LANGHOLM
Flood Protection Scheme

1

Introduction to Community Engagement Event

Welcome to the first community engagement event for the proposed Langholm Flood Protection Scheme. The aims of this event are:

- Provide information on the flood risk present within the town
- Inform the community of the actions already taken
- Outline the processes followed to date in order to achieve a flood scheme
- Give the community an opportunity to discuss the scheme with the Project Team

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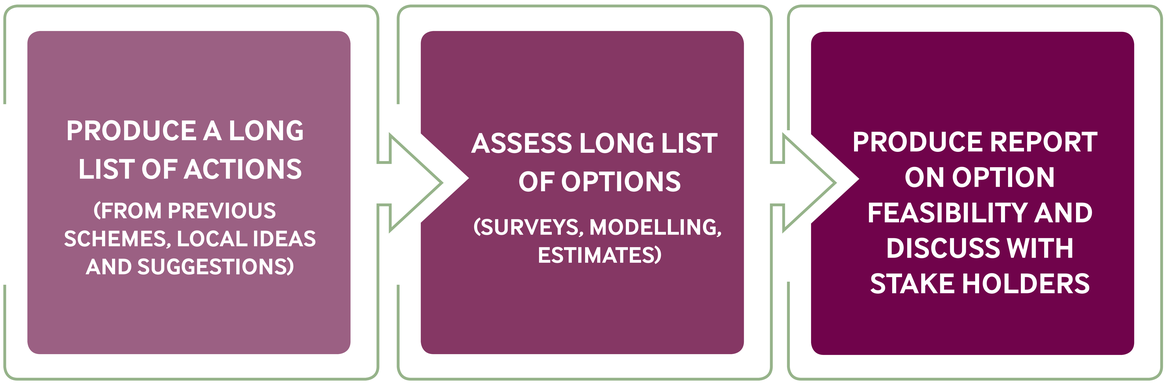
2

Flood Protection Scheme Flowchart and Progress

Work Completed to Date



Current Work

- First Community Engagement Event (this session)
- Analysis of Feedback and Final Assessment of Option/s
- Detailed Investigation and Outline Design

Future Work

- Second Community Engagement Event (Early 2020)
- Confirmation of Preferred Option by Dumfries & Galloway Council (Early 2020)
- Flood Order Process (Mid 2020)
- Scheme Confirmation (End 2020)
- Detailed Design (2021)
- Completion of Scheme (2023)

