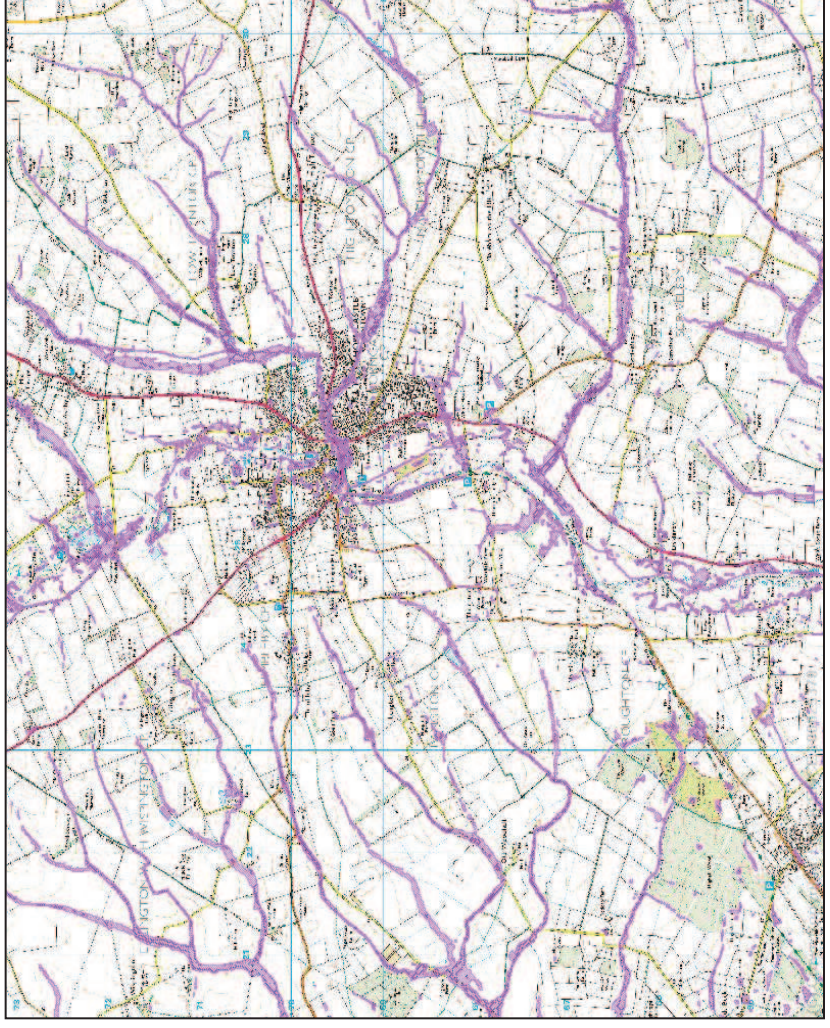


Surface Water Flood Mapping



Mark Welsh
Floods & Water and Major
Developments Manager

Recent history of surface water flood mapping:-

- ❖ Areas Susceptible to Surface Water Flooding (AStSWF)
- ❖ Flood Map for Surface Water (FMfSW)
- ❖ Updated Flood Map for Surface Water (uFMfSW)

uFMfSW in the Context of the Local Strategy

- ➔ Requirements of Flood Risk Regulations.
- ➔ Duty to prepare and publish Preliminary Flood Risk Assessment (PFRA) by Dec. 2011.
- ➔ Duty to prepare and publish flood hazard maps and flood risk maps by Dec. 2013.
- ➔ Duty to prepare Flood Risk Management Plan by Dec 2015.
- ➔ Lincs Partnership overwhelmingly support an all Risk Management Authority (RMA) and risk sources approach to the management plan as an extension to the Local Strategy – Environment Agency (EA) have just confirmed this approach.



Flood Risk Management Plans - June 2013

Environment Agency

Under the Flood Risk Regulations, some Local Flood Authorities (LFA) are required to produce Flood Risk Assessments (FRAs) for England and Wales. We've consulted on the approach to producing these plans and, taking into account the response, we're now proposing a preferred way forward.



FRAs are important because they set out how risk managers' authorities and communities will work together to reduce the potential adverse consequences of flooding. Both the Welsh Government, the Environment Agency and the newly formed Natural Resources Wales (who took over the functions of the Environment Agency in Wales on 1 April 2013) wanted to raise awareness of the planning requirements and to get views on the possible approaches to delivering FRAs for the first and subsequent cycles.

- ➔ Lincs Partnership overwhelmingly support an all Risk Management Authority (RMA) and risk sources approach to the management plan as an extension to the Local Strategy – Environment Agency (EA) have just confirmed this approach.

uFMfSW in the Context of the Local Strategy

Joint Lincolnshire Flood Risk and Drainage Management Strategy, Part 1 of 3
Strategic Vision

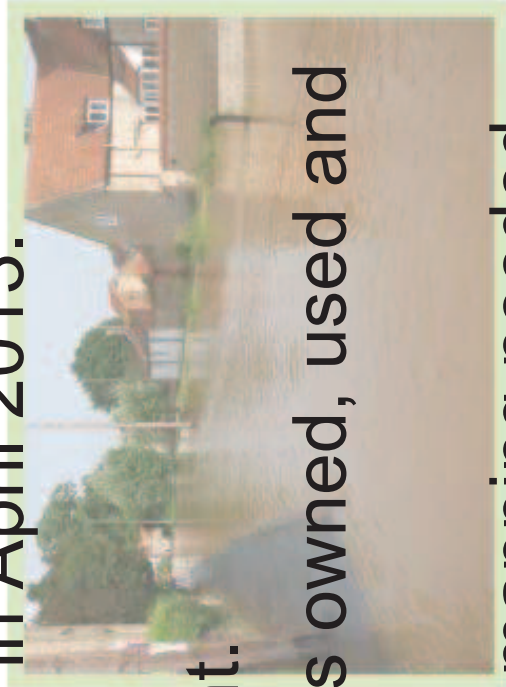
Joint Lincolnshire Flood Risk and Drainage Management Strategy, Part 1 of 3
Strategic Vision

Local Strategy and completed in April 2013.

- Considers all sources of risk.
- Need for local risk assessment.

- uFMfSW provide a set of maps owned, used and supported by all partners.

- Only additional modelling and mapping needed for "hot spots" (e.g. Flood Defence Grant in Aid (FDGiA) schemes and site specific flood risk assessments).



Joint Lincolnshire Flood Risk and Drainage Management Strategy
2012-2025
Part 1 of 3
Strategic Vision

Local Surface Water Flood Risk Information

DETERMINING LOCAL FLOOD RISK AREAS?

