

4: Flood Risk Management Options

Options Considered

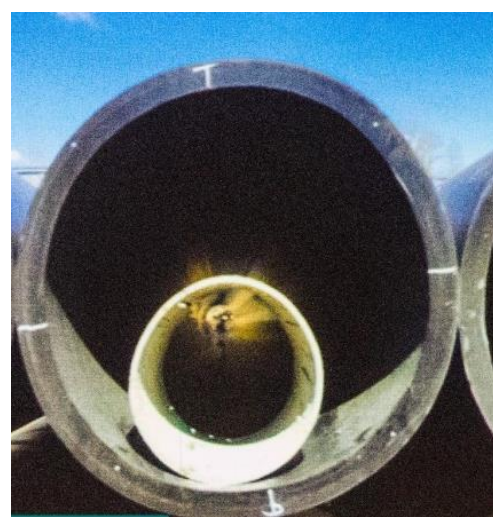
A number of potential actions have been considered to determine if they would be suitable as part of the proposed flood scheme. The actions were assessed on technical, environmental, social, and economic grounds to arrive at the recommended scheme. Some of the actions have also been assessed in combination to determine if this could provide an improved solution when compared to one action in isolation.

The options which have been considered are as set out below; those noted as being short listed from part of the recommended flood scheme.

Improvement of Channel Conveyance (Short Listed)

The limited capacity of river channels and culverts has been identified as contributing to flooding. Improvements would require increasing the capacity of the infrastructure to allow water to pass more freely without causing flooding.

The proposed scheme includes improvements to existing culverts to increase the flow capacity and alleviate flooding at key points on the Clash Burn.



Dredging (Ruled Out)

The hydraulic model was used to investigate the benefit of dredging the South Queich.

This action was ruled out as it would not be able to fully alleviate the 1 in 200 year (0.5% AEP) flood and would require repeated maintenance every 10 years at significant cost.



Property Flood Resilience (Short Listed)

Various flood products are available to protect properties or make them more resilient to the potential ingress of flood water through doors, windows, brickwork and sewage systems. While this action would not address the sources of flooding, it would help to reduce damage due to internal flooding.

This action was ruled out for the majority of the area but will be taken forward for properties where there is no other viable solution, e.g. some properties adjacent to Loch Leven.



Walls and Embankments (Short Listed)

Flood walls and embankments built along rivers can defend properties from high water levels. The heights of the defences are determined by predicted flood levels, local ground levels and calculated freeboard (an allowance for uncertainty and also a safety factor).

This action has been taken forward for the South Queich.



Flood Embankment



Flood Wall

Property Relocation (Ruled Out)

Where the value of a property significantly outweighs the cost to protect it from flooding, then it may be viable to purchase the property and relocate the affected parties.

Given the scale of flooding in the area, and the location in the heart of the town, this action was ruled out at an early stage as being unacceptable.

Diversion Channel (Ruled Out)

A diversion channel was considered which would have been designed to divert flood water from the Gelly Burn directly into Loch Leven, thereby bypassing Kinross and the confluence of the South Queich.

