

# Scotland's Flood Resilience Conference 2025



## Taking Actions to Implement the FRS



Scottish Government  
Riaghaltas na h-Alba  
gov.scot



# Scotland's Flood Resilience Conference 2025

Plenary session welcome

Chair: Jo Kerr, Sniffer

**FLOOD**<sup>RE</sup>

**Balfour Beatty**

 **AtkinsRéalis**



Join at:  
[slido.com](https://slido.com)  
[#Floodresilience2025](https://twitter.com/Floodresilience2025)





# Scotland's Flood Resilience Conference 2025

Dr Alasdair Allan

Acting Minister for Climate Action

**FLOOD**RE

**Balfour Beatty**

 AtkinsRéalis



# Scotland's Flood Resilience Conference 2025

**Aspirations of a younger generation**

Pupils from Cumbrae Primary; Irvine Royal Academy and  
Portobello High School

**FLOOD<sup>RE</sup>**

**Balfour Beatty**

 **AtkinsRéalis**



# Flood Resilience Conference 2025

Dynamic Earth, Edinburgh



**Voices of Younger People**



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# Scotland's Flood Resilience Conference 2025

Innovation for flood resilience

Stuart Logue, Floodre

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



# FLOODRE

## Innovation in Flood Resilience – Flood Performance Certificates

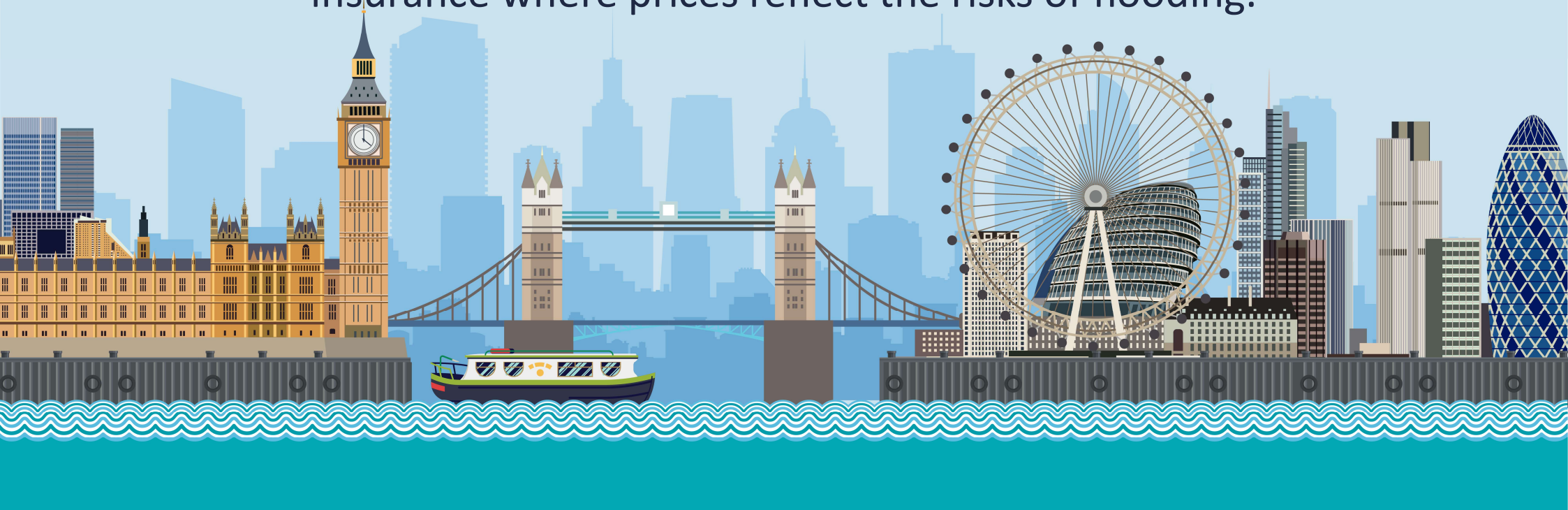
Stuart Logue – FloodRe





## OUR PURPOSE

Flood Re's purpose is to promote and enable the **availability** and **affordability** of flood insurance for eligible homes and manage over its lifetime the **transition** to an affordable market for household flood insurance where prices reflect the risks of flooding.







Flood Re is a  
company with  
three aims

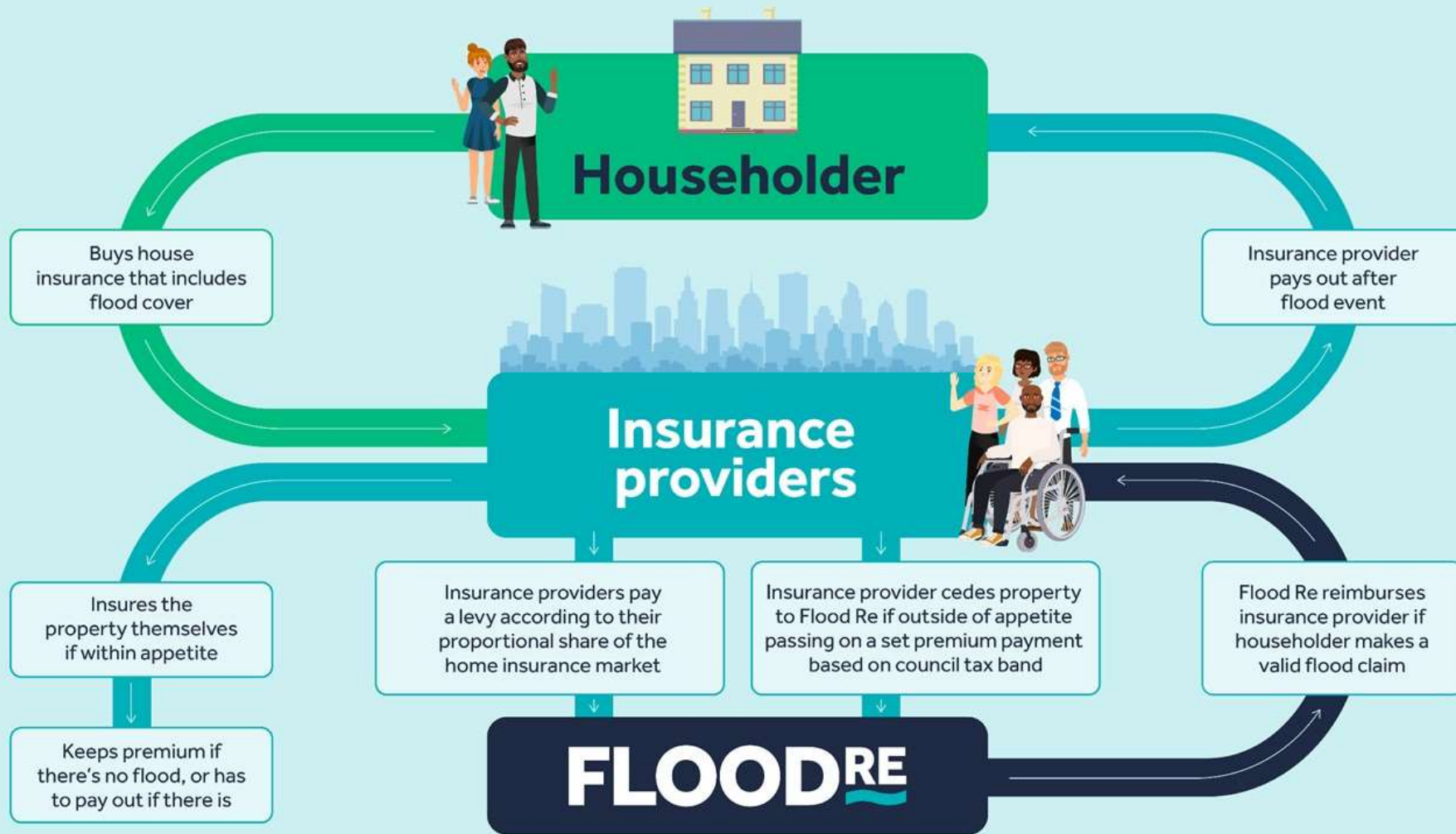
Managing  
Flood Re's  
transition

Delivering on  
availability and  
affordability

Operating with  
efficiency and  
financial security



# How Flood Re Works

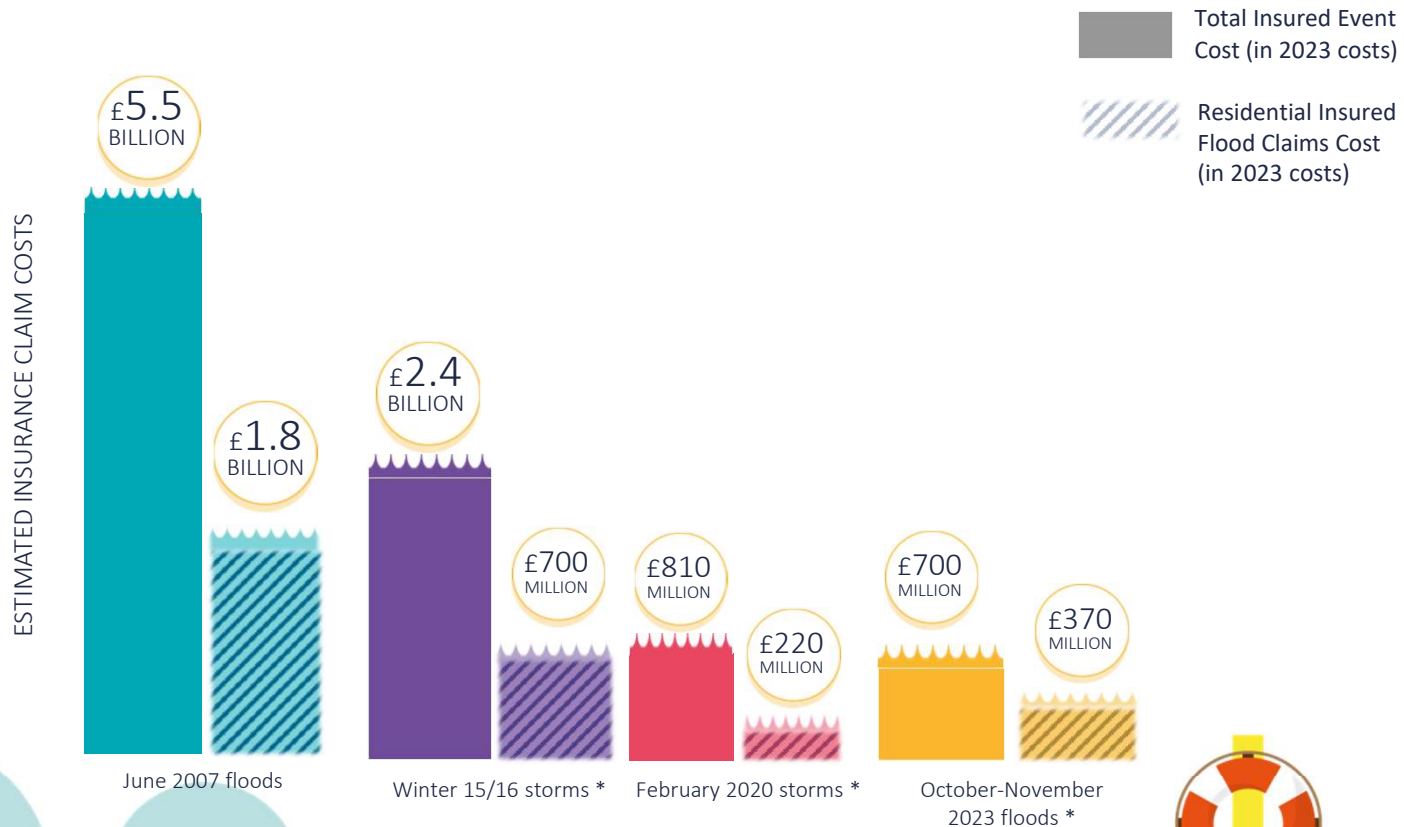




# Flooding is expensive

*Prevention is better than cure*

**FLOODRE**



\* Total insured cost consists of flood and wind damage

1. FloodRe whole of market estimate based on ABI data





# Flood Re Eligibility

**FLOODRE**

*Flood Re is a scheme for householders*

## ELIGIBLE PROPERTIES:

Insured in the name of individuals

Must have a Council tax band  
(All Council Tax bands covered)

Held for residential use

Insured on individual basis

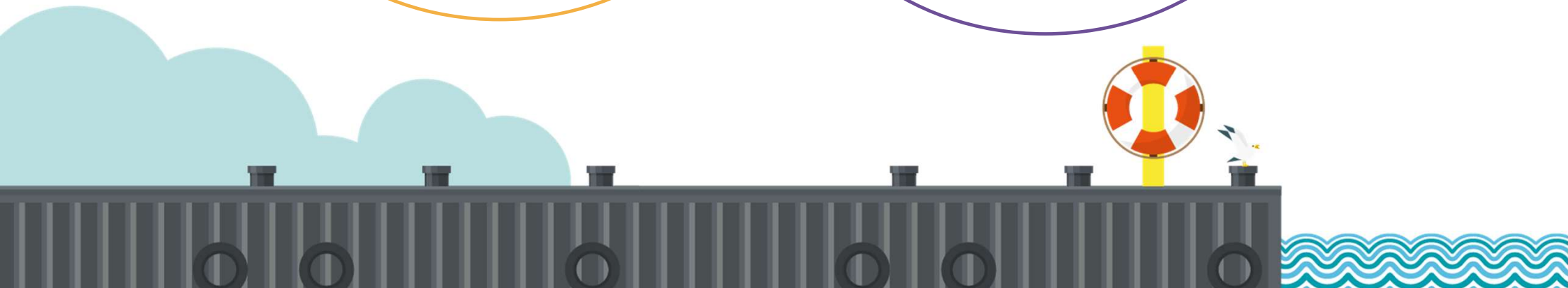
Occupied by policy holder or  
immediate family some of  
the time or unoccupied

## OUT OF SCOPE:

Homes built on or after  
01 January 2009

Small businesses  
(business rated)

Buildings cover for leasehold  
premises 4 or more units





## Flood Re is working!



### Delivering on Availability of home insurance for those at high flood Risk

After the launch of Flood Re, 90% of households with previous flood claims saw a **reduction of more than 50%** for the best home insurance price available to them in 2018 compared to 2016

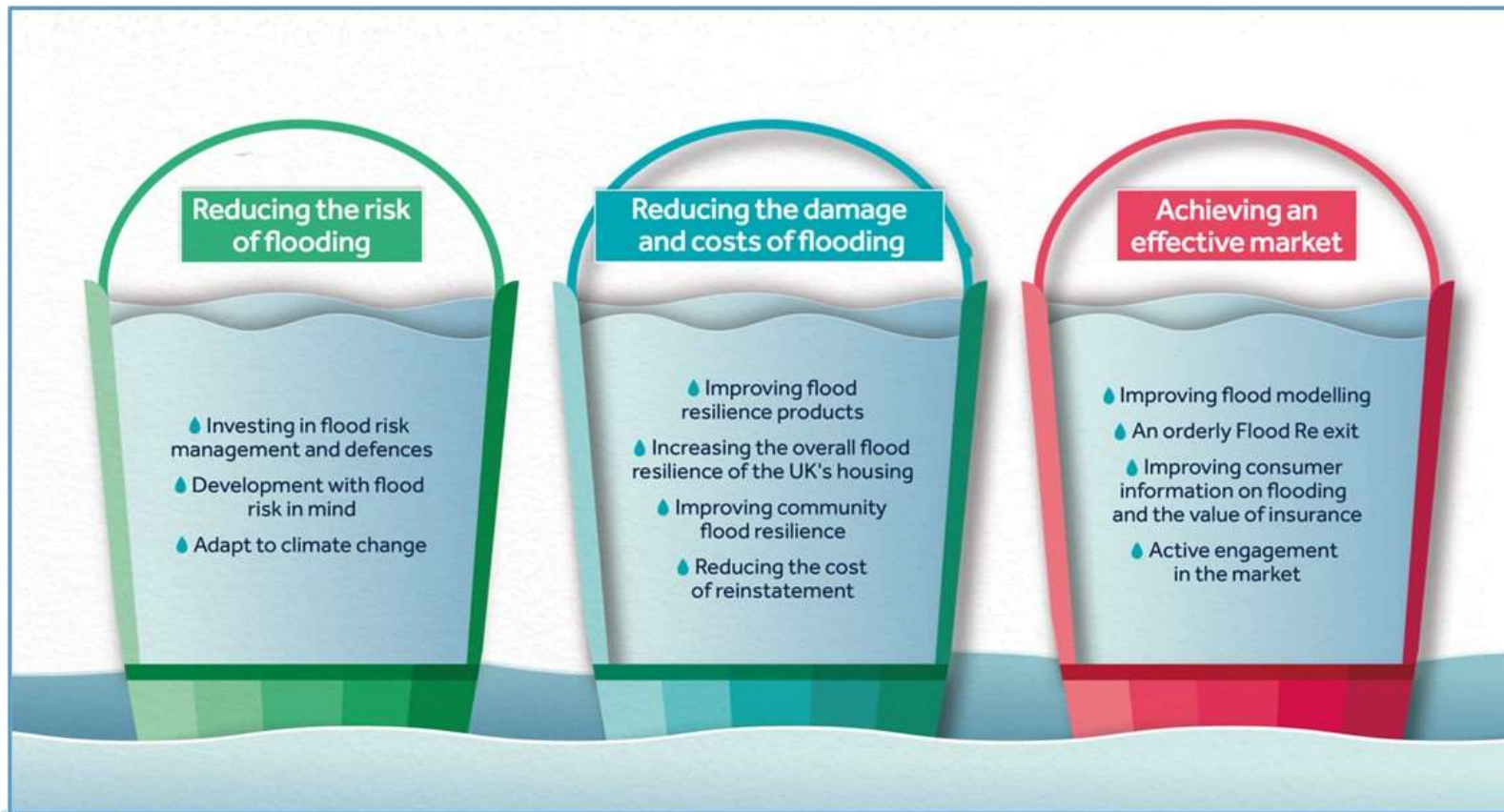
Year	Two or more quotes	10 or more quotes
2016 (pre Flood Re)	9%	0
2023	98%	92%





## A wide range of underlying issues affect flood insurance availability

**FLOODRE**



Flood Re groups these into three 'buckets'

FPC particularly focuses on Bucket 3 'Achieving an effective market'





## Build Back Better

**FLOODRE**



After a flood - Up to £10,000 extra to spend of flood resilience measures

Decreases the time to repair a home after a flood

Gives households peace of mind that if they

Flooded again their homes and lives are protected.

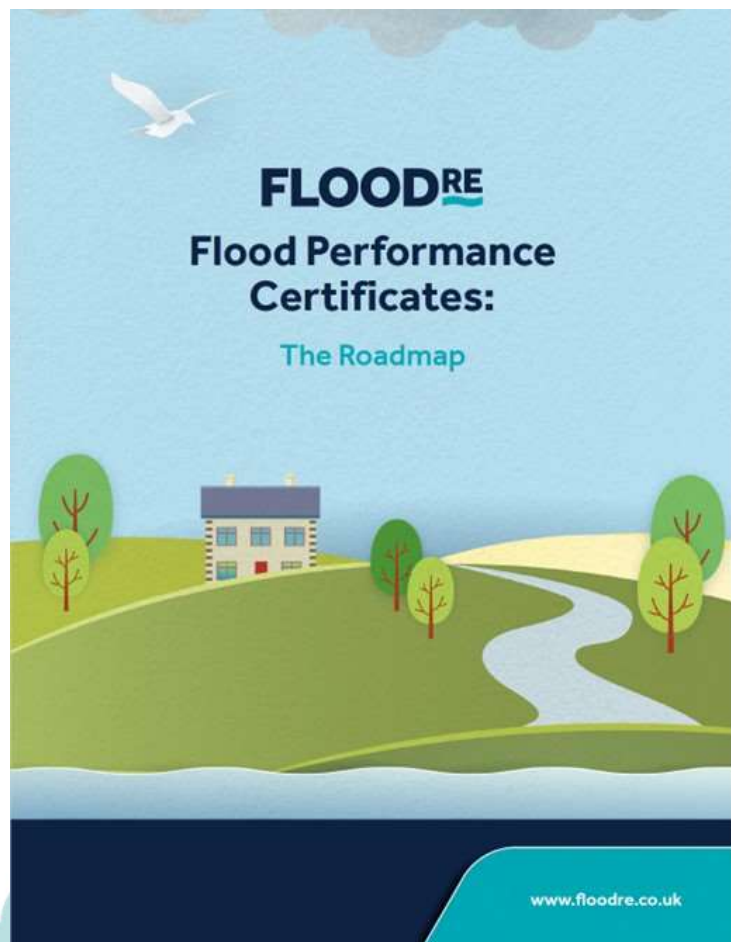
Reduces cost of future flood insurance claims.

Over 70% of UK home insurance market committed to scheme.





# Flood Performance Certificates

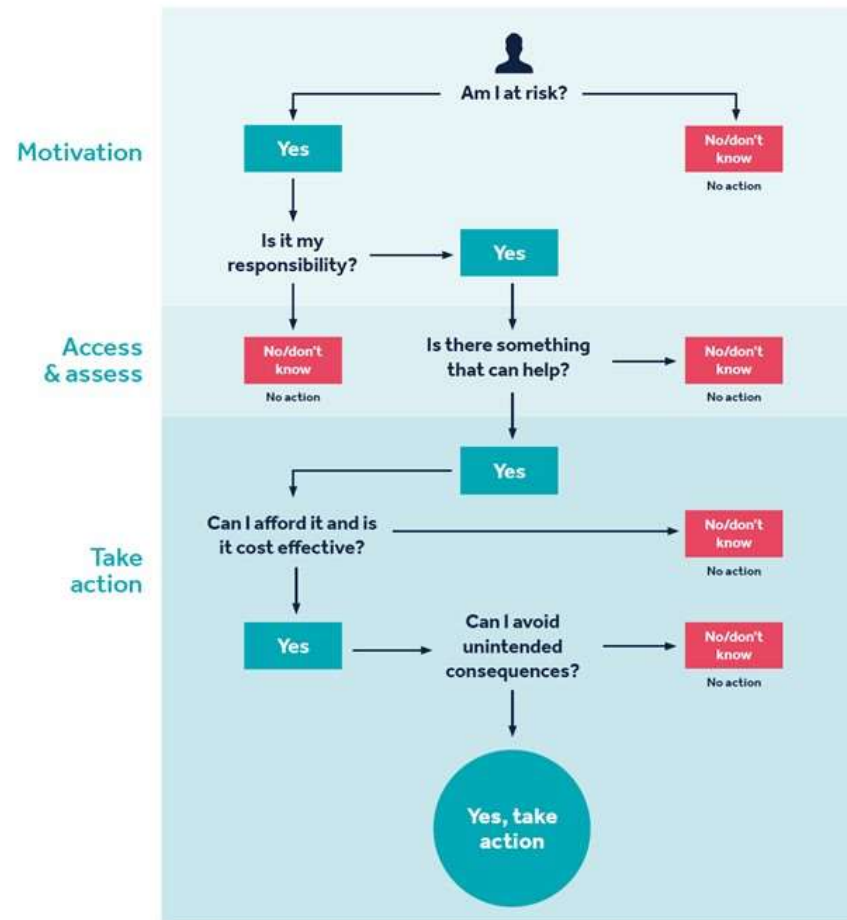


An FPC enables householders to:

- ❖ Understand what level of resilience their property has to being flooded.
- ❖ How to improve their property's level of resilience, so that they and their home are better prepared if a flood happens.
- ❖ Explain to other people – potential buyers, insurers, mortgage lenders etc – what levels of protection the house has.

Property Flood Resilience is the umbrella term which covers all the adaptations which give homes protections homes can have.





Protecting your home is currently overly complex, with poor information and many false incentives.



# What does a Flood Performance Certificate enable? **FLOODRE**

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- Householders to understand the risk their home is at, what protections its offered and how to change it
- PFR to be considered by insurers assessing risk
- PFR to be part of lending decisions
- PFR to be mainstreamed in flood mitigations
- PFR to be a transparent part of the planning system

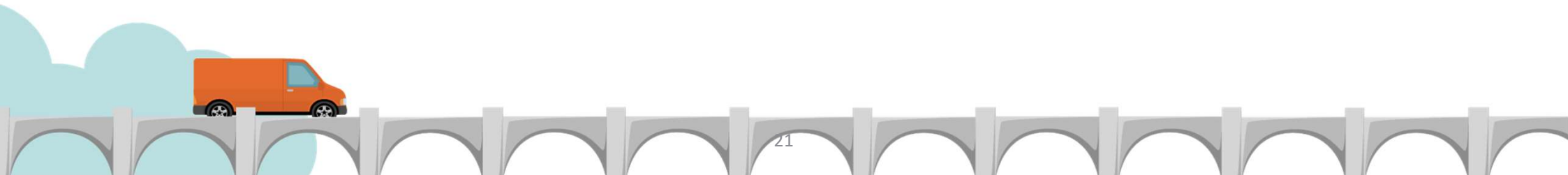




# How do we create a Flood Performance Certificate? **FLOODRE**

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- Develop a model that recognises the different ways flood damage can be reduced at household level
- Make it practical by standardising the method of assessing individual homes
- Ensure it works by testing the model
- Allow the benefits to be realised by householders through a certification system
- Support innovation in the utilisation of the framework

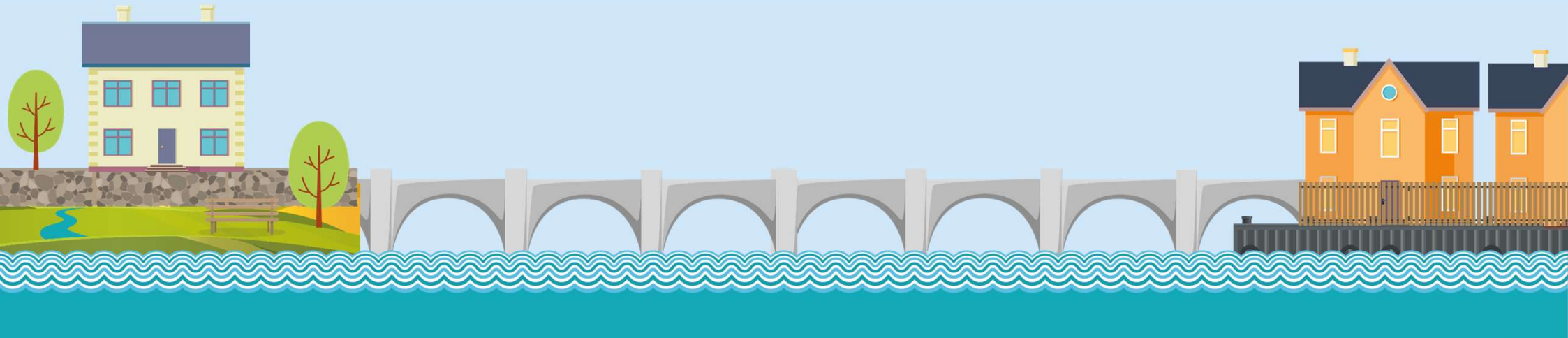






**FLOODRE**

Thank you





# Scotland's Flood Resilience Conference 2025

Innovation for flood resilience

Angela Pllu, Balfour Beatty

**FLOOD**<sup>RE</sup>

**Balfour Beatty**

 **AtkinsRéalis**



**Balfour Beatty**

# Constructing Flood Resilience



Angela Pillu – Senior Environmental  
Sustainability Manager  
UKCS Regional Scotland



# Our Core Markets



## Flood & Coastal

Balfour Beatty helps to protect communities and economies from the effects of flooding and manages the whole life-cycle of water networks



## Highways & Transportation

We maintain, improve, manage and operate major highway networks across the UK and support local authorities creating communities where people want to live, work and play



## Active Travel & Public Realm

Collaborating with Local Authorities to reimagine our public spaces and infrastructure, improving safe and sustainable walking and wheeling routes for communities throughout the country.



# Our Core Markets



## Energy

We provide market-leading project management, design, construction, installation, testing and commissioning for power generation facilities ranging from nuclear power stations through to gas fired, oil, coal, wind and hydro-power assets.



## Structures

We construct, refurbish and maintain some of the country's most iconic structures, securing them for generations to come.



## Health

From small, specialist facilities to large, complex, multi-disciplinary hospitals for the NHS and other healthcare authorities, we invest in, design, build and maintain hospital and healthcare projects in the UK and North America.



## Education

our experience ranges from the delivery of primary and secondary schools through to university buildings. We have completed projects throughout the UK from the refurbishment and extension of existing facilities to the construction of brand new campuses.



## Collaborative Customer Relationships:



In the last **10 years**, across the UK:

- **£1.5 billion** worth of flood protection projects
- Over **130,000** homes protected



## Importance of Early Contractor Involvement (ECI)

### ECI:

- **One process-one team** - bringing organisations together early in the process.
- **Buildability and practicality** – influencing **sustainable outcomes** through early involvement in the solution.
- **Improve pricing and programme certainty** - based on previous projects and current market conditions

### Early Supplier Engagement:

- **Leveraging local knowledge and expertise** – local contractors who work in the area and know the conditions
- **Certainty of work to local organisations**, including social enterprises and charities.
- Develop the right **social value strategy** for communities – understanding the local community and their needs.



# Social Value - Almondbank Flood Prevention Scheme



**£1.7m**

of value added through our various local employment & skills development programmes.



**68%**

of the workforce (incl. supply chain) is local to the contract

**488**

local people (incl. supply chain) employed on the contract

**212**

days of paid work experience provided

**1130**

days worked by graduates on site



**£2.6m**

spent with local SME's

**48%**

of supply chain value spent with SMEs.



**£1,555**

raised for local charities

**£11,500**

in kind donations to the local community

**8**

public and community open doors days hosted

**169**

school pupils and university students engaged with

**235**

days worked by people previously not in employment, education or training

**12**

weeks of pre-employment courses delivered with JB Safesite Ltd



**PERTH & KINROSS COUNCIL**



## Comrie Flood Protection Scheme

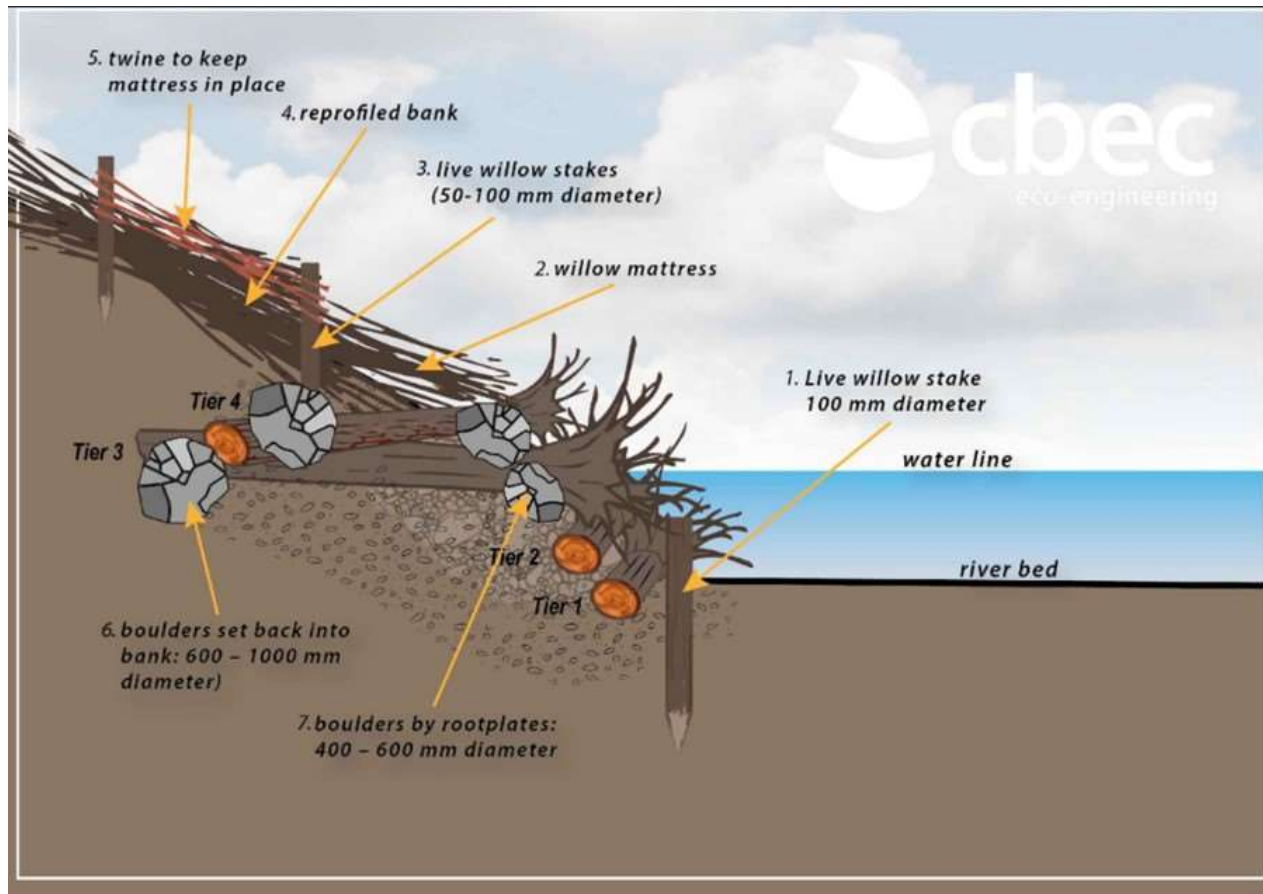


 **SCAPE SCOTLAND**  
CIVIL ENGINEERING

- Designed to protect 189 homes and businesses.
- Significantly reduce the flood risk to those properties from three rivers; the River Earn, the River Lednock and the Water of Ruchill.
- It will provide a standard of protection equivalent to a 1 in 200 year flood event.
- Combination of flood walls, embankments and root wad revetment



# Root Wad Revetment



- Green bank protection for ~225m of eroding section of the Water of Ruchill.
- The complex structure of the root plate dissipates hydraulic forces, rather than just translating the energy downstream.
- Provision of cover/ habitat for fish, invertebrates, amphibians etc
- The opportunity to recycle a ~40m section of boulder bank protection.
- Inclusion of otter holts in the design.



## Low carbon site set up



- The Canvey Island Southern Shoreline Revetment Project
- During the 4-week period:
  - ▶ The site consumed 202.5kg of green hydrogen
  - ▶ Generated 3,310kWh of energy
  - ▶ Saved 4256kg CO<sub>2</sub>e, eliminating the direct emissions associated with powering the compound.



## Microplastics in Drainage



- AWPR B-T road maintenance project
- Looking at whether existing SUDS attenuate microplastics and understanding the complex water chemistry associated with the microplastics arising from the network.
- Looking at making suggestions for improvements to SUDS ponds.
- In conjunction with Robert Gordon University.



# Climate Resilience Workshops



- Dunfermline Learning Campus and HMP Highland projects.
- Train the Trainer workshop with Sniffer to allow us to offer to all customers on projects.
- Raising awareness as well as technical and operational solutions.

Supporting construction of a climate-resilient Dunfermline Learning Campus - Adaptation Scotland



# Scotland's Flood Resilience Conference 2025

Innovation for flood resilience

Hannah Howe, AECOM

**FLOOD**<sup>RE</sup>

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# Implementing successful SUDS and Blue-Green Infrastructure

Mansfield Sustainable Flood Resilience  
Severn Trent's Catchment scale Retrofit SuDS project

Hannah Howe, AECOM








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# Green Recovery: Mansfield Sustainable Flood Resilience

## The Challenge

£76million investment to remove surface water from the foul combined sewer network by March 2025, using SuDS.

## Outcomes

-  Climate resilience using green solutions
-  Reduce flooding
-  Improve river water quality
-  Provide a greener and cleaner community
-  Green job creation





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## What makes this project different?

