

1. Overview

Binnies (part of RSK Group) on behalf of **Perth & Kinross Council** has completed a draft **Surface Water Management Plan (SWMP)** for the town of **Blairgowrie and Rattray** to understand existing flood risk and investigate potential improvements to the management of surface water and help prepare for impacts of climate change. These steps aim to **reduce the risk of flooding** to homes, business and transport links, while also enhancing our watercourses.

We would appreciate your involvement in the development of this SWMP by providing your views on the proposed action plan currently being developed by Perth & Kinross Council. We hope you find this document informative, and we are eager to receive as much feedback as possible. **Your experience and views are crucial for the success of this SWMP** and will ensure that flood risk is appropriately managed.

Blairgowrie and Rattray was affected by **significant localised flooding** in 1994, 2001, 2004, 2015, 2020 and 2023, and therefore has been identified as a **Potentially Vulnerable Area**, which makes it a national priority for surface water management.

Under the Flood Risk Management (Scotland) Act 2009, Blairgowrie & Rattray were located within a wider Potentially Vulnerable Area (reference 02/08/06) 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 Surface Water Management Plan in Blairgowrie and Rattray.

Further information at www.pkc.gov.uk/frmplans

The main sources of flooding in the area are attributed to **surface water** runoff from heavy rainfall and **out-of-bank flows** from the Rattray Burn. The public sewer network serving the town is not designed to accommodate these overland flows during these events, leading to flooding in various locations.

This SWMP has been developed in consultation with key organisations such as **SEPA** and **Scottish Water** to define a strategy identifying the most appropriate and cost-effective opportunities to manage surface water flooding.

The **key objectives** for the Blairgowrie and Rattray SWMP are:

- **Reduce the risk of flooding** to homes, business and main transport links from both surface water and watercourses.
- **Prepare for climate change**, which is predicted to produce more intense and frequent rainfall events in the future.
- Help to **protect watercourses** from pollution.
- **Improve local green spaces**, habitats and biodiversity, contributing to enhanced placemaking.
- **Enable economic development.**



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2. Understanding surface water flooding

When it rains, that **water has to go somewhere**. If rainwater cannot soak into the ground or evaporate, flows overland into drains leading to **watercourses** or the **sewer system**.

Impervious surfaces present a significant challenge as they not only replace vegetated cover, reducing water retention and infiltration into the ground, but also generate increased runoff that flows more rapidly into the sewer network. As the town grows, new roads, roofs and pavements are built. That means increasing rapidly the impermeable surfaces and therefore the amount of **runoff** into the sewer system. Putting more pressure on its capacity, increasing the magnitude of **floods** and the amount of **pollution** in the watercourses.

Within most urban areas in the UK the majority of the existing sewer network is "**combined**", receiving **foul** water from toilets and other domestic, commercial and industrial usage, as well as **rainwater** runoff from roads, pavements and roofs. Flooding from these combined sewers poses a particular **pollution** and **food** damage problem.



Example of surface water flooding

To understand how rare a flood event is, we use a concept called the "**return period**" or "**annual exceedance probability** (AEP)". These tells us about their probability of occurrence, which means the chance of a flood happening in any given year. It is important to remember that this is a statistical way of describing events. It does not mean that the 1-in-200-year flood will only happen once in a 200-year period. **Flood is a natural event that can occur at any time**. So, it is possible to experience two 200-year floods within a short span of time.



Example of SuDS (source NatureScot)

SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

Traditional engineering aims to move storm-water away from the streets and properties as quickly as possible by directing it into the combined sewer network, burn or river. As the town grows more water is directed into sewer network, burn or river. Relying entirely on this approach can stress the sewer network and watercourses, increasing the **risk of flooding** and **pollution**. This can result ultimately in a **costly** and **unsustainable** sewer system which is incapable of dealing with urban growth and climate change.

New approaches are being adopted. The strategy we follow for new development sites is to minimise impact by **imitating the natural drainage processes** using **SuDS**. SuDS have **innovative** designs and they can take many forms to collect, store and treat overland flow, before releasing it back into the environment. Most SuDS are types of **green infrastructure**, which provide habitat that enhances the **ecology** and **amenity** of the area, creating **attractive spaces** for living, working and playing for the local community. However, historical urban areas served by a combined sewer continue to experience surface water flooding

3. Predicted flood risk

An **integrated catchment model** has been developed to represent the interactions between the sewer network, watercourses, and urban fabric of Blairgowrie & Rattray. This model included the Rattray Burn, Cuttle Burn Den and a representation of the River Ericht. The model was used to produce maps showing the estimated **extents of floods** for a range of extreme rainfall events.

