

Technical Note

To	Stephen Taylor
Copy	Mike Wellington
From	Vic Mohun
Office	Wrexham Office
Date	23 April 2018
File	V-R6519.00
Subject	Wrexham Maelor Hospital P/2018/0241 – Responses to NRW Comments

The following provides a summary of the comments received from Natural Resources Wales (NRW) and responses/additional information provided by Opus:

NRW Comment 1

The FCA only details the predicted external flood depths or water levels around the building and site and does not indicate flood water depths and velocities and there is no assessment of the hazards.

Opus Response 1

Flood depths – a comparison of the modelled flood depths is given in Table 2, page 12 of the FCA report and is reproduced below for reference:

Scenario	Site level (m AOD)	Pre development (m AOD)	Post development (m AOD)	Difference (m)	Water depth on site (mm)
1%AEP +20CC		-	-	-	-
1%AEP +45CC		-	-	-	-
0.1%AEP	87.39	87.82	87.82	-	480
1%AEP +20CC - 90% Blk	87.39	87.96	87.94	-0.02	570
1%AEP +45CC - 90% Blk	87.39	88.00	87.97	-0.03	610
0.1% AEP - 90% Blk	87.39	88.02	87.99	-0.03	630

Table 2: Maximum water level at proposed development site (Pre and Post development)

The table below shows the values of velocity, depth and hazard ratings near the 3 access points to the building for 3 different modelled events, including the worst case (90% blockage) scenarios. Please note that the access levels are proposed to be raised above the modelled 1000 year flood level.

	NGR			PRE Development				POST Development			
Point	Easting	Northing	Event	Velocity (m/s)	Depth (m)	Hazard		Velocity (m/s)	Depth (m)	Hazard	
1	332501	350265	1.0 AEP + 20CC	0.161	0.55	1.35	Significant	0.201	0.56	1.38	Significant
			1.0 AEP +45CC	0.165	0.57	1.37	Significant	0.207	0.59	1.41	Significant
			0.1 AEP	0.174	0.59	1.39	Significant	0.216	0.61	1.43	Significant
2	332543	350233	1.0 AEP + 20CC	0.357	0.13	0.61	Low	0.391	0.14	0.62	Low
			1.0 AEP +45CC	0.380	0.15	0.63	Low	0.429	0.16	0.65	Low
			0.1 AEP	0.394	0.18	0.66	Low	0.454	0.18	0.67	Low
3	332573	350237	1.0 AEP + 20CC	0.302	0.16	0.62	Low	0.056	0.12	0.56	Low
			1.0 AEP +45CC	0.303	0.20	0.65	Low	0.057	0.16	0.58	Low
			0.1 AEP	0.302	0.23	0.67	Low	0.057	0.19	0.59	Low

The comparison table above shows negligible differences between the flood depths, velocities and hazard ratings near those 3 access points.

Please note that the proposed building and access are proposed to be raised 310mm above the modelled 1 in 1000 year flood levels to ensure safe and dry access and egress and therefore the information provided in the table above do not apply internally to the building, but only externally and therefore do not affect the operation of the building.

The detailed flood depth maps are included in Appendix E of the FCA report. The flood velocity and hazard maps are also appended to this Technical Note for reference.

NRW Comment 2

It is not clear if it would involve the demolition of an existing part of the hospital building or replacement of existing temporary buildings.

Opus Response 2

Sections 2.1 and 2.1.1, page 6 of the FCA report confirm the nature of the proposed development as follows:

"The scheme consists of the demolition of the existing temporary modular buildings, to allow the construction of a replacement modular building. The proposed building will be used as additional operation theatre space and endoscope unit. The building will include two general operating theatres with associated recovery wards, preparation, changing areas, consultation rooms, an endoscope assessment room, reception / waiting area and office space.

The development proposals are shown on the Architects plans enclosed within Appendix B. This will include setting the finished floor levels above the modelled 1 in 1000 year flood level with 90% upstream culvert blockage scenario (this is based on a worst case blockage scenario of 90%). This was found to be 88.30mAOD as part of this assessment and includes a 300mm freeboard, as required by the NRW. There will be a reduction in the overall footprint of the proposed building approximately 1700m² to approximately 870m²."

NRW Comment 3

It is not clear in the FCA if the proposed development would result in any floodwater displacement or re-routing because whilst the increase in levels are confirmed.

Opus Response 3

The FCA report has demonstrated that there is an overall reduction in the post development external flood levels and therefore **NO** increase. See table 2, page 12 of the FCA report.

Figures 3 and 4 and Figures 5 and 6 of the FCA (paragraph 3.3) also appended to this report below, show a graphical comparison of the before and after scenarios. Appendix E of the FCA report also show a number of detailed flood maps with the modelled extents of the floodplains and flood depths in the pre and post development scenarios. The pre and post development modelled flood maps do not show any floodwater displacement or re-routing as a result of the proposed development.

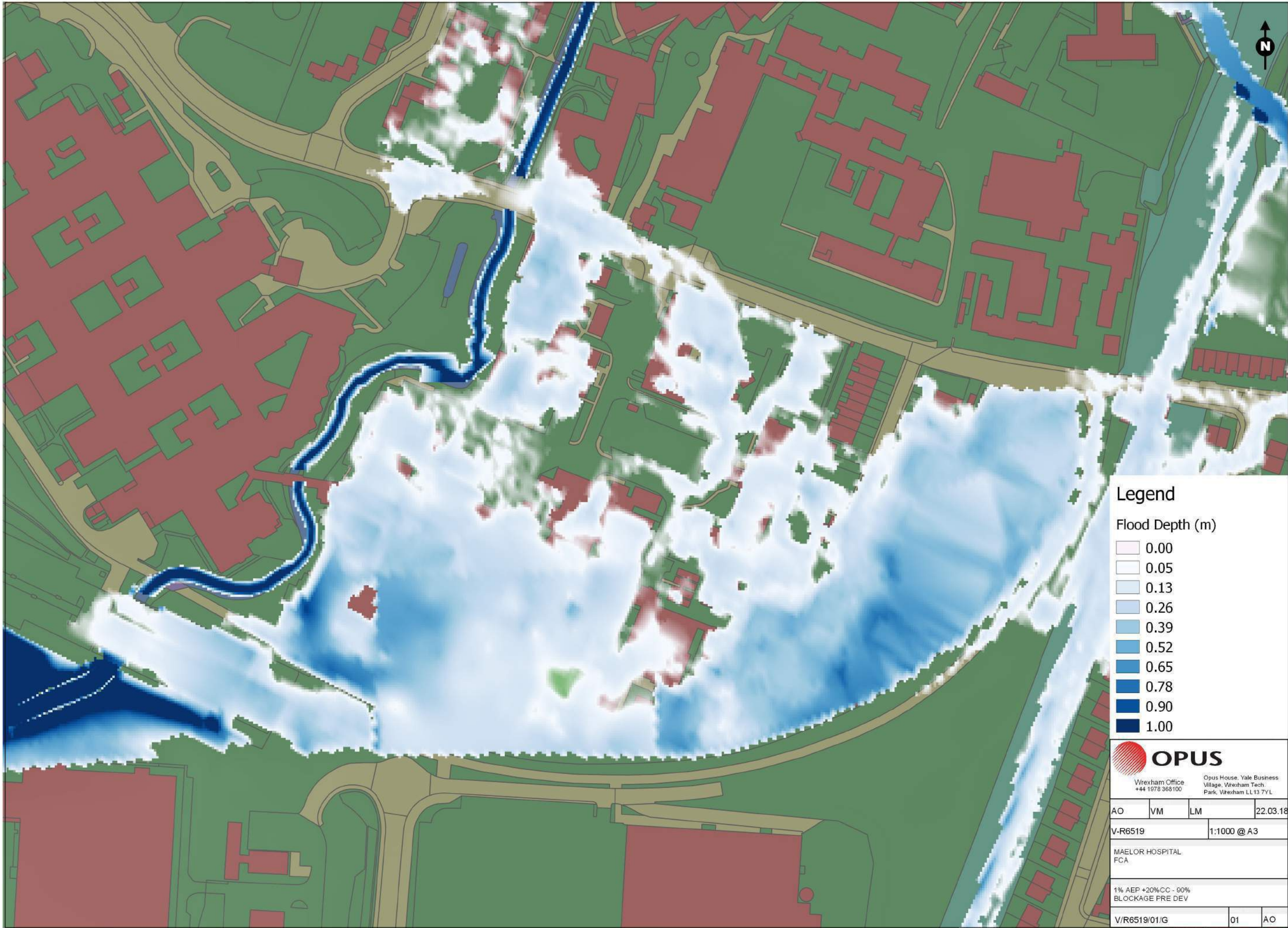
Due to the reduction of the footprint of the proposed building and decrease in modelled flood levels, there will be no floodplain loss and no floodwater displacement or re-routing.

