Low Crosby flood risk management scheme

Source: Environment Agency

THE FLOOD HUB

geography southwest

Why does Low Crosby need flood protection?

Source: Cumbria County Council

- Low Crosby has been affected by flooding on several occasions, most recently in 2005 and 2015.
- In 2015, floodwaters overtopped the eastern flood embankment and inundated the village from the west via Willow Beck.
- The existing defences afforded the village protection from a 2% Annual Exceedance Probability (AEP) event. The 2015 event had a 0.6% AEP - less frequent but higher magnitude.
- With climate change, these rare high magnitude events are predicted to become more frequent.

The wider context

Source: Environment Agency

- Carlisle (population 108,000) is the largest settlement in the Eden catchment.
- The city, which lies downstream from Low Crosby, has been affected by flooding on multiple occasions (1968, 2005 and 2015). In 2015, thousands of properties were affected and there were impacts on roads, rail and power.
- The flood risk management scheme at Low Crosby is part of a whole catchment management plan which aims to reduce the flood risk at Carlisle.
- Following the 2015 floods, the UK government allocated £25m to reduce the flood risk in the area.

Source: The Flood Hub

Existing defences at Low Crosby

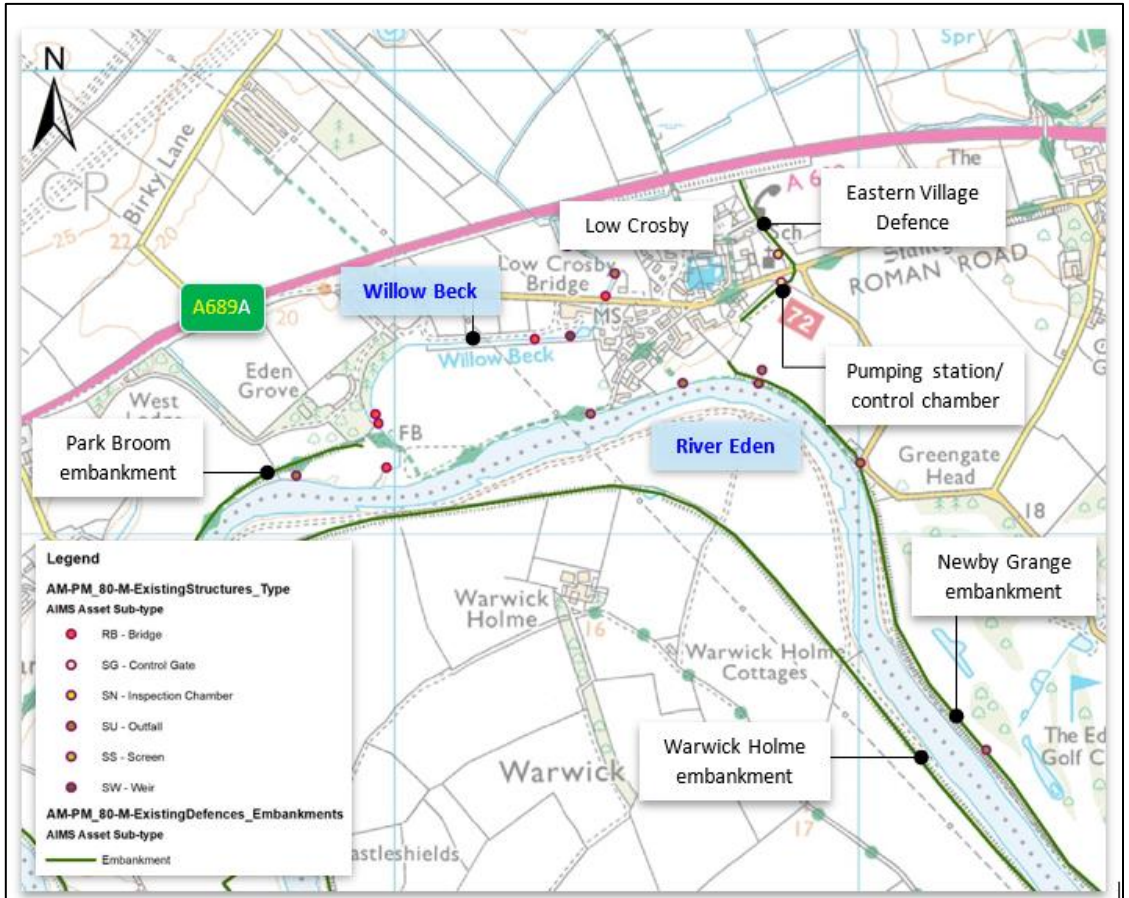

Figure 2.3: Existing FCERM assets and flooding mechanisms associated with Storm Desmond (Source: Contains OS data © Crown copyright and database right (2021). Derived from Environment Agency Asset Information Management System (AIMS) data (2016).

Source: Environment Agency

- Eastern Village defence – constructed in 2010, a 380m embankment incorporating 100m concrete flood wall, 1.4m high and a pumping station. This was constructed to offer protection from a 1% AEP event.
- Warwick Holme embankment – 3,000m earth embankment, 1.5m high.
- Newby Grange embankment – 140m earth embankment, 4.3m high.
- The earth embankments vary in condition from fair to very poor. They protect agricultural land but raise the flood risk in Low Crosby.

Objectives of the Low Crosby FRMS

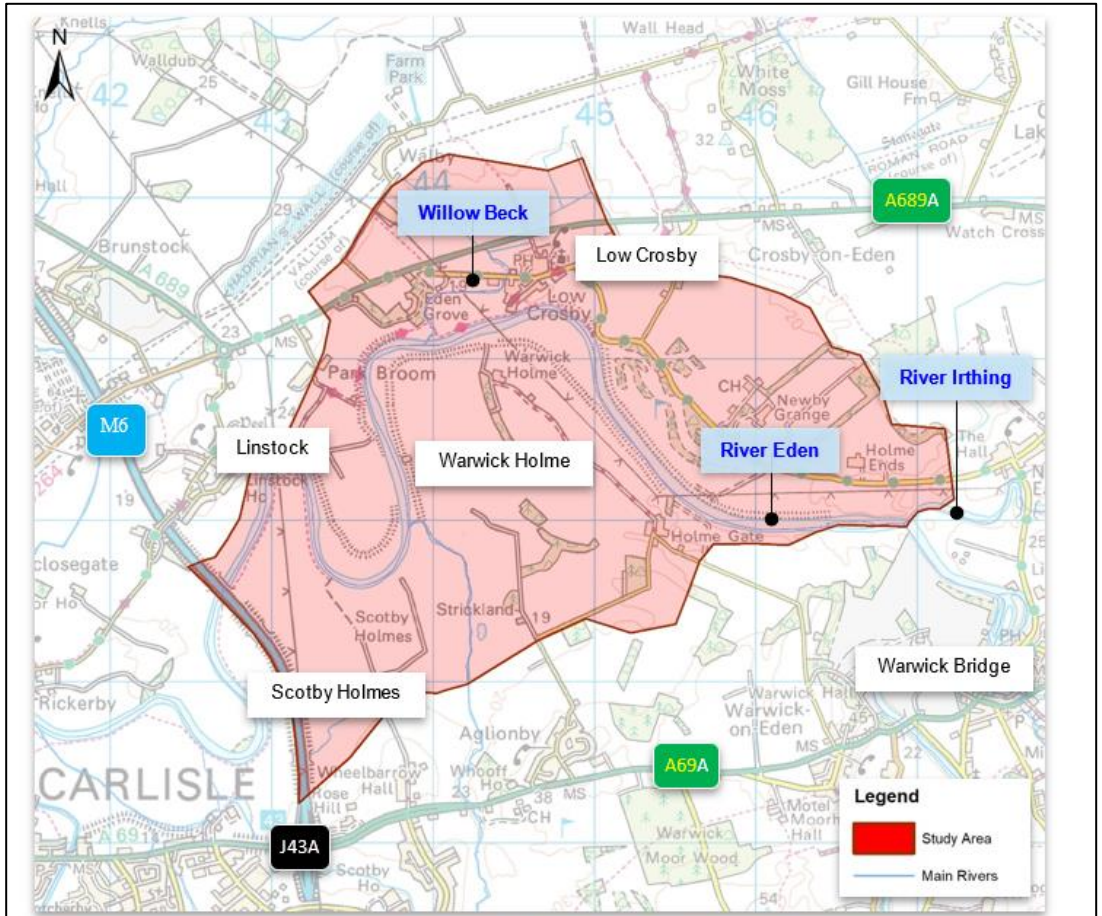

Figure 2.1: Low Crosby study area (Source: Contains OS data © Crown copyright and database right (2021))