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3

Flood Risk In Langholm

Historical Flood Events

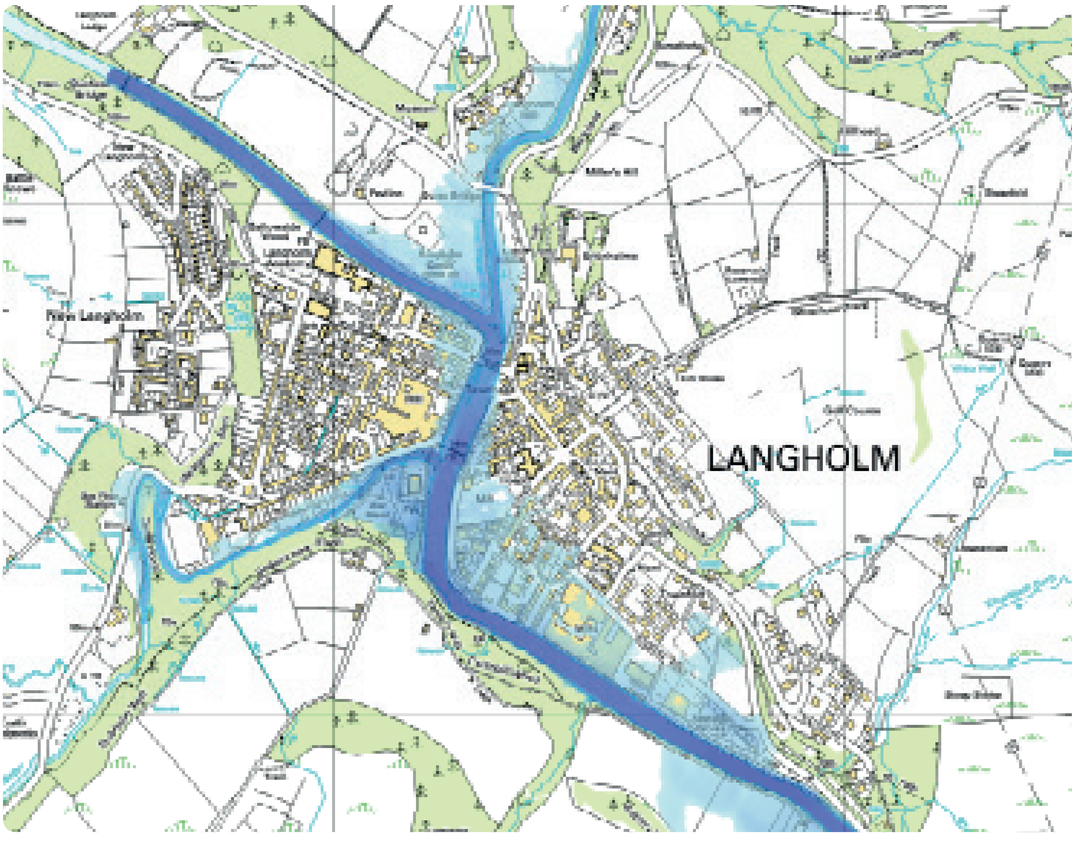
There have been previous flood events in Langholm with one of the worst occurring in December 2015 when the River Esk came out of bank. Homes within George Street and the town were evacuated by the Police and a care centre was established.

It is predicted that flood events will increase in frequency and severity in the future.

Computer Modelling

A computer model of Langholm simulates potential future storm events which may occur in Langholm.

Protection in Langholm will be provided up to a 1 in 200 year flood event or 0.5% Annual Exceedence Probability. The percentage is the chance of this extreme flood event happening in any given year.



1 in 200 year Flood Map

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4

Potential Actions Identified

Action		Description
Natural Flood Management	Agricultural and Upland Drainage Modification	Blocking man-made drains in strategic locations and managed tree felling with consideration to flood risk.
	Catchment Woodlands	Studies have shown that woodlands can be effective in reducing runoff as they intercept precipitation via their tree canopy and increase infiltration into the ground through their root system.
	Floodplain Woodlands	Woodland that is located within the floodplain of the river and acts as a barrier to the movement of water.
	Instream Structures	These have the potential to reduce flood flows by slowing the water down and forcing it out into the floodplain.
Upstream Storage		Storage areas reduce the peak flows and therefore flood risk.
Improve Conveyance	Works to Alter the River Channel	Stretches of the river channel may be suitable for the addition of a two stage channel, an overflow channel or channel realignment.
	Sediment Management	Removal of built up sediment can increase the capacity of the channel.
Direct Defences		Flood walls and embankments could be used throughout the study area to reduce flood risk.
Property Level Protection (PLP)		PLP can be used to provide protection where direct defences are not suitable. PLP will not be considered here as a standalone action, however it may be used in combination with other actions.

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5

Natural Flood Management (NFM)

Examples of NFM

1. Agricultural and Upland Drainage Modification (Commercial Forestry)

Managed tree felling and blocking man made drainage channels in upland areas can have positive effects on surface runoff volumes.

2. Catchment Woodlands

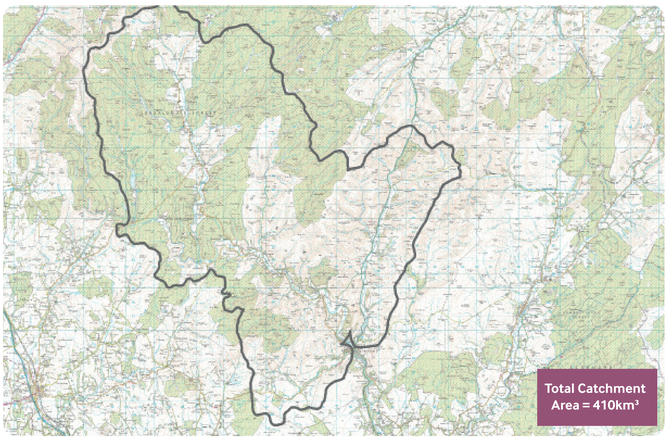
The more wooded area in a catchment, the larger the reduction in peak flow will be during a flood event.

