

# East Dunbartonshire Surface Water Management Plan

## Introduction

Welcome to the second public consultation event for the East Dunbartonshire Surface Water Management Plans (SWMPs). The purpose of the event is to bring you up to date with the development of the study and the investigations which have led to the determination of the short-listed mitigation options. This will help us take everything into account and ensure public opinion is taken on board when developing the next stage of design of the preferred options.

### Why are we here?

Following the last public consultation event in June 2018 we have been developing options to reduce flooding and protect properties from flooding in Bearsden and Milngavie.

An extensive amount of options have been assessed. These have been narrowed down to those that are most feasible assessing the technical, legal, environmental and cost implications and which options would provide the most benefit by reducing flood risk or enhancing surrounding areas. The feedback we receive today will inform the short-listing process to produce a list of preferred options to take forwards.

### What can we tell you today?

- To describe the nature of the flooding problem in Bearsden and Milngavie
- To tell you about the work that has been done so far
- Talk through the options we considered
- To explain the next steps in the process

### How can you provide your feedback?

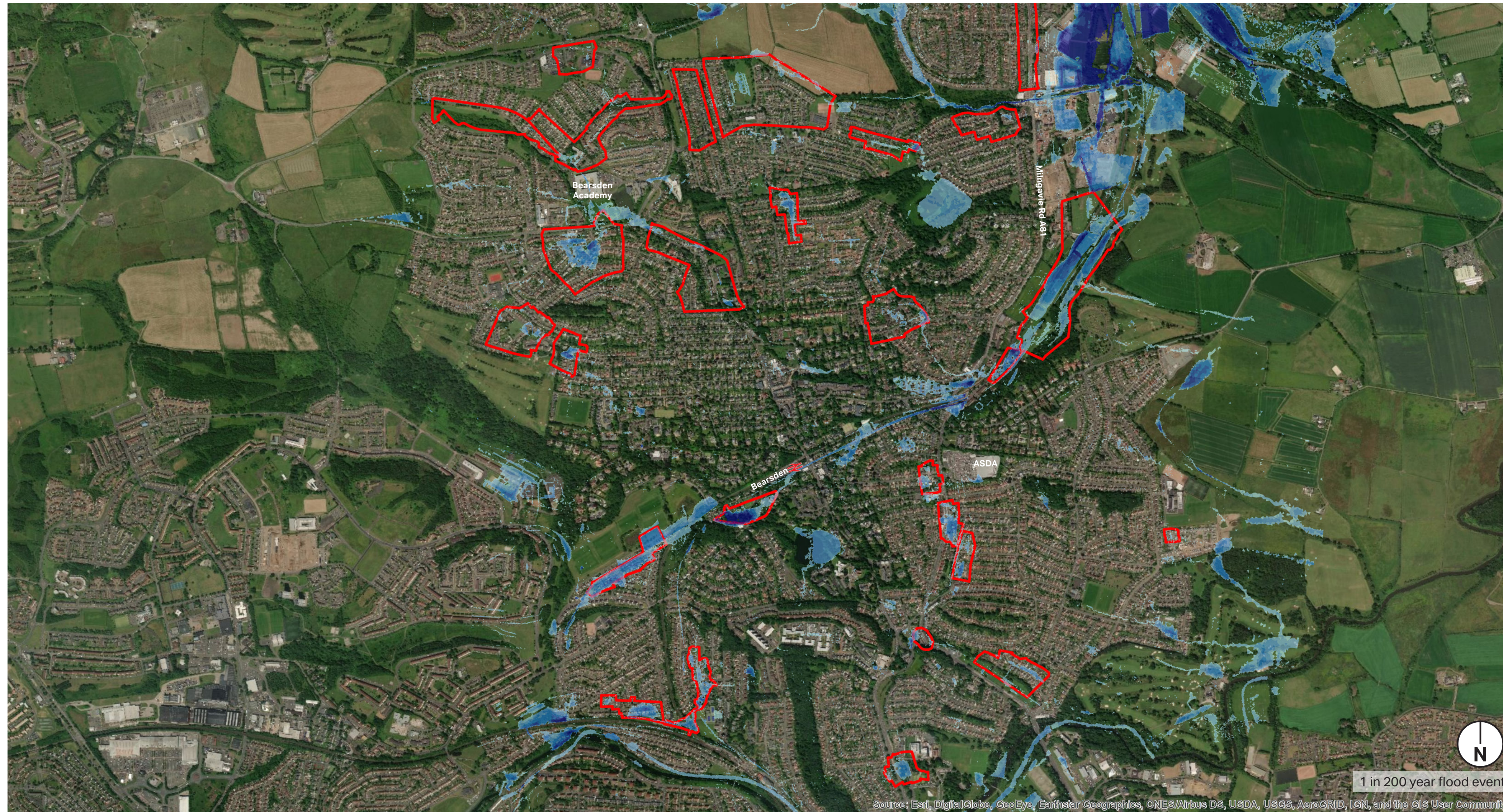
A questionnaire is available for you to leave your comments. You can also feedback to: **[raj.kumar@eastdunbarton.gov.uk](mailto:raj.kumar@eastdunbarton.gov.uk)**  
Please browse through the information provided on the display posters. Our team is here to answer any questions you may have.





