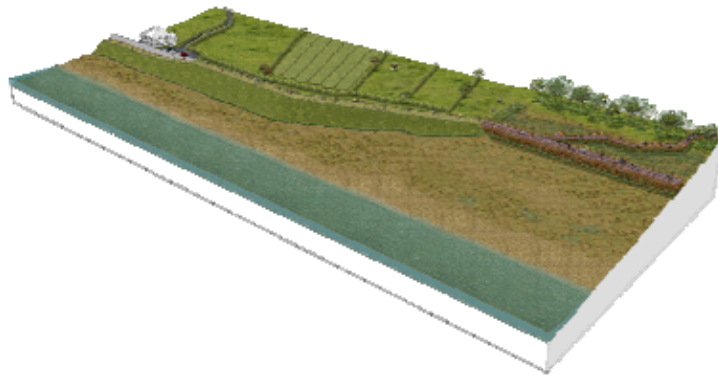


Thames Estuary 2100 Project Greater London Metropolitan Area

This project is the development of a flood risk assessment and management plan for the greater metropolitan area of London and the Thames Estuary, taking account of the existing and predicted future flood defences. The area has assets estimated in the trillions of euro and a population of over 8 million people.

A spatial database was created, integrating a wide range of data to analyse future flood risks and the impacts of any proposed flood defences. A web-based data viewer allowed users to view and query data interactively, including georeferenced images and reports. The tool allowed cross-reference of planned flood defences alongside numerous environmental and social constraints.



3D-Flood Modelling Northwich, Cheshire

Arup developed a 3-Dimensional visualisation tool for the local planning authority for Vale Borough Council, integrating gaming technology with hydraulic modelling outputs and LiDAR information.

The town of Northwich has a history of flooding problems, that have been analysed by Arup in previous studies. These studies have led to the current proposals of improvements to flood defence infrastructure.

Arup developed tools which permit a "fly through" view of the town during a flood event, with the potential to interrogate the model for hydraulic data such as depth or velocity at any location.

This type of approach to flood simulation and flood risk mapping could have many uses, especially at high-profile sites where flooding is a salient planning issue. The tool can be relayed to 3rd parties via a web link and allows the planning authority to inform planning decisions and to engage with the public and other key stakeholders.



Range of Services

Arup offers a comprehensive range of engineering services. In addition to providing extensive resources for Structural, Civil and Building Services design, we can offer you a wide range of other engineering services from our offices in Dublin, Cork, Limerick and Galway.

We have the knowledge, the skills and the experience to meet all your project needs.

Core Services

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- Research & Development
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- Process Safety Management

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Flood Risk Assessment

Flood Risk Assessment and
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Mallow Flood Alleviation Scheme Co Cork

Mallow is located 35km north of Cork City on the N20 Cork-Limerick Road and the N72 Killarney to Fermoy Road. Mallow town is divided by the Blackwater River with the main street and the commercial centre of the town located to the north of the river. Arup was originally commissioned to prepare a flood study report for Mallow.

This included:

- Procuring and managing a topographical and hydrological survey
- Procuring and managing a site investigation
- Analysing historical and current flood data, rainfall data etc.

Using the information from above a hydraulic model of the Blackwater was prepared. Subsequently, after analysis of the model, a preliminary flood defence scheme was prepared, inclusive of a cost benefit analysis.

In 2004 Arup was commissioned to carry out the detailed design for a flood protection scheme to protect Mallow from flooding from the Blackwater, the main water course that runs through the town. The Hospital Stream and Spa Glen tributaries flow into the Blackwater. The flood defences along these tributaries protect against flooding from the Blackwater in conjunction with a flood event occurring in these secondary catchments. A joint probability analysis was carried out to investigate the most significant combined event.

The proposed flood defence works for Mallow have been broken into 3 distinct projects, defined by region as Mallow North, Mallow South and Mallow West.