3. Floodplain Woodlands

Floodplain woodland can slow the movement of water through a floodplain, reducing peak flows.

4. Instream Structures

These slow the movement of water through the upper reaches of a catchment which reduces peak flows downstream.



Langholm Overall Catchment

Effectiveness

A large portion of the catchment would be required, which may have a small impact on flooding in less extreme storm events. The cost of such measures (e.g. the cost of providing upland drain blocking and planting 'productive confers') could be in the region of £40 million.

Conclusion

NFM is considered to be a long term action which could potentially reduce the level of flooding in Langholm during less extreme storm events, however at this stage is not considered an action which could achieve the level of protection required.

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6

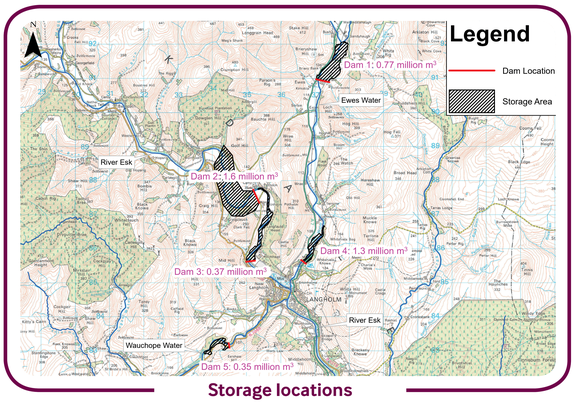
Upstream Storage

Flood storage in a catchment slows the flow of water in a storm event and can reduce the volume being above the capacity of the river channel and thus the amount, extent and likelihood of flooding.

For an area to be suitable a number of characteristics need to be considered such as topography, location and dam height.

Five suitable locations were identified in the Langholm catchment. These areas would provide a capacity of 4.4 million m³.

For storage to be worthwhile action in Langholm, approximately 9.9 million m³ of water would need to be stored. This volume of water is equivalent to over 5000 Olympic swimming pools.



Storage locations

Effectiveness

Advantages	Disadvantages
Would reduce peak flows in Langholm	Expensive (approximately £25 million for the structures alone)
Less invasive to Langholm residents	Technically complex
	Negative impact on upstream land owners/ houses/businesses

Conclusion

Upstream storage in Langholm wasn't considered technically or economically feasible as the potential areas wouldn't provide enough capacity and would be too expensive.

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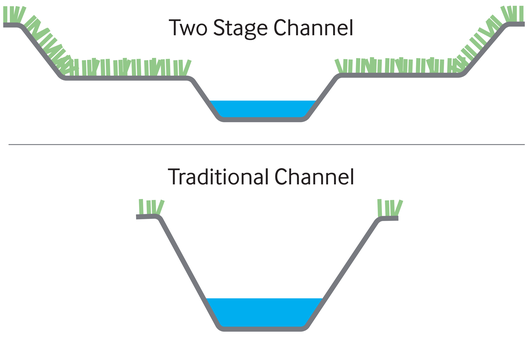
7

Improved Conveyance (Alterations to River Channel) Part 1

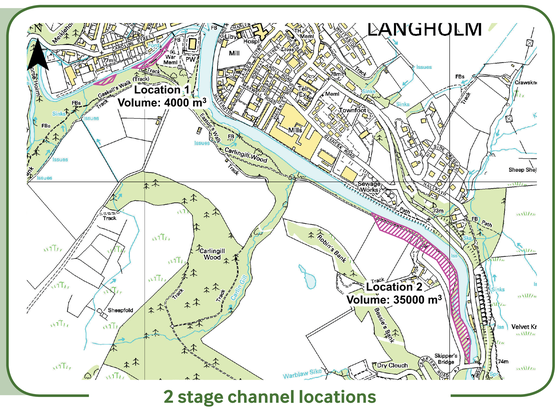
An increase in channel capacity can be brought about by changing the shape or amount of river channels in an area. Flood conveyance channels can be used to either re-route the direction of the river itself or to convey a portion of the flow at times of flooding away from the area. Additional channel capacity can be brought about by altering the existing profile of a river channel.



