



Catchment Based Flood Mitigation & Planning

Flood & Coast 2019 Conference

Alys Bishop, Central Bedfordshire Council
Ryan Thomas, Hertfordshire County Council
John Oldfield, Bedford Group IDB
Jonathan Glerum, Anglian Water

Telford | 18th June 2019

Pix Brook Catchment

Background

- **Ordinary Watercourse**

A tributary of the River Ivel, passing through Letchworth Garden City, Stotfold and Arlesey

- **Multiple Stakeholders**

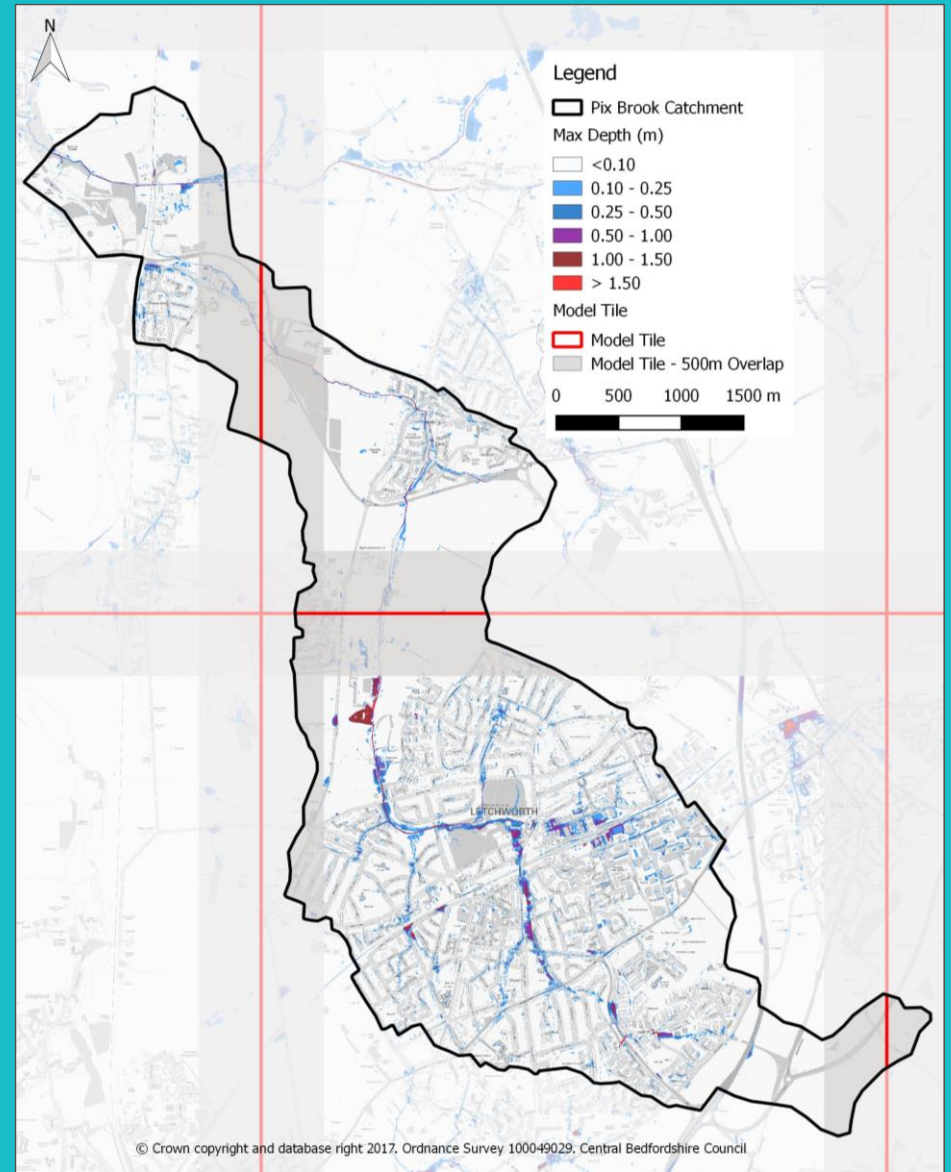
Straddles NHDC and CBC (LLFAs), Bedfordshire and River Ivel IDB, Anglian water, and others

- **Long History of Flooding**

Repeated flooding to properties. Flood management assets in operation to mitigate flooding

- **National Mapping & Previous Flood Studies**

National mapping underestimates flooding. Past studies considering issues in isolation of wider catchment response



Pix Brook Catchment

Drivers for Further Study

- **Recent Flooding in 2016**

Triggered a formal investigation under FWMA

- **Multiple Sources of Flooding**

Surface water, sewer and highways exceedance, flooding from the Pix Brook

- **Uncertainty**

Catchment response to storm events was still unknown. Uncertain how to mitigate flooding.

- **Project Group and funding**

CBC, HCC, Bedford IDBs & AW. Committee invested levy funding with partner contributions for details analysis of flood risk



TUFLOW & WaterRIDE

Software Selection

- **Two-dimensional Unsteady Flow (TUFLOW)**

40 years development history

Benchmarked by Environment Agency

Flooding from all sources (Fluvial/Pluvial/Sewer/Reservoir)

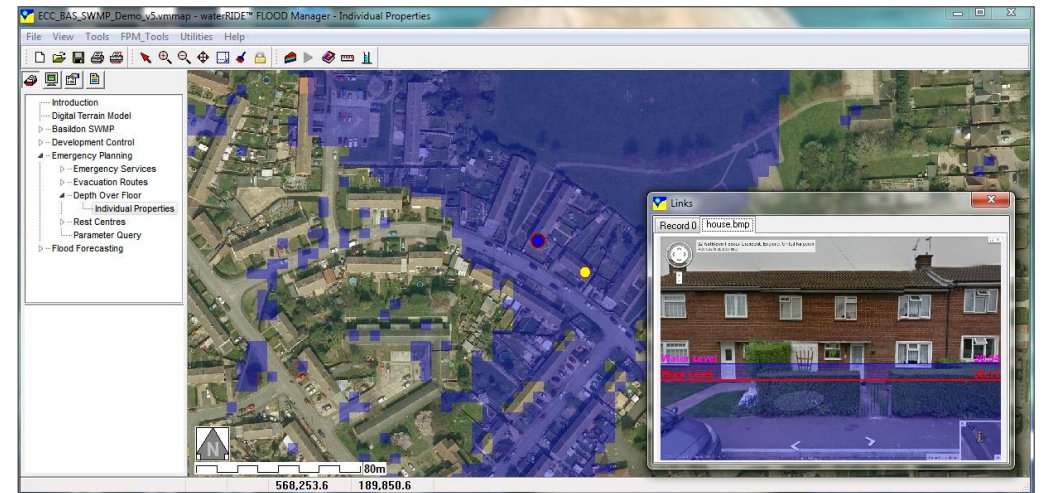
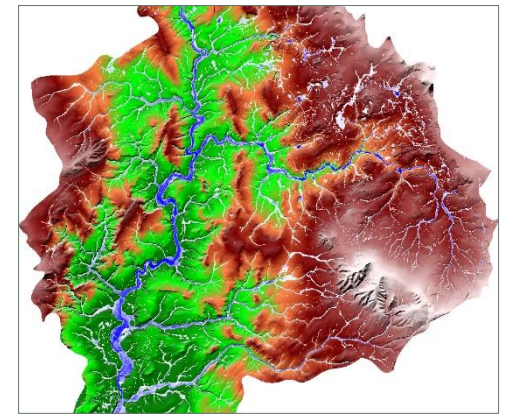
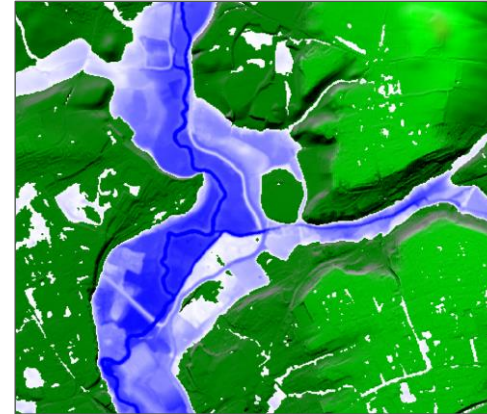
Advanced features (Rain-on-grid, Infiltration, GPU/Cloud)