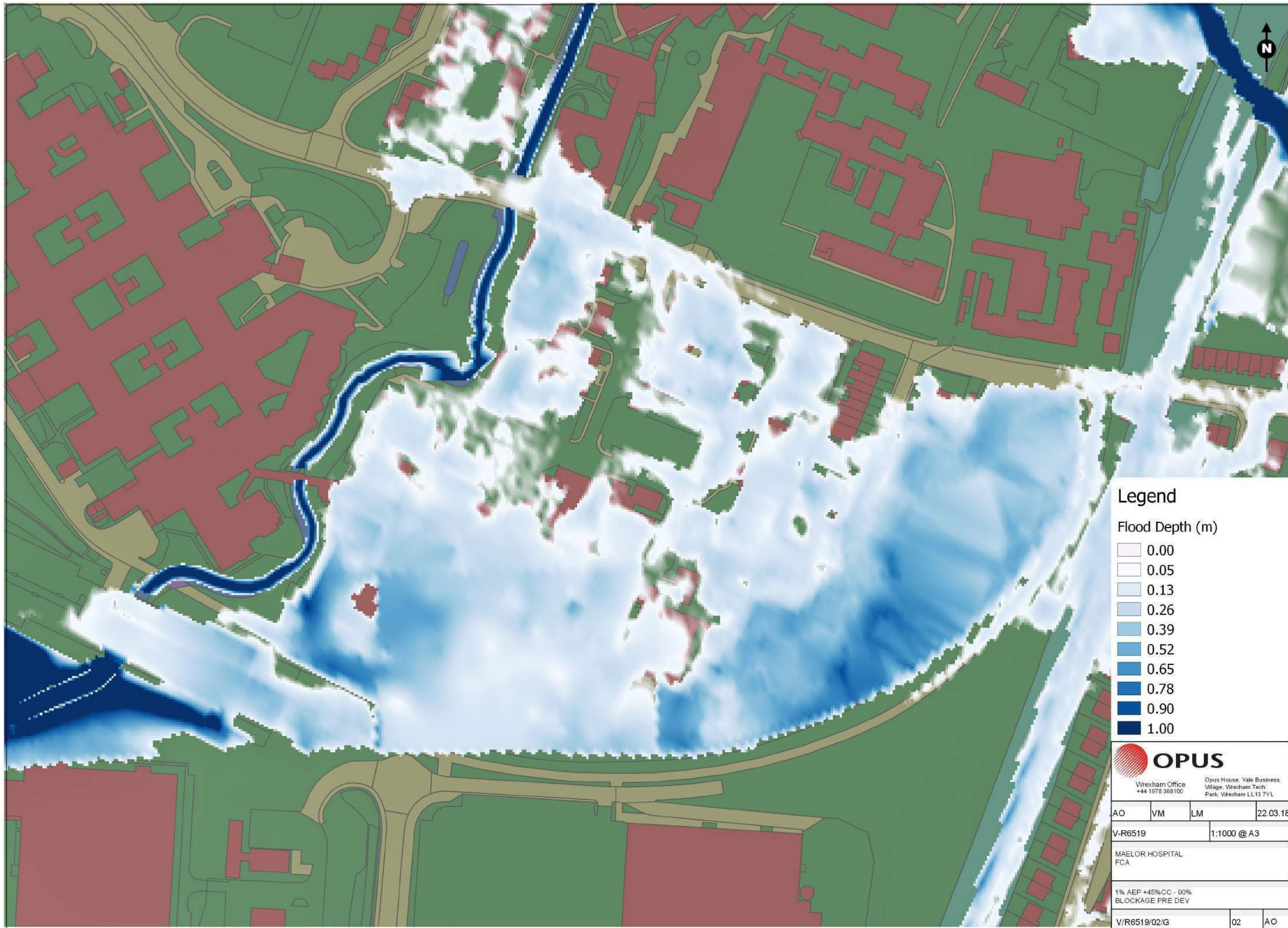
NRW Comment 4

It's difficult in the absence of hazard details to assess impacts to emergency access and egress during times of flood.

Opus Comment 4

Please refer to the table above and the flood hazard maps provided as part of this Technical Note.





Legend

Flood Depth (m)