Figure 2 and **Figure 3** show the estimated extent and depth of the **1:30-year flood** (the flood with a 3.33% chance of occurring in any given year). This is the magnitude of event that a modern-day urban drainage network is designed to handle, and although the network in Blairgowrie & Rattray was constructed prior to this standard becoming typical it remains a useful benchmark for comparison.

Using a combination of the reported flood history; responses to the public questionnaire submitted in February 2023; and predicted flood outlines produced by the integrated catchment model, **three flooding ‘hotspots’** were defined. These are shown on **Figure 1** with the hotspots located at:

- HOTSPOT 1: Blairgowrie town centre**
- HOTSPOT 2: Burnhead Road**
- HOTSPOT 3: Rattray Burn**

The integrated catchment model indicates that **76 properties are currently at risk of flooding** throughout Blairgowrie & Rattray at the 1:30-year event, estimated to increase to **91** by 2080 due to anticipated **climate change**.



Figure 1. Flooding hotspots across Blairgowrie & Rattray

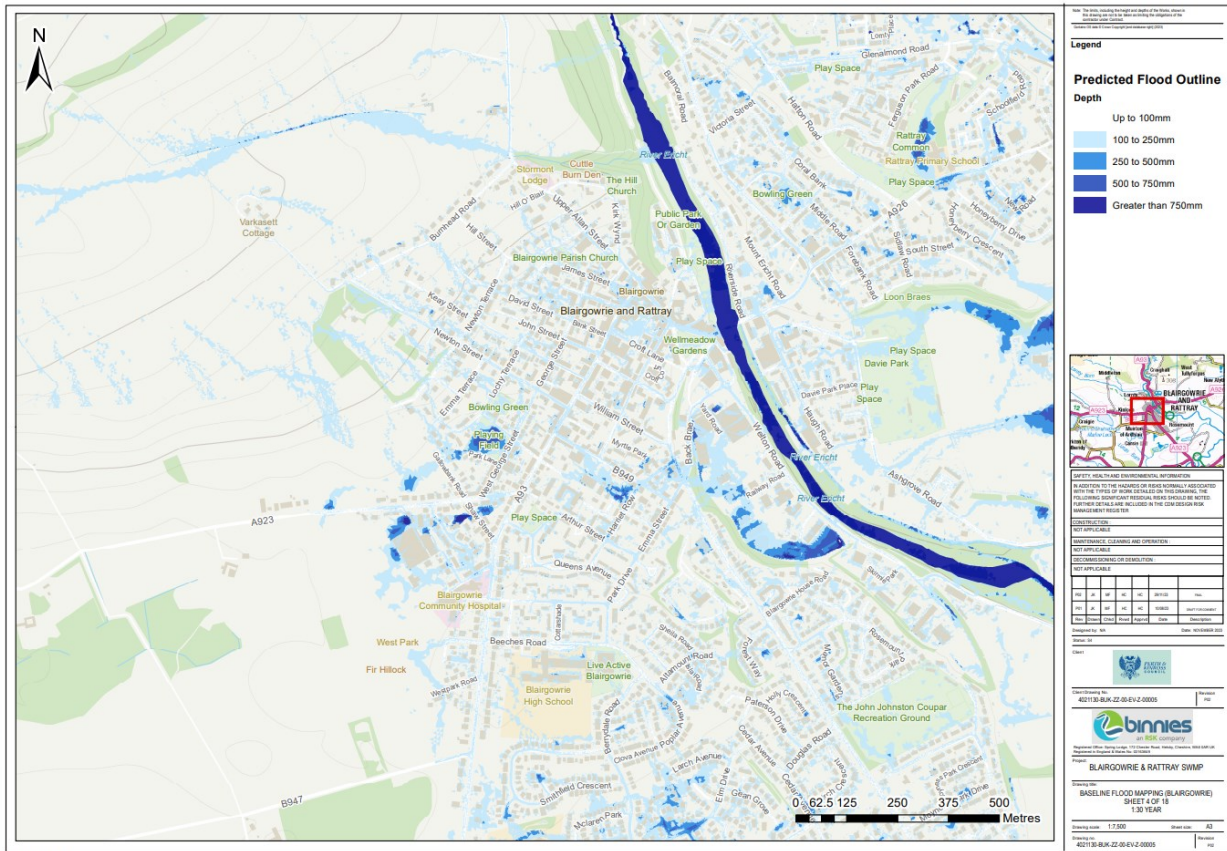


Figure 2. Estimated extent and depth of the 1:30-year flood at Blairgowrie

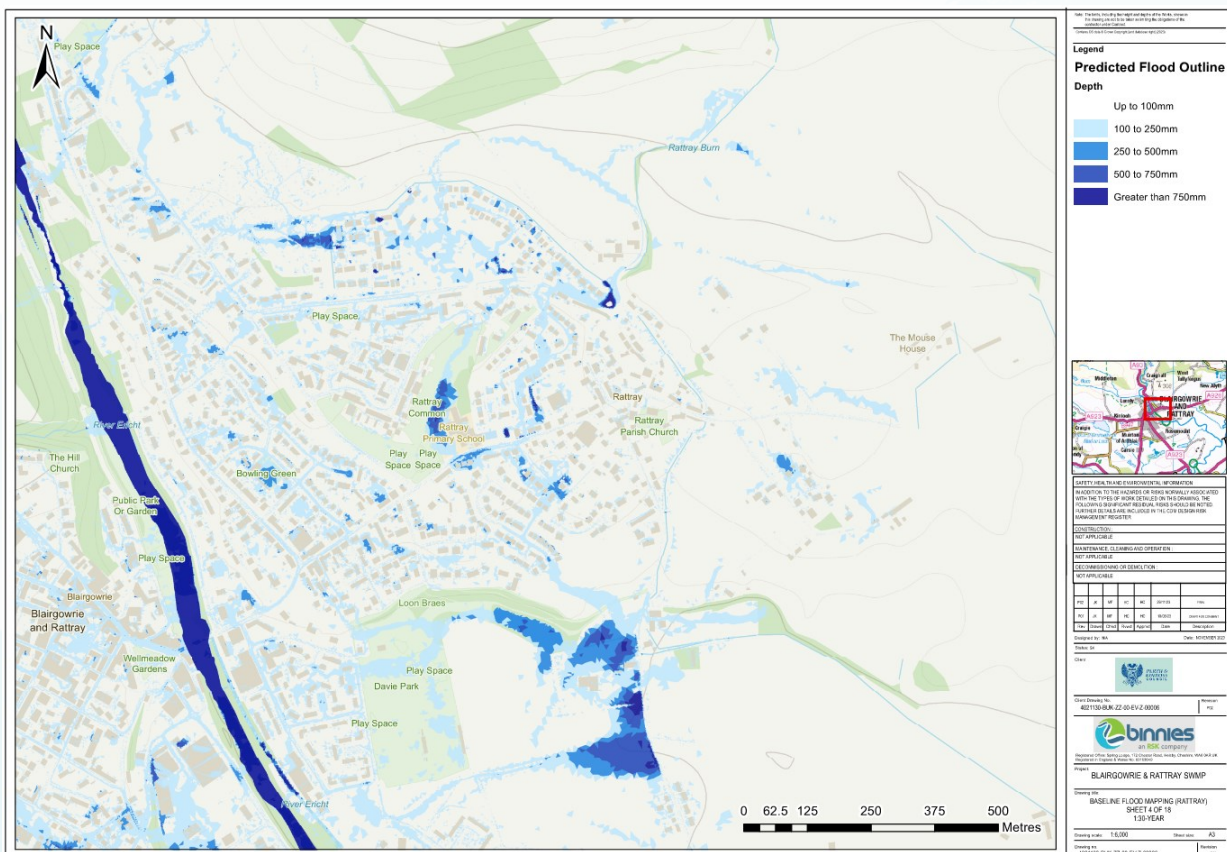


Figure 3. Estimated extent and depth of the 1:30-year flood at Rattray

4. Flood risk management

To develop options for managing and, if possible, reducing flood risk in Blairgowrie and Rattray, we followed a series of steps.

1. Available information and a hydraulic model were used to identify the flooding issues within the catchment. These findings serve as a **baseline** for evaluating options to manage flood risk.
2. A **long-list** of measures was considered that could be taken to reduce or manage the flood risk. This was screened to remove measures that were clearly unfeasible, leaving an initial short list of potential actions.
3. We conducted a high-level scoring exercise to evaluate the options and produce a final **short-list** of those that are most feasible. This helped us eliminate measures that were not practical or viable for the situation.
4. We conducted a **detailed appraisal** (multi-criteria assessment) of the final short-listed options using the hydraulic model. This involved evaluating their performance under different scenarios, considering their implementation requirements, compatibility with other policies and plans, and their potential to achieve the objectives of the SWMP.
5. Based on the results of the appraisal, we selected **recommended options**. Factors such as effectiveness, affordability, environmental and social impacts were considered during the selection process.

