

TECHNICAL NOTE

JBA Project Code	2023s0381
Contract	Tunbridge Wells Borough Council Local Plan Support
Client	Tunbridge Wells Borough Council
Version / Date	V1 / September 2023
Author	Ben Gibson BSc MSc MCIWEM C.WEM
Reviewer / Sign-off	Alastair Dale BSc PGDip MIAHR
Subject	Updated present day and climate change Flood Zone mapping

1 Introduction

JBA Consulting was commissioned by Tunbridge Wells Borough Council to prepare updated present day and climate change fluvial flood modelling for modelling which produces flood predictions at and close to Paddock Wood within the parishes of Capel and Paddock Wood.

The updated flood modelling and mapping is prepared for the 3.3%, 1% and 0.1% Annual Exceedance Probability (AEP) events, which relate to Flood Zone 3b, Flood Zone 3a, and Flood Zone 2, respectively. For each AEP event, modelling and mapping is prepared for the present day flood estimates and also for the predicted effects of climate change.

Two flood risk mapping models inform the flood predictions within this area. The mapping and modelling assessment for these models is described in separate technical notes, the details of which are listed below:

River Medway and River Teise flood modelling – document reference:

- KFT-JBAU-XX-XX-TN-HM-0001-Medway_Teise_Flood_Zone_modelling_and_mapping

Paddock Wood Streams flood modelling – document reference

- KFT-JBAU-XX-XX-TN-HM-0002-Paddock_Wood_Streams_Flood_Zone_modelling_and_mapping

This technical note presents flood mapping predictions for the area of interest produced by combining the predictions from the two models.

For Flood Zone 3b, the modelling includes allowance for the presence and operation of the Leigh Flood Storage Area (FSA) located on the River Medway upstream (west) of Tonbridge and so represents the defended case situation. For Flood Zone 3a and Flood Zone 2, the modelling represents an undefended case, in which Leigh FSA is not present/operating. Therefore, the mapping predictions for Flood Zones 3a and 2 do not represent the actual risk of flooding i.e. with defences in place/operating, which act to reduce flooding from the River Medway.

1.1 Climate change allowances

The modelling and mapping is prepared for flow allowances of +27% and +37%, reflecting the Central and Higher central estimates of climate change applicable to the catchment for the 2080s epoch (years 2070-2125) according to the latest guidance¹.

¹ Environment Agency, Flood risk assessments: climate change allowances. Last updated 27 May 2022. Available: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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2 Mapping and approach

The sections below record how the flood extent and depth, velocity and hazard rating information was prepared for the area of interest, and appendices present the mapping outputs. These outputs should be used by the council to support their decision-making relating to, among other things, the placement of development and safe access and escape during floods.

2.1 Flood extents

Flood extent predictions for the present day and climate change events for Flood Zone 3b, Flood Zone 3a and Flood Zone 2 are presented in Appendices A, B and C, respectively.

The flood extents for each event are produced by merging the maximum flood extents from the River Medway/River Teise and Paddock Wood Streams models.

2.2 Flood depth, velocity and hazard rating

2.2.1 Processing gridded outputs from the two models

For each event magnitude, maximum grids from the two models were merged, creating a grid with a spatial resolution of 1-metre. Where flood predictions are present from both models at a location, the maximum value was retained.

To produce grids of maximums from the River Medway/River Teise modelling, the grids from each of the three applicable output zones (refer to the modelling note) were merged to create a grid with a spatial resolution of 3m. Maximum values in the grids were preserved where there are overlaps between the output zones

To produce grids of maximums from the Paddock Wood Streams modelling, the mesh elements with flood depths greater than 0.01m and a hazard rating greater than 0.575 were converted from vector data to a raster grid with a spatial resolution of 1m. The criteria above are used so that relatively shallow or slow moving water is not presented as a fluvial flooding (which could otherwise mean the full model extent is displayed as flooded given that rainfall is applied everywhere in the model). However, when preparing flood extents, additional cleaning steps are undertaken to produce flood extents that are more representative of fluvial-only flooding. These additional steps involve merging all mesh elements together and removing areas of flood extent which are disconnected from watercourses. Therefore, the depth, hazard rating and velocity outputs for Paddock Wood Streams display larger areas of flooding in places than the Flood Zone extent mapping. The flood extents should be taken as definitive accounts of the Flood Zones. The additional areas contained within the grids are regions which typically have shallower depths and low hazard rating values associated with them.

2.2.2 Flood depths

Appendices D and E present maximum depth outputs for +27% and +37% flow allowances for the 1% AEP (Flood Zone 3a) and 0.1% AEP (Flood Zone 2) events, respectively.

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2.2.3 Flood velocity

Appendices F and G present maximum velocity outputs for +27% and +37% flow allowances for the 1% AEP (Flood Zone 3a) and 0.1% AEP (Flood Zone 2) events, respectively.