- **Water Resources Integrated Development Environment (WaterRIDE)**

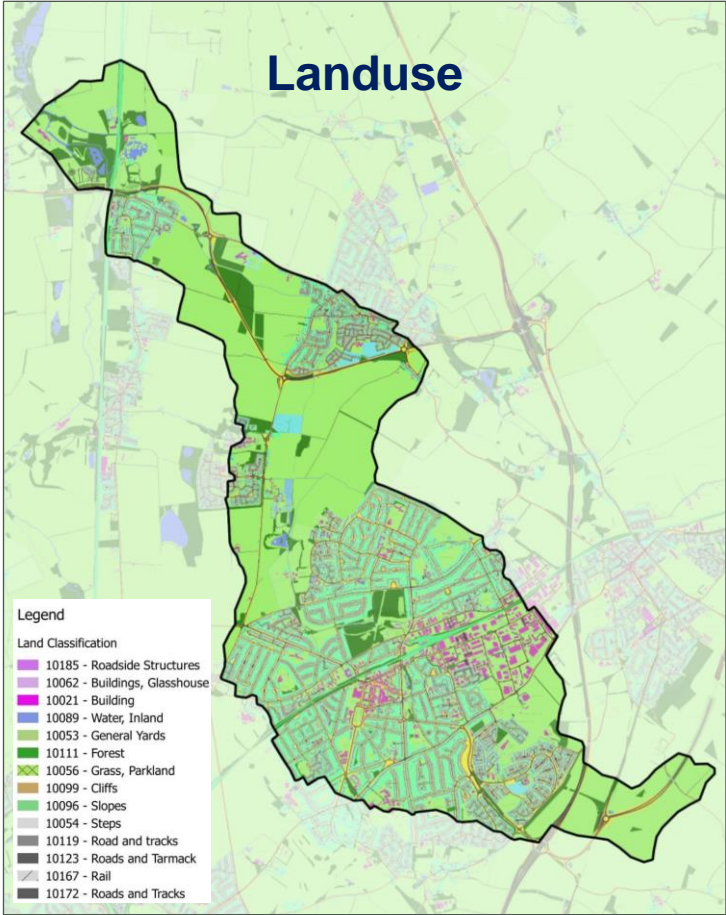
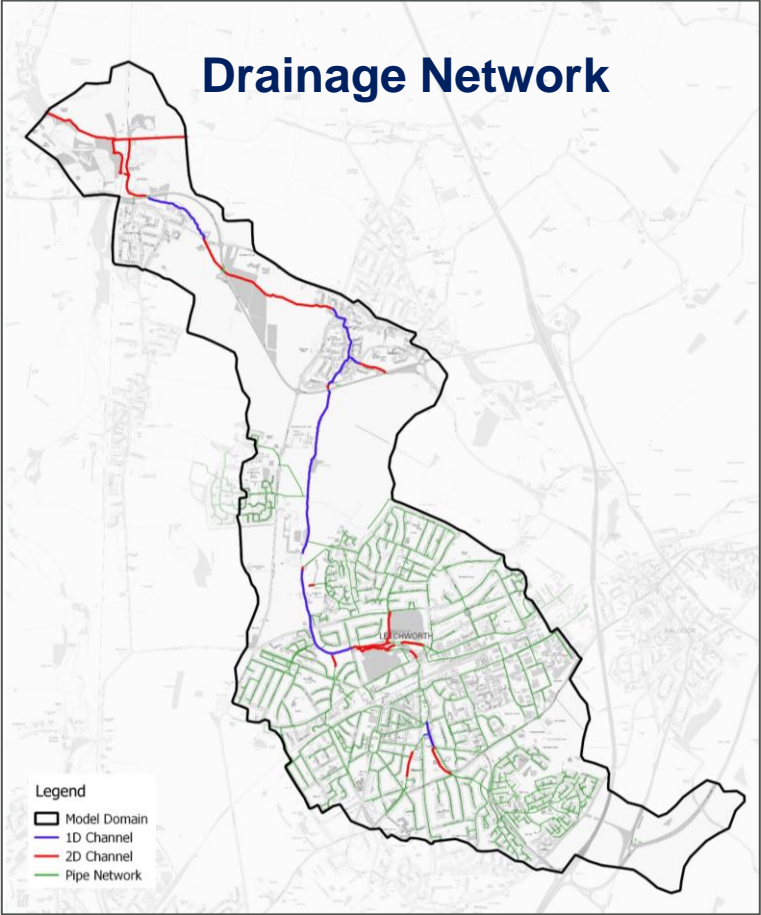
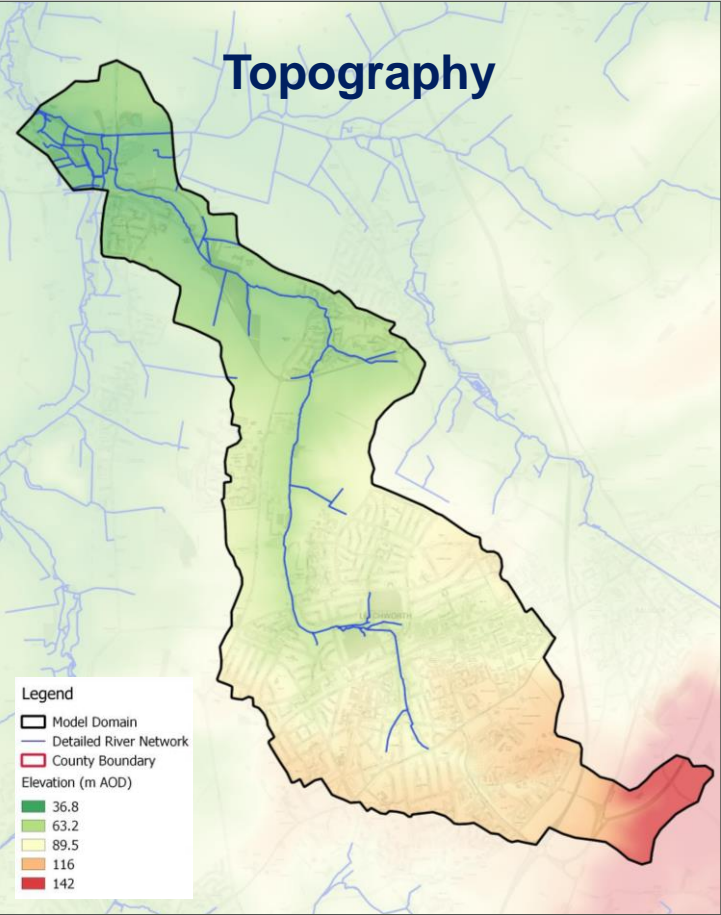
Translates Flood data into Flood intelligence