# East Dunbartonshire Surface Water Management Plan

## What is the scale of the flooding problem in Bearsden?



Surface water flooding is often widespread and fragmented across an urban area so that in many cases it is not feasible to solve all surface water flooding problems at once. Scottish Government guidance therefore recommends a risk-based approach in order that effort and investment can be directed toward areas at greatest risk of flooding and where the most benefits can be achieved.

On this basis, hydraulic modelling has been used to identify the worst affected flooding hotspots. These are shown in red in the flood map adjacent.



### Flood risk in numbers for a 1 in 200 year event

- 231 properties out of 1064 properties assessed are within the flood extents in Bearsden
- Flood Risk to key community buildings including Kessington Public Hall and Sainsburys
- Flood risk to the A81 a key transport link



By all means look up your property on the flood map shown here. You should remember, however, that the computer modelling was carried out on a catchment-wide scale that is not specific to any one property. No specific account is taken of localised features such as raised floor levels, roads and garden walls which in reality may affect localised flow paths.



# East Dunbartonshire Surface Water Management Plan

## What is the scale of the flooding problem in Milngavie?



### Flood risk in numbers for a 1 in 200 year event

- 164 properties out of 442 properties assessed are within the flood extents in Milngavie
- Flood risk to a number of local roads and key strategic links including Clober Road & Clochbar Avenue, A81, Station Road and Oakburn Avenue

Surface water flooding is often widespread and fragmented across an urban area so that in many cases it is not feasible to solve all surface water flooding problems at once. Scottish Government guidance therefore recommends a risk-based approach in order that effort and investment can be directed toward areas at greatest risk of flooding and where the most benefits can be achieved.

On this basis, hydraulic modelling has been used to identify the worst affected flooding hotspots. These are shown in red in the flood map adjacent.

Although this study is focused on surface water flooding, overtopping from the Allander Water has also been modelled and assessed to understand fluvial flood mechanisms in more detail. AECOM have now been commissioned to develop potential natural flood management measures in the upper catchment to slow the flow entering the watercourse and hold more water upstream of Milngavie to improve flood risk resilience



By all means look up your property on the flood map shown here. You should remember, however, that the computer modelling was carried out on a catchment-wide scale that is not specific to any one property. No specific account is taken of localised features such as raised floor levels, roads and garden walls which in reality may affect localised flow paths.



