


Hawick Flood Protection Scheme

Document: R004 Version: 1.1

Stages 2 & 3 (Part 2): Option Appraisal –
Non Technical Summary

Scottish Borders Council

7 March 2013



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Halcrow Group Limited

City Park, 368 Alexandra Parade, Glasgow G31 3AU
tel 0141 552 2000 fax 0141 552 2525
halcrow.com

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Document history

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This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
1.0	12/12/2012	Draft for Client comment	Steven Vint	John Drake	Steven Vint
1.1	07/03/2013	FINAL incl Client comments	Steven Vint	Steven Vint	Steven Vint

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1 Non-Technical Summary

Hawick is the Scottish Borders' largest town and has a long history of suffering the effects of flooding from the River Teviot. Over 1,000 residential, industrial and commercial properties are at risk from a 1 in 200 year flood event on the River Teviot and the National Flood Risk Assessment, recently published by the Scottish Environment Protection Agency, shows that the town is recognised as a Potentially Vulnerable Area. Previous studies by Halcrow¹ quantified this flood risk and concluded that a Flood Protection Scheme, promoted under the Flood Risk Management (Scotland) Act 2009, would be the most appropriate way to deliver flood risk reduction to Hawick.

This report set out to confirm that a Flood Protection Scheme for Hawick was economically, socially, environmentally and technically viable, through identification and appraisal of a preferred combination of flood protection measures which were selected from a range of possible options. The appraisal process was carried out in accordance with guidance from the Scottish Government and Scottish Borders Council.

Identification of the residual risks associated with the preferred Scheme and recommendations for taking the project forward into Stage 4 Outline Design were also determined.

The appraisal process involved numerous consultation exercises, including a two day public exhibition in July 2012 and focused workshop type events for key stakeholders in July and October 2012. Feedback from these consultation processes included significant resistance from the farming community to upstream flood storage proposals and guarding against severance of the town with high walls. This feedback influenced the overall appraisal process.

1.1 Option Appraisal conclusions

Overview

1. There are essentially two preferred Schemes, to cater for the current uncertainty over the volumes of seepage flow which could be realised in the Sandbed area and the ability of existing buildings to be incorporated into the Scheme.

¹ August 2011; Halcrow Group Limited; Hawick Town Centre Direct Defences

- a. The preferred Scheme makes the best use of existing infrastructure in the Sandbed and Albert Bridge area, flood proofing the buildings which form the Orrock Hall, Sonia's Bistro and Hawick Burns Club.
- b. Instead of flood-proofing these buildings, the alternative preferred Scheme involves the construction of brand new walls, offset from the buildings.
- c. The current approach is that the Scheme to be taken forward into Stage 4 is the scheme which makes use of the existing buildings. The alternative Scheme (new walls) would only be selected as the preferred Scheme if the seepage and building integrity analysis to be undertaken as a priority during Stage 4 showed that incorporating these buildings into the Scheme was not feasible. This can only be determined following conclusion of Stage 4.

Standard of Protection

2. The standard of protection to be provided will be to protect against the effects of the 1 in 75 year flood event (excluding the effects of climate change) and that this standard of protection should be uniformly applied to all parts of the town to be protected.

Future Flexibility

3. The Flood Protection Scheme accounts for future flexibility, where there is a potential for the flood protection measures to be increased in height. All new defence foundations shall therefore be designed for a future standard of protection which protects against the effects of the 1 in 100 year flood event (including the effects of climate change).
4. It is noted that the early discounted options relating to online flood storage and natural flood management may form part of the future flexibility and a long term strategy to reduce the flows in the River Teviot catchment, thus providing a mechanism through which the standard of protection proposed for the preferred Scheme could be further increased.

Sources of flooding

5. The preferred Scheme provides protection against pluvial (overtopping), seepage (groundwater), pluvial (high intensity rainfall) and secondary (water mains or sewers) flooding sources.