 Lincolnshire
COUNTY COUNCIL

Lincolnshire County Council
Lead Local Flood Authority

Preliminary Flood Risk Assessment
Preliminary Assessment Report

Final Report (excluding appendices)

18 June 2011

Prepared by:
Mervyn Pettifor

Prepared for:
David Hickman



Flooding at Stamma End, Lincoln - June/July 2007

Page 1 of 76

Lincolnshire Wards and Parishes

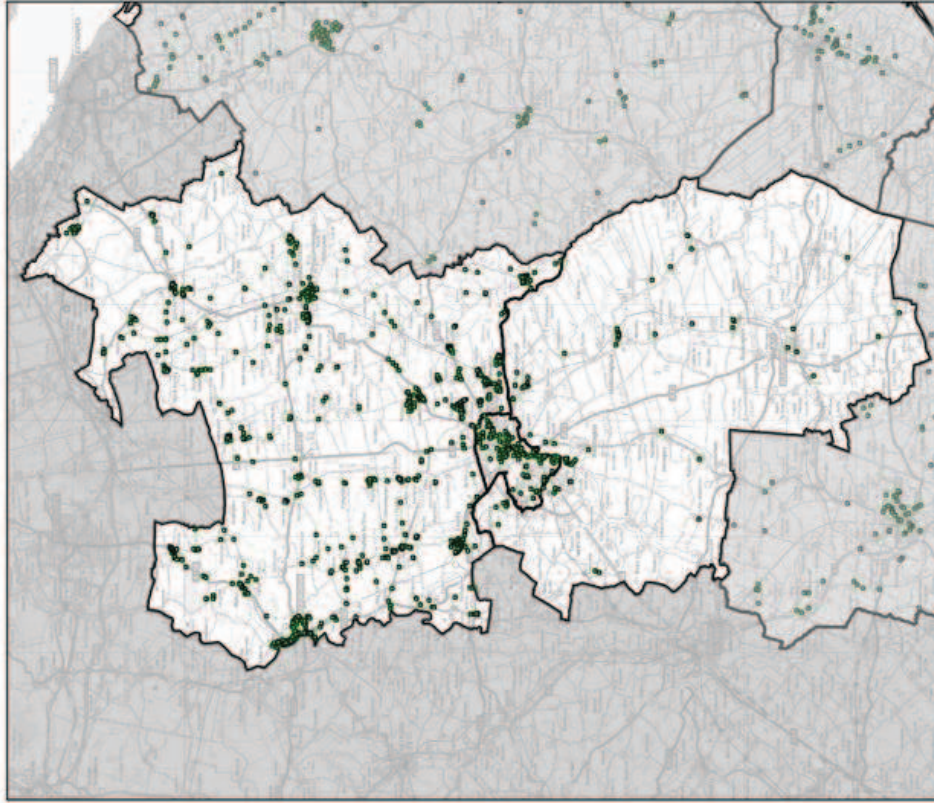
Initial County Level Significant Flood Risk Areas (Total number of flooded props >50)

Candidate Flood risk Area

FR&DMG, LA & Parish	Total No of All Prop in the Parish (A)	No of All Past Property Flooding Within Modelled "Deep" Area (B)	No of All Past Property Flooding Outside Modelled "Deep" Area (C)	Total No of All Past Property Flooding (B+C=D)	Future Property Flooding Within Modelled "Deep" Area (E)	Total No of Past Property Flooding Outside "Deep" plus Additional Future Property Flooding Within Modelled "Deep" Area (E-B+C-F)	Total No of Recorded Property & Additional Future Property Flooding in Modelled "Deep" Area as a Proportion of All Properties (F/A=G)	No of Cl. ES & LB in Modelled "Deep" Area
Central Lincs								
West Lindsey DC								
GAINSBOROUGH EAST WARD	1,740	2	29	31	81	108	6%	0
GAINSBOROUGH NORTH WARD	1,930	1	20	21	104	123	6%	3
GAINSBOROUGH SOUTH-WEST WARD	2,210	1	18	19	84	101	5%	1
SUB TOTAL (3 No)	5,880	4	67	71	269	332	6%	4
Cherry Willingham CP	1,546	3	58	61	72	127	8%	0
Fiskerton CP	534	3	39	42	28	64	12%	0
Ingham CP	417	3	16	19	58	71	17%	3
Market Rasen CP	1,901	11	48	59	95	132	7%	1
Nettleham CP	1,637	10	42	52	58	90	5%	6
Saxilby with Ingelby CP	1,840	3	82	85	82	82	4%	4
Scotter CP	1,362	15	62	77	16	63	5%	1
Sturton By Stow CP	634	2	51	53	2	51	8%	0
SUB TOTAL (8 No)	9,871	50	398	448	411	680	8%	15

PFRA Data Gathering & Outputs

Central Lincolnshire FR&DMG – Recorded incidents of historical local flooding
 NOTE: MAP SHOULD BE VIEWED AT NO LARGER THAN 1:50,000 SCALE



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Legend – Recorded incidents of historical local flooding shown as 

Central Lincolnshire FR&DMG – Initial areas where potential flood risk requires further investigation as part of the local strategy
 NOTE: MAP SHOULD BE VIEWED AT NO LARGER THAN 1:50,000 SCALE



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Legend – Estimated number of properties within a 0.5 km sq at potential risk of local flooding



Draft Flood Risk Assessment Report (1)

- PFRA review and data collection
- *Target areas*
- *Increase flood risk evidence*
- *Report and map outputs*

<p>Data collection</p> <ul style="list-style-type: none"> • LCC • District Councils • EA • IDBs • Water Companies • PFRA data • Community & EP related data sets (PlanWeb) • DG5 datasets • WC drainage area studies • EA flood maps • CFMPs • IDB catchment studies <p style="text-align: right;">Lincolnshire COUNTY COUNCIL</p>	<p>Sewer modelling coverage</p> <ul style="list-style-type: none"> • Model coverage • Model verification • System performance • Known problems • Knowledge of systems good • Evidence of storm water performance less so <table border="1"> <thead> <tr> <th>Catchment</th> <th>Drainage Area Reports</th> <th>Combined System</th> <th>Storm Systems</th> </tr> </thead> <tbody> <tr> <td>Lincoln</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Conventham</td> <td>Yes</td> <td>Yes</td> <td>Limited</td> </tr> <tr> <td>Skellingthorpe</td> <td>No</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>Stamford</td> <td>Yes</td> <td>Many Fail</td> <td>No</td> </tr> <tr> <td>Loth</td> <td>No</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Boston</td> <td>No</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Skewness</td> <td>No</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>Spalding</td> <td>Yes</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>Osborneough</td> <td>No</td> <td>Yes</td> <td>Limited</td> </tr> </tbody> </table> <p>Table 1 – Sewer Modelling Coverage</p> <p style="text-align: right;">Lincolnshire COUNTY COUNCIL</p>	Catchment	Drainage Area Reports	Combined System	Storm Systems	Lincoln	Yes	Yes	Yes	Conventham	Yes	Yes	Limited	Skellingthorpe	No	Yes	No	Stamford	Yes	Many Fail	No	Loth	No	Yes	Yes	Boston	No	Yes	Yes	Skewness	No	Yes	No	Spalding	Yes	Yes	No	Osborneough	No	Yes	Limited
Catchment	Drainage Area Reports	Combined System	Storm Systems																																						
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Skewness	No	Yes	No																																						
Spalding	Yes	Yes	No																																						
Osborneough	No	Yes	Limited																																						
<p>Assessment of risk</p> <ul style="list-style-type: none"> • Initial methodology established • Involved scoring risk factors • Risk = Likelihood x Consequence • Based on 1:200y EA FMFSW • Mainly parishes identified in PFRA where 20-39 & 40+ props affected • Overall parish “Total Consequence” score <p style="text-align: right;">Lincolnshire COUNTY COUNCIL</p>	<p>Total Consequence Score incl.</p> <ul style="list-style-type: none"> • Essential Transport Infrastructure • Essential Utility Infrastructure • Main Police Stations • Other Emergency Services • Military Installations • Major Hospitals • Schools • Residential Properties • Industrial and Commercial Premises • Hazardous Substance Consents • Agricultural Properties • Agricultural Land • Environmental Sites <p style="text-align: right;">Lincolnshire COUNTY COUNCIL</p>																																								