# East Dunbartonshire Surface Water Management Plan

## What is a Surface Water Management Plan?

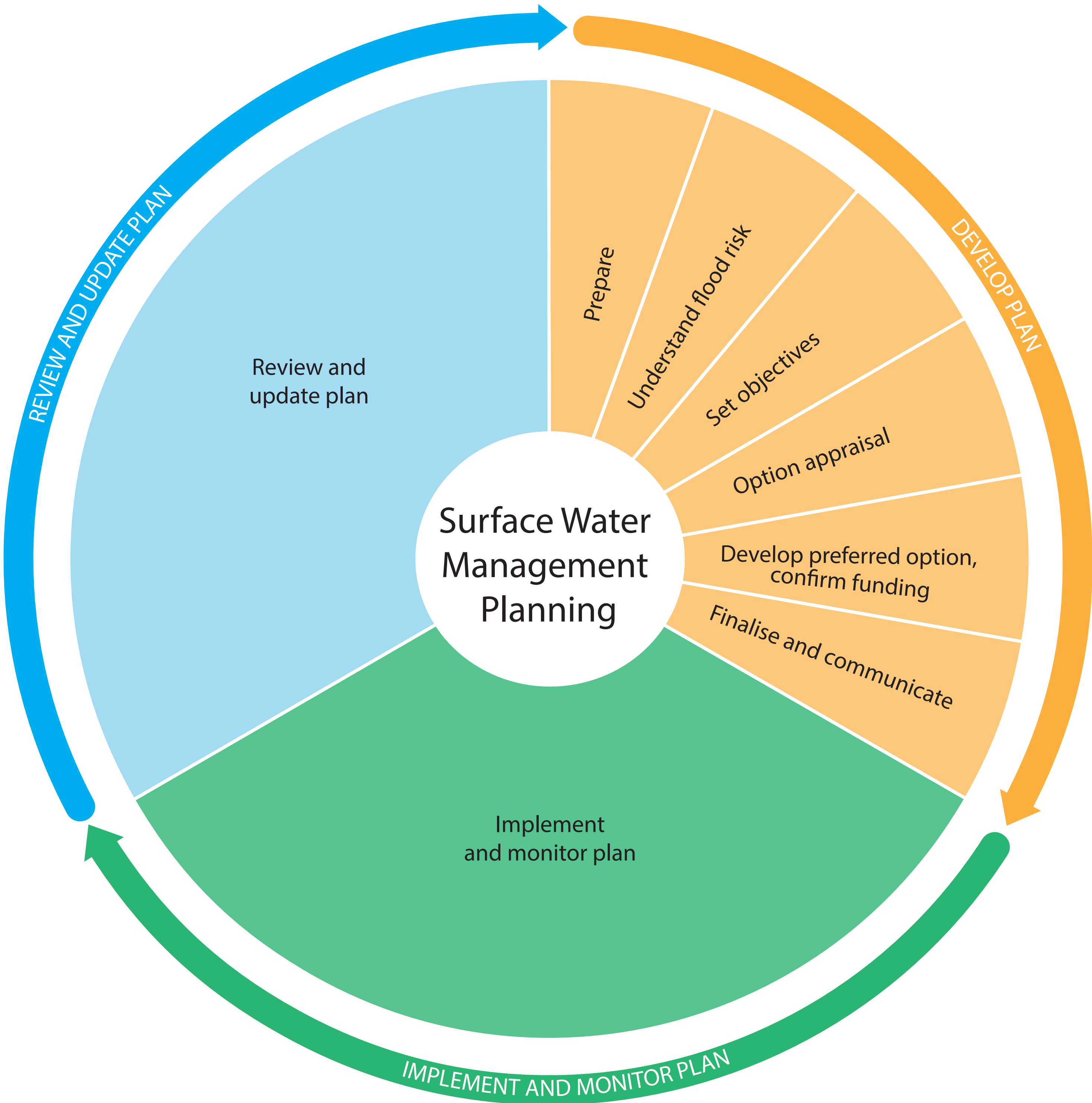
The aim of a surface water management plan is to reduce the risk of surface water flooding in the most sustainable way, as required under the Flood Risk Management Act.

SWMPs set out a **long-term** vision for sustainably managing surface water flooding in an area and the actions needed to achieve that vision.

