PERTH & KINROSS COUNCIL

Amey

PERTH

Surface Water Management Plan

1. Making Perth Rain Ready

Amey Consulting, on behalf of Perth & Kinross Council, have been looking at how we can better manage rainwater in **Perth**, taking steps to help reduce flooding of homes, business and important transport links, while also protecting our streams and rivers.

A **Surface Water Management Plan** (SWMP) has been developed for the area, to understand the existing flood risk and investigate potential ways to better manage surface water and help prepare for the impacts of climate change.

This SWMP is a **long-term strategy**, developed in consultation with key organisations such as SEPA and Scottish Water, and **community feedback** is important as well. Your experience and views are a crucial to help shape any proposals to manage flood risk.

There is a **history of flooding in Perth, with recent notable flooding events** occurring in August 2020, September 2022, October 2023 and July 2025. Perth 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**, Perth is designated as a potentially vulnerable area (reference 02/08/12) 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 Perth.

Further information is available at **www.pkc.gov.uk/frmplans**

Various sources contribute to the flood risk in Perth, from the **River Tay** and smaller **urban watercourses**, **surface water runoff** and **overloaded drainage systems**.

The key objectives for the Perth SWMP were to:

- Build on previous flood risk management work to **improve the understanding of the flood risk** in Perth, through an integrated catchment study.
- Investigate measures and opportunities to **manage and 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 make rainfall heavier in the future.
- **Improve local green spaces, habitats and biodiversity**, contributing to enhanced placemaking.
- Enable **appropriate and sustainable economic development**

We hope you find this document informative and are eager **to hear your feedback** regarding this work.

Craigie Burn at Queen's Avenue, Perth

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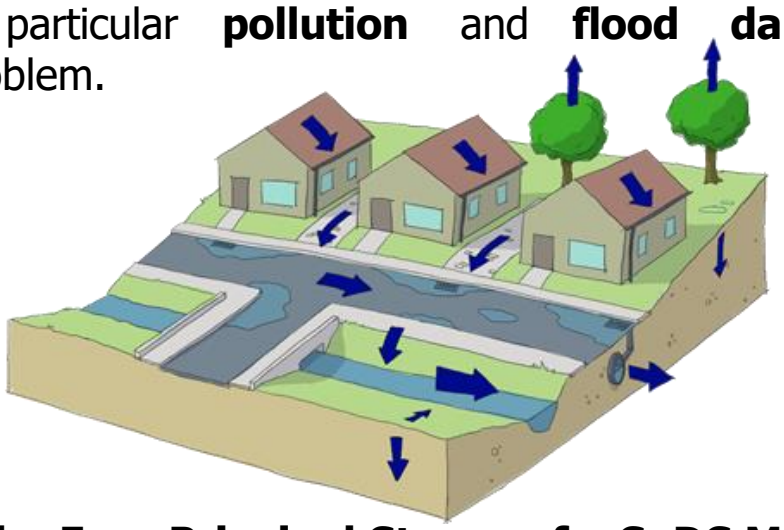
2. Understanding Surface Water Flooding

When it rains, that **water has to go somewhere**. If rainwater can't soak into the ground or evaporate, it washes off into drains leading to **watercourses** or the **sewer system**.

I**mpervious surfaces** are a significant challenge as they not only replace the 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 city 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 (via increased spills from combined sewer overflows).

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 **flood damage** problem.



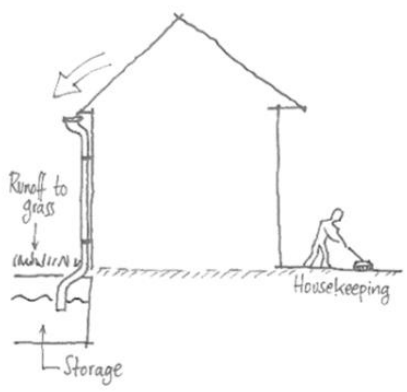
SUSTAINABLE **D**RAINAGE **S**YSTEMS (**SuDS**)

Traditional engineering aims to move storm-water away from the streets and properties as quickly as possible by directing drainage systems into a burn, river or Waste Water Treatment Works. Relying on this approach can **overload** drainage systems and watercourses, increasing **flood risk** and **pollution**. This can result ultimately in a costly and unsustainable sewer system which is unable to deal with urban growth and climate change.

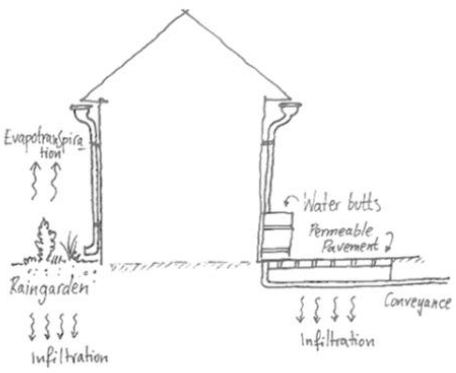
New approaches are being adopted. The strategy we follow for new development sites is to minimise impact by imitating the natural drainage processes using Sustainable Drainage Systems (SuDS). SuDS have innovative designs and they can take many forms to collect, store and treat overland flow, before releasing 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. The four principles stages of SUDS management are outlined below.

The Four Principal Stages of a SuDS Management Train

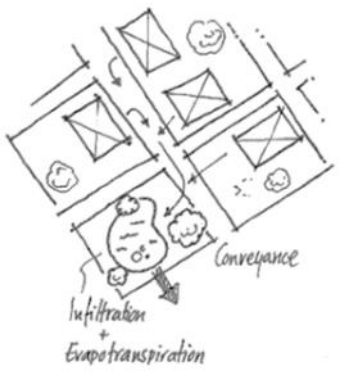
1. Prevention: Good site design and effective housekeeping measures can help minimise runoff and pollution levels. These approaches should generally be included within the site management plan to ensure that they are implemented.