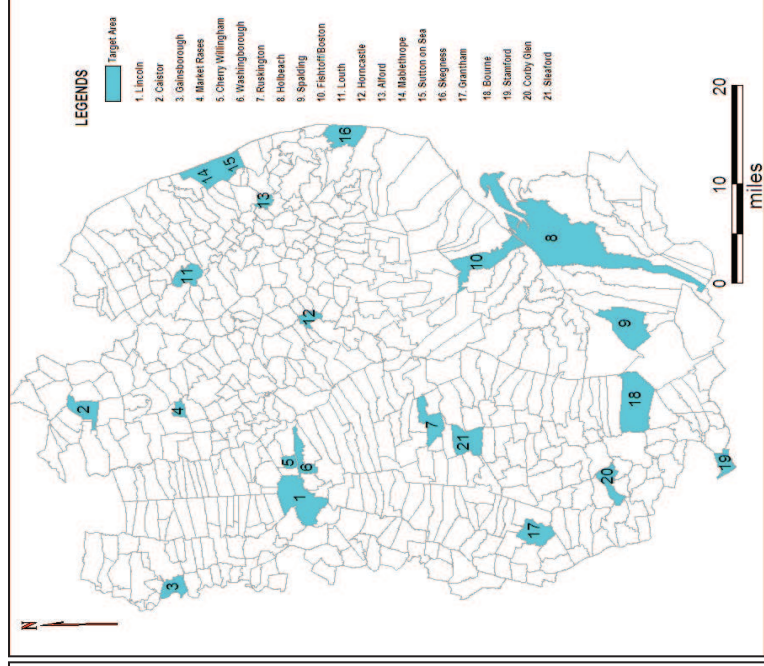
Draft Flood Risk Assessment

Report (2)

- *PFRA review and data collection*
- **Target areas**
- *Increase flood risk evidence*
- *Report and map outputs*

Target Areas

- Identify clusters based on the following three main criteria:
 - **Historic flooding as identified in the PFRA** – adjacent areas were identified where five or more historic incidents had been reported
 - **Predicted Flooding from the 1 in 200 EA SW flood maps** – parishes were identified that fell into the following categories of properties at risk: 20-39 and 40+
 - **Consequences of flooding from the risk assessment exercise** – a total score was obtained to identify those areas containing the most important installations
- We also considered at risk parishes that also fell within zones of interaction, and made sure all drainage groups were included to ensure county –wide coverage..



Draft Flood Risk Assessment Report (3)

- *PFRA review and data collection*
- *Target areas*
- **Increase flood risk evidence**
- *Report and map outputs*

Scientific evidence and modelling

Three different categories:

1. Environment Agency 1 in 200 and 1 in 30 return period mapping
2. Enhanced Modelling undertaken for this study covering 21 Target areas at a 1 in 30 year return period. This was carried out on a catchment basis and also included velocity and hazard mapping.
3. The further national Surface Water mapping by the Agency commencing in October 2012 for publishing in summer 2013.

Lincolnshire
COUNTY COUNCIL

Key improvements

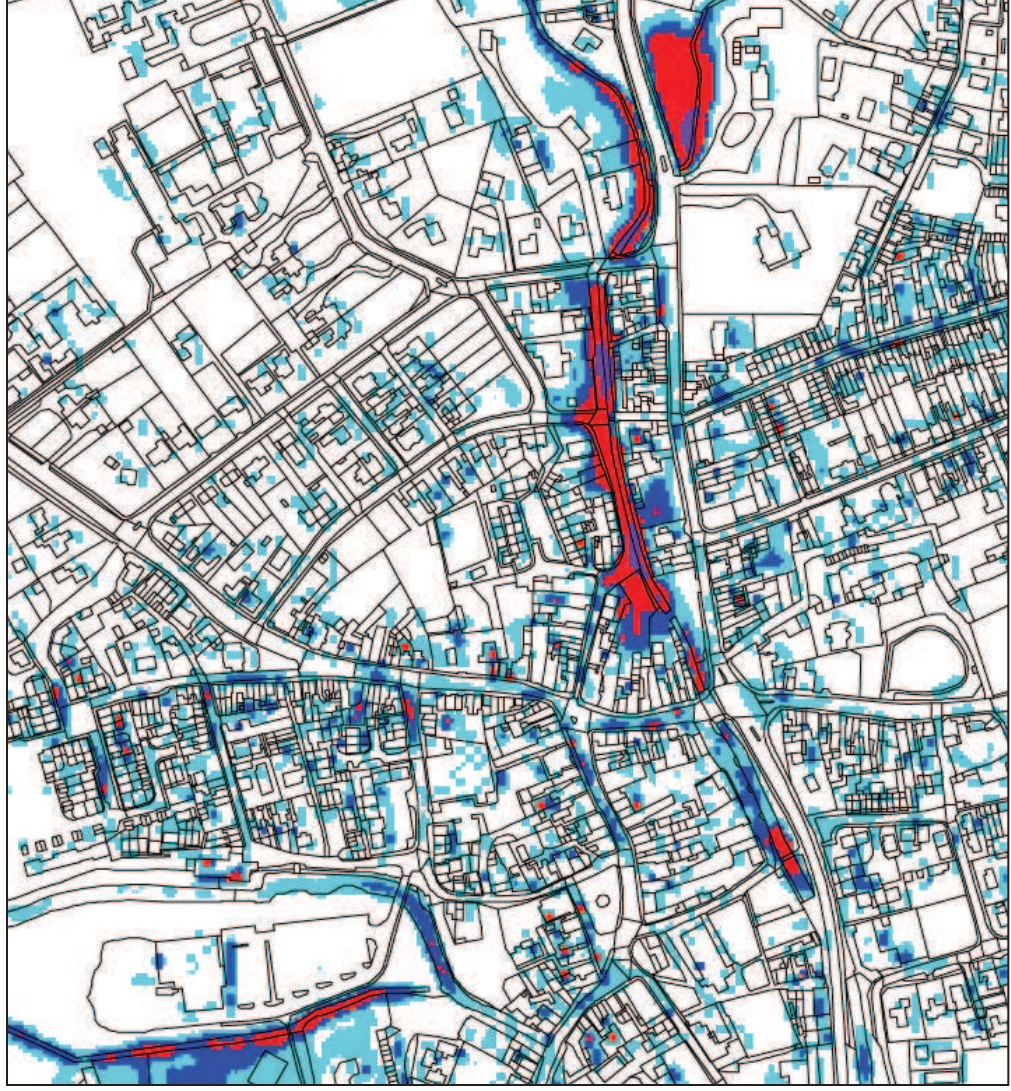
- Local Rainfall Profiles with variable durations
- Catchment based models
- More accurate 2-d modelling software (Tu Flow)
- More detailed representation of features including buildings
- Other return periods available but less accurate at lower return periods
- Velocity and hazard maps also available
- Local sources indicative Depth, Velocity & Hazard maps covering target areas