Multi-criteria assessment

Options are evaluated against a range of criteria to determine their suitability, including **technical, environmental, social** and **economic** feasibility.

In managing flood risk, Perth & Kinross Council is required to have regard to the economic impact of its actions. For an option to be considered viable, the costs must not exceed the benefits, i.e. the **benefit-cost ratio** (BCR) must be greater than 1.

What was considered in the long-list?

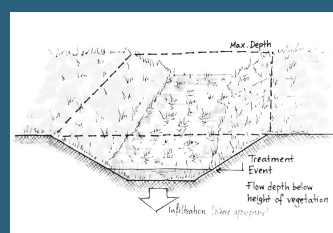
A range of different options were considered when producing the long-list. The options can be classified under the following categories:



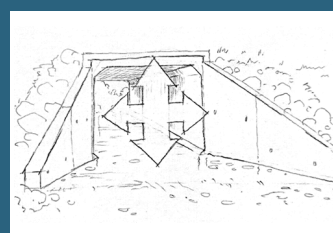
◀ Permeable SuDS



◀ SuDS ponds



◀ SuDS swales



◀ Hard engineering



◀ River restoration



◀ Natural flood management

Figure 4. Long-list of options (categories)

A total of **8 options** passed the multi-criteria assessment process, however the process is designed to highlight the best possible options that the Council can choose to implement based on funding and/or regulatory requirements moving forward. Therefore, the 8 options were ranked in order of preference based on their assessment scores, and the **top 5 options** from this ranking were:

- **Option A:** Surface water diversion (speed hump) at Upper Allan Street
- **Option B:** Natural Flood Management (leaky dams) on the Rattray Burn
- **Option C:** Disconnection of the industrial area at Welton Road from the combined sewer network
- **Option D:** Construction of SuDS on Rattray Common
- **Option E:** Construction of a swale behind Burnhead Road

