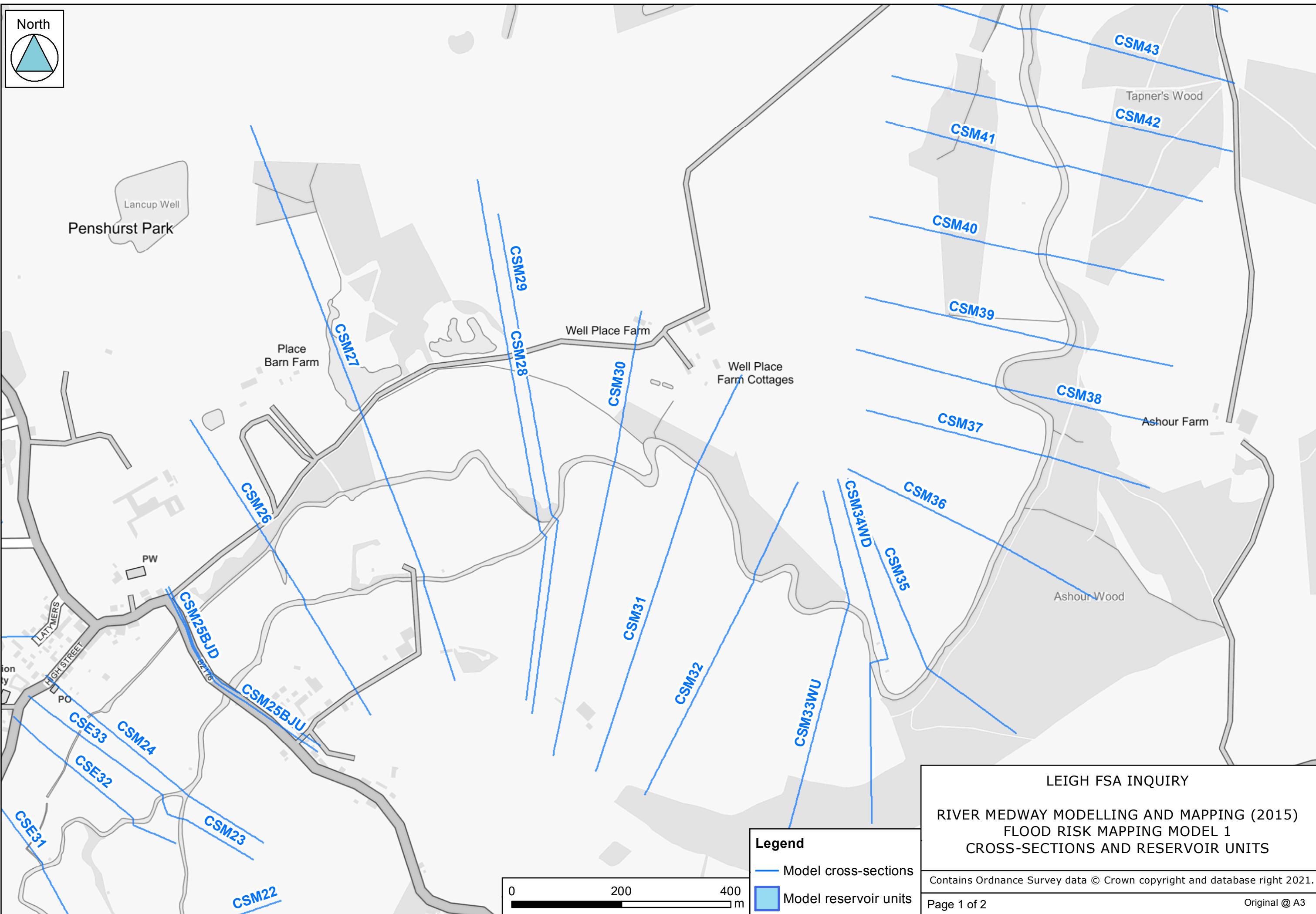
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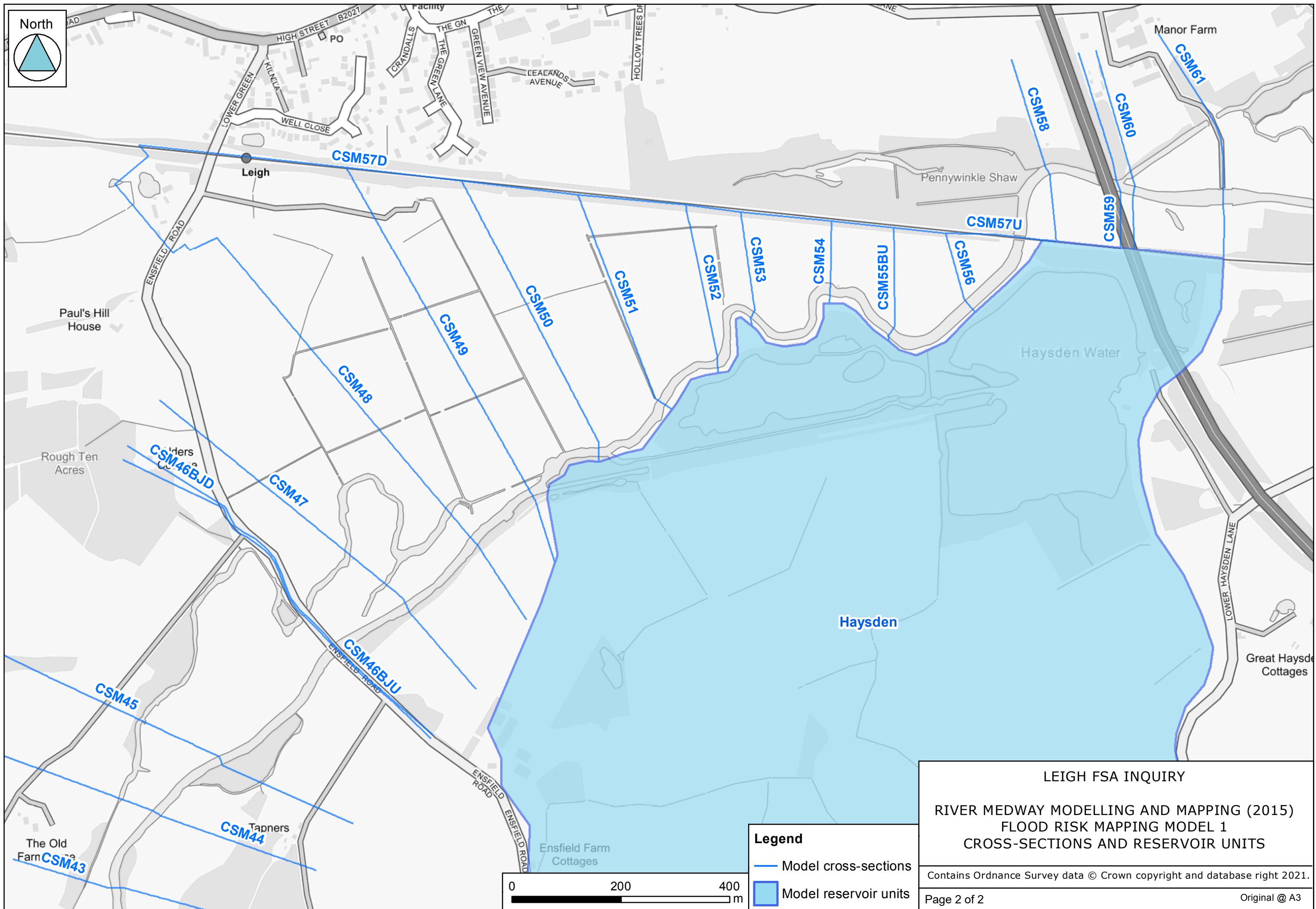
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3. Maps displaying the location of RMMMP (2015) Model 1 cross-sections and reservoir units between Penshurst and Leigh FSA embankment