Flood Cells

6. The areas of Hawick at risk of flooding have been split into six discrete flood cells, each of which are hydraulically and topographically separate from each other (refer to drawing 201573 – 010 in appendix A of this report):
 - a. Cell 1: Volunteer Park, Hawick High School and Sandbed
 - b. Cell 2: Common Haugh and Commercial Road
 - c. Cell 3: Teviot Road, Teviot Crescent and Laidlaw Terrace

- d. Cell 4: Duke Street
- e. Cell 5: Mansfield Road (including Hawick RFC, RAFC and SBC Depot)
- f. Cell 6: Weensland

Original Options

- 7. Over fifty separate flood protection options were considered, with measures such as online flood storage areas, natural flood management, flow conveyance improvements and direct defences (including permanent and demountable) considered.

Scheme objectives and early discounted options

- 8. The appraisal process considered twenty specific Scheme objectives which were set by Scottish Borders Council. The objectives were set in accordance with the ethos of the Flood Risk Management (Scotland) Act. These objectives are presented in their entirety in Appendix B of the this report. These objectives were analysed to filter out some of the original fifty options which would quite clearly not satisfy the objectives. Some of these early discounted options included:
 - a. Upstream online flood storage
 - b. Natural flood management
 - c. Flood embankment to protect Volunteer Park
 - d. Removal of the Coble Cauld
 - e. Removal of the Albert Bridge
 - f. Raising the James Thomson bridge and other footbridges
 - g. Large and local scale gravel removal

The preferred Scheme satisfies 19 of the 20 objectives and the work required to satisfy the twentieth during Stage 4 has been identified.

The preferred Scheme measures

- 9. The preferred combination of flood protection measures which should form the Hawick Flood Protection Scheme are listed below and are identified on drawings 201573-008 and 009 in Appendix A of the this report. It should be noted that these options may be reviewed and amended in the light of more detailed information to be gathered during Stage 4 (Outline Design).

Cell 1 - Volunteer Park, Hawick High School and Sandbed

- Option 2d: Set back walls and embankments around the perimeter of Volunteer Park, with specific land regrading measures across Volunteer Park provided to ensure the feasibility of the Bill McLaren Foundation project from a flood risk mitigation perspective.

- Option 3: Raising the existing Hawick High School flood defence wall, including provision of a new flood gate at the Lawson footbridge.
- Option 4b: Partial demolition of the upper section of retaining wall at Ellabank and Royal Mail Sorting office and construction of new flood defence wall on existing foundations. Floodproofing the Orrock Hall, including potential for buying the basement of the property.
- Option 10b: Flood-proofing the building which houses Sonia's Bistro and Guest House.
- Option 11: Demolition of existing river edge infrastructure along the left bank of the Slitrig Water from Sonia's Bistro to the building at Drumlanrig Bridge and construction of a new flood defence wall.
- Provision of one automatic pumping station in the Sandbed area to cater for seepage, pluvial and secondary flooding issues.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at the High School and Royal Mail sorting office.

Cell 2: Common Haugh and Commercial Road

- Option 7b: Flood defence embankment along Victoria Road (from near Coble Cauld) and along western side of the Common Haugh car park. Flood defence wall along the southern side of the Common Haugh car park, existing footpath remains at flood risk.
- Option 12b: Flood-proofing the Hawick Burns Club building.
- Option 15: New flood defence wall from Hawick Burns Club to James Thomson Bridge. Raise footpath on approach to James Thomson Bridge.
- Option 19: Demolition of existing upper section of masonry wall downstream of James Thomson Bridge and construction of new flood defence wall. Construction of new flood defence wall between the rear of the mill buildings on Commercial Road and the River Teviot.
- Option 20: Demolition of the existing masonry wall on Commercial Road upstream of Victoria Bridge and replacement with new flood defence wall. New flood gate at entrance to Victoria Bridge.
- Option 21: Demolition of the upper section of the existing masonry wall on Commercial Road downstream of Victoria Bridge and construction of new flood defence wall on top of existing foundations.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at the Common Haugh car park and low point on Commercial Road.