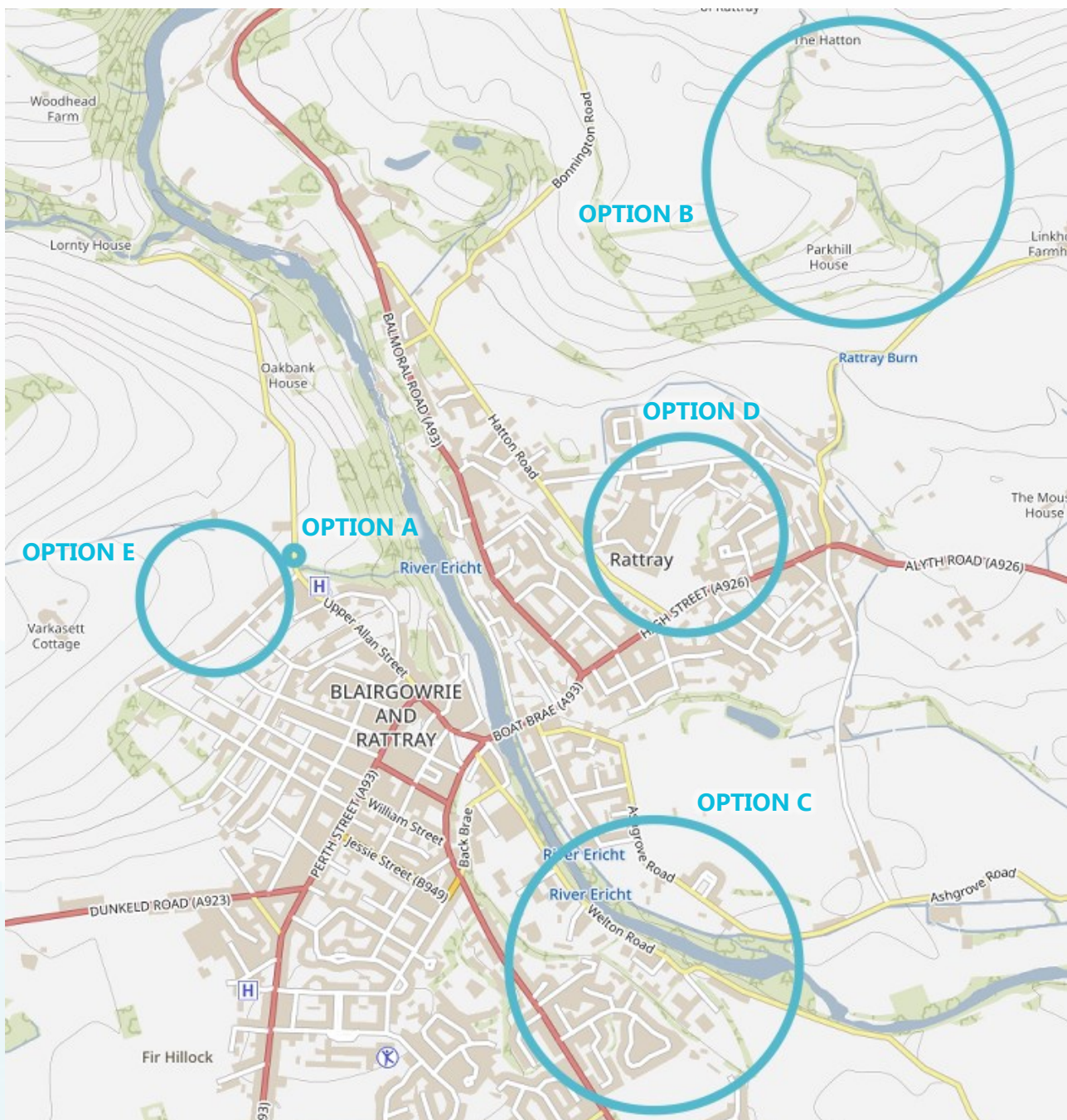
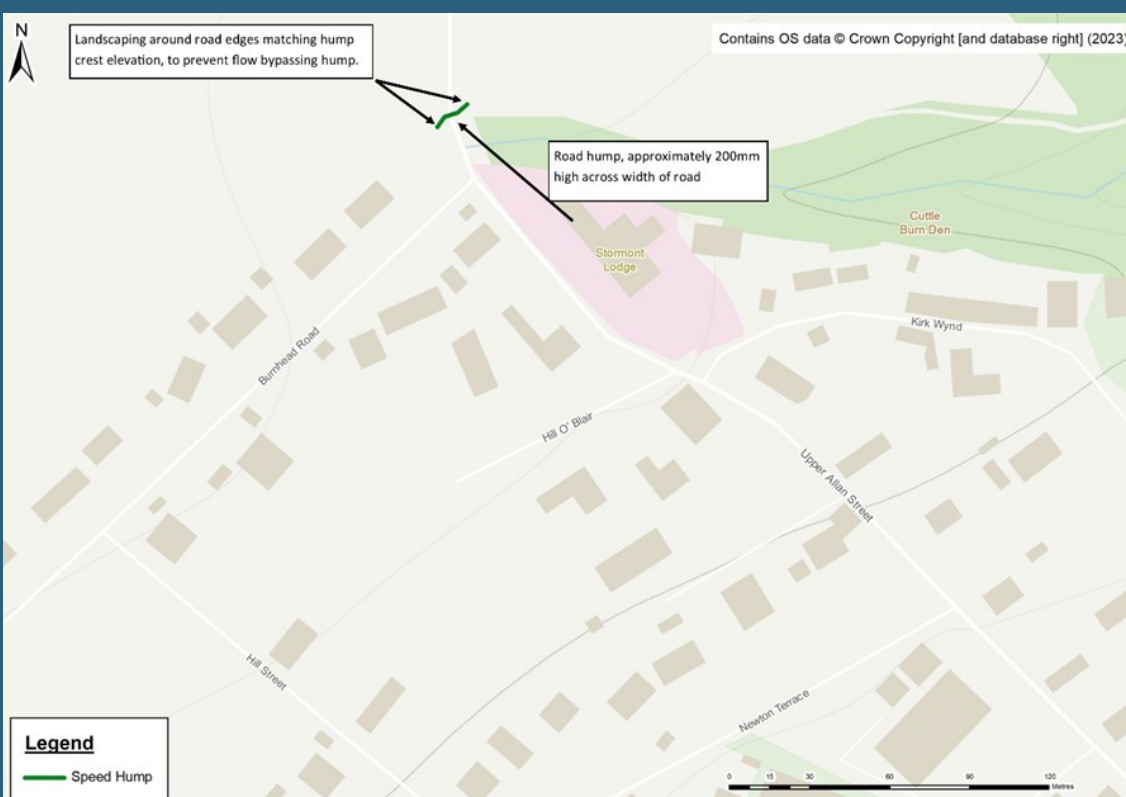


