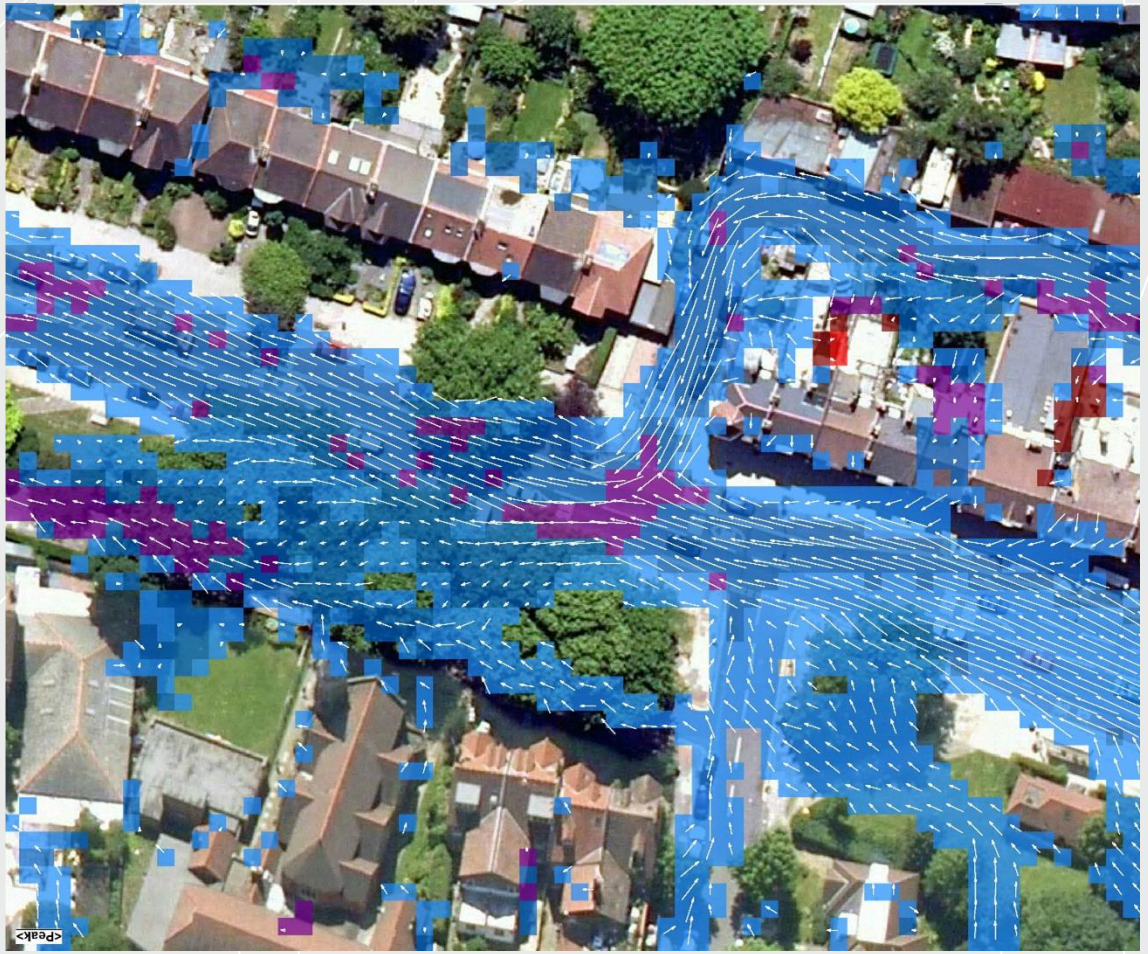
BMT WBM

"Where will our knowledge take you?"

Flood Maps for Surface Water and Beyond – *Understanding Limitations and Improving Decision Making*