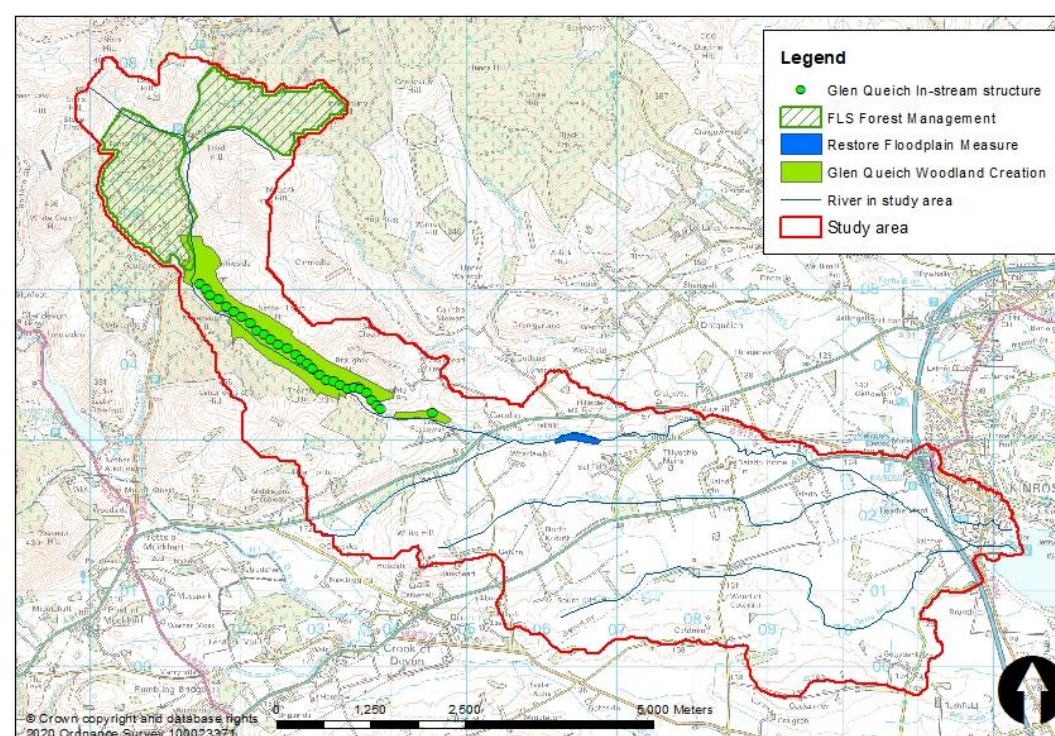
The action was ruled out based upon the flood walls and embankment options having a better cost benefit ratio.

Natural Flood Management (NFM) (Ruled Out)

Natural flood management involves altering land management practices upstream to slow or store the flow of water into watercourses. This reduces flood risk and provides environmental and biodiversity improvements. An NFM study was carried out in the catchment to consider measures such as:

- Woodland creation at Glen Queich and riparian planting along river-banks
- Leaky barriers along the valley floor at Glen Queich and within the river channel
- Floodplain reconnection and ponds for flood storage higher up in the catchment
- Land management in the commercial forestry areas to reduce surface water runoff
- Buffer strips and hedges as well as alteration to drainage/farming practices

The study confirmed that NFM measures would provide a standard of protection significantly below the 1 in 200 year flood (0.5% AEP). This action would require extensive work with upstream landowners and would not reduce flood levels sufficiently to work in isolation. This option would also take a number of years to implement fully. The use of natural flood management as an option has therefore been ruled out as part of this scheme.



Woodland Creation



Leaky Barrier

Flood Storage Pond (Ruled Out)

A flood storage pond at the Myre playing fields was considered to manage flooding from the Clash Burn. This pond would be dry in normal conditions.

This action has been ruled out due to unfavourable loss of amenity space and the cost associated with a large area of excavation and disposal of material.



Online/Offline Storage (Short Listed)

Where space is available, excess flood water can be temporarily stored upstream to reduce flooding further downstream. The flood water can be released at a slower rate after the flood peak to protect properties further downstream. Areas that can typically be utilised include public parks, sports fields or agricultural land.

While no suitably large areas were identified which could store sufficient flood water, a suitable area of upstream flood storage was identified to reduce the risk to the Kinross Services. This action has been taken forward for this area.



Loch Leven Defences (Ruled Out)

Flood walls were considered in the vicinity of the Loch Leven Boat House, to provide protection to properties from high levels on Loch Leven and the South Queich.

Flood defences would result in these properties being surrounded, or ringfenced, and cut off from the Loch. This option was therefore ruled out as the business relies on access to the loch for social and economic reasons. Property Flood Resilience measures have been recommended instead.



Recommended Scheme

Following an assessment and appraisal of the various potential actions, the proposed flood scheme includes the provision of **new flood walls and embankments, culvert improvements, a flood storage area and property flood resilience measures.**