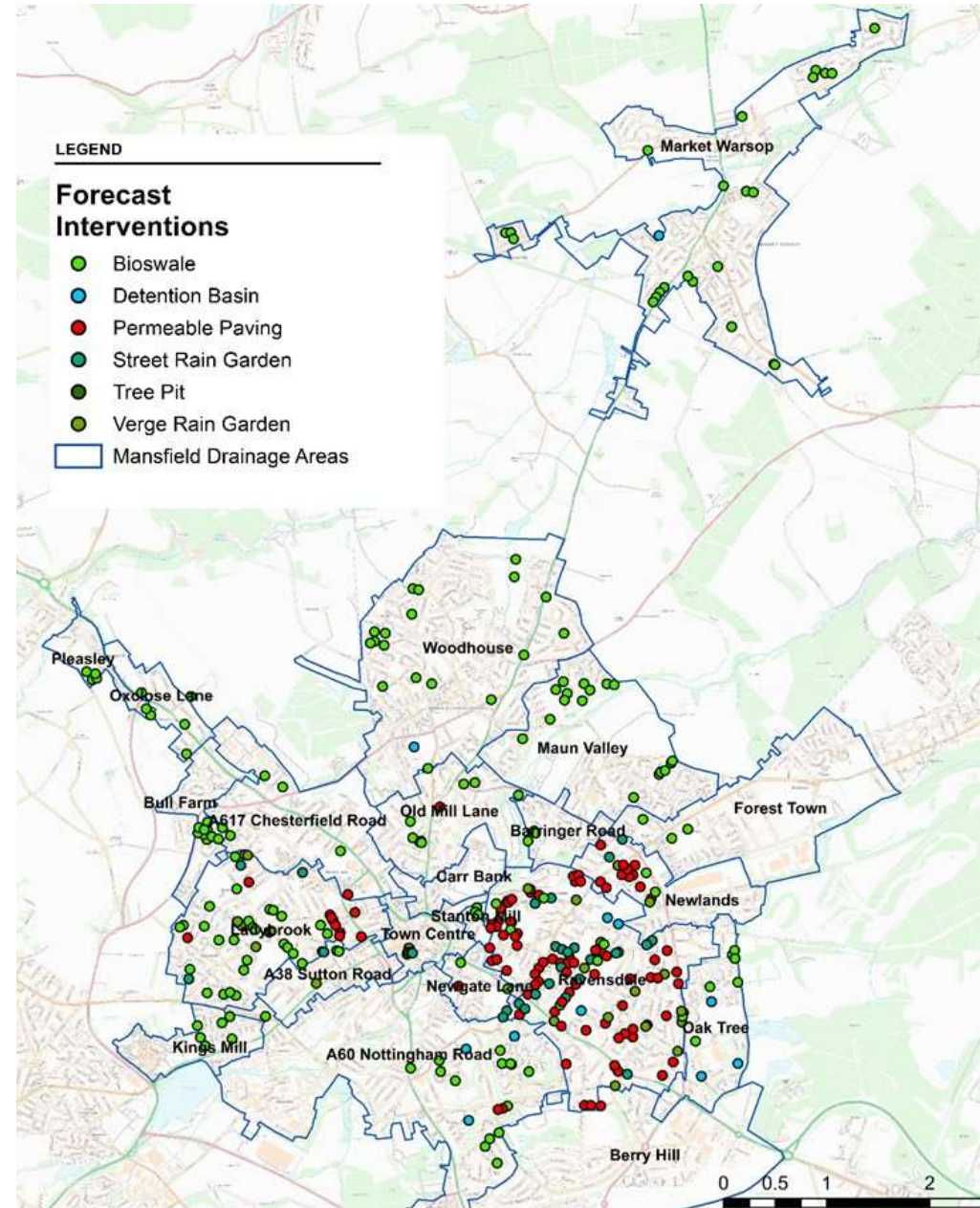
- ✓ Its about **RESILIENCE**
- ✓ **HOW** to do Catchment Scale SuDS
- ✓ **NO** Regrets
- ✓ Scale & Pace
- ✓ Building **first**, modelling later
- ✓ **OWNERSHIP**





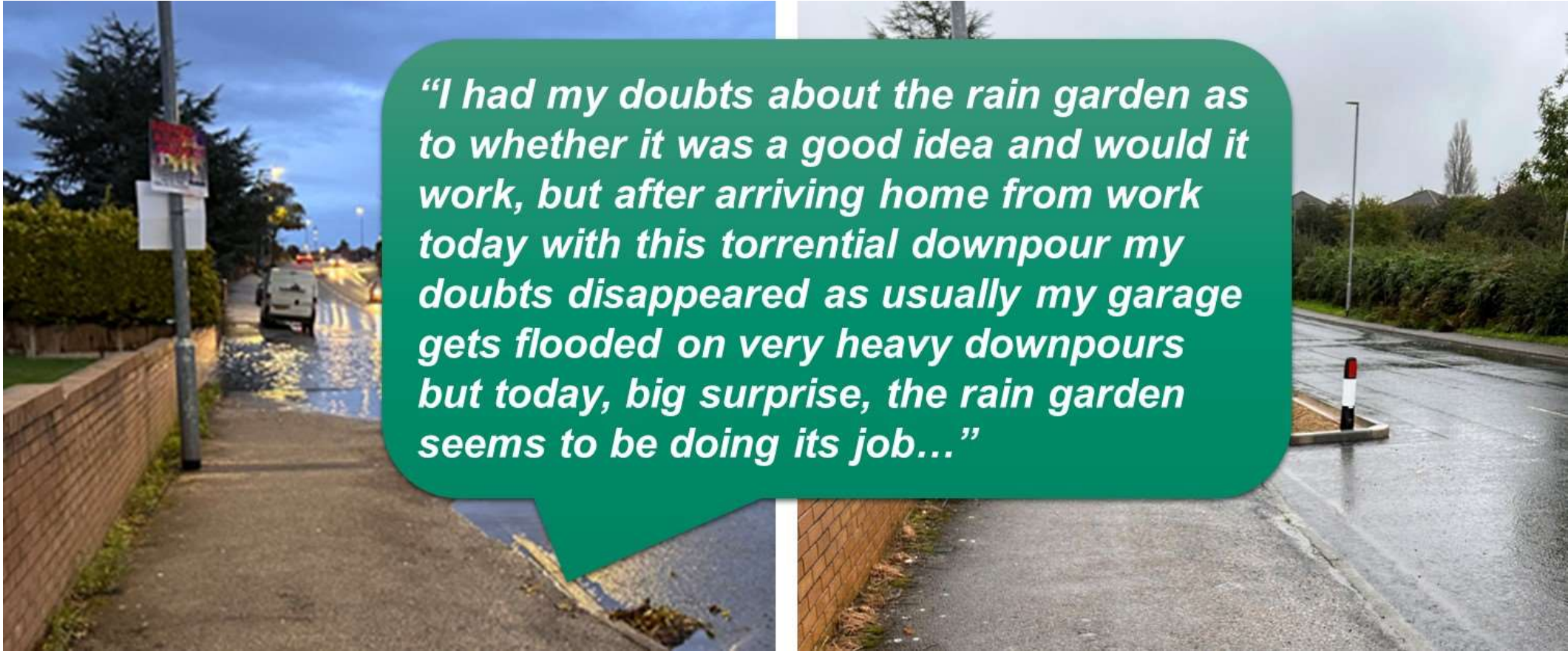
## Sponge Town?

- ✓ 363 interventions
- ✓ 30,000m<sup>3</sup> storage
  - ✓ Bioswales
  - ✓ Detention Basins
  - ✓ Verge rain gardens / street planters
  - ✓ Permeable Paving





## Is it working? Eakring Road



*“I had my doubts about the rain garden as to whether it was a good idea and would it work, but after arriving home from work today with this torrential downpour my doubts disappeared as usually my garage gets flooded on very heavy downpours but today, big surprise, the rain garden seems to be doing its job...”*



–  
Partnership & legal agreements





SEVERN  
TRENT

AECOM

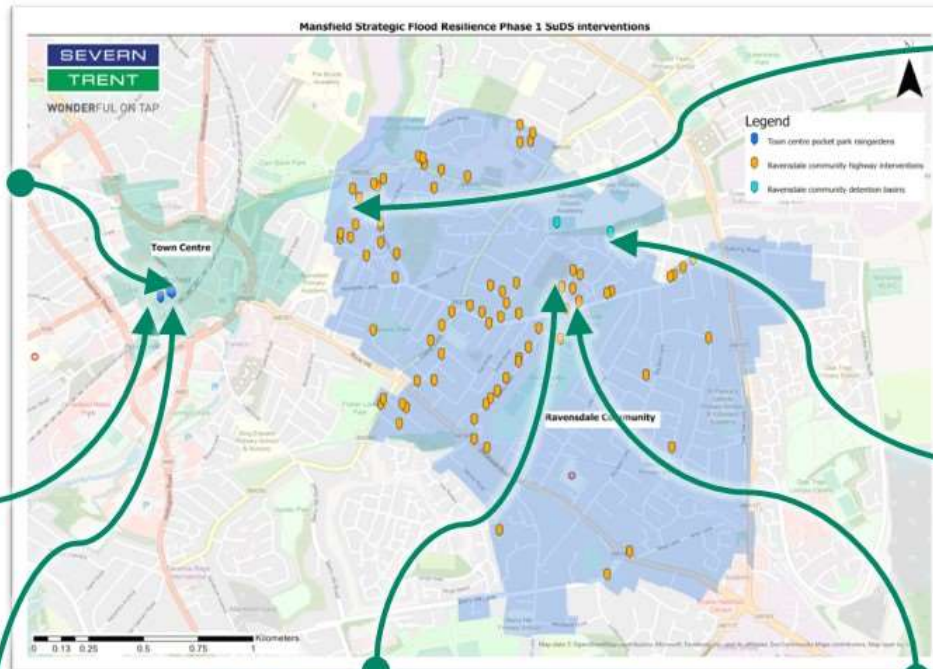
# Delivery

Delivering a better world

 [aecom.com](https://www.aecom.com)



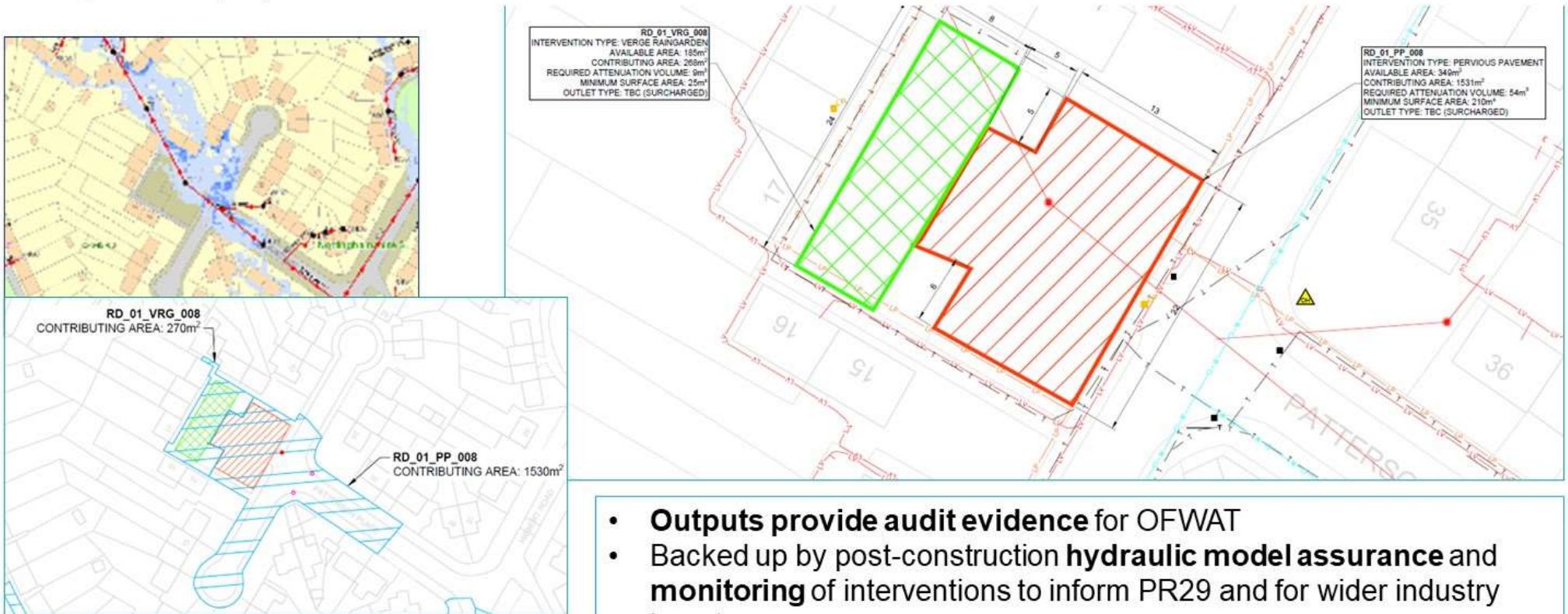
# Pilot Phase – Ravensdale area & Town Centre





# SuDS Volume Calculation tool – to design at speed

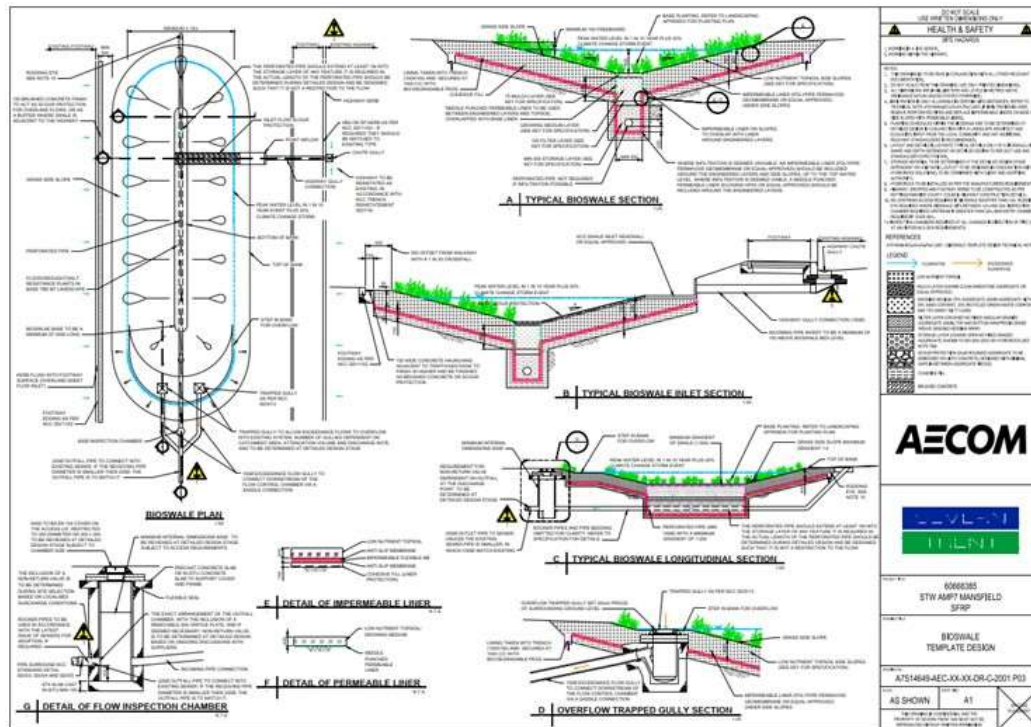
- Very early on the project developed a spreadsheet tool to calculate each intervention's  $\text{m}^3$  benefit
- Avoids modelling each – **to save programme time**
- Inputs: contributing catchment area, infiltration rates, outflow controls, intervention layer make up and properties, etc
- Outputs for audit: contributing catchment area ( $\text{m}^2$ ), intervention area ( $\text{m}^2$ ), effective volume ( $\text{m}^3$ ) and network equivalent storage benefit ( $\text{m}^3$ ).



- **Outputs provide audit evidence** for OFWAT
- Backed up by post-construction **hydraulic model assurance** and **monitoring** of interventions to inform PR29 and for wider industry learning



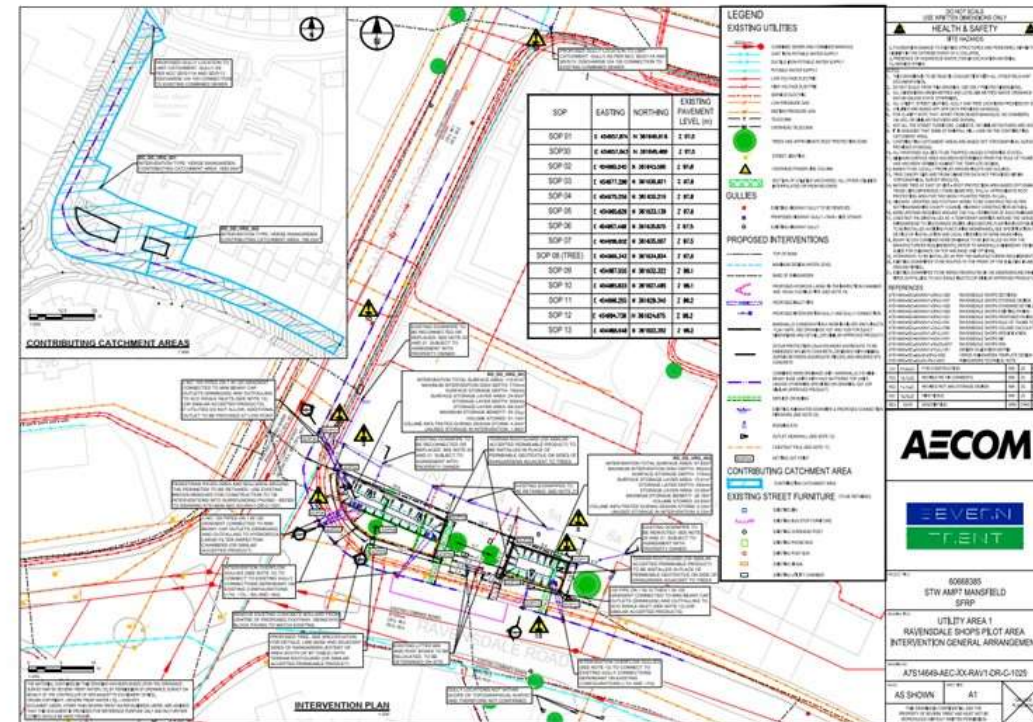
# Template Design Development



- **Template design drawings**, technical notes and specifications
- Standards - **blend** of industry best practice and design requirements from Severn Trent and the Highway Authority
- Ensures **consistency** across the catchment and multiple consultants
- **Collaboration** with the Highway Authority, adherence to the templates also helps to expedite the **approvals process**
- The templates now adopted as Severn Trent **business-wide SuDS Standards**



# Ravensdale Shops - Design





## Ravensdale Shops - Concept



**Ravensdale Shops Rain Garden: AECOM Visualisation**  
66m<sup>3</sup> of surface water storage



## Ravensdale Shops - Construction





## Ravensdale Shops - Completion





SEVERN  
TRENT

AECOM

# Basins

Delivering a better world

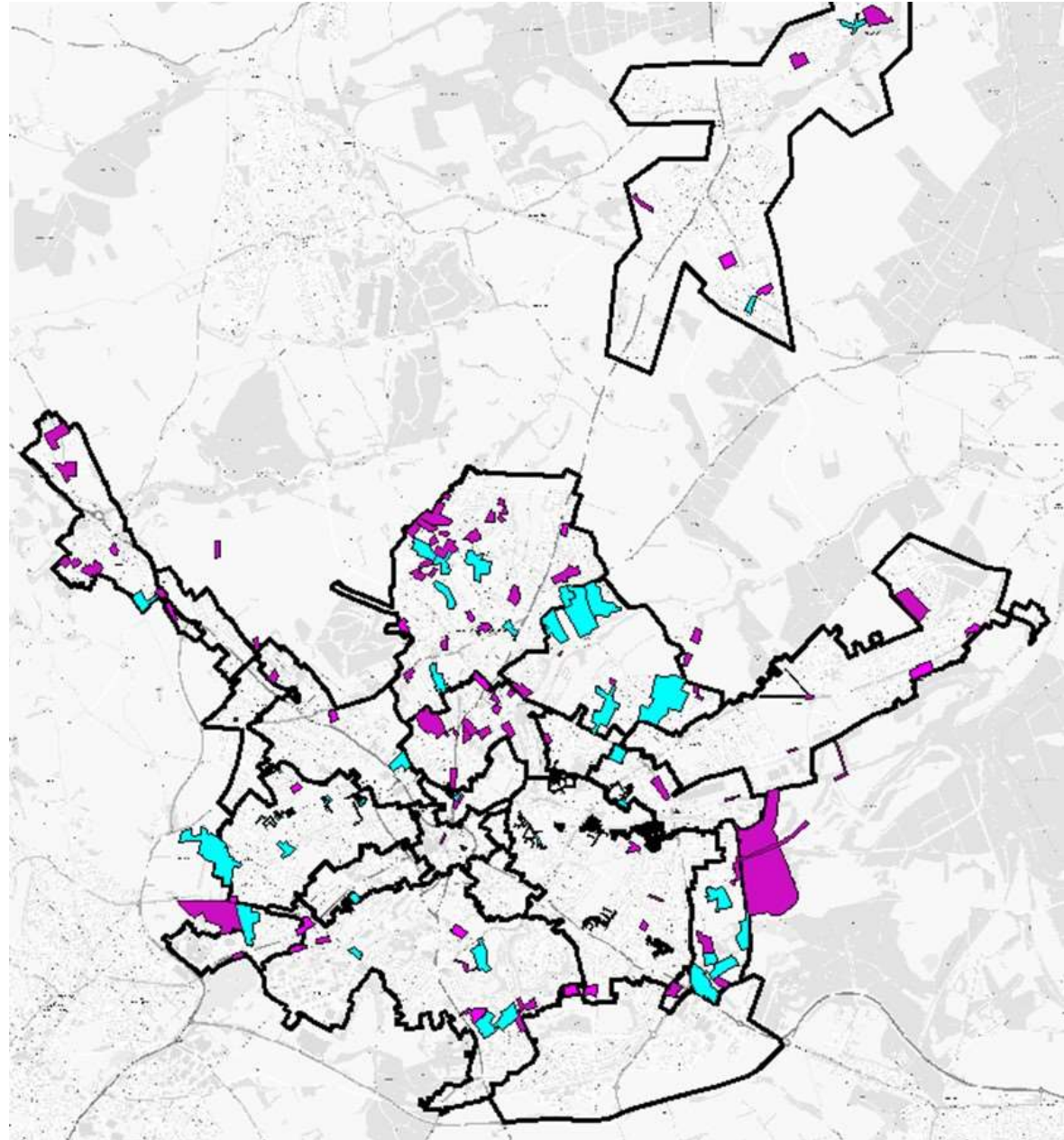
 [aecom.com](https://www.aecom.com)



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## Big Wins

- 11 bespoke basins
- 8,555m<sup>3</sup> storage
- Planning Permission
- Large volumes, modelling required
- Screening:
  - Available location
  - Value of location
  - Available catchment













# Conclusion



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## Lessons Learned



Adapt to flex around change

Importance research & development = continuous improvement

Close Collaboration is key

Time for developing relationships



# Questions & Discussion

[www.slido.com](https://www.slido.com)  
#Floodresilience2025



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# Coming up next...

Breakout sessions – ‘People’

A – Engaging with coastal communities

B – Building resilience with and in communities

C – Creating resilient futures

D – Planning community engagement training



# Scotland's Flood Resilience Conference 2025

Refreshments

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# Scotland's Flood Resilience Conference 2025

## Breakout A – Engaging with coastal communities – challenges and opportunities

Will Burnish, Moray Council (Chair);

Paul Buckley, CEFAS; Kate Munro, Angus Climate Hub; Katia Rajovic, Dumfries and  
Galloway Council; and Pippa Lawton-Van Kuijk, RPA Ltd





Marine Climate Change  
Impacts Partnership

**Climate change risks to COastal COmmunities,  
and their health and wellbeing (COCO)**

Barriers to action...and moving forward

Paul Buckley (Cefas / MCCIP programme manager)









# Climate change risks to COastal COmmunities, and their health and wellbeing (COCO)



## Why is MCCIP interested?

- Limited 'impacts' evidence in MCCIP topic reviews
- High exposure to CC risks (land / sea / compound) and many coastal communities vulnerable
- Highlighted in national CC assessments and adaptation plans
- Opportunity to engage with relevant networks and stakeholders

UK-wide consultation (setting the scene for today!) informing 'local' actions





# Climate change risks to COastal COmmunities, and their health and wellbeing

What are the barriers to addressing the vulnerability of coastal communities to climate change?



180+ Stakeholders contacted - 150 Barrier statements and descriptions (survey) - 52 options for positive action (workshop)



# Stakeholder engagement in Scotland

- Scottish Government, SEPA and NatureScot on the SG (and many other evidence providers)
- Scottish Government and Sniffer on the COCO WG

A wide range of Scottish organisations were sent the barrier question and invited to the workshop, including...

Salmon Scotland	Highlands and Islands Airports
Scottish Association for Marine Science	Forth Estuary Forum
Scottish Environment Link	East Grampian Coastal Partnership
Scottish Fishermen's Federation	Clyde Marine Planning Partnership
Scottish Fishermen's Organisation	SEPA
Scottish Government Marine Directorate	Shetland Shellfish Management Organisation
Scottish Sea Farms	Shetland University of the Highlands and Islands
Historic Environment Scotland	SNIFFER
Orkney Islands Council	Tobermory Harbour Association
Moray Firth Coastal Partnership	Tay Estuary Forum
North Link Ferries	Caledonian MacBrayne
Montrose Port Authority	CalMac Ferries

*The full list of 182 UK stakeholders included, but were not limited to, national and local government; industry; coastal partnerships and community fora; climate change research; social research; statutory agencies; services and utilities; maritime and coastal infrastructure and transport links; health services; nature conservation and management; arts and culture; marine recreation; climate and weather forecasting; lifesaving at sea; tourism, culture and heritage; and food standards*

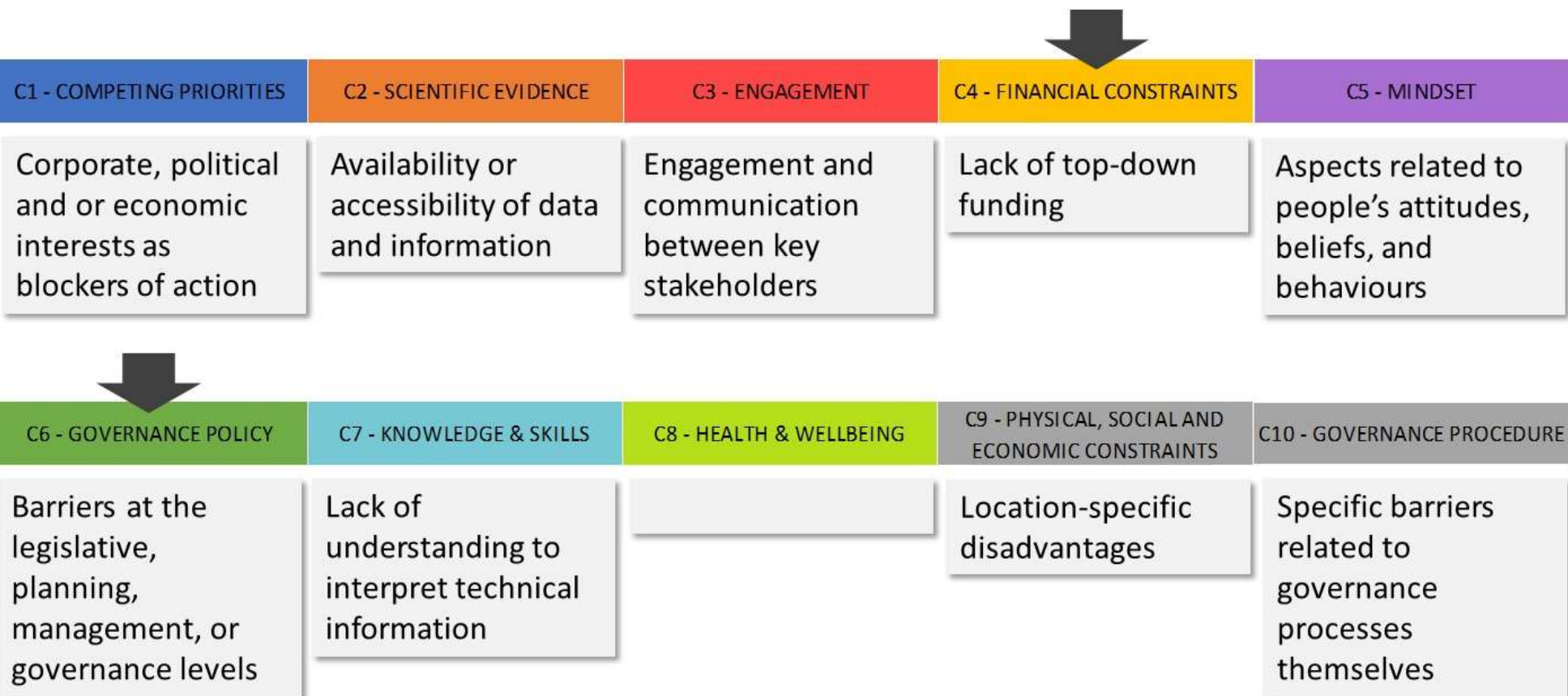




# Coastal communities and their health and wellbeing

150 barriers, categorised as follows...

(↓ denotes categories with the most barriers)







# Coastal communities and their health and wellbeing

Top ranked barriers by category (at follow up workshop)

Category	Barrier statement
Competing Priorities	Political will
Governance procedure	Inadequate procedures and processes for improving outcomes for coastal communities
Evidence	Reliable and accessible information
Evidence	Lack of understanding of the health impacts of climate issues at the coast - health and wellbeing (and support services)
Engagement	Getting the relevant people together so all can be heard, understood and able to contribute
Financial constraints	Funding and resources
Mindset	The difficulty in changing behaviours towards climate change and adaptation to climate change
Knowledge and skills	Lack of sharing of best practice and what works across coastal communities
Engagement	Lack of trust between coastal communities and decision makers
Financial constraints	Lack of funding to properly investigate and explain the costs (and need for) adaptation
Governance policy	Failure to consider socio-cultural value and impact
Knowledge and skills	Misinformation



# A *lot* of detail behind the barrier statements!

A useful 'mine' of information, from a broad spectrum of UK consultees



BARRIER No.	BARRIER STATEMENT	BARRIER CLARIFICATION
<b>C1 - COMPETING PRIORITIES</b>		
B102	Landownership	-
B121	Political implications and risks	The impact on reputation of Government and their delegated bodies in respect to accepting (or not!) the responsibility of negative impacts from unsustainable flood risk management or other impacts from climate change. Assessing the vulnerability of coastal communities' lays-bare the need for Government policy and commitment to mitigate the risks or provide compensation for impacts on communities, infrastructure, and environment where perhaps there is no DIRECT legal duties of care? E.g. loss of equity from climate change related sea level rise or loss of agricultural land (note this is similar to the second point but relates specifically to policy gaps or political "hot potatoes"!
B122	Reputational Risks leading to FOIs and high-profile challenges.	Government priorities may not satisfy everyone's expectations! – Another difficult issue is explaining the problem of climate change related impacts and relating that to the priorities of government as defined in National Flood Risk Management strategies and climate change related adaptation guidance or policy. For example, the loss of agricultural land to sea level rise! These policies and positions may not meet everyone's expectations or likely leading to lobby or high-profile negative publicity. I.e. Government emphasis on protecting communities at risk (but only when economically viable in respect to cost benefit) rather than primarily infrastructure, distribution networks and agricultural land. This may be a difficult message for many within vulnerable coastal areas, particularly where there are only low numbers of community at risk which effect the cost benefit ratio!
B124	Managing the reputational risks.	Many of the messages and engagement narratives are extremely difficult and negative in nature when dealing with the climate change emergency. They involve a change in the status quo, disturbing peoples feeling of security and sometimes involves existential risks. For example, evidence associated with existential threat from tidal flooding in coastal communities and unsustainable flood risk management potential. The messages disturb the status quo and security of the public and stakeholders and lays bare some unpalatable realities of future short-, medium- and long-term change expectations. Messaging is therefore complex and needs to ensure that accountability is not assumed.
B131	Coastal assets in private ownership	In Cornwall in particular, many coastal assets are in private hands (for complex historical reasons linked to the Duchy of Cornwall). The whole of Cornwall has about 30m of coastal defences are owned by the Crown Estate.
B41	Political will	National and local government may not understand or prioritise the needs of coastal communities, particularly small ones. Their attention and associated funding decisions can be focused elsewhere, e.g. town centres, industrial development, urban areas with larger voting cohorts. Rural coastal communities may particularly be vulnerable to being overlooked or deliberately not prioritised.
B42	Economic pressure to develop in inappropriate areas on the coast	There used to be national planning guidance that protected coastal areas for industry that needed to be located at the coast. This no longer exists. Although the government has coastal change management areas this leads to a piecemeal approach to what is appropriate to site where and can lead to problems for coastal communities regarding non-CCMA areas which can have any kind of development built there, potentially impacting on the ability of communities to relocate as the need arises and skewing the spending on coastal defences.
B54	Greenwashing	The ability of companies and businesses to Greenwash is meaning that people are badly informed of the issues and don't understand what is actually being actioned
B55	Corporate greed	There is still too much focus on making profit and this is often from pollution. Water companies, plastic producers and oil giants are not seeing environment issues as their main driver and instead investing in unsustainable solutions.
B74	Inadequate focus	Often politics or campaigns are driving the focus on what might not be a pressing problem but constitute a stronger headline.



## Positive action (to address vulnerability of coastal communities)

52 initial suggestions from the COCO workshop, most popular include...

Promote good practice through the media

Capture stories of what is possible (with early movers e.g. National Trust, RSPB)

Use coastal groups to share reliable information and support challenging conversations

Expand CoastSnap to educate and expand data collection

Frameworks for rolling back communities or assets for better cross-UK consistency

Interdisciplinary adaptation projects for holistic and place-relevant projects

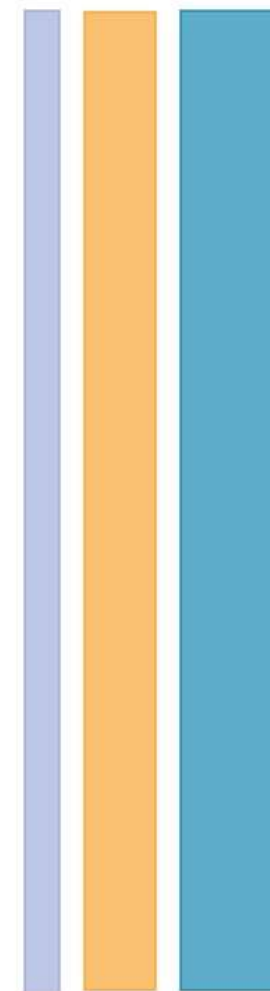
Fund SMP community engagement on intent and development

Database for end users of project successes/failures (and promote acceptance of failure and learning from it)

Change in government mindset so coastal adaptation is a cross departmental issue

Change procedural governance to require early (and ongoing) community participation

Again, there is a lot more detail behind these statements in the report...





# Moving forward (MCCIP)

Consultation report published...onto activities with WG partners



## What are the **Barriers** to **Action**?

- Competing priorities
- **Scientific evidence**
- **Engagement**
- Financial constraints
- Mindset
- Government policy and procedure
- **Knowledge and skills**
- Physical, social and economic constraints

## How to **Respond**?

- **(Improved) knowledge and skills**
- (More) integrated approaches
- **(Better) public discourse**
- (Better targeted) funding opportunities
- **(Better targeted) policy, legislation and guidance**
- **(Climate ready) stakeholder fora**

Full consultation report available at [www.mccip.org.uk/recent-updates](http://www.mccip.org.uk/recent-updates)





# Pilot activities

(in consultation with SNIFFER for Scotland)

- Inspiring Change
- Ocean Literacy
- Accessible Evidence
- Community Engagement

## What?

- Coastal climate hazards (flood / erosion / other)

## How?

- Find out community priorities
- Manage ambitions...any missing 'pieces' we can help with
- Existing activities with established fora/groups

## Where?

- Nature area / council / town / village

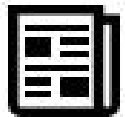






office@mccip.org.uk

@MccipOrgUK



<http://www.mccip.org.uk>







# Storm Angus

Experiences of a changing climate

Kate Munro



# Storm Angus

Videos of lived experiences





# WE LIVE HERE NOW



The climate of  
your youth no  
longer exists.

Impacts will  
keep coming



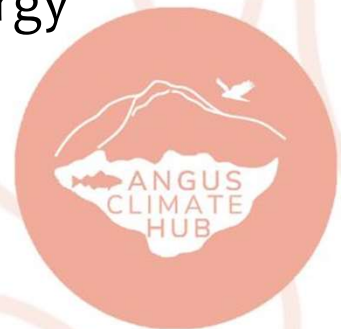


# WHAT MELTS THE ICE WON'T BUILD THE BOAT



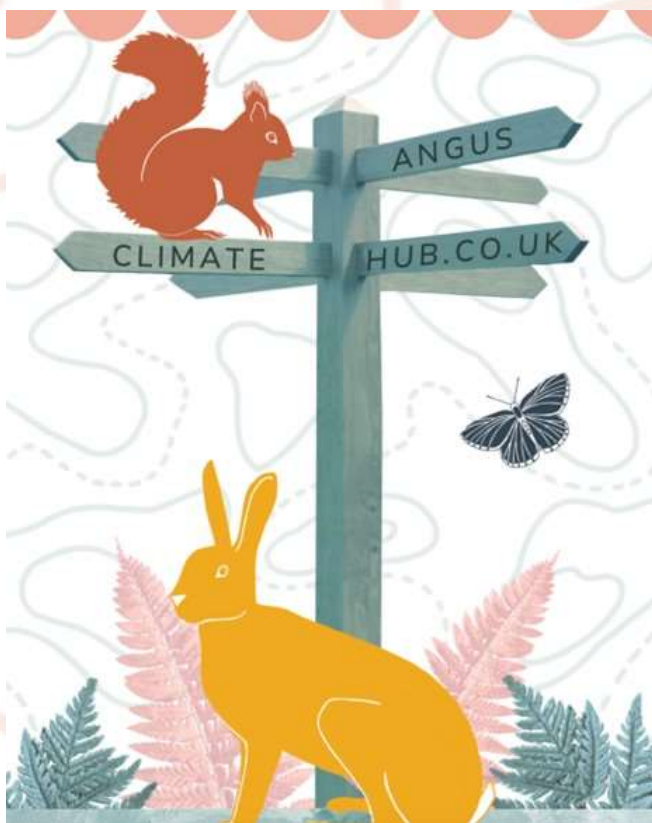
Which People, places & things deserve your

- Attention
- Money
- Time
- Skills
- Energy





# YOU ARE THE COMPASS



Maybe you can only  
change you.

What direction to  
take?

No capes.







# Sandhead Rewilding Project

January 2025

*Katia Rajovic*  
Technician, Flood Risk Management Team





# The area



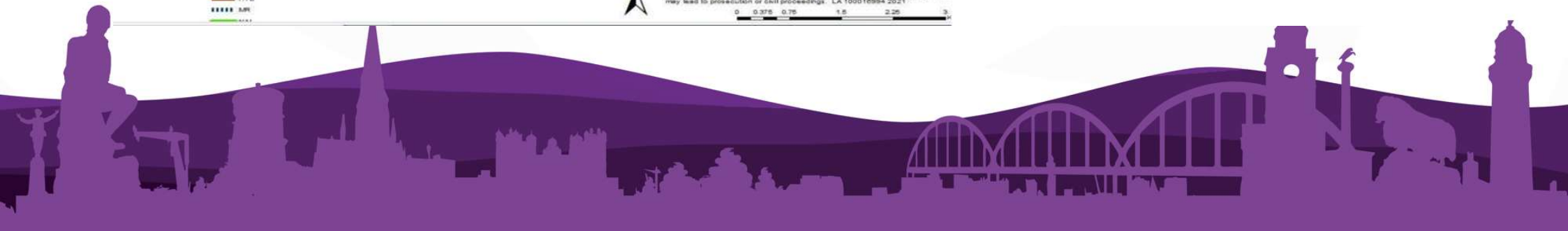
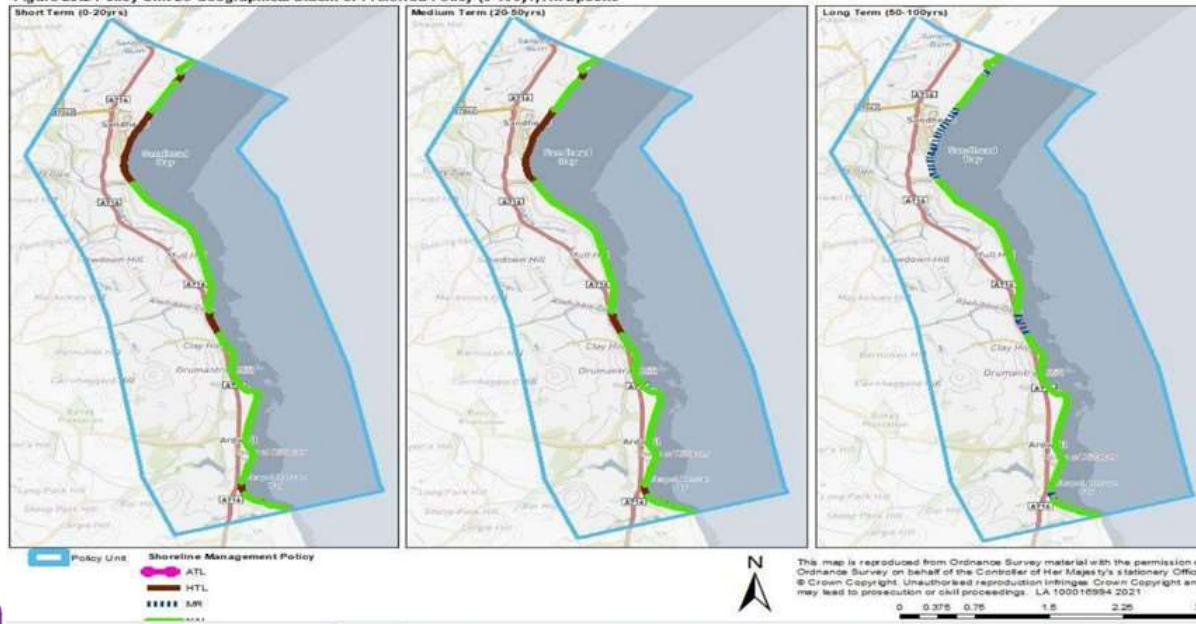
- 340km-long shoreline
- The shoreline faces east towards Luce Bay, exposed to large waves and strong tidal currents.