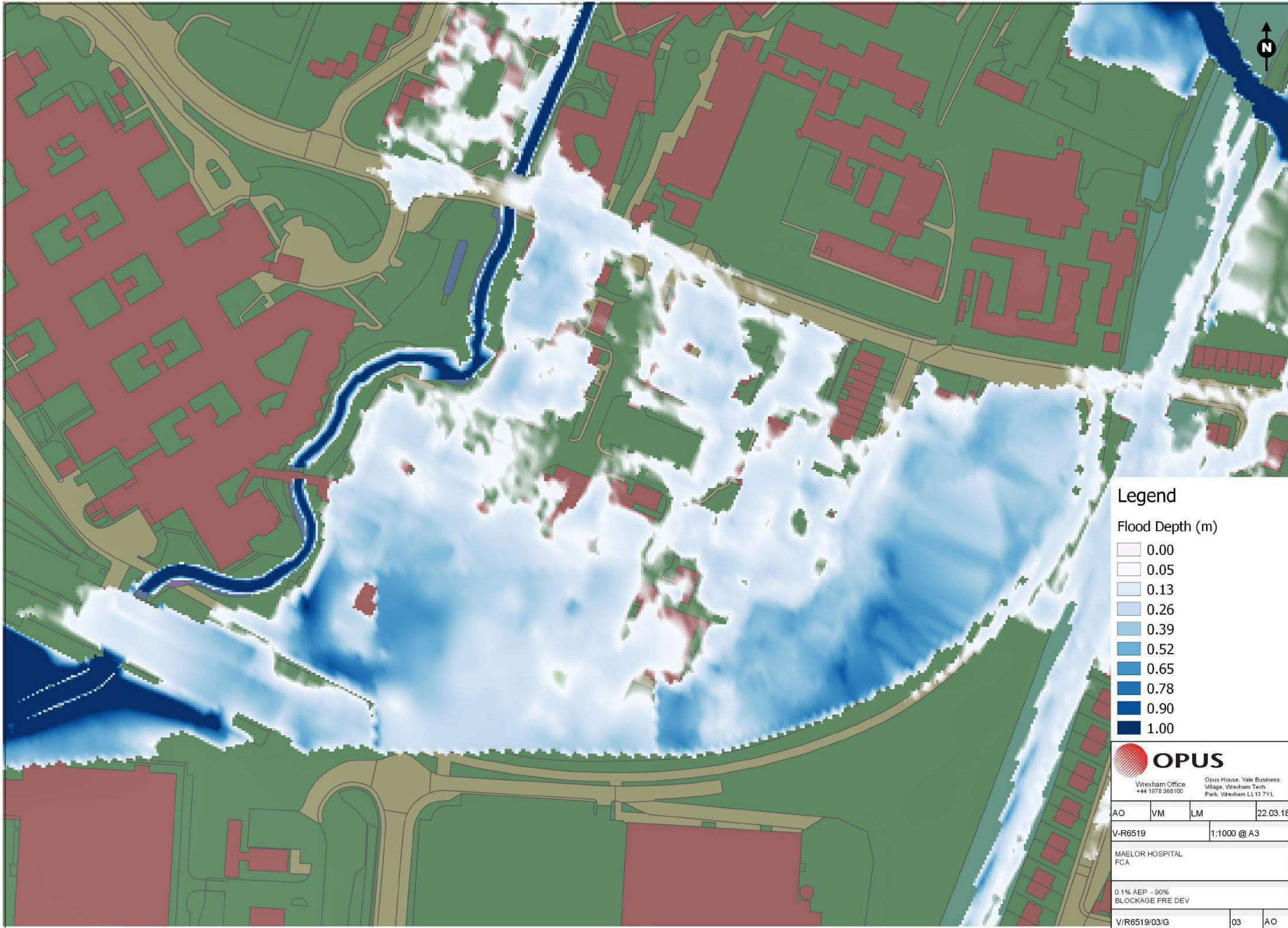
- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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AO	VM	LM	22.03.18
V-R6519		1:1000 @ A3	
MAELOR HOSPITAL FCA			
1% AEP +45%CC - 90% BLOCKAGE PRE DEV			
V/R6519/02/G		02	AO



Legend

Flood Depth (m)

- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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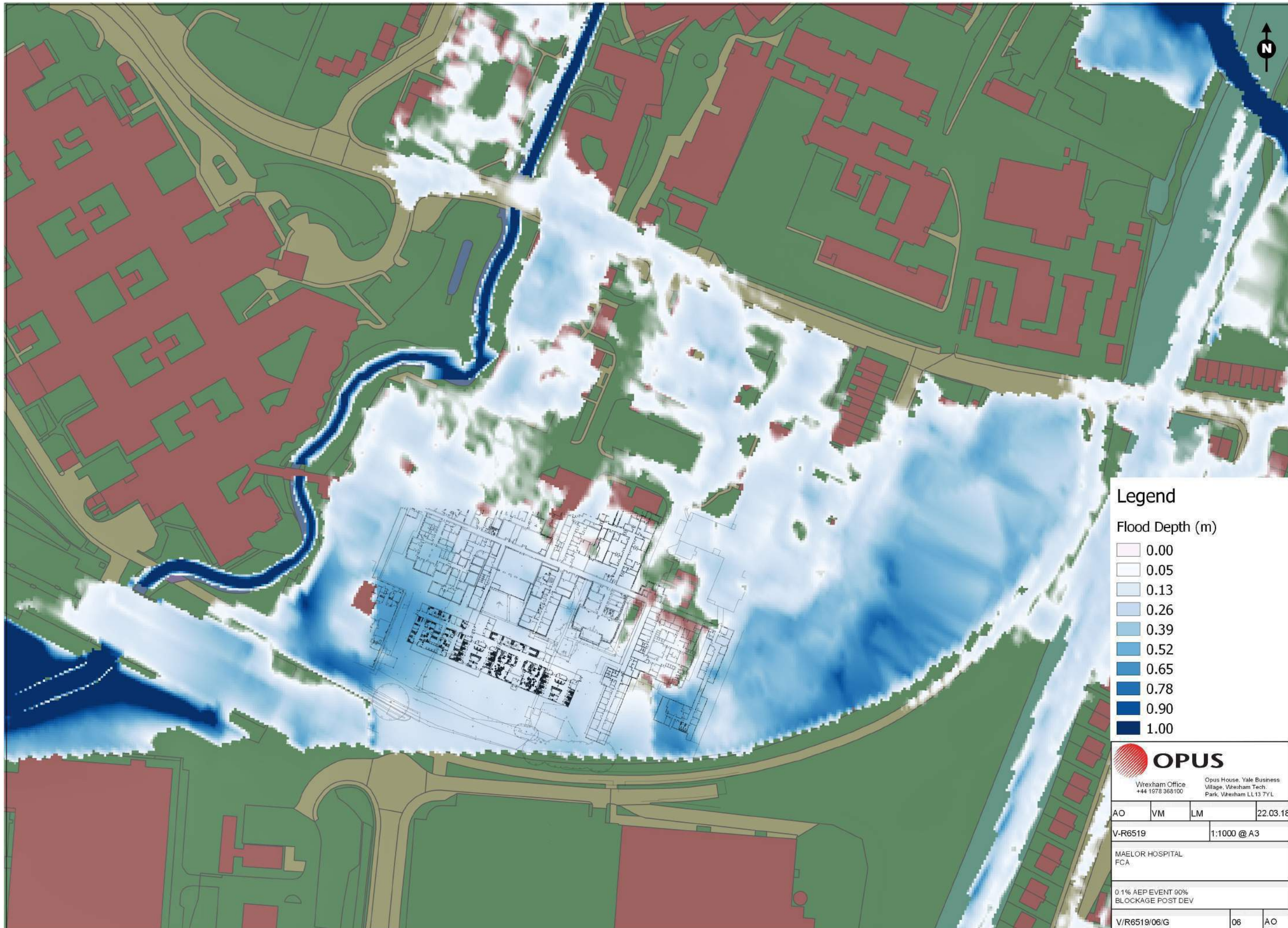
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AO	VM	LM	22.03.18
V-R6519		1:1000 @ A3	
MAELOR HOSPITAL FCA			
0.1% AEP - 90% BLOCKAGE PRE DEV			
V/R6519/03/G		03	AO