Not a model – visualise, interrogate, analyse and communicate complex flood data

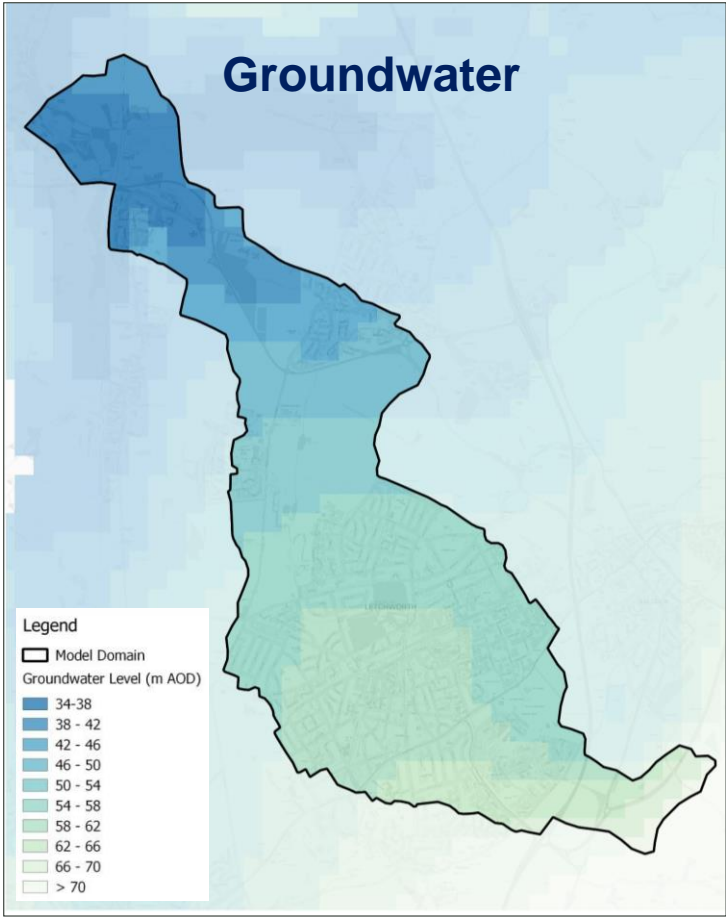
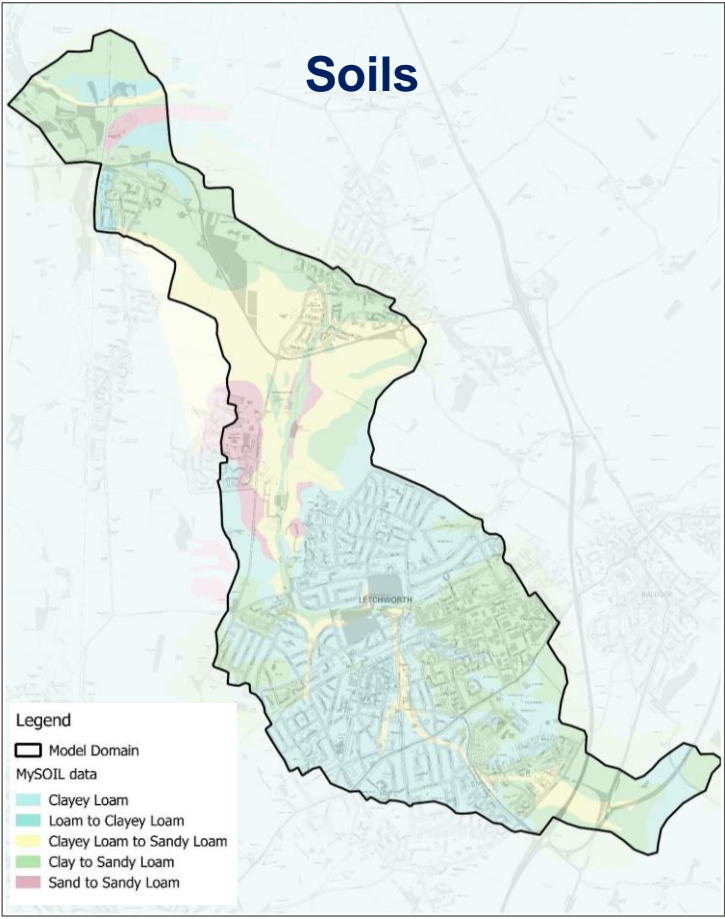
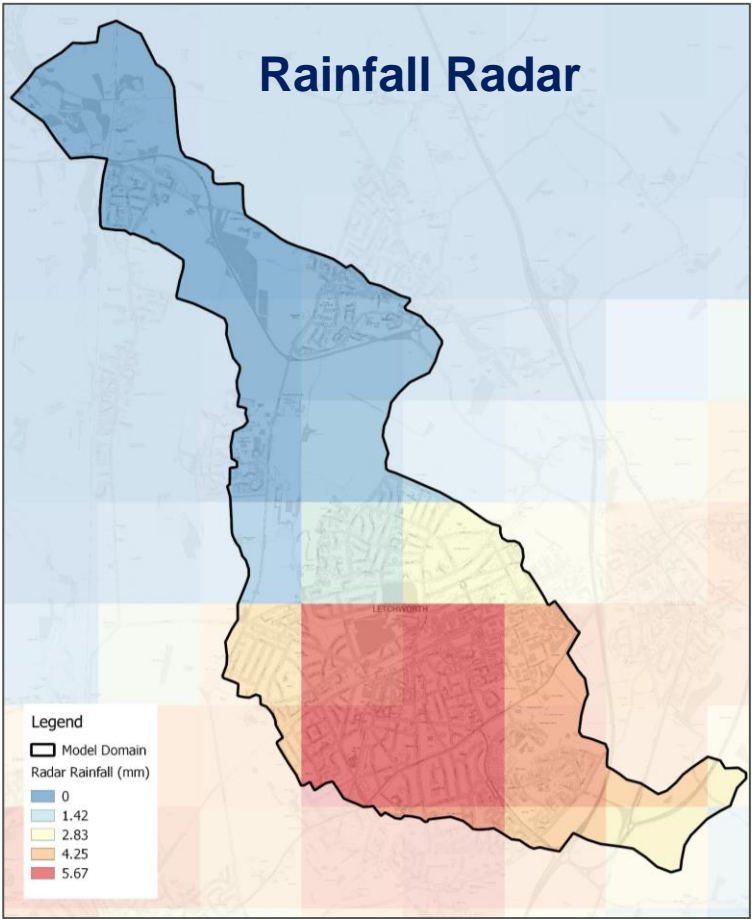
Designed for Lead Local Flood Authorities and Stakeholder Engagement