- The D&G SMP indicates that, by 2050, this shoreline will become predominately erosional, receding by up to 16m at Sandhead (Dynamic Coast).

Figure 23.2 Policy Unit 23 Geographical Extent of Preferred Policy (0-100yr) All Epochs





# Background

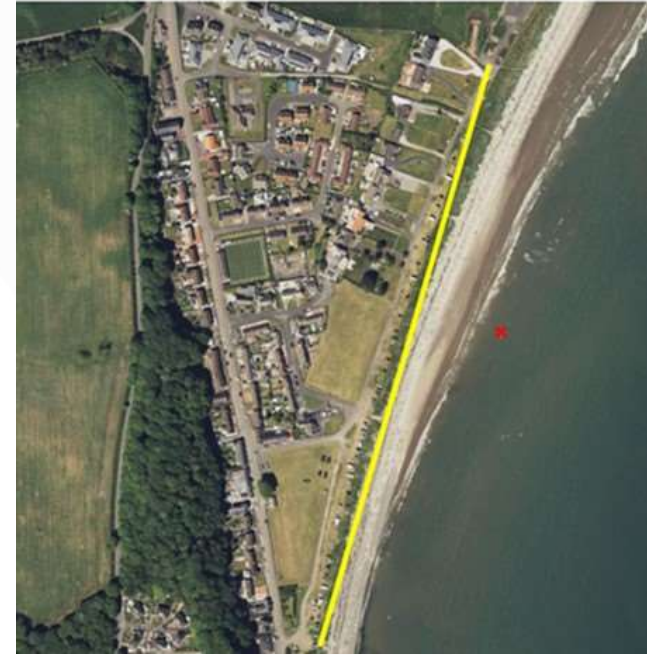
- Popular tourist destination leading to increased vehicle / human presence, has resulted in habitat degradation
- Also believed to be a contributing factor to increased flooding





# The proposal

- Community-led project – Stoneykirk Community Council.
- Stoneykirk Community Council conducted a public consultation which showed support for the development of an area designated for re-wilding.
- Support / input from a number of organizations: DGC, Solway Firth Partnership, NatureScot.
- COASTAL CHANGE ADAPTATION BUDGET - 2023/24 Case study proposal application submitted by DGC.
- Approximately 600m designated for re-wilding adjacent to the Shore Road





# The proposal

- At the same time allowing visitors to enjoy the beach - the area designed for vehicle parking is limited to a 7-metre space from the road.
- The remaining area between the parking area and the beach is to be rewilded and protected by a fence.
- Access to the beach will be through 6 paths with 2.5-3m matting that protects the sand and allows for vegetation growth.
- Slipway maintained.
- Updated signage, reinstallation of picnic tables.
- Pre and post vegetation survey work.
- Total grant £36k





## Post Installation





# Post Installation





# Video





# Expected Benefits

- Use of nature-based solutions in the adaption for the future effects of climate change.
- Reestablishment of the backshore vegetation, creating a healthier habitat that could possibly be more resilient to the coastal changes that this area is likely to experience in the future.
- Slow the rate of coastal erosion.
- Biodiversity benefits





# Challenges and Considerations

- Lack of support from visitors;
- Complaints that it's not needed, not been shared / communicated enough; claims that erosion is not happening;
- Monitoring method still to be established, initiated discussions with local university.
- Importance of communication and engagement;
- Importance of affected communities to understand the future risks and impacts that projects are addressing and aiming to mitigate.





# Thank you!

- With thanks to Alex Whannel, former Stoneykirk Community Council member.
- Gordon Braid, for aerial footage.
- Nic Coombe, Solway Firth Partnership, for photographs.

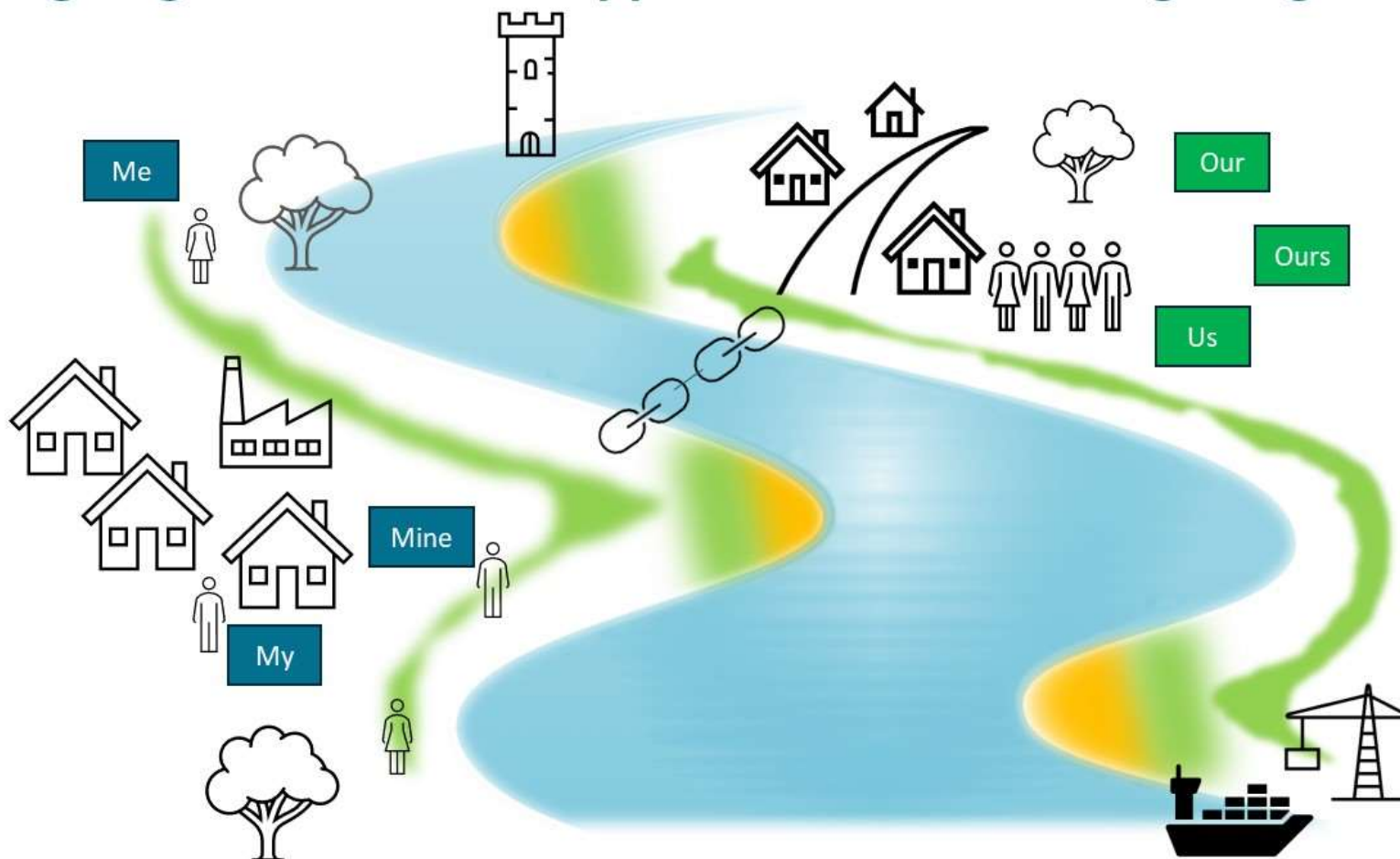
[Katia.Rajovic@dumgal.gov.uk](mailto:Katia.Rajovic@dumgal.gov.uk)

[CommunitiesFlooding@dumgal.gov.uk](mailto:CommunitiesFlooding@dumgal.gov.uk)





## We are going to build a new approach...and the bridge to get there







Flood and coastal resilience innovation programme

Part of the £200m  
Flood and coastal innovation programmes

# Resilient Coasts: a new economic approach for the coast

Scotland's Flood Resilience Conference

28 January 2025

**Pippa Lawton-Van Kuijk (Client Services, Contracts and Delivery Manager)**

Co-Authored by Karen Thomas (Head of Coastal Management at Coastal Partnership East) and Teresa Fenn (Director at RPA)



## What is the problem?

The value of coastal communities is not captured within the current economic calculations and benefits assessments



They do not consider how coastal community functioning would change due to flooding or coastal erosion



# Why?





## How?

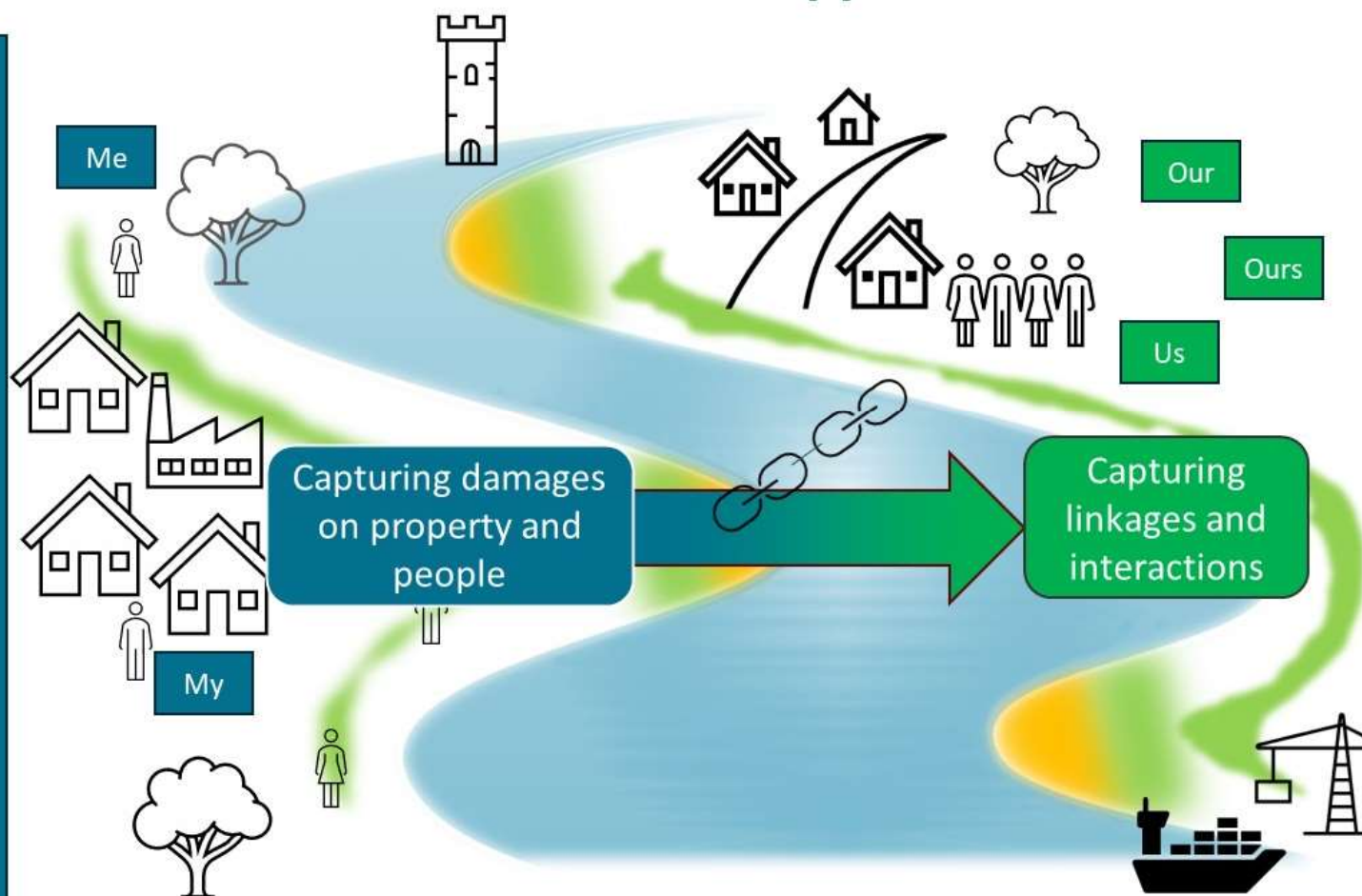




# The aim of our work is to build a new approach

## Current approach:

- Impacts on **my** property (£ property damages)
- Impacts on **me** (£ health)
- Impacts on **my** activities (£ recreation)
- Impacts on infrastructure assets (£ damage)
- Impacts on the environment (£ damage)

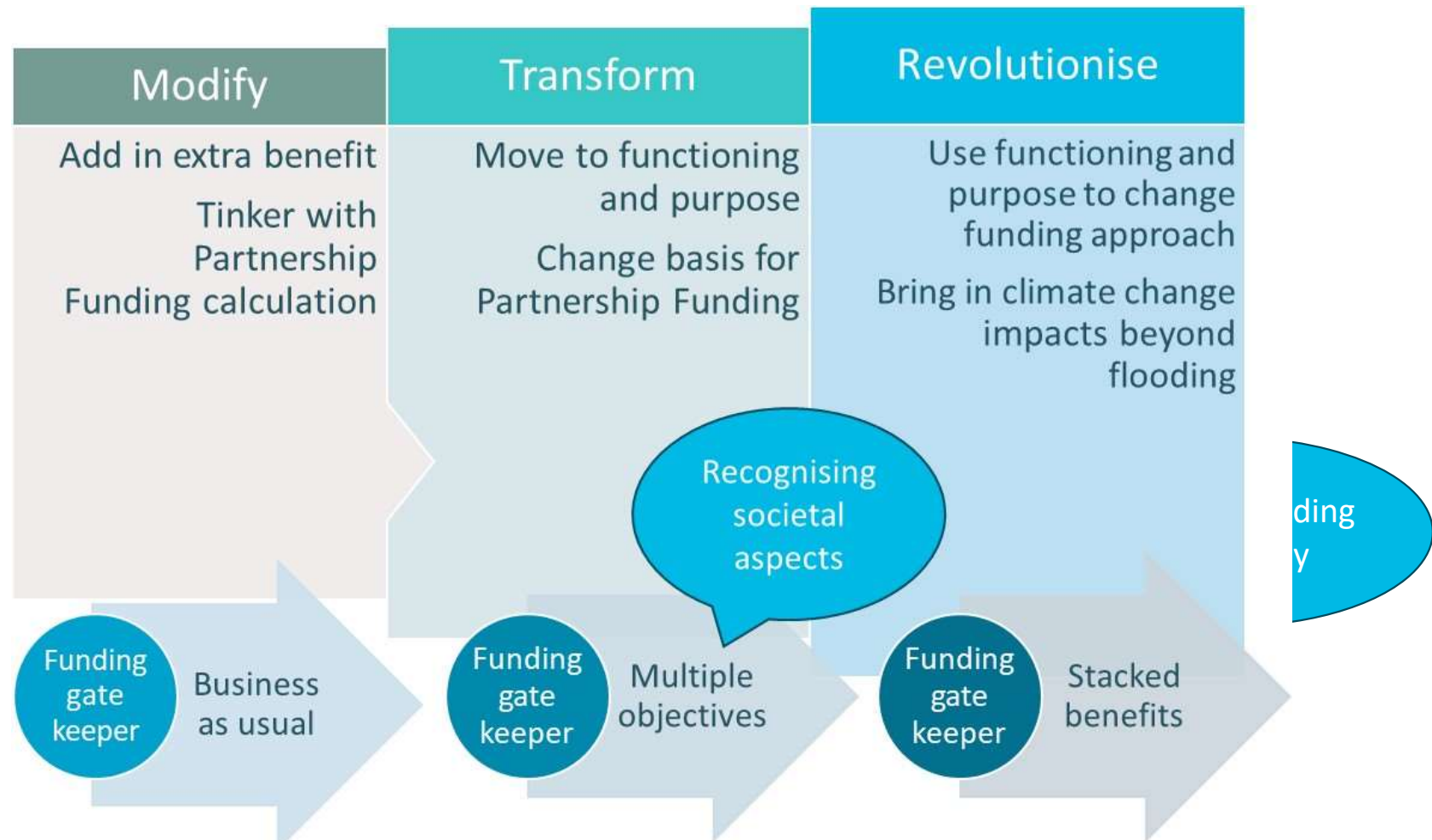


## Proposed approach:

- Impacts on **our** community, **our** culture and **our** way of life (functioning)
- Impacts on **our** economy (purpose)
- Adapting **our** infrastructure supporting **our** place (people-based)
- Adapting **our** environment making **our place** what it is (nature-based)














# Building the bridge





# Function and purpose

<b>Functioning (loss of assets)</b>	<p><b>Do-nothing</b></p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>	<b>Functioning (delay time to loss of assets)</b>	<p><b>Defences</b></p>  <p>Department for Environment Food &amp; Rural Affairs Environment Agency</p> <p>Flood and coastal resilience innovation programme Part of the £200m Flood and coastal innovation programmes</p>	<b>Functioning (rollback of assets; assets retained in community)</b>	<p><b>Adaptation</b></p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>
<b>Purpose (loss of economic activity)</b>	 <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>	<b>Purpose (loss of economic activity)</b>	 <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>	<b>Purpose (maintained or enhanced economic activity)</b>	 <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>  <p>At <a href="https://www.bbc.com/news/uk-england-suffolk-43465731">https://www.bbc.com/news/uk-england-suffolk-43465731</a> 16/10/25</p>



# The future in coastal economics...







Measuring what is valuable rather than valuing what is measurable





NATIONAL  
CENTRE FOR  
RESILIENCE

BUILDING SCOTLAND'S RESILIENCE TO NATURAL HAZARDS



## Building Resilience Workshop

Empathy in Action







# NATIONAL CENTRE FOR RESILIENCE

BUILDING SCOTLAND'S RESILIENCE TO NATURAL HAZARDS

## A Collaborative Resilience Partnership

- An independent partnership
- Connecting government, academia, third-sector organisations, local authorities, and practitioners across the UK
- Enhance resilience to natural hazards through interdisciplinary collaboration.

## Bridging Academia, Policy, and Practice

- Commission research
- Collate evidence
- Fund projects
- Facilitate workshops
- Mobilise knowledge
- Create resources & tools
- Inform national strategies to address climate and weather-related challenges.



Flood Risk Management Conference



[www.ncr.glasgow.ac.uk](http://www.ncr.glasgow.ac.uk)



'Building Scotland's resilience to natural hazards'





## Workshop Objectives

### **Build Empathy:**

Use visual prompts and assigned personas to connect emotionally and practically with flooding scenarios.

### **Encourage Reflection:**

Explore how personas react to flooding and consider the emotional and practical impacts.

### **Understand Different Perspectives:**

Gain insights into the challenges and priorities of others to approach community issues with sensitivity.

### **Enhance Communication Skills:**

Learn how visual aids and storytelling can help break down barriers and foster understanding.

### **Provide Practical Tools:**

Take away insights and techniques to improve community engagement and develop tailored resilience strategies.





## Exercise 1 – Persona-Based Discussion (30 Minutes)



1. Location & Flooding Scenario



2. Allocated Community Member



3. Allocated Practitioner

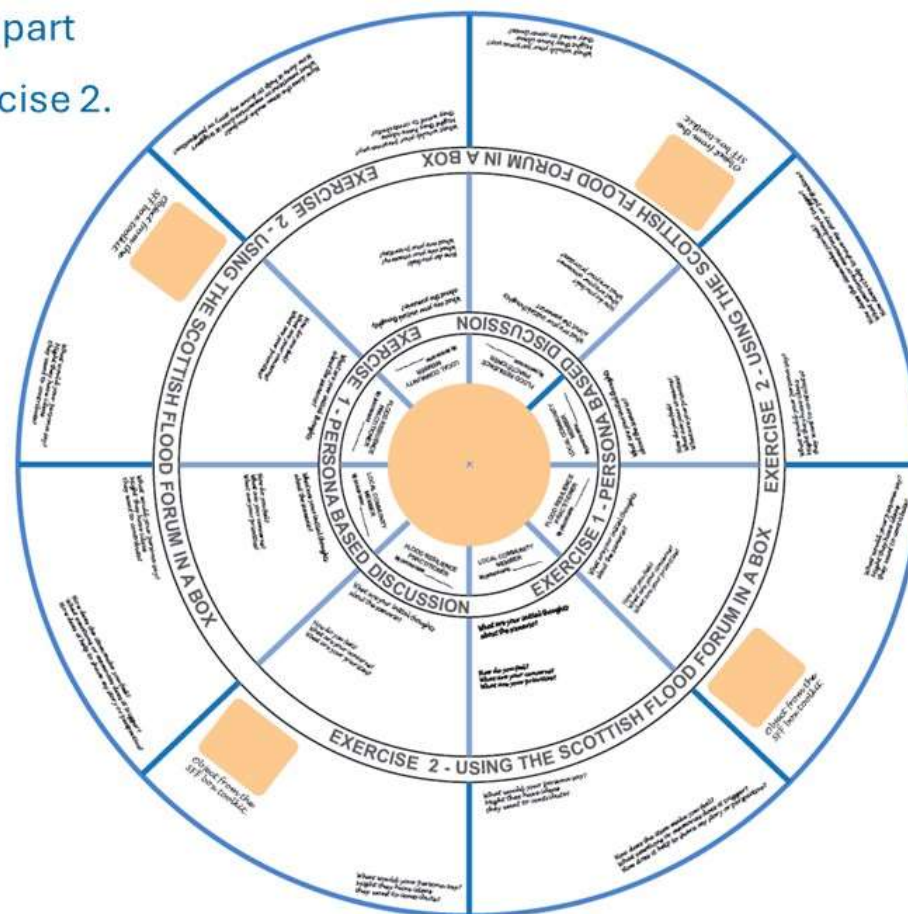




## Exercise 1 – Persona-Based Discussion (30 Minutes)

This exercise is designed to help you complete the first part of the community wheel and get into character for Exercise 2.

- Each table is a community
- Each community is facing a flood risk scenario
- You are having a meeting to discuss the impacts of flooding.
- Adopt your persona's perspective through out the exercise.
- Document your persona's thoughts and feelings on the community wheel throughout the exercise.







## Exercise 2 – Empathy IN Action (30 Minutes)

Now that you are in character

Build empathy through storytelling using items from the SFF toolkit to build on the Communitywheel

### Community Members

Choose an item from the toolkit that resonates with your character's experience.

Reflect on its significance:

- How does this item make me feel as my persona?
- What emotions or memories does it trigger?
- How does it help me share my story or perspective?

### Practitioners

Respond empathetically to their partner's story:

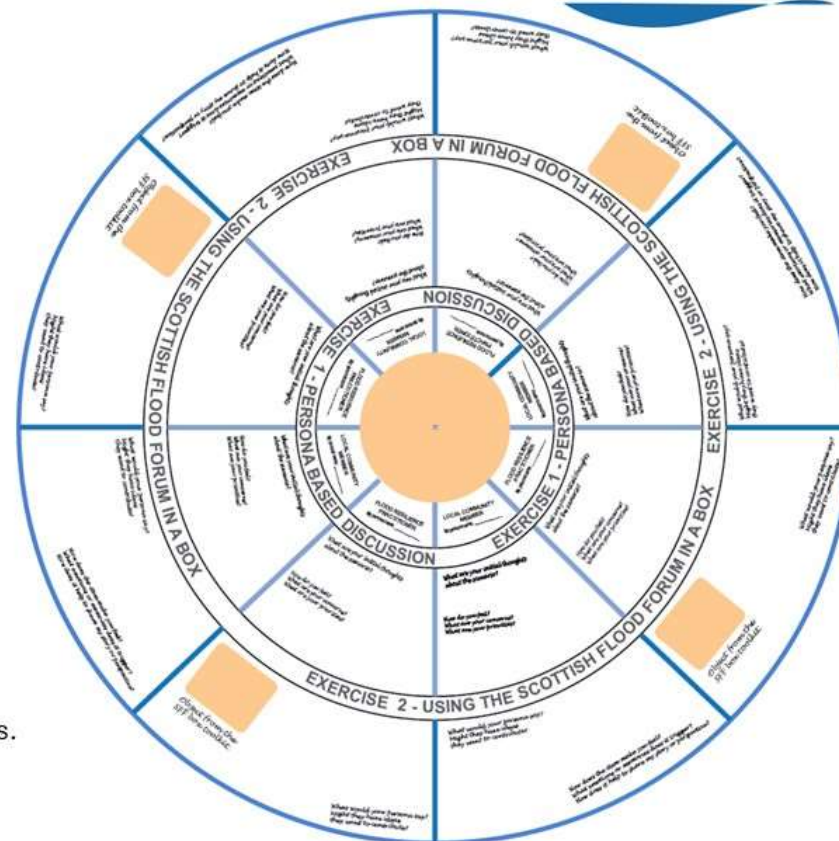
- How does this story affect your understanding of their perspective?
- What emotions did it evoke in you?

**Add to the community wheel throughout the exercise:**

- New insights, connections, and reflections as the conversation progresses.

**Highlight major themes:**

- Draw arrows or connections between personas.
- Use colours or symbols to indicate areas of consensus or conflict.
- Summarise key insights and shared concerns
- Use pre-made graphics to visually capture key points





# Thank you.

Join the NCR  
Mailing List:



Learn more  
about the NCR  
& our work:



Learn more  
about the SFF  
& our work





# Scotland's Flood Resilience Conference 2025

## Breakout C – Improving flood resilience through data

Deryck Irving, Hydro Nation Chair;

Peter Hunter, Forth-ERA; Caroline Wilkie, Scottish Water

and Kerri McClymont, Mott MacDonald



# Parallel session C

## Improving Flood Resilience through Data

Flood Resilience Conference 2025



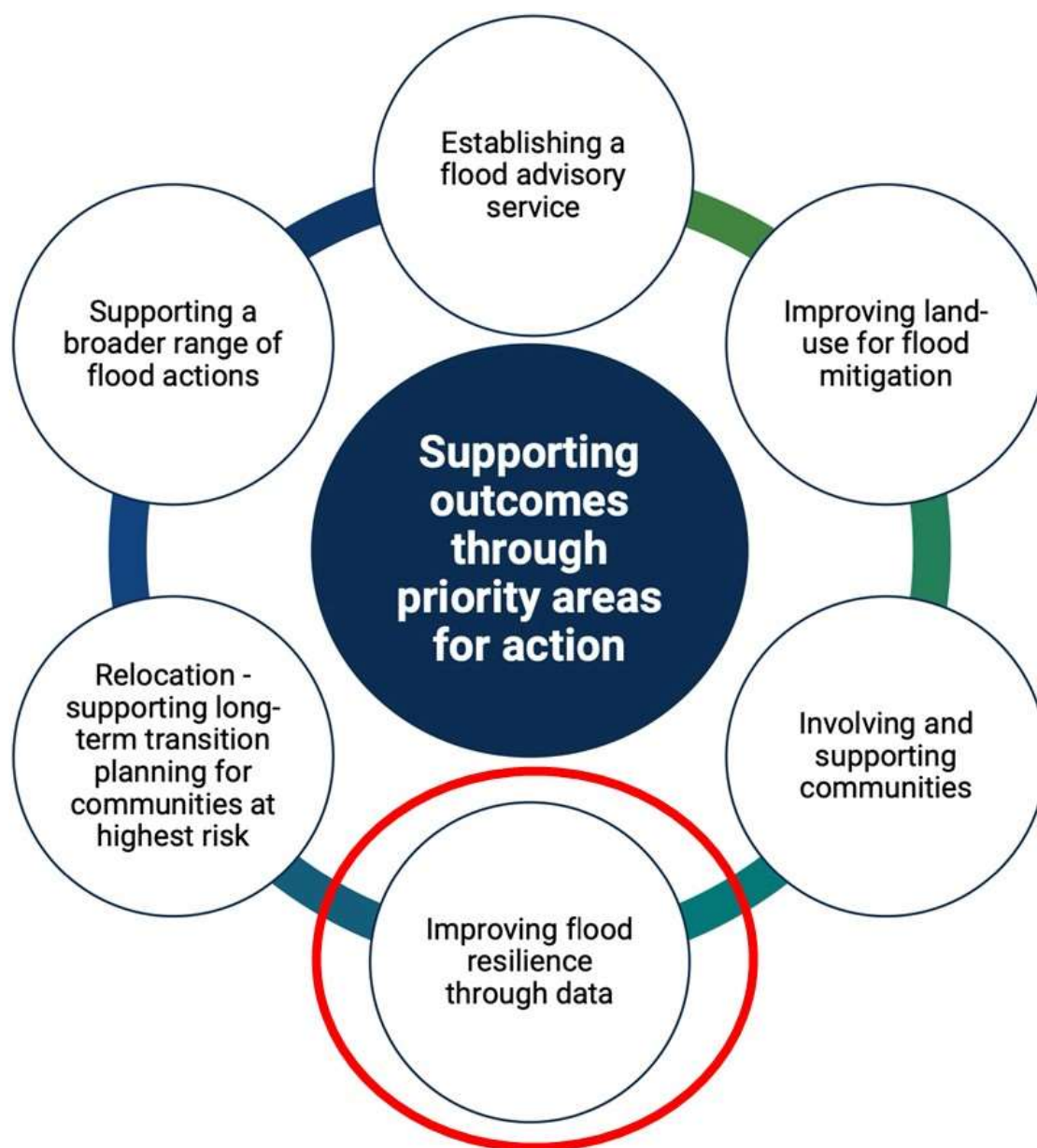
UNIVERSITY of  
**STIRLING**



**Scottish  
Water**  
Trusted to serve Scotland



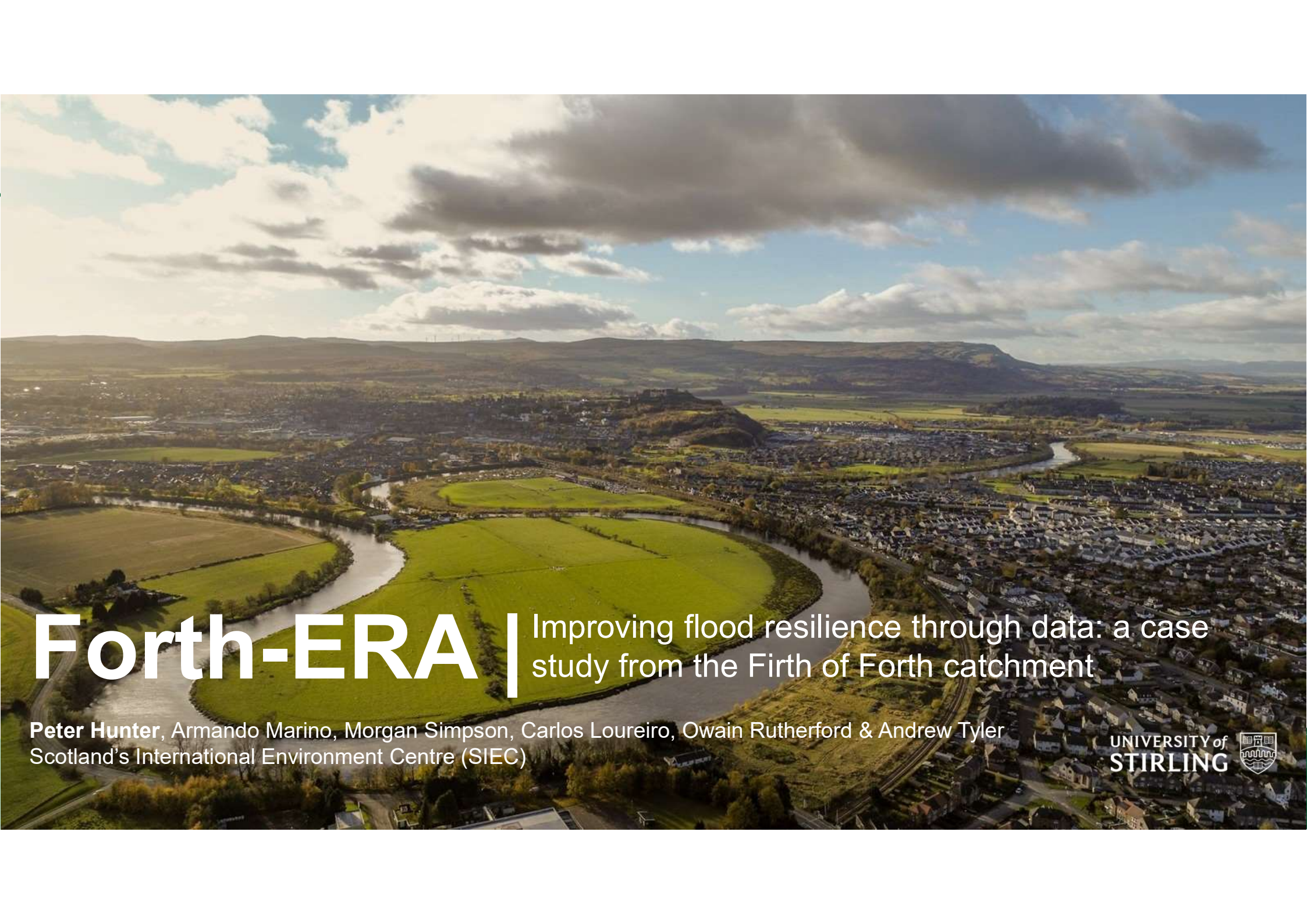




*‘improve our presentation and use of data to drive flood resilient activity’*

From National Flood Resilience Strategy 2024





# Forth-ERA | Improving flood resilience through data: a case study from the Firth of Forth catchment

**Peter Hunter**, Armando Marino, Morgan Simpson, Carlos Loureiro, Owain Rutherford & Andrew Tyler  
Scotland's International Environment Centre (SIEC)

UNIVERSITY of  
**STIRLING**





# Catchment intelligence at scale

Long-term monitoring of hydrological systems is essential. But we need **cost-effective** and **low carbon** solutions that provide widescale coverage of catchments while simultaneously capturing short-lived events and extremes.



## How does data improve flood resilience?

- Multi-modal data help constrain, calibrate and test predictive models
- Raises community awareness and empowers citizens to engage and take action
- Improves strategic, operational and emergency decision-making

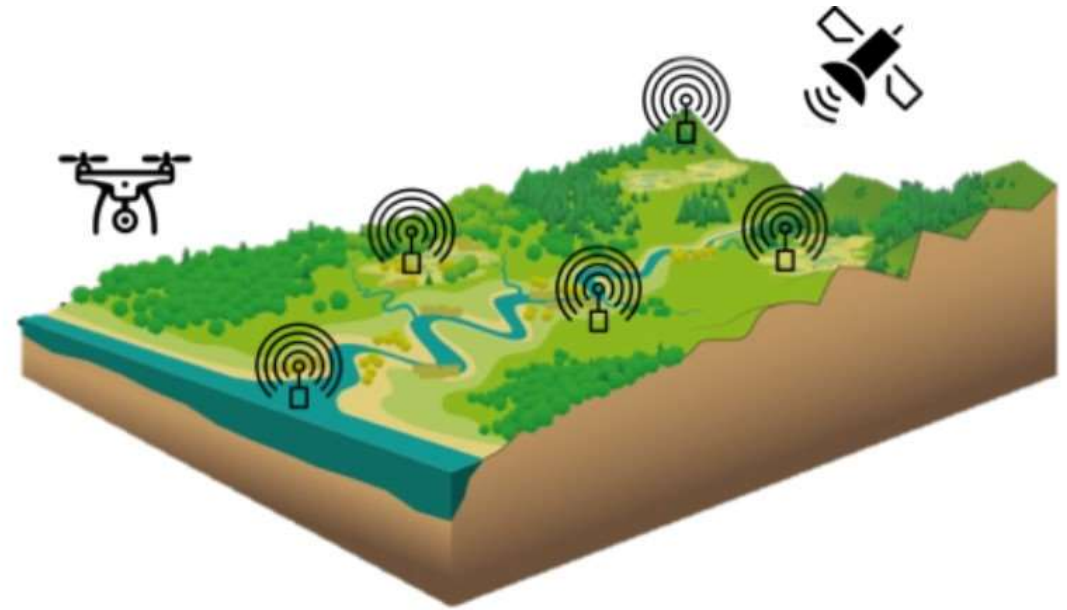


# The era of big environmental data

Integration of new technologies and tools can help us build resilience to flooding by allowing us to scale the collection of hydrological data, automate procedures, reduce latencies and make data more democratic.

## New-ish technologies and approaches

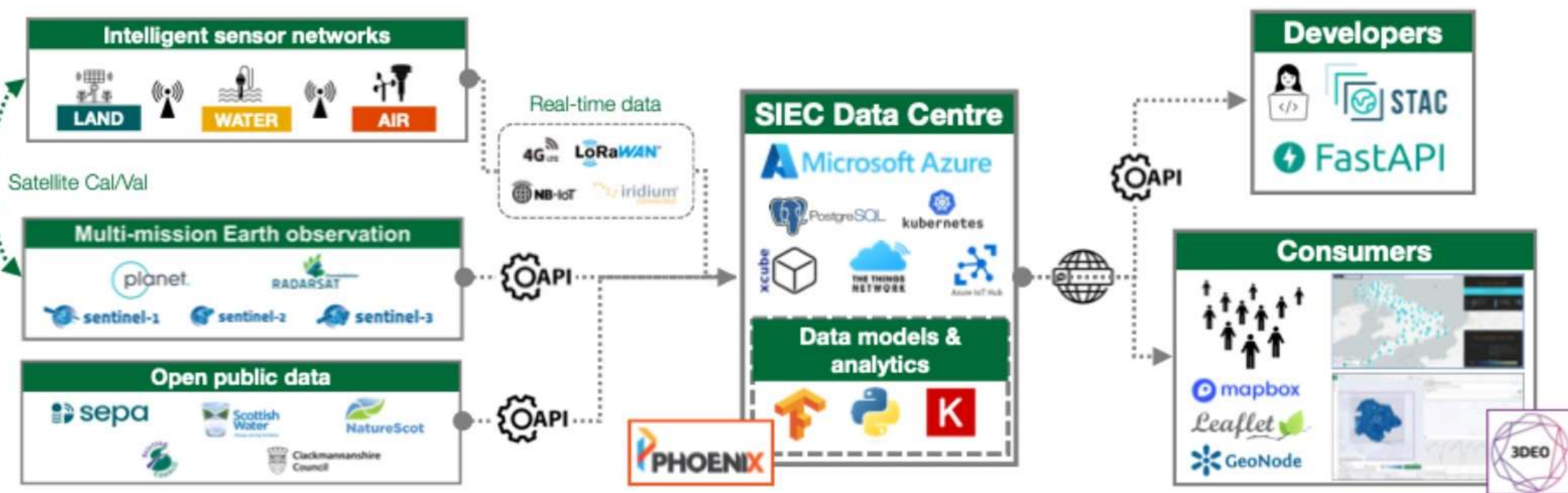
- Remote sensing (satellites and drones)
- Wireless sensor networks
- Low-cost IoT sensors offering scalability
- AI/ML for automating data collection, management and analysis
- Citizen sensing (e.g., CrowdWater)
- Catchment digital twins





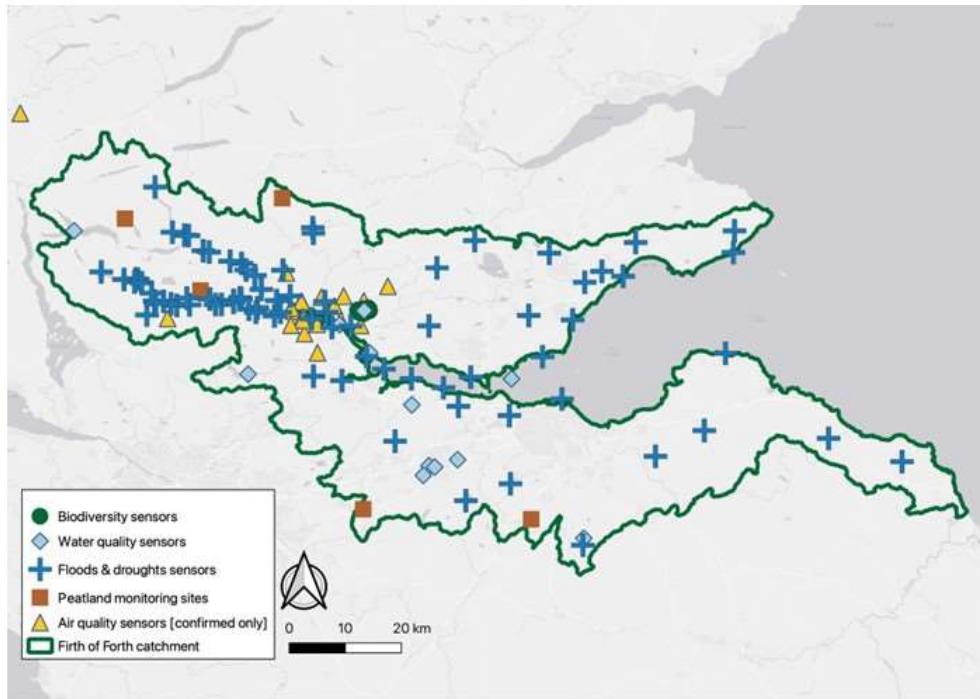
# Forth-ERA from sensors to stakeholders

Forth-ERA is pioneering transformative approaches to environmental monitoring through the integration of **sensor networks**, **satellite observations** and **models** providing a real-world testbed where new methods can be developed, demonstrated and operationalized at scale.





