





Agenda

- Background
- How the Project is being delivered
- Challenges
- Future

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Background

- Approximately 10 percent of the population of England live within areas potentially at risk from flooding
- Over £200 billion worth of assets are at risk of flooding on Britain
- Around 5 million people, in 2 million properties, live in flood risk areas in England and Wales
- Between 950,000 and 1.2 million properties are built on inland floodplains in the UK
- October 2000 floods cost the UK insurance industry £1 billion and NUI £200 million
- Accuracy of Maps available to us for flood modelling

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G.I.S Timeline



- Disconnected use of GIS
- Maps only used for presentation purposes
- More accurate mapping
- Flood modelling
- Expand GIS capability to other areas
- Web-enabled GIS on every desktop

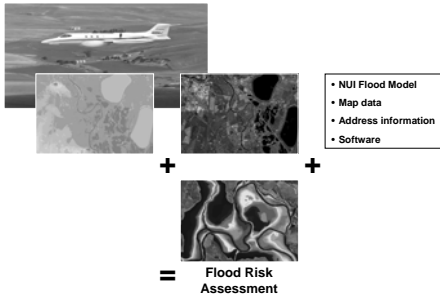
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Partners

- Norwich Union
- Willis
- Intermap
- JBA
- UCL
- H R Wallingford

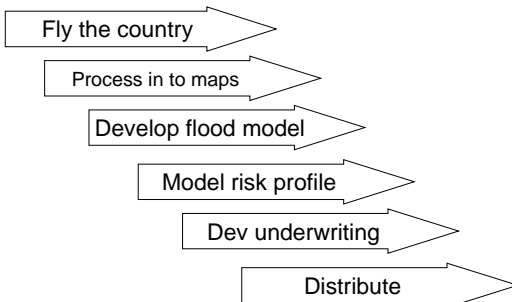
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Process



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Overview of the Process



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Coverage Area



- Coverage area 230,000 sq. km.
- Accurate position of each home and commercial building
- Approximately 320,000 km of rivers in the UK
- Over 14 billion elevation postings
- Over 230 billion image pixels

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Some Maths !

$$Q = \frac{AR^{0.67} S^{0.5}}{n}$$

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$$Q = \frac{wd^{1.67} S^{0.5}}{n}$$

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$$Q_{\text{inflow}} = Q_{\text{in}} * \frac{d_i^{1.67}}{\sum_n d_i^{1.67}}$$

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$$Q = \frac{wd^{i.67}S^{0.5}}{n}$$

$$\text{where } S^2 = S_i^2 + S_j^2$$

$$\text{in which } S_i = \frac{h_{i,j} - h_{i+1,j}}{w}, \text{ and } S_j = \frac{h_{i,j} - h_{i,j+1}}{w}$$

$$\text{and } d = \frac{d_i S_i^2 + d_j S_j^2}{S^2}$$

$$\text{in which } d_i = h_{i,j} - \max[g_{i,j}, g_{i+1,j}] \text{ and } d_j = h_{i,j} - \max[g_{i,j}, g_{i,j+1}]$$

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$$Q_i = Q \frac{S_i}{S} = \frac{wd^{i.67}S_i}{nS^{0.5}} = \frac{wd^{i.67} \left(\frac{h_{i,j} - h_{i+1,j}}{w} \right)}{n \left[\left(\frac{h_{i,j} - h_{i+1,j}}{w} \right)^2 + \left(\frac{h_{i,j} - h_{i,j+1}}{w} \right)^2 \right]^{\frac{1}{4}}}$$

$$Q_j = Q \frac{S_j}{S} = \frac{wd^{i.67}S_j}{nS^{0.5}} = \frac{wd^{i.67} \left(\frac{h_{i,j} - h_{i,j+1}}{w} \right)}{n \left[\left(\frac{h_{i,j} - h_{i+1,j}}{w} \right)^2 + \left(\frac{h_{i,j} - h_{i,j+1}}{w} \right)^2 \right]^{\frac{1}{4}}}$$

$$\text{and } V = \frac{Q}{wd}, \quad v_i = \frac{Q_i}{wd} \text{ and } v_j = \frac{Q_j}{wd}$$

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$$\frac{w\Delta d}{\Delta t} = \sum Q_{in} - \sum Q_{out} + Q_{inf low}$$

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$$\text{wetperc} = \max \left(1, \frac{v \Delta t}{w} \right)$$

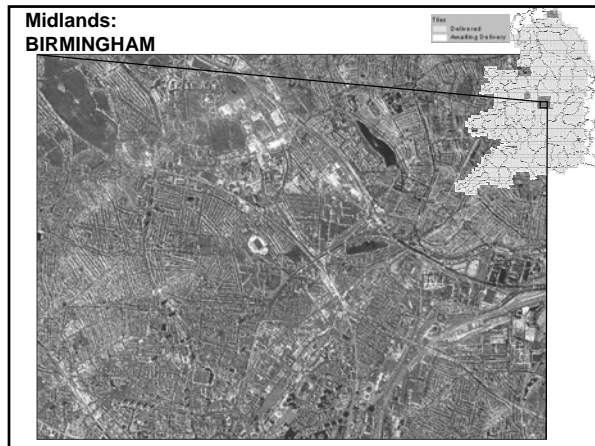
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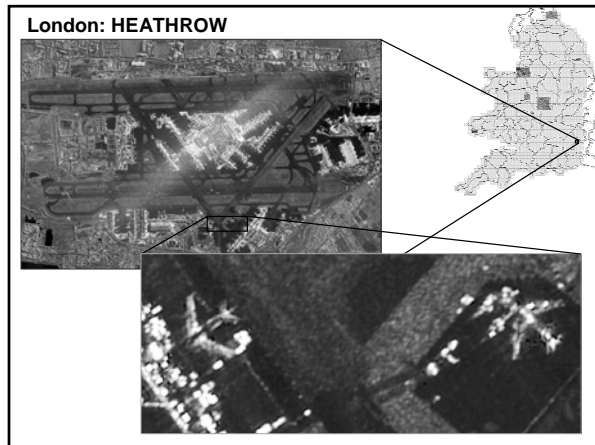
$$\text{drying} = \frac{w^2 (d - d_{\min})}{(Q_{out} - Q_{in} - Q_{inflow}) \Delta t}$$