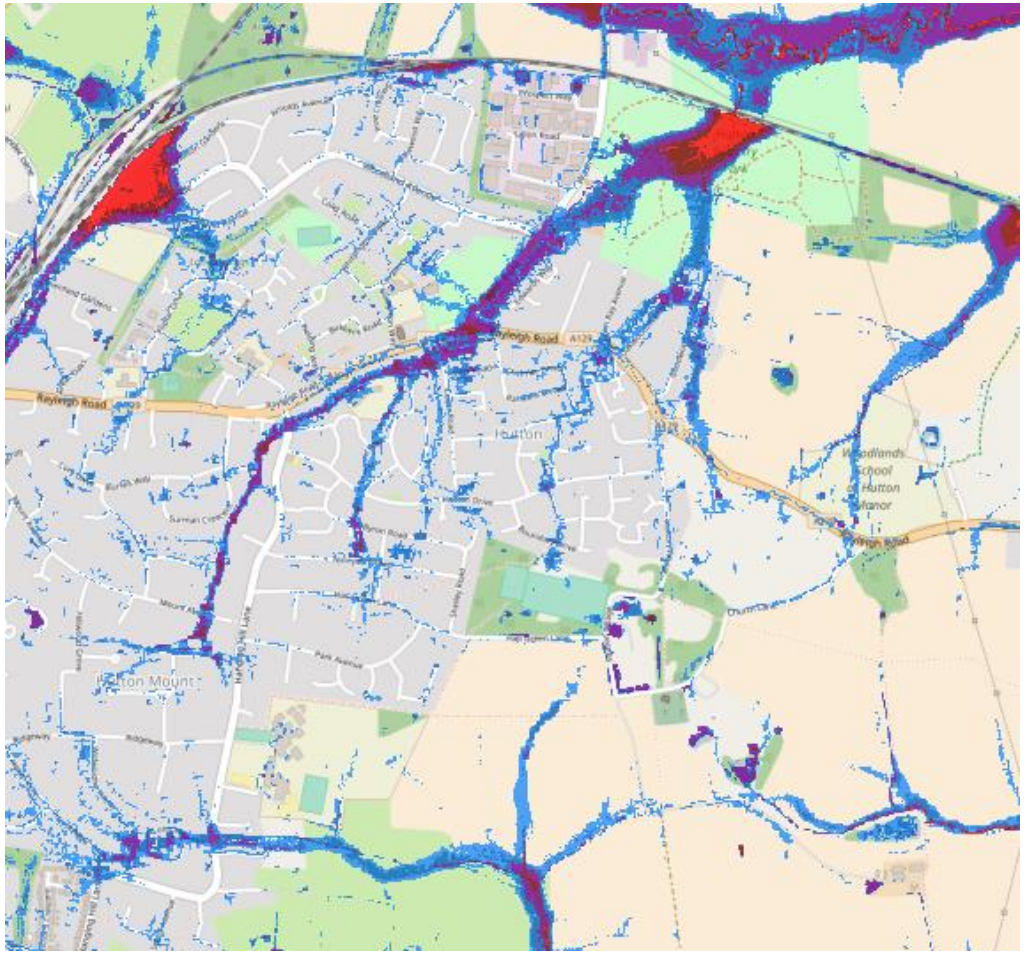
Rachel Jensen
rachel.jensen@bmtwbm.co.uk



What are the Risk of Flooding from Surface Water maps?

Basics

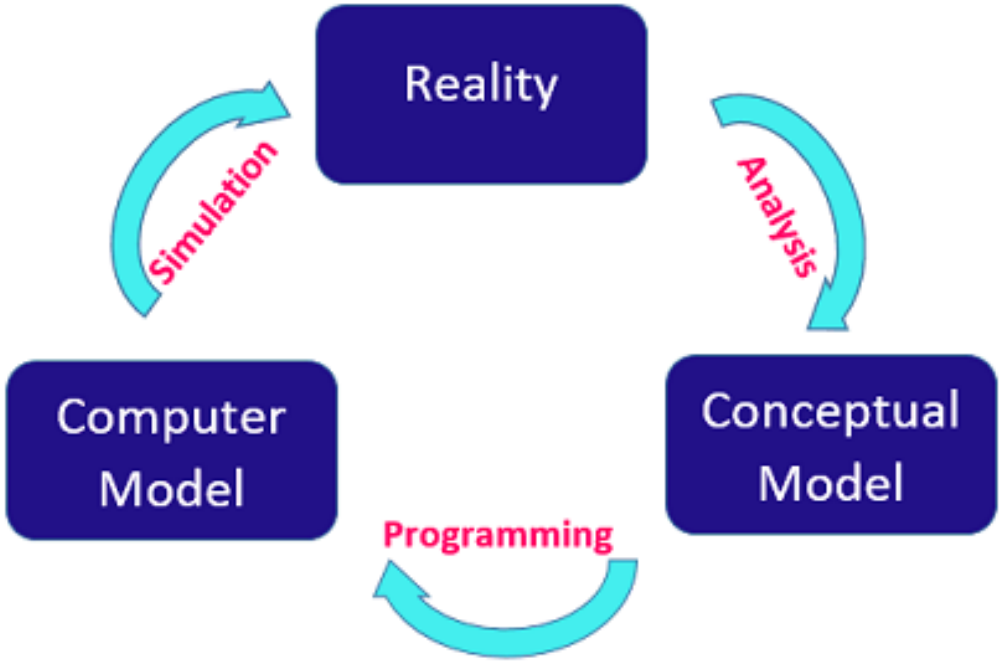
- Developed by Environment Agency in 2013 to support Lead Local Flood Authorities
- National dataset
- Surface water flood maps
- Suitable at country to town or town to street level



What are the Risk of Flooding from Surface Water maps?