# Hydro-meteorological sensor network



The Forth-ERA sensor network in the Firth of Forth catchment.

+ Hydro-meteorological stations

	Eldes X-band rainfall radar		Xylem buoy with MOTUS wave sensor and ADCP	£100k+
	Campbell met station		Geolux river level & flow	£10k
	Vega river level		AquaPower Directional wave buoy	
	RiverTrack river level		Kisters rain gauge + soil moisture	£1k+



# Satellite flood mapping

## Near-real time operational service

- Data from Copernicus Sentinel-1.
- 8-day repeat cycle with two satellites
- Deep learning flood detection

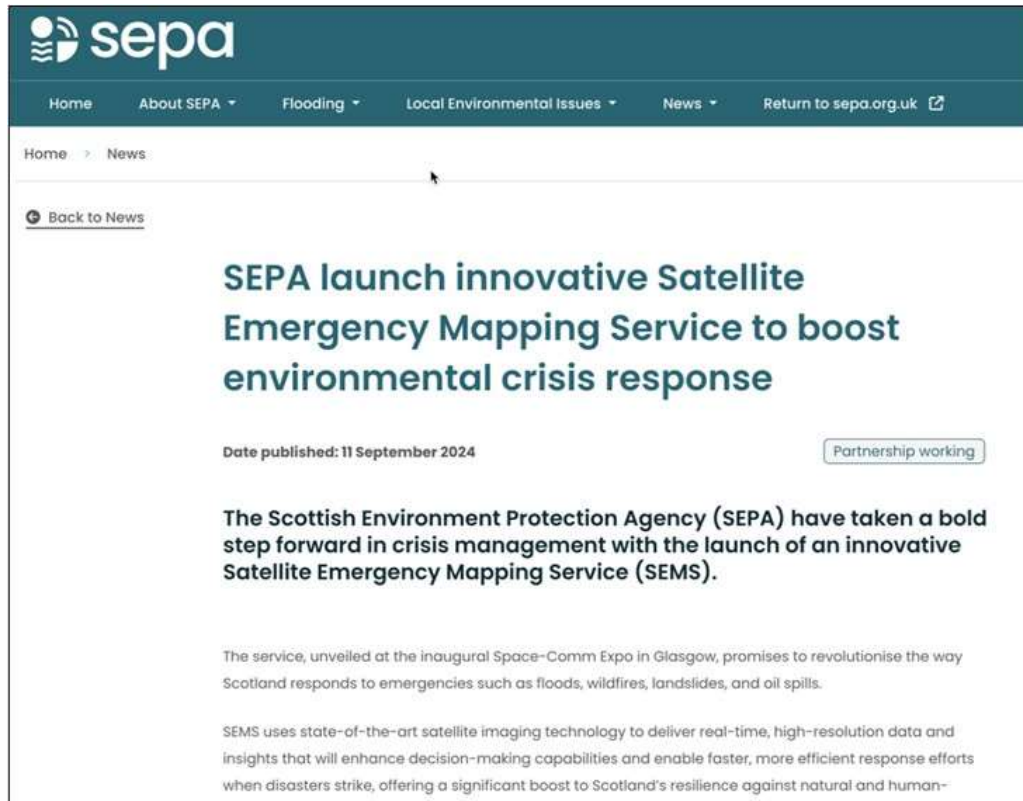
## Emergency 'on-demand' service

- Data from Radarsat-2, TerraSAR-X, Sentinel-2
- Available through International Disasters Charter (or via tasking)
- Statistic thresholding for flood detection





# SEPA SEMS flood mapping



**18th November 2022:** Torrential rain hit much of the East of Scotland, with roads and rail travel impacted, schools closed and power cuts affecting areas in Aberdeenshire. **Danger to life or significant economic damage expected.**

**6th October 2023:** Heavy rainfall caused flooding and landslides in Scotland, with some areas receiving more than two weeks' worth of rain in two days. **Danger to life or significant economic damage expected.**

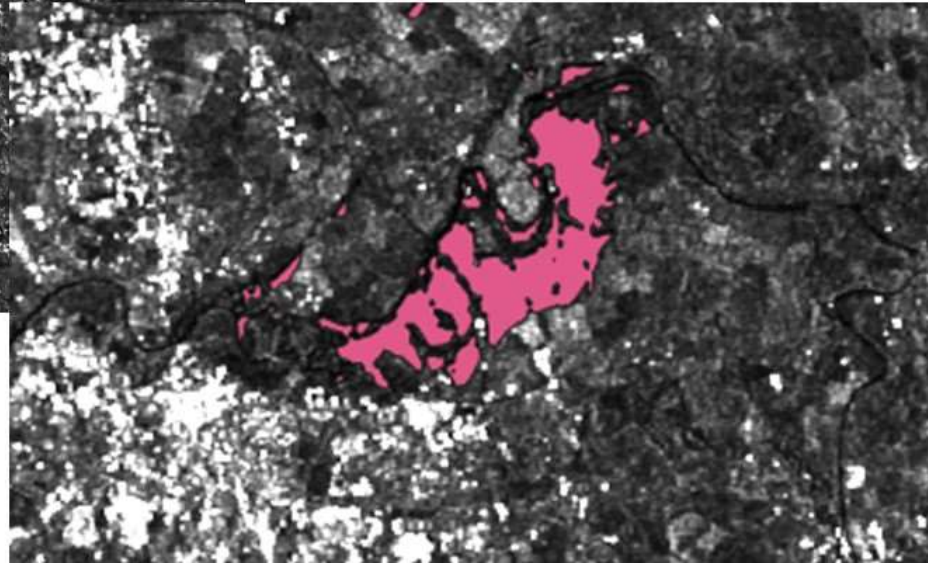
**31<sup>st</sup> December 2024:** Speyside... **Danger to life or significant economic damage expected.**



# SEPA SEMS flood mapping



**01 December 2025:** Flooding on the River Eden in Carlisle observed by Sentinel-1





# Water quality

Integrated observatories allow us to assess the impact of hydro-climatic extremes on water quality in river, lakes and coastal waters



Three monitoring buoys in the Forth estuary at South Alloa, Kincardine and Middlebank (outer estuary)



Bankside monitoring of river water quality at various locations including the River Almond



# Closing remarks

---

**Integration of new technologies can help build resilience to flooding**

**Forth-ERA is an integrated full catchment observatory providing a real-world testbed where new monitoring methods can be developed, demonstrated and operationalized at scale.**

**Understanding the data needs of the community will help focus future efforts and target the development of new technology**



# Thank you!

## Peter D. Hunter

Forth-ERA Science Director &  
Professor of the Digital Environment  
Scotland's International Environment Centre  
University of Stirling



+44 1786 466538



[p.d.hunter@stir.ac.uk](mailto:p.d.hunter@stir.ac.uk)



[www.stir.ac.uk/people/255710](http://www.stir.ac.uk/people/255710)



[.../drpetehunter/](https://www.linkedin.com/in/drpetehunter/)



**River Almond Lighthouse Project  
High Level Project Outline  
Sniffer Flood Resilience Conference  
28 January 2025**





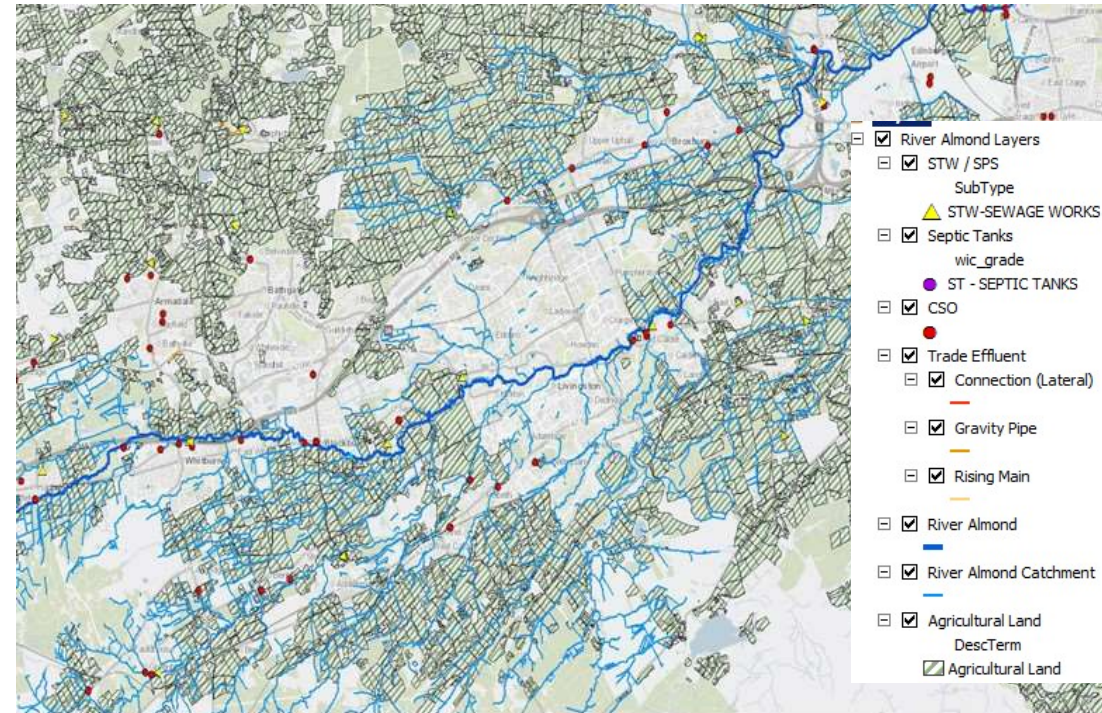
# River Almond Lighthouse Project – Background

The River Almond Valley is located in West Lothian. The river flows for 50km from the Cant Hills near Kirk of Shotts to where it enters the Firth of Forth at Cramond.

Scottish Water commitment to deliver two lighthouse projects, these are projects which are (1) Transformative; (2) multi-stakeholder; (3) future oriented; (4) scaleable.

Pilot project - aimed at providing insights on ecological health of the River Almond, determine impacts of current and future wastewater management. Make the river health information more accessible for our customers.

- Quality and aesthetics
- Complex catchment
- Water Framework Directive classification is “Moderate”
- Draft River Basin Management Plan 3 – Status to “Good”





# River Almond Lighthouse Project - Objectives

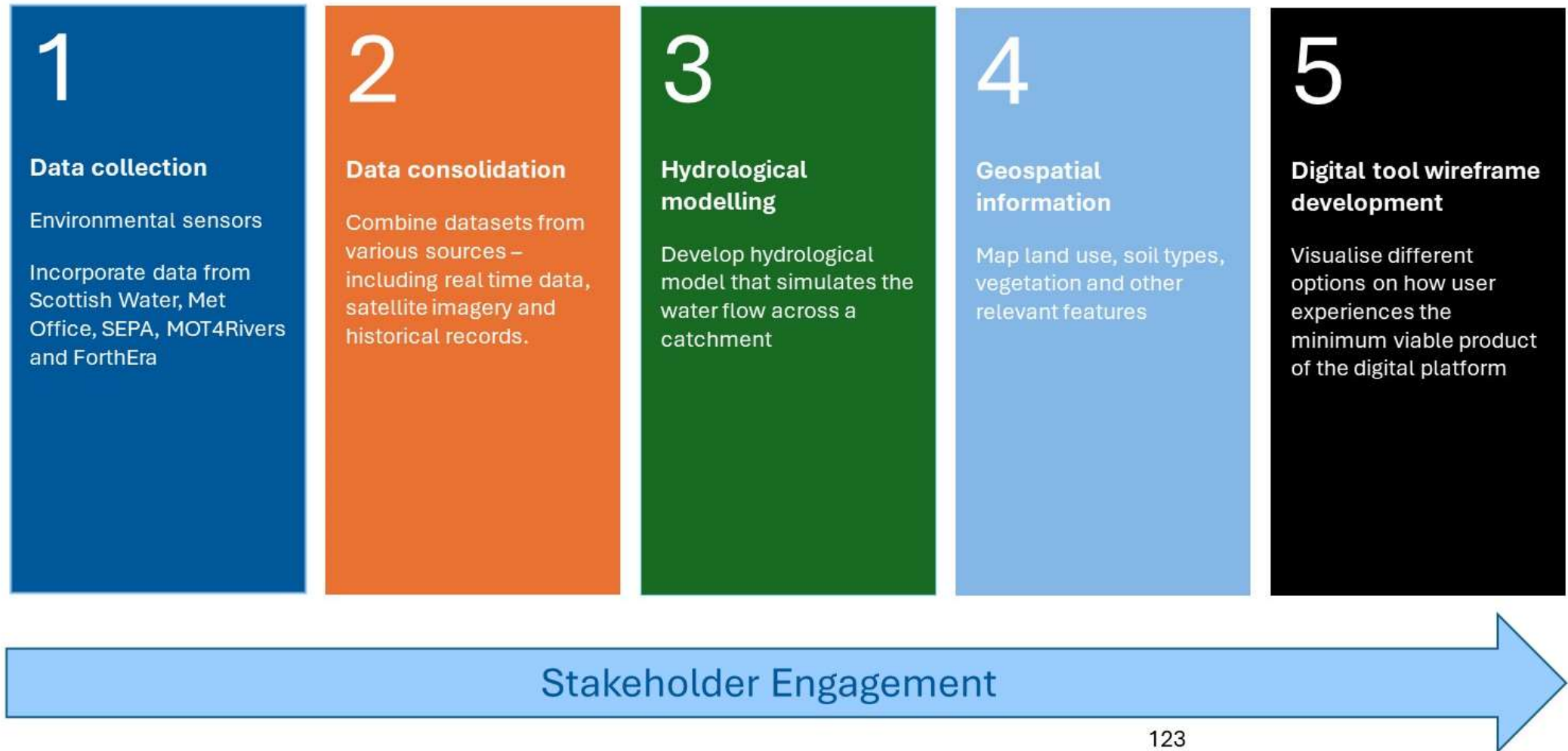


- Incorporation of One Planet Choices, developed by SEPA
- Development of a OPC Dependency Diagram.
- MVP development of a digital tool to help improve river health through better decision making.
- Collecting data and bringing it together.
- Insights on the ecological health.
- Progress options for creating a scalable, geographical catchment view on a digital platform for the community to access, assist them to make informed decisions and report into.
- Empower community to take action.
- Improve long term resilience of the catchment, overall river health, flood resilience.
- Climate adaptation.





## Data sources - understand river health





# Collaboration linked to driving action



## Scottish Water Asset Manager:

Identify key assets that have or may negatively impact water quality, to prioritise investment for improving asset performance.



## Scottish Water Operations Manager:

Analyse trends to detect unwelcome deviations and adapt operations accordingly



## SEPA:

Understand the environmental impact of infrastructure schemes, to reduce the risk of pollution events.



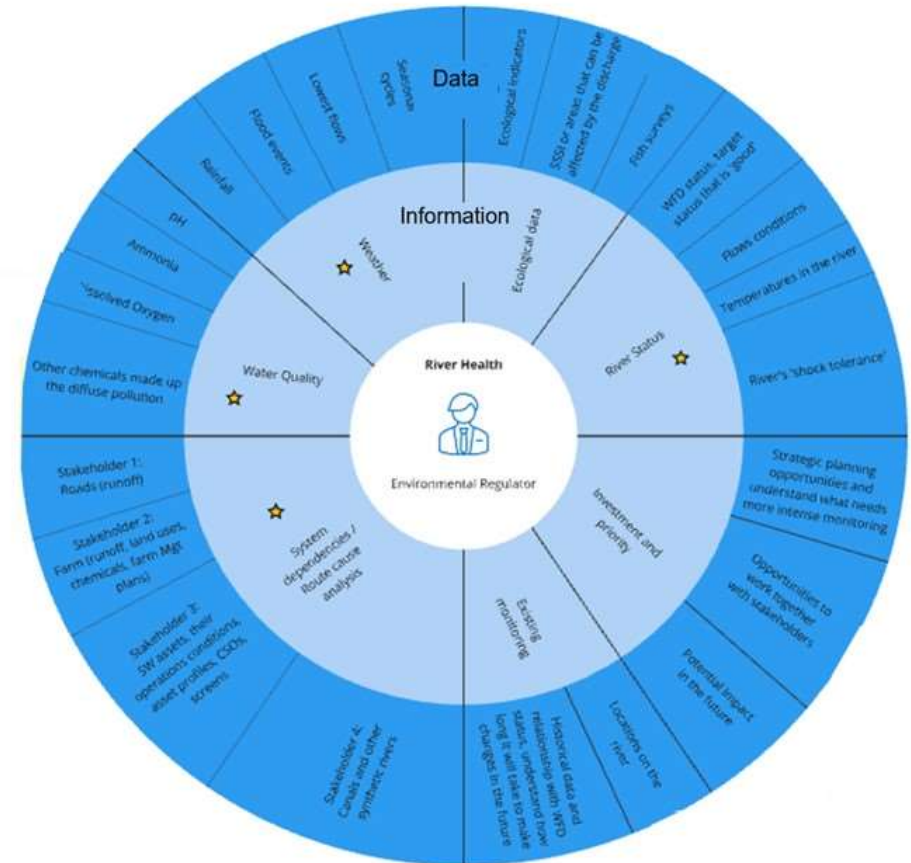
## Local Community:

Understand what contributes to poor river health and take action for improvement. Identify who is responsible to report issues in the river.



## Local industry (who interact with the river):

Understand what contributes to poor river health and take action for improvement to avoid any unplanned disruption to my business.



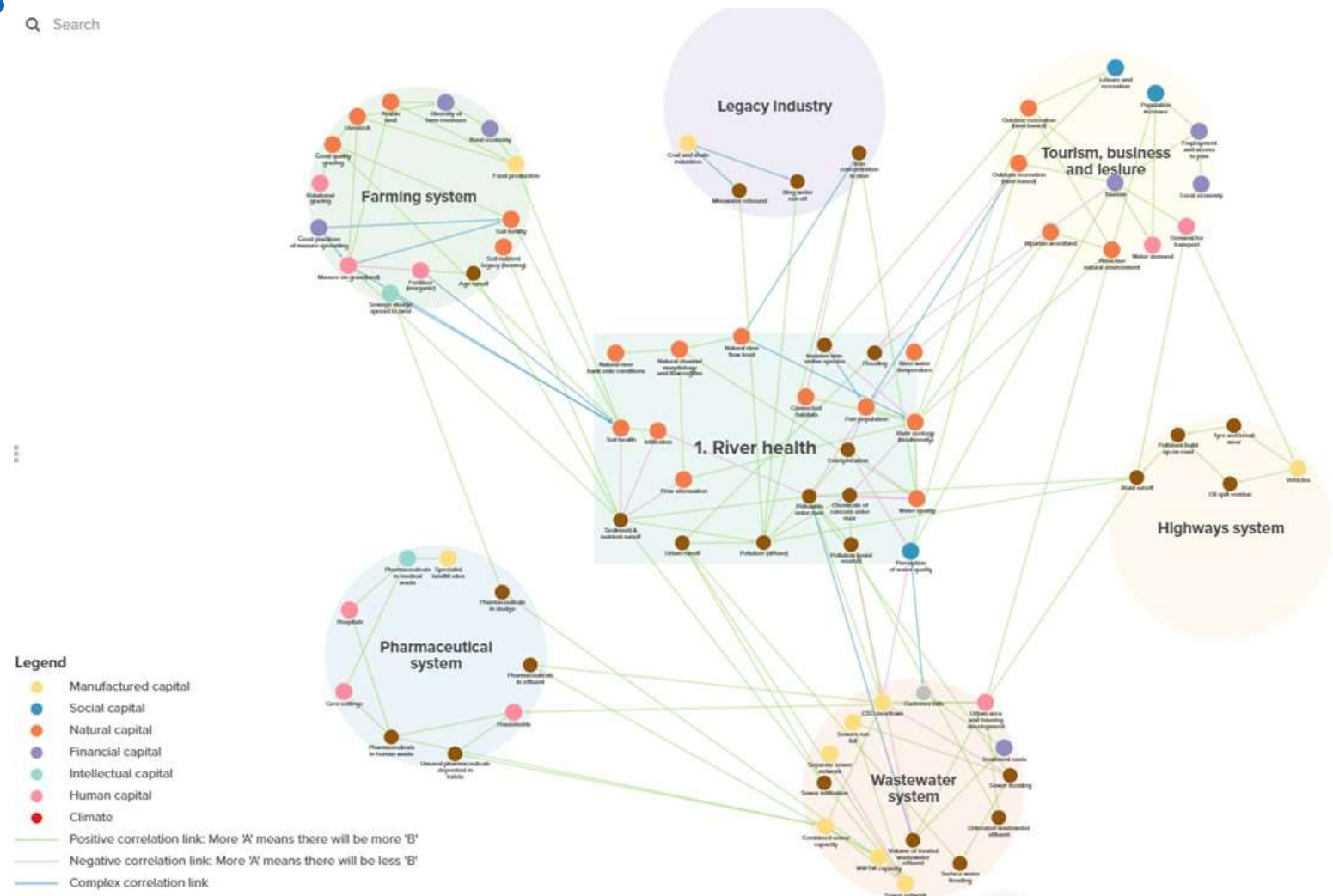


# One Planet Choices

Search

River health is a shared resource which is influenced by multiple stakeholders and their interactions across the catchment

- Framing Question:
- “What combination of actions across all stakeholders would enable good water quality status in the River Almond now and in the future?”





# SUMMARY

- River Almond Lighthouse Project will bring together members of a shared river community through a digital tool so that collaboratively they can understand, engage with and improve the health of the river almond.
- This digital tool will bring to life, through visual representation, right time data on river health and ecology.



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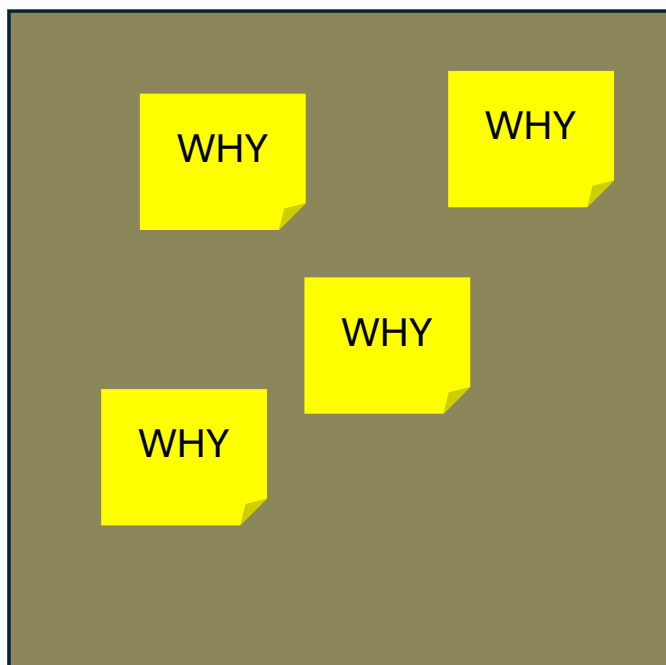




**Thank you**



# Box sprint instructions 1



## 5 minutes:

Individually:

On the first side of your box stick Post-It notes explaining **WHY** your group/organisation needs data and information.

(use the second side if necessary)



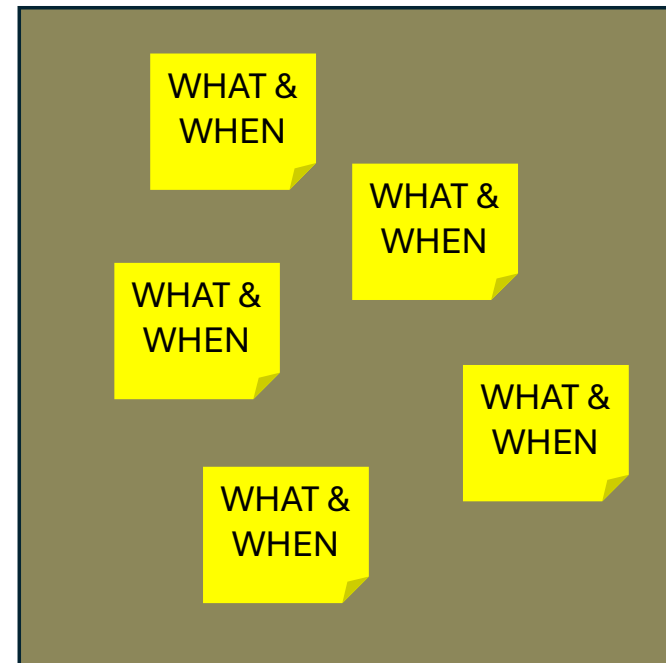
# Box sprint instructions 2

## 5 minutes:

Individually:

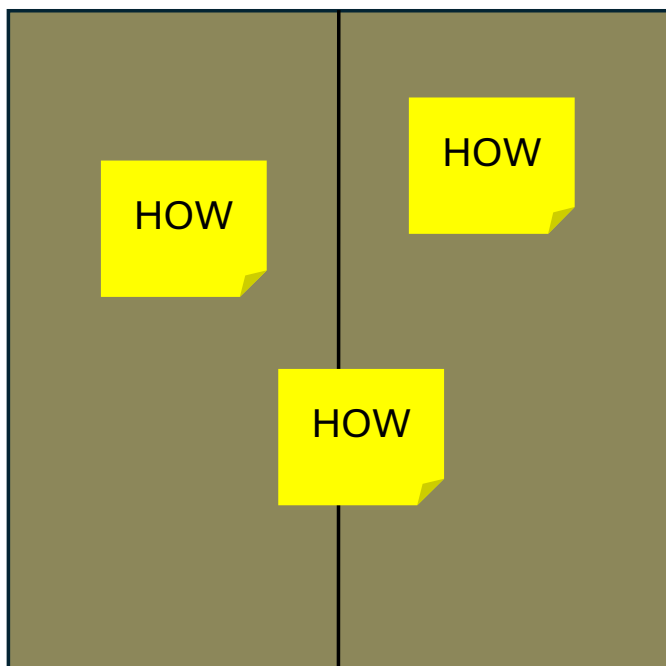
On the third side of your box stick Post-It notes explaining **WHAT** data/information you need to have access to and **WHEN** you need it

(use the fourth side if necessary)





# Box sprint instructions 3



## 15 minutes:

As a group, discuss any themes that have emerged in your answers so far. Are there common needs or are there significant differences.

Use the TOP of the box to begin to describe what an ideal **data/info sharing system(s)** would be like.

Please nominate someone to feed back **3 aspects /characteristics** of your ideal system.



# Feedback





# Planning Aid Scotland and SCDC

Flood resilience conference

January 2025



# SCDC

SCDC is the lead body for community development in Scotland. We work to our vision of an active, inclusive and just Scotland where our communities are strong, equitable and sustainable.

We work directly with:

- Community groups and organisations
- Community development practitioners
- Government and other policy makers
- Local partnerships and agencies across Scotland who want to involve communities in their work



Formed in 1994, we are a charity and Company Limited by Guarantee based in Glasgow. With staff with a wealth of experience and backgrounds, we bring our firm commitment to the values and principles of community development to all aspects of our work.



# Community Engagement is...

“always a process that involves **purposeful ongoing dialogue** between public agencies and communities aimed at **improving understanding** between them and taking more **effective action** to achieve **beneficial change**.”

*The National Standards for Community Engagement*

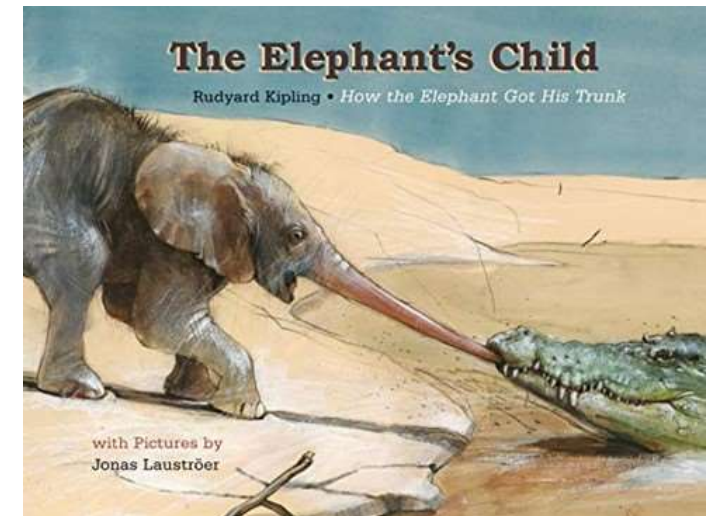




# Planning community engagement

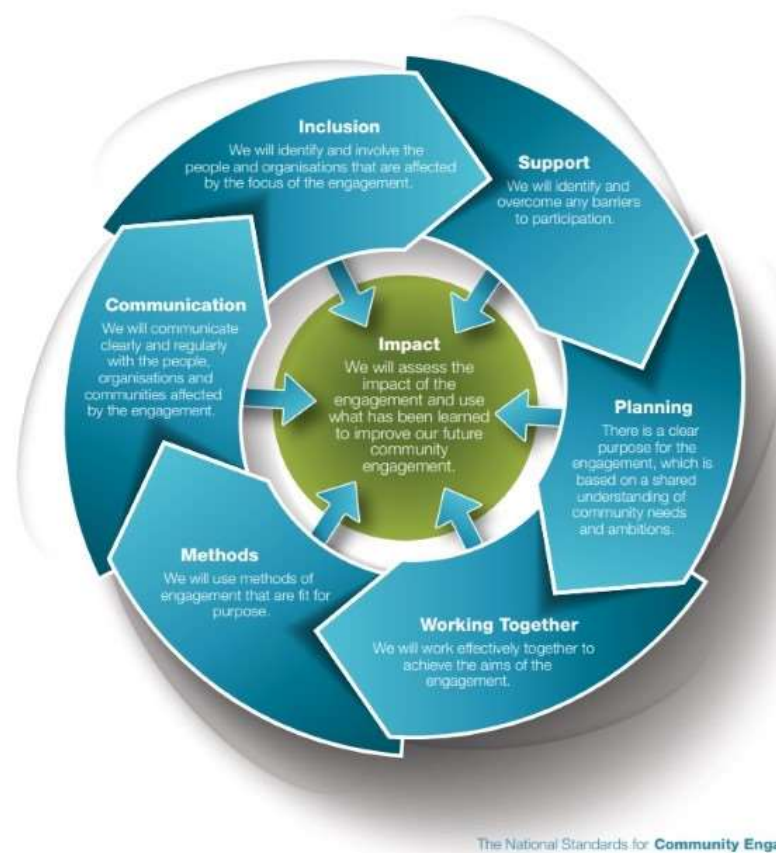
I keep six honest serving-men  
(They taught me all I knew);  
Their names are What and Why and When  
And How and Where and Who.

Rudyard Kipling  
The Elephant's Child (1902)





# National Standards for community engagement





# National Standards for community engagement

The **National Standards for Community Engagement** are good-practice principles, designed to support and inform the process of community engagement, and improve what happens as a result

## There are 7 Standards



Inclusion

Support

Working together



Communication

Methods

Planning

Impact

Find out more: [www.scdc.org.uk/what/national-standards](http://www.scdc.org.uk/what/national-standards)




# International Association of Public Participation (IAP2)

## IAP2 Spectrum of Public Participation



IAP2's Spectrum of Public Participation was designed to assist with the selection of the level of participation that defines the public's role in any public participation process. The Spectrum is used internationally, and it is found in public participation plans around the world.

INCREASING IMPACT ON THE DECISION 					
	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

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# International Association of Public Participation (IAP2)

## Core Values for the Practice of Public Participation

- Public participation is based on the belief that those who are affected by a decision have **a right to be involved** in the decision-making process.
- Public participation includes the promise that the public's contribution will **influence** the decision.
- Public participation promotes **sustainable decisions** by recognizing and communicating the needs and interests of all participants, including decision makers.
- Public participation seeks out and facilitates the involvement of those **potentially affected by or interested in** a decision.
- Public participation seeks **input from participants** in designing how they participate.
- Public participation provides participants with the information they need to participate in **a meaningful way**.
- Public participation communicates to participants **how their input affected the decision**.

[IAP2 Core Values of Public Participation](#)



# International Association of Public Participation (IAP2)

## CODE OF ETHICS



IAP2 Federation's Code of Ethics is a set of principles that guides us in our practice of enhancing the integrity of the public participation process. As practitioners, we hold ourselves accountable to these principles and strive to hold all participants to the same standards.

### 1. PURPOSE

We support public participation as a process to make better decisions that incorporate the interests and concerns of all affected stakeholders and meet the needs of the decision-making body.

### 2. ROLE OF PRACTITIONER

We will enhance the public's participation in the decision-making process and assist decision-makers in being responsive to the public's concerns and suggestions.

### 3. TRUST

We will undertake and encourage actions that build trust and credibility for the process among all the participants.

### 4. DEFINING THE PUBLIC'S ROLE

We will carefully consider and accurately portray the public's role in the decision-making process.

### 5. OPENNESS

We will encourage the disclosure of all information relevant to the public's understanding and evaluation of a decision.

### 6. ACCESS TO THE PROCESS

We will ensure that stakeholders have fair and equal access to the public participation process and the opportunity to influence decisions.

### 7. RESPECT FOR COMMUNITIES

We will avoid strategies that risk polarizing community interests or that appear to "divide and conquer."

### 8. ADVOCACY

We will advocate for the public participation process and will not advocate for interest, party or project outcome.

### 9. COMMITMENTS

We ensure that all commitments made to the public, including those by the decision-maker, are made in good faith.

### 10. SUPPORT OF THE PRACTICE

We will mentor new practitioners in the field and education decision-makers and the public about the value and use of public participation.





# VOICE Structure

Plan					
Title	Purpose	Who should be involved	Change you & Partners want to see	Barriers/ Resources	Actions

Do	
Progress	Related documents

Review			
Who was involved	NSfCE	Change	Lessons



Access VOICE Here.

<https://www.voicescotland.org.uk/voice/>





# Successful Planning = Effective Engagement and Delivery

*What is SP=EED?*

**SP=EED<sup>®</sup>**  **verified**



# What is SP=EED?

“Successful Planning = Effective Engagement & Delivery”



## A Practical Guide to Better Engagement in Planning and Placemaking



The Planning (Scotland) Act 2019 aims to achieve a collaborative and inclusive planning system. Local Place Plans are an important opportunity for community groups to prepare a plan for their own area. Planning Aid Scotland supports communities to plan effective, inclusive engagement.

SP=EED was developed by Planning Aid Scotland to help everyone carry out effective and inclusive engagement with planning and related areas. It is referred to in the Scottish Government's Planning Advice Note 3/2010 on Community Engagement

Planning Aid Scotland delivers SP=EED Verification, a two-part training programme to enable participants to have the confidence and creativity to deliver effective community engagement

SP=EED can be used to guide the engagement process for proposals led by planning authority and by developers, and for Local Place Plans and community-led proposals. It can also assist community groups and members of the public in suggesting to planning authorities or developers how they would like to be engaged.



# 3 Levels of Engagement

**SP=EED<sup>®</sup>**

Successful Planning = Effective Engagement and Delivery



## 1. Informing

An essential building block for engagement

A one-way process

A valuable end in itself and the most appropriate level to aim for in certain situations where the public has limited influence on final proposals

An essential step in achieving Levels 2 and 3



## 2. Consulting

Incorporates and builds on Level 1

An interactive and iterative process – listening, and being responsive to issues raised

An appropriate level in many situations where the public can influence proposals



## 3. Partnership

Incorporates Levels 1 and 2, but goes well beyond

The most resource-intensive level of engagement

Where members of the public are involved in the design and development process, such as charrettes

Involves in-depth collaboration with partners, and should include potential for their input into the design of proposals and the engagement process, plus a co-production approach with shared ownership of outcomes

May take place over an extended period of time, or be a shorter, more intensive process



# 8 criteria for effective engagement

**SP=EED<sup>®</sup>**

Successful Planning = Effective Engagement and Delivery



## Level 1 Informing

1. Transparency & Integrity
2. Co-ordination
3. Information



## Level 2 Consulting

4. Appropriateness
5. Responsiveness
6. Inclusiveness



## Level 3 Partnership

7. Monitoring & Evaluating
8. Learning & Sharing



Planning Aid Scotland



# Who Can Use SP=EED?

# SP=EED®

Successful Planning = Effective Engagement and Delivery

## Planning Authorities

- Discussing your approach to engagement
- Writing an engagement strategy
- Local Development Plan engagement
- Development Plan Schemes and Participation Statements
- Design and Development Briefs
- Advising applicants about engagement
- Assessing PAC reports

## Community Groups & Development Trusts

- Engaging with your local community
- Discussing your approach to engagement
- Writing an engagement strategy
- Local Place Plans
- Community-led proposals
- Discussing how you would like to engage

- Discussing your approach to engagement
- Writing an engagement strategy
- Proposal of Application Notices
- Designing Pre-Application Consultation engagement
- PAC report
- Development Brief and Masterplan engagement
- Guiding engagement on energy consent and other procedures

## Community Planning Partnerships

- Discussing your approach to engagement
- Writing an engagement strategy
- Local Outcome Improvement Plan engagement
- Locality Plan Engagement
- Co-ordinating engagement across different plans



Planning Aid Scotland





## Break Out Groups – 20 minutes

Using the case studies provided, talk about how you would plan a good engagement process. You may want to think about...