Legend

Flood Depth (m)

- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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V-R6519		1:1000 @ A3	
MAELOR HOSPITAL FCA			
0.1% AEP EVENT 90% BLOCKAGE POST DEV			
V/R6519/06/G		06	AO



Legend

Flood Depth (m)

	0.00
	0.05
	0.13
	0.26
	0.39
	0.52
	0.65
	0.78
	0.90
	1.00

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MAELOR HOSPITAL FCA			
1% AEP +20% CC			
V/R6519/08/G			08 AO



Legend

Flood Depth (m)

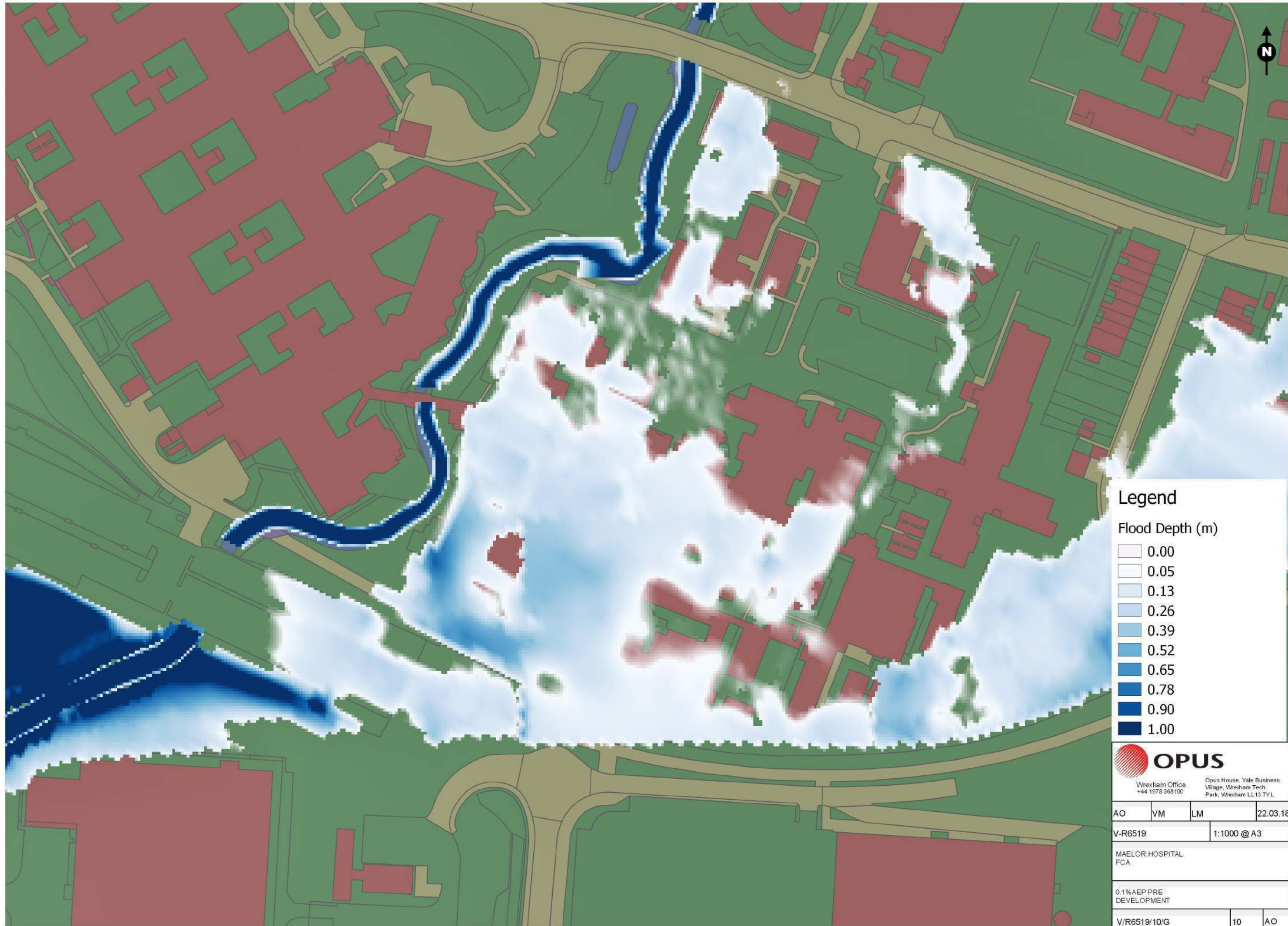
- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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MAELOR HOSPITAL FCA			
1% AEP +45% CC			
V/R6519/09/G		09	AO



Legend

Flood Depth (m)

- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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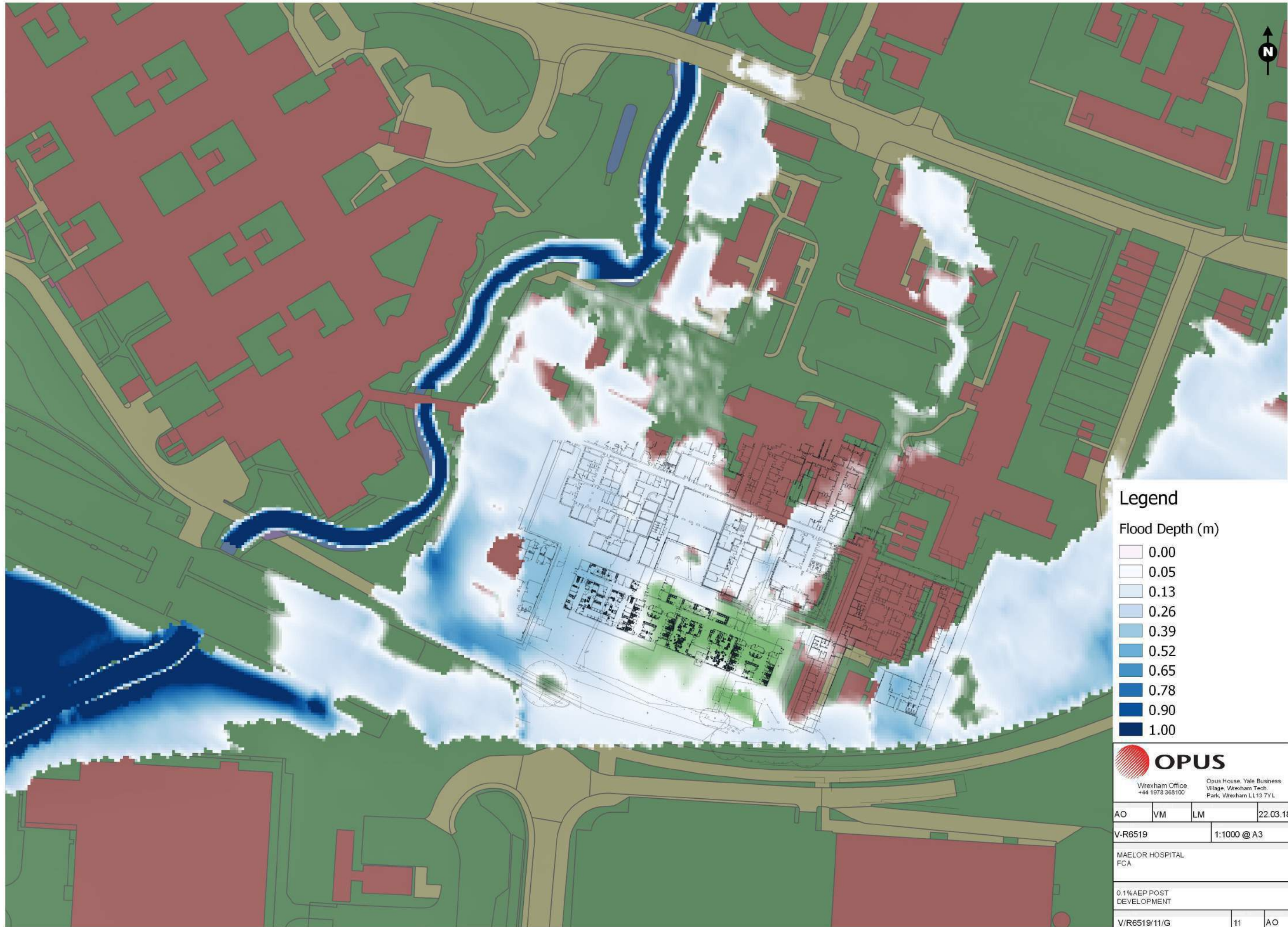
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MAELOR HOSPITAL FCA