The SWMP will take an **iterative** approach. The study areas will be monitored, reviewed and updated with timescales for reviews and updates that consider the Flood Risk Management Planning cycles and new flood risk information.

The framework for undertaking a SWMP study is illustrated through a wheel diagram, with this study covering the “Develop Plan” Phase. At this stage we have carried out prepare, understand risk and the objective setting elements of the study.

We are currently at the Option Appraisal Phase. The Options presented here today form our “short list” which have been developed following an assessment of feasibility from a technical, legal, environmental and cost perspective. The information gathered at this event will go into informing the assessment of options stage.





# East Dunbartonshire Surface Water Management Plan

## What options have we looked at?



### On or Offline Storage

Where there is space, excess flood waters can be held back and stored during a storm event. Water can be stored and released at a slower rate than would currently occur to relieve pressure on any downstream infrastructure. Areas that can be utilised include public parks, sports fields or agricultural land. These areas are not likely to be flooded very frequently and as such can be used for other purposes for the majority of the time.



### Property Flood Protection (PFP)

PFP can be employed to protect properties from potential ingress of flood water through pathways such as doors and windows, brickwork and sewage systems. This option would not address the source of flooding but could act as a resilience technique to protect against internal flooding. The success of PFP is heavily dependent on the correct operation and maintenance procedure being applied.



### Sustainable Urban Drainage (SuDS) Measures

Controlled management of surface water has been considered, so that overland flow paths and open spaces can be utilised efficiently in order that sensitive receptors and important community spaces are not impacted by surface water flooding. Conveyance features such as swales could be provided to capture overland flow. This would direct flow away from vulnerable receptors, transporting it above ground in a managed flow path. This could be partnered with storage in detention basins to hold back and slow flows to a controlled rate before discharge back to the Scottish Water network or watercourse.



### Retrofit of SuDS

Retrofitting SuDS could potentially help solve some of the flooding and water quality problems that are experienced in the area. Flooding from sewerage networks is driven by the expansion of towns where historic sewerage networks are required to cope with flows much greater than for which they were designed. For the area of East Dunbartonshire, a strategy of separating storm water from the sewerage network could reduce sewer flooding. This option would involve disconnecting roof or hardstand areas which contribute large volumes of surface water to the combined sewerage network and draining it into Sustainable Urban Drainage feature such as a detention basin, infiltration trench, swale or underground tank to store and attenuate flows to more manageable rates.



### Infrastructure Upgrades

This would require increasing the capacity of critical infrastructure to allow water to pass more freely without causing flooding. Investigation into this option could identify key bridges and/or main culverts that cause constrictions to flow. Upgrading this infrastructure could alleviate flooding at key points by increasing the capacity to accept flows further downstream.



### Underground Storage

Where open space is not available, excess surface water can be stored underground. Large open car parks for example, can be utilised by installing permeable paving or underground storage tanks.



### Deculverting and Watercourse Restoration

Opening up "buried" watercourses can offer improvement in flood risk by restoring natural drainage routes and increasing storage available for flood flows. This would also allow improvements to the amenity of the area as well as having the potential to create habitat for wildlife. In a similar way watercourse restoration can reinstate the natural river processes such as meandering which slows down flows and promotes the creation of habitat.



### Direct Defences

Where other measures are not possible or there is no space to store excess flood waters direct defences can be used to protect areas from flooding. These measures could involve the building of flood walls or embankments. These measures would most likely to be used where flooding is experienced from watercourses.

Please note some of these long list options have been removed from the short list based on further technical assessments around buildability and flood risk performance as well as analysis of environmental, legal and cost constraints.