2 Stage Channels

A 2 stage channel is a common method of providing additional channel capacity and thus conveyance.

Two locations were identified as being suitable to provide space to potentially incorporate 2 stage conveyance channels in the locations shown.



2 stage channel locations

Effectiveness

Modelling indicated that water levels decreased locally by a maximum of 100mm along sections of location 1. Modelling also indicated that the water levels decreased on average by 300mm along an 80m length in location 2.

Conclusion

Due to the large volume of material (39,000m³) requiring removal to reduce water levels and the fact that the reduction caused would be small and over a short distance, 2 stage channels were not considered a feasible option for Langholm.

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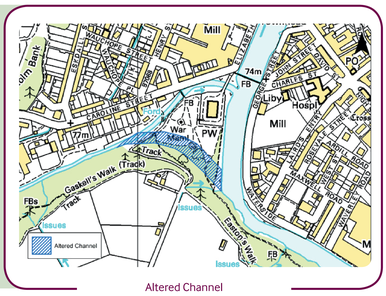
8

Improved Conveyance (Alterations to River Channel) Part 2

Overflow Channel or Realigned Channel

The location shown was identified as being potentially suitable for an overflow or realigned channel.

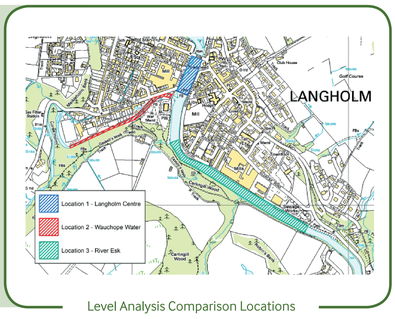
To quantify the effect of this option on flood levels in the Langholm area the scenario was hydraulically modelled.



Altered Channel

Results

This option resulted in the reduction of flood levels at locations 1 and 2. This would reduce the extent of the Direct Defences required.



Level Analysis Comparison Locations

Effectiveness

Advantages	Disadvantages
Minimises negative social impacts on Langholm Residents	Limited suitable areas within Langholm
Possible reduction of required Direct Defence heights	Requires removal of large volumes of material and significant landscaping to work
	Potentially detrimental to the environment

Conclusion

The addition of a diversion channel in Langholm is considered feasible as it could bring about a significant net reduction in the required Direct Defence heights in socially sensitive locations within Langholm.

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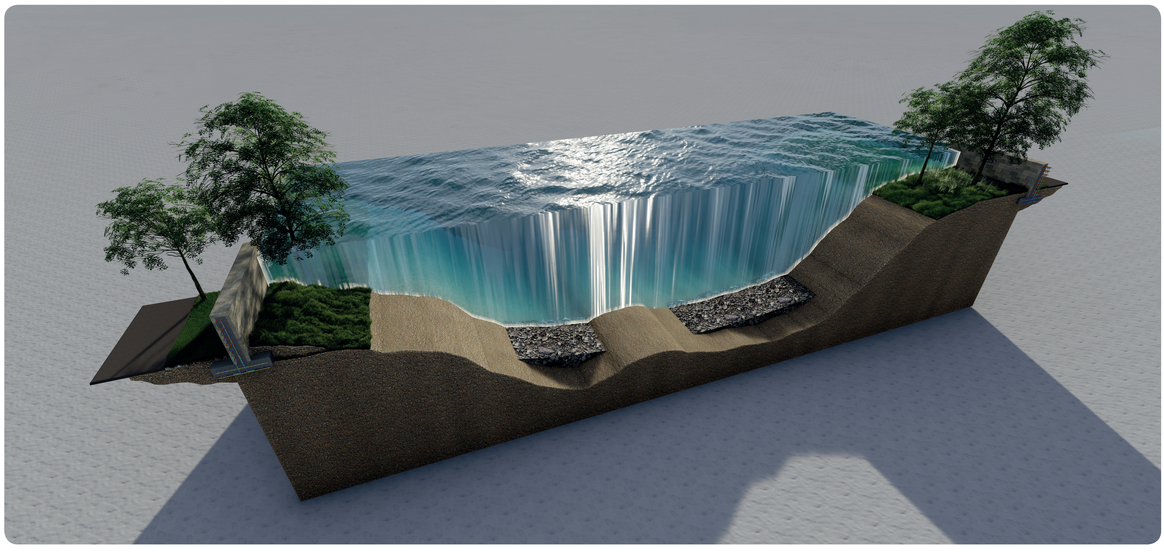
9