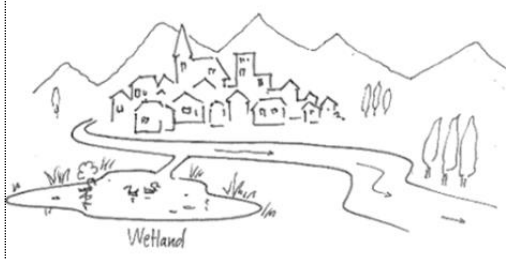
2. Source control: Effective control of runoff at or very near it's source. This can be achieved with features such as green roofs, soakaways, rain gardens and permeable pavements. When rainwater is harvested on site it can be re-used as a source of non-potable 'grey' water thereby reducing the demand for fresh mains water.



3. Site control: Planned management of water in a local area or site - examples would include routing water from building roofs and car parks to soakaway or infiltration areas and then to storm tanks or a detention basin thereby attenuating the flow of water entering the system after a storm event.



4. Regional control: Designing a system that can efficiently manage the runoff from a site, or several sites, typically resulting in a storage pond or wetland. This provides a natural method of handling excess water thereby reducing the risk of flooding events.



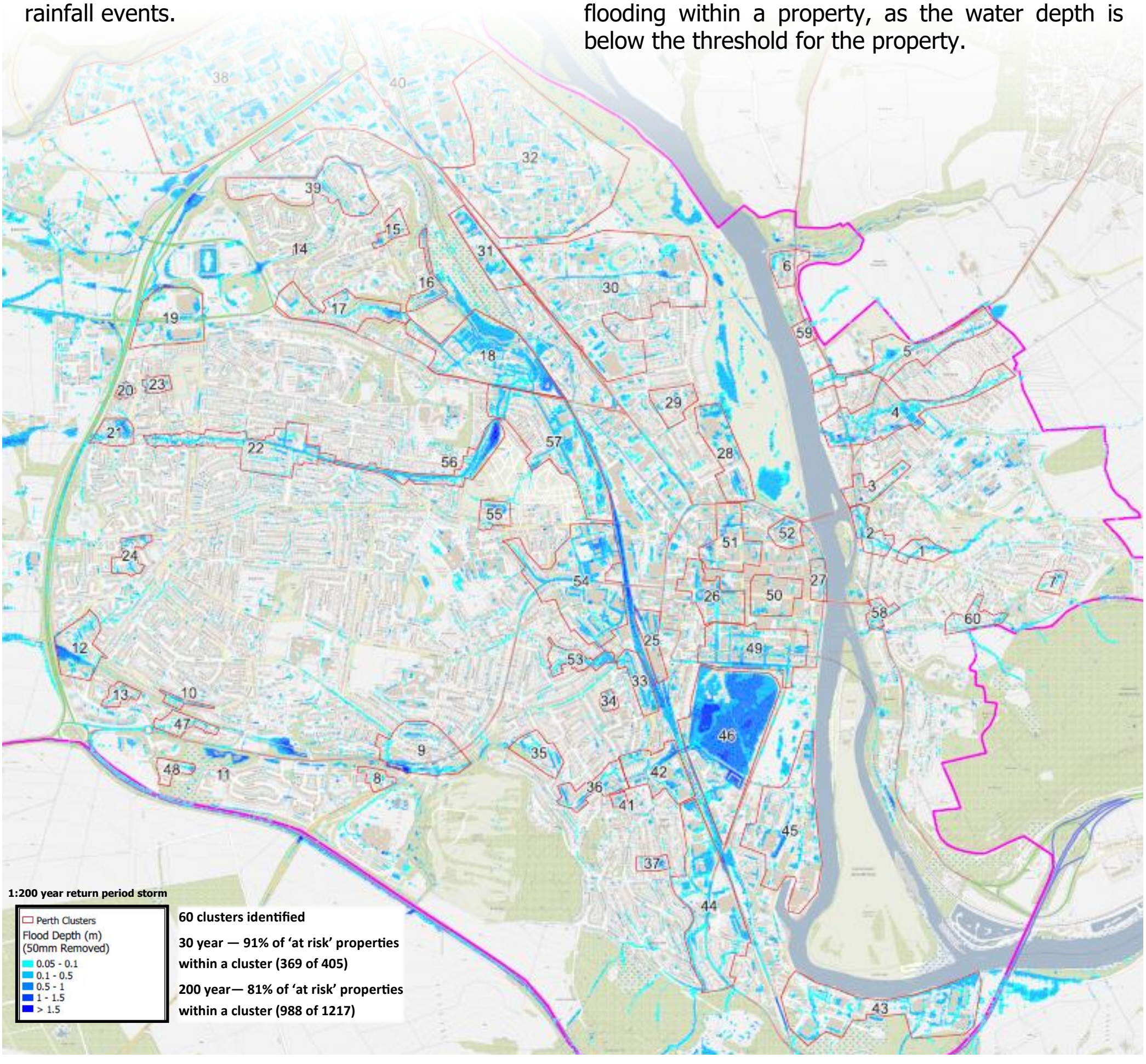
3. Predicted Flood Risk

An extensive **hydraulic computer model** was developed for the Perth SWMP, utilising up-to-date techniques to represent the interactions between drainage systems, watercourses and urban landscape of Perth.

The model was used to **predict** which areas are most likely to be affected by surface water flooding, with **flood maps** produced for a range of extreme rainfall events.

The map below shows the **estimated extent and depth** of the **1:200 year rainfall event** (a rainfall event with a 0.5% chance of occurring in any given year).

Whilst **extensive flooding** is identified across Perth, this is **relatively shallow** in a number of areas. This means that although an area is within the flood extents, it does not necessarily result in flooding within a property, as the water depth is below the threshold for the property.



The model predicts **405** properties at risk during the 1 in 30 year storm event and **1217** during the 1 in 200 year storm event. In future (2080) this is estimated to increase to 1041 and 2198 properties at risk respectively due to the effects of climate change.

The SWMP identified a total of **60 clusters** which cover the areas of highest surface water flood risk across Perth. These are shown on the above plan.

4. Flood risk management

To develop options for managing and, if possible, reducing surface water flood risk in Perth, we followed a series of steps:

1) Available information and the outputs from the hydraulic modelling exercise were used to identify the areas of highest surface water flood risk. This served as a **baseline** to consider potential options to manage flood risk in the catchment.

2) We undertook a screening exercise of the identified clusters to refine this down to areas with the most potential to identify viable options. This reduced the initial 60 clusters to 29, and a further multi-criteria assessment identified 14 areas as being the highest potential to identify measures.