2.2.4 Flood hazard rating

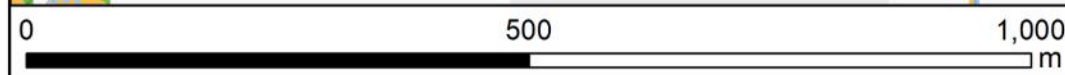
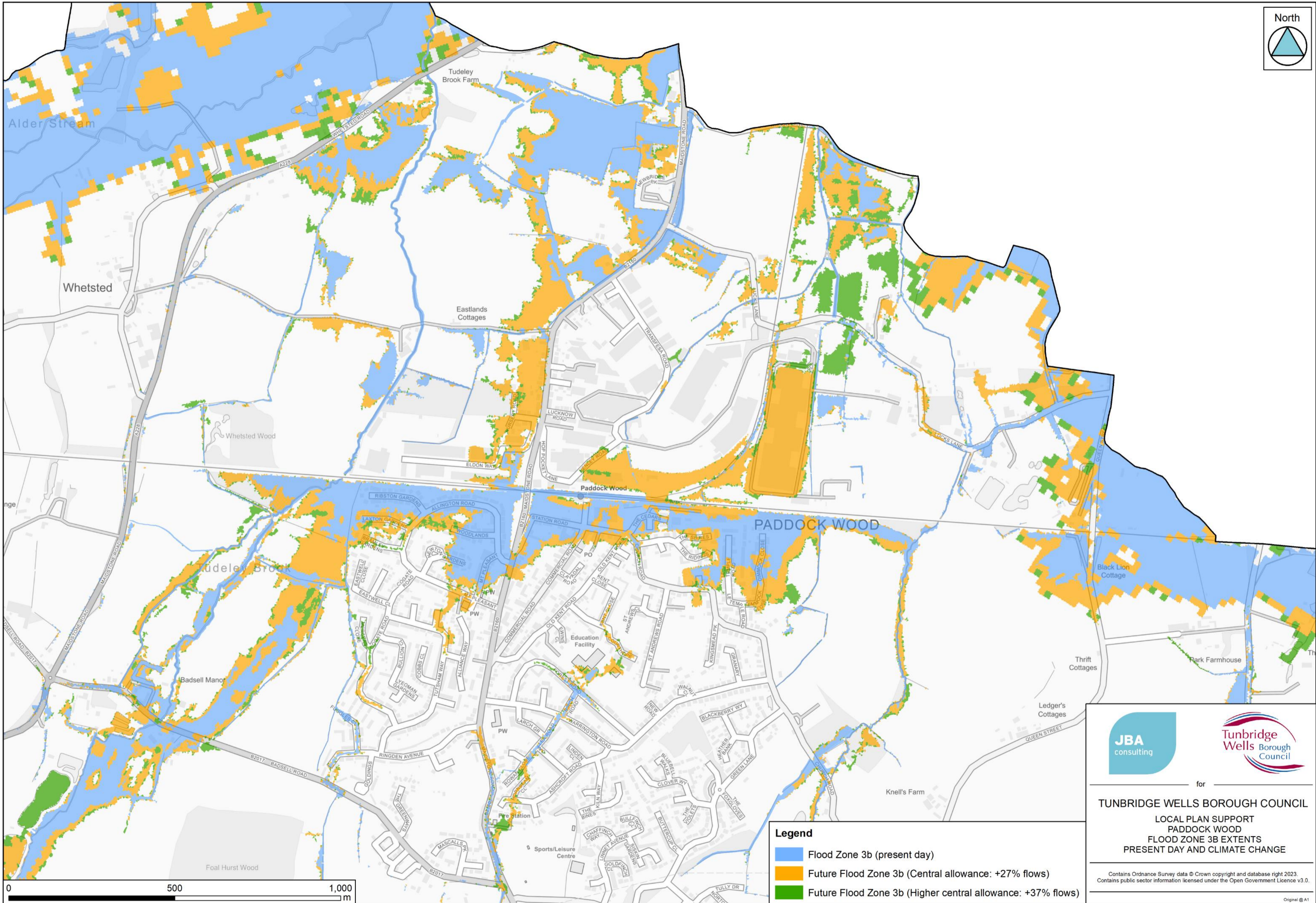
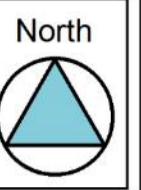
Appendices H and I present maximum hazard rating outputs for +27% and +37% flow allowances for the 1% AEP (Flood Zone 3a) and 0.1% AEP (Flood Zone 2) events, respectively.

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Appendices

A Combined Flood Zone 3b extent mapping: present day and climate change allowances



- Legend**
- Flood Zone 3b (present day)
 - Future Flood Zone 3b (Central allowance: +27% flows)
 - Future Flood Zone 3b (Higher central allowance: +37% flows)



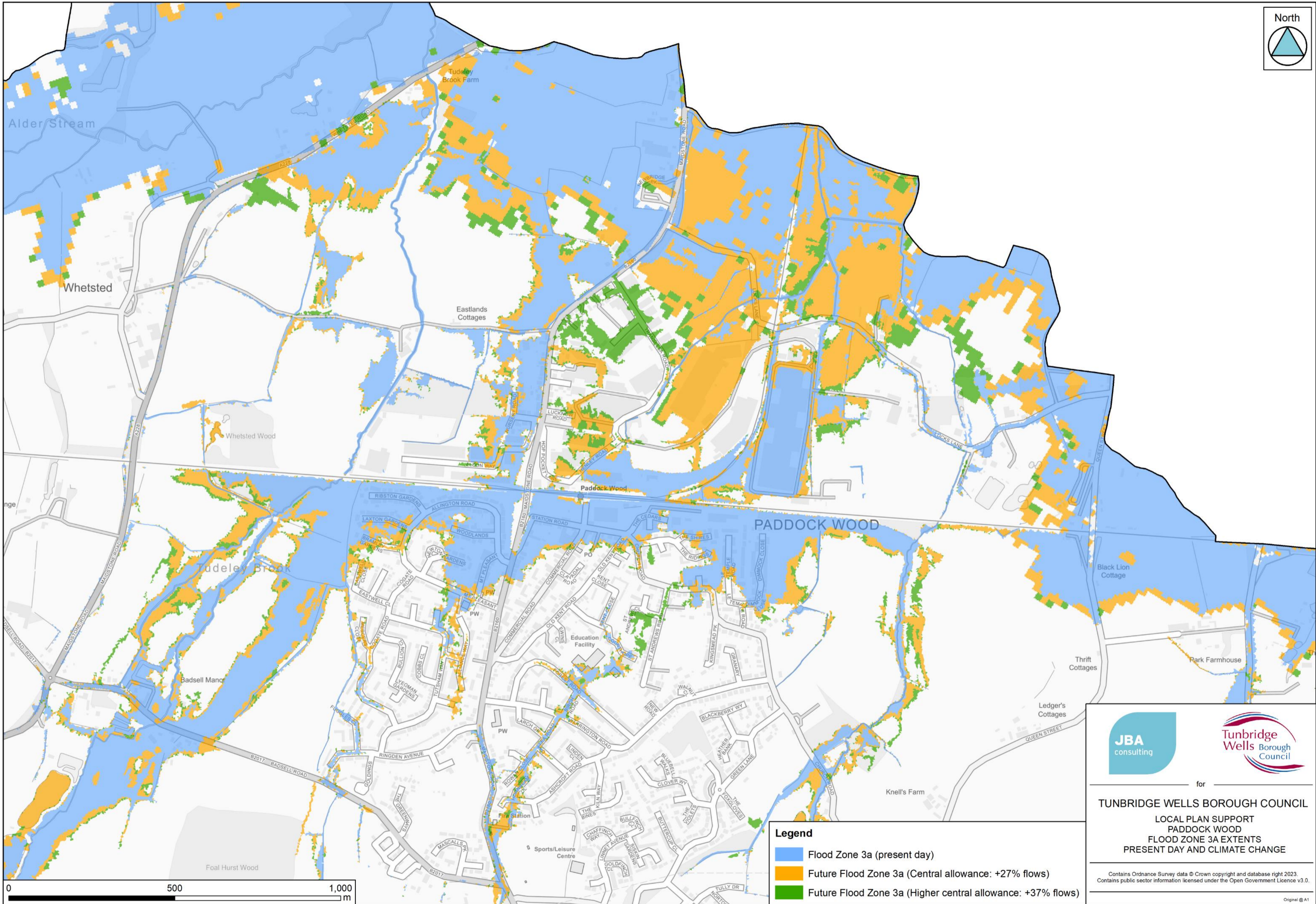
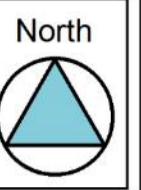
for
TUNBRIDGE WELLS BOROUGH COUNCIL
 LOCAL PLAN SUPPORT
 PADDOCK WOOD
 FLOOD ZONE 3B EXTENTS
 PRESENT DAY AND CLIMATE CHANGE