Figure 5. Location of the top 5 options

OPTION A

Surface water diversion (speed hump) at Upper Allan Street

This was the top scoring option from the multi-criteria assessment. It is a simple speed ramp, placed on Upper Allan Street. The rationale behind this is to intercept overland flow that currently causes some of the flood risk experienced in Blairgowrie town centre and direct it into Cuttle Burn Den which will naturally enable it to flow towards the River Ericht away from buildings in the town. Figure 6 indicates on a map where this feature would be sited; and Figure 7 shows a recent flood event showing silt deposits from the overland flow towards Blairgowrie which implementation of the option aims to intercept and direct away from the town.



▲ Figure 6. Indicative sketch showing proposed implementation of Option A

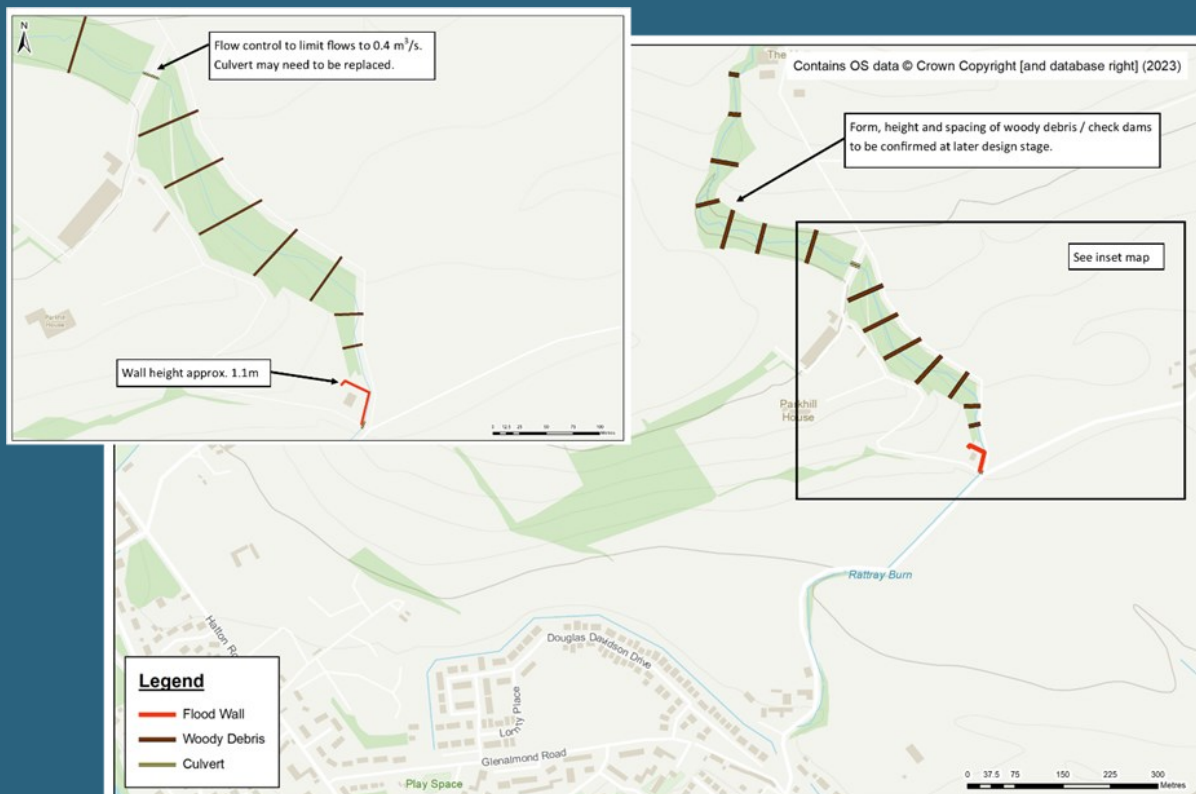


▶ Figure 7. Proposed location of speed hump, showing deposition from overland flow during the flood event of November 2023

OPTION B

Leaky Dams / Natural Flood Management on the Rattray Burn

This option scored 2nd place in the multi-criteria assessment. The rationale behind this is to hold water further up in the Rattray Burn catchment releasing it slowly to keep it within the capacity of the Rattray Burn channel for as long as possible thus reducing the amount of time it spills out-of-bank towards the urban area of Rattray. Figure 8 indicates on a map where these features could be sited; Figure 9 shows the wide and deep river channel at the location where the leaky dams are proposed and Figure 10 shows an example of what a leaky dam looks like in-situ.