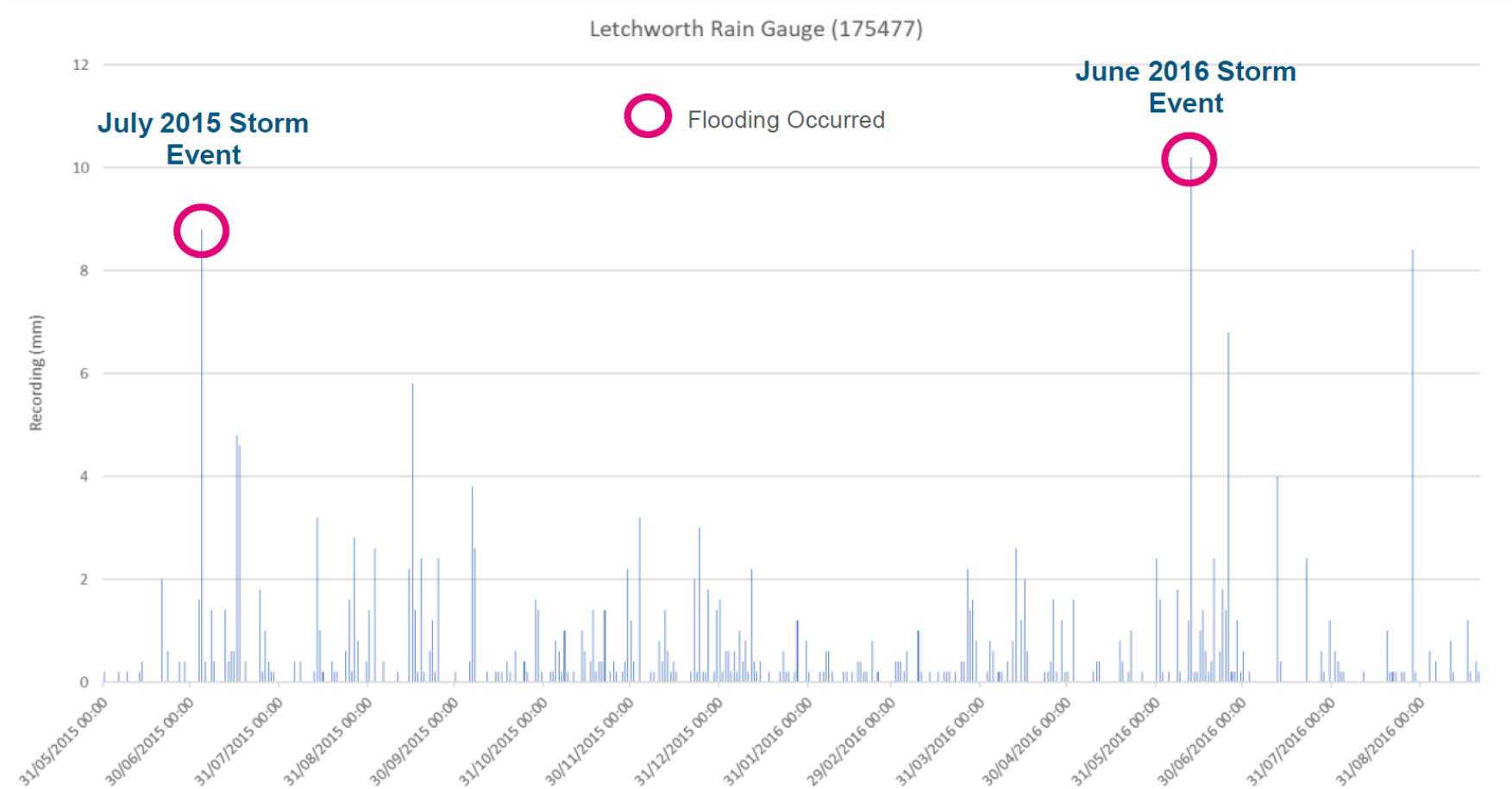
TUFLOW Integrated Catchment Model



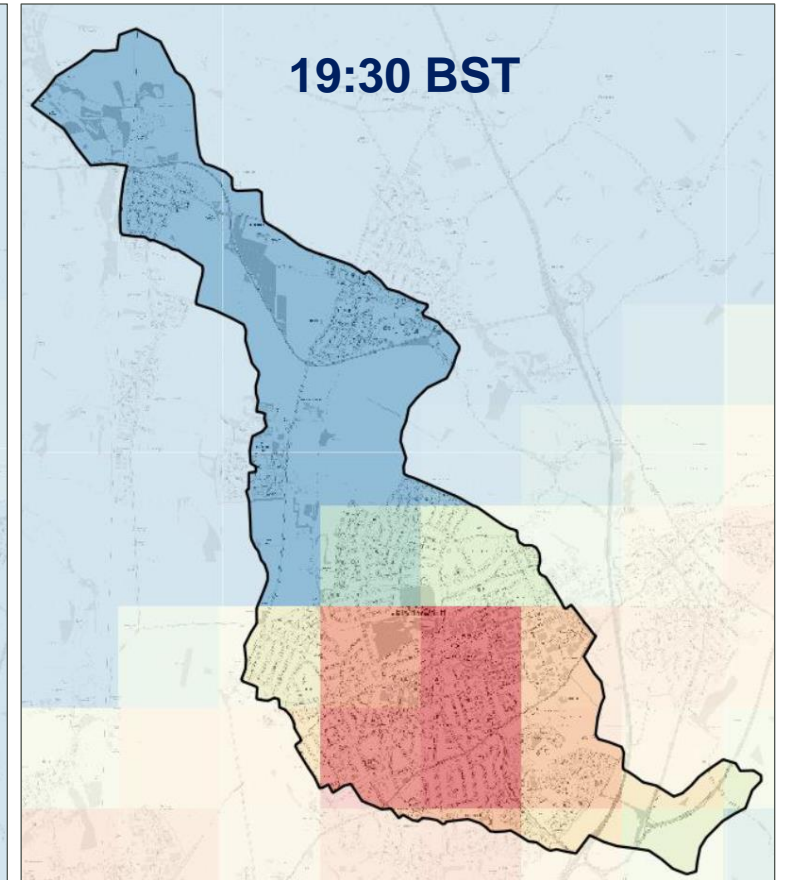
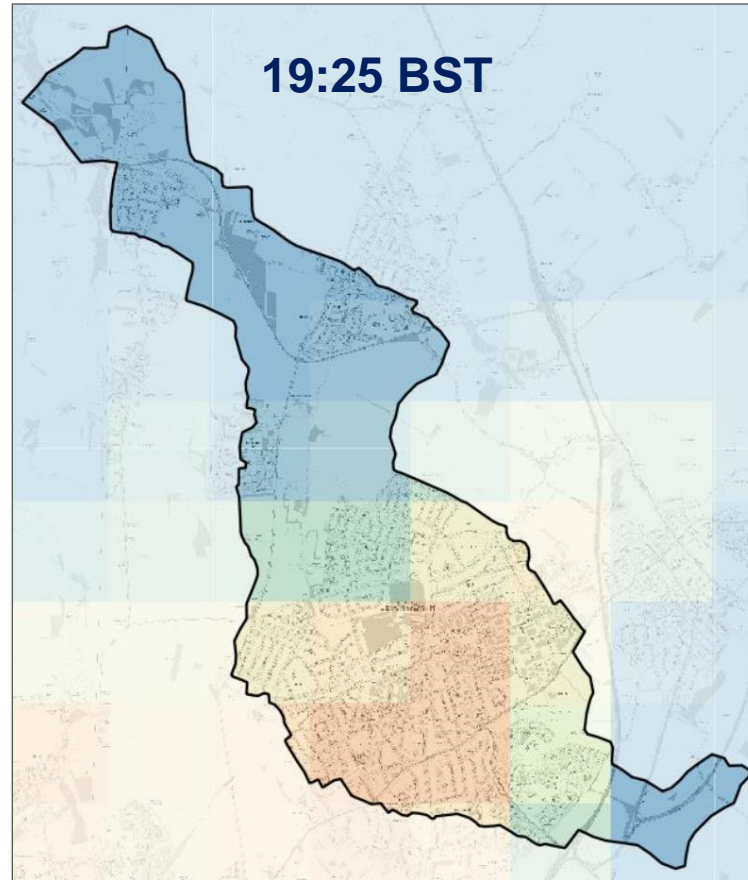
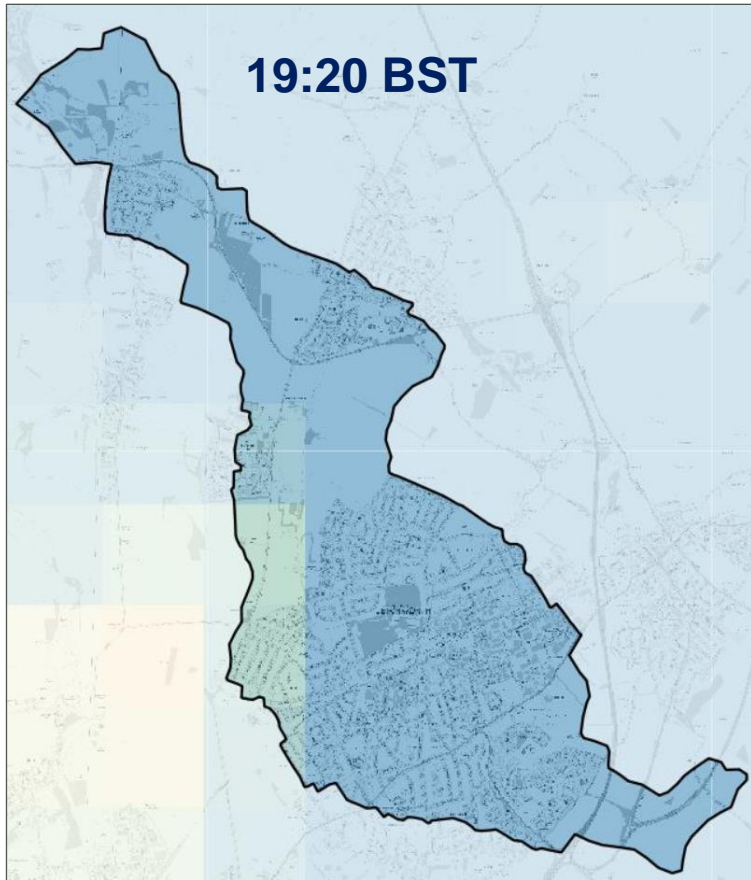
TUFLOW Integrated Catchment Model



