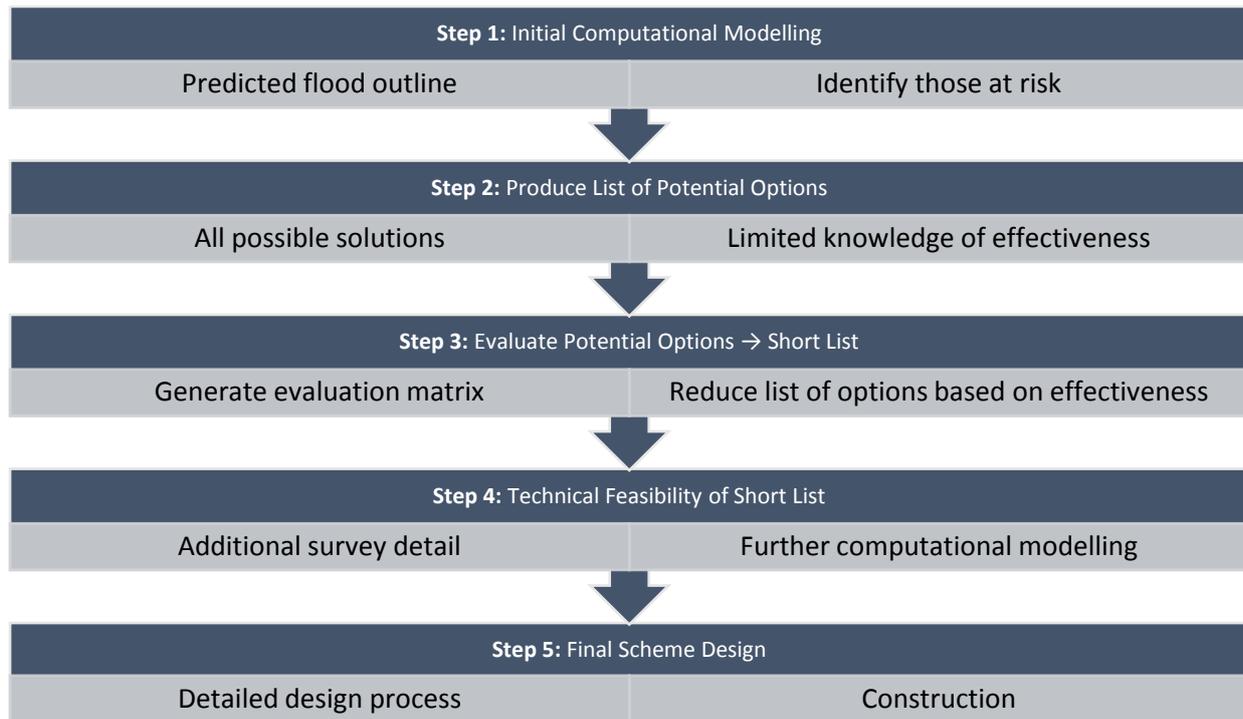


## 1. Introduction and Background

Where flood risk is a long-term and ongoing problem; there is a well-established technical process which is followed to produce a feasible solution. This is a phased process – initially taking into account all potential solutions; before reducing to a short-list that will be assessed in detail on technical merit. An outline of this process is provided in Figure 1.



**Figure 1: Flood Prevention Scheme – Optioneering Process**

Initial computer modelling has been carried out which will be updated with additional survey data to ensure accurate prediction of flood levels in Newton Stewart. The project is now at the second step in this process and a 'long-list' of potential options has been produced. This document provides a brief outline of these options.

## 2. List of Potential Options

As outlined above, an initial list of potential options has been identified. This list is based on a number of factors, including but not limited to:

- Options known to be effective in other flood protection schemes;
- Options known to store water, or reduce the flood peak;
- Options that are considered to result in water flowing to areas away from buildings;
- Options suggested by the local community and those with specialist knowledge of the watercourse; and
- Options identified through a site walkover by the project team.

The aim of this step within the process is to ensure that no potential solutions are omitted. The options presented here are considered 'any and all' possible solutions. These options are to be evaluated further and those found to be most feasible taken forward as a short-list for more detailed analysis.