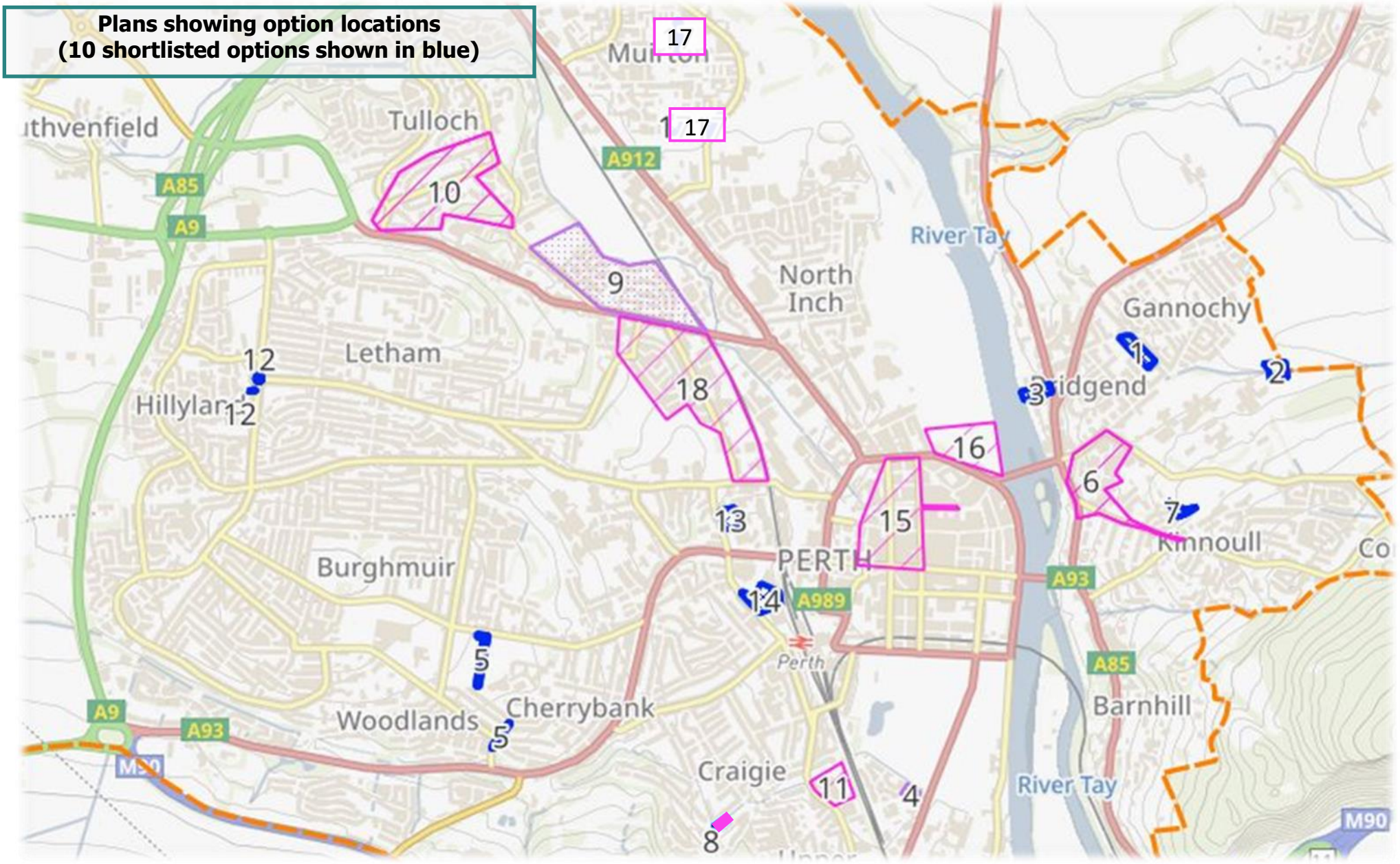
3) For the 14 identified areas, a **long-list** of potential actions was considered that could manage or reduce the risk of surface water flooding. This list was screened to remove clearly unfeasible actions, leaving an initial short list of 18 potential actions, as shown in the plan below.

4) We conducted a high-level scoring exercise to evaluate options and produced a final **short-list** of 10 actions that were most likely to be viable, as indicated in blue in the plan below.

5) We conducted a **detailed appraisal** 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.

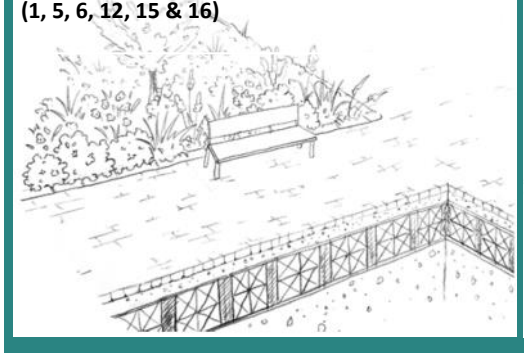
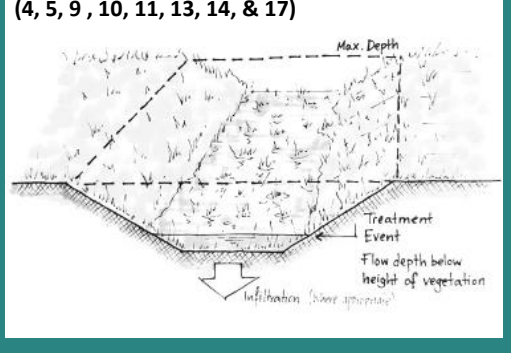
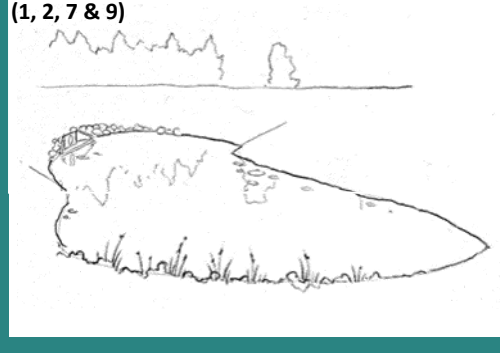
6) Based on the outcome of the appraisal process, options were **recommended**. Factors such as effectiveness, affordability, environmental and social impacts were considered during the selection process. Non-structural measures were also considered as part of the overall recommendations.