Lincolnshire
COUNTY COUNCIL

Draft Flood Risk Assessment

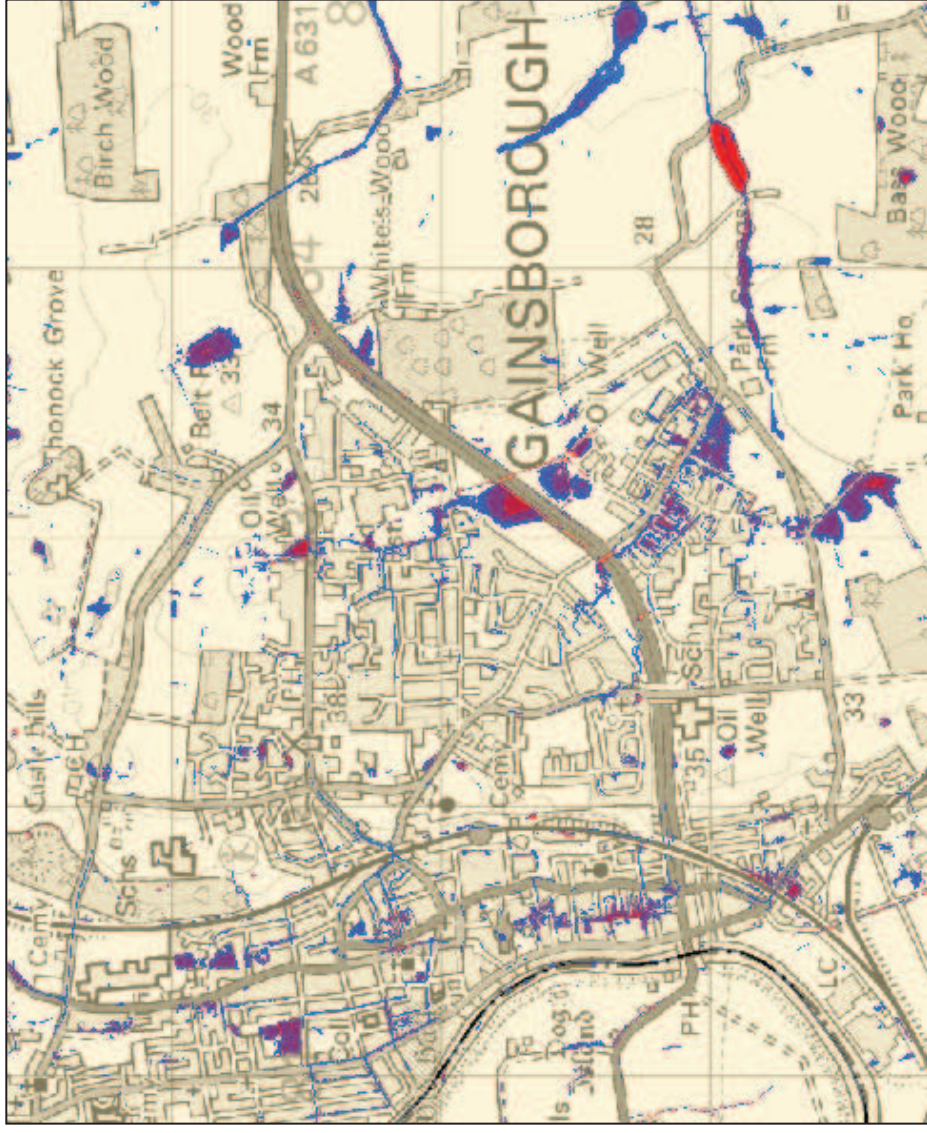
Report (4)

- *PFRA review and data collection*
- *Target areas*
- *Increase flood risk evidence*
- *Report and map outputs*



Draft Flood Risk Assessment Report (5)

- Local information incorporated in uFMfSW
- uFMfSW now supersedes previous surface water modelling and mapping
- Best comprehensive science available to date



uFMfSW National Coverage and Improved Science



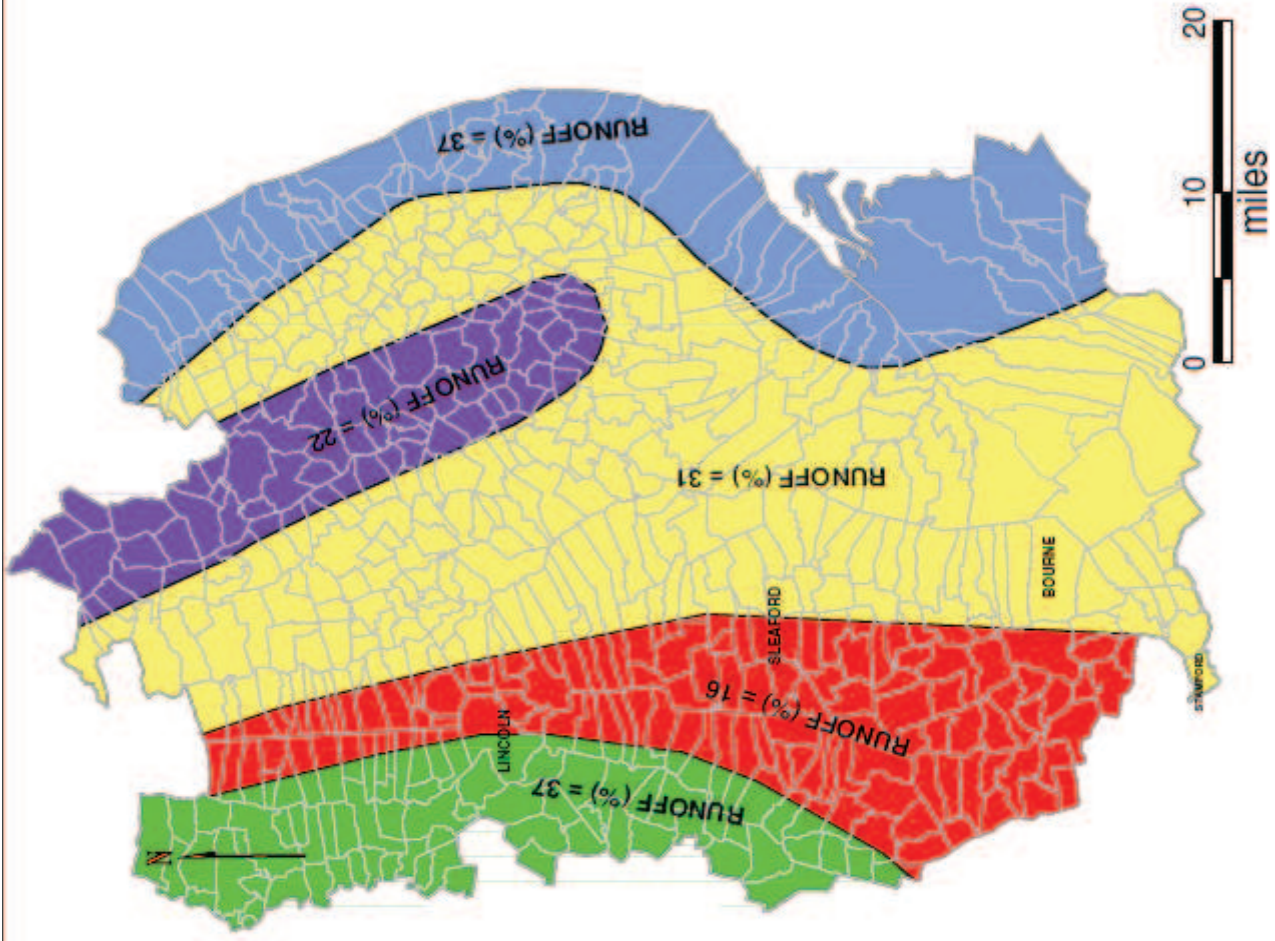
- Improved Digital Terrain Model (DTM).
- Includes buildings and lowering of roads to better represent flow paths.
- 1 in 30, 1 in 100, 1 in 1000 probability, 3 critical storm durations.
- Flood depths, speed and hazard rating.
- Direction of flow at maximum hazard rating and maximum speed.
- Manual editing to provide flow paths through ‘flyover’ features.
- Includes local parameters.