Refer to the maps provided on the next two pages of this document.





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4. Peak flows and water levels at model cross-sections and reservoir units within the RMMMP (2015) defended case (current scheme) simulations

Notes:

- The nodes presented extended from immediately downstream of the confluence of the River Medway and River Eden (node 'CSM24') to immediately upstream of the Leigh FSA radial gates (node 'CSM61')
- The 3.33% AEP and 10% AEP +20% flow events, originally simulated for the RMMMP (2015) project were not re-simulated for the FRA, so information for these events is not presented in the table
- Units of water level are 'mAOD'
- Units of flow are 'm³/s'
- Flow rates are not recorded by the flood modelling software at reservoir units, so a value of 'N/a' is stated for node 'Haysden'

Node label	20% AEP		5% AEP		2% AEP		1.33% AEP		1% AEP		1% AEP +20%		0.4% AEP		0.1% AEP	
	Water Level	Flow														
CSM24	28.94	98	29.53	153	29.92	208	29.99	218	30.15	246	30.42	298	30.41	293	31.58	609
CSM25BJU	28.89	99	29.49	153	29.89	208	29.96	219	30.12	247	30.38	300	30.38	295	31.53	613
CSM25BJD	28.44	99	28.77	153	29.07	208	29.14	219	29.27	247	29.52	300	29.58	295	30.89	613
CSM26	28.35	99	28.67	153	28.95	208	29.03	219	29.15	247	29.40	300	29.48	294	30.82	612
CSM27	28.25	99	28.58	153	28.87	208	28.95	219	29.07	247	29.33	299	29.43	294	30.80	609
CSM28	28.13	99	28.49	153	28.80	207	28.89	218	29.01	246	29.28	299	29.39	293	30.77	605
CSM29	28.12	99	28.48	153	28.80	207	28.89	218	29.00	246	29.27	299	29.38	292	30.77	605
CSM30	28.04	99	28.42	153	28.74	207	28.84	218	28.95	246	29.23	298	29.35	292	30.75	602
CSM31	27.96	99	28.35	152	28.68	207	28.78	217	28.89	246	29.17	298	29.30	291	30.73	599
CSM32	27.87	99	28.28	152	28.61	207	28.73	217	28.83	246	29.12	297	29.26	290	30.70	596
CSM33WU	27.70	99	28.08	152	28.40	207	28.57	216	28.62	245	28.94	297	29.11	289	30.60	592
CSM34WD	27.67	99	28.04	152	28.35	207	28.54	216	28.57	245	28.90	297	29.06	289	30.55	592
CSM35	27.58	98	27.95	152	28.27	206	28.49	216	28.52	245	28.84	296	29.01	288	30.52	590
CSM36	27.41	98	27.79	152	28.11	206	28.41	215	28.44	245	28.76	296	28.93	287	30.47	587
CSM37	27.33	98	27.70	152	28.08	206	28.38	215	28.41	244	28.72	295	28.89	286	30.45	584
CSM38	27.20	98	27.57	152	28.04	206	28.34	214	28.35	244	28.67	294	28.83	286	30.42	582
CSM39	27.10	98	27.47	152	28.02	206	28.31	213	28.32	244	28.63	294	28.79	286	30.39	579
CSM40	27.03	98	27.43	152	28.00	205	28.28	213	28.29	243	28.60	293	28.76	285	30.37	576
CSM41	26.97	98	27.41	152	27.98	205	28.26	212	28.27	243	28.57	292	28.73	285	30.35	574
CSM42	26.91	98	27.39	152	27.97	205	28.24	211	28.24	242	28.54	291	28.70	285	30.33	571
CSM43	26.83	98	27.36	152	27.95	204	28.22	210	28.21	242	28.50	290	28.66	284	30.31	569
CSM44	26.76	98	27.34	151	27.94	204	28.20	209	28.18	241	28.47	289	28.62	284	30.28	566
CSM45	26.61	99	27.32	152	27.92	204	28.18	209	28.16	242	28.45	290	28.60	288	30.27	567
CSM46BJU	26.36	99	27.30	151	27.91	202	28.17	206	28.14	239	28.42	287	28.57	287	30.25	559
CSM46BJD	26.20	99	27.29	151	27.90	202	28.16	206	28.13	239	28.40	287	28.54	287	30.23	559
CSM47	26.05	99	27.28	151	27.90	200	28.15	203	28.12	237	28.40	284	28.54	287	30.23	554
CSM48	25.93	98	27.28	149	27.90	196	28.15	200	28.12	235	28.39	281	28.53	287	30.23	547
CSM49	25.89	98	27.28	148	27.90	193	28.15	197	28.12	232	28.39	278	28.53	287	30.23	541
CSM50	25.87	79	27.28	116	27.90	152	28.15	158	28.12	185	28.39	224	28.53	235	30.23	448
CSM51	25.87	62	27.28	89	27.90	118	28.15	125	28.12	146	28.39	178	28.53	191	30.23	367
CSM52	25.86	49	27.28	67	27.90	89	28.15	96	28.12	112	28.39	137	28.53	149	30.23	293
CSM53	25.86	46	27.28	48	27.90	64	28.15	70	28.12	81	28.39	101	28.53	112	30.23	225
CSM54	25.85	47	27.28	48	27.90	49	28.15	49	28.12	53	28.39	68	28.53	78	30.23	166
CSM55BU	25.84	51	27.28	51	27.90	51	28.15	49	28.12	51	28.39	55	28.53	63	30.23	136
CSM56	25.80	65	27.28	63	27.90	58	28.15	65	28.11	66	28.39	78	28.53	85	30.22	149
CSM57U	25.64	95	27.26	126	27.87	147	28.10	167	28.06	204	28.30	260	28.42	286	30.09	489
CSM57D	25.49	95	27.22	126	27.82	147	28.00	167	27.92	204	28.07	260	28.12	286	29.29	489
CSM58	25.43	95	27.21	125	27.81	144	27.99	166	27.91	202	28.05	262	28.10	286	29.25	489
CSM59	25.19	95	27.21	124	27.81	144	27.98	166	27.89	202	28.03	262	28.07	286	29.22	489
CSM60	25.13	95	27.21	124	27.80	143	27.98	166	27.89	201	28.02	263	28.06	286	29.21	489
CSM61	25.02	95														