Source: Environment Agency

There are four main objectives:

- Reduce the risk of flooding – to protect Low Crosby from a flood of similar magnitude to 2015 (0.6% AEP). In protecting Low Crosby, increase employment and economic activity.
- Protect, conserve and enhance the environment.
- Promote health and well-being, reducing home-owner's anxiety by reducing the flood risk.
- Create a sustainable, low-carbon solution.

What were the options?

In 2020, a short list of four options were considered as part of the Outline Business Plan (2021):

1. **Do nothing** - cease maintenance of existing assets; no emergency responses.
2. **Do minimum** – maintain existing assets; implement emergency responses.
3. **Do-something (Option 1)** – raised linear defence on western side of village.
4. **Do-something (Option 2)** – reprofiling (lowering) of Warwick Holme embankment, to the south of the river.

What happened next?

- A detailed evaluation was conducted by the Environment Agency culminating in a Full Business Case (FBC). This was published in 2022.
- Each of the four options were assessed according to the following criteria: economic (costs v benefits), sustainability and carbon appraisal.
- The impacts of climate change to 2080 were considered.
- Each option was assessed in terms of the level of protection it afforded (AEP), bearing in mind that the current protection for the village is 2% AEP and the 2015 event was 0.6% AEP.

Options 1 and 2 were dismissed as they offered no improvements in flood protection for the residents of Low Crosby, leaving people and properties vulnerable particularly when considering the likely impacts of climate change.

How do the ‘do-something’ options compare?

Do-something Option 1

- Construct a raised embankment to the west of the village to prevent flow-back along Willow Beck. This would link up with the eastern embankment, which itself would be raised at the High Street crossing.
- It would protect 29 homes from a 1.3% AEP event (2% AEP adjusted for climate change).
- Cost of £3.5m with benefits of £2.1m.

Do-something Option 2

- Lowering the existing embankment on the south side of the river (Warwick Holmes), reconnecting 185ha of natural floodplain. At high flow, water would overtop the embankment and would not reach the height at which it floods Low Crosby.
- It would protect 103 homes currently at risk from a 0.5% AEP event (including climate change).
- Cost of £6.1m with benefits of £15.5m.

Which one do you think is best and why?

Why was Option 2 the preferred choice?