Local Model Parameters

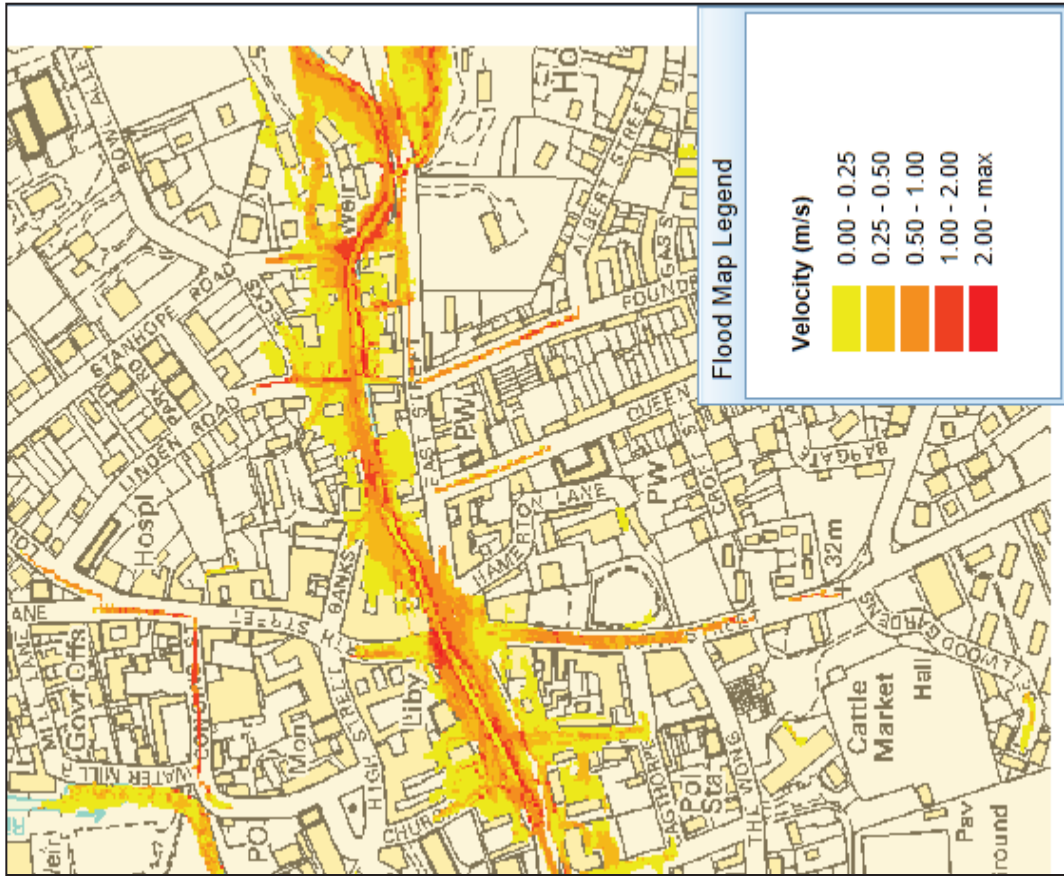
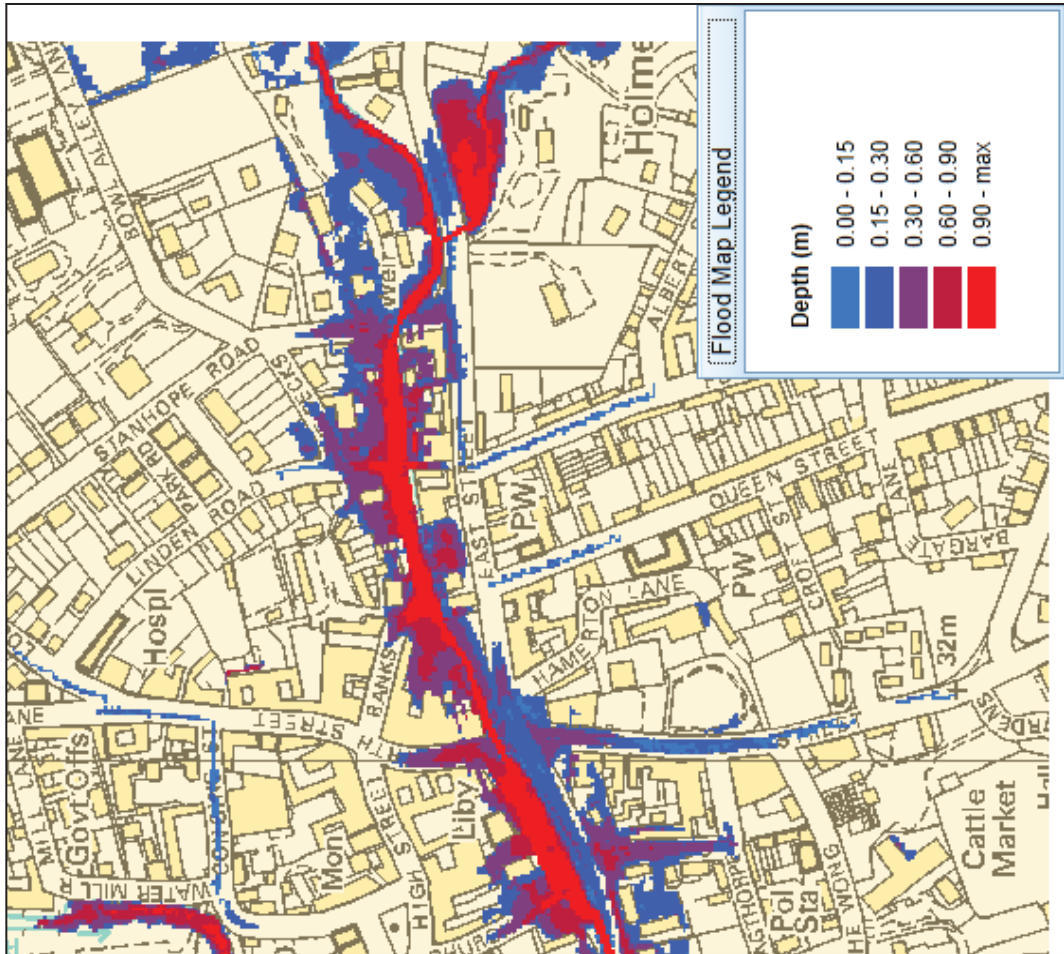
Model parameter	Range of values				FMFSW (2010)	AStSWF (2009)
	Low	Medium Default values 2012	High			
Equivalent sewer capacity	6mm/hour	12mm/hour	20mm/hour		12mm/hour	0mm/hour (no sewer drainage)
Percentage runoff	50%	70%	90%		Urban 70% Rural 39%	100%
Critical storm duration	1 hour	3 hours	6 hours		1.1 hours (summer storm profile)	6.5 hours (summer storm profile)

- Local model information used where available and appropriate e.g. where Surface Water Management Plans (SWMPs) exist – minimal coverage.
- Critical storm durations – covers all bases 1hr, 3hr & 6hr – negating need for LLFA input and providing consistency.
- Only remaining LLFA input was percentage run-off .

