

## Managing Flood Risk: Carlisle Case Study

### What solutions were proposed in the Flood Management Plan?

As a result of the 2005 floods it was obvious a solution needed to be found to protect Carlisle from future damage. For projects such as this the Environment Agency produces a flood management plan to assess which is the best scheme. This had to take into account land use, the hydrology of the Rivers Eden and Petrill, and likely future flooding. It also had to listen to the views of local residents and businesses, and consider the impact on the environment. This process is called flood risk management.

The Environment Agency considered these options for Carlisle:

#### Option 1: Do Nothing

If the Environment Agency did nothing, nature would take its course. The existing defences will worsen over time, so the risk of flood damage will increase.

Total costs	£0
Value of damages	£92,147,000
Value of benefit	£0

This is the baseline for comparing other options.

#### Option 2: Do Minimum

If the Environment Agency did the minimum, it would maintain and repair the existing flood defences, but in future some floods will be too big for them. Protection is likely to be 1 in 10 to 1 in 25.

Total costs	£2,389,000
Value of damages	£58,830,000
Value of benefit	£33,316,000

#### Option 3: Rebuild/Construct Raised Defences

The existing flood defences only gave protection for a standard of less than 50 years, which is unacceptable for urban areas. So rebuilding and constructing new flood defences was the only viable solution. The plan looked at standards of protection of 50 years, 75 years, 100 years and 200 years offered by increased defence heights.

Standard of protection:	50 years	75 years	100 years	200 years
Total costs	9,754,000	10,054,000	10,407,000	10,862,000
Value of damages	54,504,000	43,113,000	35,893,000	27,594,000
Value of benefit	37,642,000	49,034,000	56,253,000	64,551,122

#### Option 4 – Upstream Storage

Large-scale upstream storage schemes have also been considered to provide flood relief for the Lower Eden catchment. These would be flood relief reservoirs holding up to 1.5 million cubic metres of water. However the area required for any scheme would be vast, flooding areas like Low Crosby, Warwick Bridge and potentially Hadrian's Wall. So it would be environmentally unacceptable, very expensive (over £300 million) and technically difficult.

## Option 5 – Improve Flood Warning

There is a full flood warning service in Carlisle and since the 2005 flood, more properties have signed up to the flood warning service (currently 50%). This option would only increase the numbers of properties currently signed up to the system and would still result in significant risk to life and property. Improved flood warning is not feasible as a stand-alone scheme and was discounted, although the existing flood warning system will continue to be operational in flood events.

The Environment Agency has to make an Environmental Impact Assessment and a benefit-cost analysis of the schemes.

- The Environmental Impact Assessment looks at likely impacts on residents, wildlife and habitats, water and air quality, cultural heritage, landscape, soils, noise, transport and access.
- The [benefit-cost analysis](#) helps decide whether it is worthwhile to undertake a scheme and the best solution.

### See also:

[Engineering Solutions](#) (PDF)

[Engineering Diagrams](#) (PDF)