Key Assumptions

- Key assumptions:
  - Rainfall – spatial and temporal
  - Runoff and infiltration
  - Stormwater Drainage network
- Impacts vary from catchment to catchment. Depending on:
  - Terrain
  - Urban extent
  - Drainage network characteristics



Key Assumption
Rainfall Runoff Coefficient

Fixed Rainfall-Runoff coefficient in urban areas

- Loss applied to rainfall
  - No infiltration losses when rainfall ceases
  - Volume infiltrated depends on event
- Same across urban areas
  - No spatial variation between very dense urban and suburban
- Suitable for broad scale studies and data-poor environments

Dynamic Infiltration Approach

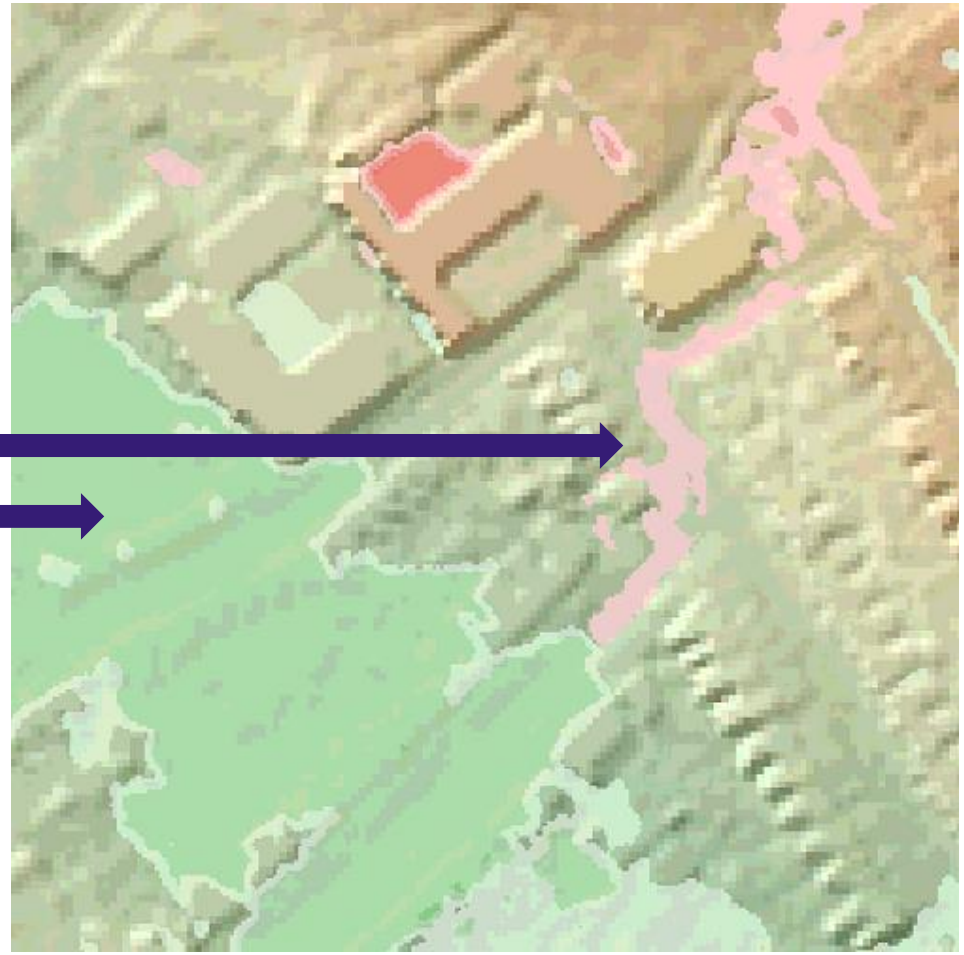
- Varies with soil characteristics, depth of ponded water
  - Where soil has capacity and water ponds, infiltration will continue
  - Volume depends on soil and ponding
- Applied only to pervious surfaces
  - Reflects spatial variation in catchment
- Suitable for spatially diverse catchments with available data