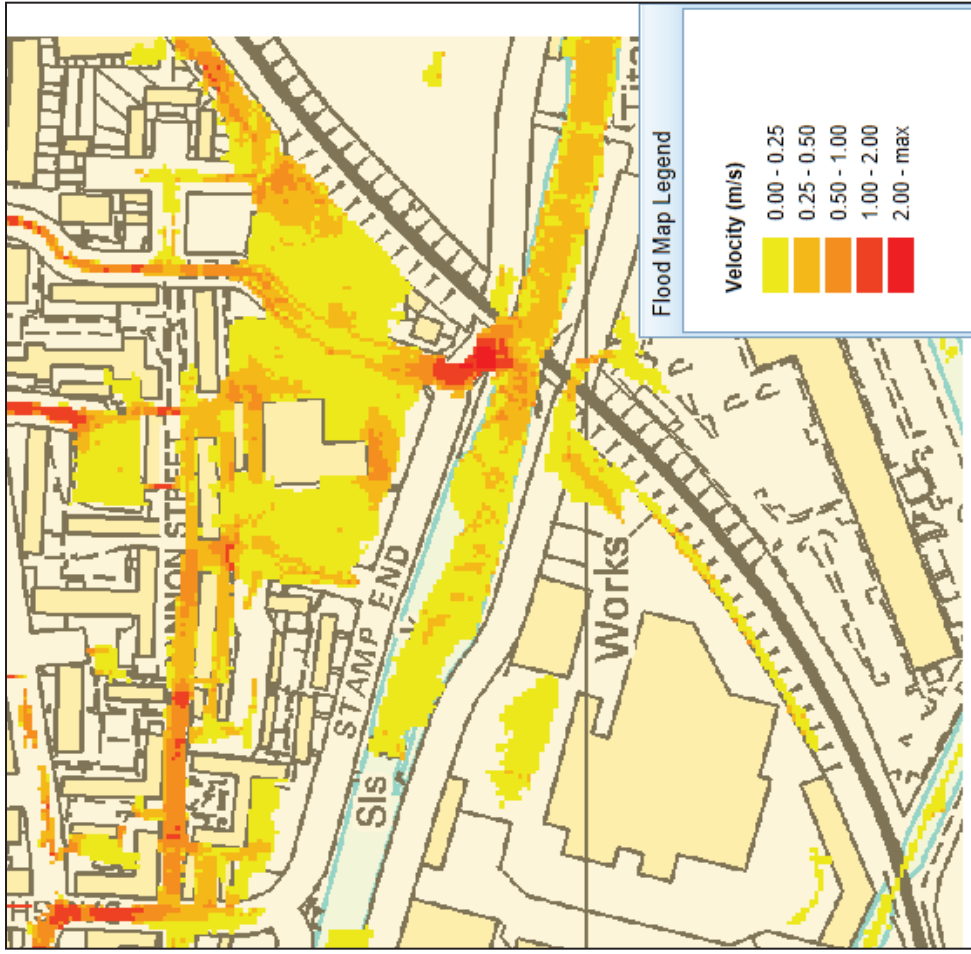
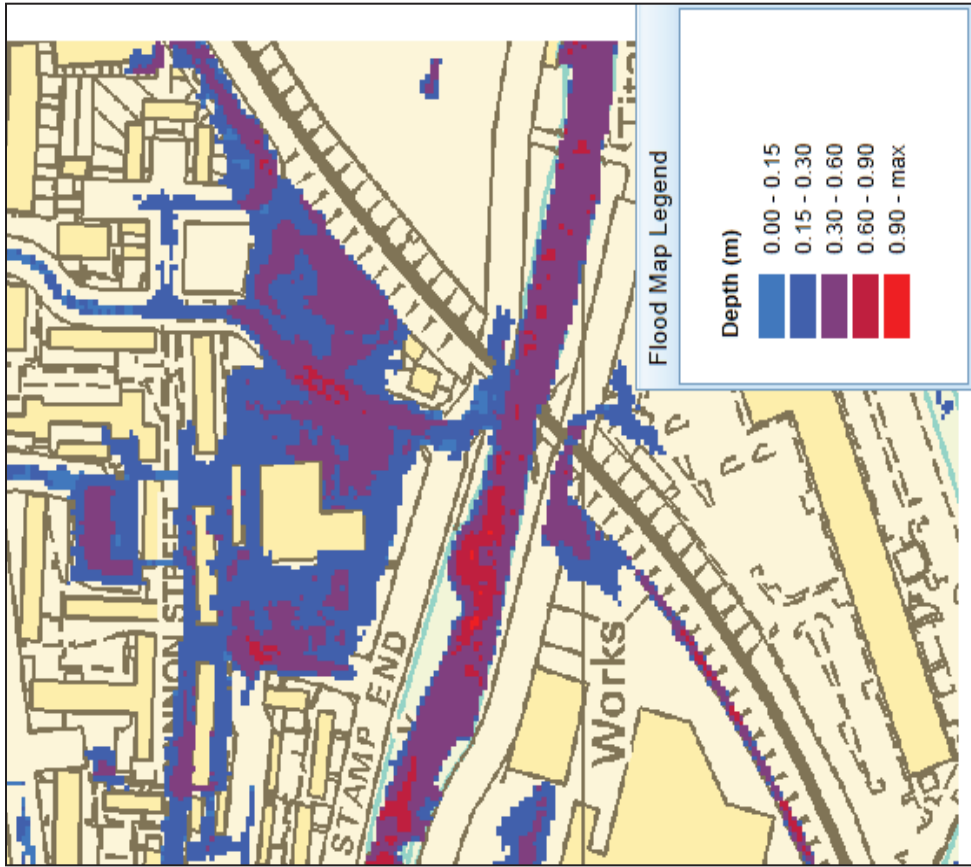
Lincolnshire Percentages for Rural run-off



First Impressions – Very Good! (1)

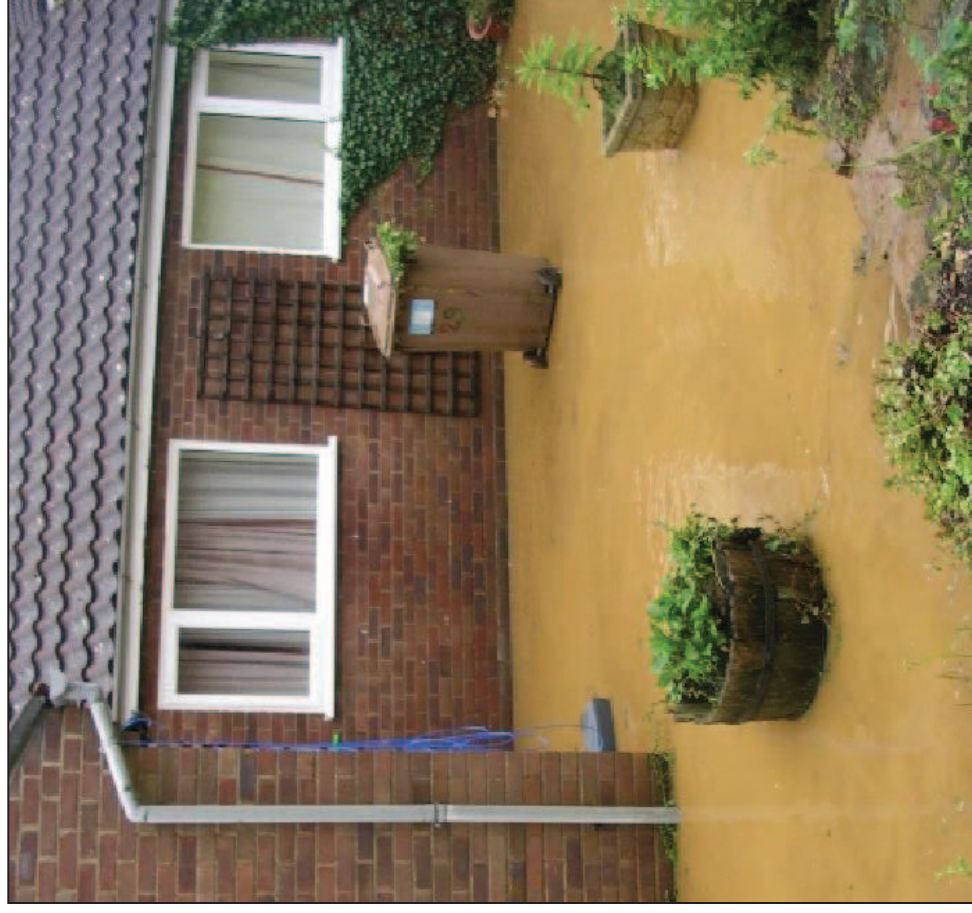


First Impressions – Very Good! (2)