- Stakeholders
- Barriers & Opportunities
- Skills required
- Materials
- Time

Please record on the flipcharts provided





## World Café Rapid Review – 10 minutes

Take a quick look at one or two of the other case studies

Use a pen and tick anything you had in common

Is there anything you saw in another group that was different?





Quick evaluation and any final questions?







Dawn Brown  
Development Manager  
SCDC

[dawn@scdc.org.uk](mailto:dawn@scdc.org.uk)

07484 023 947



Diane Cassidy  
Projects & Training Officer  
Planning Aid Scotland

[diane@pas.org.uk](mailto:diane@pas.org.uk)

0131 385 7848



# Scotland's Flood Resilience Conference 2025

## Breakout E – Spatial planning and decision making

Ujwala Fernandes, AtkinsRéalis(Chair); Dan Jeffries, AtkinsRéalis and Julie Waldron, City of Edinburgh Council; Andy Reid, Dundee City Council and Dominic McBennett, Scottish Water; Kirstin Taylor and Rory Wilson, LDA Design; Kevin Jones/Rolf Roscher, Erz and Chris Rankin / David Muir, rankinfraser



# DRYLAW & TELFORD MASTERPLAN

January 2025





# Running Order

**Why Drylaw:** Project Background / Policy Context

**Understanding Drylaw:** An Area Profile

**A Masterplan for Drylaw:** Strategic Design Moves and Project Opportunities

**Next Steps:** Further Thinking



# WHY DRYLAW: PROJECT BACKGROUND / POLICY CONTEXT



# Edinburgh Context

## City Vision 2050



## Climate Change Strategy



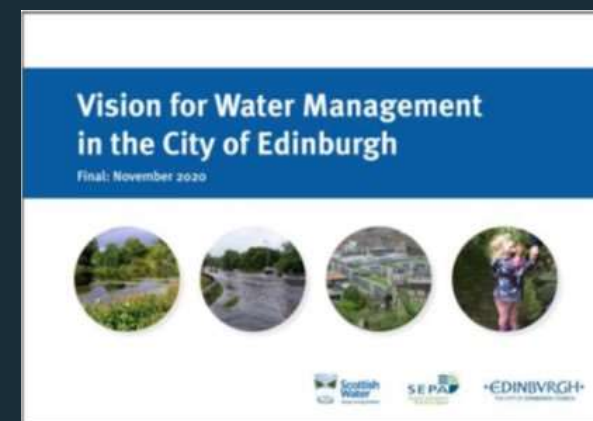
## End Poverty in Edinburgh



## Climate Ready Edinburgh



## Vision for Water Management

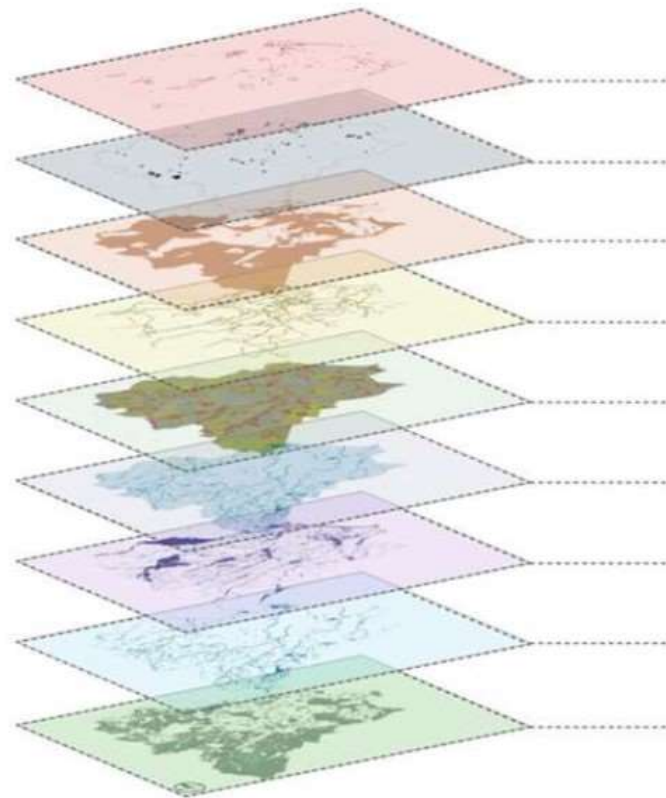




# The Strategic Green Blue Network\*



- **Habitat Networks**  
(Edinburgh Nature Network)
- **Carbon**
- **Sequestration**
- **Noise**
- **Air Quality**



**Development Areas**

**Derelict Land and Areas of Deprivation**

**Protected Areas & Designations**

**Paths and Cycle Ways**

**Ecosystem services**

**Paths and Cycle Ways**

**Flood Risk**

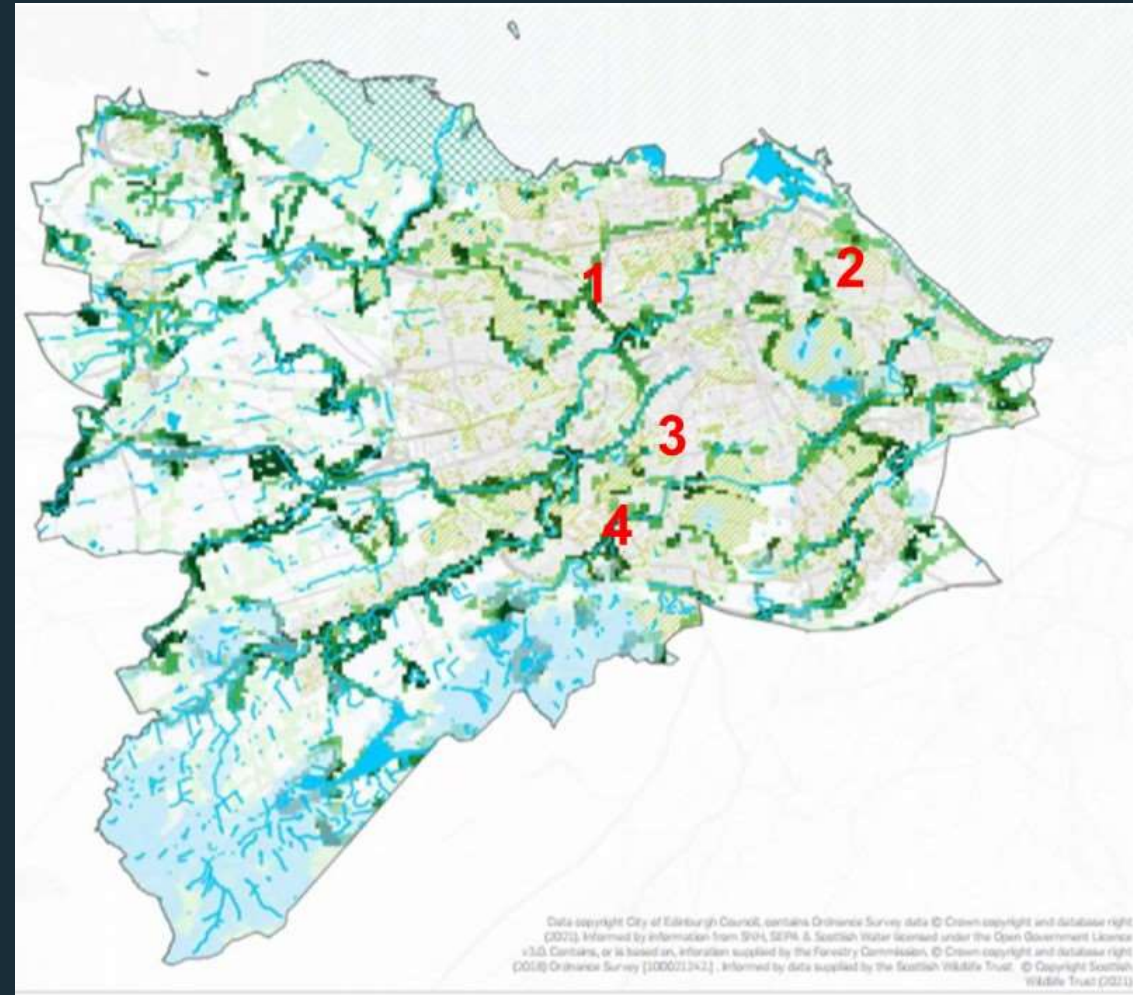
**River Networks**

**Green Space**



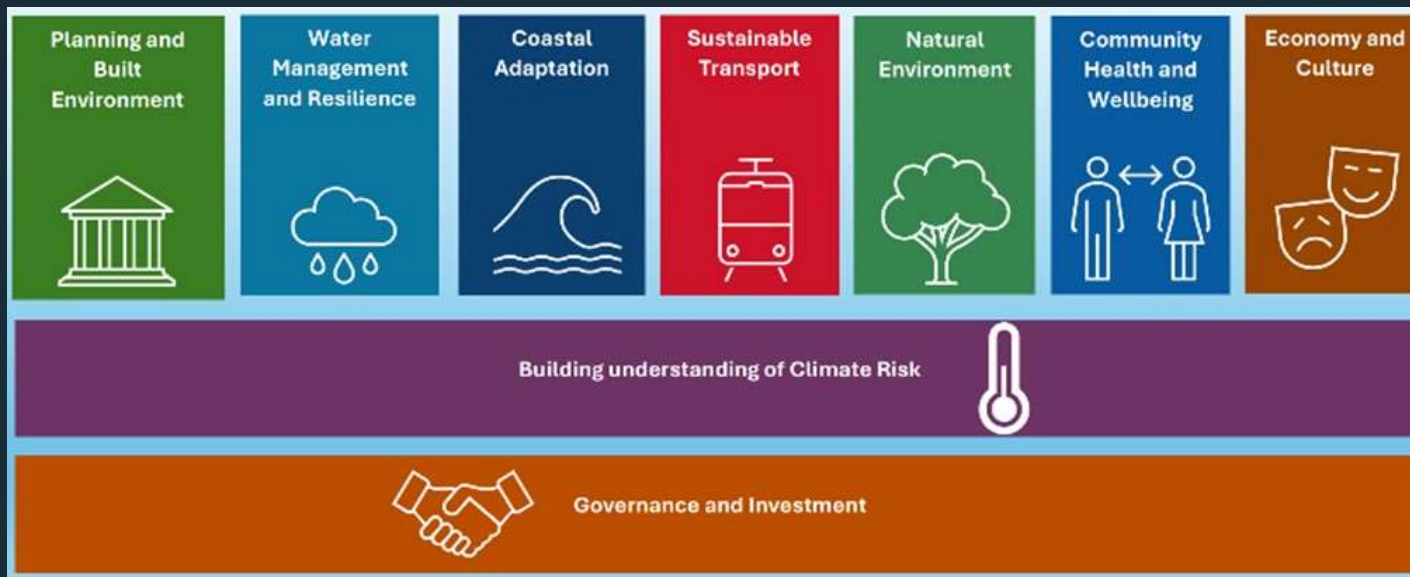
# The Strategic Green Blue Network: Top Priority Areas

1. Craigleith, Drylaw and Inverleith
2. Leith
3. Morningside
4. Oxgangs





# Climate Ready Neighbourhood: Themes and Objectives from Climate Ready Edinburgh



**Objective A4:** Increase permeable surfacing and use nature-based solutions to reduce the impact of urban creep and increase nature-rich landscapes, creating attractive well-adapted places

**Objective B1:** Deliver a long term and sustainable approach to water management across Edinburgh

**Objective B2:** Deliver a strategic Green Blue Network for Edinburgh







Community  
Health and  
Wellbeing



Sustainable  
Transport



Governance and Investment

Natural  
Environment



Water  
Management  
and Resilience

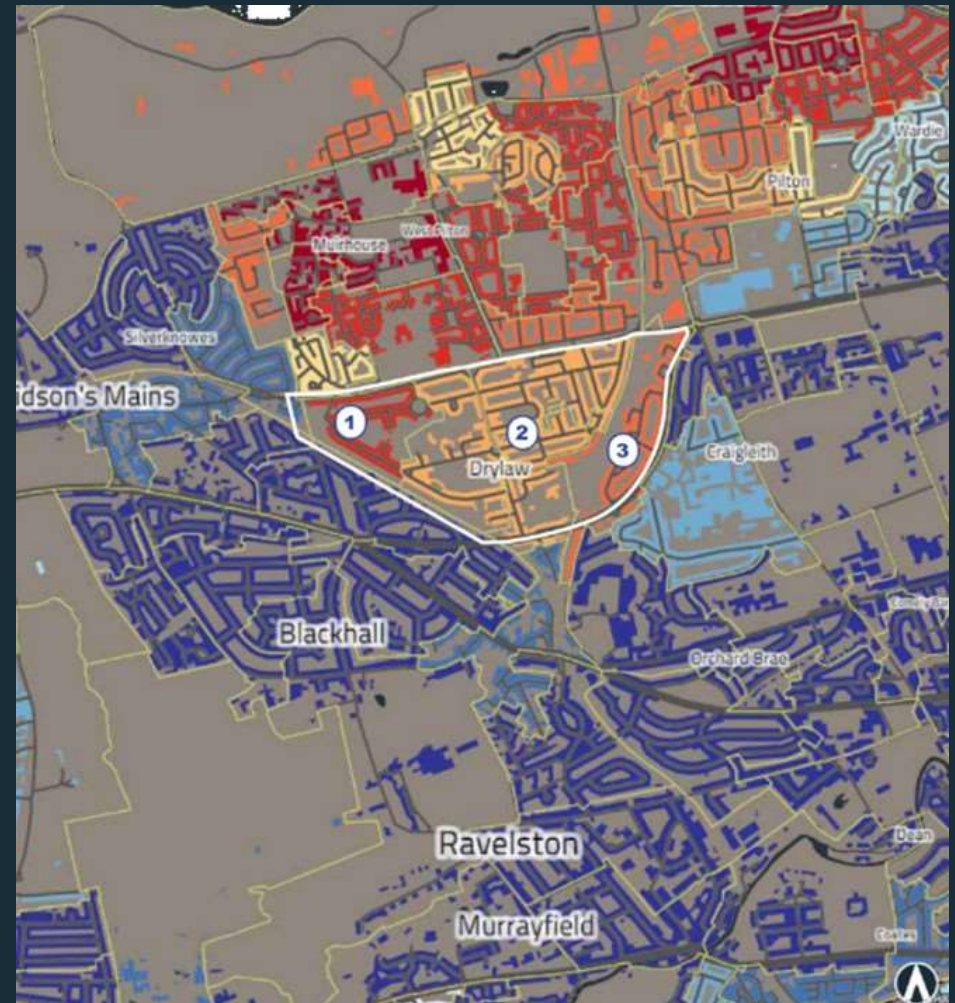
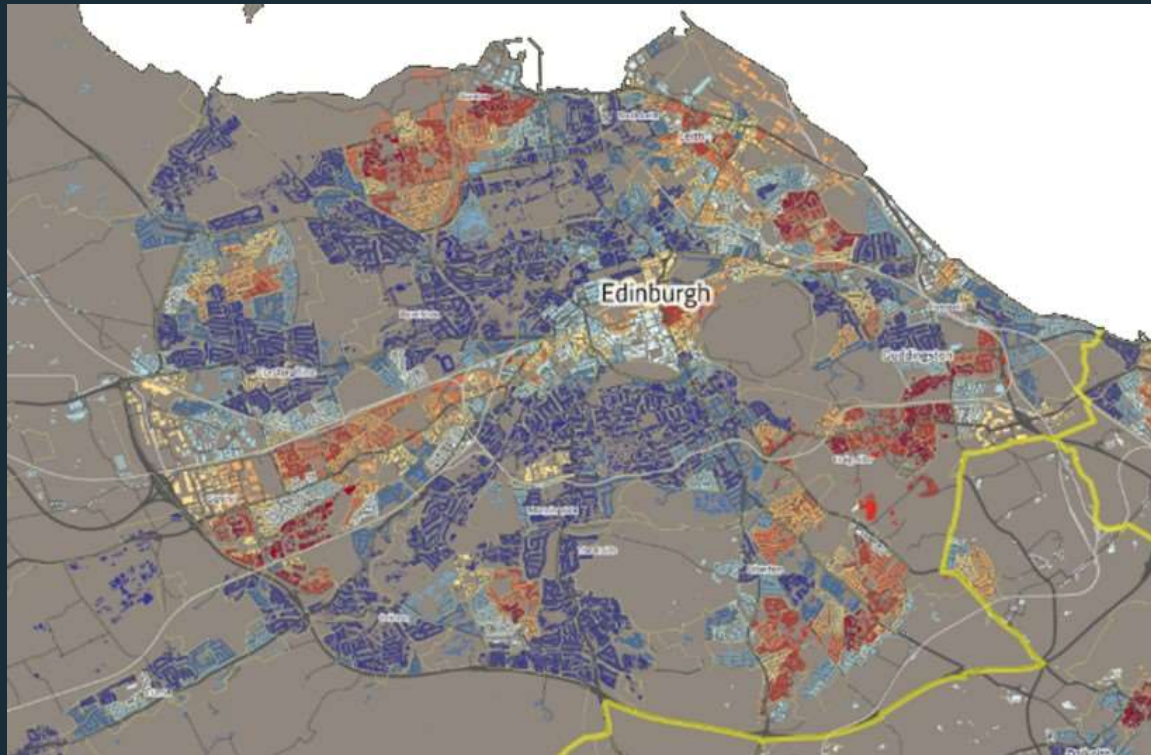




# UNDERSTANDING DRYLAW: AN AREA PROFILE



# Community Health and Wellbeing: Scottish Index of Multiple Deprivation (SIMD)



<https://simd.scot>



# Natural Environment: Open Space Network

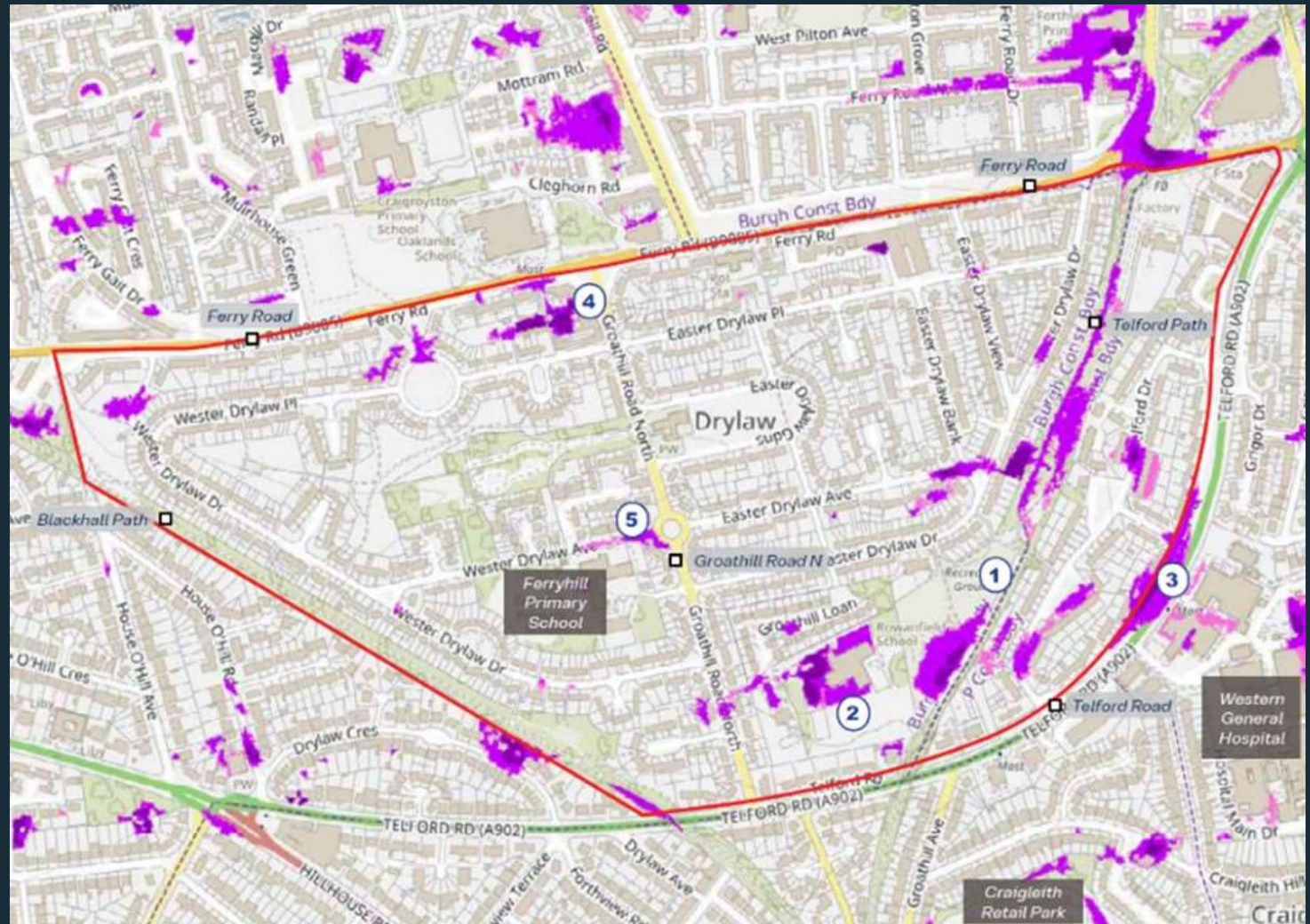








# Water Management and Resilience: Surface Water Flooding



1. Easter Drylaw Park and along Telford Path
2. Rowanfield Special School
3. Telford Road
4. Adjacent to Groathill Road N shops
5. Eastern end of Wester Drylaw Avenue



# Sustainable Transport: Accessibility





# A MASTERPLAN FOR DRYLAW: STRATEGIC DESIGN MOVES AND PROJECT OPPORTUNITIES



# Project Opportunities

Telford and Ferry Road Accessibility Enhancement

Improved accessibility to and comfort around North Groathill Shops

School Street improvements

Street Tree and Woodland Planting

Improved Active Travel Link from Blackhall Path

Enhance Easter Drylaw Gardens green space

Enhance accessibility along North Groathill Road

Enhance Easter Drylaw Gardens green space

East west Telford Active Travel Link Enhancements

Enhance active travel and accessibility along Easter Drylaw Bank/Avenue/Drive

Realign eastern boundary of Rowanfield Special School





# Easter Drylaw Gardens

Informal play and exercise provision to create a more active and multi-generational space

Seating areas and community gardens to create a more sociable and community focused parkland space

Footpaths, aligned with an existing desire lines that criss-cross the green space.

Tree and wildflower planting to soften the edges of the space and contribute to the tree canopy coverage in the area

New hedgerow or stone wall boundary treatment to the space with intermittent entry points to help define the extent of the space and pull through heritage features from the adjacent Drylaw Estate.





# Groathill Road Shops

Re-arrange parking provision and narrow carriageway adjacent to shops to create a more accessible local centre with wider footways

Improve on-street cycle provision to link up to NEAT project

SUDs provision around shopping area to address existing surface water flooding

Seating, planters, street trees and hanging baskets to create more welcoming, inclusive and attractive shopping area

Street tree planting in green space adjacent to North Groathill Road / Ferry Road junction

Provide dropped kerbs, surface material change on carriageway and buildouts to create safer crossing points along North Groathill Road.





**NEXT STEPS:  
FURTHER THINKING**



# What does the latest science say?

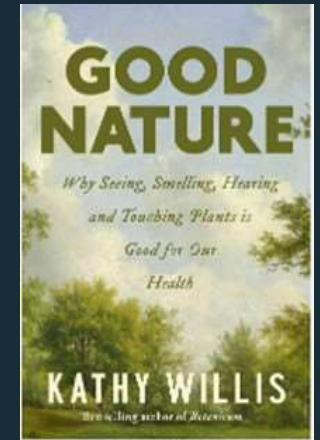
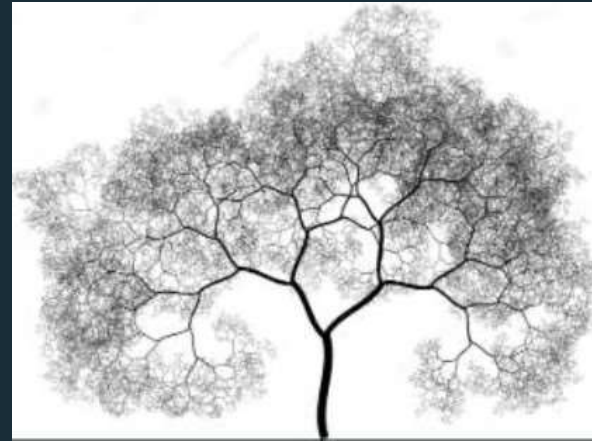
## Skylines, Fractals and Stress

**Colour:** More colour in nature activates brain areas associated with concentration, attention and creativity

**Noise:** Good noise reduces stress levels after just one minute - sounds like bird song/water and wind in the trees

**Fractal Complexity:** Patterns of mid-level fractal complexity triggers calming and attention restoration

**Canopy Cover:** People recover from stress faster with 24 – 34% canopy coverage





# What does the latest science say?

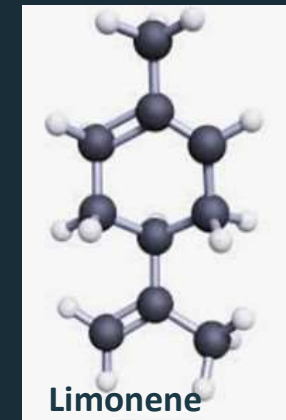
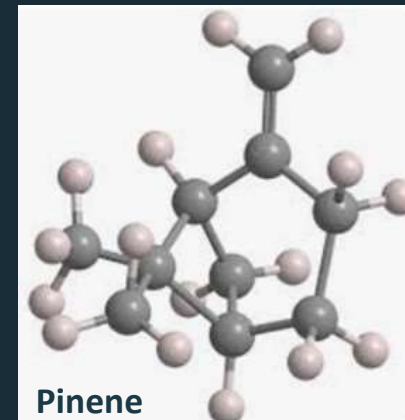
## On the air and what we touch

**Pollen:** Certain pollen triggers asthma and Hayfever

**Smells:** Certain smells lower our stress hormones and raises levels of T Killer cells. For instance, smelling fresh roses for 90 seconds has been shown to provide a positive physiological and psychological effects on stress

**Bacteria:** Bacteria in the air and soils affects us directly - our noses and skin develop the microbial community matching that of the urban spaces people had been in

**Touch:** harvesting lettuces – improved cognitive ability and calming – change in the prefrontal lobes in brain





# What does the latest science say? Community Gardening

Cognitive behavioural therapy or Horticultural activities?  
Which is better?

14,321 published papers - meta-analysis - any nature-based activity outdoors has a positive effect on mental health.

Min 20 mins 3 x a week

Children - exposure to quality greenspace overall 147% improvement in health and cognitive outcomes in children

Children who played in sandpits enriched with soil enriched their skin microbiota and increased their good T cells levels ('immunoregulatory' responses)





# Next Steps

Wider stakeholder and community engagement

Listen to everyone's thoughts and comments and develop a working masterplan that delivers a :

**Beautiful, climate adapted and nature rich place where people thrive**





thank you



# Water Resilient Dundee

A collaborative process of managing water, linking the people, systems, needs and opportunities in the urban environment.

**We can jointly and sustainably manage water in the City of Dundee to help the city respond to climate change now and for future generations, while delivering wider benefits.**



**Andy Reid CEng MICE - Dundee City Council**  
**Dom McBennett - Scottish Water**



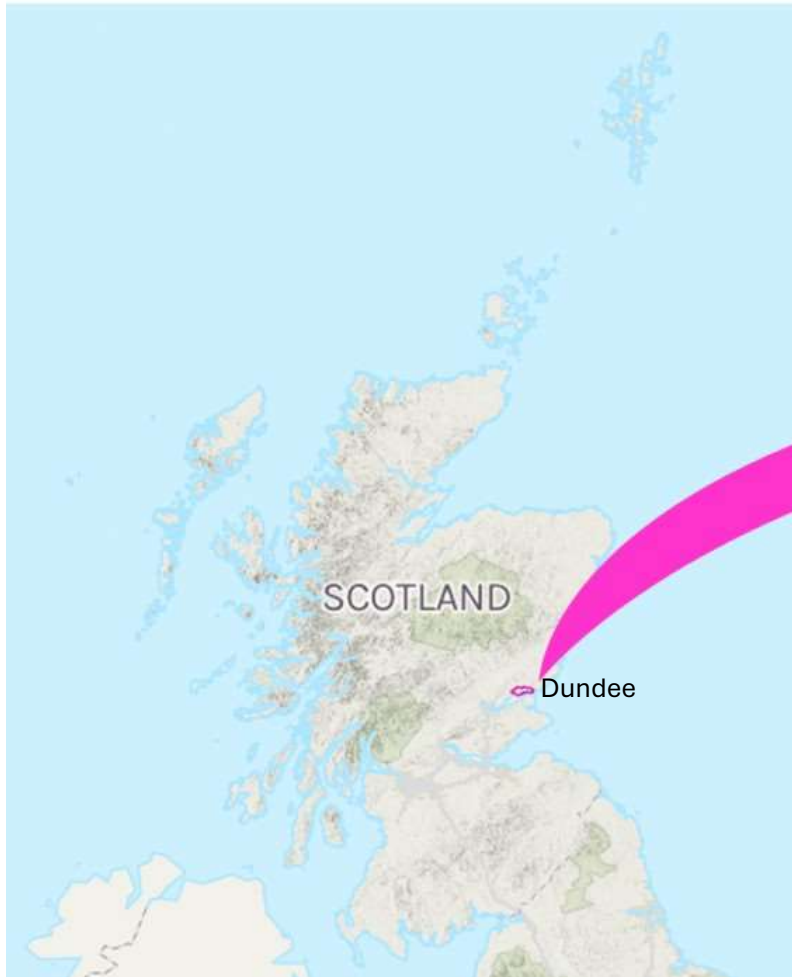
# Water Resilient Dundee

- Water Resilient Dundee Partnership
- Surface Water Drainage Strategy Approach
- Examples of Projects Implemented



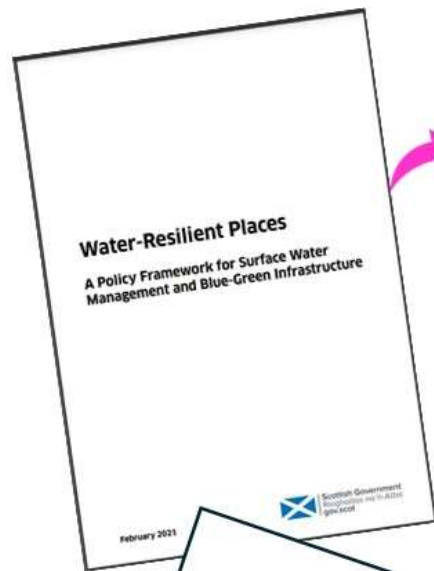


# Dundee Location



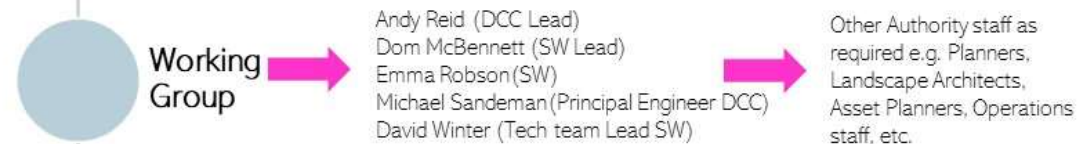
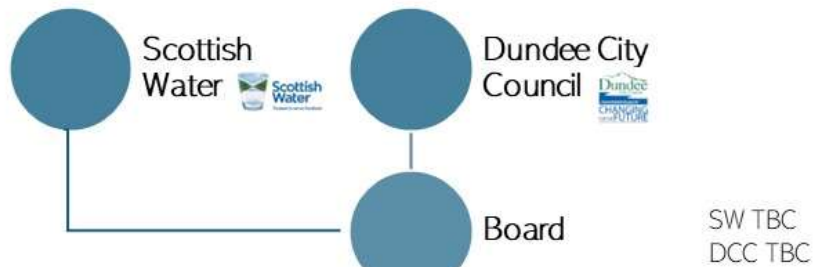
- 4<sup>th</sup> largest city in Scotland
- Population of approximately 148,000
- Highest percentage of combined sewerage in Scotland (88%)



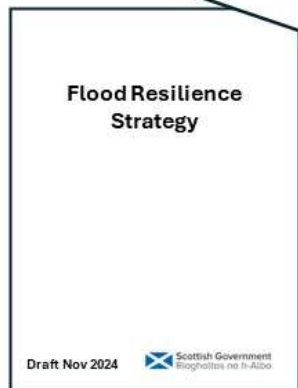


Recommendations include:  
"Larger towns and cities should be encouraged to establish drainage partnerships to lead a coordinated drive towards blue-green cities and water resilience"

## Water Resilient Dundee Partnership Structure

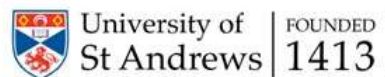


Other Authority staff as required e.g. Planners, Landscape Architects, Asset Planners, Operations staff, etc.





# Some Informal Partners





## Water Resilient Dundee Main Strategic Objectives

**Reduce sewer and surface water flood risk** by adapting storm water management to deal with predicted future rainfall events

**Protect and improve water quality** by reducing sewer overflow spills to rivers and the sea

**Improve natural capital and enhance biodiversity** by using blue-green infrastructure to manage storm water

**Enable growth and development** by reducing storm water inputs to the sewer system

**Mitigate climate change by reducing CO<sub>2</sub> emissions** during construction and operation of assets, and sequestering carbon in blue-green infrastructure

**Drought Resilience** by considering strategic rainwater storage locations across the city

**Enhance the amenity value of places** to maximise health and wellbeing benefits for local communities

**Involve Communities in decision making**





# Approach

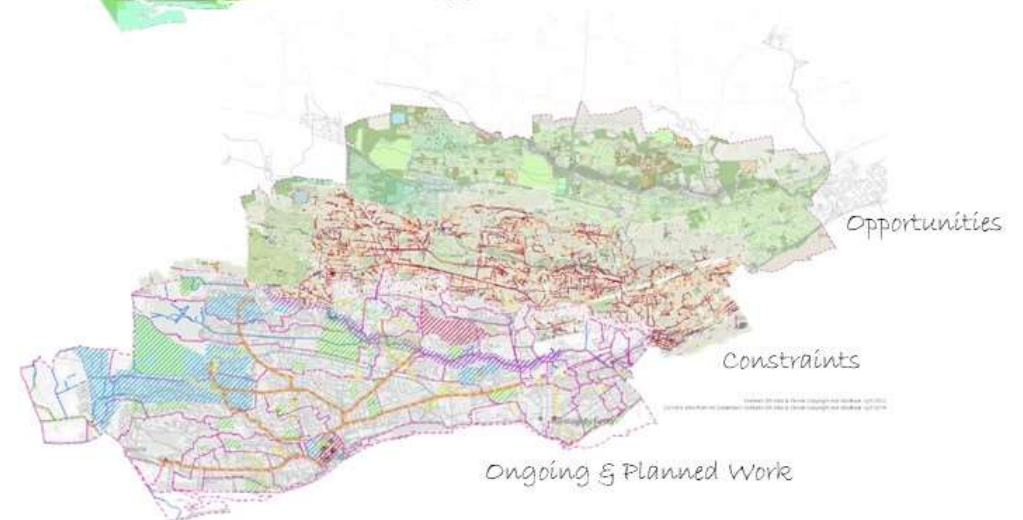
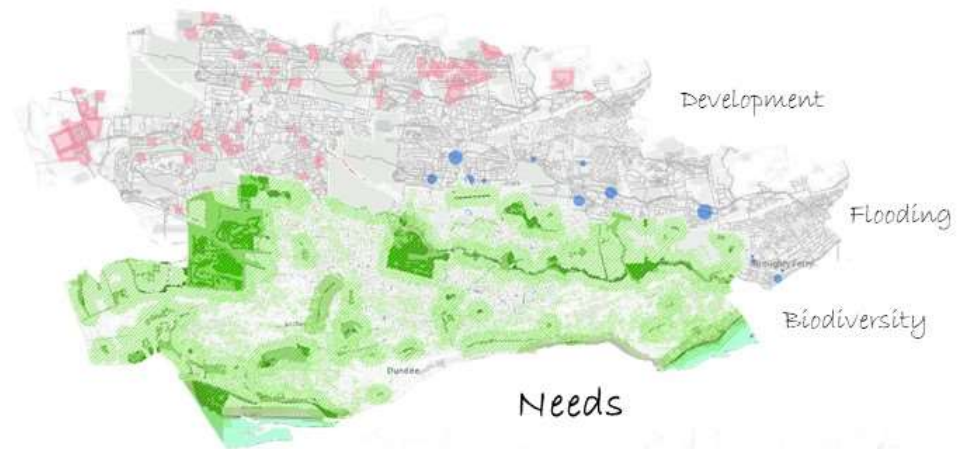
A collaborative process of managing water, linking the people, systems, needs and opportunities in the urban environment.