Cell 3: Teviot Road, Teviot Crescent and Laidlaw Terrace

- Option 13: Demolition of the upper section of the existing masonry wall on Mill Port and construction of new wall on existing foundations. Work required to existing Slitrig Water mill lade.
- Option 14b: Raising the existing ramp and steps leading to the eastern side of the James Thomson Bridge, or provision of a flood gate across the eastern entrance to the bridge deck.
- Option 16: Raising the existing concrete walls which form the access platform to the eastern side of the James Thomson Bridge.
- Option 17: Demolition of the upper section of the existing masonry wall on Teviot Road and construction of new wall on existing foundations.
- Option 18a: Construction of new set back flood defence embankment around the eastern and northern sides of the existing playpark area. Provision of flood gate downstream of the Victoria Bridge.
- Option 22a: Construction of new flood wall along line of existing railings between Victoria Bridge and Laidlaw Terrace, using existing foundations.
- Option 23: Construction of new flood wall along line of existing railings at Laidlaw Terrace.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at low points on Teviot Road and Teviot Crescent.

Cell 4: Duke Street

- Option 25: Construction of new flood wall along line of existing railings to the Noble Place Bridge, including flood gate at the bridge.
- Option 26: Demolition of upper portion of existing retaining wall from downstream of Scottish Water CSO at Noble Place and construction of new wall on existing foundations.
- Option 28a: New flood defence wall perpendicular to the river Teviot to tie in with high ground to the east of the former Glebe Mill.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at a low point on Duke Street.

Cell 5: Mansfield Road

- Option 24: Construction of new flood wall along line of existing railings from the approach to the Mart Street roundabout to opposite Hawick RFC, including a flood gate at the Noble Place bridge.
- Option 29c: Construction of a new flood defence embankment across the grassy area opposite Hawick RFC, set back around 5m from the edge of Mansfield Road to allow the potential provision of approximately 105 car parking spaces.

- Option 30: New flood defence wall along the edge of Mansfield Road opposite Hawick RAFC.
- Option 31b: New flood defence wall and embankment along the edge of Mansfield Road past the recycling centre and depot, becoming an embankment and turning perpendicular to the river to tie in with high ground to the north-east of the depot.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at a low points on Mansfield Road and by gravity past the defences downstream of the SBC depot.

Cell 6: Weensland

- Option 33: Construction of a new flood defence embankment along the line of the existing flood bund and continuation of this new embankment to the east of the existing allotments, crossing the Mill Lade to tie in with high ground next to the A698. Provision of a new culvert with non-return equipment to permit the Mill Lade to discharge.
- Provision of high capacity drainage to collect, store and pump (through deployment of mobile pumps) seepage flows at a low point within the Industrial Estate.

The alternative preferred Scheme measures

10. The flood protection measures for the alternative preferred Scheme are identical to the preferred Scheme, with the following amendments:

Cell 1

- Option 4a replaces 4b: brand new flood wall from the Lawson Bridge to the Albert Bridge, offset around 2m from the existing river edge / buildings
- Option 10a replaces 10b: brand new flood wall from the Albert Bridge to the Slitrig Water confluence, then along the Slitrig Water for a distance of around 15 metres, offset around 2m from the existing river edge / buildings

Cell 2

- Option 12a replaces 12b: brand new flood wall from the Albert Bridge to the downstream end of the Hawick Burns Club, offset around 2m from the existing river building.

Capital and maintenance costs

11. The overall capital and maintenance costs for the provision of the preferred and alternative preferred Schemes include an allowance for optimism bias (varies between 50% and 60%, depending on the complexities and risks associated with construction each option). This level of Optimism Bias is

appropriate for this stage of the Scheme. Allowances for site set up, contractor’s preliminaries and general items, design costs and service diversions have been included in the costs.

The total cost of providing and maintaining the preferred Scheme is **£27,978,961**.

The total cost of providing and maintaining the alternative preferred Scheme is **£29,279,761**, an increase of 4.6% over the preferred Scheme.

Benefits and Benefit Cost Ratio

12. Every flood cell within the preferred Scheme has a Benefit to Cost ratio (BCR) in excess of unity (ie greater than 1.0). This is essential to ensure that some parts of the Scheme (with BCRs in excess of unity) are not cross subsidising other less economically feasible parts. The following table summarises the overall costs, benefits and BCR for each cell and for the preferred Scheme as a whole

The BCR for the alternative preferred Scheme drops to 2.88.