Plans showing option locations
(10 shortlisted options shown in blue)



What type of measures were considered?

A range of different options were considered during the options appraisal:

Improved drainage/Infiltration	Sewer disconnections /SuDS	Increased storage/Attenuation	Conveyance Improvements
(1, 5, 6, 12, 15 & 16)	(4, 5, 9 , 10, 11, 13, 14, & 17)	(1, 2, 7 & 9)	(3 & 8)
			

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5. Options Appraisal - Short List

Perth SWMP Short list summary table

Option ID	Cluster Number	Option Description	Capital cost	Total PV Benefits	Benefit : cost ratio
1a	4	SuDS Attenuation, additional road drainage on Dupplin Road and Annat Road with a raingarden opposite Gannochy Pond.	£145,622	- £ 12,327	0
2	4	Upper catchment attenuation and storage in fields opposite the	£189,201	- £ 11,212	0
3	4	Create surface water route to River Tay through derelict land using cascading swales and raingardens.	£134,231	£ 5,927	0
5a	9	Kerb drainage and storm sewer upgrade at Oakbank Crescent and Oakbank Place.	£171,180	£ 14,207	0.1
5b	9	SuDS swale and detention basin within Perth Academy grounds to intercept drainage before it reaches Oakbank Place.	£156,299	£ 21,291	0.1
7	2	SuDS attenuation in Millennium Park.	£467,409	£ 8,457	0
12a	22	Rannoch Road drainage upgrade and SuDS feature within Newhouse Road roundabout. Kerb drainage along Rannoch Road between Newhouse Road and Letham Road roundabouts.	£399,633	£ 6,718	0
12b	56	Kerb drainage along Rannoch Road between Letham Road and Unity Terrace roundabout, including periodic raingardens for interception	£293,487	- £ 11,392	0
13	54	Whitefriars industrial rooftop disconnections.	£412,647	£ 1,857,908	3.4
14	54	SuDS (infiltration and storage) Dewars Centre and Perth Leisure Pool	£220,600	£ 694,204	2.2

Each of the short-listed options were tested and assessed using the hydraulic model. The adjacent summary table shows the key details from this assessment—estimated capital **costs**, estimated overall **benefits** and the **benefit to cost ratio** (BCR).

Options typically require a **BCR greater than 1** to be considered feasible, as this demonstrates effective use of public funds.

The adjacent table shows the outcome of this appraisal.

The below graphic shows options 1a, 2, 3 and 7 which are located in the Gannochy and Kinnoull areas of Perth.

All options had limited, and in some cases negative, impacts on flood risk and so were **not recommended**.

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5. Options Appraisal - Short List (continued)

Perth SWMP Short list summary table

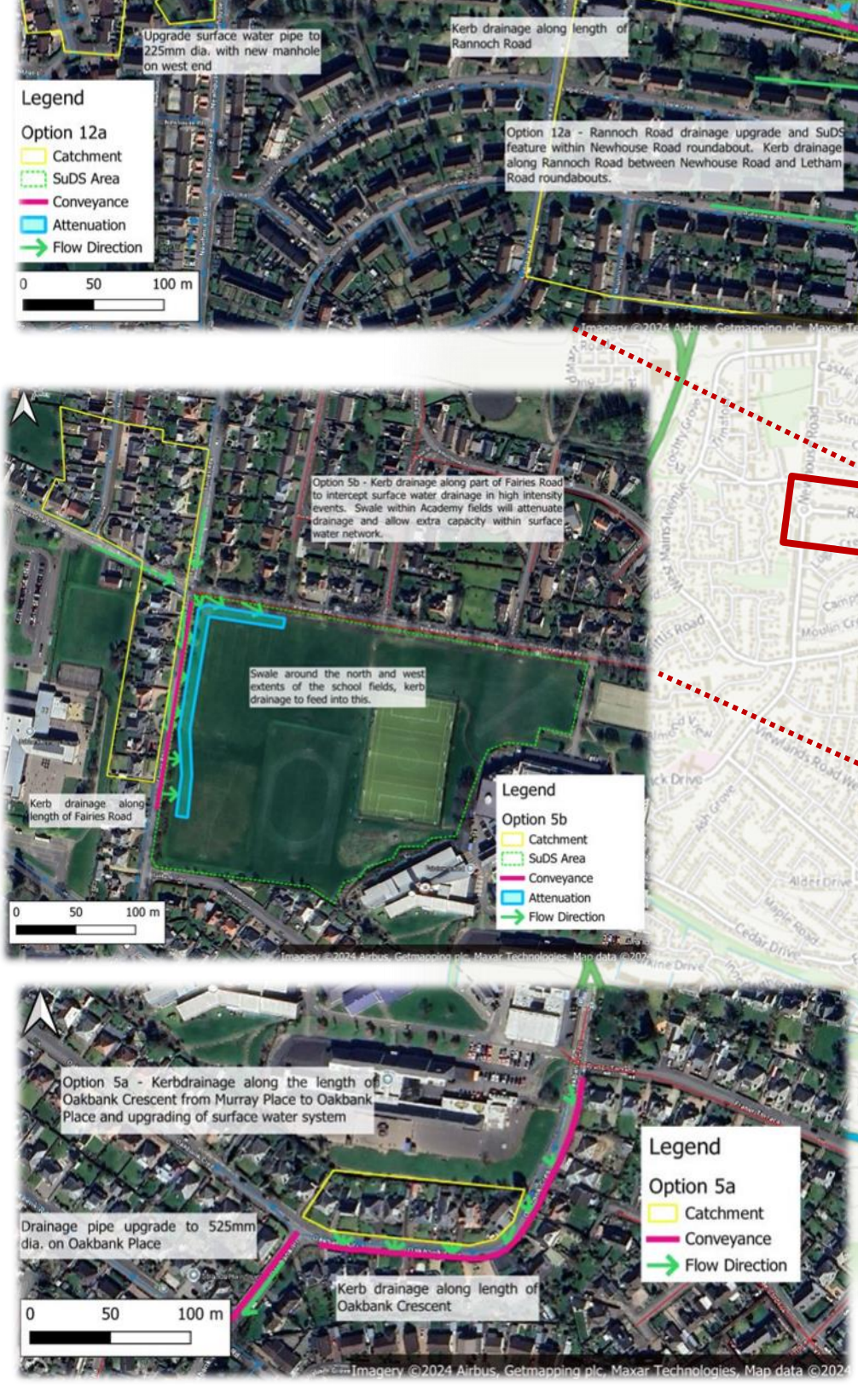
Option ID	Cluster Number	Option Description	Capital cost	Total PV Benefits	Benefit : cost ratio
1a	4	SuDS Attenuation, additional road drainage on Dupplin Road and Annat Road with a raingarden opposite Gannochy Pond.	£145,622	- £ 12,327	0
2	4	Upper catchment attenuation and storage in fields opposite the	£189,201	- £ 11,212	0
3	4	Create surface water route to River Tay through derelict land using cascading swales and raingardens.	£134,231	£ 5,927	0
5a	9	Kerb drainage and storm sewer upgrade at Oakbank Crescent and Oakbank Place.	£171,180	£ 14,207	0.1
5b	9	SuDS swale and detention basin within Perth Academy grounds to intercept drainage before it reaches Oakbank Place.	£156,299	£ 21,291	0.1
7	2	SuDS attenuation in Millennium Park.	£467,409	£ 8,457	0
12a	22	Rannoch Road drainage upgrade and SuDS feature within Newhouse Road roundabout. Kerb drainage along Rannoch Road between Newhouse Road and Letham Road roundabouts.	£399,633	£ 6,718	0
12b	56	Kerb drainage along Rannoch Road between Letham Road and Unity Terrace roundabout, including periodic raingardens for interception	£293,487	- £ 11,392	0
13	54	Whitefriars industrial rooftop disconnections.	£412,647	£ 1,857,908	3.4
14	54	SuDS (infiltration and storage) Dewars Centre and Perth Leisure Pool	£220,600	£ 694,204	2.2