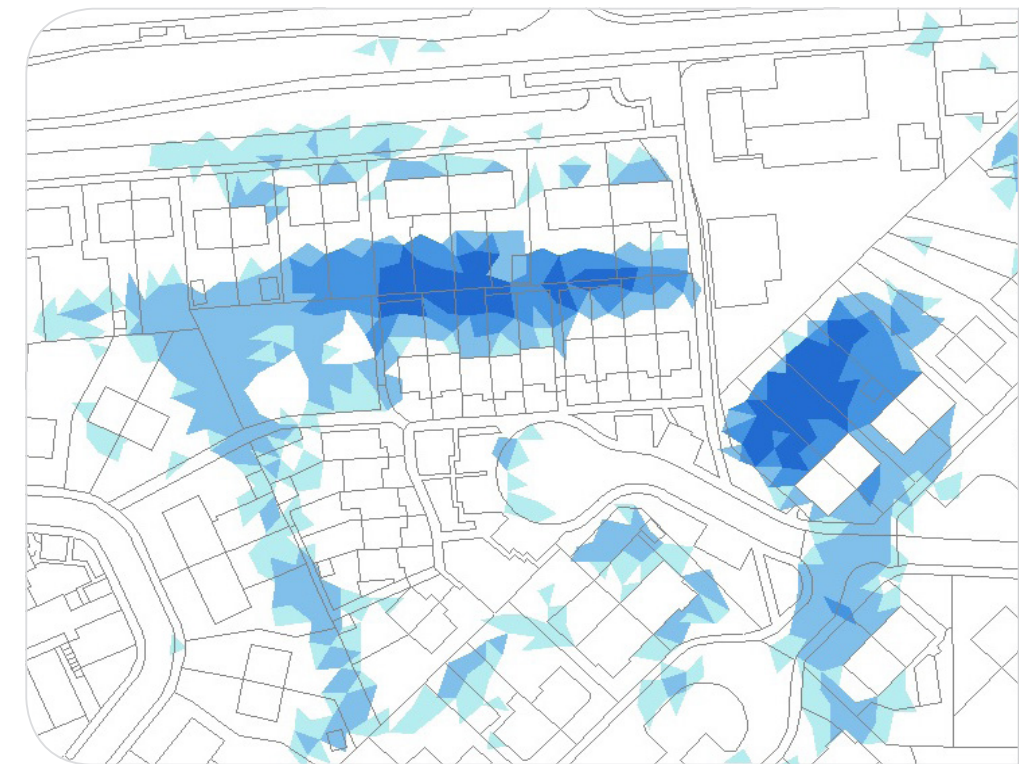
# East Dunbartonshire Surface Water Management Plan

## What has been done to develop the options?



### Environmental Appraisals

We have carried out an assessment of possible planning and environmental issues. This has allowed us to identify constraints and opportunities for any proposed options as well as identify additional environmental stakeholders we need to consult with such as Scottish Natural Heritage. These outputs will aid our design of the preferred options and also identify any further studies which would be needed before construction.



### Modelling

We used a computer model to simulate a wide range of flood events in the study area, which included an allowance for climate change. This allows us to predict which areas are susceptible to flooding now and potentially in the future, including depths and velocities of flood water. The model was also used to test a wide variety of options so that we could see how well they performed. This aided production of our short list of mitigation options.



### Social and Environmental Appraisal

In line with Scottish Government guidance, we looked at the social and environmental aspects of each option to make sure that not only would the options be economically worthwhile but also that social and environmental benefits were maximised (and negative impacts minimised). This includes assessing potential impacts on landscape, biodiversity, water quality, key community buildings and health impacts.