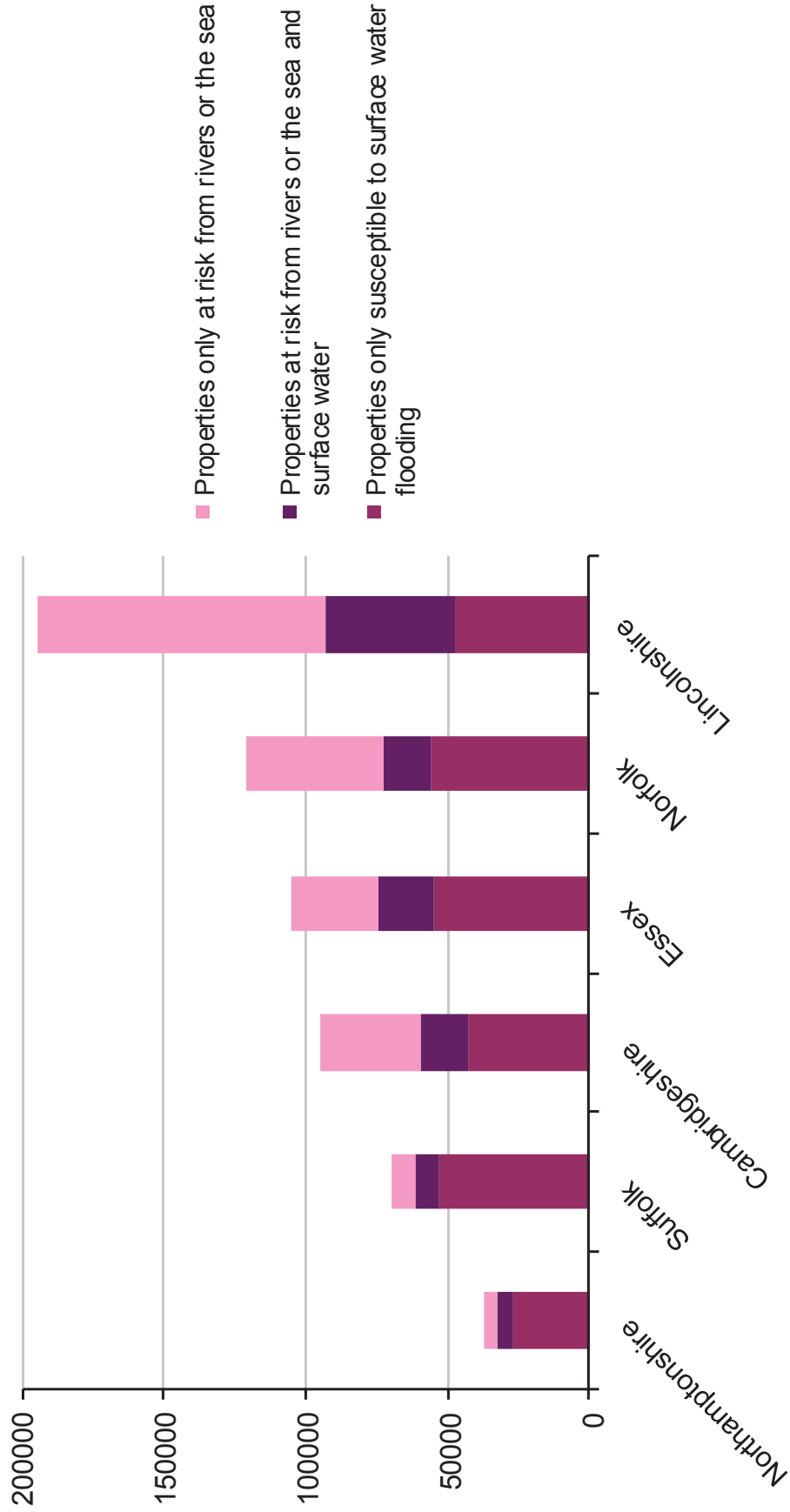


uFMfSW in the Planning Process

- uFMfSW need to be used extensively by all partners and developers in the land use planning and development control process

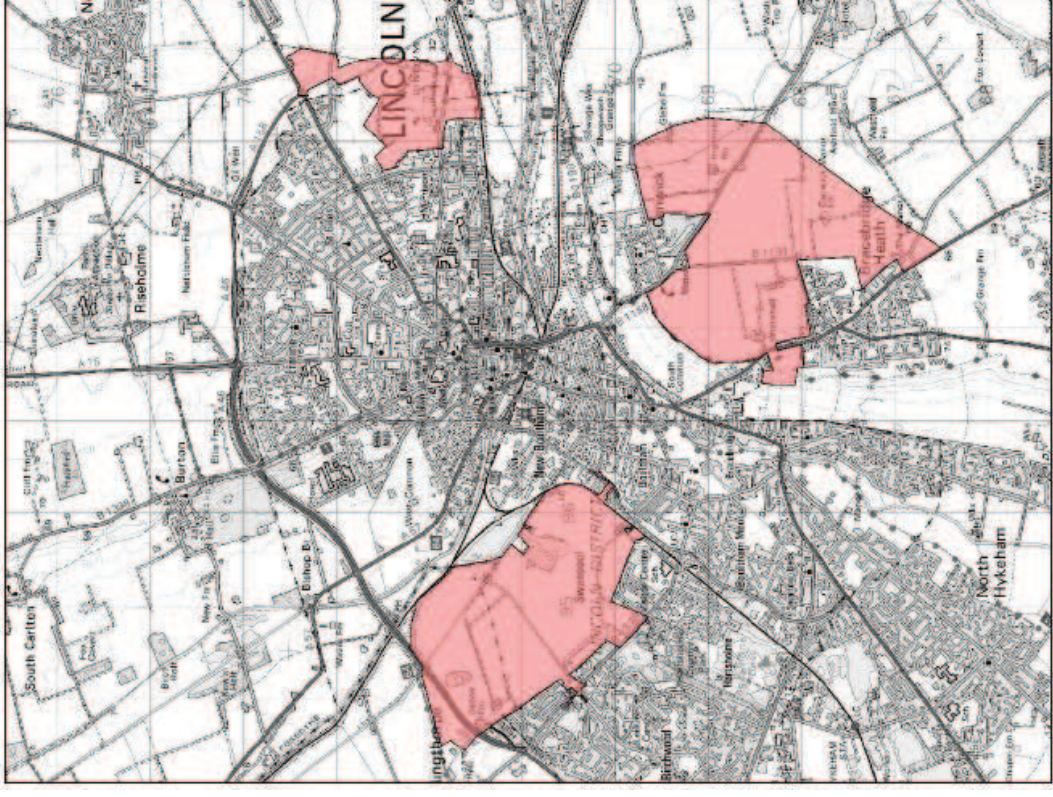


Properties at risk, comparison of our County Councils, December 2009



The need for uFMfSW in the Planning Process

- Districts as LPAs and RMAs principal decision makers.
- LLFAs key consultees now and statutory in the future, (but only for SuDS).
- Strategic & Local Plan considerations.
- Use in understanding risk requiring and determining FRAs, etc.
- Impact on Strategic Flood Risk Assessments (FRAs) and possible need for future updates.

