

# ***Otley Flood Alleviation Scheme***

## **Leeds City Council Outline Business Case**

### **Executive Summary**



**Version No:** 2 (NPAS Review #2 submission)

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# 1. Executive Summary

## 1.1. Introduction

This report is to support an application for Flood Defence Central Government funding and to seek approval to undertake a flood risk management scheme. The scheme will provide and maintain a 4% annual event probability (AEP) standard of protection (SoP) against flooding from the River Wharfe in Otley for Farnley Lane and Back Bridge Avenue. The scheme will address fluvial flood risk from the River Wharfe on Farnley Lane and Back Bridge Avenue. It will include measures to divert surface water flows from Kell Beck where these are affected by fluvial flood defence works. Otherwise, flooding from other sources (surface water or ground flooding) is not included in the scope of this work.

## 1.2. Strategic case

### Strategic context

Otley Flood Alleviation Scheme (FAS) is on the Environment Agency (EA) Flood and Coastal Erosion Risk Management (FCERM) Programme for reducing flood risk to residential properties. The history of flooding in Otley and the case for taking further action to reduce flood risk is highlighted in several EA and Leeds City Council (LCC) strategic documents:

- River Wharfe Flood Risk Management Strategy, EA (2006),
- River Ouse Catchment Flood Management Plan, EA (2010),
- Local Flood Risk Management Strategy, LCC (2014),
- Strategic Flood Risk Assessment, LCC (2012),
- Preliminary Flood Risk Assessment, LCC (2011), and
- Leeds City Region Strategic Economic Plan, LCC (2016).

The case for Otley FAS aligns with the strategies set out in these documents, more detail is provided in Section 2.2.

### The case for change

Otley has a history of flooding and most recently Otley experienced significant flooding on 26th December 2015, when over 50 residential properties were internally flooded by an estimated 5% (AEP) event<sup>1</sup>. Flooding occurred due to the River Wharfe overtopping its banks and caused significant internal flooding to properties on Farnley Lane and Back Bridge Avenue in the centre of Otley. The concentration of residential properties at significant risk of flooding in this area provides the basis for implementing a flood risk management scheme.

In the Autumn Statement 2016, the Government announced that Otley was one of the areas where additional funding of £2m was available to invest in a scheme to better protect homes and businesses affected by flooding on Boxing Day 2015. Management of surface water flooding will not be addressed specifically as part of this scheme. This is because Otley has historically experienced fluvial flooding and that the additional funding was provided to address the flooding that had occurred on Boxing Day 2015. The scheme will take account of the interaction between the River Wharfe and existing drainage outlets to prevent flood water circumventing the proposed scheme.

### Objectives

- Reduce flood risk to properties at Otley impacted by the 2015 floods
- Enhance and maintain the existing environment and water quality of the River Wharfe;

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<sup>1</sup> Leeds Strategic Flood Investigation Report under Section 19 of the flood and Water Management Act 2010, Storm Eve flood event 25 – 29 December 2015

- Maintain the safety of the local community during design, construction and operation of the scheme
- Manage and minimise any adverse environmental and geomorphological impacts during design, construction and operation of the scheme
- Implement a scheme that is economically justified
- Complete works by December 2020 to comply with the conditions associated with the additional government funding
- Avoid adverse impacts on Otley's historical and visual context.

### 1.3. Economic case

#### Options considered

Table 1.1 Summary of options considered for alleviating flood risk to Farnley Lane and Back Bridge Avenue and review outcome.

Option	Review Outcome
Flood defences extending along Billams Hill and the River Wharfe (including vehicle access ramp)	Discounted: prohibitively expensive, causing an adverse visual impact at Wharefmeadows Park and would have been opposed by many of the residents consulted.
Flood defences along Billams Hill (including vehicle access ramp)	Prevents the main flood mechanism into the Farnley Lane and Back Bridge Avenue area.
Property level protection (PLP)	Discounted: most of the properties within the affected area already have PLP, as such, further PLP would provide little benefit to reducing flood risk.
Localised upstream storage (floodplain / wetland to the west of Billams Hill)	Discounted: Did not reduce the risk of flooding sufficiently and was not cost effective to combine with other options due to its high cost and limited reduction in flood levels.
Removal of Otley Weir	Discounted: significant environmental impacts and did not reduce the risk of flooding sufficiently
All vegetation removed on the Islands downstream of Otley Weir	As a standalone option did not reduce the risk of flooding sufficiently but showed reduction in flood levels.
Half of the vegetation removed on the Islands downstream of Otley Weir	As a standalone option did not reduce the risk of flooding sufficiently but showed reduction in flood levels.
Tree removal only on the Islands downstream of Otley Weir, leaving lower vegetation in place	As a standalone option did not reduce the risk of flooding sufficiently but showed reduction in flood levels.
Natural flood risk management in the upstream catchment	Discounted: did not reduce the risk of flooding sufficiently
Upstream storage (near Addingham)	Discounted: prohibitively expensive and did not reduce the risk of flooding sufficiently
Deep dredging	Discounted: large reductions in flood levels but presented unacceptable environmental impacts and buildability issues.