Key Assumption

Rainfall Runoff Coefficient

Fixed Rainfall-Runoff coefficient vs dynamic infiltration

- Urban test model comparing fixed coefficient and Green-Ampt infiltration
- Test model shows fixed coefficient method:
  - Overestimates flooding in parks and suburban areas
  - Underestimates flooding in dense urban areas
- Dynamic Infiltration potentially has greatest impact:
  - Longer duration storms where ponding occurs
  - Highly variable soils and pervious areas



Key Assumption

Drainage Network Representation

Continuing Loss

- Loss applied to rainfall
  - No drainage losses when rainfall ceases
- Uniform application across urban areas
  - No spatial variation based on network capacity or age
- Suitable for broad scale studies and data-poor environments

Integrated Urban Drainage

- Pit and Pipe network modelling
  - Network and inlet capacity
  - Spatial variation based on drainage assets
- Dynamic linking with surface water
  - Potential for surcharging
  - Captures localised effects
- Very data and time intensive, suitable for detailed studies

Key Assumption

Drainage Network Representation

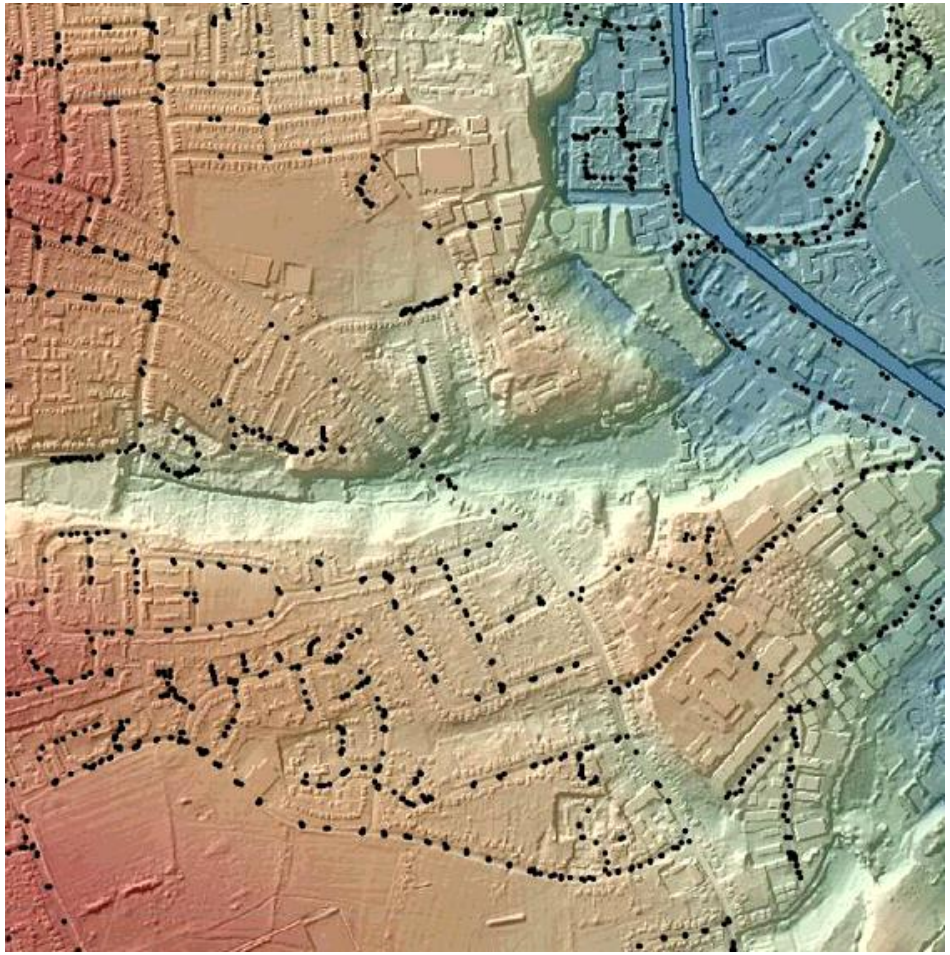
Continuing Loss vs Integrated Urban Drainage

- Urban test model comparing continuing loss and Integrated urban drainage
- Test model shows continuing loss method:
  - Typically underestimates flood depth
- IUD potentially has greatest impact:
  - Network constraints dominate

What's Next?

Can we get the best of both?

- Catchment approach based on:
  - Data availability
  - Study goals
  - Catchment Characteristics
- Hybrid approaches
  - Virtual pipes



Conclusions

- The assumptions used to model complex physical systems fundamentally underpin the results
- Know the assumptions your modelling is based on and when they're critical