Based on Retrofitting to manage surface water (C713F)  
CIRIA, 2012



# Assemble & Review Data



0 1.25 2.5 5 Kilometers





# City Wide Strategy Development

Drainage  
City

Water  
Resilient  
City

Water  
Sensitive  
City



# Tactical Planning District Strategy Development 2025



0 1.25 2.5 5 Kilometers

District Strategies	Benefits							
Camperdown District Strategy								
Dens District Strategy								
City Centre District Strategy								
Gelly Burn District Strategy								
Douglas District Strategy								

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Contains data from OS Zoomstack



# Partnership Work Delivered to Date

- Douglas Community Park and community Engagement
- Craigie Street Pocket Park
- Arthurstone Terrace Rain Gardens
- Balmore Street Rain Gardens
- Mill Street De-paving
- Broughty Ferry Rain Gardens
- St Marys Engagement/Education





# Craigie Street Pocket Park

- Project funded by Dundee City Council, Sustrans and Scottish Water
- Collects road and roof drainage
- Reduces flood risk downstream
- Creates a place for the community and increases biodiversity
- Monitoring Equipment to be installed





# Craigie Street Pocket Park



Original Early Design



With Water Resilient  
Dundee Input To Design





[www.waterresilientdundee.co.uk](http://www.waterresilientdundee.co.uk)



# Scottish Flood Resilience Conference

Spatial planning and decision making session

LD&A DESIGN 





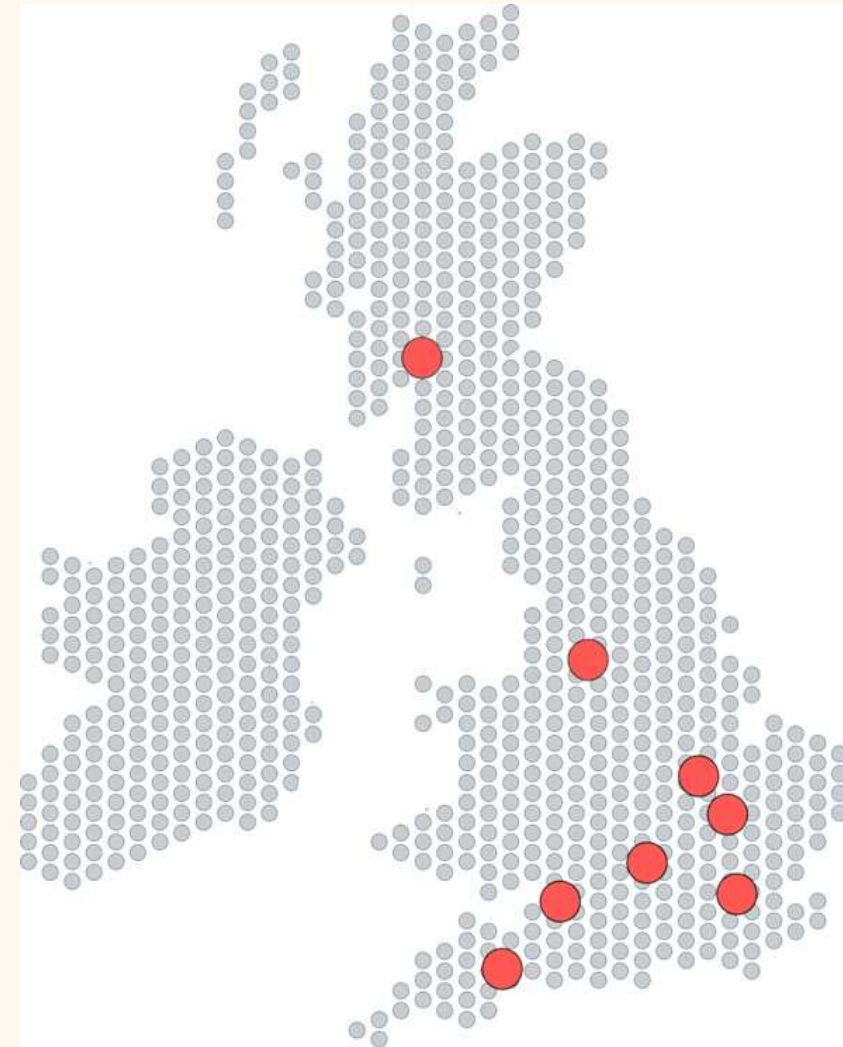
Our  
practice

WE  
ARE A  
CREATIVE  
COLLECTIVE  
INDEPENDENT  
AND PROUD TO BE  
OWNED  
BY THE PEOPLE  
WHO WORK  
HERE





- \* A leading independent design & environmental consultancy established in 1979
- \* Employee owned since 2021
- \* One business from eight UK office locations, London, Peterborough, Oxford, Exeter, Bristol, Manchester, Cambridge and Glasgow
- \* A strong team of 220
- \* Landscape Architecture, Masterplanning, Urban Design, Planning, Environmental Impact Assessment, Biodiversity

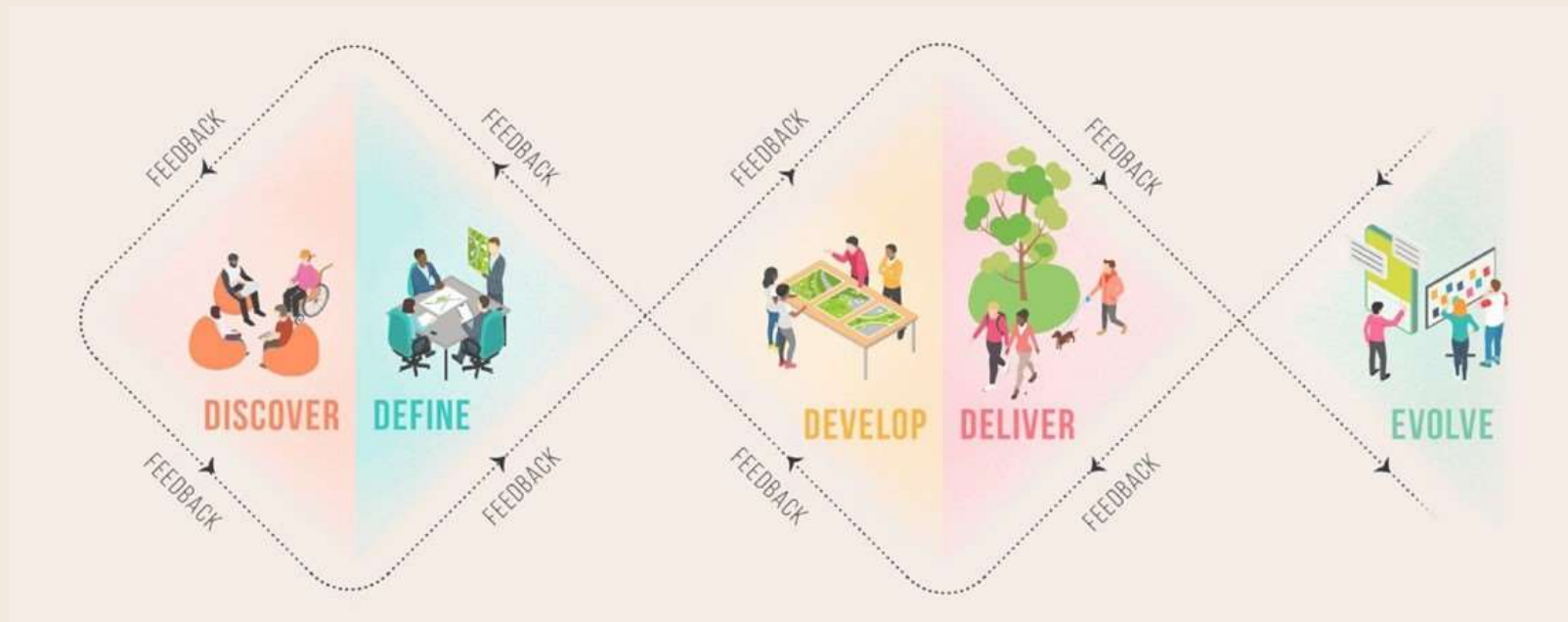


LD&DESIGN



# Our approach

We endeavour to take a holistic approach to design, engagement and delivery of social value - placing climate, sustainability and social equity at the heart of planning and design.





# Outcomes based

- \* Adaptable, low impact design
- \* Thriving, represented communities
- \* Healthy, resilient ecosystems





An aerial night photograph of Dundee, Scotland, showing a dense urban landscape with numerous buildings, streets, and a prominent church spire. The city is illuminated by streetlights and building lights, creating a warm glow against the dark sky. The River Tay is visible in the background.

Dundee

# OUR FUTURE CITY CENTRE

---

DUNDEE STRATEGIC INVESTMENT PLAN 2050



# Dundee Strategic Investment Plan

A place of ease, resilience and delight

Fundamental to the vision are better designed and more purposeful public spaces and streets that will bring life, activity and commerce into the city centre.

The vision also promotes blue and green infrastructure connections, which support ecology and climate resilience and improving air quality around the city centre.



## From This...

City Centre core severed from the surrounding city by large scale road infrastructure. Green space lacks connectivity and maximised use.



## To This...

Active travel prioritised across the ring road, key east- west and north - south movements easily accessible to the extended city centre community.

Streetscape, green space and playfulness embraced, bringing identity and a civic heart to the city's core.



## A RESILIENT CITY

The vision identifies opportunities to integrate blue-green infrastructure within all key routes and spaces, bringing opportunities for access to nature, improved air quality and surface water management.

Building on several existing schemes underway in conjunction with Scottish Water, the vision identifies key opportunities for SUDs infrastructure, particularly surface treatment such as rain gardens and bio-swales.



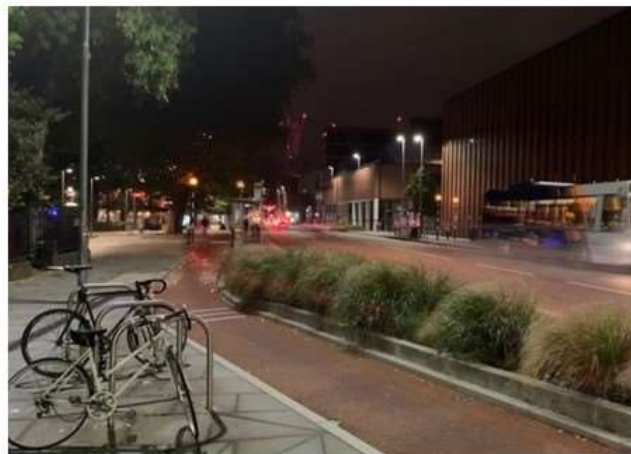
1 Promote the integration of blue-green infrastructure

Jaktgatan and Lövängsgatan,  
Norra Djurgårdsstaden, Sweden



2 Opportunities for surface level treatment e.g. bio-swales/ rain gardens

Portland Rain Gardens, US



3 Integrating SUDs infrastructure with Active travel routes

Kings Cross, London



4 Street tree planting supports air quality improvements

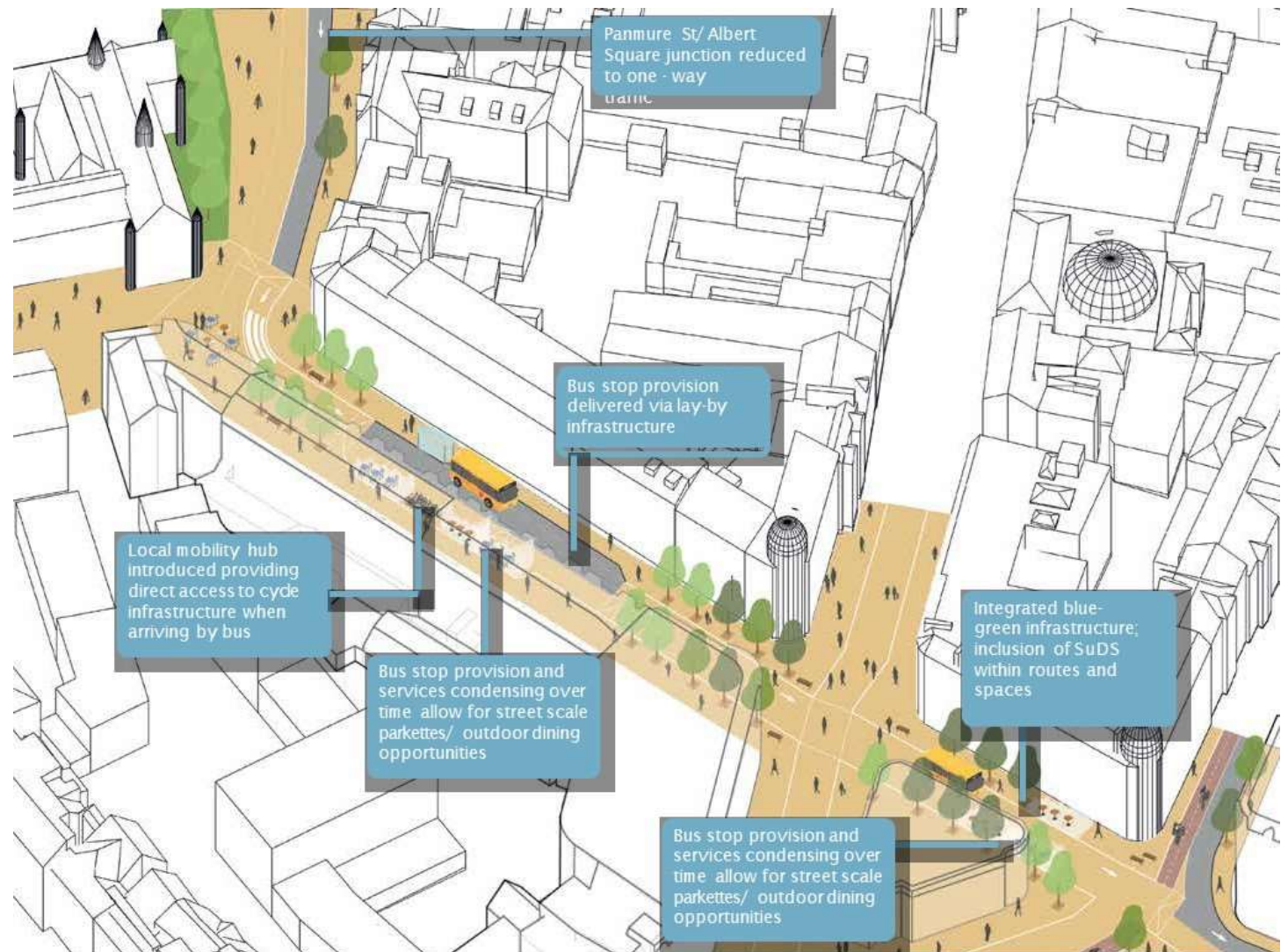
Tåsinge plads, Copenhagen



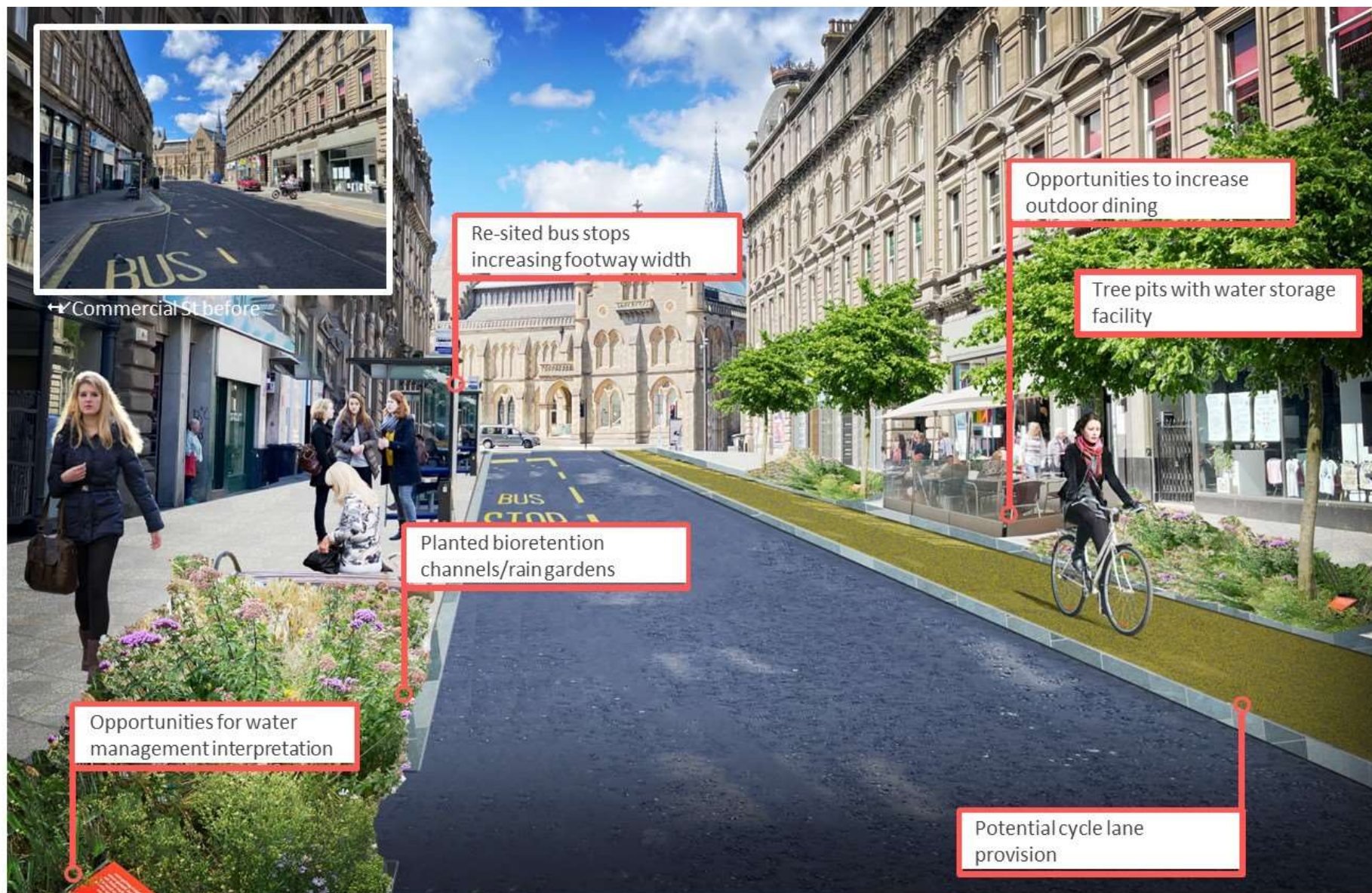
## A RESILIENT CITY

### Aspirations for Murraygate/ Commercial St

The vision seeks to deliver on opportunities to improve climate resilience and flood risk mitigation throughout the city centre through retrofitting SUDs infrastructure.







Commercial St intervention aspirations



Glasgow

WORLDWIDE DESIGN





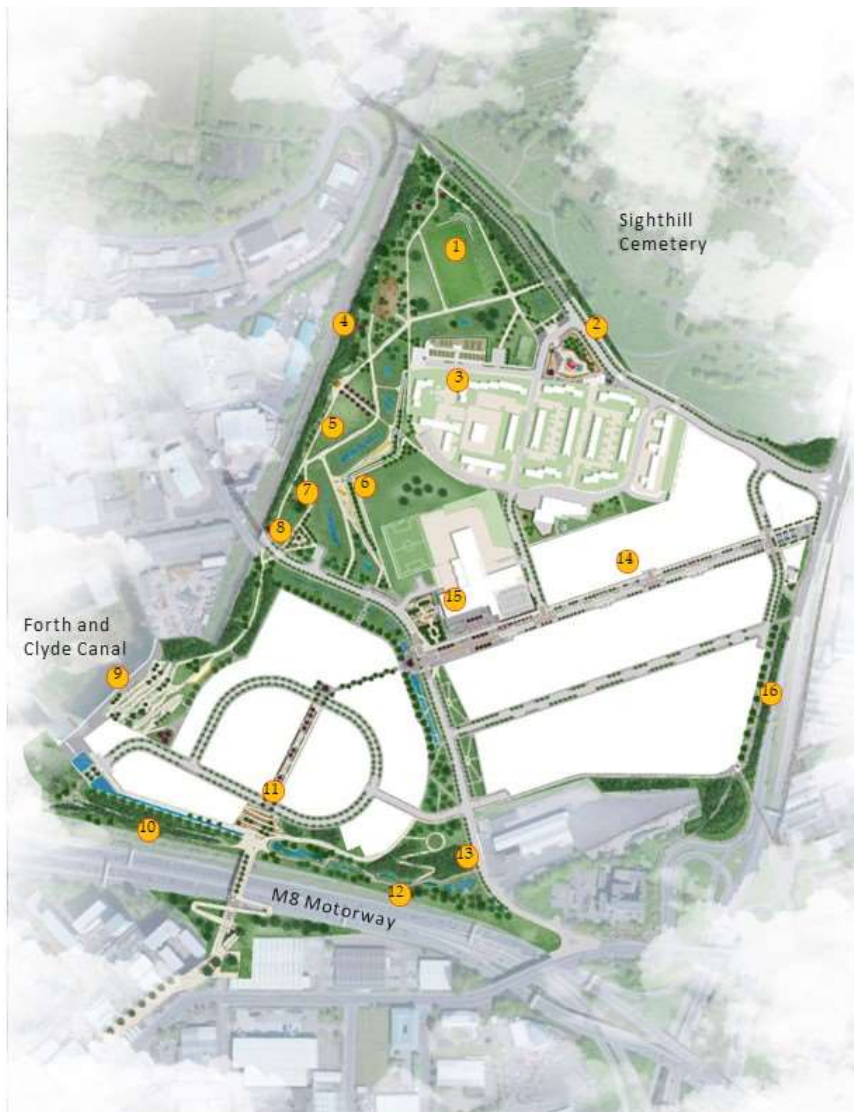


# Sighthill Transformational Regeneration Area

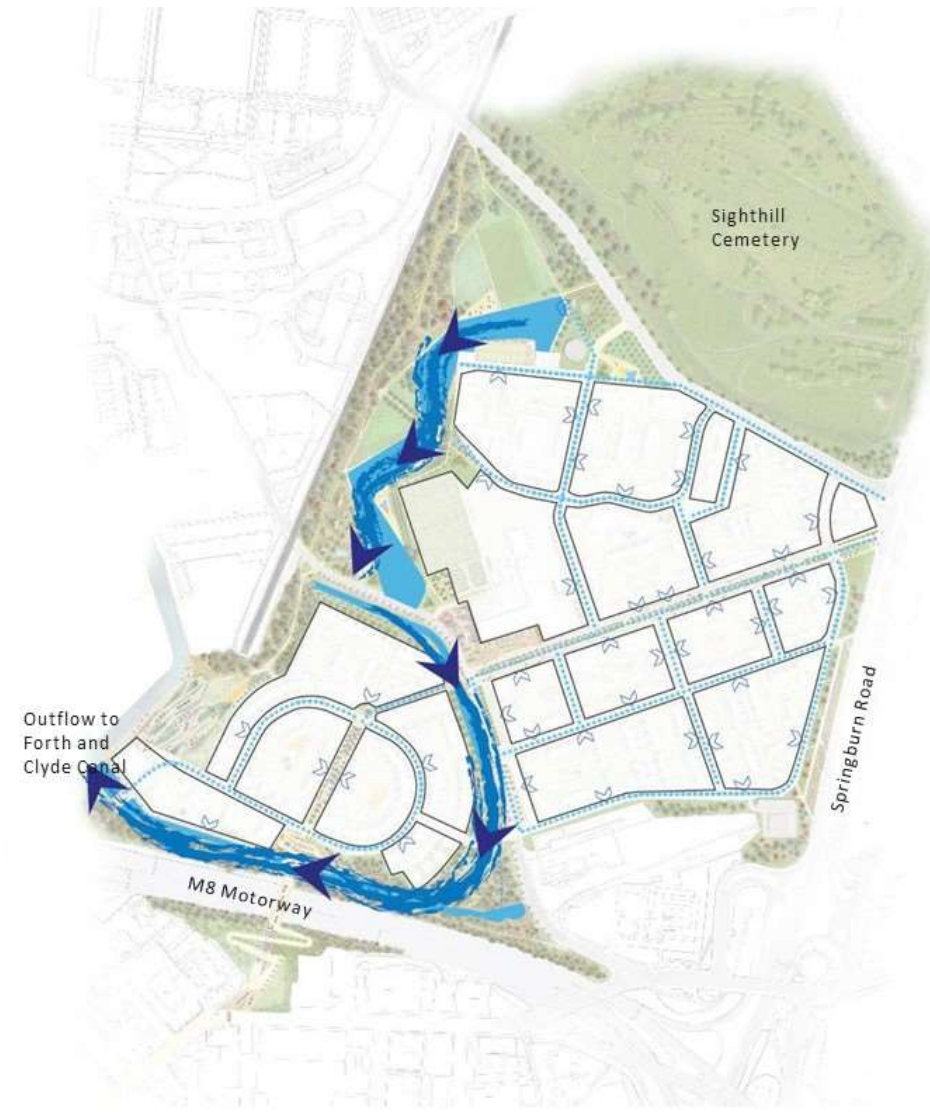
A landscape led residential masterplan



- 1 The Haugh
- 2 The Village Green
- 3 Allotments
- 4 The Glade Woods
- 5 REC & Wet Meadows
- 6 Play Spine & Terraces
- 7 Mound Meadows
- 8 Woodland Gardens
- 9 Canal Terraces
- 10 Canal Boulevard
- 11 Bridge Terraces
- 12 The Wet Woodlands
- 13 Standing Stones
- 14 Civic Spine
- 15 Civic Square
- 16 Springburn Walk



Advanced Infrastructure Masterplan



SUDs system



## Conceptual approach



Outfall to  
canal basin



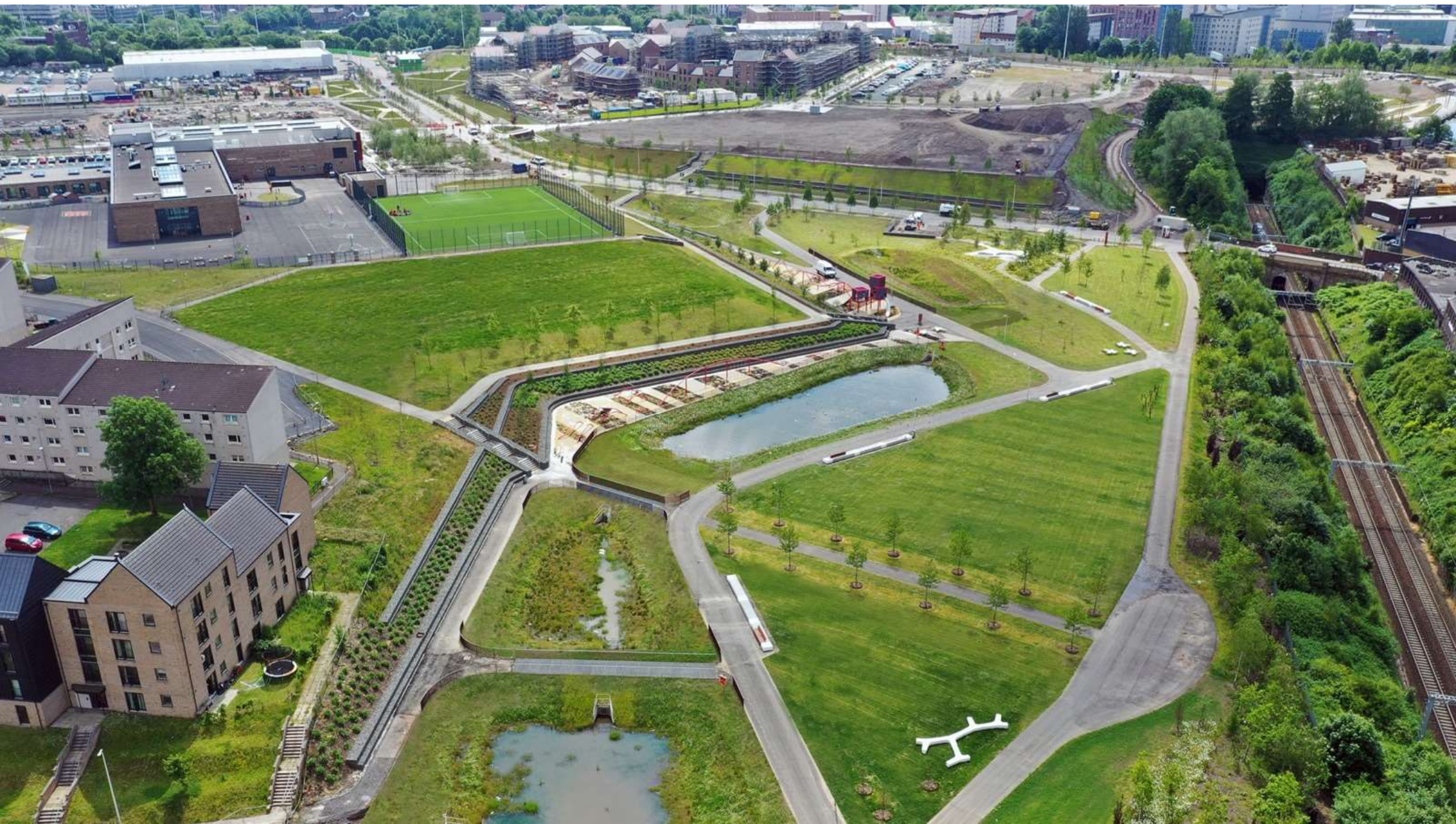


















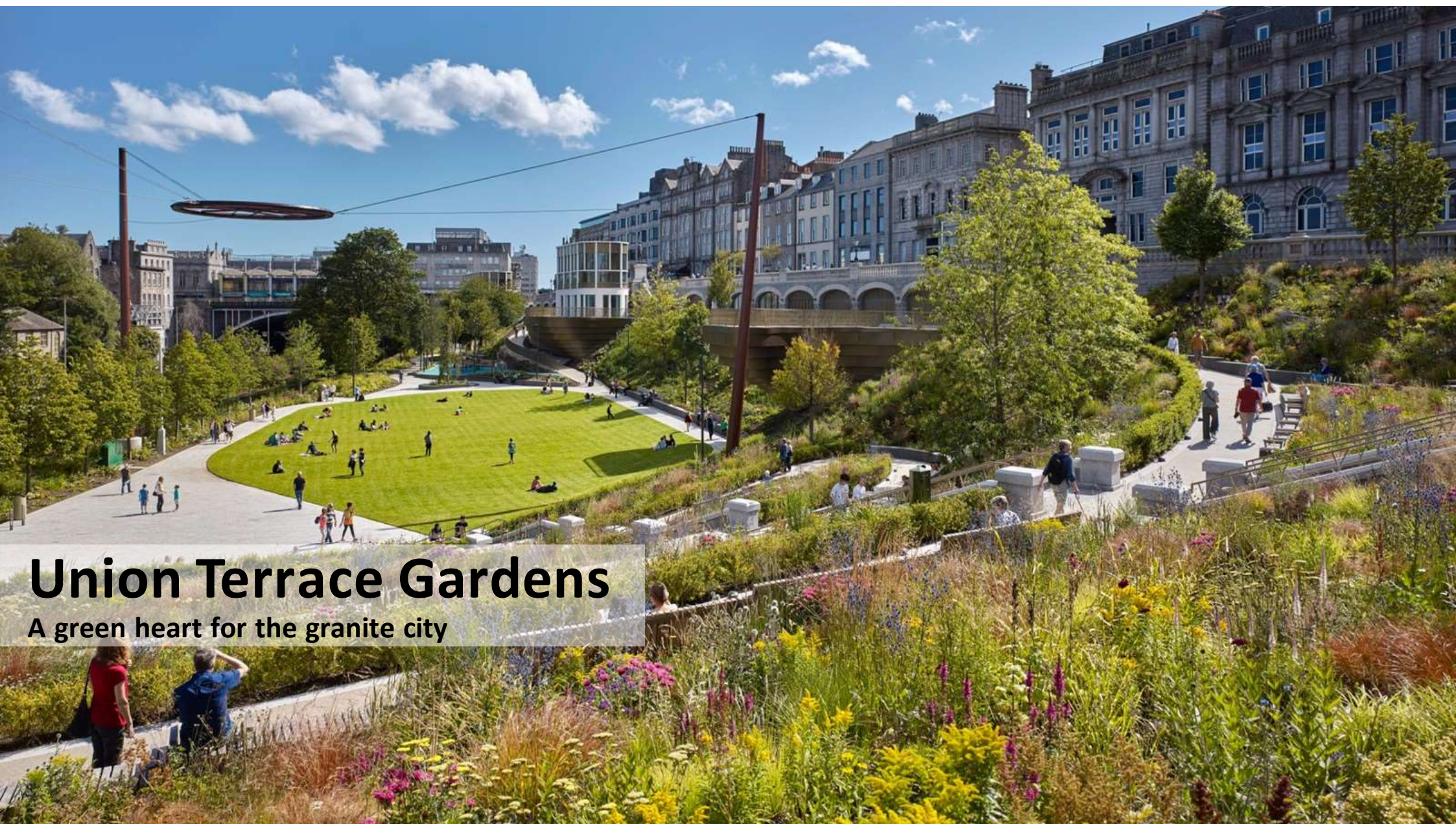




# Aberdeen







# Union Terrace Gardens

A green heart for the granite city



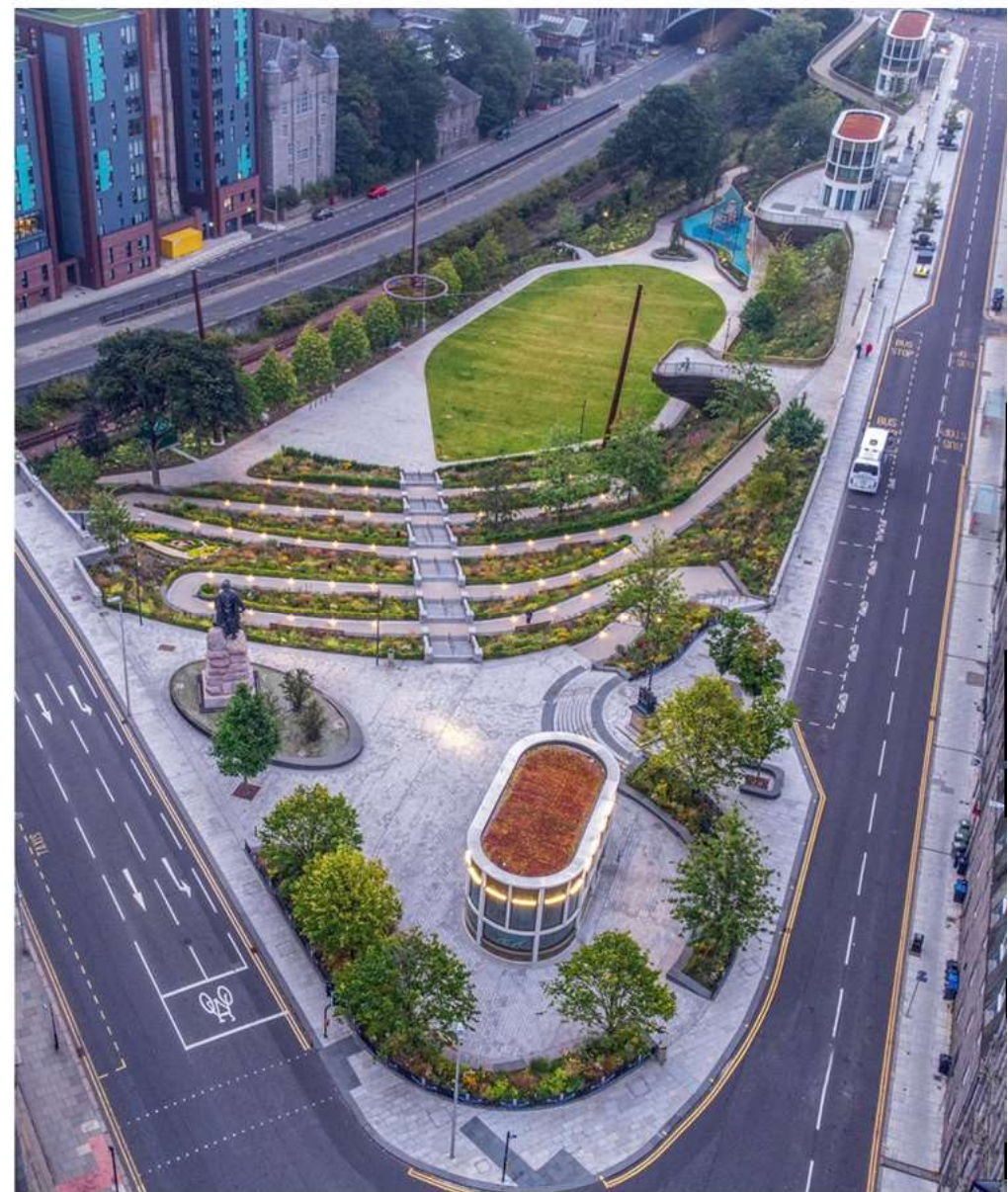




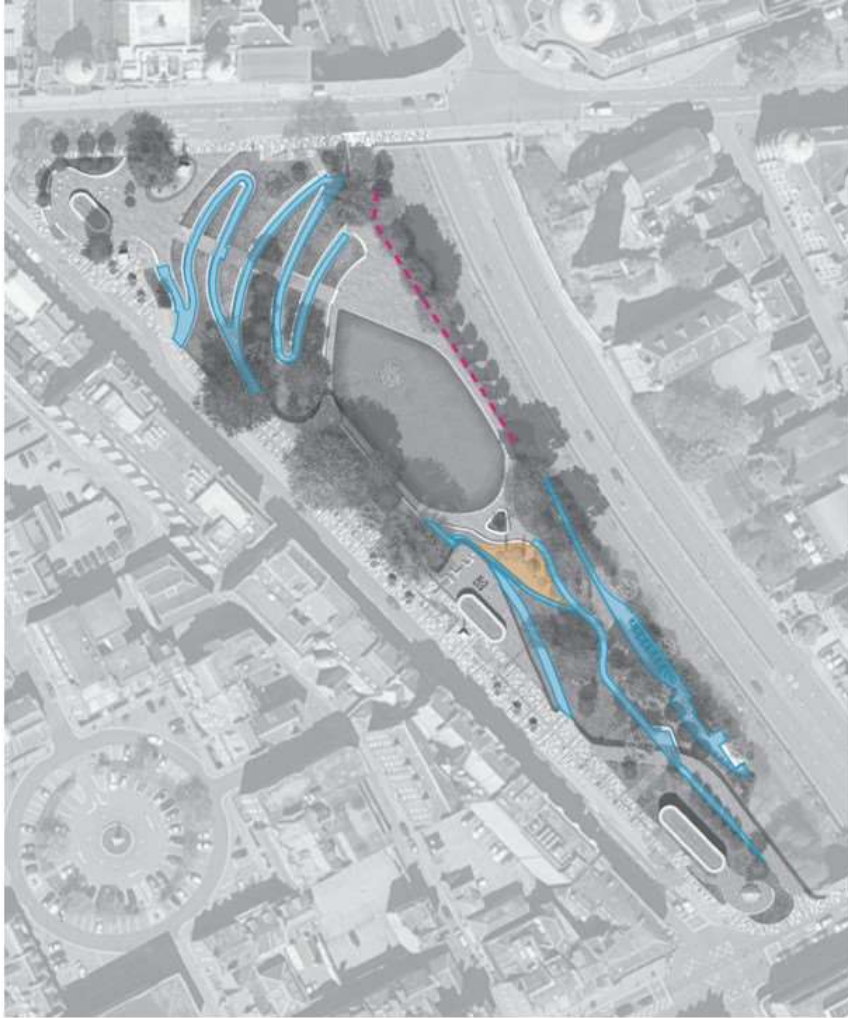
After....