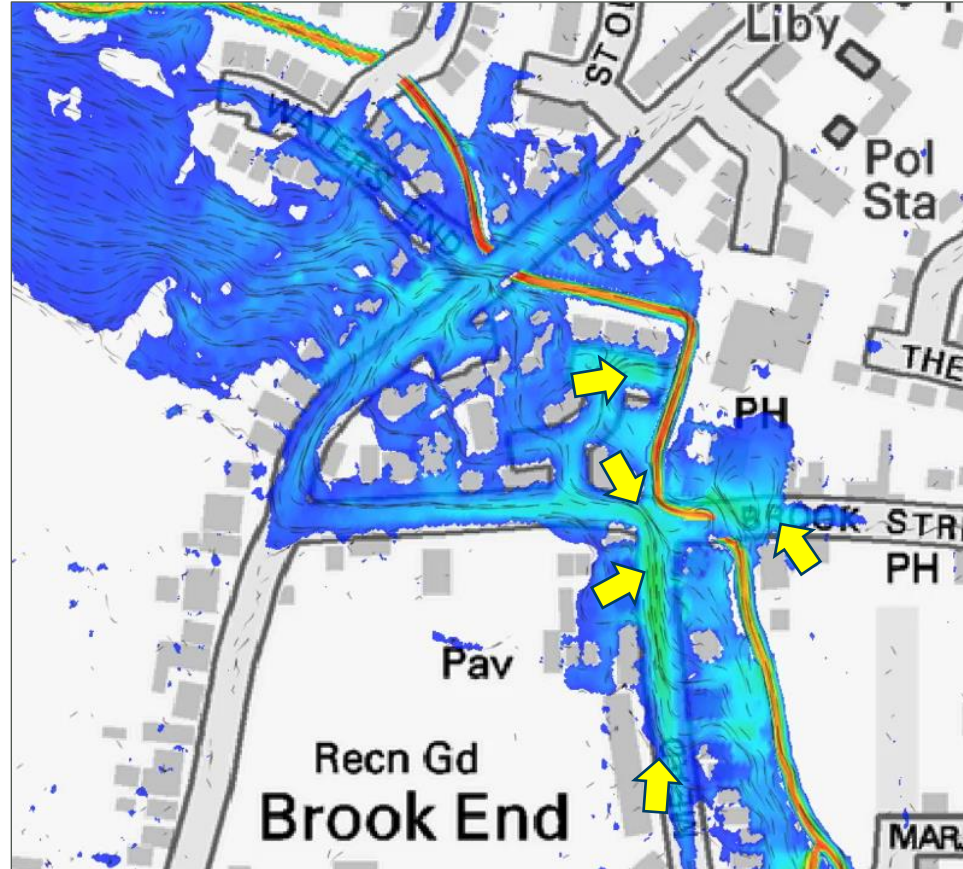
Validation Storm Event – 12th June 2016



Validation Storm Event – 12th June 2016



Validation Storm Event – 12th June 2016



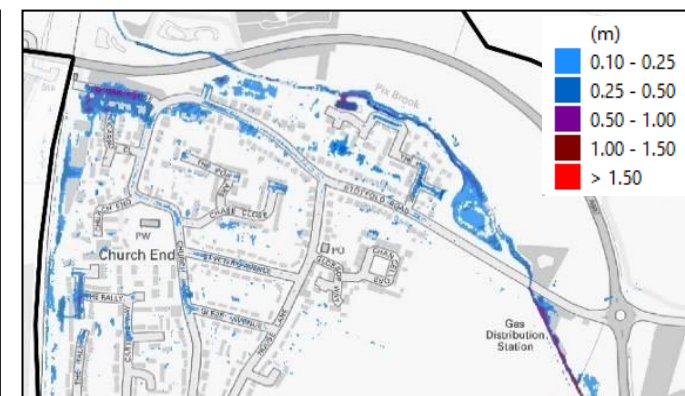
Baseline Comparison (1% AEP Storm Event, Max Depth)

Letchworth