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5. Peak flows and water levels at model cross-sections and reservoir units within the RMMMP (2015) undefended case (without Leigh FSA or other defences) simulations.

Notes:

- The nodes presented extended from immediately downstream of the confluence of the River Medway and River Eden (node 'CSM24') to immediately upstream of the Leigh FSA radial gates (node 'CSM61')
- Fewer undefended case events were simulated as part of the RMMMP (2015) project compared with the defended case events
- Units of water level are 'mAOD'
- Units of flow are 'm³/s'
- Flow rates are not recorded by the flood modelling software at reservoir units, so a value of 'N/a' is stated for node 'Haysden'

Node label	5% AEP		1% AEP		1% AEP + 20%		0.1% AEP	
	Water Level	Flow	Water Level	Flow	Water Level	Flow	Water Level	Flow
CSM24	29.53	153	30.15	246	30.42	299	31.56	613
CSM25BJU	29.50	154	30.12	248	30.38	301	31.51	617
CSM25BJD	28.78	154	29.26	248	29.50	301	30.60	617
CSM26	28.67	154	29.14	248	29.37	301	30.47	617
CSM27	28.58	153	29.06	247	29.30	301	30.41	616
CSM28	28.50	153	29.00	247	29.25	301	30.36	616
CSM29	28.49	153	28.99	247	29.24	301	30.36	615
CSM30	28.43	153	28.94	247	29.19	301	30.31	615
CSM31	28.35	153	28.88	247	29.13	300	30.26	615
CSM32	28.28	153	28.81	247	29.06	300	30.19	615
CSM33WU	28.08	153	28.59	247	28.83	300	29.92	614
CSM34WD	28.04	153	28.53	247	28.76	300	29.81	614
CSM35	27.95	153	28.44	247	28.67	300	29.71	614
CSM36	27.78	153	28.28	247	28.50	300	29.53	614
CSM37	27.70	152	28.19	247	28.42	300	29.44	614
CSM38	27.56	152	28.05	247	28.27	300	29.28	614
CSM39	27.46	152	27.94	246	28.17	300	29.16	614
CSM40	27.39	152	27.86	246	28.08	300	29.05	614
CSM41	27.32	152	27.77	246	27.99	300	28.93	614
CSM42	27.24	152	27.69	246	27.89	300	28.81	614
CSM43	27.14	152	27.56	246	27.76	300	28.63	614
CSM44	27.04	152	27.42	246	27.60	300	28.42	614
CSM45	26.90	153	27.27	248	27.45	302	28.24	619
CSM46BJU	26.66	153	27.04	248	27.22	302	28.02	619
CSM46BJD	26.38	153	26.63	248	26.74	302	27.27	619
CSM47	26.15	153	26.37	248	26.48	302	26.97	619
CSM48	25.91	153	26.14	248	26.25	302	26.75	618
CSM49	25.80	153	26.02	248	26.13	302	26.63	618
CSM50	25.73	135	25.94	214	26.04	259	26.54	523
CSM51	25.68	116	25.88	181	25.98	218	26.46	433
CSM52	25.63	104	25.82	155	25.91	185	26.38	353
CSM53	25.58	90	25.75	129	25.83	151	26.29	273
CSM54	25.48	79	25.63	103	25.71	116	26.18	188
CSM55BU	25.44	74	25.59	90	25.66	98	26.16	141
CSM56	25.27	73	25.44	82	25.52	87	26.14	105
CSM57U	25.03	73	25.21	82	25.32	85	26.11	91
CSM57D	24.81	73	25.01	82	25.14	85	26.09	91
CSM58	24.56	73	24.87	82	25.04	85	26.08	89
CSM59	24.39	73	24.73	82	24.94	85	26.08	88
CSM60	24.23	73	24.57	82	24.80	85	26.08	88
CSM61	24.11	73	24.50	82	24.75	85	26.07	87
Haysden	24.38	N/a	24.64	N/a	24.84	N/a	26.11	N/a