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B Combined Flood Zone 3a extent mapping: present day and climate change allowances



Legend

- Flood Zone 3a (present day)
- Future Flood Zone 3a (Central allowance: +27% flows)
- Future Flood Zone 3a (Higher central allowance: +37% flows)



for

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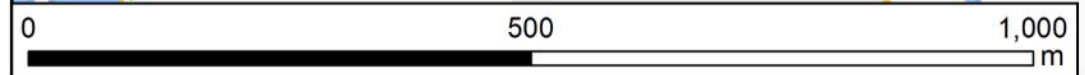
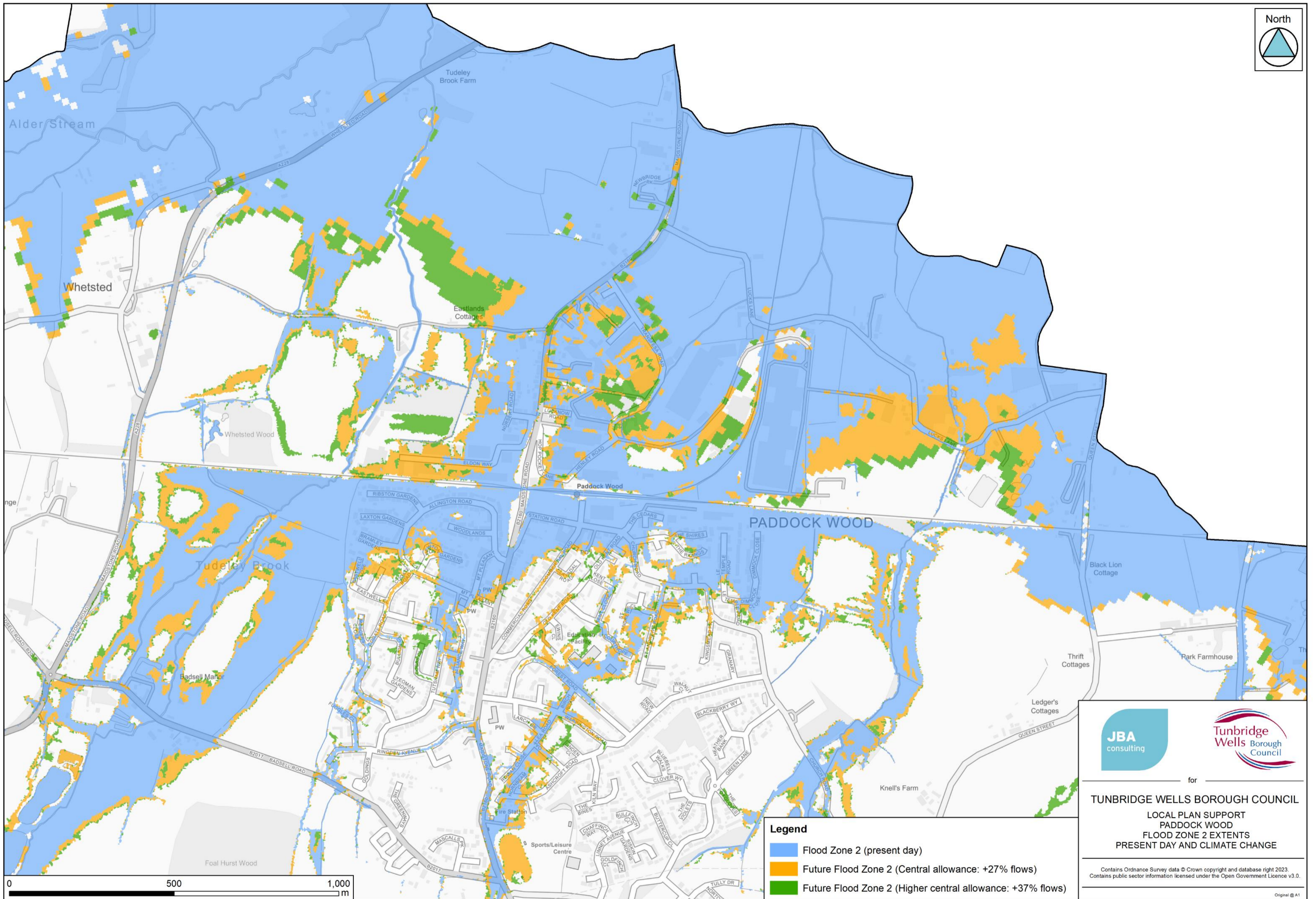
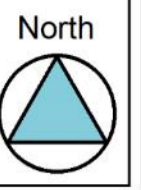
LOCAL PLAN SUPPORT
 PADDOCK WOOD
 FLOOD ZONE 3A EXTENTS
 PRESENT DAY AND CLIMATE CHANGE