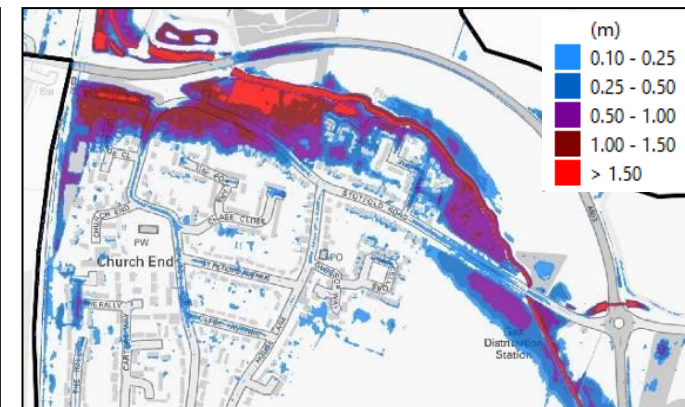
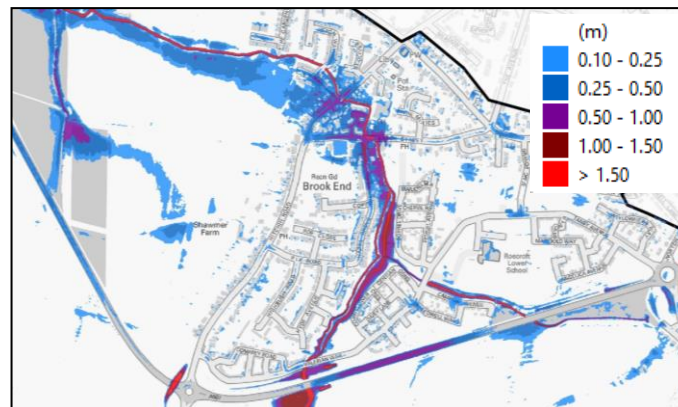
Stotfold

Arlesey

RofFSW



TUFLOW



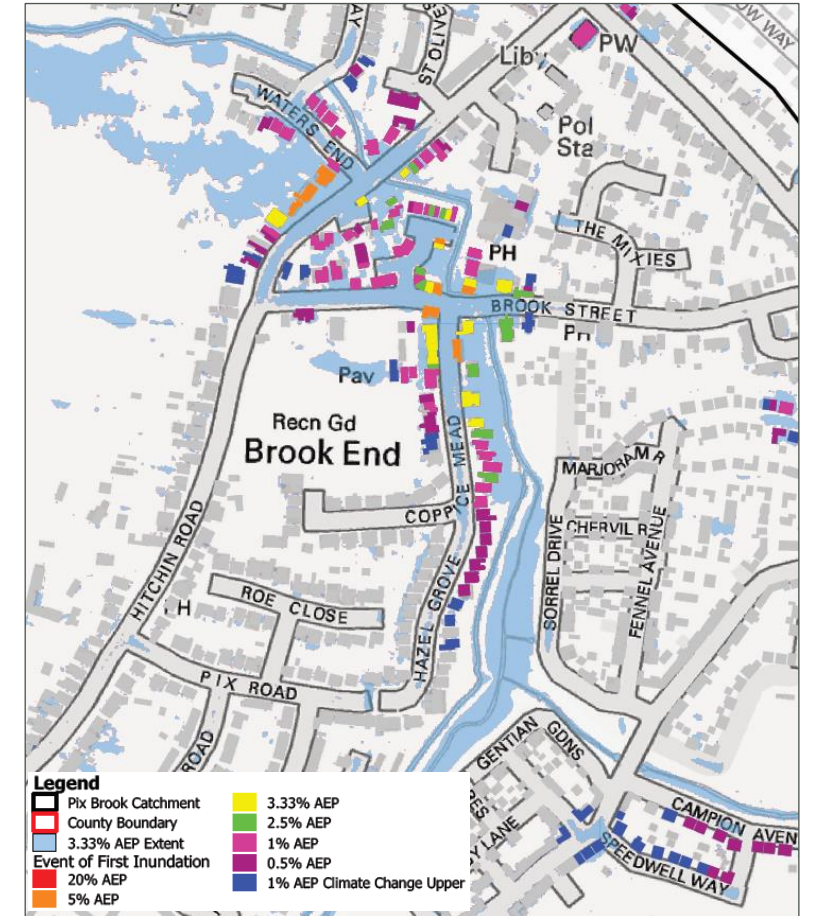
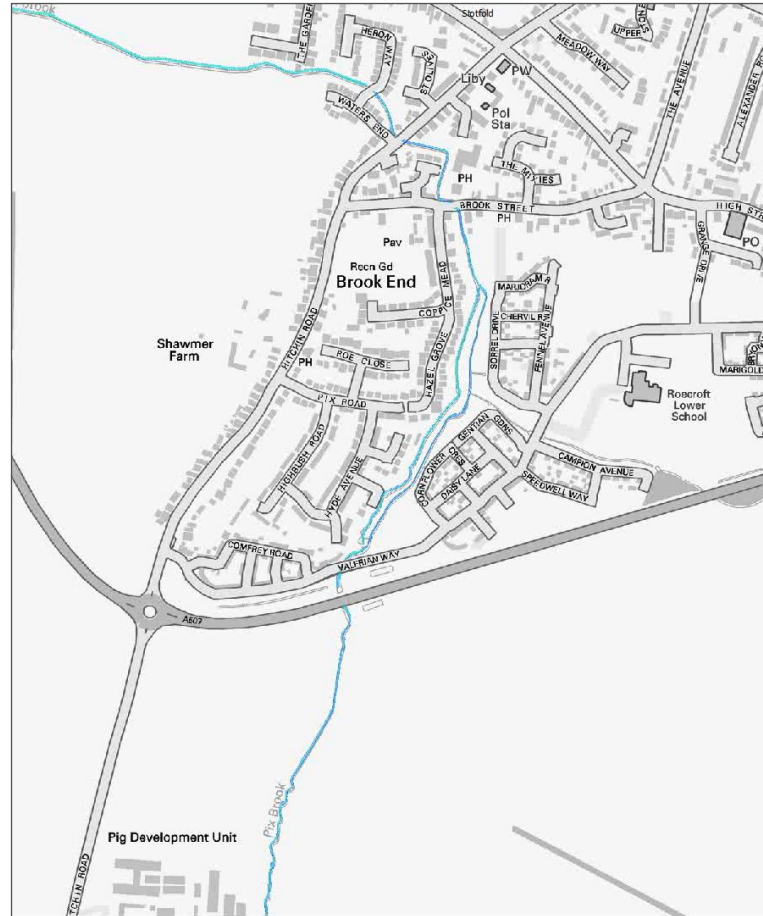
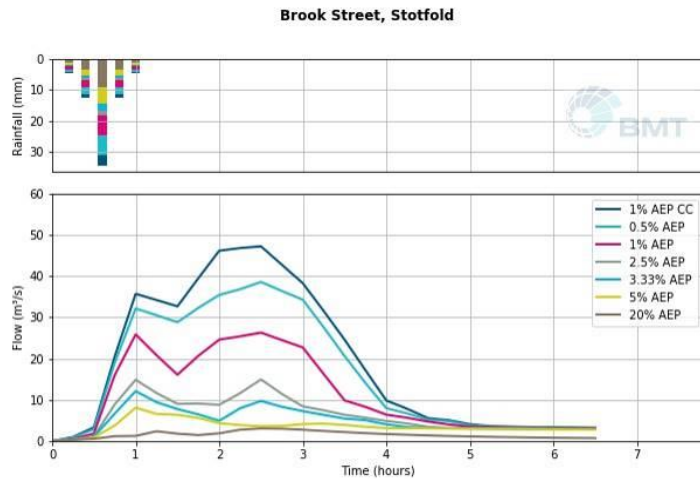
Multiple Sources/Timing of Flooding