Improved Conveyance (Sediment Management)

In theory the removal of sediment from a river channel increases the capacity. However any impact will only be seen during low flows. In practice the amount of sediment in comparison to the river channel, particularly during extreme events, is negligible.



The removal of sediment will generally have a negative environmental impact on the river ecosystem. The cost of this option, compared to it's benefit, is also very high.

Furthermore, sediment management is an ongoing process. The river will naturally carry and deposit sediment and so sediment removal would need to be repeated on a regular basis.

Computer modelling shows that the removal of sediment does not offer any significant or long-term benefits on water levels during a flood event.

Effectiveness

Advantages	Disadvantages
Less invasive to Langholm residents	Very limited positive effect on flood levels (not near the level of reduction required)
	Costly relative to benefit
	Would require repeated removal, adding to cost
	Negative Impact on Environment

Conclusion

Sediment Management is not considered a feasible option as it does not work as a flood mitigation measure and it is prohibitively expensive.

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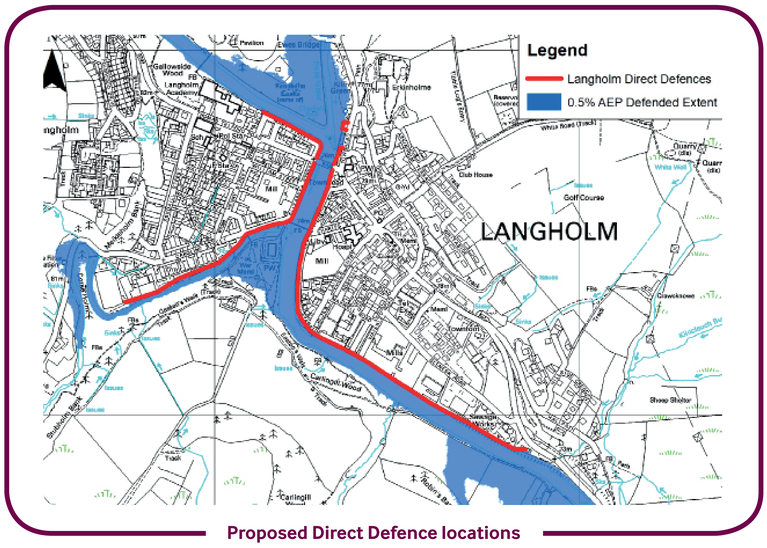
10

Direct Defences Part 1

Direct Defences are generally suitable for all areas of a scheme. The line of the defence is normally designed in such a way that the wall is positioned as far away from the river as possible to allow for as much of the natural flood plain to be utilised.



Proposed Direct Defence locations

Advantages	Disadvantages
Most cost effective solution	Can affect residents' views of the river/reduce access to the river
Design can be future proofed to allow increase in heights	Can have negative environmental impacts
Defences can be embankments, walls or walls/glass panels to match surroundings and minimise the visual impact	Any existing drains that discharge to the river will need to be managed through the defences.
Use of flood gates can improve access or retain existing routes	
Proven and effective method of protection used widely in flood affected areas	

Conclusion

Direct Defences were considered a feasible way of providing flood protection to Langholm.