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C Combined Flood Zone 2 extent mapping: present day and climate change allowances



Legend

- Flood Zone 2 (present day)
- Future Flood Zone 2 (Central allowance: +27% flows)
- Future Flood Zone 2 (Higher central allowance: +37% flows)



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 FLOOD ZONE 2 EXTENTS
 PRESENT DAY AND CLIMATE CHANGE

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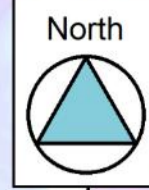
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D Flood Zone 3a plus climate change (+27% and +37%) maximum flood depth mapping

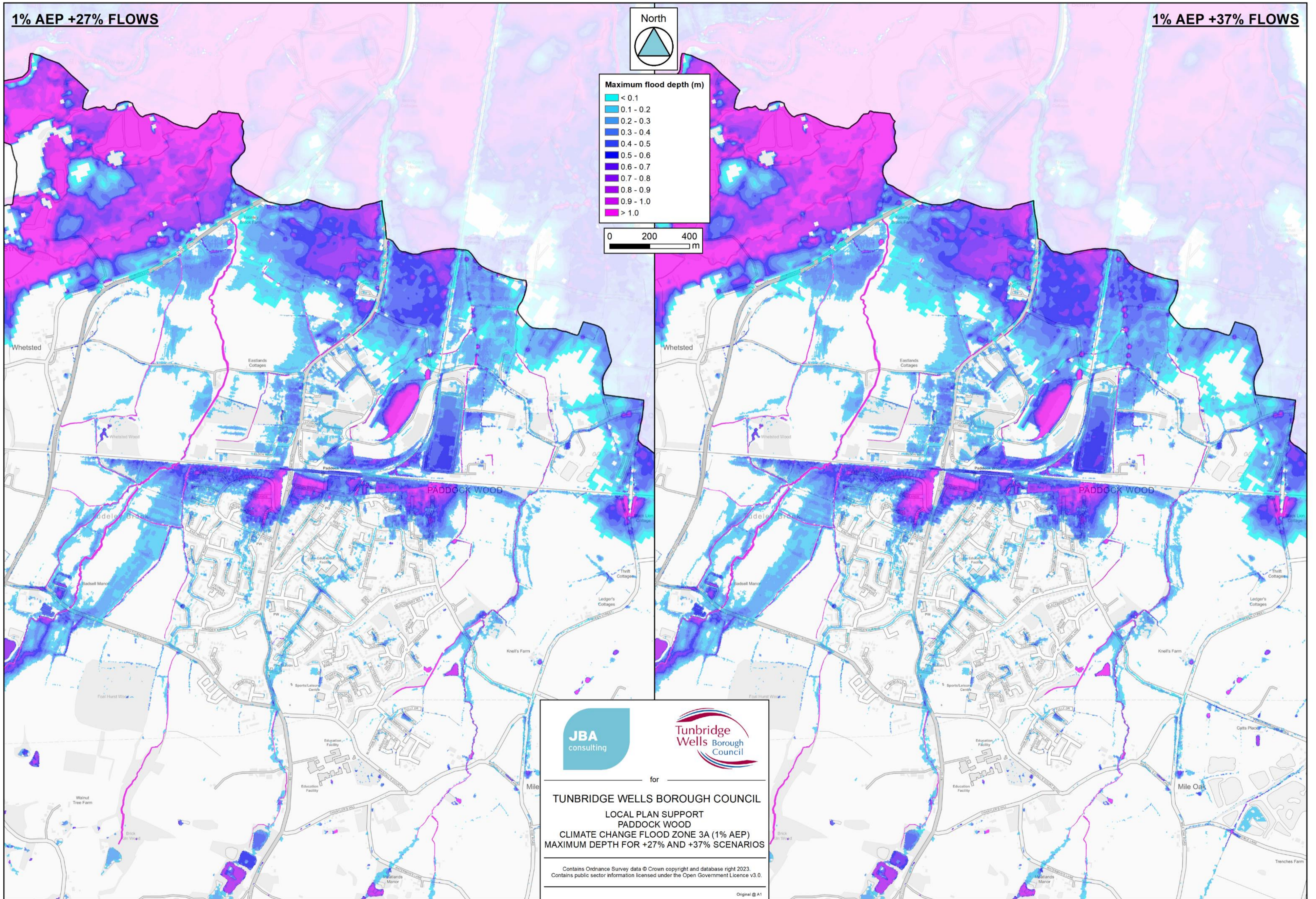
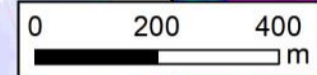
1% AEP +27% FLOWS

1% AEP +37% FLOWS



Maximum flood depth (m)

< 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0



for

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 PADDOCK WOOD
 CLIMATE CHANGE FLOOD ZONE 3A (1% AEP)
 MAXIMUM DEPTH FOR +27% AND +37% SCENARIOS

