

DARD Rivers Agency - Flood Maps (NI)

3/12

Key Points



Rivers Agency - Update to the Strategic Flood Map to comply with the EU Floods Directive.

Project involved development of much more detailed flood hazard and flood risk information for 69 settlements across Northern Ireland.

Map viewers for separate audiences:

1. Government and Utility Stakeholders
2. The Public

Flood Hazard & Flood Risk maps completed for 20 'Significant Flood Risk Areas' by December 2013. Maps for a further 49 settlements completed by March 2014.

Lessons Learned: Adaptation involves understanding past vulnerabilities to mitigate future ones. Flood Maps (NI) provide detailed analysis for spatial planning, emergency planning, asset management and flood preparedness.

This case study details the drivers, implementation and outcomes of the update to the Strategic Flood Map. The project has been carried out in order to comply with the Article 6 (Flood Hazard & Flood Risk Mapping) requirements of the EU Floods Directive. The project sits within the 'flooding' action category of the Northern Ireland Climate Adaptation Programme.

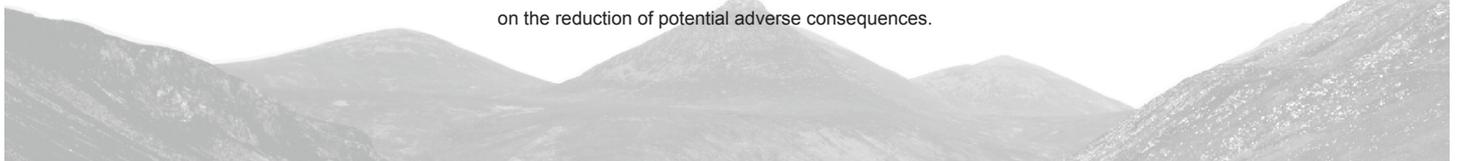
This case study outlines the 2nd stage in the implementation of the EU Floods Directive. The 1st Stage involved carrying out a "Preliminary Flood Risk Assessment" to identify the "Significant Flood Risk Areas (SFRA)" across Northern Ireland. The 2nd stage focused on the flood hazard and flood risk within these areas and required the production of detailed maps covering various sources of flooding and flood scenarios. The new maps include data on the water level and speed of flow for three return periods. This means those at risk of flooding will have a better understanding of what infrastructure and facilities are at risk and how they may be impacted by flooding.

The 3rd stage will build on this knowledge base and will inform the work to develop "Flood Risk Management Plans" for areas at significant risk. These will be published documents that establish objectives for the management of the flood risk areas, focusing on the reduction of potential adverse consequences.

The plans will include various measures tailored to the specific characteristics of individual areas.

The original Strategic Flood Map viewer was developed by Rivers Agency in 2008, releasing 'strategic level' flood hazard information to the public. The current Flood Maps (NI) viewer further develops the quality of information available to the public and stakeholders by:

- Providing flood mapping information from strategic and detailed modelling at an enhanced scale - the interactive viewer now displays at a scale of 1:10,000.
- Providing access to pre-formatted PDF maps showing flood hazard, including flood extents, depth, velocity and flow; and flood risk, including the indicative number of people affected and the impact on economic activity.



Aims/objectives

- Compliance with the EU Floods Directive requirements for Flood Hazard and Flood Risk Mapping for the 20 SFRAs to be completed by December 2013.
- Complete Flood Hazard and Flood Risk Maps for the other 49 areas that were considered during the PFRA stage, by March 2014.
- Communicate the detailed maps to stakeholders at appropriate scales and levels of detail so that the maps can be used for flood risk management purposes including: spatial planning, emergency planning, asset management, flood preparedness (by both flood risk management professionals and the general public).

Audiences

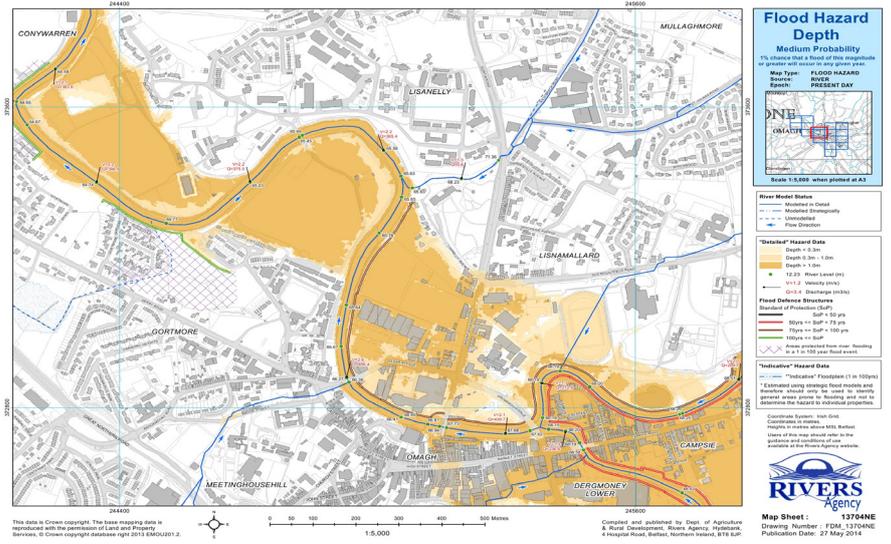
Two distinct map viewers were developed for:

Government and Utility Stakeholders (via a secure GIS viewer). This viewer provides the user with a wide range of flood scenarios including allowing an infrastructure provider to consider the flood risk to its assets, and therefore consider mitigation measures.