### **Options Involving Storage of Water**

This is where a volume of water (during times of flood) is diverted into a storage area with the intention of preventing it reaching the town. This water is later re-introduced to the river after the storm when flows are lower. The following options build upon this concept, and are dependent on further investigation showing the identified areas to be suitable, and also detailed computational modelling showing that they do not increase flood risk elsewhere. The following options involving storage of water may be available:

- *Option 1:* Storage of water in the Glenhapple area, to the north-west of the town.
- *Option 2:* Storage of water in the Linloskin Bridge area, to the north-west of the town.
- *Option 3:* Storage of water in the Frankie Hill area, to the north-west of the town.
- *Option 4:* Construction of an upstream obstruction on the River Cree, which may result in water being stored within the watercourse elsewhere, prior to reaching the town.
- *Option 5:* Construction of an upstream obstruction on the Penkiln Burn, which may result in water being stored within the watercourse elsewhere, prior to reaching the town.

### **Options Relating to Direct Defences**

Direct defences (mostly involving the siting of walls) are simply constructed to an appropriate height to contain flows within the watercourse. Construction of direct defences can come with the risk of increasing water levels overall; and, hence, detailed modelling is needed to identify adequate locations and heights for these defences. The following options involving direct defences may be available:

- *Option 6:* Construction of walls to provide protection and convey flood water downstream.

### **Options at the A75 Road**

The A75 road crosses the river at the southern end of Newton Stewart. This crossing comprises a clear-span bridge, along with an embankment spanning low-lying land adjacent to the River Cree. The embankment itself acts as a barrier to flows during times of flood, and thus options to increase the area available to flow at this location have been considered. The following options involving the A75 road crossing may be available:

- *Option 7:* Increase flow area beneath A75 bridge, which would permit additional flow to pass beneath the bridge; and could affect water levels elsewhere.
- *Option 8:* Removal of A75 embankment to open up additional floodplain downstream of the A75; which may affect water levels elsewhere.
- *Option 9:* Creation of a diversion channel beneath the A75, which could potentially increase flow capacity towards downstream floodplain; which may affect water levels elsewhere. Further detailed computational modelling is required to assess this option.

### **Options to Remove Obstruction to Flow**

Obstructions to flow exist within the watercourse in the form of either natural features (resulting from sediment deposition), or man-made features. These obstructions reduce the area available to flow

and can change water levels locally. The removal of identified obstructions could potentially impact water levels, but a detailed assessment of each option is needed to fully appraise potential benefits. The following options involving removing obstructions to flow may be available:

- *Option 10:* Removal of gravel berm present within the town, to increase the area available to the flow.
- *Option 11:* Removal of the in-line weir within the town centre, which raises water levels upstream under normal (i.e. non-flood) conditions.
- *Option 12:* Investigate upstream weir. A weir has been identified upstream of the town on historical mapping.

### **Options to Modify the River Channel**

Direct modification of the river channel can increase the area available to flow, which in turn may alter water levels. Modification includes any physical intervention that may increase the capacity of the river to pass flow downstream. The following options involving modification of the river channel may be available:

- *Option 13:* Historically the Penkiln Burn and River Cree were connected further upstream, and reconnecting the two streams at the historical upstream location to create more flow paths.
- *Option 14:* Removing Mill Island increase the flow area at the confluence of the River Cree and Penkiln Burn.
- *Option 15:* Removal of sediment that has built up around key structures within the town area to increase the capacity of the channel.
- *Option 16:* Creating a potential diversion of Penkiln Burn which would be used during extreme flow to reduce the overall flow passing through the Newton Stewart town centre.
- *Option 17:* Removal of sediment build up within the river through dredging of the channel to increase the flow capacity.
- *Option 18:* Disconnecting the former Mill Lade from the River Cree to divert flow away from properties in the vicinity of this channel.

### **Options to Reprofile Land**

Water only flows out-of-bank and onto floodplain when it reaches the level of the banks. Reprofiling of land to cause water to spill over bank in different locations, or create additional areas of floodplain not previously utilised. The following options involving land reprofiling may be available:

- *Option 19:* Reprofiling land in the Broomisle area to allow for a new area of floodplain, potentially providing storage for water during flood events.

## **3. Conclusions**

A total of 19 potential options have been identified for the Newton Stewart Flood Protection Scheme. These options have been identified from all information available and have not yet been appraised on their technical merit. The next stages involve creating a ranking system to screen for the best options to be progressed to a short-list; and then to conduct additional computer modelling where needed to assess the effectiveness of proposed options.



**Legend**  
Areas of Note

**Former mill lade**

**Mill Island**

**Options at weir, gravel berm and structures**

**NEWTON STEWART**

**Options at the A75**



0 0.0275055 0.11 0.165 0.22 Kilometers

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