



the **Design Vision & Guide** for
Leeds (River Aire) Flood Alleviation Scheme

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This informal guide was prepared by Leeds City Council in partnership with the Environment Agency, May 2009

Leeds is the regional capital of Yorkshire and Humber and one of the UK's fastest growing cities. Significant flooding in the city centre would be catastrophic. It would affect lives, property, business and travel. Potential changes to our climate and weather patterns look likely to cause more severe storms and heavier rainfall and based on the Environment Agency's predictions this could radically increase peak flood levels throughout the River Aire corridor affecting the city centre in particular.

Leeds is a major economic centre and the financial capital of the North. With a population of around 750,000 it is the second largest Metropolitan District in England and covers an area of approximately 217 square miles. In terms of wealth creation Leeds is a major driving force within the regional economy. Total Gross Domestic Product (GDP) stands at over £12.8 billion per annum, and is projected to grow by around 34% the next ten years. Over the last ten years over £2.5 billion has been invested in large property development schemes, a further £1.5bn is currently under construction with £3.4bn in the pipeline.

The role of Leeds as the regional capital of Yorkshire and Humber makes continued investment and development pivotal, not only to Leeds but to the North of England. Leeds City Council has set out its 'Vision for Leeds' to 2020 which encompasses aspirations for the city centre as a place that is 'welcoming, walkable, liveable and well connected'. It also describes Leeds as a place that is 'sustainable, business friendly, and has a high quality environment and cultural offer'.



left bank of the Aire at Fearn's Island

Flooding: the Threat

Leeds has been flooded by the River Aire throughout recorded history as well as in recent years. Serious flood damage was narrowly avoided during the October 2000 flood event, when water levels rose to such an extent that a major arterial road into the city had to be closed as a precautionary measure. In June 2007 the Leeds District experienced three severe rainfall events each of which led to flooding in different parts of the city. This was the wettest June since records began, with an average of over 153mm falling throughout June in northern England and around 100mm falling in the 24 hour period covering 25th June. Although the River Aire flooded a number of properties in and around the city, the city centre narrowly avoided major flooding and damage was relatively limited.

The worst flooding occurred in areas of South Yorkshire and affected Sheffield, Doncaster, Rotherham and Hull. Lives were lost and businesses, homes, services and infrastructure were severely damaged. If the rainfall had tracked further north rather than settling over South and East Yorkshire it could have

affected Leeds to the same extent or possibly worse. As a major economic centre and regional capital the effects of this would transcend Leeds' boundaries and would further impact on regional economics.

Over the last few years Leeds City Council has taken a number of positive steps towards improving flood risk management, emergency response, and flood defence work. The Environment Agency is currently working in partnership with Leeds City Council, and other agencies, in developing a strategic approach to drainage and flood risk management for Leeds. Part of this work concentrates on identifying areas at risk and proposals for flood defence along the River Aire corridor. The project is known as the Leeds Flood (River Aire) Alleviation Scheme (FAS) and is a collaboration between Leeds City Council, the Environment Agency, Yorkshire Forward, Yorkshire Water and British Waterways.

The Partnership is currently co-funding on two lines of work – The Leeds (River Aire) FAS Design Vision & Guide and the Leeds Economic Flood Risk Impact Study.

The Purpose of this Document

The Environment Agency is considering different ways to manage the flood risk to Leeds from the River Aire, and one solution is to build flood defences in several locations along the river corridor. The defences could take various forms such as earth embankments, landscaped areas, new walls, terracing and strengthening of existing buildings and structures.

The design of the flood defence scheme is at outline design stage and full details will not be known until 2010 when further feasibility work is completed, and when initial feedback on the outline proposals has been considered. Any new structure on the riverside has the potential to impact on the area's character and affect how the river corridor develops in the future. However, there is a variety of engineering and landscaping options available and in some areas there are several ways defences could be designed and integrated into the landscape. To ensure the best solution is achieved for Leeds it is crucial to consider the scheme in its wider context and to consider all options at an early stage of scheme planning.

The purpose of **the Leeds (River Aire) FAS Design Vision and Guide** is to ensure existing elements, future aspirations and wider design visions for the city are properly integrated into the physical appearance and functional design of the Leeds Flood Alleviation Scheme defences. The work will analyse the river corridor as a whole, looking at the existing landscape and land uses, proposed development / growth areas, and future ambitions for the city centre waterfront. It is intended that the vision will embrace the aspirations identified under local planning policies and frameworks and from these identify opportunities for environmental enhancements that could be delivered as part of the defence scheme. The Vision will also make recommendations on the design of flood defences which are relevant to that particular area and which maintains local character and identity. It will further set out relevant strategies which should influence and shape all aspects of flood defence planning, and which can produce attainable benefits throughout.