- **Initial Peak**

Runoff from land d/st of the reservoir
(local surface water flooding)

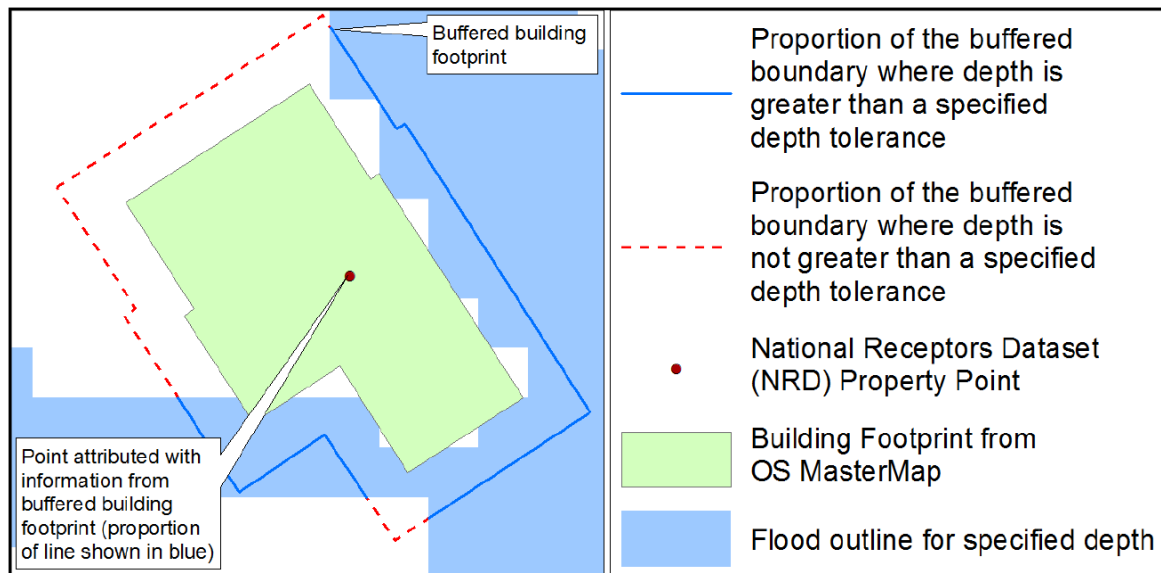
- **Second Peak**

Flow from Letchworth, u/st of
reservoir (fluvial flooding)