0.1% AEP PRE DEVELOPMENT

V/R6519/10/G	10	AO
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Legend

Flood Depth (m)

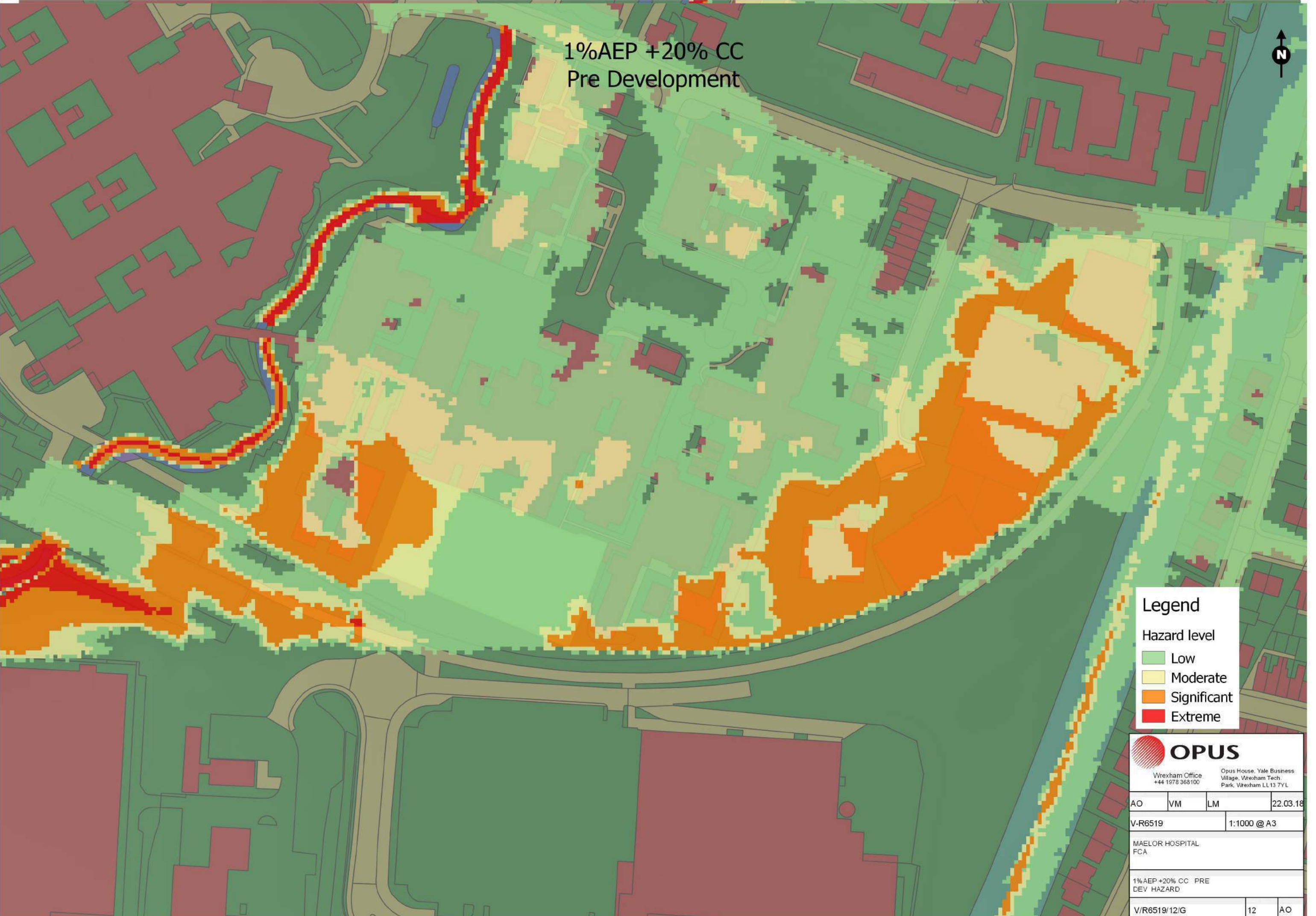
- 0.00
- 0.05
- 0.13
- 0.26
- 0.39
- 0.52
- 0.65
- 0.78
- 0.90
- 1.00

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MAELOR HOSPITAL FCA			
0.1% AEP POST DEVELOPMENT			
V/R6519/11/G			11 AO