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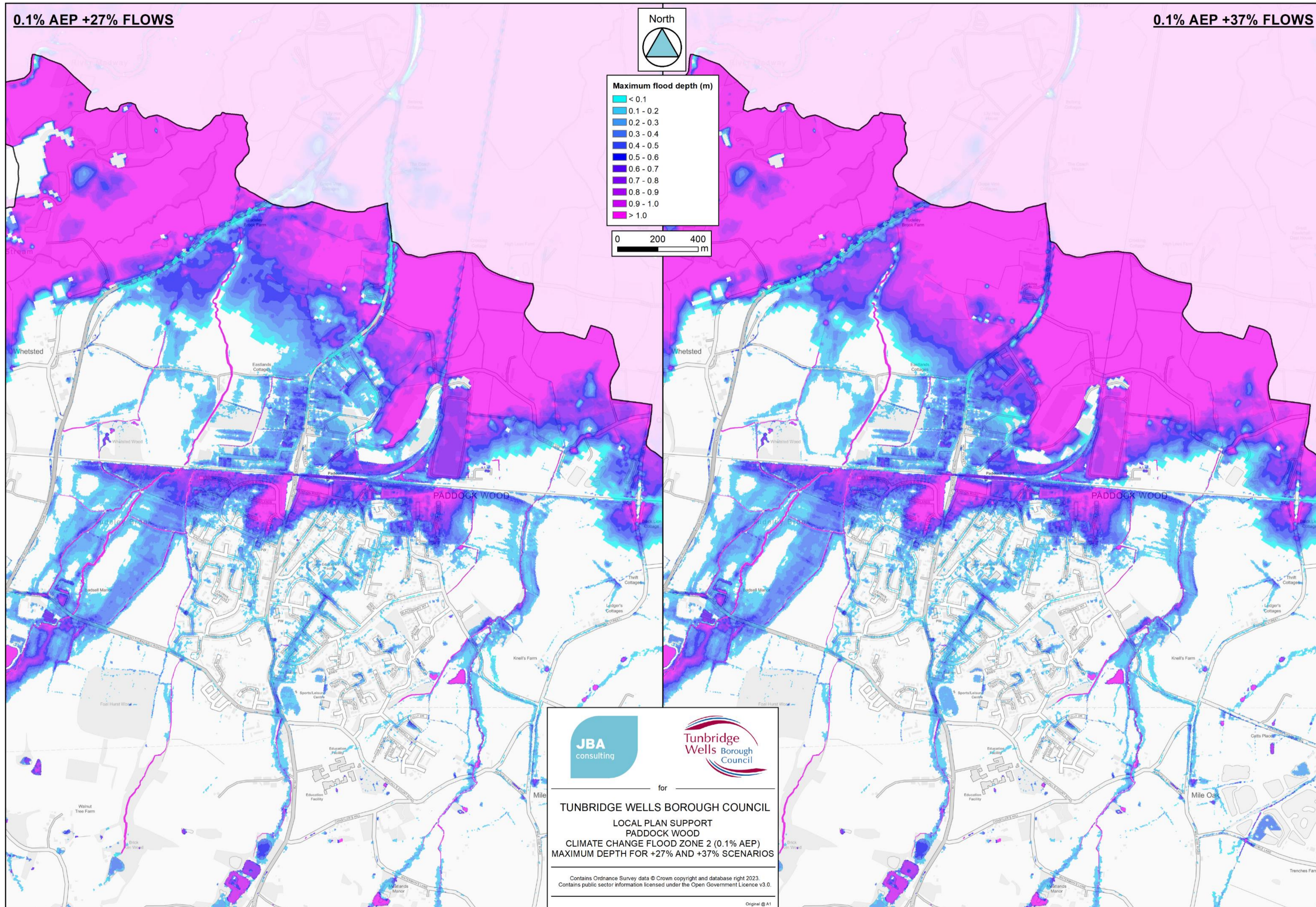
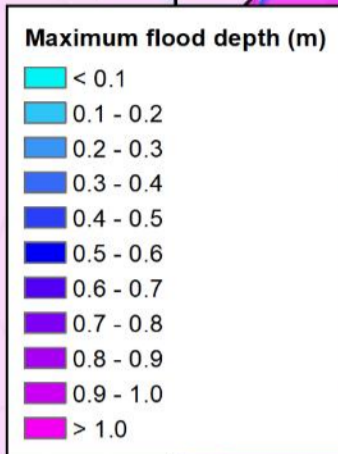
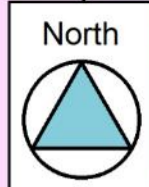
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E Flood Zone 2 plus climate change (+27% and +37%) maximum flood depth mapping

0.1% AEP +27% FLOWS

0.1% AEP +37% FLOWS



for
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 LOCAL PLAN SUPPORT
 PADDOCK WOOD
 CLIMATE CHANGE FLOOD ZONE 2 (0.1% AEP)
 MAXIMUM DEPTH FOR +27% AND +37% SCENARIOS