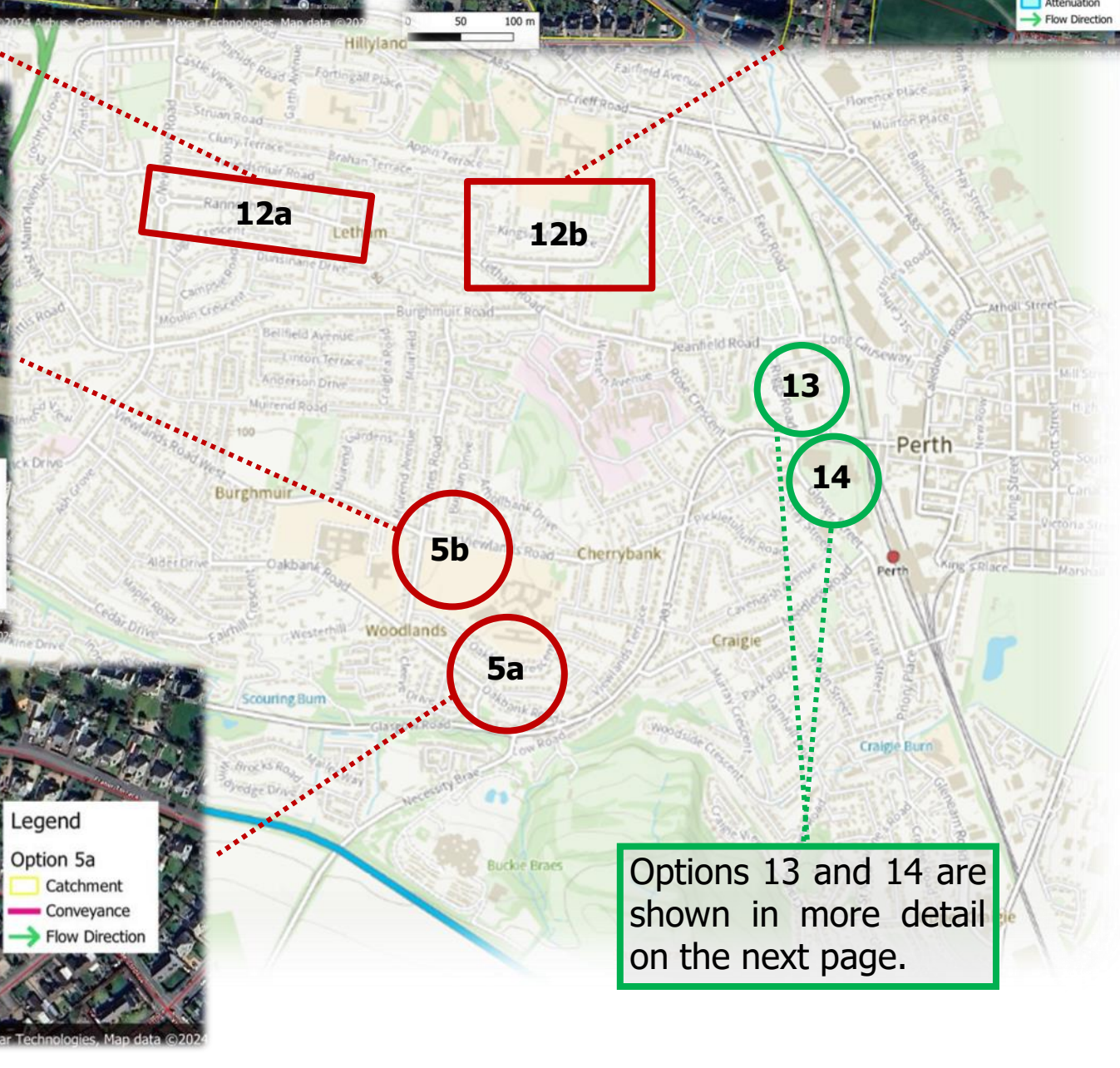
The below graphic shows options 5a, 5b, 12a and 12b which are located in the Letham and Oakbank areas of Perth.

These options had limited, and in some cases negative, impacts on flood risk and so were **not recommended**.

