

# Case study 46. Humber Estuary Erosion Protection Programme

**Author:** Laura Rhodes

**Main driver:** Defence maintenance and Water Framework Directive compliance

**Project stage:** Programme development

**Project summary:**

The defences around the Humber Estuary are affected by erosive forces as a result of strong currents and wave action. These erosive forces cause damage to the defences and over time undermine the stability and integrity of the defences. If not addressed these defences are at risk of breaching, potentially causing significant flooding and risk to life. The Humber Estuary Erosion Protection Programme aims to remediate and manage the erosion caused to the defences. The programme is supported by the Defra-approved Humber Flood Risk Management Strategy. Alongside erosion protection works, the project also aims to achieve Water Framework Directive objectives through the design of schemes that deliver benefits to the environment.

**Key facts:**

The Humber Estuary (Map 1) is home to 921,000 people of whom nearly 400,000 are at risk of flooding, as are important industries, 32,500 business and a significant agricultural sector. The area hosts some of the highest value assets and critical infrastructure in the country, including power stations and refineries, the country's largest port complex, a petrochemicals industry worth £6 billion per year and approximately 115,000ha of high grade agricultural land. There are some 230km of flood defences protecting the area to various standards of protection.



**Map 1: Humber Estuary**

## 1. Contact details

Contact details	
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<b>Lead organisation:</b>	Environment Agency
<b>Partners:</b>	
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## 2. Location and coastal/estuarine water body description

Coastal/estuarine water body summary	
<b>National Grid Reference:</b>	512532, 426693
<b>Town, County, Country:</b>	Humber Estuary
<b>Regional Flood and Coastal Committee (RFCC) region:</b>	Yorkshire, Anglian and Midlands
<b>Transitional and coastal water body size (km<sup>2</sup>):</b>	350km <sup>2</sup>
<b>Transitional and coastal water body and location:</b>	Humber Estuary
<b>Water Framework Directive water body reference:</b>	GB530402609201, GB530402609202, GB530402609203
<b>Land use, geology, substrate, tidal range:</b>	Floodplain/Farmland/Towns. Tidal flat deposits (clay and silt), Beach and tidal flat deposits, Alluvium (clay, sand and gravel), Till (devensian). The tidal range increases as the tide moves up the estuary; it is 7.4m at Saltend, and 6.9m at Hessle which is 45km inland.

## 3. Background summary of the coastal/estuarine water body

### Socioeconomic/historic context

The Humber Estuary is the largest British macro-tidal coastal plain estuary on the North Sea coast and drains one-fifth of England. The Estuary and its surrounding hinterland are biologically important and support a large number of internationally and nationally significant habitats protected by legal designations.

The Estuary is also important in terms of the coastal resources present, resulting in various activities such as commercial and recreational fishing, agriculture, navigation with associated ports and harbours, aggregate extraction, energy production and recreation and tourism. These activities contribute to its economic importance.

## **Flood and coastal erosion risk management problem(s)**

Around 400,000 people living around the Humber Estuary are at risk of flooding, as are important industries, 32,500 business and a significant agricultural sector. The flat, expansive landscape means that much of the floodplain is hydraulically connected and that flooding in one area can quickly and easily spread to another. The tidal defences around the Estuary offer a variable standard of protection. The Humber Flood Risk Management Strategy provides a strategic approach to the management of tidal flood risk around the Estuary, including an approach to meeting the related environmental legislation.

## **Other environmental problems**

The Humber Flood Risk Management Strategy includes a programme of managed realignment to enable flood risk management works in line with the Habitats Directive. Development, flood risk management works and industry cause pressures on the natural environment. Work under the Water Framework Directive has identified a number of measures to improve the Estuary's water bodies including addressing issues with coastal squeeze and habitat loss.

## **4. Defining the problem(s) and developing the solution**

### **What evidence is there to define the flood and coastal erosion risk management problem(s) and solution(s)?**

There is a wide range of modelling available to inform understanding of risk around the Humber Estuary. Evidence from the tidal surge of 2013 has been used to calibrate this modelling. Information, evidence and ideas from other areas of the country, including the River Thames, has been used to inform potential design solutions.

### **What was the design rationale?**

The project will assess a wide range of design options to deliver flood risk management and environmental benefits, and will draw on experience from schemes in other areas of the country. While the primary objective of the project is to deliver erosion protection solutions, achieving environmental objectives is a fundamental aspect of the project and traditional 'hard' engineering solutions will be used as a last resort. The project team is working with specialists at Glasgow University to inform the design process.

#### **Project summary**

<b>Area of transitional and coastal water body or length benefiting from project:</b>	Programme yet to be determined
<b>Types of measures/interventions used (Working with Natural Processes and traditional):</b>	Programme expected to include both Working with Natural Processes (WWNP) and traditional approach to erosion protection
<b>Numbers of measures/interventions used (Working with Natural Processes and traditional):</b>	To be determined
<b>Standard of protection for project as a whole:</b>	Sustains current standard of protection of defences
<b>Estimated number of properties protected:</b>	Programme yet to be determined

### How effective has the project been?

Cannot be assessed at this stage.

## 5. Project construction

### How were individual measures constructed?

Not applicable

### How long were measures designed to last?

Not applicable

### Were there any landowner or legal requirements which needed consideration?

- Designated sites; Access; and Landowner engagement

## 6. Funding

### Funding summary for Working with Natural Processes (WWNP)/Natural Flood Management (NFM) measures

Year project was undertaken/completed:	On-site start date of 2017
How was the project funded:	Flood Defence Grant-in-Aid (some contributions may be secured)
Total cash cost of project (£):	Not yet known
Overall cost and cost breakdown for WWNP/NFM measures (£):	Not yet known
WWNP/NFM costs as a % of overall project costs:	Not yet known.
Unit breakdown of costs for WWNP/NFM measures:	Not yet known
Cost–benefit ratio (and timescale in years over which it has been estimated):	Not yet known

## 7. Wider benefits

### What wider benefits has the project achieved?

An ecosystems services assessment has yet to be undertaken.

### How much habitat has been created, improved or restored?

Programme yet to be determined

## 8. Maintenance, monitoring and adaptive management

**Are maintenance activities planned?**

Not yet known

**Is the project being monitored?**

Not yet known

**Has adaptive management been needed?**

Not yet known

## 9. Lessons learnt

**What did you learn and how could it be applied elsewhere?**

Not yet known

## 10. Bibliography

Not applicable

## Project background

This case study relates to project SC150005 'Working with Natural Flood Management: Evidence Directory'. It was commissioned by Defra and the Environment Agency's [Joint Flood and Coastal Erosion Risk Management Research and Development Programme](#).