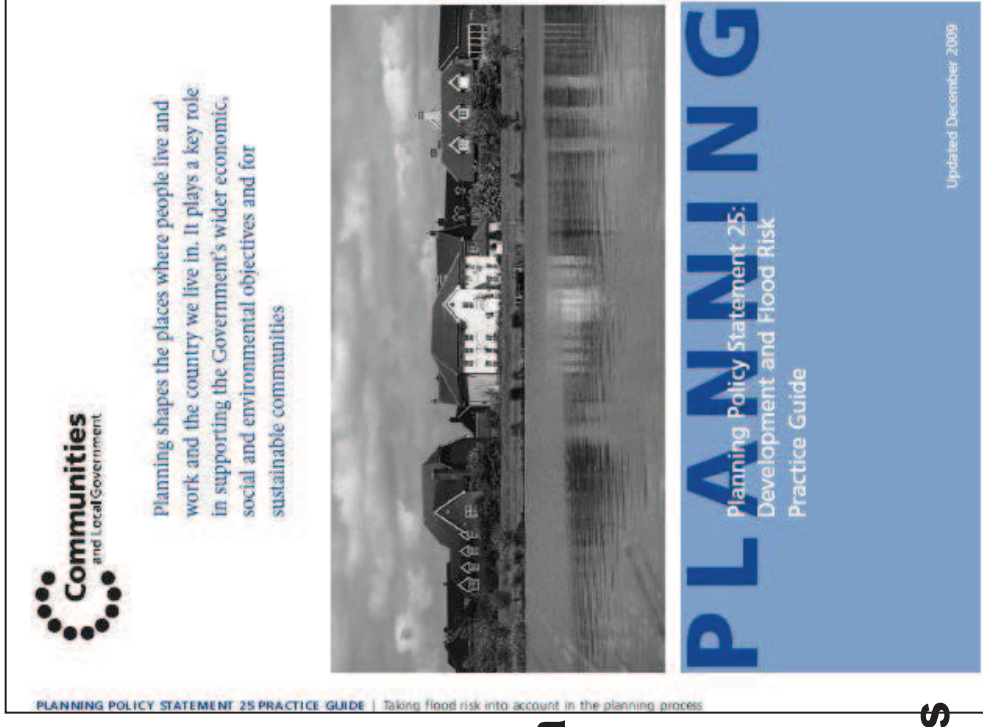


Role of the Local Planning Authority LPA

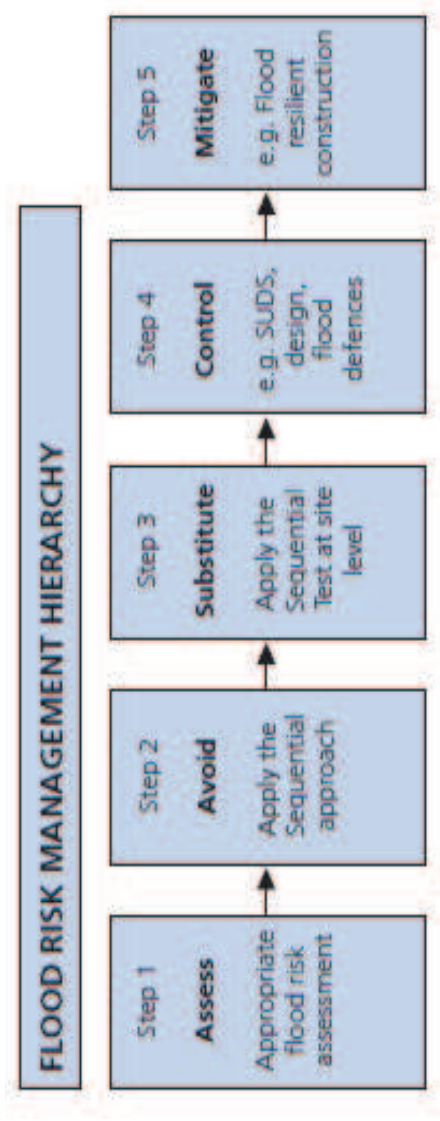
PPS25 Practice Guide

The LPA is the principal decision maker on applications for new development ... Specifically the LPA should:

- **State where development would be acceptable on flood risk grounds;**
- **advise the developer on the need for a site specific Flood Risk Assessment (FRA) and consultation with the Environment Agency and/or other flood risk consultees;**
- **encourage pre-application discussions with the identified flood risk consultees.**



SITE SPECIFIC FLOOD RISK ASSESSMENTS (FRAs) should establish:



- whether the proposed development is likely to be affected by current or future flooding from any source (**including surface water**)
- whether it will increase flood risk elsewhere
- whether the measures proposed to deal with these effects and risks are appropriate (drainage strategy - i.e. how it is to be protected and drained)

Wolsey Way Lincoln

1980s development
2012 flood map



Key Messages (1)

- 1) Use of latest improvements in data, technology and modelling techniques.
- 2) National scale mapping incorporating local information and using the best science available.
- 3) A credible set of surface water maps supported and **owned** by all partners, which will be **published!** for the first time.
- 4) The best assessment of surface water flood risk.
- 5) Topographic based and makes allowance for infrastructure.

Key Messages (2)

- 1) Essential information for consideration in all aspects of land use planning and development control.
- 2) Need to ensure maps are not used inappropriately e.g. individual property level.
- 3) New LLFA surface water mapping only required for “hot spots” where specific local detailed understanding of risk is needed (e.g. Surface water improvement schemes).
- 4) A set of models available for use by the LLFA for further and more detailed work.
- 5) Promotes sharing consistent and relevant data in an open and transparent way.

Practical Demonstration of uFMfSW

Welcome Mark Welsh [Edit Profile]

Updated Flood Map for Surface Water

Home News Review Maps Forum Support Users

Table of Contents

- My Review Data
- Notes
- LLFA Feedback
- Model Locations
- My Flood Data
- Flood Maps
 - 1 in 30 Chance
 - 1 in 100 Chance
- Depth
- Velocity
- Hazard Rating
- Flow Direction
- 1 in 1000 Chance
- Confidence Rating
- Confidence Rating
- Flood Model Input Data
- LIDAR Data Coverage
- DTM
- Hydraulic Roughness (Manning's n)
- Total Rainfall Depths (mm)
- Effective Rainfall Depths (mm)
- Context
- ASTSWF Flood Maps
- FMFSW Flood Maps
- Base Mapping

NGR, Postcode or Town Search Add Note Add LLFA Feedback Review/Edit LLFA Feedback Review/Edit Model Locations Download Annotations

Upload Flood Data Review/Edit Notes Review/Edit LLFA Feedback Review/Edit Model Locations Download Annotations

GRIMSBY Spurn Head Cleethorpes LINCOLNSHIRE

Measurements

Flood Map Layer

Confidence Layer

Transf