Potential collaboration opportunities with Scottish Water may exist that could realise some of the benefits of option 5b.

Options 13 and 14 were assessed to have **significant benefit** and form part of the **recommendations** of the SWMP.





Options 13 and 14 are shown in more detail on the next page.

6. Recommended Options

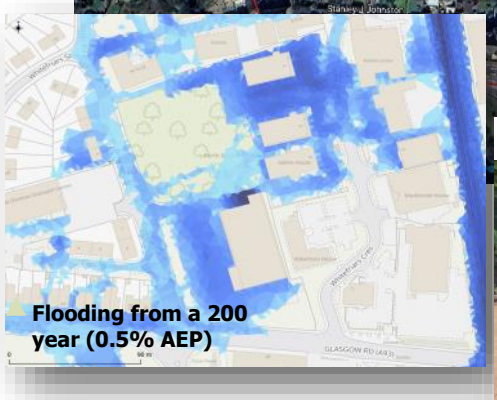
Option 13—Whitefriars Separation and SuDS

Why?

- Area identified as being at risk from surface water flooding from buildings and surrounding roads.
- Site offers an opportunity to reduce flood risk through the reduction of the inflows to the sewer network using SuDS.
- The attenuation space could be used for multiple purposes benefiting local business, the community and local ecology.

What is proposed and where are they to be located?

- Disconnect drainage from industrial rooftops and redirect into an independent SuDS Attenuation system.
- Surface water will be discharged into the existing sewer at a reduced rate which would help reduce flood risk.
- Potential to disconnect other buildings and road drainage into the attenuation site to maximise flood risk benefits.



Example of SuDS attenuation (source: susdrain.org)

Option 14—Dewars Centre and Perth Leisure Pool SuDS

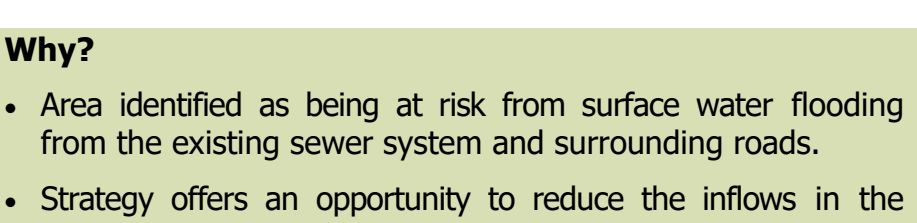
Why?

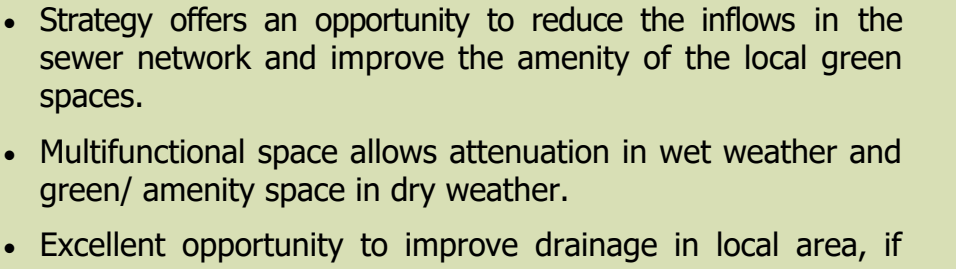
- Area identified as being at risk from surface water flooding from the existing sewer system and surrounding roads.
- Strategy offers an opportunity to reduce the inflows in the sewer network and improve the amenity of the local green spaces.
- Multifunctional space allows attenuation in wet weather and green/ amenity space in dry weather.
- Excellent opportunity to improve drainage in local area, if redeveloped.

What is proposed and where are they to be located?

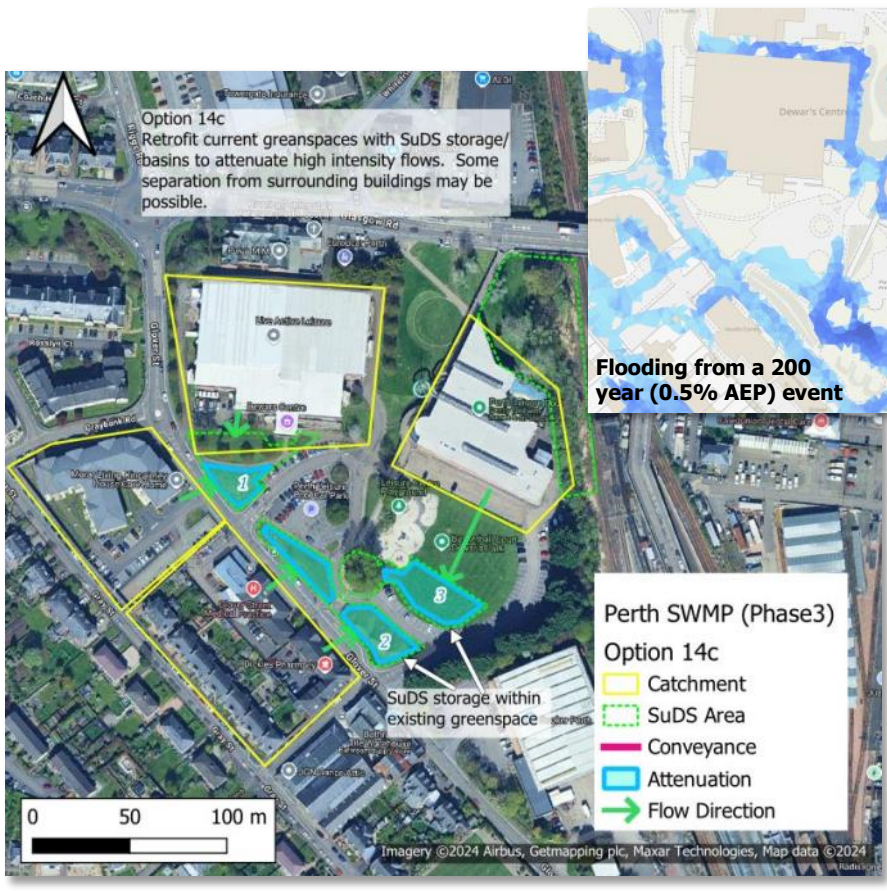
- Retrofit existing greenspaces on the site with raingardens or detention basins.
- Disconnect rooftops from Dewars Centre and Perth Leisure Centre.
- Control discharge back into the sewer system at a reduced rate which would help to reduce flood risk.
- Potential to disconnect further surrounding roof drainage and road drainage to connect into this system and maximise benefit