#### Key findings

A combination of flood defences along Billams Hill with one of the island vegetation management options were shortlisted. The island vegetation management options provide essential mitigation for flood defences along Billams Hill, which in isolation would increase water levels upstream of Otley Bridge.

The short-listed options were:

- A flood wall along Billams Hill, providing a 4% AEP SoP, or
- A flood embankment along Billams Hill, providing a 4% AEP SoP,

In combination with either:

- Removal of all the island vegetation downstream of the weir, or
- Removal of half of the island vegetation downstream of the weir, or
- Removal of trees only on the island downstream of the weir, leaving lower vegetation in place.

The flood defences along Billams Hill will include a vehicle access ramp to maintain the current access arrangements and provide a passive defence.

Each option involves building over Kell Beck and includes works to divert Kell Beck and another unnamed drain to discharge to the River Wharfe directly, rather than via the existing surface water drainage infrastructure in Billams Hill. This will block a potential flood flow route through the defences at Billams Hill and reduce the flow into the surface water system on the dry side of the proposed defence.

The amount of tree and vegetation removal in each of the options was carefully considered to ensure that the required flood alleviation could be achieved while also ensuring that environmental impacts were minimised and that WFD requirements were met.

#### Preferred way forward

The preferred option is to provide a 4% AEP SoP using a flood embankment along Billams Hill and management of half the vegetation on the island downstream of the Otley Weir. This option has a benefit cost ratio (BCR) of 6.26 compared with a do-nothing baseline scenario (See table 3.5.3.) The scheme cost is £3,374,000 and has a negligible increase to flood risk in other areas, keeps environmental impacts to a minimum and fits in with the surrounding historic setting.

## 1.6. Management case

### Project management

The project will be managed by Leeds City Council Flood Risk Management team, who have a track record of successfully delivering flood risk management schemes. The works will be directly awarded to a Leeds City Council framework contractor in June 2020, with work commencing in June 2020 and scheduled to be completed in November 2020, (see Appendix E).

### Benefits realisation

The objective of the works is to provide a 4% AEP standard of protection (SoP) for Farnley Lane and Back Bridge Avenue properties against fluvial flooding from the River Wharfe. The flood risk management infrastructure will be monitored through regular inspections. All benefits will be realised once works are completed due November 2020.

However as by the end of the 100 years scheme life the standard of protection offered by the scheme will have reduced to ### because of climate change. The modelling indicates that immediately after construction that there will be 53 residential properties that will have moved from very significant risk to significant risk. At the end of the appraisal period there will be no change in the flood risk classification for properties in Otley.

## Risk management

Risk has been identified and is being managed through a comprehensive risk register process. Risk workshops have also been undertaken to manage and quantify the residual risks.

Risk	Management
Utilities - diversion works and undiscovered services	Utility information has been defined through C2 Requests and GPR survey, intrusive investigations will be undertaken prior to construction.
Issues with Otley Bridge	Utility information has been defined through C2 Requests and GPR survey, intrusive investigations will be undertaken prior to construction.
Surface water flooding post construction	Drainage investigations have been undertaken on key assets to insure the proposed development does not increase the risk of surface water flooding

## Assurance, approval & post project evaluation

Assurance of the preferred solution and decision to invest is sought from the EA's National Project Assurance Service (NPAS).

Ongoing project assurance and change management approval will be undertaken by the Project Board. The scheme will follow the relevant LCC internal approval processes.

All work will be supervised on site by competent engineers, with final sign off by the Principal Engineer or Engineering Manager. The indicative standard of protection will be reported on as part of the RCMP's new reporting procedures.

Lessons learnt meetings will be held at suitable stages in the project, concluding with a Project Evaluation Review (PER). The PER will be used to verify that all the objectives have been met, the intended benefits have been realised and lessons learnt during the project are captured and shared.

## 1.7. Recommendation

The recommended option is to construct a flood embankment to the west of Billams Hill, from Otley Bridge to Newall Mount. The flood embankment will contain ramped access for pedestrians and vehicles. Vegetation will be managed on the islands downstream of the weir to mitigate for the impacts associated with construction of the defence.