It is important for Leeds to have a clear vision as to how the flood defences will work within the existing landscape - be it city centre, city rim, semi-rural or rural. It is intended that this document will be a comprehensive guide for the overall design and positioning of the flood defences and is primarily for use by the Environment Agency. However, the objectives and recommendations of the Vision can also be used to inform and engage future developers and decision-makers in the public sectors, and in commerce, to ensure consistent standards of design are followed on development schemes throughout the river corridor.

The River Corridor

The study area covers approximately 19km of the River Aire, and includes significant areas of land extending either side of the river. The Flood Alleviation Scheme follows the river corridor from Newlay Bridge in the west and runs east, downstream to Fleet Weir, Woodlesford. It includes the built-up area of Leeds City Centre.

The river corridor contains the Leeds - Liverpool Canal and the Aire and Calder Navigation, running parallel to the river and merging within the city centre. The canal and river share a common landscape, with both water bodies providing transport, recreation, wildlife and amenity to Leeds. An extensive rail network also runs through the flood plain and forms a key component of the study area.

In recent years the City Centre waterfront has been developed into what has become a priceless economic and social asset.

The Environment Agency Proposals

Currently Leeds has no formal flood defences. There are discontinuous informal defences but these are of variable condition and many are likely to fail in severe flood conditions. The informal defences do not create a continuous flood barrier and gaps and low spots offer routes for flood water to enter the city centre and other vulnerable areas along the river corridor. The height of flood defences is also variable and it is likely that defences will be regularly breached in the future.

The Environment Agency proposes to raise the standards of flood protection by a combination of measures including improvements to flood warnings, providing information on flood proofing, and by significantly raising the standard of flood defences.

The Leeds Flood (River Aire) Alleviation Scheme (FAS) is part of a wider initiative to manage flood risk in the Upper Aire catchment. A high level Catchment Flood Management Plan (CFMP) for the Aire and a more detailed Flood Risk Management Strategy (FRMS) for the Upper Aire are in preparation and will be subject to consultation. The FRMS has investigated in detail the extent of flood risk to Leeds and has recommended that the Leeds (River Aire) FAS should be developed.

The Environment Agency has modelled the river corridor for a 1 in 200 year extreme flood event (0.5% annual probability) and have assessed that there are approximately 4,450 properties in Leeds at risk of being affected by flooding, with approximately 3,700 being residential. Flooding of the city centre would extensively affect offices, shops, bars, and restaurants and impact on daily commuters, residents, recreation and tourism.

The Flood Alleviation Scheme will include both improvements to existing informal defences and the construction of new defences. Existing structures are to be upgraded and new defences constructed to a defined level of flood risk. New structures are strategically planned throughout the river corridor thereby creating an extensive infrastructure of defence. The structures take the form of embankments, walls, terraces and raised ground levels, the type and finish being selected to fit into the character of the existing landscape. Control structures are also proposed to minimise water flows through goits at times of flood and surface water drainage improvements and pumping stations will also be considered at strategic locations.

At the time of publication it is important to recognise that the Flood Alleviation Scheme does not have Government approval or funding. The Environment Agency is developing a business case to submit to Government and this application will have to meet strict guidelines for achieving 'best value for money'. Because of limited funds for flood defences, the Leeds (River Aire) FAS is also in competition with other schemes in the country and in order to meet the aspirations of this Design Vision, and deliver its objectives, significant external funding in the range of millions of pounds will be required. The project partners are working towards achieving this through direct contributions and private investment through the planning process.

Leeds Waterfront Strategy

The Leeds Waterfront Strategy is the key document to guide the regeneration of the Leeds waterfront. It covers an area of 6.5km of the river and canal corridor running through central Leeds and therefore covers a key section of the FAS Design Vision Study. The Waterfront Strategy was produced by Leeds City Council in conjunction with a number of partner organisations including the Environment Agency. It is now adopted as Supplementary Planning Guidance (SPG) and as such is used as a basis for negotiating design, planning conditions and legal agreements relating to appropriate development along the waterfront.