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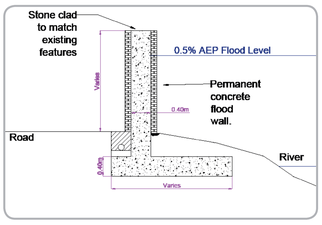
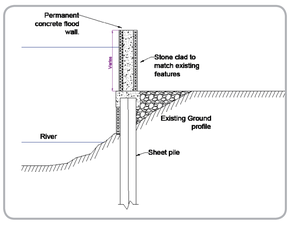
11

Direct Defences Part 2

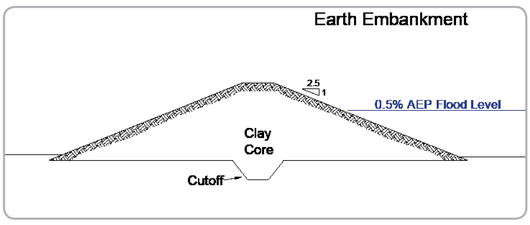
Examples of Defence Types



Flood Wall

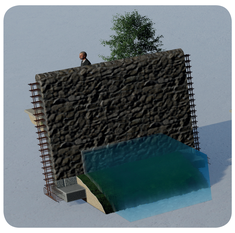


Flood Wall with Pile Foundation



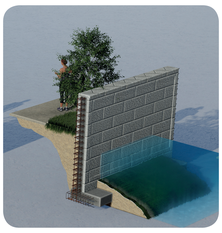
Flood Embankment

Wall Types



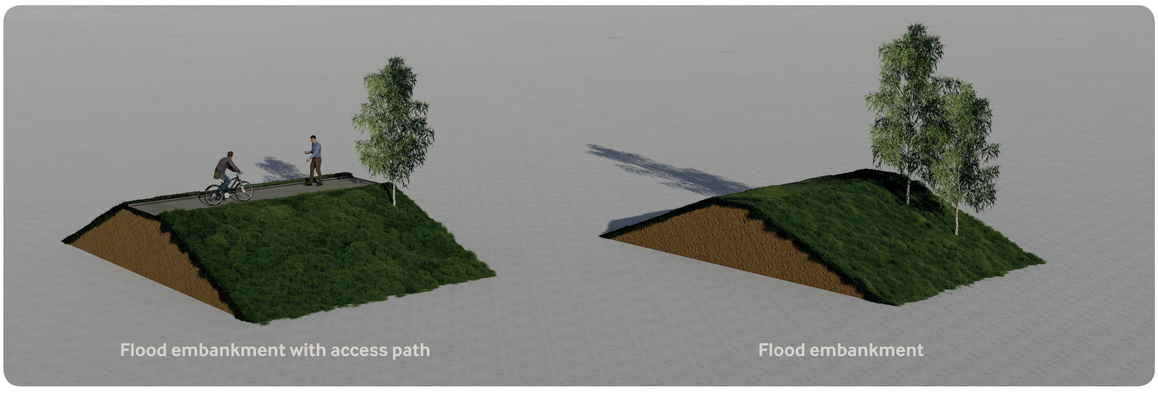
Masonry clad flood wall

Concrete & glass flood wall



Concrete flood wall

Clay Embankment



Flood embankment with access path

Flood embankment

Conclusion

Current estimates of the cost of providing direct defences in Langholm is £7.5 million. This is less than the estimated benefits and is therefore a feasible and effective option. The type and finish of defences will be determined at design stage when more accurate costs are available.