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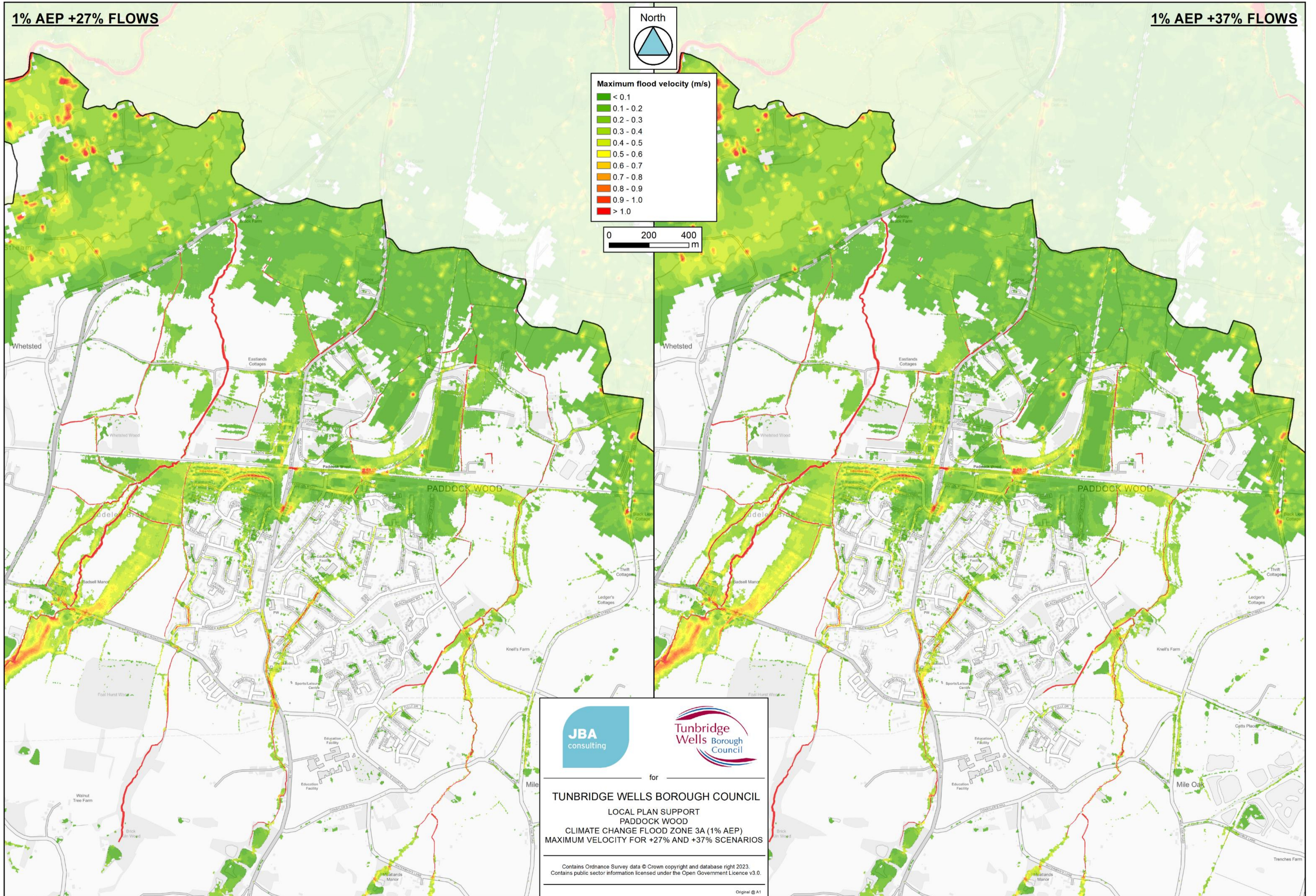
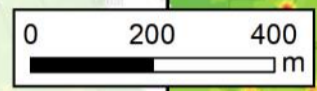
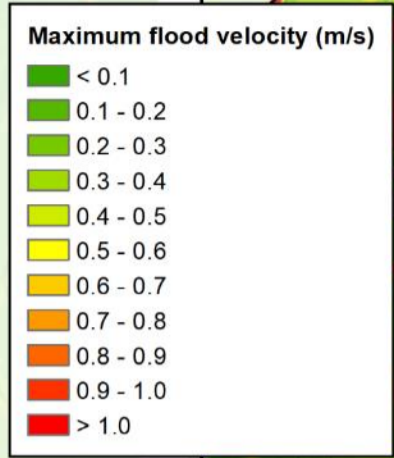
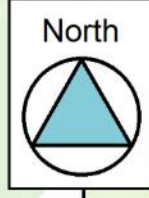
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F Flood Zone 3a plus climate change (+27% and +37%) maximum flood velocity mapping

1% AEP +27% FLOWS

1% AEP +37% FLOWS



for

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PADDOCK WOOD
CLIMATE CHANGE FLOOD ZONE 3A (1% AEP)
MAXIMUM VELOCITY FOR +27% AND +37% SCENARIOS

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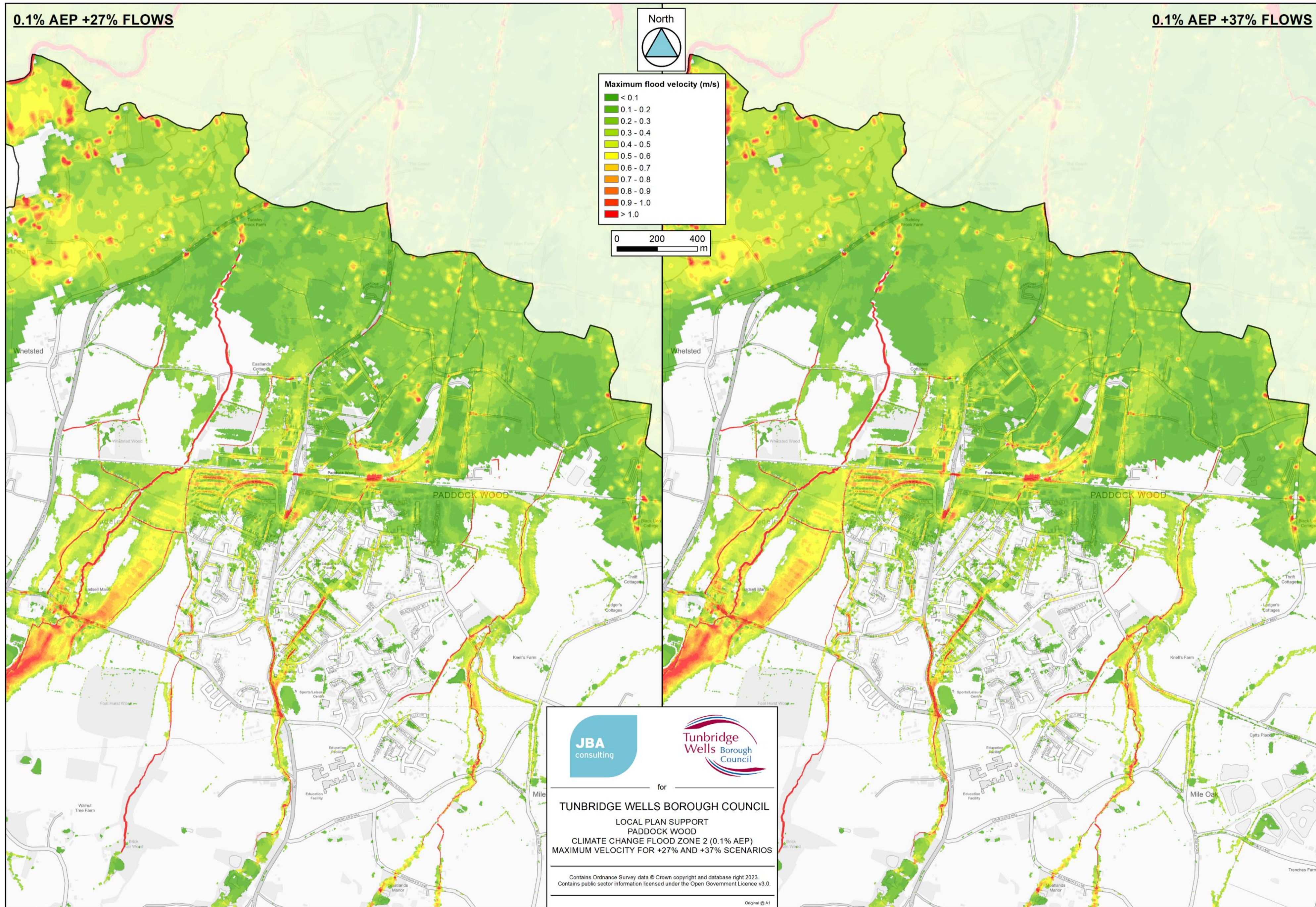
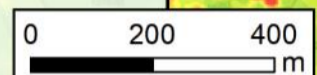
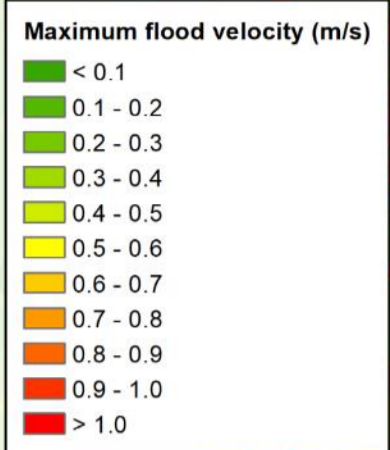
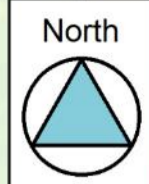
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G Flood Zone 2 plus climate change (+27% and +37%) maximum flood velocity mapping