Leeds Waterfront Strategy Aims & Objectives

The overall objectives of the Waterfront Strategy are common to the FAS Design Vision. These being:

- Develop a strategic vision that identifies the key components for generating an attractive, vibrant, safe and sustainable waterway corridor.
- Provide a framework to inform, guide and assess new development, and improvement or management proposals to ensure that these are appropriate and meet the needs and aspirations of local communities.
- Develop a co-ordinated approach to development and marketing of the waterway that allows public, private and voluntary interests to work in a co-ordinated way to achieve the strategic vision.
- Identify opportunities to improve pedestrian access to and along the waterway corridor.
- Identify opportunities for environmental improvements to the waterway corridor, including the waterway, waterfront walkways and riparian properties.
- Ensure that the entire project is accessible to all users of the community and that any changes should seek improvements that facilitate access for all.
- Provide proposals for the creation of vital, sustainable and viable development and activity on and along the waterway.
- Provide guidance on issues of waterside design, including a vocabulary of street furniture and materials, to create a distinctive and co-ordinated identity for the waterfront area.
- Review the issues of flood defence that affect the riverside corridor.
- Promote the use of the waterspace for suitable leisure activities and navigation through a waterspace strategy.
- Safeguard the long-term future of areas of significant landscape, heritage, ecological and nature conservation value.

The Design Vision Objectives

The Waterfront Strategy objectives will be used to guide the FAS Design Vision Study in its assessment of the wider river corridor. More specifically the Design Vision will aim to shape the layout and design of the flood defences and the scope of this work will therefore:

- Identify existing key sites directly affected by the flood defence scheme.
- Pinpoint planned development sites, future growth areas, city-wide design visions within the river corridor.
- Identify key opportunities for environmental improvements that the flood defence scheme can help deliver.
- Identify main mitigation measures required to minimise the impact of the proposed defences in sensitive locations.
- Establish specific design principles and parameters to reflect local issues and enhance local character and identity.
- Ensure that where possible the scheme is accessible to all users of the community and that any changes should seek improvements that facilitate access for all.
- Recommend design alternatives which still achieve the objectives of flood defences.
- Promote improvements to connectivity particularly to pedestrian and cycle routes and linkages to wider route networks. Develop the potential of the corridor as a 'green' commuter route.
- Safeguard and improve the ecological value and nature conservation of the river and flood plain.
- Contribute to the achievement of the flood alleviation scheme as a sustainable development.
- Provide a steer and reference to further regulatory information affecting the River Aire Corridor.

How to Use this Document

The Study Zones

The study area stretches from Newlay Bridge to the west of the city through to Woodlesford in the east. The study area has been divided into 7 broad zones bounded by bridges. The zones are characterised by the predominating land use but may also contain a key site, for instance an important historic landmark such as Kirkstall Abbey, or a key commercial site such as the Kirkstall Leisure Complex.

The character and constraints within each zone are analysed and the impact of the flood defence proposals are assessed against these. The FAS development should relate to its local context and we have aimed therefore to bring both local planning policies and wider strategies into the analysis so that it is properly integrated into the whole. At specific locations, options for varying the alignment and design of the flood walls or embankments are explored and recommendations made to reduce any adverse effects on the landscape or built environment.

There are opportunities throughout the study area for improvements to the river frontage such as new landscape features, increased access and pedestrian / cycle linkages, and biodiversity enhancement. Each site is described on its own merits, but such opportunities to address corridor wide issues are identified throughout.

A summary of mitigation measures and opportunities for good design are highlighted thus *

Each zone contains 3 maps of information:

- i) A Context map showing the predominating land uses together with key sites, constraints, access, and planning policies relevant to the area. This map provides a synopsis of the whole environment and also shows what is or may be changing.
- ii) A map of the Environment Agency Draft proposals, showing the areas requiring flood defence and information relating to the proposed height of the flood defence.
- iii) The Vision map: This brings together the information from both of the above to identify areas of potential conflict with recommended actions, design guidance, mitigation measures, and enhancement opportunities.

Zones 1-7

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'Left Bank' refers to the left river bank looking downstream.

'Right Bank' refers to the right river bank looking downstream.

The Design Guide

page 62 - 74

The Design Guide shows a series of generic design solutions for the placement and appearance of flood walls and embankments throughout the river corridor. The design principles shown for each solution may be applicable to a number of situations and are intended as 'good practice' examples.

Biodiversity

page 75 - 78

This section is devoted to biodiversity and habitat enhancement and generic design solutions are again presented as 'good practice' models. The section sets out principles and detailed objectives for the protection of the environmental quality of the river corridor.

Case Studies

page 79 - 82

This section shows how flood defences could be integrated into the environment in different locations.

Illustrations contained within this document are indicative and may not necessarily represent the final design. Final designs are subject to consultation, funding and planning approvals.

The Study Area - River Corridor and Zones

