



### **Dunkeld Flood Protection Study**

#### 1. Overview

Perth & Kinross Council has been carrying out a flood protection study for the Dunkeld area and is seeking the views of the community on the draft outputs.

Dunkeld has experienced flooding in the past from the River Tay, the River Braan, and other small watercourses including the Spoutwells, Inchewan and the Sawmill Brae Burns. The most recent significant flood event occurred in February 2020 and other significant floods occurred in January 1993 and August 2004.

Under the Flood Risk Management (Scotland) Act 2009, Dunkeld was located within a wider Potentially Vulnerable Area (reference 08/08) within the Tay Local Plan District. Actions to manage flood risk are contained within the published Tay Local Flood Risk Management Plan, and this includes the requirement for a flood protection study. Further information can be found at www.pkc.gov.uk/frmplans.

The Council engaged consulting engineers, AECOM, to deliver the flood protection study. The purpose of the study is to improve our understanding of flood risk to homes and businesses within Dunkeld and the surrounding area, and to explore potential flood protection options for managing and, where possible, reducing the identified risk.

A substantial amount of data was collected to inform the study from site walkovers, topographical and environmental surveys and river and rainfall records. Local information was gathered by issuing a community questionnaire in May 2020 to supplement existing records of flooding.

# 2. Predicted Flood Risk

A hydraulic model was developed to represent the watercourses around Dunkeld including the River Tay, the River Braan and the Spoutwells, Inchewan and Sawmill Brae Burns. The hydraulic model was used to produce maps showing the estimated extent of floods of various magnitudes.

A separate assessment of flood risk at Trochry was modelled but only one property was found to be affected so no further action was taken.

Figure 1 shows the estimated extent and depth of the 1 in 200-year flood (the flood with a 0.5% chance of occurring in any given year). Figure 2 indicates how this will change in the future due to climate change.



Figure 1 – The estimated extent and depth (in meters) of the 1 in 200-year flood



Figure 2 – The estimated extent and depth (in meters) of the 1 in 200-year flood with an allowance for climate change

You can view the flood maps in more detail on the Council's consultation hub - a link is provided later in this newsletter.

The main areas predicted to flood in Dunkeld are properties in Atholl Gardens, Atholl Street, High Street and Cathedral Street because of overtopping of the Spoutwells and Sawmill Brae Burns. The River Braan is predicted to overtop and flood various areas of Inver including the Caravan Park. The River Tay is predicted to exceed the existing raised embankment and flood Burnmouth Road as well as flooding Boat Road and the greenspace areas to the south of Cathedral Street. The flood map indicates that 138 properties are currently at risk of flooding throughout Dunkeld and the surrounding area in the 1 in 200-year flood. In future this is estimated to increase to 157 due to climate change.

# 3. Flood Risk Management

The next step involved consideration of the potential options to manage the predicted flood risk. A long list of potential actions was considered – see Figure 3. These actions were then screened (on technical, environmental, social, and economic grounds) to produce a short list for further appraisal.



Figure 3 – Examples from long list of potential actions

Many of the properties at risk are located at Inver on the River Braan. Unfortunately, all actions relating to the River Braan did not meet the minimum economic criteria or would increase flood risk elsewhere to an unacceptable level. As such, flood defences on the River Braan were not considered further.

The short-listed actions were combined into four options that were tested using the hydraulic model to assess their performance.

**Option 1 -** Culvert upgrades on Sawmill Brae and Spoutwells Burn. The existing culverts would be increased in size to convey more water.



**Option 2 –** New Flood Wall and Embankment at Burnmouth Road



**Option 3 -** Planned relocation of affected properties at Burnmouth Road. Properties would be bought out and removed from flood plain.



Option 4 - New Flood Wall and Embankment on North Bank of River Tay



Each of the four short-listed options have varying levels of benefit. Different standards of flood protection were considered due to the complexities of the urban environment, steepness of the local topography and differences in design height of the proposed defences that could be deemed acceptable to the local community.