1%AEP +20% CC
Pre Development

Legend

Hazard level

- Low
- Moderate
- Significant
- Extreme

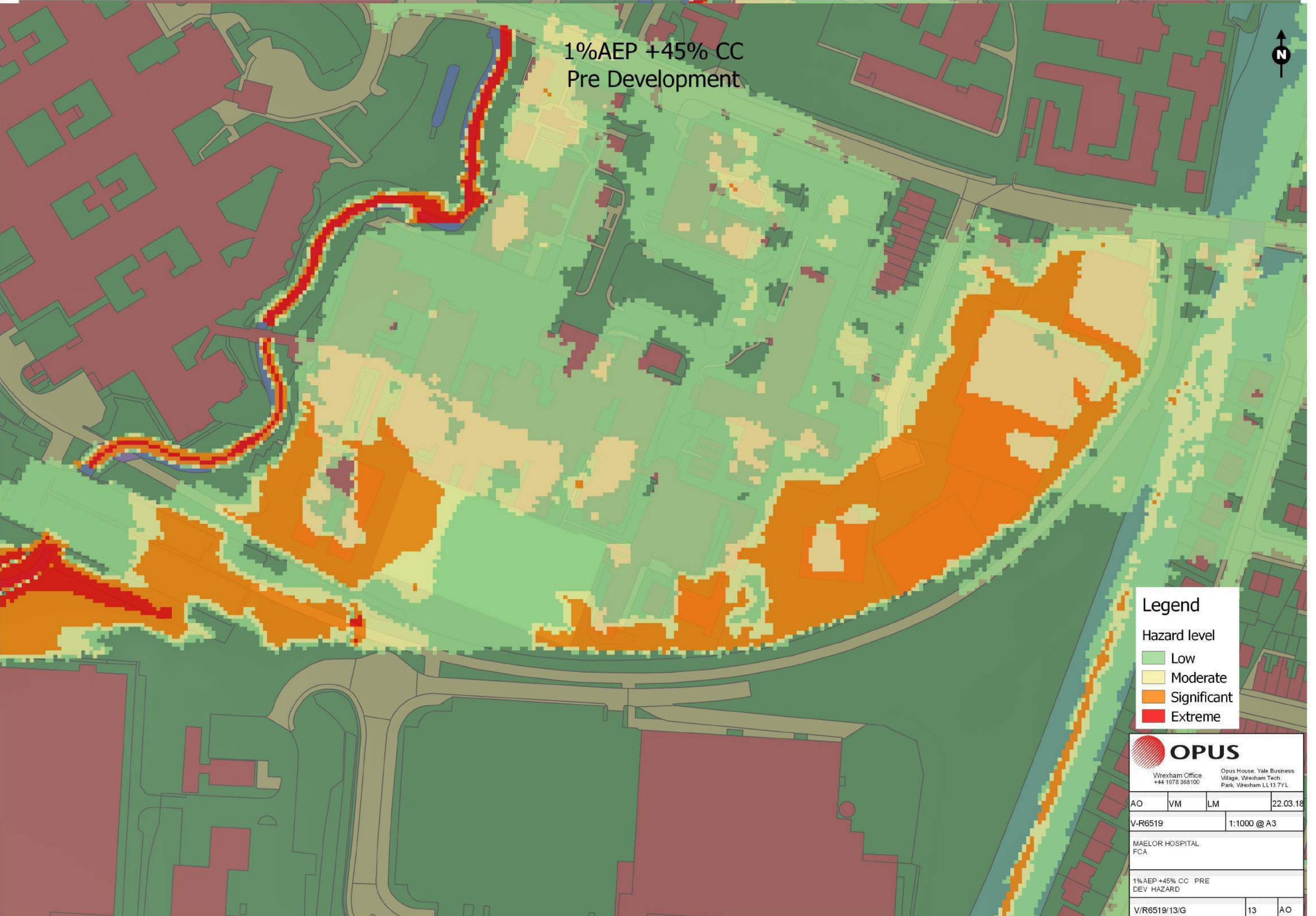


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MAELOR HOSPITAL FCA			
1%AEP+20% CC PRE DEV HAZARD			
V/R6519/12/G		12	AO



1%AEP +45% CC
Pre Development

Legend

Hazard level

- Low
- Moderate
- Significant
- Extreme

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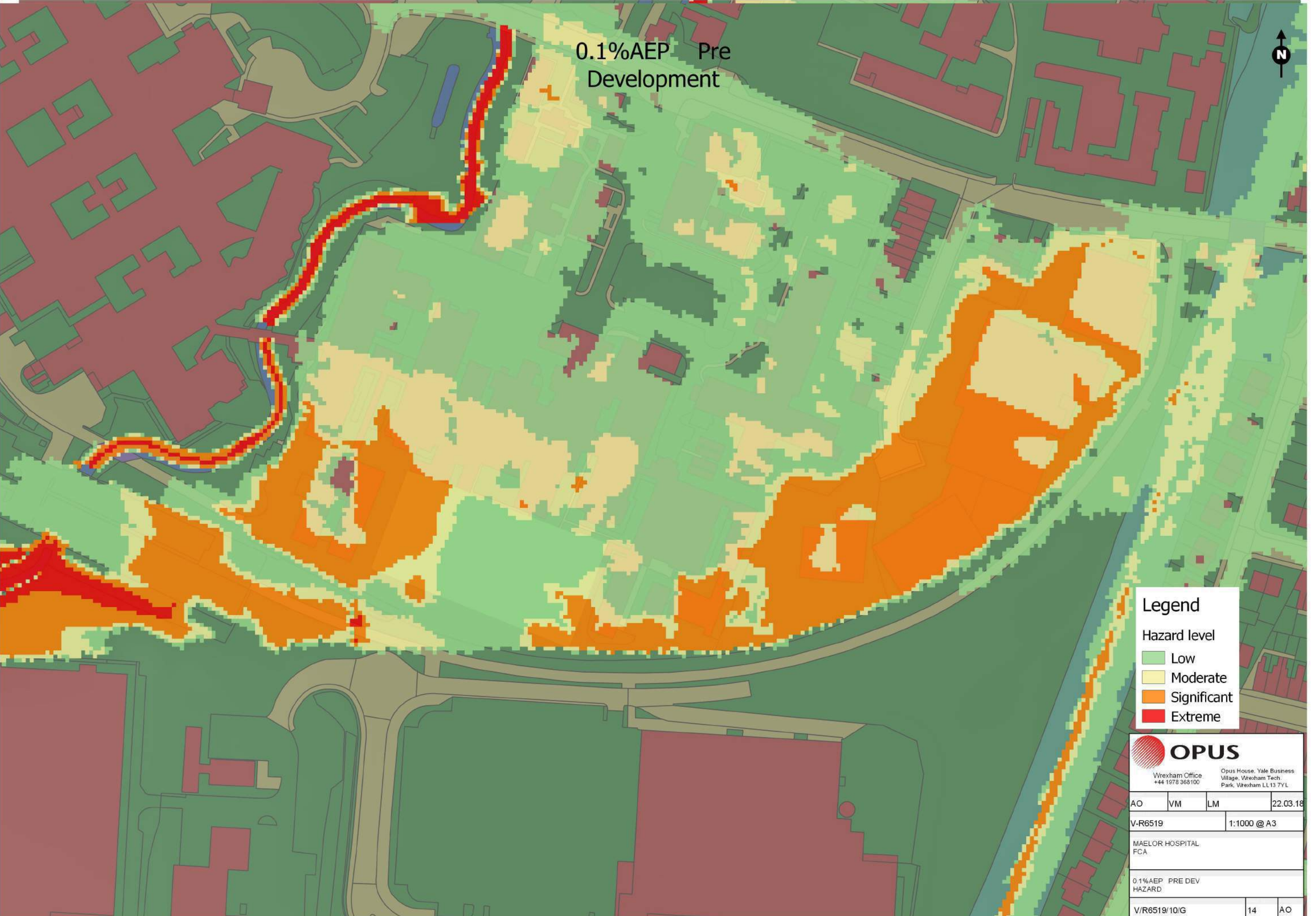
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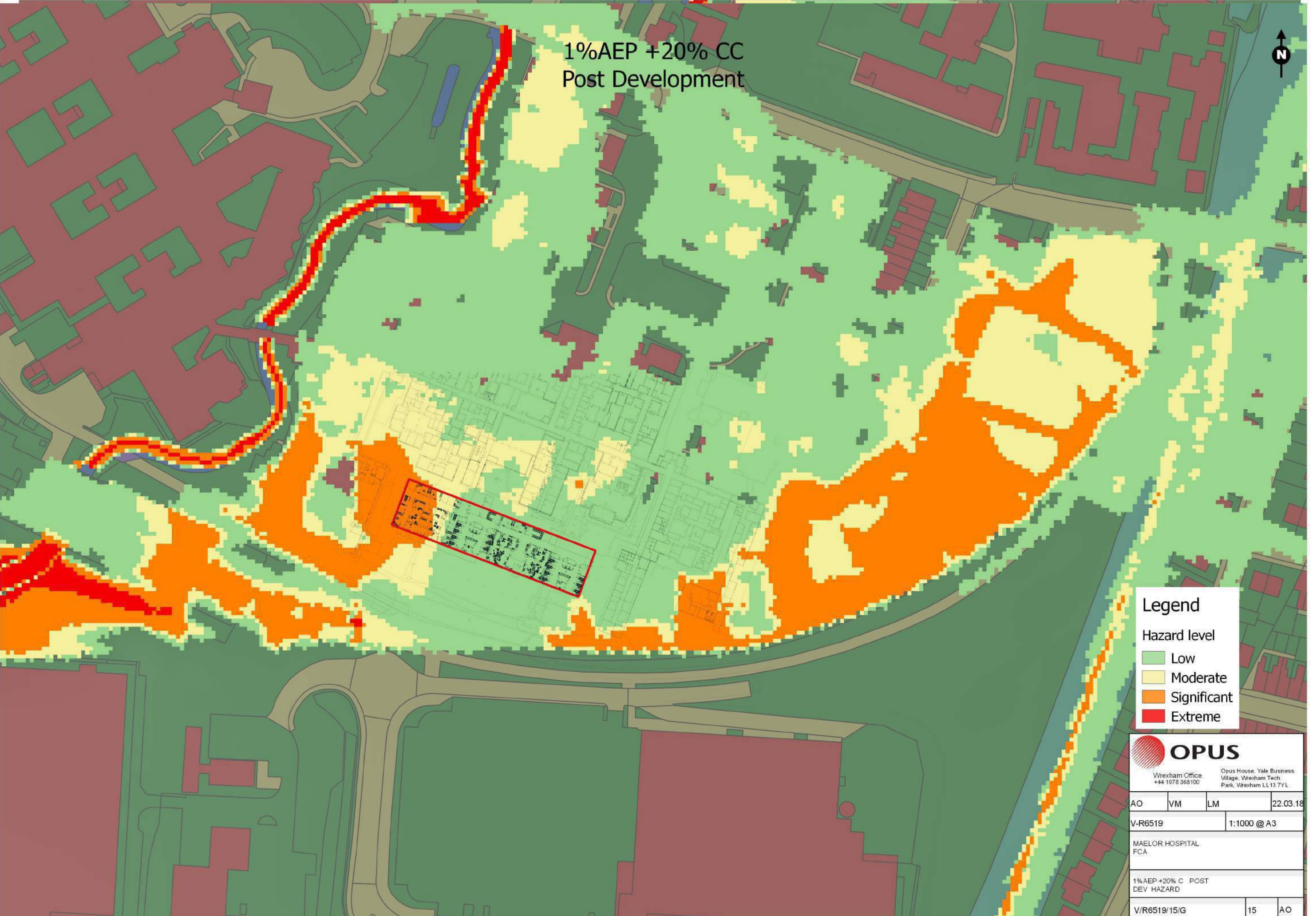
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MAELOR HOSPITAL FCA