▲ Figure 8. Indicative sketch showing proposed implementation of Option B

▼ Figure 9. Form of river channel at suggested location for option implementation



▼ Figure 10. Example leaky dam, image from Yorkshire Integrated Catchment Solutions Programme



OPTION C

Disconnection of the industrial area at Welton Road from the combined sewer network

This option scored 3rd place in the multi-criteria assessment. The rationale behind this is to redirect surface water runoff out of the combined sewer into an open pond to treat it prior to discharge into the River Erich. This increases the combined sewer capacity upstream reducing the surface water flood risk in Blairgowrie town centre. Figure 11 indicates on a map where this features could be sited and Figure 12 shows an example of a small-scale SuDS pond attenuating and treating flow prior to discharge to watercourse to provide an impression of what this feature may look like.



▲ Figure 11. Indicative sketch showing proposed implementation of Option C



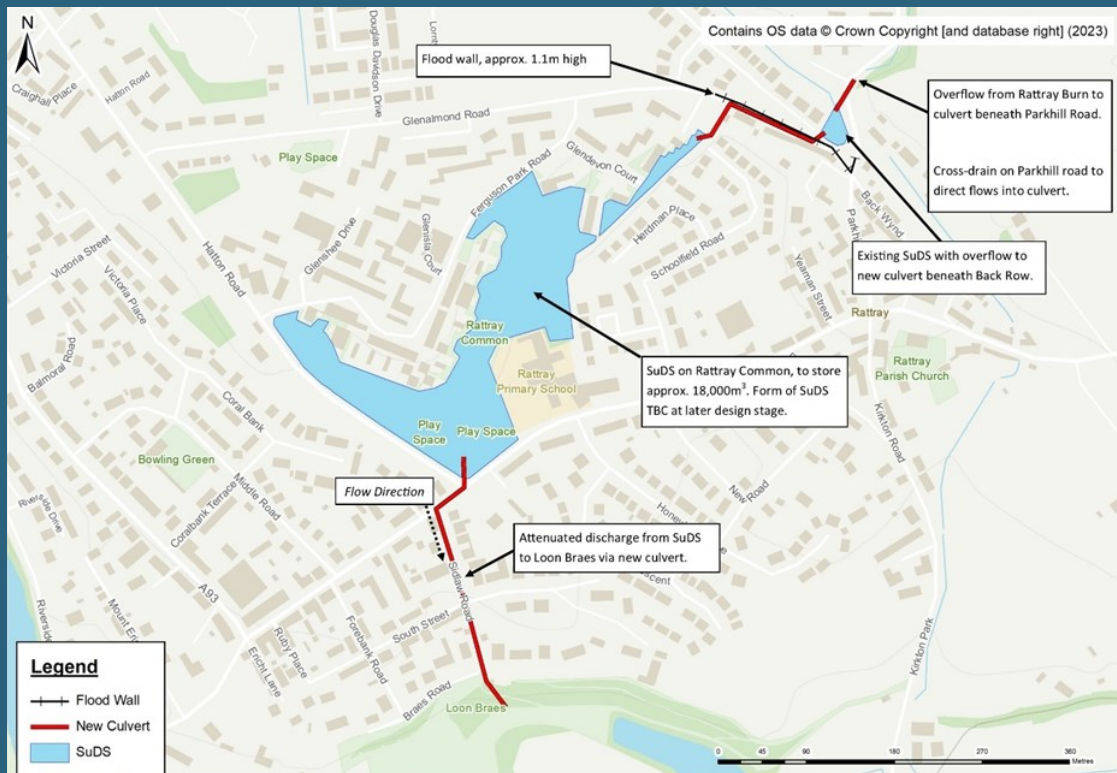
▶ Figure 12. Example small-space SuDS pond in Carstairs (image from NatureScot)

OPTION D

Construction of SuDS on Rattray Common

This option scored 4th place in the multi-criteria assessment. The rationale behind this is to direct excess flows from the Rattray Burn and route them to a new SuDS facility in Rattray Common prior to discharge to Loon Braes. A high volume of water is estimated to be required for storage/attenuation but the storage for this can be split between Rattray Common, Loon Braes and potentially to an expanded SuDS facility at David Grimmond Place (subject to agreeing use of land). Figure 13 indicates on a map where the features could be sited and Figure 14 shows an example of a large-scale SuDS to provide an impression of what such a facility could look like.