0.1% AEP +27% FLOWS

0.1% AEP +37% FLOWS



for

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PADDOCK WOOD
CLIMATE CHANGE FLOOD ZONE 2 (0.1% AEP)
MAXIMUM VELOCITY FOR +27% AND +37% SCENARIOS

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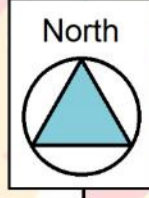
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H Flood Zone 3a plus climate change (+27% and +37%) maximum flood hazard rating mapping

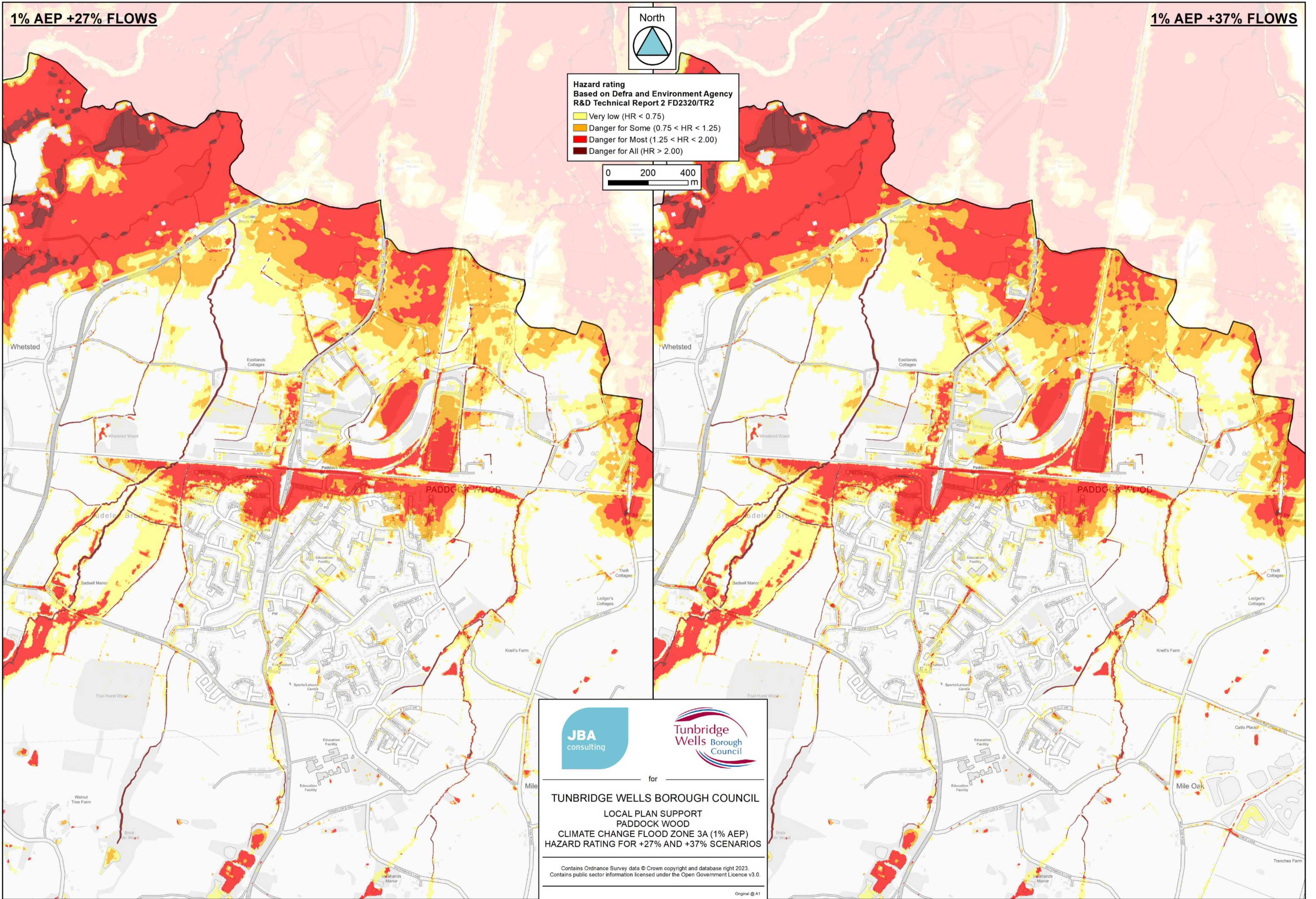
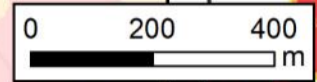
1% AEP +27% FLOWS