1%AEP +45% CC PRE DEV HAZARD

V/R6519/13/G	13	AO
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1% AEP + 20% CC
Post Development

Legend

Hazard level

- Low
- Moderate
- Significant
- Extreme

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MAELOR HOSPITAL FCA			
1% AEP + 20% C POST DEV HAZARD			
V/R6519/15/G		15	AO



1%AEP +45% CC
Post Development



Legend

Hazard level

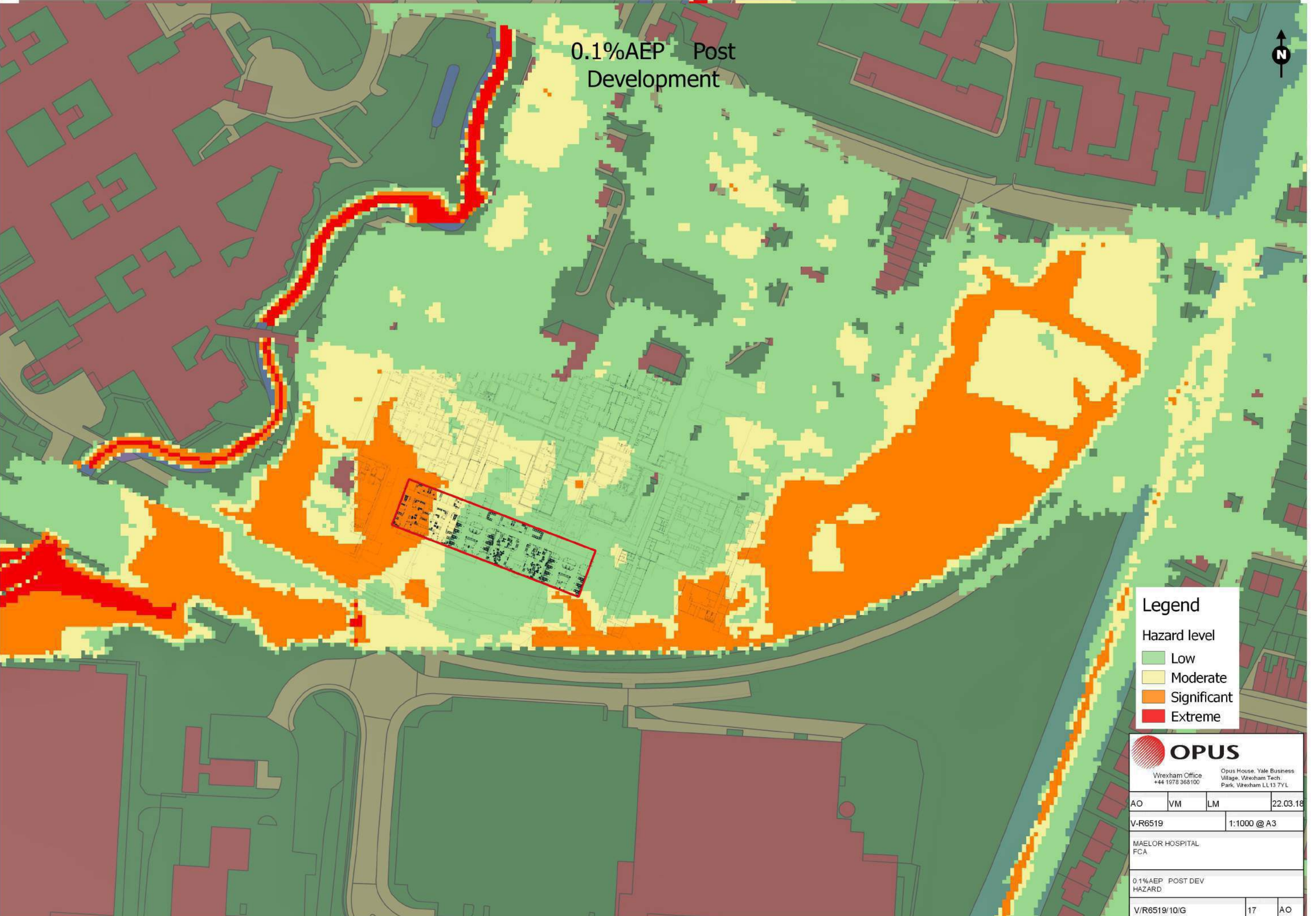
- Low
- Moderate
- Significant
- Extreme