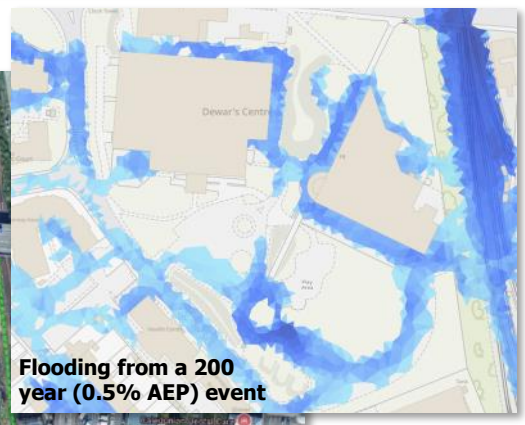
The option at Dewar's Perth Leisure Pool was initially identified through an opportunity to utilise the significant areas of greenspace through the site's current use. More recent, and ongoing discussions regarding the future use or redevelopment of the site do not alter these conclusions.





Examples of existing greenspace on site





Summary of Benefits

It is difficult to estimate a standard of protection for surface water measures; however we can estimate the potential reduction in the number of properties at risk. The below table shows the number of properties currently at risk and the predicted number of properties at risk if the preferred measures were established

Area	Option	M2	M5	M10	M30	M50	M100	M200
Cluster 54	Baseline	0	2	6	14	20	26	33
Whitefriars Industrial Park	Option 13	0	3	4	14	19	25	33
Dewars Centre and Perth	Baseline	0	2	6	14	20	26	33
Leisure Centre	Option 14	0	2	5	12	20	26	33

Green: indicates a reduction in the predicted number of properties affected by flooding

Red: indicates an increase in the predicted number of properties affected by flooding, which would require mitigation through the design process

7. Overall SWMP Recommendations

Summary of SWMP Findings

The **Perth SWMP** has further improved our understanding of flood risk across Perth, building on the significant amount of previous studies and ongoing projects across the city.

It has identified that there is **extensive surface water flooding** across Perth, however in many areas this is **relatively shallow** in depth.

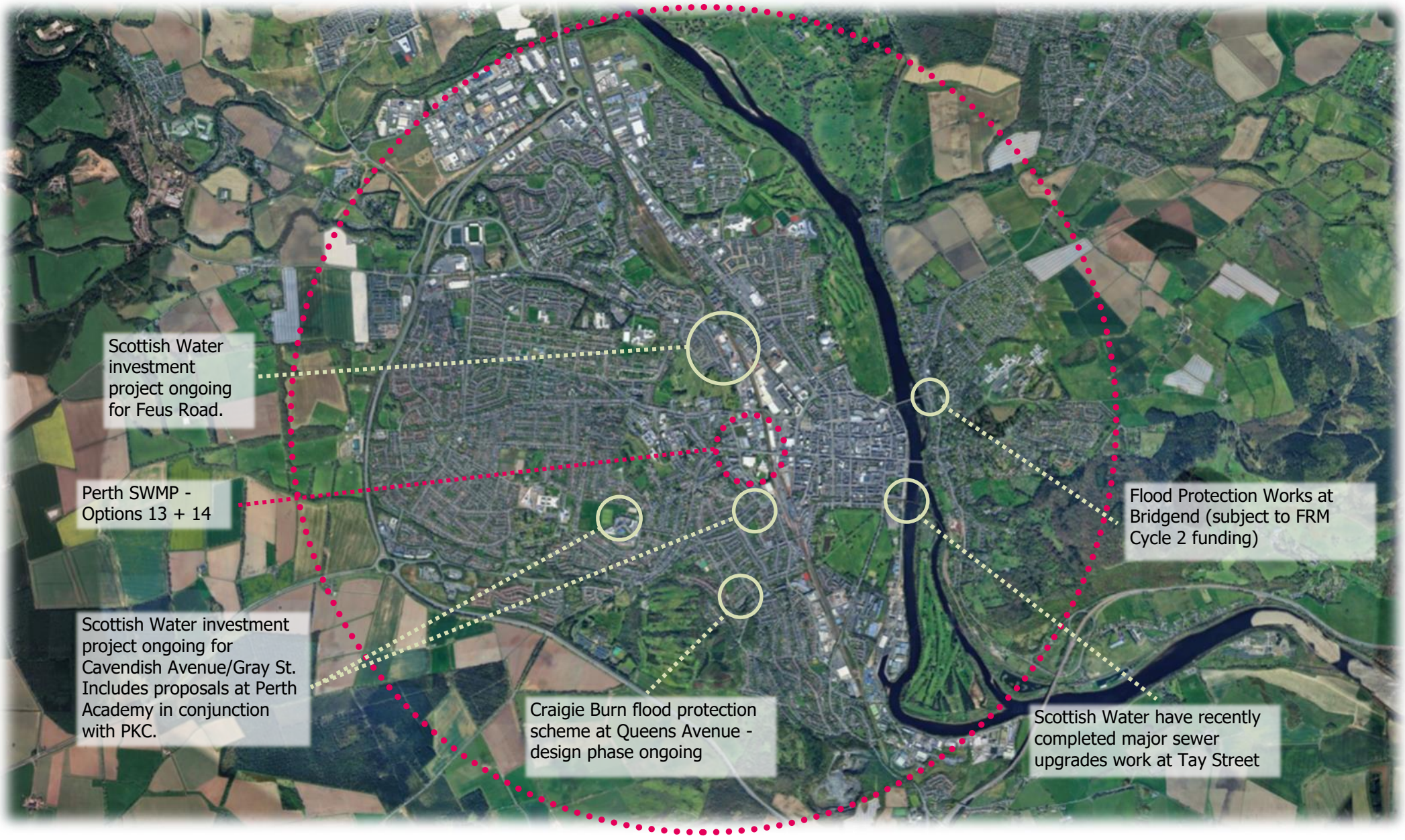
Like many large urban areas, Perth historically relies on **combined sewer systems** to manage both foul and surface water. Traditional drainage approaches has put pressure on these systems, with climate change increasing this further through predicted rises in rainfall volumes and intensities. As such many of the main trunk sewers are affected by a **lack of capacity**. The SWMP highlighted that Perth is constrained by limited opportunities to store surface water above ground, and reducing the risk typically requires prohibitively expensive infrastructure upgrades which often face technical challenges (spatial constraints and conflicts with buried utilities).