### Walkovers

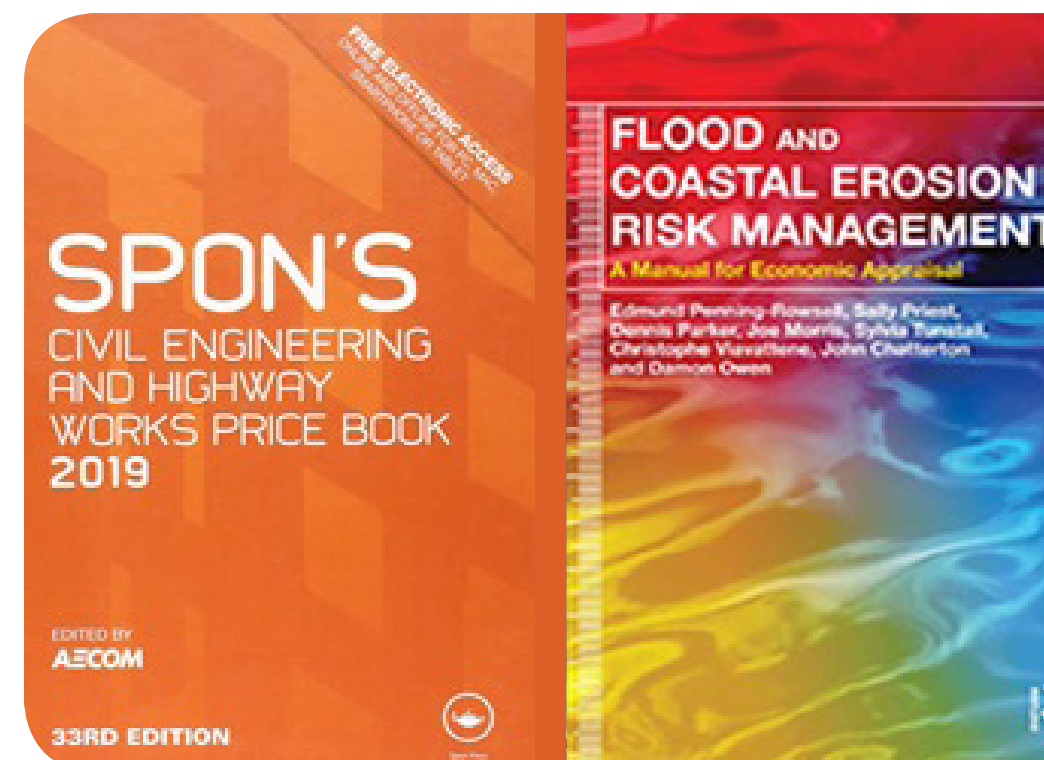
We have visited the site a number of times to ensure our computer models represent the area fairly and to help develop the options.



### Consultation

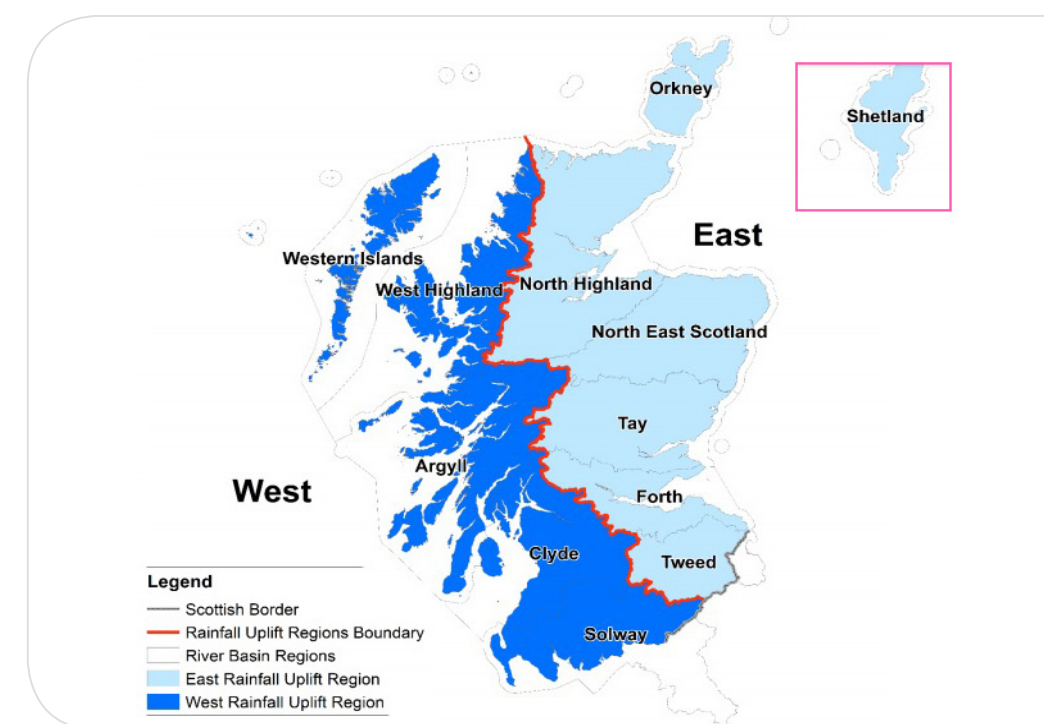
We have consulted with a wide range of stakeholders throughout developing this plan, through:

- Public consultation - At our previous public consultation events we gathered information on historic flooding and your experiences/local knowledge.
- In order to add social value to the project and increase flood risk awareness we ran STEM events with Douglas Academy and Bearsden Academy. We challenged the students to develop a flood scheme for a real life flooding problem in Edinburgh. This session gave students an insight into careers in the Science Engineering Technology and Maths sector.
- Workshops - with Scottish Water and East Dunbartonshire Council to gain feedback on potential options, identify opportunities for quick wins and tie up future investment plans.



### Economic Appraisal

We need to ensure any proposals are economically viable; this means that the cost of building the scheme should be less than the benefit we expect. We developed outline scheme costs based on Best Practice guidance and experience on similar schemes. The benefits were based on the damages likely to be avoided with the flood scheme in place over 100 years, including elements such as direct property damages, local authority, emergency and recovery costs, social equity and climate change allowances.



### Responding to Climate Change

In the context of Scotland's declared climate emergency, it is important to recognize the changing flood risk profiles associated with a changing climate. The impact of climate change on rainfall and on economic damages has been measured. New guidance from SEPA was reviewed to ensure most recent science was applied in order to have the best picture of flood risk and consider adaptability in options.



# East Dunbartonshire Surface Water Management Plan

## Where are the options located in Bearsden and what might they look like?

**Wetland ①**



**Flood Storage Area ②**



**Swale ③**



**Deepdene Road & Conon Avenue**

\*Please note not all solutions will progress, however there is likely to be a combination of different solutions to reduce flood risk across Bearsden.

**④ Pipe Upgrade**



**⑤ Drainage Separation**



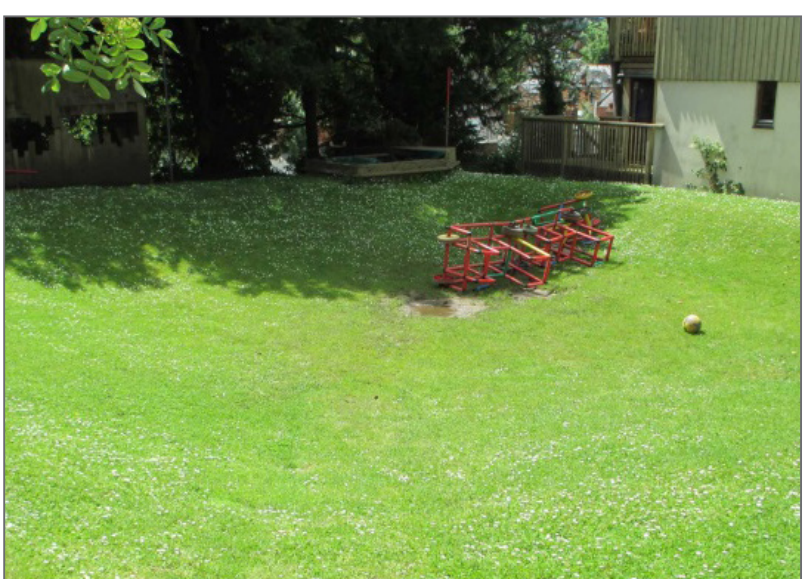
**⑥ Detention basin**



**Upstream Storage ①**



**Detention basin ②**



**Drainage Separation ③**



**Whitehurst & Heather Avenue**

\* Please note not all solutions will progress, however there is likely to be a combination of different solutions to reduce flood risk across Bearsden.