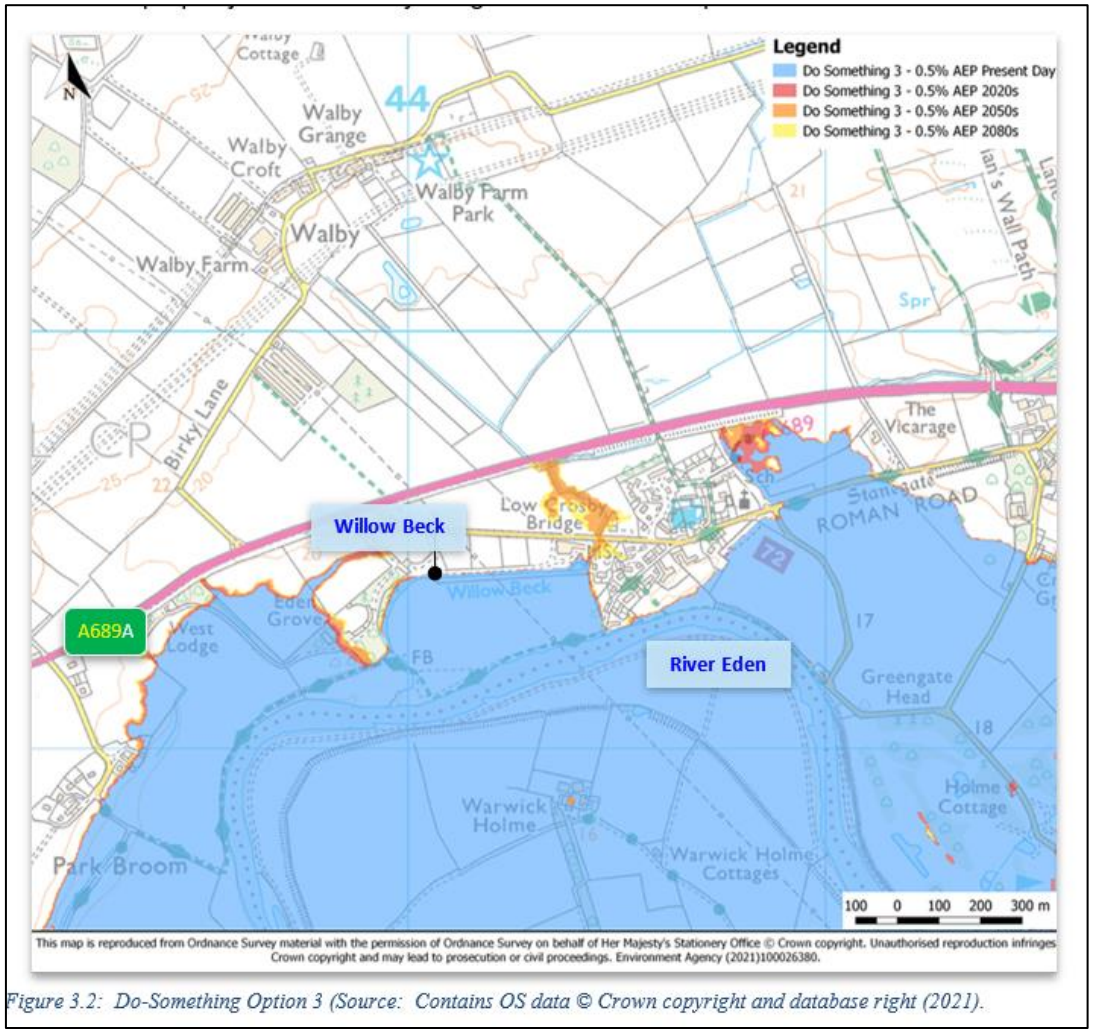

Figure 3.2: Do-Something Option 3 (Source: Contains OS data © Crown copyright and database right (2021).

Source: Environment Agency

Option 2 ('Do Something 3' on the map alongside) was considered to be the most cost-effective, affording a high level of protection to Low Crosby. It promised considerable environmental benefits, is sustainable and improves carbon capture.

The map shows predicted flooding during a 0.5% AEP flood event (similar to 2015) after the lowering of the Warwick Holme embankment.

Excess water now flows over the floodplain to the south leaving Low Crosby largely unaffected.

Ecological benefits of Option 2

- Reprofiling of the Warwick Holme embankment will reconnect 185ha of floodplain with the River Eden.
- Periodic flooding will create high value grassland and wetlands, increasing biodiversity.
- Additional natural capital benefits include carbon storage and improved resilience to climate change.
- The natural landscape will be restored.

Reprofiling Warwick Holme embankment

Source: Environment Agency

- In 2022, work started on the reprofiling of the Warwick Holme embankment.
- Reprofiling involved reducing the height of the embankment by about 1m. The spoil was spread on the landward side of the embankment.
- Existing buildings in Warwick Holmes were abandoned due to the increased flood risk.
- The photo shows natural flooding across the floodplain following the reprofiling of the embankment.

Completion of the flood management scheme

Source: Environment Agency

- In October 2022, the reprofiling of the Warwick Holme embankment was completed at a cost of about £1 million.
- Through a Countryside Stewardship Agreement (CSA) between the land owner and Natural England, the land at Warwick Holme will be managed as permanent pasture rather than arable land.
- This means that the embankment will no longer need to be maintained. Flooding will now take place as a natural response of the river to high rainfall events