It is important to note that the proposals at feasibility study stage are primarily to understand if the option is viable, and that the final form of an intervention of this size can be a community driven design and sometimes involves other aspects such as landscape architecture and/or active travel routes depending on other local aspirations.



▲ Figure 13. Indicative sketch showing proposed implementation of Option D



◀ Figure 14. Large SuDS within a park at Countesswells (image from NatureScot)

OPTION E

Construction of a swale behind Burnhead Road

This option scored 5th place in the multi-criteria assessment. The rationale behind this is to collect overland flow in a small ditch from steep fields behind Burnhead Road and direct it towards the Cuttle Burn Den so it can then naturally flow into the River Ericht and away from properties. Figure 15 indicates on a map where this option could be sited.



▲ Figure 15. Indicative sketch showing proposed implementation of Option E



◀ Figure 14. Example of a swale

Each of the short-listed options have varying levels of benefit. It is difficult to estimate a standard of protection for surface water management measures, however it is possible to estimate the **reduction in the number of properties at risk** for a given flood event. It is also possible to estimate the **cost** of each option and compare this with the **benefit** to produce a **benefit-cost ratio** (BCR). If this BCR is **greater than 1**, then this suggests that implementation of the **option will save more than it will cost**. Typically, options with a **BCR < 1** are **not progressed** as they would not represent responsible use of public funds.

Option	A	B	C	D	E
Reduction in no. flooded properties at 1:30-year flood event	4	10	28	19	5
Reduction in no. flooded properties at 1:200-year flood event	2	11	27	23	8
Capital Cost	£42,462	£237,293	£986,840	£2,116,880	£78,390
Total cost, including operation & maintenance across a 100-year lifespan	£42,432	£237,293	£1,235,000	£2,277,040	£150,550
Estimated flood damages avoided across a 100-year lifespan	£532,462	£1,412,072	£5,541,873	£2,521,956	£640,366
Benefit-cost ratio	12.5	6.0	4.5	1.1	4.3
Multi-criteria assessment score	78%	78%	78%	77%	73%

5. Consultation & Next steps

A **community drop-in session** will be held at:

Blairgowrie Town Hall, Brown Street

on the following dates:

DAY 1:

**Wednesday, 28th February
from 2pm to 8pm**

DAY 2:

**Thursday, 7th March
from 2pm to 8pm**

Council officers and the design consultants will be present to provide an opportunity for residents to learn more about the study outcomes and ask any questions.

It is also anticipated that the following partner agencies will be present on Thursday 7th March between the times noted below:

Scottish Water — 2pm to 4pm to answer any queries on the sewer network.

SEPA — 2pm to 4pm to provide advice on Floodline and the Scottish Flood Forecast.

Scottish Flood Forum — 3pm to 6pm to provide advice on property flood resilience products.

The Council has outlined the draft study findings within this newsletter and on the **Council's consultation hub**

(See: <https://consult.pkc.gov.uk/communities/blairgowrieswmpevent>)

The study findings suggest **options which aim to reduce flood risk** at locations across Blairgowrie & Rattray. These will improve the town's resilience to frequent flood events, but cannot completely eliminate the risk of flooding.

Residents are encouraged to **provide their views** on the draft study findings and its recommendations. A **comment form** is available from the consultation hub 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 22nd March 2024.

A **Question & Answer document** will be produced following receipt of the comment forms and will be circulated to those that responded (and available on the consultation hub) to answer any queries/comments received.

The Blairgowrie & Rattray Surface Water Management Plan will then be **updated** and **finalised**. The conclusions of the plan will then be reported to the next **Climate Change and Sustainability Committee**. Thereafter, the Council will seek to secure funding and any relevant regulatory approvals to implement the recommendations of the report.

Contact details

For further information on the Blairgowrie & Rattray Surface Water Management Plan please contact:

Russell Stewart, Senior Engineer (Flooding)

Perth & Kinross Council, Pullar House,
35 Kinnoull Street, Perth, PH1 5GD

Tel: **01738 475000**

Email: **flood@pkc.gov.uk**