**④ SuDS Pond**



**⑤ Property Flood Protection**



**⑥ Bioretention**





# East Dunbartonshire Surface Water Management Plan

## Where are the options located in Bearsden and what might they look like?

**Swale ①**



**Pipe Upgrade ②**



**Bearsden South**

**③ Underground Storage**



**④ Bioretention**



\* Please note not all solutions will progress, however there is likely to be a combination of different solutions to reduce flood risk across Bearsden.

## Where are the options located in Milngavie and what might they look like?

**Swale ①**



**Bioretention ②**



**Detention Basin ③**



**Clober Road & Oakburn**

**④ Upstream Storage**



**⑤ Pipe Upgrade**



**⑥ Bund**



\* Please note not all solutions will progress, however there is likely to be a combination of different solutions to reduce flood risk across Milngavie.



# East Dunbartonshire Surface Water Management Plan

## What work has been carried out/is planned to reduce flood risk to Bearsden and Milngavie?

### Colquhoun Park Flood Alleviation Scheme

East Dunbartonshire Council commissioned and promoted a flood alleviation scheme under the FRM Act 2009. Detailed modelling of these watercourses was undertaken - including environmental and engineering options - to determine the most effective methods for managing the flood risk. The scheme comprises:

- Wetland area in the north east of Colquhoun Park
- Embankment creation
- Day-lighting and diversions of watercourse
- Creation of a detention basin

The wetlands function as additional storage during high rainfall events, easing the impact on the existing drainage system. Localised ground profiling and bunding offer an additional level of protection. The scheme also provides additional amenity value to the general public with the reinstatement of an existing skating pond and construction of a new children's playpark.

The scheme was completed in November 2014, with landscaping completed in the summer of 2015.

### Heather Avenue Flood Alleviation Scheme

East Dunbartonshire Council undertook flood alleviation and improvement works within the Heather Avenue Park area in response to a history of flood events in the area. The works included:

- replacement of a footbridge,
- installation of a trash screen to reduce risk of any blockages at the culvert inlet downstream;
- Creation of low level bunds and re-profiling of existing open grass areas to provide overland flow route paths to areas where flood waters can be temporarily stored

These works were completed in March 2017.

### Drumchapel Surface Water Management Works

Work has begun to improve Scottish Water's waste water infrastructure and tackle flooding in areas of Bearsden and Drumchapel. This project has been developed in partnership between Glasgow City Council, East Dunbartonshire Council and Scottish Water.

The project involves the upsizing of a local sewer and just over half a mile of pipework being installed to upgrade the existing sewer network. Two storm water storage reservoirs adjacent to Southdean Avenue and Garscadden Road downstream will also be constructed.

The work will benefit properties in Conon Avenue, Bearsden and properties in Moraine Avenue, Drumchapel.

This project will also help protect the local environment.

Work is scheduled to be complete by February 2021.

### Golf View Flood Alleviation Scheme

East Dunbartonshire Council are currently on site constructing the Golf View Flood Alleviation Scheme. The scheme involves construction of a flow control to limit back up of flow from Bearsden Golf Course culvert and construction of a detention feature to store and attenuate flows to an appropriate rate before discharging to the culvert. Landscaping will also be carried out to route overland flows towards the feature.

### Kelvin Tributaries Natural Flood Management Study

AECOM have been engaged to deliver a feasibility study to investigate opportunities for river restoration along the Allander Water. The long-term aim of the project is to improve the River Basin Management Plan (RBMP) status of the watercourses while also delivering co-benefits for biodiversity, access, recreation, well-being and flood alleviation. The study is scheduled for completion in Summer 2020.