1% AEP +37% FLOWS



Hazard rating
Based on Defra and Environment Agency
R&D Technical Report 2 FD2320/TR2

- Very low (HR < 0.75)
- Danger for Some (0.75 < HR < 1.25)
- Danger for Most (1.25 < HR < 2.00)
- Danger for All (HR > 2.00)



for

TUNBRIDGE WELLS BOROUGH COUNCIL
LOCAL PLAN SUPPORT
PADDOCK WOOD
CLIMATE CHANGE FLOOD ZONE 3A (1% AEP)
HAZARD RATING FOR +27% AND +37% SCENARIOS

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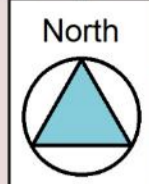
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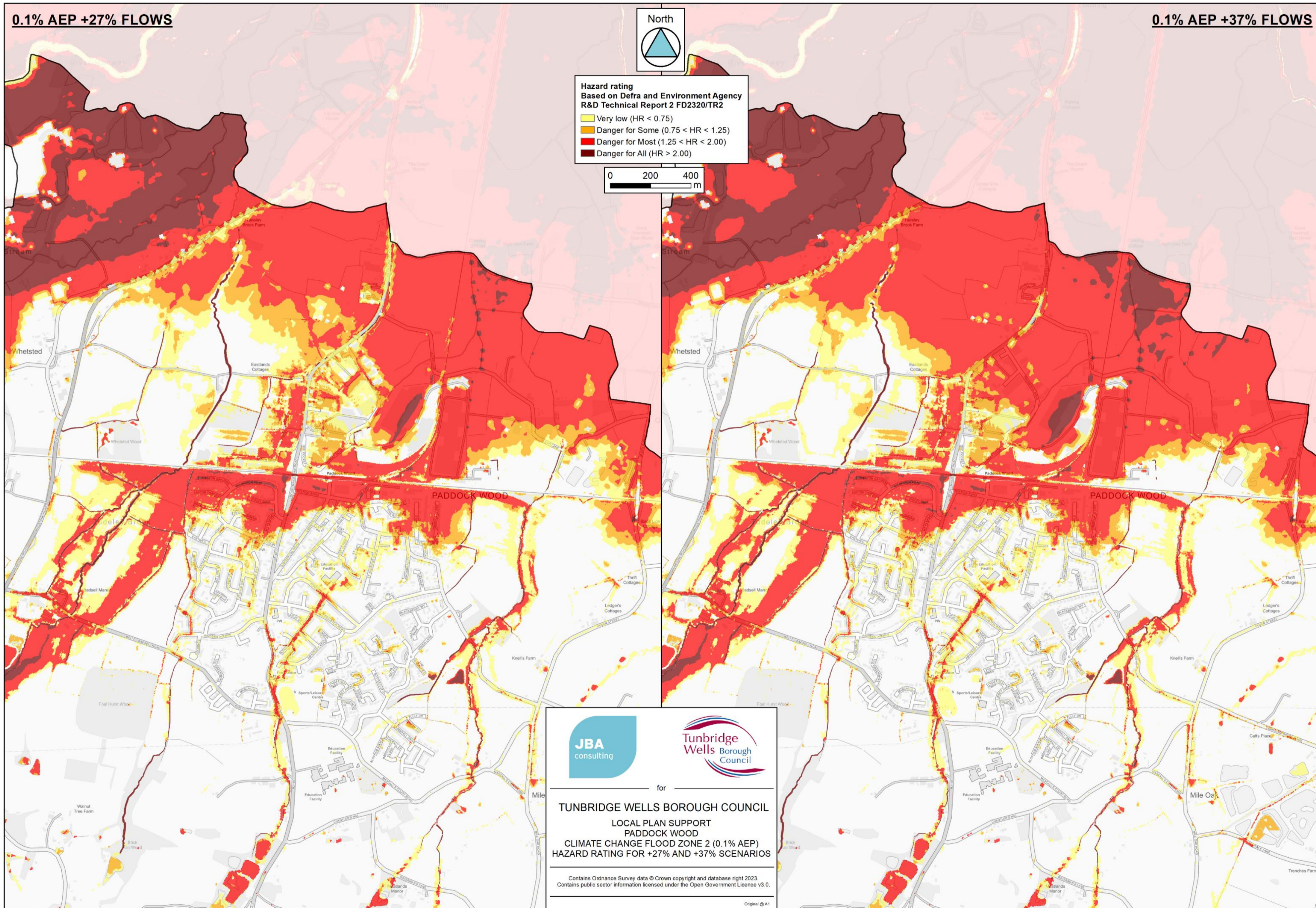
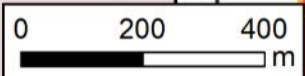
0.1% AEP +27% FLOWS

0.1% AEP +37% FLOWS



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- Very low (HR < 0.75)
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- Danger for Most (1.25 < HR < 2.00)
- Danger for All (HR > 2.00)



for

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LOCAL PLAN SUPPORT
Paddock Wood
CLIMATE CHANGE FLOOD ZONE 2 (0.1% AEP)
HAZARD RATING FOR +27% AND +37% SCENARIOS

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