Cell	Capital and maintenance cost	Benefits	BCR
Cell 1	£4,594,784	£16,453,987	3.58
Cell 2	£4,684,635	£21,734,876	4.63
Cell 3	£4,182,320	£8,907,724	2.13
Cell 4	£3,505,975	£17,216,378	4.91
Cell 5	£8,726,800	£17,463,660	2.00
Cell 6	£2,284,447	£2,617,206	1.26
Scheme	£27,968,961	£84,393,831	3.02

General Facts and Figures

13. The preferred Scheme will protect approximately 1,030 residential and commercial properties from the effects of flooding from the River Teviot.
14. The total length of the preferred Scheme is approximately 5.56 kilometres.
15. Seven new floodgates shall be required as part of the preferred Scheme.
16. The average height of the preferred Scheme is 1.48 metres above existing footpath level.

17. The maximum height of the preferred Scheme defences is 2.1 metres above existing ground level at the Lawson Bridge floodgate and also at the Weensland Industrial Estate.
18. Approximately 600 metres of footpath will require to be raised by up to 200mm above current existing levels in order to ensure that the top of the wall is no greater than 1.4m above the footpath level.

1.2 Residual Risks

A number of technical and environmental risks remain in relation to the preferred Scheme flood defence measures. These risks are:

- Seepage: there is a technical and financial risk that the magnitude of seepage flow beneath the proposed flood defence walls is such that the secondary preferred Scheme works require to be implemented for Cells 1 and 2. A full hydro-geological analysis requires to be undertaken to determine the magnitude of these flows. This will be carried out during stage 4.
- Services: there is a financial and programme risk that the interaction between the scheme and existing services and utilities is more onerous than assumed, thus increasing the scheme cost estimate
- Existing structures: there is a technical and financial risk that the existing walls and structures which are proposed to be wholly or partially incorporated into the scheme are not suitable for such incorporation. A suite of investigation works are required to prove the dimensions and conditions of these structures to mitigate the risk. These works will be carried out during Stage 4.
- Bridges: there is a technical and financial risk that the existing bridge structures (Laurie, Lawson, Albert, James Thomson, Victoria and Noble Place bridges) are more susceptible to damage during flood events due to the effect of the defences increasing flood levels along the protected reach of the River Teviot. A detailed inspection and assessment of the lateral force capacity of the bridges is required and potential remedial works may require to be included within the Scheme if necessary. This analysis will be carried out during Stage 4.
- Existing Mill Lades: there is a hydraulic and technical risk to the Scheme's integrity due to the presence of a network of mill lades which conveyed water from the Slitrig Water and River Teviot to drive mill machinery. These lades require to be identified and specific remedial works recommended, which may have a financial impact on the Scheme. This investigative work will require to be carried out during Stage 4.
- Slitrig Water: a recent study into Slitrig Water flood risk determined that there was a small, but significant risk that flood waters escaping from the Slitrig Water could affect Hawick Town Centre and ultimately, become trapped against the River Teviot flood walls at Mill Port and Teviot Road.

It is recommended that a full two dimensional model of the Slitrig Water is constructed to fully assess this risk and determine whether or not flood protection works to the Slitrig Water should be included as part of the River Teviot Flood Protection Scheme.

1.3 Recommendations

Taking forward the Hawick Flood Protection Scheme into Stage 4 will require a considerable amount of new information to be gathered to mitigate the risks identified in Section 1.2. Examples of the work required include, but are not limited to:

- Detailed Ground Investigation (boreholes, permeabilities, contamination)
- Topographic survey (expand on current survey)
- Structural Investigation (find out wall dimensions, structural condition)
- Slitrig Water 2D model (determine true flood risk to Teviot defences)
- Ecology Surveys (inform the SEA and EIA)
- Mill Lade Surveys (determine what measures are required to reduce risk)
- Strategic Environmental Assessment (SEA)
- Environmental Impact Assessment (EIA)
- Stakeholder and Landowner consultation (discuss scheme impacts with landowners and bodies that govern the watercourse)
- Investigating the potential to take forward Natural Flood Management measures in the Teviot catchment, potentially as part of the Scheme.