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MAELOR HOSPITAL FCA			
1%AEP +45% CC POST DEV HAZARD			
V/R6519/16/G		16	AO



0.1%AEP Post Development



Legend

Hazard level

- Low
- Moderate
- Significant
- Extreme



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AO	VM	LM	22.03.18
V-R6519		1:1000 @ A3	
MAELOR HOSPITAL FCA			
0.1%AEP POST DEV HAZARD			
V/R6519/10/G		17	AO



1%AEP +20% CC
Pre Development

Legend

Velocity m/s

- 0
- 0.371
- 0.743
- 1.11
- 1.49

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MAELOR HOSPITAL FCA

1%AEP+20% CC PRE DEV VELOCITY

V/R6519/18/G	18	AO
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1%AEP +45% CC
Pre Development

Legend

Velocity m/s

- 0
- 0.371
- 0.743
- 1.11
- 1.49



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MAELOR HOSPITAL FCA			
1%AEP+45% CC PRE DEV VELOCITY			
V/R6519/19/G		19	AO



0.1%AEP Pre Development

Legend

Velocity m/s

- 0
- 0.371
- 0.743
- 1.11
- 1.49

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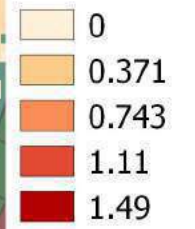
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MAELOR HOSPITAL FCA			
0.1%AEP PRE DEV VELOCITY			
V/R6519/20/G		20	AO

1%AEP +20% CC
Post Development



Legend

Velocity m/s



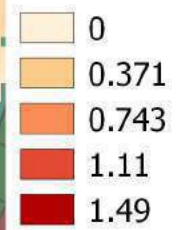
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MAELOR HOSPITAL FCA			
1%AEP+20% CC POST DEV VELOCITY			
V/R6519/21/G		21	AO

1%AEP +45% CC
Post Development



Legend

Velocity m/s

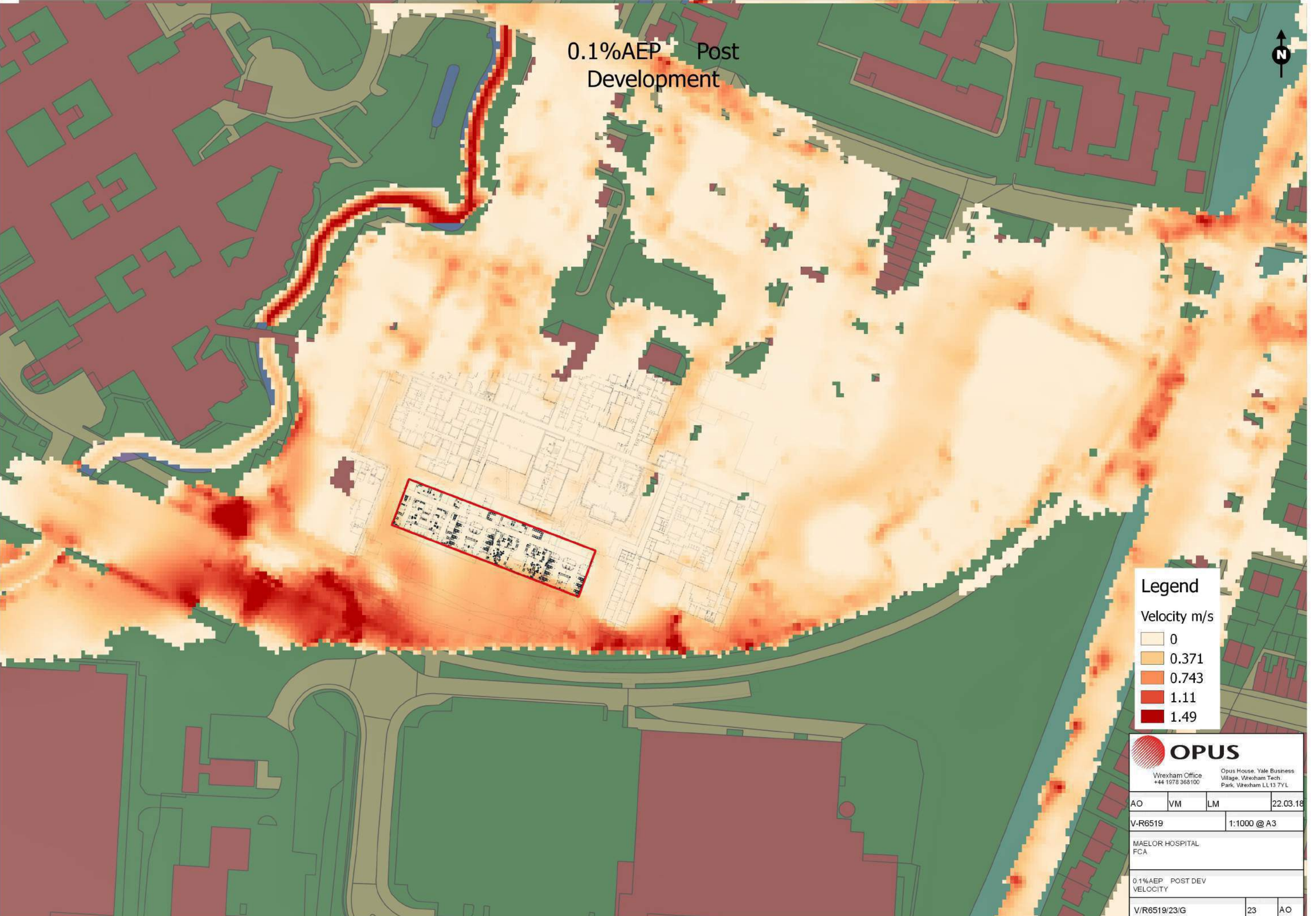


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MAELOR HOSPITAL FCA			
1%AEP +45% CC POST DEV VELOCITY			
V/R6519/22/G		22	AO



0.1%AEP Post Development

Legend

Velocity m/s

- 0
- 0.371
- 0.743
- 1.11
- 1.49



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0.1%AEP POST DEV VELOCITY			
V/R6519/23/G		23	AO