The assessment included an economic appraisal (cost benefit analysis) of the options. In managing flood risk, the Council must have regard to the economic impact of its actions. The cost of the flood scheme cannot exceed the benefits, i.e. the benefit/cost ratio must be greater than 1.0. Some benefits are difficult to monetise (for example health and wellbeing or biodiversity) hence the benefit/cost ratio only forms part of the final overall assessment.

	Option	Option	Option	Option	Option	Option	Option	Option
Properties protected in 1 in 100 year flood	35	35	9	6	0	0	0	0
Standard of Protection	1:100	1:100	1:200 + CC	1:100	1:1000	1:100	1:100	1:200
Capital Cost	£672k	£628k	£1,246k	£839k	£3,879k	£1,831k	£1,837k	£1,966k
Benefit Cost Ratio	2.17	2.21	0.53	0.49	0.17	0	0	0.001
Assessment	Option 1b pr degree of pro 35 properties protection pr required to b further three Option 1a pr additional de flood protect higher culver headwalls) b increase the properties pr flood mecha change at hig periods. Option 1b of greater cost with lower environment impacts.	ovides a obtection to s but flood roducts are the fitted to a covides an egree of cion (due to t ut does not number of rotected, as nisms gher return fers a benefit, cal/social	Option mee study objec providing flu protection t properties a However sig capital costs both option unviable, ar of defences unlikely to b environmer socially acce	ts the tives by ood at risk. gnificant s make s at the size are be atally or eptable.	This option involves returning Burnmouth Road to flood plain and requires the purchase (not protection) of all 9 affected properties, and an additional 3 properties with access from Burnmouth Road. The purchase costs are significant, making this option unviable. It would also have social impacts.	Option 4a w wall only; 4 and embanl wall/emban This option objectives a benefit in te risk to prop initially con- understand the Tay and discharging and Sawmil The works w require sub- land resource	yould involve to a combinati kment; 4c a h kment. does not mee nd has very li erms of reduc erties. This op sidered to be the interaction the overland from the Spo I Brae burns. vould be intru- stantial const ces.	a flood on of wall igher et the study imited ing flood otion was tter on between flow utwells usive and ruction and

Table 1 summarises the options assessment.

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Unfortunately, none of the short-listed options for the River Tay and Inchewan Burn are viable and they all have a cost benefit ratio of less than 1.0. However, the short-listed options for the Sawmill Brae and Spoutwells Burn did achieve a cost benefit ratio of more than 1.0 and Option 1b has been identified as the most cost-effective.

### 4. Recommendations

The flood study identified a viable option (1b) that provides flood protection for Dunkeld in the vicinity of Sawmill Brae, Spoutwells Burn and the town centre.

The Council has outlined the draft study findings within this newsletter and on the Council's consultation hub (see <u>https://consult.pkc.gov.uk/communities/Dunkeldfps</u>). A community drop-in session will also be held at Atholl Arms Hotel, Bridgehead, Tay Terrace, Dunkeld on Tuesday 7 March from 2pm until 8pm. Council officers will be present to provide an opportunity for residents to learn more about the study outcomes and ask any questions. SEPA will attend to provide advice in relation to their flood warning services and flood risk management plans, and the Scottish Flood Forum will provide advice on flood protection products.

# 5. Next Steps

Residents are encouraged to provide their views on the draft study findings and recommendations. A comment form has been provided and should be returned to the Council at the address at the bottom of this page (preferably by e-mail) or online via the consultation hub (link provided above) before Friday 10 March 2023.

A Question & Answer document will be produced following receipt of the comment forms and will be circulated to the community to answer any queries/comments received.

The Dunkeld Flood Protection Study will then be updated and finalised. The conclusions of the flood study will then be reported to the next Climate Change and Sustainability Committee. Thereafter, the Council will implement the recommendations of the report.

#### **Contact Details:**

For further information on the Dunkeld Flood Study please contact:

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