Two options were identified through the options appraisal process as being viable. It is considered that the best delivery mechanism for these benefits is through **future development opportunities** of these sites. The next iteration of the Local Development Plan (LDP3) presents an opportunity to deliver this either through site specific development requirements and through Blue-Green network mapping and guidance.

The SWMP also identified wider non-structural recommendations:

- Continued implementation of national and local **planning policies** to ensure no increase in surface water flood risk, and to realise opportunities for betterment (such as redevelopment of brownfield sites).
- **Improving resilience**, in line with the National Resilience Strategy — explore ways to increase uptake of property flood resilience (PFR) measures and supporting community resilience/flood groups.
- **Raising awareness** and **improving understanding** of surface water management
- Explore further **collaborative opportunities** to maximise surface water management through coordination with other projects or development proposals (some of which are highlighted on the map below)

Other projects/actions contributing to surface water management in Perth



Perth Flood Protection Scheme

Perth already benefits from the **Perth Flood Protection Scheme**, which was designed primarily to reduce the risk of flooding from the River Tay, but also from the smaller urban watercourses (Craigie Burn and Town Lade). The scheme provides significant flood storage within the city and includes a number of pumping stations to mitigate localised surface water flooding in these locations.

Work is also now ongoing on the design of the **Craigie Burn flood protection scheme**, which will improve the conveyance of the Craigie Burn in the vicinity of Balmoral Place and Queen's Avenue, reducing overall flood risk.

Flood protection works have also previously been identified at **Bridgend** to improve surface water drainage, and a design has been developed. This project is currently awaiting funding through Cycle 2 of the FRM process .

8. Further Information and Next Steps

On-going Maintenance by PKC

Road Drainage

The Council's Roads Maintenance Partnership regularly clean out carriageway gullies that collect the water from the road, and arrange special visits by gully tankers to respond to sudden blockages. Gullies are cleaned out biennially, with reactive cleansing more often in higher risk areas.

To report any issues, see the gulley cleaning schedule and view an interactive map of when we last cleared gulleys near you, please visit: Report drains and spillage issues - Perth & Kinross Council

Watercourses

Responsibility for watercourse maintenance primarily rests with the riparian (river bank) landowner; however the Council also has duties under the Flood Risk Management (Scotland) Act 2009 to inspect watercourses in its area from time to time. Watercourses within Perth (Scouring and Craigie Burn and the Town Lade) are routinely inspected on a 6-monthly basis. Where our assessments confirm the watercourses to be in a condition that gives rise to a flood risk, and clearance and repair works will substantially reduce that risk, then the Council will undertake these works, in line with other priorities and available resources.

The Council's clearance and repair schedule can be viewed at: Flooding - duties and responsibilities - Perth & Kinross Council

Trash Screens

The Council's Roads Maintenance partnership inspect and clear trash screens on a fortnightly schedule, and respond to any issues raised between scheduled maintenance. Critical screens are monitored during flood events, as far as resources allow.

To report any issues, please visit: Report drains and spillage issues - Perth & Kinross Council

Emergency Response

The responsibility for protecting individual properties lies with the property owner. The Council has no statutory duty to prevent properties from flooding, but we will help residents and communities as much as we can.

The Council's customer service centre can be contacted for assistance during office hours (8:45am-5pm) on **01738 475000** and the out of hours emergency number is **01738 476476**.

If flooding is occurring from the sewer, please contact Scottish Water via the Scottish Water 24 hour customer helpline on **0800 077 8778**.

Road Closures During Flood Events

We are aware that traffic moving through flood water can create bow waves, and that this can increase the risk of flood water entering adjacent properties. However only the Police and the Road Authority have the legal power to close a road. Whilst we will always endeavour to assist residents during a flood, we cannot guarantee the necessary resources will be available to close roads during widespread flooding.

Property Flood Resilience (PFR)

The shallow nature of surface water flooding in many areas mean that property flood resilience is often the most effective approach to managing surface water flood risk across Perth.

We advise that all residents consider installing suitable property resilience measures. Given the speed that surface water flooding can occur, passive measures are preferable, however this will depend on what is most suitable for your property. We would always advise having a PFR survey carried out at your home to advise on the most appropriate measures for you. These can be arranged through the Scottish Flood Forum (web link in box below), or through specialist surveyors / consultants.

Community Resilience

Perth & Kinross Council has made funding available to support community resilience groups. The Council's Civil Contingencies team work with existing groups, and can provide advice on setting up new ones.

Within Perth, the Perth Community Flood Aid group continues to carry out excellent work to improve resilience in areas of flood risk across Perth (Perth Community Flood Aid | Flood Support & Resilience in Perth).

Next Steps

A 'Question & Answer' report will be produced and disseminated, and a future event will be held to discuss any feedback as part of the awareness raising recommended by the SWMP.

The outcome of the Perth Surface Water Management Plan will be reported to the Climate Change and Sustainability Committee on 05 November 2025.

SWMPs should be monitored, reviewed and updated to align with the six-year Flood Risk Management planning cycle. The next update is expected to be required in Cycle 3 (2028-2034). Feedback received will be fed into future iterations.

Useful Webpages

PKC Flooding: Flooding - duties and responsibilities - Perth & Kinross Council

PKC Road Maintenance: Report drains and spillage issues - Perth & Kinross Council

Scottish Water: Sewer Flooding - Scottish Water

SEPA: Flooding | Beta | SEPA | Scottish Environment Protection Agency

Scottish Flood Forum: The Scottish Flood Forum - Supporting Flood Risk Communities

Contact Details

For further information regarding the Perth Surface Water Management Plan please contact:

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