2006 saw the completion of an advanced phase of the scheme which was predominately in public lands. The main contract commenced in the spring of 2008 and is due to be completed in Spring/Summer 2009. Detailed design has commenced on the Mallow South and West Schemes and it is hoped to go to construction in Autumn 2009.



Development and Flood Risk Guidance CIRIA/Department for Communities and Local Government

Arup prepared both CIRIA Report C624 "Development and flood risk: guidance for the construction industry," and the Practice Guide Companion to the English Government's "Planning Policy Statement 25 - Development and Flood Risk."

The **CIRIA C624 document** provides best practice guidance for developers on the preparation of appropriate development proposals in accordance with national Planning Policy.

The guidance includes advice on how to undertake a Flood Risk Assessment and how to design developments to manage flood risk. It recommends a three-stage tiered approach to flood risk assessment, with the level of detail required proportionate to the nature of the flood risk and the proposed development, and the available information.

The report also contains an introduction to the types of flood alleviation measures which may be used to protect new developments and the issues to be considered in their selection and design.



The **PPS25 Practice Guide** is the definitive guide to sustainable, best practice for developers, planning authorities and the Environment Agency.

The guide explains how development zoning is used to locate new development in areas of little or no flood risk before any decision is made to locate new development in areas of higher flood risk.

Where it is in the wider, more sustainable interests of the community that development should proceed, the guide sets out an approach to be taken to ensure safe new development.

Arklow Flood Relief Scheme Environmental Impact Assessment Arklow, Co Wicklow

This project may incorporate extensive flood defences, increasing the carrying capacity and appropriate routing of flood waters and dredging works in the Avoca River and Estuary adjacent to Arklow Port. The impact of these works on the local environment is the focus of this project.



Arup have been retained by the OPW to complete 3 phases of the Environmental Impact Assessment and public consultation for the proposed flood relief scheme for Arklow, Co. Wicklow.

Phase 1 consisted of an Environmental Constraints Study and Public Information Day. The main areas of environmental constraints identified were; ecology, water quality, archaeology, landscape/visual and local socio-economic features.

Phase 2 is an Options Assessment based on the findings of the Environmental Constraints Report. PH McCarthy Consulting Engineers will design and model a range of possible flood relief options. The potential environmental impacts of these options will then be assessed by Arup and an Options Assessment Report completed for the OPW's consideration.

Phase 3 is an EIA of the preferred Flood Relief Scheme which will be chosen by the OPW. This involves the compilation of an Environmental Impact Statement. Subsequent to the publication of the EIS a Public Exhibition will be held to outline the scheme.



North East Yorkshire Strategic Flood Risk Assessment (SFRA)

The aims of the SFRA were to:

- Produce flood risk assessment maps to allow the identification of flood risk zones and the actual level of flood risk within the study area;
- Develop guidance to promote consistent decision-making with regard to flood risk for areas identified for future development.

The SFRA maps flood risk from fluvial flooding, coastal flooding, overland flow, groundwater, and sewer flooding. These flood risk maps were derived from existing flood plain maps, consultation, and a review of previous studies and flood alleviation scheme design reports. Areas which are particularly prone to surface water and/or groundwater flooding were identified. As part of the SFRA, Lidar data and modelled flood levels were used to produce flood depth maps within key settlements where future development pressure is anticipated.

Rapid Inundation Zone maps showing areas of high, medium and low risk to people in the event of a flood defence breach were also produced. Detailed information on flood risk issues were provided for each key settlement in the study area.

Arup developed guidance for planners on how to take flood risk issues into account when producing land allocations in their Local Development Frameworks. Guidance was also produced on the requirements for Flood Risk Assessments and possible mitigation measures for potential development sites. In addition, guidance was also developed for different flood risk zones, to ensure appropriate development would occur in the future.

The SFRA also investigated the potential for land use management, and identified a range of techniques which may be implemented to manage flood risk within the study area. The report provides guidance on surface water management and the implementation of Sustainable Drainage Systems.