- RESIN BOUND GRAVEL
- D SAFETY SURFACE TO PLAY  
PLAY AREA
- PROPOSED SWALE





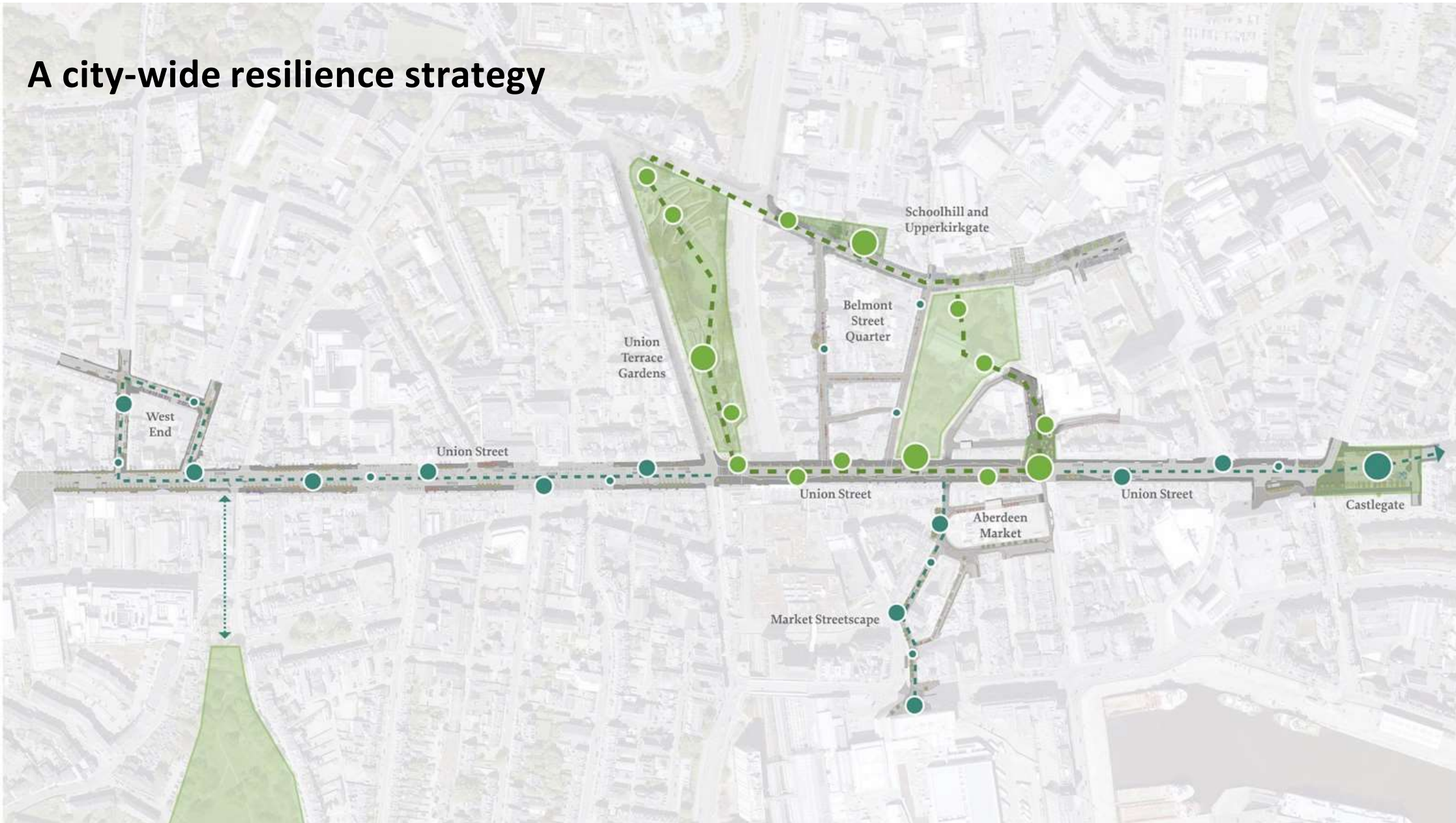








# A city-wide resilience strategy





After...

## Castlegate





Thank you!



LD&DESIGN





# LOCHGILPHEAD FRONT GREEN FLOOD RESILIENCE IN THE PUBLIC REALM

erz

Argyll & Bute Council

Narros





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# INTRODUCTION

**Approach:** Using flood resilience as a key driver to create successful public realm

**Overview:**

- Site prior to works and flooding issue
- Aims of project
- Coastal flood defences
- Design principles
- Technical detail
- Completed works

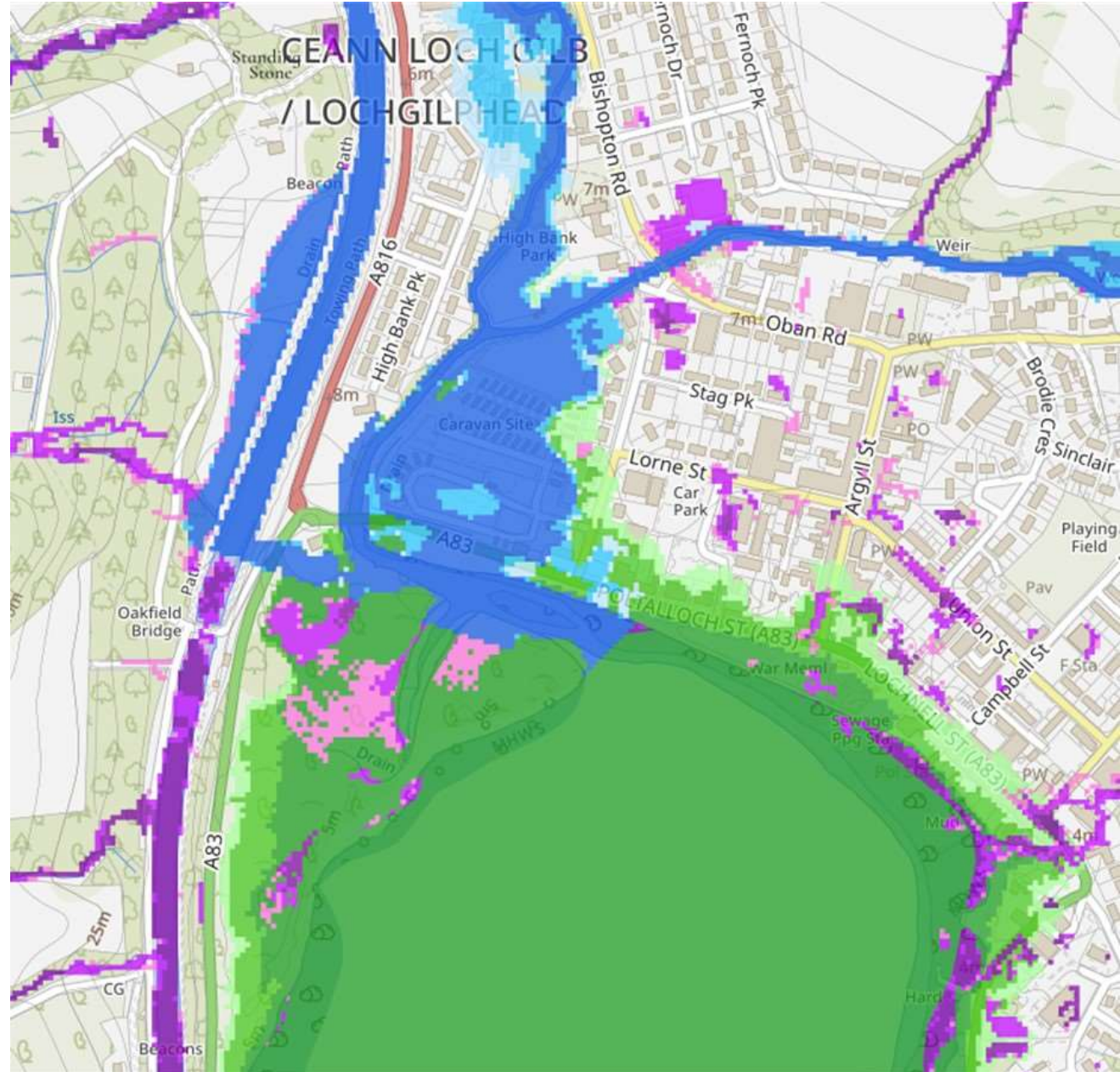




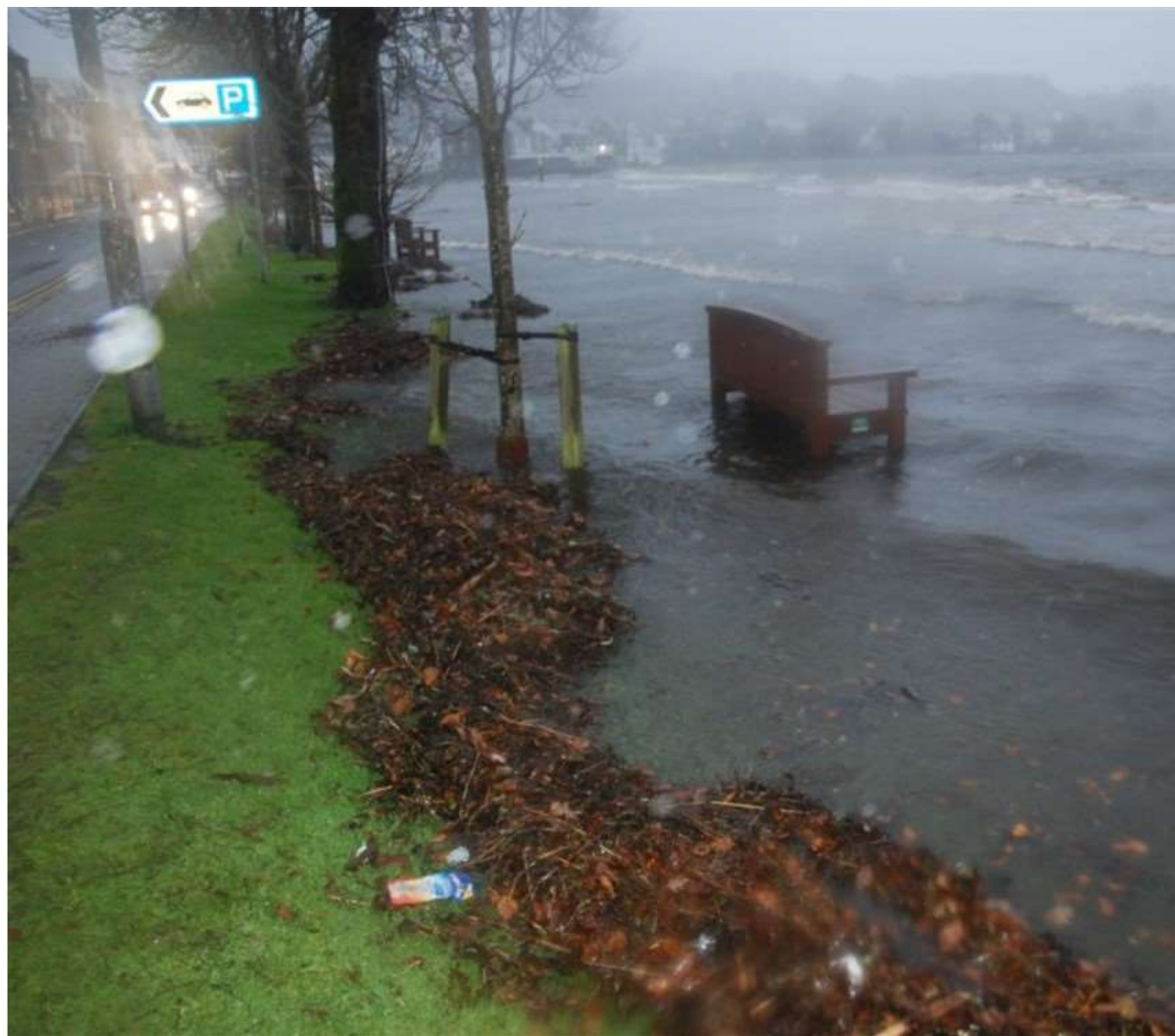
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## SITE CONTEXT

- Site is the main public space for Lochgilphead, situated at the head of the Loch
- Subject to coastal flooding
- Frequent winter flood events
- Threatens A83 and adjacent properties
- Burden to council clean up
- Resulting in a site that has become unusable due to wet and boggy ground conditions.







Images of storm flooding and the clean up after



---

# PROJECT AIMS

- Bringing activity back to core of town
- Increase tourism and footfall to support local economy
- Increase useability of the space
- Create new public realm, play and flexible green space
- Reconnect town to waterfront
- To achieve project aims, proposals were required to alleviate seasonal flooding

## FLOODING

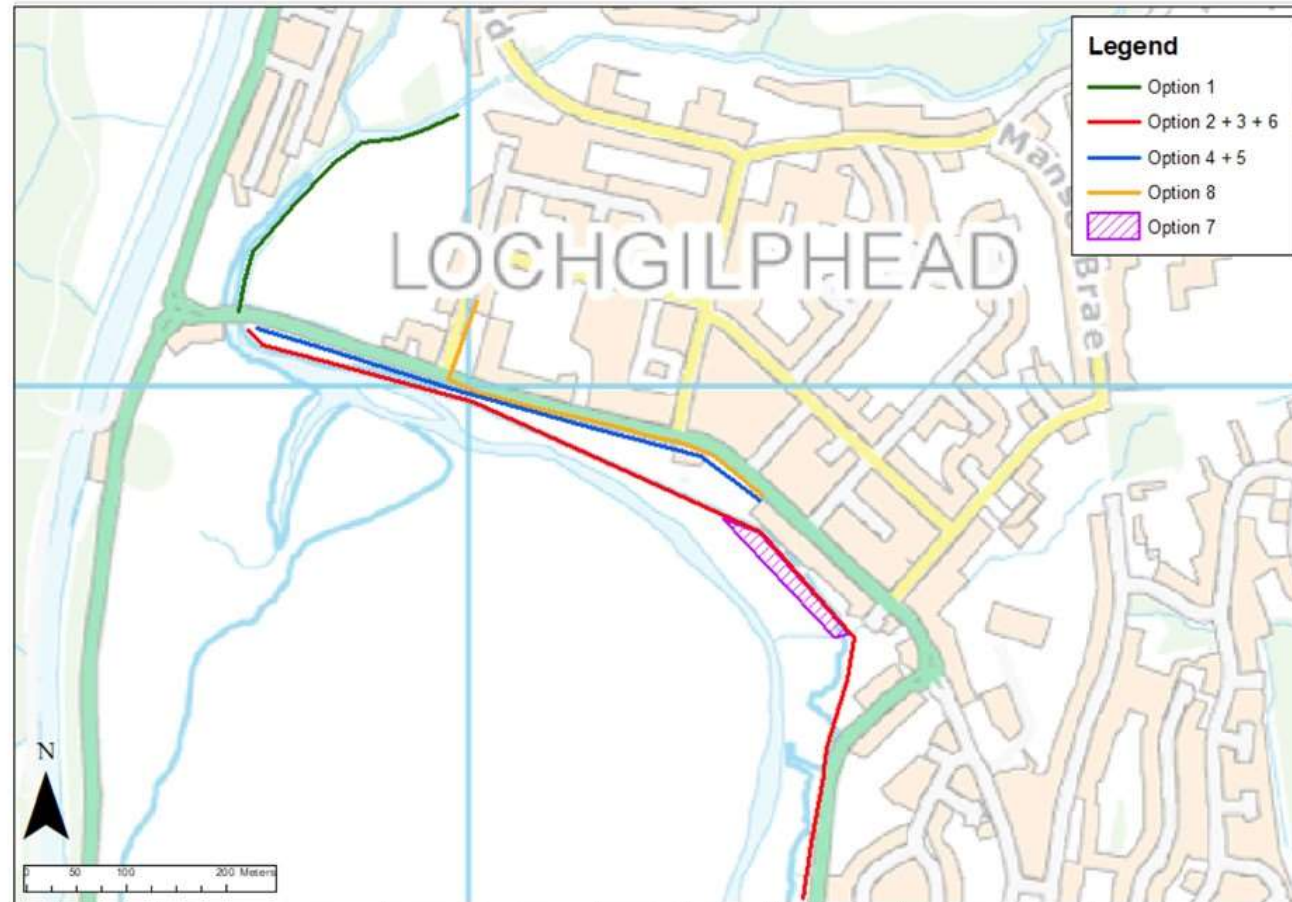




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## TRADITIONAL COASTAL DEFENCES?

- Separate AECOM study investigated coastal flood defence options
- Cost benefit analysis determined that traditional, large scale coastal defences were not viable
- Protection measures would be focused on individual properties most at risk.





# DESIGN PRINCIPLES

Table 4.2: Protection provided by different levels of land raising

Minimum Development Level (mAOD)	Provides Protection up to Return Period (years)
2.89	1
3.04	2
3.22	5
3.36	10

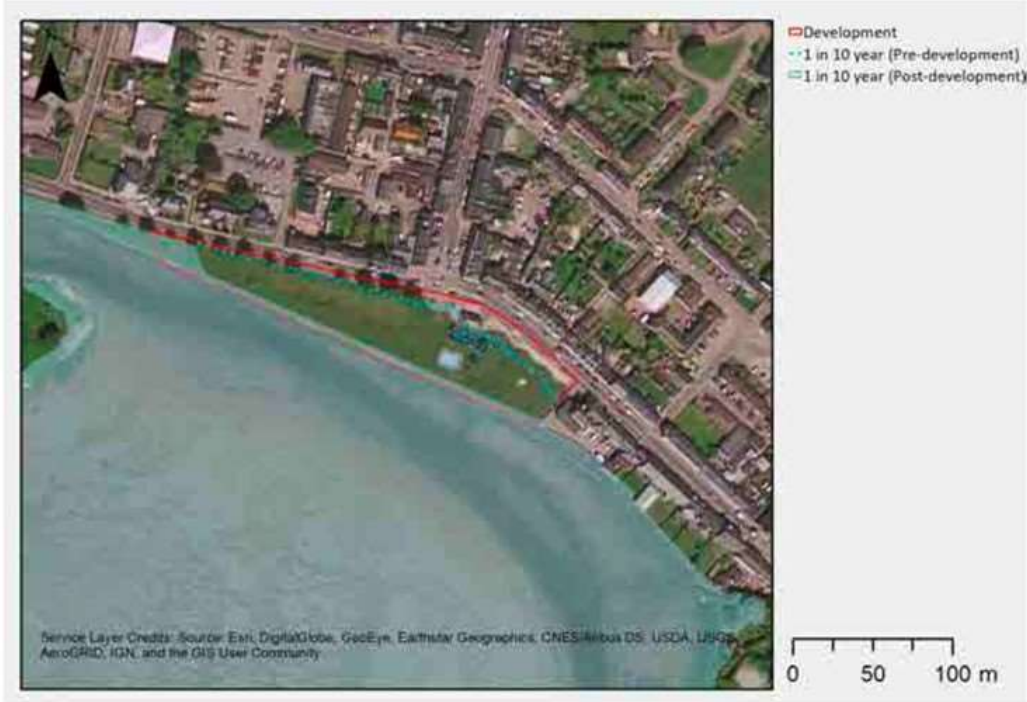


Figure 4.2: Existing 1 in 1 year flood extent

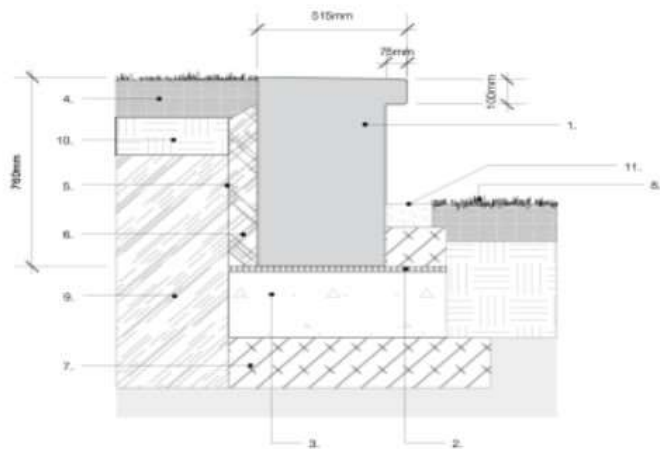
Figure 4.6: Pre- and post-development 1 in 10 year flood extent



---

# TECHNICAL DETAILS

- Raising levels
- Creating attenuation
- Robust detailing to withstand coastal conditions





---

## SITE WORKS





---

## COMPLETED SCHEME







































## **DundasHill Urban Regeneration**

A landscape led urban regeneration project

**rankinfraser landscape architecture**

**for**

**Igloo Regeneration  
Scottish Canals  
Glasgow City Region City Deal**

Speakers; David Muir and Chris Rankin  
from rankinfraser landscape architecture



## **Dundas Hill Regeneration**

### Key points

- Transformation of the former Diageo Distillery site into a new neighbourhood of up to 620 homes
- Landscape led approach with an initial focus on Blue/Green infrastructure
- Landscape framework and key public spaces built in advance of the homes
- Above ground SUDs and water management integrated into all public spaces
- Extensive tree planting
- Integration with Glasgow's 'Smart Canal' infrastructure
- Building with Nature Award winning project





Site in 2002





Site in 2016





Site Masterplan

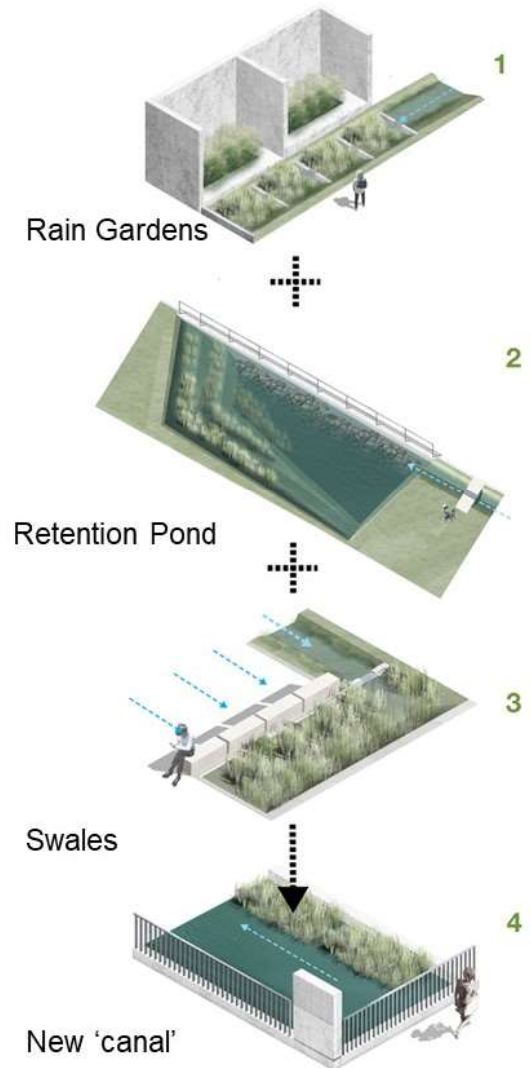




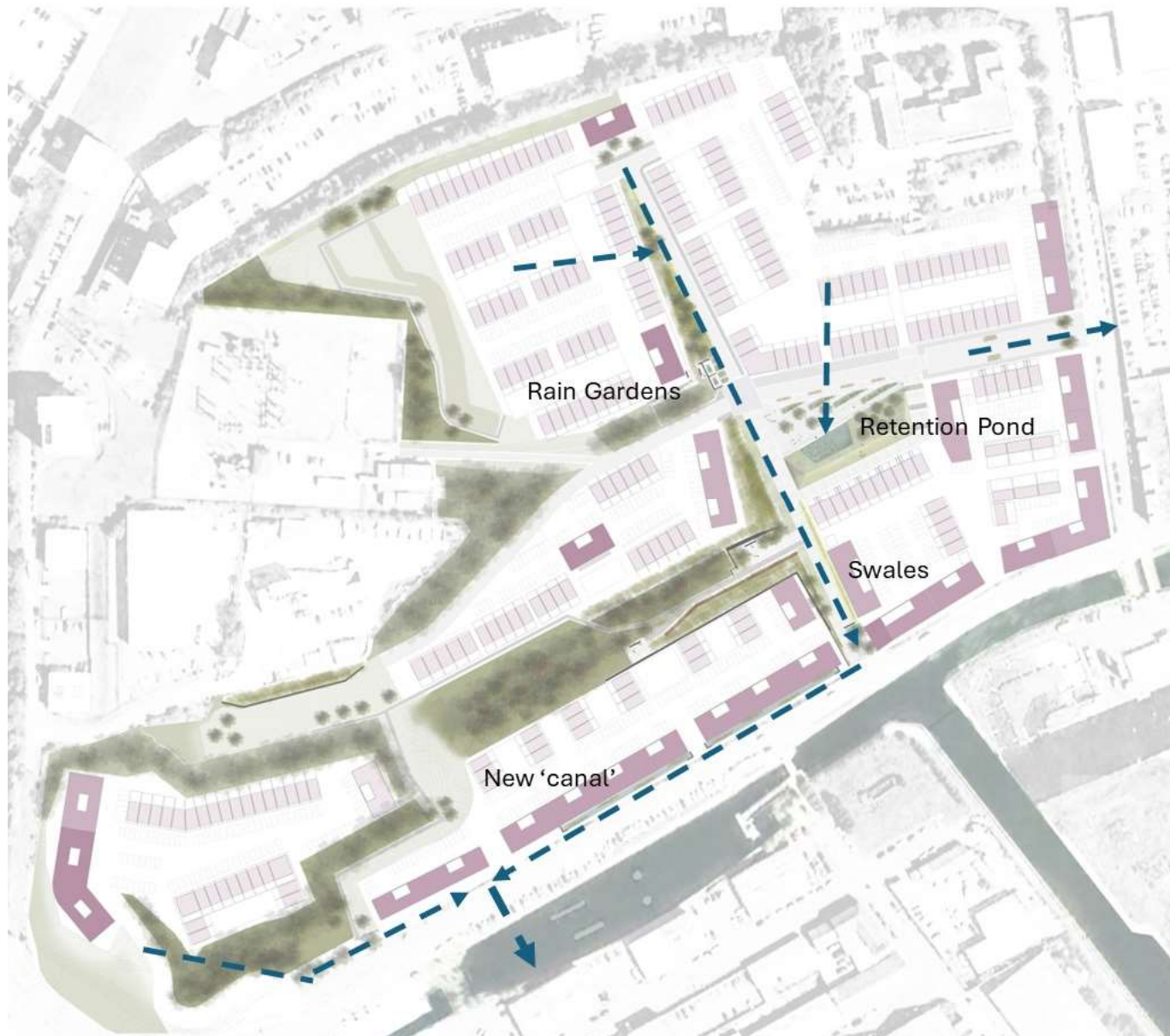




## Strategic Blue Infrastructure









































# Scotland's Flood Resilience Conference 2025

## Breakout F – Retrofitting property resilience measures

Sadiyah Rehman, Scottish Government (Chair);

George Rattray, Scottish Water; Gareth Boyd, Watertight International  
and Paul Shaffer, CIWEM

**FLOODRE**

**Balfour Beatty**

 **AtkinsRéalis**





## ‘Retrofitting Resilience Measures’ (Sewer Flooding Mitigation)

George Rattray  
Senior Service Planner  
Flooding Mitigations Team

Feb 28<sup>th</sup> / 29<sup>th</sup> 2025





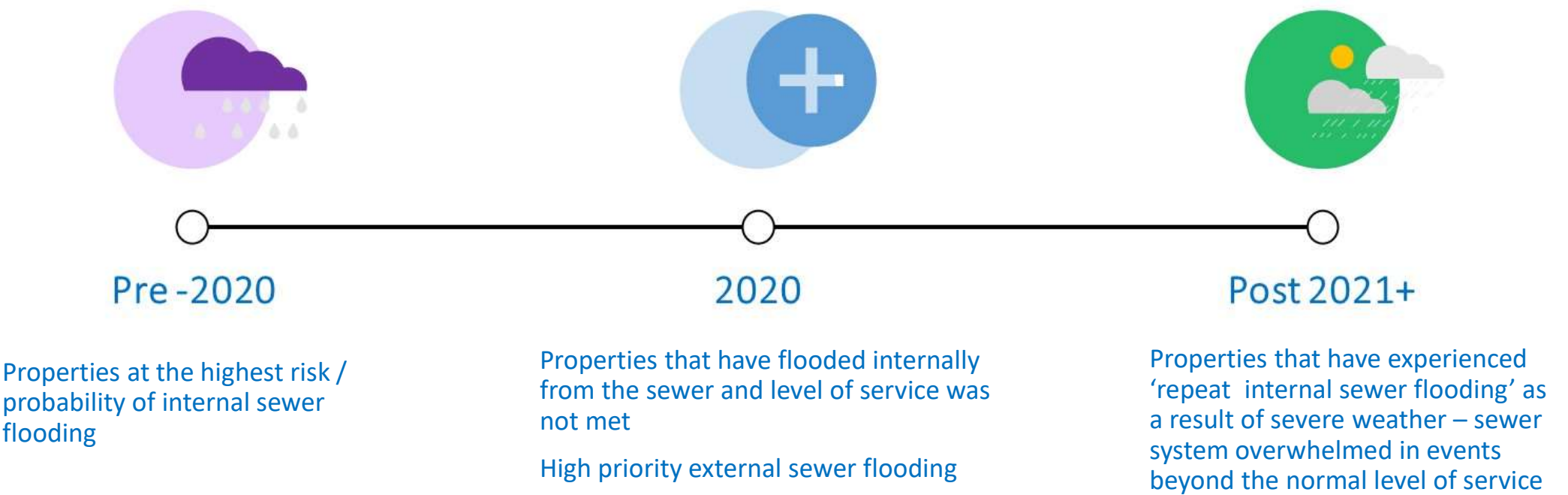
## Content

- Background
  - Timeline of Sewer Flooding Mitigation
  - Sewer Flooding Mitigation Policy
- Sewer Flooding Mitigation Installations in Practice
  - Mitigation measures
  - Challenges
- Questions



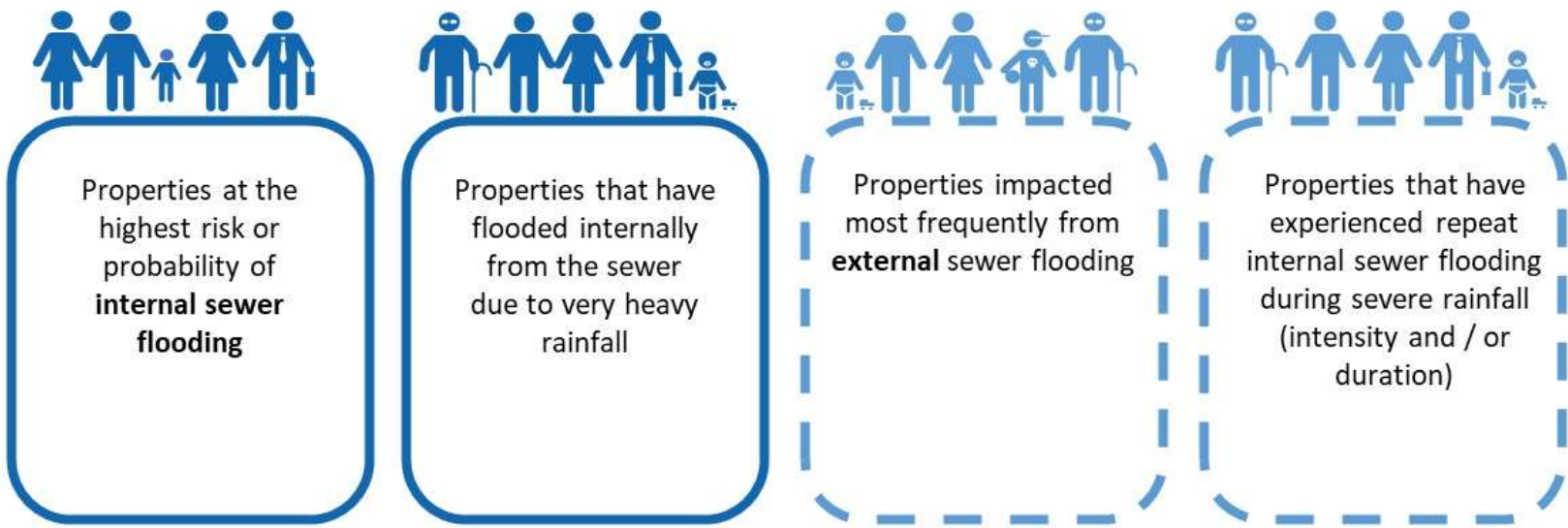


# Sewer Flooding Mitigation Measures Policy Timeline





# Mitigations Policy



Scottish Water's previous Mitigation Policy

200 - 250 properties mitigated over 6 year investment period

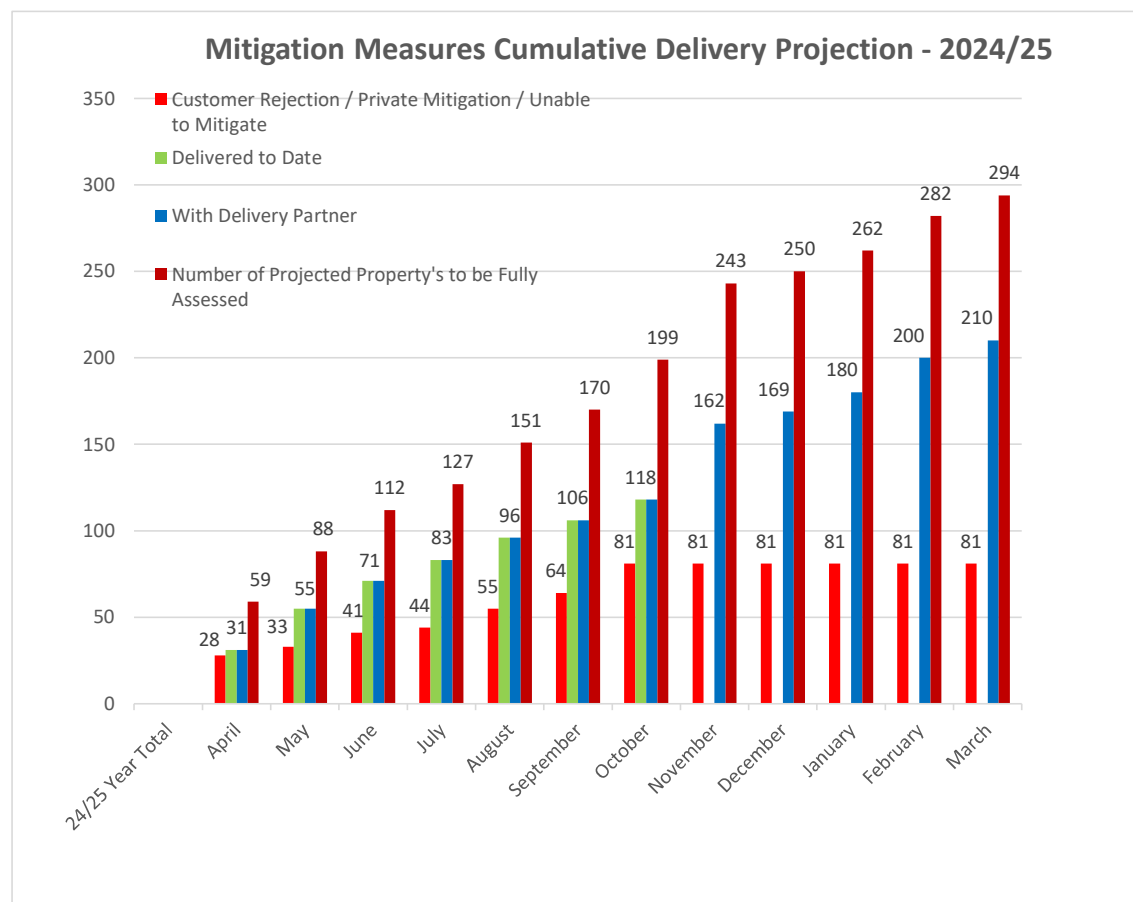
Scottish Water's current Mitigation Policy

Projecting 700-800 properties mitigated over current 6 year investment period (2021-2027)



## Measures Delivered (and maintained)

- >2000 individual measures
  - >300 Flood Doors
  - >120 Flood Barriers
  - >90 pumped measures
  - >1200 Smart Air-bricks





## Mitigation Assessments

- Following investigation, assess and where possible install mitigation measures to protect properties from **repeat internal sewer flooding**.
- Prioritise on those properties at greatest risk / frequency / impact from repeat internal sewer flooding due to confirmed sewer overloading events

In some cases mitigation cannot be offered due to flood risk transfer / detriment or excessive costs



## **What flood mitigation or resilience measures do we deploy?**

- Air vent protection - Smartbricks / Periscope vents
- Flood doors / flood gates / flood barriers
- Backflow protection (NRV / APNRV)
- Landscaping – flood bunds / barriers
- Roof water separation / SUDs