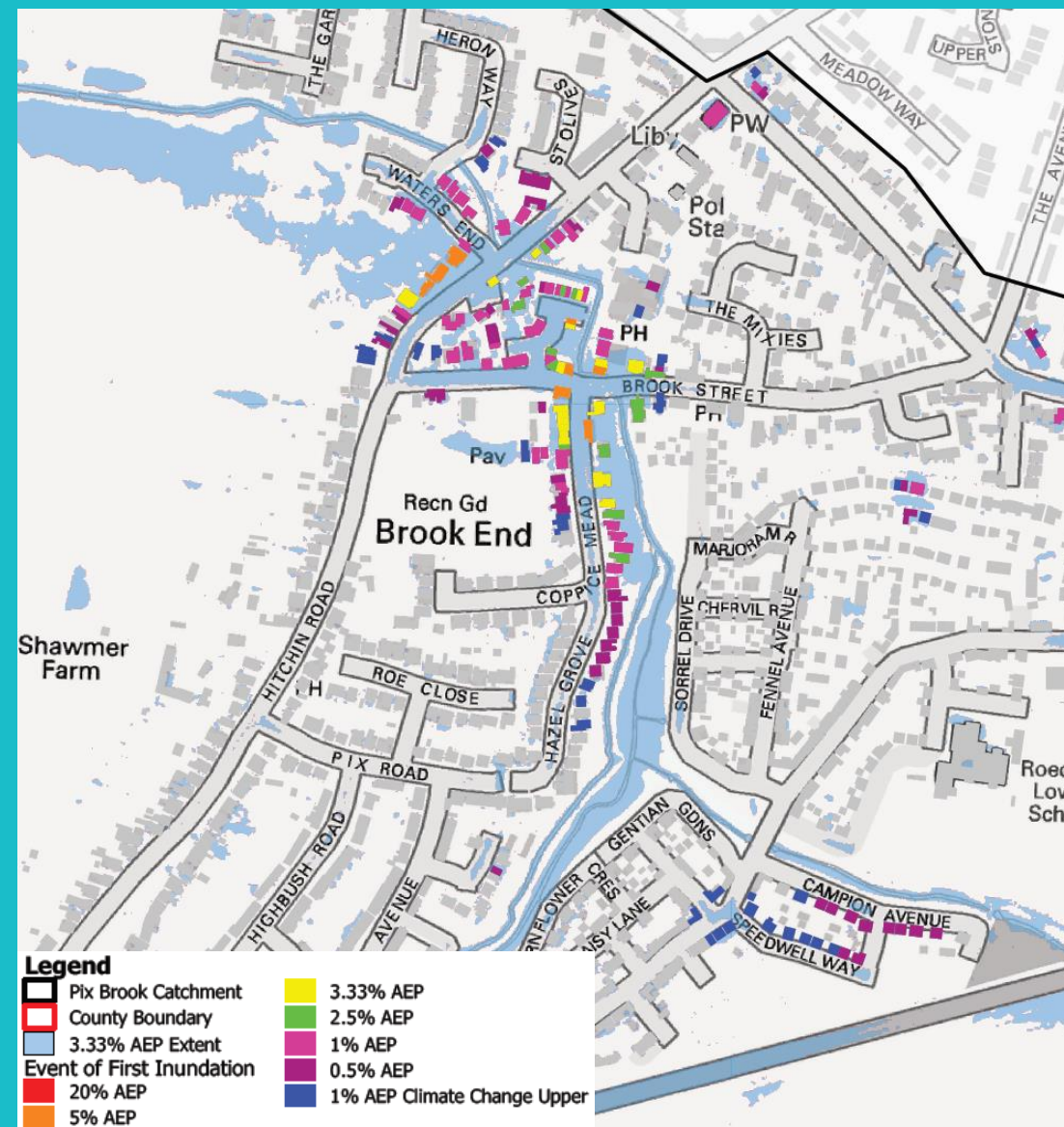


Properties at Risk

- **Property Perimeter/Depth Threshold**
 $\geq 50\%$ wetted perimeter AND $\geq 0.2\text{m}$ depth threshold;
 OR
 $\geq 25\%$ wetted perimeter AND $\geq 0.3\text{m}$ depth threshold.
- **MCM Direct/Tangible flood damages**



Source Environment Agency 2014



Catchment Mitigation

- **Opportunity Mapping**

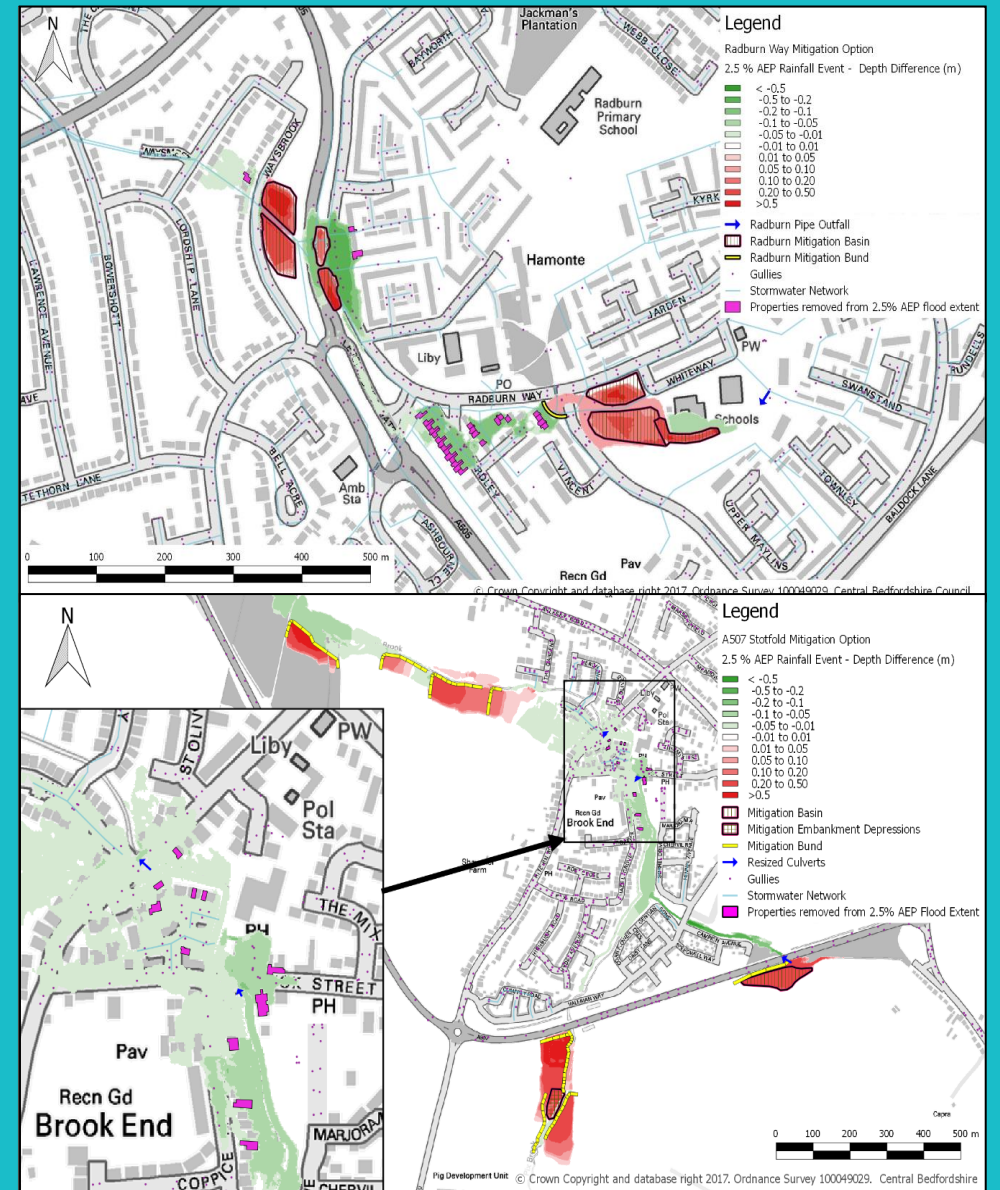
Land ownership, WwNP, SUDS Infiltration maps

- **Options Identification**

15 mitigation measures identified, categorised and scored according to their technical, economic, social and environmental merits

- **Detailed Feasibility Assessment**

Shortlist of 6 options grouped into 3 schemes (Letchworth, Stotfold and Arlesey), 7 storm events, properties at risk and flood damages calculated.



Catchment Planning

- **Future Development**

Plan to be resilient - development regulation, land use management, building standards, natural resource protection, property acquisition, critical facilities policies and public education.

- **Catchment Based Approach**

A legacy tool to deliver flood risk betterment through catchment planning.

Using development is an opportunity to reduce flood risk.

- **Land Use Management**

Protecting and managing land that has the greatest impact on catchment response.



© Crown Copyright and database right 2017. Ordnance Survey 100049029. Central Bedfordshire Council

Lessons Learnt

- **Reality of Partnership Working**

Dealing with differing objectives, managing expectations

Multiple procurement/ funding authorisation

- **Complex Study, Complex Solutions**

High Volume of data and past studies

Automated tools for data integrity checking

Multiple Sources of Flooding, when the original scope was Surface Water Management

- **Programme and Funding**

Setting realistic timescales at procurement stage

Need to access Local Levy for Surface Water Studies



Thank you



Mat Roberts

Managing Director, designate
BMT Environment UK
Mat.Roberts@bmtglobal.com

150 Minories
London, EC3N 1LS