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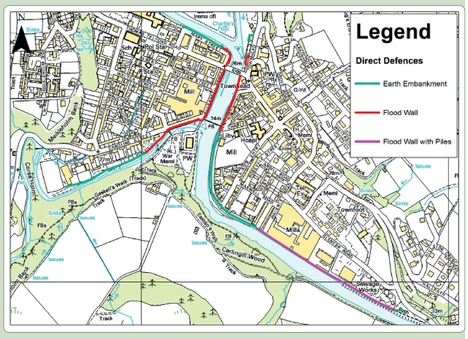
12

Combination of Actions (Direct Defences and Alteration to River Channel)

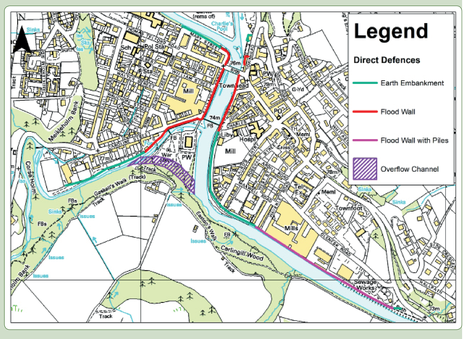
Option 1: Direct Defences

- 931m of Earth Embankment
- 501m of Flood Wall set back from river
- 549m of Flood Wall with Piled foundations
- 200m of Flood Wall, riverside



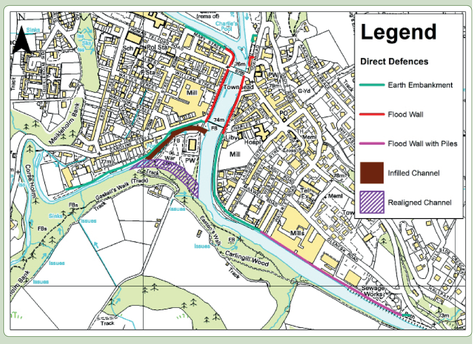
Option 2: Direct Defences with Overflow Channel

- Consists of the same lengths of Direct Defences as Option 1
- With the addition of a 200m long Overflow Channel
- The flood overflow channel reduces the required defence heights along the Wauchope Water by an average of 100mm and by an average of 200mm in the centre of Langholm



Option 3: Direct Defences with Realigned Channel

- The same lengths of Direct Defences as Option, however the line of Wauchope Water would be realigned
- The realigned channel reduces the required defence heights along the Wauchope Water by an average of 100mm and by an average of 150mm in the centre of Langholm
- The realignment of the channel would also allow the direct defences along Caroline Street to be Earth Embankments rather than Flood Walls



Conclusion

These options are to be fully costed, modelled and compared, leading to a preferred option to be taken forward.

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13

Conclusion and Summary

All options put forward to protect Langholm from future flooding have been considered in detail and can be summarised as the following:

Natural Flood Management (See Board 5)	Not considered viable as the cost outweighs the benefits and technically the challenges are too great. Natural flood management is a long term solution which will bring added benefits in the future.
Upstream Storage (See Board 6)	Not economically or technically feasible.
Improved Conveyance (River Channel) (See Boards 7&8)	Potential solution to be considered in conjunction with Direct Defences.
Improved Conveyance (Sediment management) (See Board 9)	Whilst seen as a popular choice and/or historic solution, this option is not economically viable, would have adverse evironmental impacts and will not reduce levels in flood events to offer sufficient benefits.
Direct Defences (See Boards 10 & 11)	Stand alone solution or in combination with channel diversion.

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14

Next steps

All feedback gathered at this event will be used to improve the way we do things and to help us deliver the optimum flood protection scheme for Langholm.

A survey/questionnaire is available for you to fill out with any comments or suggestions.

Future event

A second community engagement event will be held to convey further details on the scheme.

Communication and Consultation

There will be continuous engagement and discussion with all stakeholders and the community.

Comments/suggestions can be submitted to the Project Team via:

Email: langholmFPS@dumgal.gov.uk
Website: www.dumgal.gov.uk/langholmfloodprotection
Telephone: 030 33 33 3000

Flood Warning Scheme

A real-time flood warning scheme is currently available in Langholm, run by SEPA.

Sign up for flood warnings direct to your phone at the below address, or scan the QR code:

http://www.floodlinescotland.org.uk/flood-warning-schemes/river-esk-flood-warning-scheme/

Floodline
Scottish Environment Protection Agency
0345 988 1188
floodlinescotland.org.uk

Scan me

Thank you

Thank you for attending this event today and we hope you have found it useful.

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