



3: Flood Risk in Comrie

River Flows

To determine the risk of flooding in Comrie we need to know how much water passes through each of the rivers during a flood event. The river flows have been re-assessed and are based on the most up to date recorded gauge data (from past flood events where available) and national guidance.

A range of flows have been calculated to represent different flood events, which range in severity and likelihood of occurrence. These flows were independently checked by, and agreed with, SEPA.

Flood Modelling

To aid in the design of the flood scheme, a computer-based flood model was developed. This model included detailed ground information gathered from surveys of the river channels and ground levels across the town. The hydraulic model of the three watercourses has been developed further to examine the existing and proposed situations. The model has been extended further upstream and downstream and is capable of modelling flood water as it flows in the river, or over land.

The model predictions have been verified against known river flows and water levels observed from previous flood events. The predicted flood extents have been plotted on a map.

The model has been used to: predict the current level of flood risk to Comrie; to identify the required height, extent and type of the proposed flood defences; consider the impact of climate change and assess surface water flooding.

Present Day Flood Risk

The present-day (or 'baseline') flood map for the 1:200 year event is included in this display. An estimated 200 properties (approximately) are considered to be at risk.

The existing flood defences at the western extent of Dalginross have been taken into account. Some of these existing defences were built in the 1960's and are reaching the end of their life. Without intervention, these defences would degrade over time and would not be able to provide an adequate level of protection. The flood map does not show the potential failure of these existing flood defences, which would become increasingly likely if no scheme was implemented.

The flood embankment built in 2013 at the end of Camp Road also requires upgrading to provide a standard of protection that is consistent with the wider flood scheme proposed for Comrie.

The aim of the proposed scheme at Comrie is to protect the area against a 1 in 200 year flood event (the flood that has a 0.5% chance of occurring in any one year) with an addition for 'freeboard'.

Level of Flood Protection

Flooding is a natural phenomenon which can never be entirely prevented. Even a flood scheme can only protect up to a certain standard and there will always be a residual risk, should a greater flood occur.

The proposed flood scheme at Comrie will be designed to protect the area up to the 1 in 200 year flood event (the flood that has a 0.5% chance of occurring in any one year). This is larger than any recorded flooding event in Comrie.

This does not mean that the 1 in 200 year flood can only happen every 200 years - flooding can happen at any time. It represents the statistical chance of a flood of a particular size happening within a certain time.

Sweco's investigations used the peak flows in Table 2, which were agreed with SEPA and were based on recorded data (where available). These flows can be compared to the 5 highest flows recorded since 1993, as shown in Table 1 on the first display board. The proposed standard of protection for the scheme has been assessed considering a number of factors including:

- predicted water levels;
- the height, extent and 'buildability' of the proposed flood defences;
- the freeboard allowance;
- the environmental impact of the scheme;
- the combined probability of flooding on all three watercourses;
- the estimated costs of the design, construction, maintenance and safe operation of the proposed scheme

In addition to the 1 in 200 year peak flood levels, the proposed flood defences must also include a 'freeboard' allowance which accounts for the uncertainty within the hydraulic model and un-modelled processes. Freeboard can vary depending on location and the type of flood defence.

Recent Government guidance suggests increasing the peak design river flows by 20% (to 2050) and 35% (to 2080) to allow for future climate change. This was fully considered as part of the flood scheme investigation. It is not feasible to defend against climate change for the proposed flood scheme, in addition to the 1 in 200 year level of protection. Providing protection against the 1 in 200 year flood, including a climate change allowance, would result in excessive defence heights and associated visual impact. Further difficulties would be encountered with buildability in some areas.

Table 2: Design flows for watercourses

Flood Event	Chance of Flood Being Exceeded in Any Given Year	River Earn (m³/s)	Water of Ruchill (m³/s)	River Lednock (m³/s)
1 in 10 year	10.0%	98	214	77
1 in 30 year	3.3%	117	247	94
1 in 75 year	1.3%	142	284	115
1 in 100 year	1.0%	144	291	118
1 in 200 year	0.5%	163	318	133