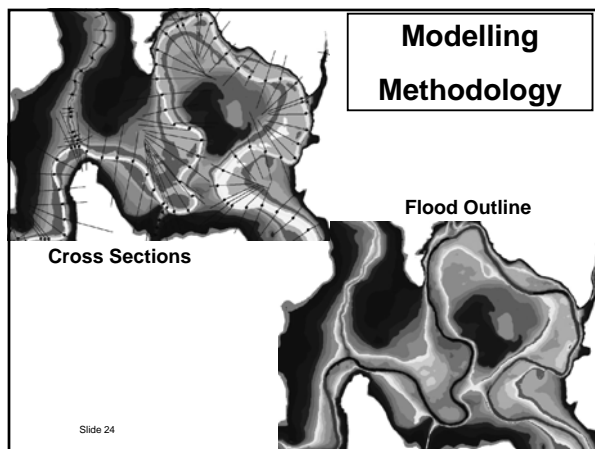
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$$\Delta t = \frac{w}{v + \sqrt{gd}}$$

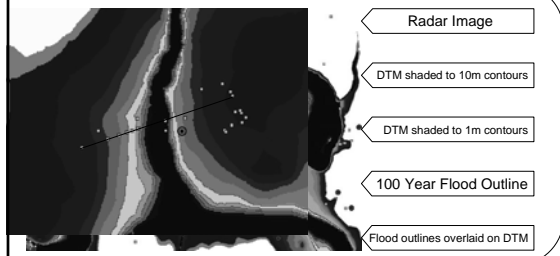
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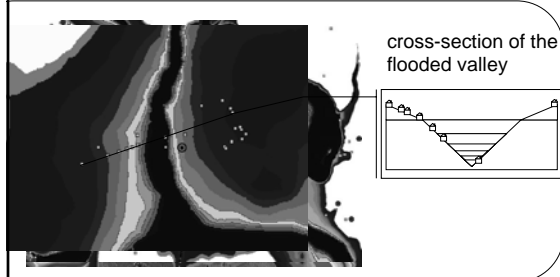


Flood layers



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Flood layers



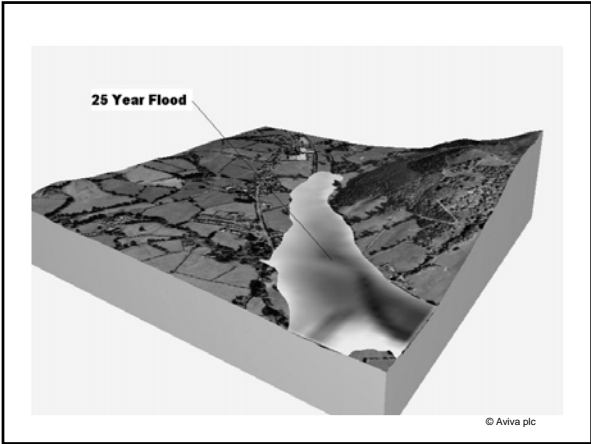
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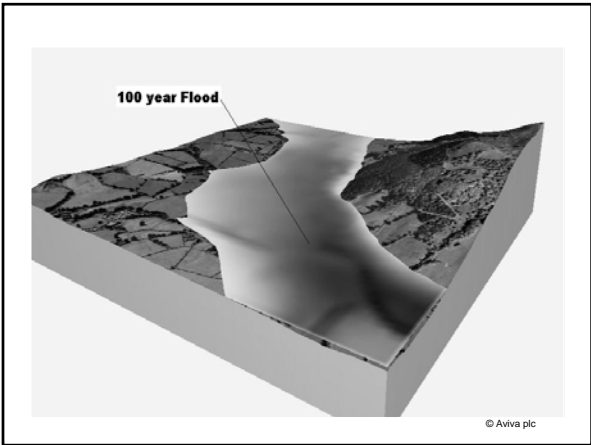
Coverage Area

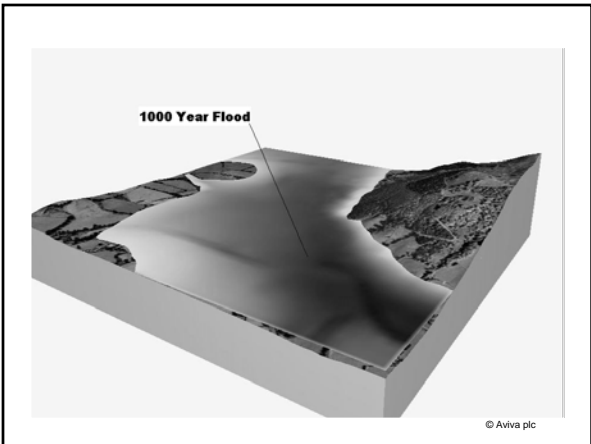


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Challenges

- Availability of Maps
- Managing R&D project to delivery
- Flood risk assessment at individual property
- Building a G.I.S capability

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Future

- Coastal Modelling
- Other Perils
- Development and Maintenance
- G.I.S Capability
- Data value

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Other Territories

- Aviva
 - Republic of Ireland
 - Poland
- Intermap
 - Czech Republic
 - Poland

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