The public (via a publically accessible GIS viewer).

<http://www.dardni.gov.uk/index/rivers.htm>

Both viewers allow the user to access high quality flood hazard and flood risk maps in PDF format.



A sample flood hazard map showing flood depths for a medium probability event

Challenges

Procurement / Programme Delivery

The overall scale of the undertaking, and the skills/resources required for building and running the hydraulic models necessitated delivery of these aspects of the project by specialist consultants. A procurement framework was established; and the modelling programme was broken down into manageable work packages. This mitigated the risk to programme delivery.

Technology

Modelling – The software available to the hydraulic model developers changed considerably over the duration of the project: from modelling river systems and culverted watercourses independently, in a 1D ‘steady state’; to modelling these systems in an integrated package hydrodynamically and in 2D.

Mapping – Similarly, at the beginning of the project the map data, and map viewer were hosted by an external provider. This meant that any changes would have required formal change control through a contract with the external provider. However by the end of the project, the technology and skills for developing the mapping viewers had been brought ‘in-house.’ This greatly increased the Agency’s capacity to respond quickly to developing requirements.

Communication Channels

In terms of flood mapping, the project needed to cater for stakeholders who were comfortable with using map viewers, but also stakeholders who might not have access to computers or that were more comfortable with paper maps.

Much effort went in to the map design and production to ensure information was compliant with the EU Floods Directive and understandable by flood risk management professionals and by the public. For this reason there is a viewer for public access, and a more feature and content rich viewer for professionals. Both are supplemented by thematic pdf maps which can be provided in hard copy format.

Verification of Outputs

A great deal of effort went into quality assuring the flood map outputs. Rivers Agency staff provided a wealth of invaluable technical knowledge in this respect, combined with historical mapping of both floods and flood hardship payments. In addition, a GIS viewer for iPad was also developed - this allowed staff to more easily verify the predicted flood extents on site.

“The project has delivered a sea-change in Northern Ireland’s knowledge and interpretation of flood risk information. We now have detailed flood mapping available for most major settlements in NI, that should help us plan for the delivery of flood prevention, protection and preparedness.”

Malcolm Calvert, Rivers Agency

Successes

Dissemination of Information on Flood Hazard and Flood Risk.

Prevention - The detailed mapping provides land use planners with the knowledge to apply PPS15 (Planning and Flood Risk) and ensure that inappropriate development on flood plains is avoided.

Protection - The mapping allows organisations with a role in flood risk management, and the public, to better prioritise interventions in terms of community flood protection schemes and individual property protection. The standard of protection provided by existing defences was also assessed as part of the modelling process.

Preparedness - Emergency Planners and individual householders are better informed about flood risk and are able to plan accordingly to mitigate that risk.

Staff Development / Knowledge Transfer.

Risk Modelling – Rivers Agency developed its ‘in-house’ capacity to use GIS for the automated quantification of flood risk in economic terms.

Flood Mapping – Rivers Agency developed its in-house GIS capacity to develop and manage the map viewers.

Climate Adaptation

While the EU Floods Directive did not specifically require production of ‘climate change’ maps, Rivers Agency completed medium probability climate change modelling and mapping for the 2030 epoch. This was carried out for all 69 study areas and will be invaluable for spatial planning.

Flow records are much longer today, compared to when many of the Agency’s flood defences were designed. Flood estimation methods have also evolved and generally produce higher flow estimates today compared to those that were used when defences were originally designed and constructed. A consequence is that the standard of protection provided by some defences is lower than the optimum design standard. The flood risk management plans will determine whether any further intervention to upgrade defences is merited.

Lessons learned

In Rivers Agency studies, the river models for coastal settlements used a combination of medium probability river events (Q100*), with a simultaneous high probability coastal event (i.e. T2*), as opposed to a mean high spring tide. The “Q100/T2” combination provides a more precautionary estimate of flood hazard, but in doing so brings into question the adequacy of defences that were designed to withstand less onerous combinations of river / coastal event.

Through this project, Rivers Agency has developed GIS viewers and static maps that communicate the requirements specified within the Floods Directive. The Agency’s understanding of flooding mechanisms has been enhanced through the use of flood animations derived from the hydraulic models. Going forward the Agency will use animations and story maps to communicate what to expect in various flood scenarios. An example of this is the animations produced for Tidal Flooding in Belfast which helped inform the emergency response during a storm surge event in January 2014.

*Q100, a 1% chance that a river flood of this magnitude or greater will occur in any given year

*T2, a 50% chance that a tidal flood of this magnitude or greater will occur in any given year



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