## Smartbricks / Periscope air vents (old and new)





# Flood doors and flood barriers





## Non-Return Valve



**Scottish  
Water**  
Trusted to serve Scotland



## Automatic Pumped Non-Return Valve (APNRV)



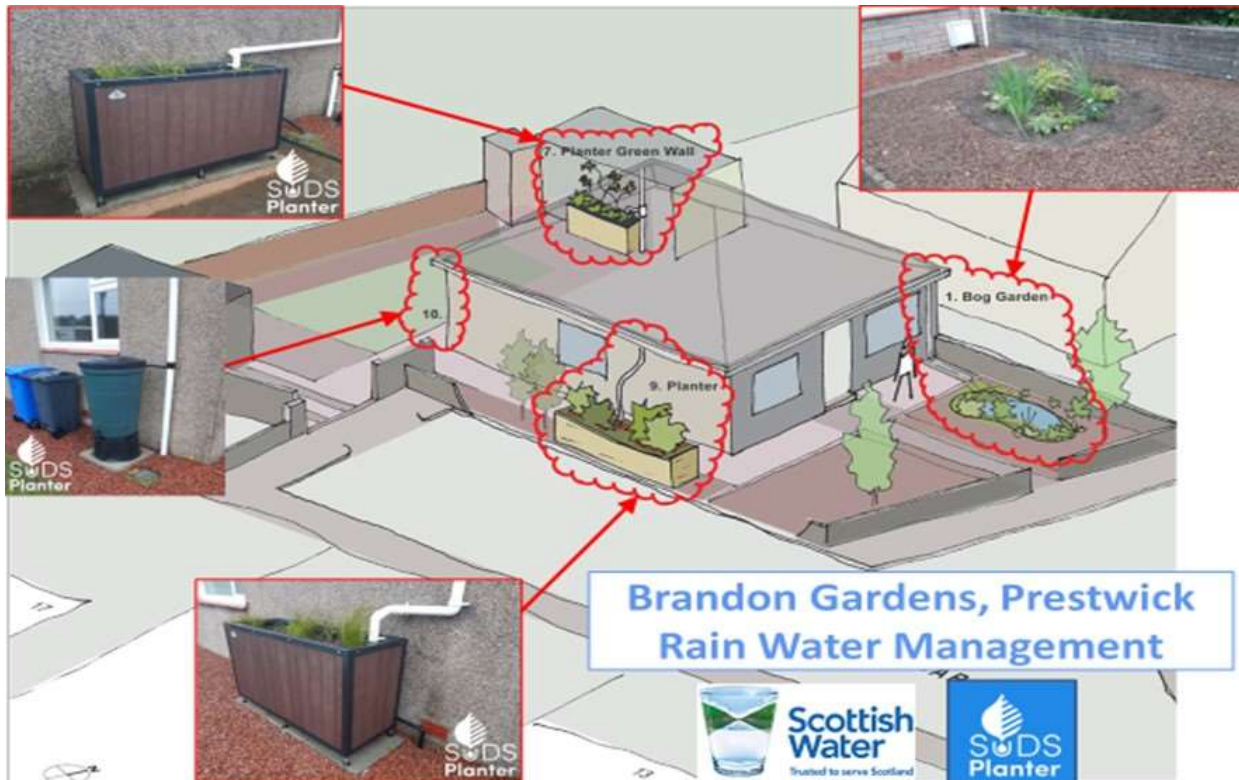


## Landscaping – flood bunds / barriers



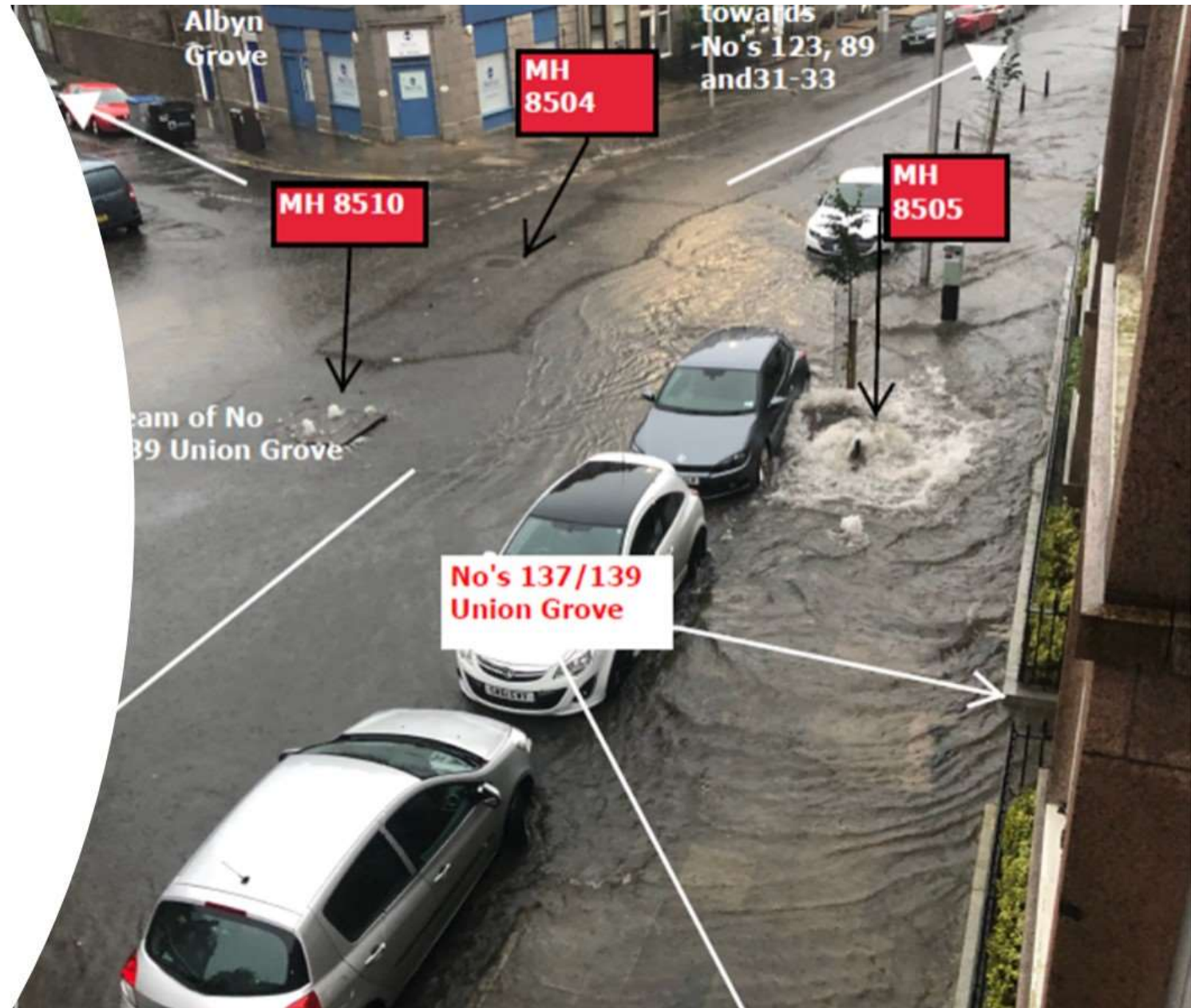


# Surface Water Management: (roofwater separation / attenuation)





## Case Study - Challenges





# Case Study

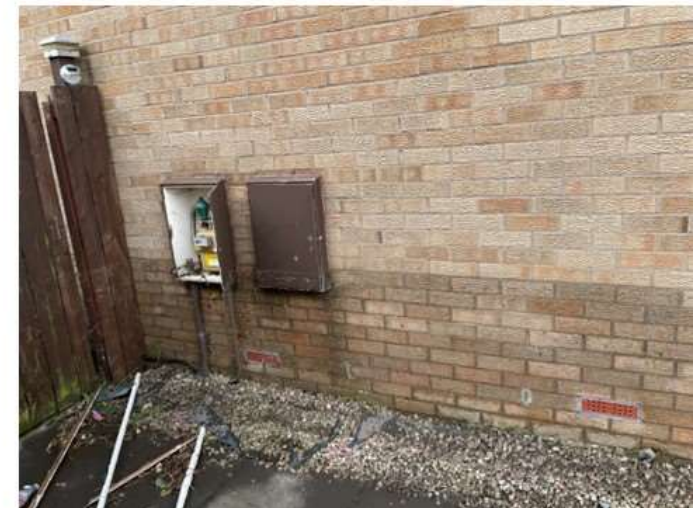
[20200812\\_074933.mp4](#)





## Case Study 2

### - Challenges





# Challenges

- Customer Expectations
  - Investigations do not always result in a flooding scheme or mitigation
- Customer denial / indifference
- The statutory planning process for properties in conservation areas or listed building status
- Flood risk transfer or consequential flooding







- Flood door (bespoke) ~ c.16 weeks from order to fabrication and installation
- but if listed building or in a conservation area:-
  - 4 weeks for survey and elevation drawing preparation
  - 4 weeks for planning document preparation
  - 16 weeks for Local Authority planning determination process +
  - 2 weeks permission review and order approval and submission +
  - 16 weeks fabrication and installation
  - **42 weeks**





## Unable to Mitigate

- Neighbour refuses consequential mitigation
- NSWRR – culvert / burn / surface
- Planning permission refusal
- Risk of Transfer – chasing point of escape / refused access to private property





# What about External Sewer Flooding?

- Process for external flooding mitigation is similar to internal flooding
- Historic external flooding incidents due to sewer overloading are reviewed and prioritised based on frequency and impact
- Investigations do not always result in a flooding scheme or mitigation
- A small number of very high priority externals are promoted to a flooding scheme and mitigation
- **Internal sewer flooding remains the priority**







## Questions



**Scottish  
Water**  
Trusted to serve Scotland





*Scotland Flood Resilience Conference 2025*  
***Session F – Retrofitting PFR***

29 January 2025





## Gareth Boyd CEO

- 10 years in Property Flood Resilience (PFR) sector
- **Gareth sits on:**
- DEFRA PFR Roundtable
- PFRDG (Scottish equivalent)
- RICS expert working group on flooding
- CIWEM community of practice
- Flood Re PFR expert working group
- Environment Agency PFR Framework Director (Watertight)
- Bricks and Water Steering Group – Policy Connect – under Baroness McIntosh

- Watertight are the leading providers of property flood resilience (PFR) in the UK to the EA, LLFAs (local authorities), Department for Education and Build Back Better (Flood Re) delivery partner for a leading British Insurer
- Watertight design, source, install and maintain bespoke and innovative property flood resilience solutions taking into account the person, the property and the flood with a solution designed and delivered within the scope of the industry code of practice.
- We do not manufacture products but provide a range of project management services, advice and solutions
- Developed the Resilico flood compliance platform





# Mainstreaming PFR in Solihull

Flood and Coast Excellence  
Awards 2023

## Partners

SMBC

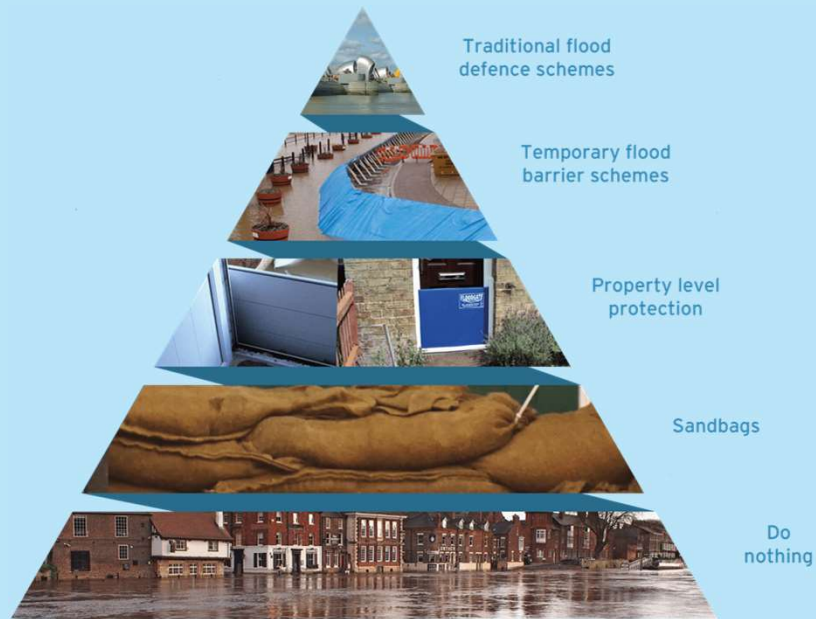
EA

Watertight

JBA



## Flood Hierarchy

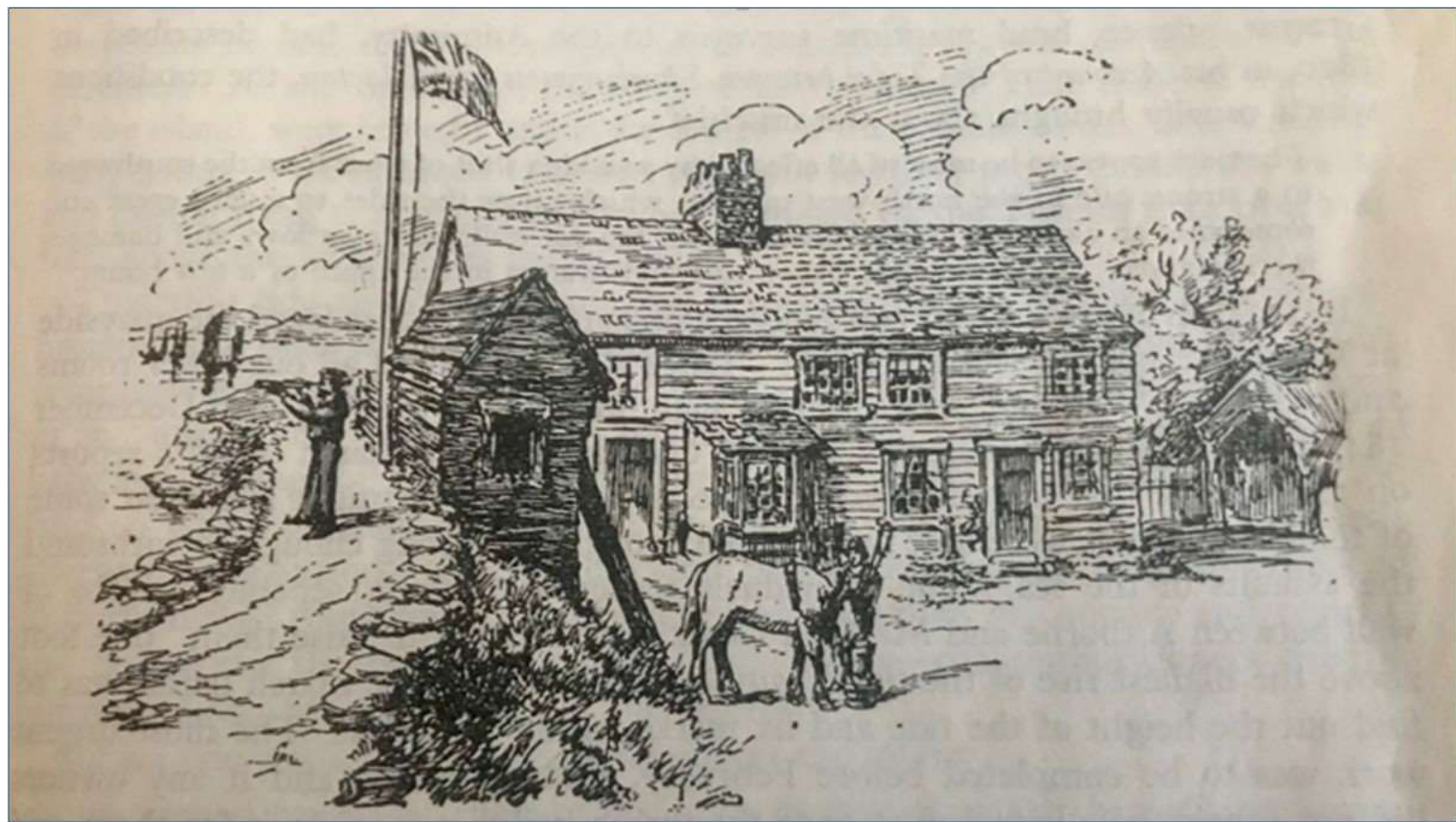


## What is PFR (property flood resilience)

- PFR includes any resilience measures built into individual properties designed to empower people and organisations to take ownership, control and responsibility for and to live with the risk of flooding.
- **It is government policy to “mainstream PFR”**
- **A multi layered approach**
- **No longer measure of last resort**
- It has three component parts:
- **Resistance measures** – using products (barriers / flood-doors) or building materials to reduce the chance of water entering a property
- **Recoverability measures** – adapting the property to minimise the effects of flood water, reduce the damage and to aid faster recovery
- **Preparedness** – “knowing what to do and when to do it” – includes access to flood alerts, creating flood plans and ensuring PFR measures are maintained.
- **PFR is a jigsaw** – there is no one size fits all solution and there will always be some residual risk











G.1885.

THE LOBSTER SMACK, CANVEY ISLAND.







- **PFR Industry**
- PFR a new industry
- 2015 Cumbria – cowboys!
- Standards and best practice
- Lack of suppliers / installers / BSI
- PFR seen as measure of last resort
- Immature industry
- Focus on Resistance
- **Homeowner Take Up**
- Education and Awareness
- Its not my responsibility
- Reliance on Govt
- *“People will know my property is at risk of flooding”*
- *“I wont be able to sell my house”*
- *“My insurance will go up”*
- *“How can I trust the measures will work”*
- *“Who can I trust to install it correctly and maintain it”*
- Aesthetics



## Challenges of retrofitting PFR



**From this.....**



**To this....**



**Wet testing flood door**



## East Peckham - Kent



- UPVC Windows and composite front flood door M3 – kitemarked product
- Garage barrier – Caro – fully tested





# Customer Testimonials and Feedback



**From:** Pauline Head <[ph5109@gmail.com](mailto:ph5109@gmail.com)>  
**Sent:** 23 December 2019 09:29  
**To:** Gareth Boyd <[Gareth@watertightinternational.com](mailto:Gareth@watertightinternational.com)>  
**Subject:** Flood Gates Little Brook Plantation TN129RB

Hi Gareth

I just wanted to let you know that we were flooded on Friday 20th December and the flood gates that you made for our property saved us all from the terrible flooding that devastated our house in 2013. The gates were amazing no water came through them. We did experience some low level flooding from ground water that came up through the ground where it was so saturated but this did not get into the house, thankfully. We just wanted to thank you and everyone involved with the planning making and installation of our gates, thereby ensuring that Christmas 2019 will not be the disaster we had in 2013. Wishing you all a very happy Christmas and new year.

Our kindest regards

Pauline Head and family





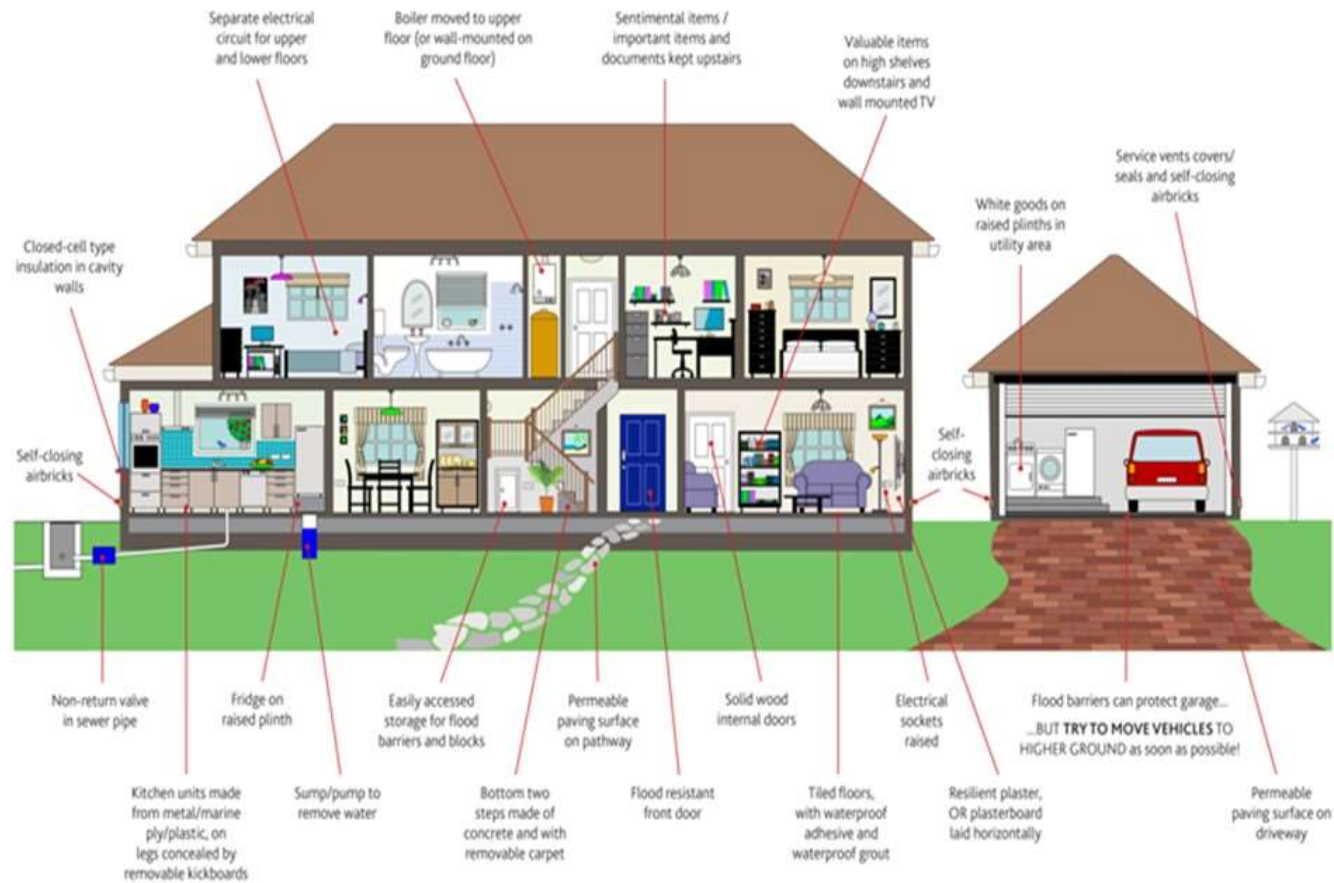
## Reframing PFR Retrofit

- Preparedness
  - Access to warnings
  - Creating a flood plan
  - Maintaining PFR measures
  - High impact / low cost
  - A starting point on road to resilience
- Recoverability
  - After a flood – BBB
  - Before a flood
  - As part of normal home improvements
- Resistance
  - After a flood
  - Before a flood
- *“normalising all of the above”*



## Options for Retrofitting PFR and BBB

**Combined resistance and resilience measures** Keeping water out for as long as possible buys valuable time to raise / move your belongings





- Not promising to keep properties dry – liability!
- Protection to adaptation
- It is about reducing the risk and minimising the costs – financial and non-financial
- Not having to move out of your house
- An honest conversation with the homeowner
- Responsibility shared via multi-layered approach
- PFR now a primary measure and also a measure to deal with residual risk
- Change behaviours and improve take up rates



## Reframing PFR Success



## KESWICK – STORM DESMOND







## Opportunities for PFR Retrofit

## Education and Awareness







## Code of practice for property flood resilience

*Edition 2*



## PFR Industry Successes



- **PFR Code of Practice**
- **National Flood School – CIWEM courses**
- **IPFRA – Trade Association**
- **KIWA – alternative accreditation**
- **New testing facility at Hull University**





## Hull University test tank







# Resilico



## Residents and property managers

### Mobile app and website

- Access flood warnings
- Create and manage bespoke flood plans
- Manage PFR maintenance
- Enterprise version for multiple properties



## PFR Professionals

### Tablet app

- Capture data
- Surveys
- Optioneering and design
- Manage installation and handover
- Aligned to Code of Practice



## Industry, Insurers, Lenders and Government

### Data Tools

- Reporting, dashboard and analytics
- PFR scheme and Build Back Better management

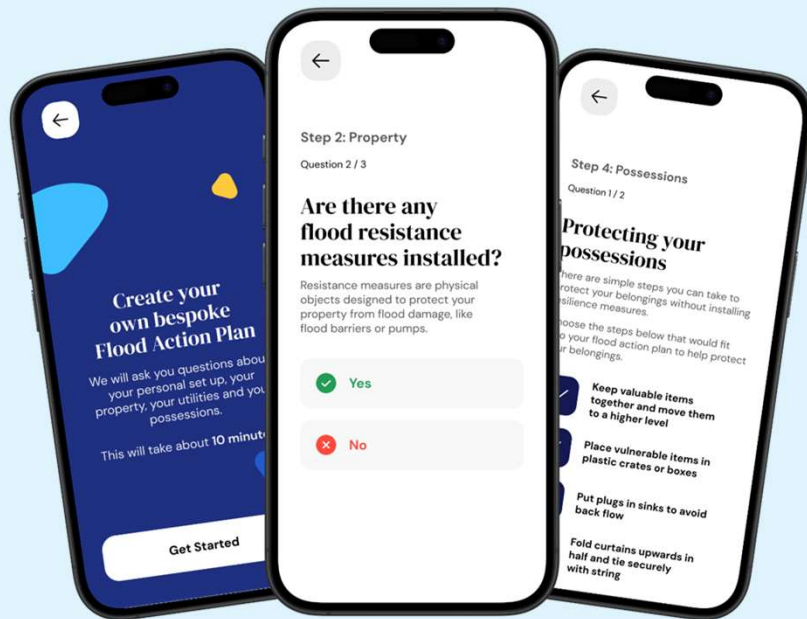




## “Permission to act.”

Geri is notified of flood warnings and alerts on **Resilico Connect** (preparedness). She can find out what this means for her, decide when to initiate her flood action plan, and be guided through it.

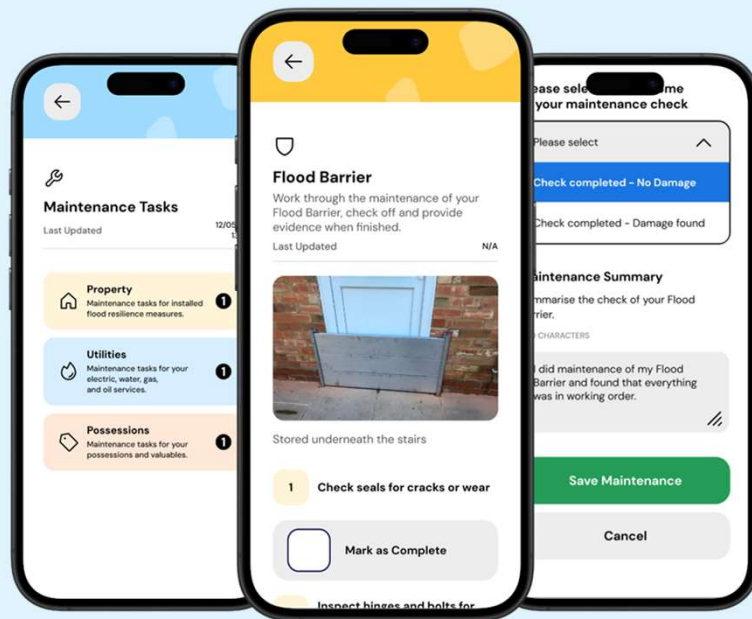




## Make a plan.

Using **Resilico Connect**, (preparedness) Geri makes a flood action plan for her property. She learns what to do and when to do it, before, during, and after the flood.






## Maintain PFR.





**Resilico Connect** tells Geri when her PFR measures need maintained, and how to do so. She's also reminded of actions she can take as the seasons change.






## Build Back Better

**FLOODRE** |  Build Back Better

Speak to your insurer to see if they offer Build Back Better

 <p>After Build Back Better families can be back in their homes in a matter of days rather than months</p>	 <p>Offers up to £10,000 extra to enable property flood resilience measures to be installed following a flood insurance claim</p>
 <p>Build Back Better gives homeowners peace of mind that next time it floods they're homes and lives are protected</p>	 <p>Reduces future flood insurance claims by keeping more water out and protecting homes against the water that does get in</p>

 Flood Re  [floodre.com](https://floodre.com)  floodre

## Flood Performance Certificates





# The Future







Paul Shaffer

# Creating confidence in PFR

Certainty | Competence | Confidence | Community | Consistency

Sniffer 2025

**BeFloodReady**  
CIWEM's Community of Practice

**CIWEM**



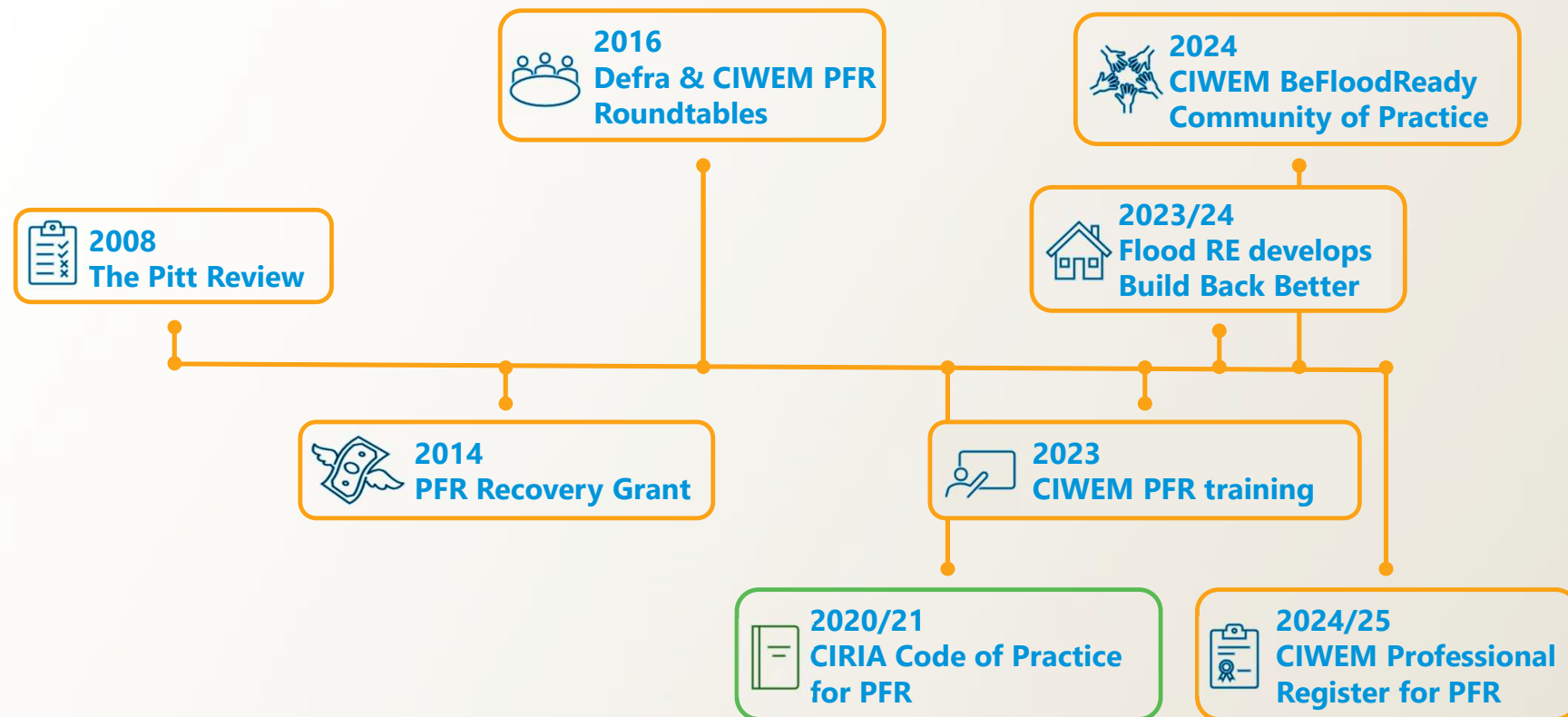


## Imagine if...

*A world in which professionalism and excellence build connections to inspire widespread, impactful water and environmental solutions*



## Context for PFR in the UK





## 」 Certainty & clarity

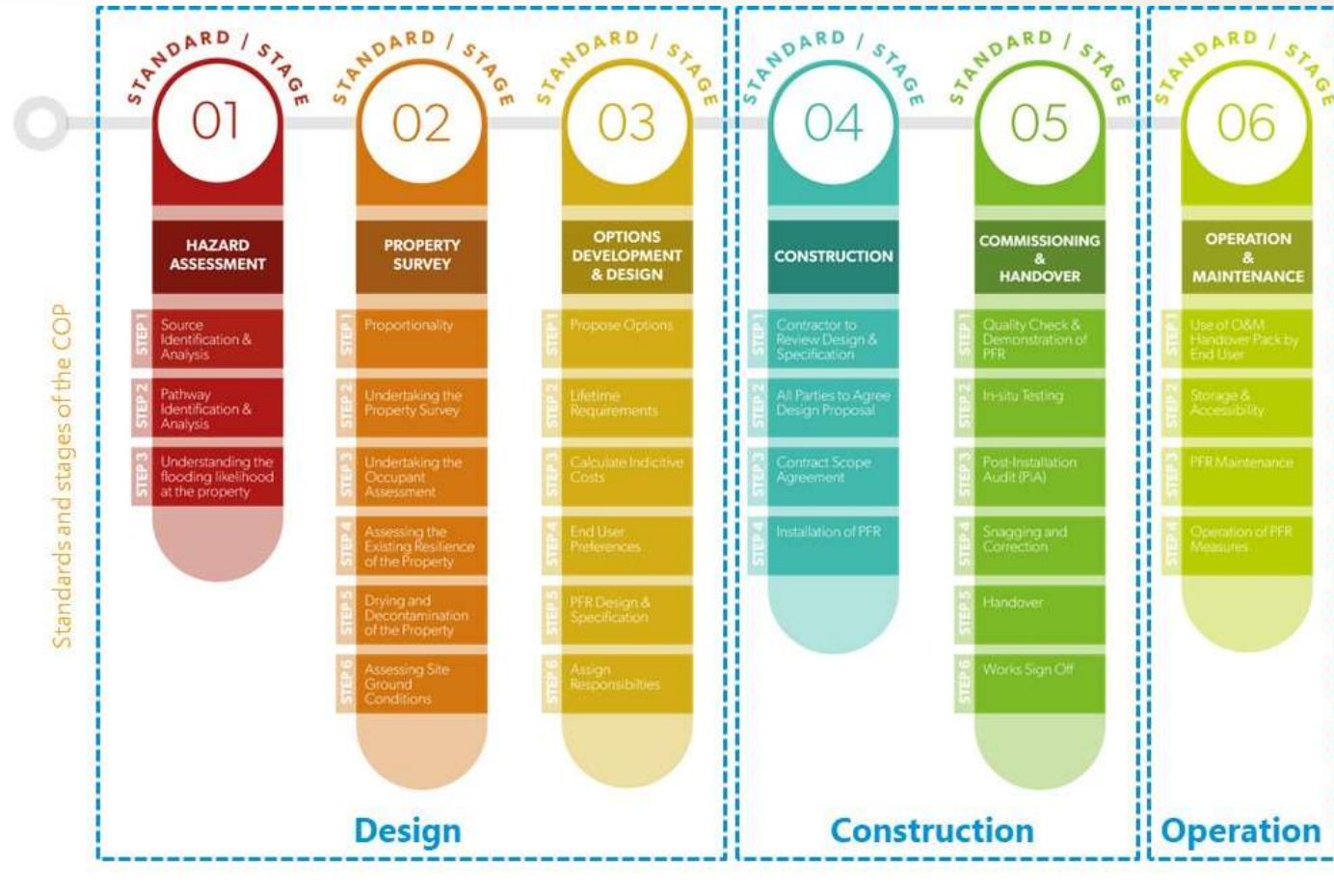
### Code of practice for PFR

- **WHAT** - benchmarks for good practice (6 Standards).
- **HOW** - guidance on the process (6 Stages).
- CoP and resources @ [www.ciria.org/PFR](http://www.ciria.org/PFR).



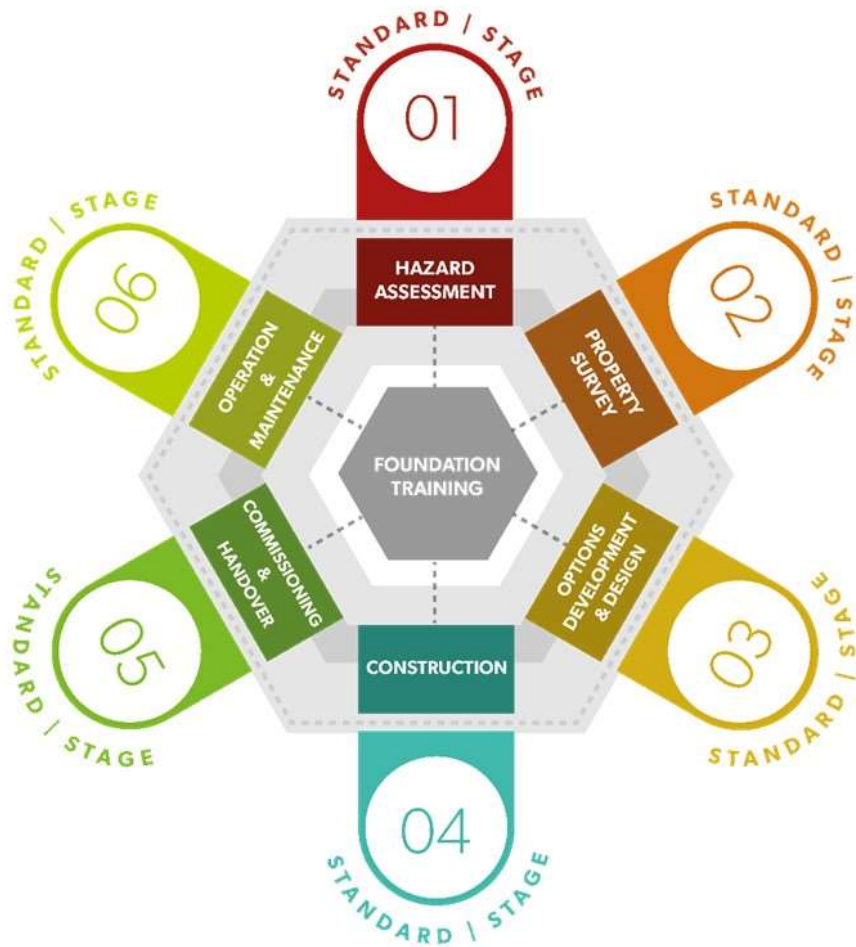


## 」 Certainty - The structure of the Code of Practice and training





## Competency – 7 courses & 24 modules





## Competency - the learning journey





## 」 Competency – Confidence – Consistency through certification

### CIWEM's special register for PFR practitioners

- A register providing reassurance on competence.
- Certified against individual standards.
  - Surveyor (and quality assurance)
  - Contractor/installation
- Assessment based on:
  - Successful completion of accredited training
  - CV
  - Report on case studies demonstrating competencies.
  - Successful Professional Review Interview





## CONSOLIDATION | COMPETENCE | CONFIDENCE

- Developing community, competency, confidence, and consistency.
- Hosting and signpost relevant resources related to PFR delivery.
  - Before | during | after
- Host events to share good practice.
- Signpost case studies of successful PFR delivery.
- Link to accredited training and events.
- Share industry news (blog & newsletter).

The screenshot displays the BeFloodReady website, which is CIWEM's Community of Practice. The header includes navigation links: About, Property flood resilience, Partners & supporters directory, Case studies, Resources, and Contact Us. The main banner features the title 'Community of practice on property flood resilience (PFR)' with a 'Find Out More' button. Below this, a section titled 'How can we help?' is divided into three columns: 'Before a flood', 'Property flood resilience', and 'After a flood'. Each column contains an icon, a title, and a brief description. At the bottom, a circular diagram titled 'What is PFR? Property Flood Resilience' explains that PFR is an important part of managing flood risk and lists two approaches: 'Flood resistance' and 'Flood recoverability'. The 'Flood resistance' box lists physical measures like barriers and covers, and the 'Flood recoverability' box lists measures to adapt the internal property to limit damage and speed up recovery.

BeFloodReady  
CIWEM's Community of Practice

News Events & training

About Property flood resilience Partners & supporters directory Case studies Resources Contact Us

# Community of practice on property flood resilience (PFR)

Find Out More

## How can we help?

### Before a flood

Being prepared for potential flooding is an important element of being flood resilient as it leads to approaches to use PFR measures. It's about understanding your flood risk, now and for the future.

### Property flood resilience

Property Flood Resilience (PFR) is an important part of managing flood risk. It includes measures that improve flood resilience at the building scale, helping reduce the damage and disruption caused by flooding.

### After a flood

Recovering from a flood can be a challenging journey, often filled with stress and disruption. In certain instances, the road to returning home has extended to as long as two years for some individuals facing these extreme circumstances.

## What is PFR? Property Flood Resilience

Property Flood Resilience (PFR) is an important part of managing flood risk.

There are different PFR approaches and measures which can either provide

### Flood resistance

Physical measures (barriers, covers etc) that aim to

- Limit floodwater entering a building
- Reduce damage and disruption

### Flood recoverability

Measures to adapt the internal property that aim to

- Limit the damage caused if water does enter a building
- Speed up recovery and reoccupation



## 」 Collaborating

- Visit the website:  
<https://befloodready.ciwem.org/>
- **Signup** to the Community of Practice.
- Opportunities to contribute content for:
  - Case studies
  - News items/blogs
  - Suggest content to signpost
  - Suggest event topics – next one will be on PFR delivery
  - Contribute to the BeFloodReady LinkedIn Group
- Become a Partner or Supporter
- For further information contact:  
**[paul.shaffer@ciwem.org](mailto:paul.shaffer@ciwem.org)**

**BeFloodReady**  
CIWEM's Community of Practice



Scan me



**CIWEM**





## Summary

### Where can you learn more about PFR

- The Code of Practice – CIRIA.
- Training on flood risk management and PFR – CIWEM.
- BeFloodReady – CIWEM.
- Specialist Register – CIWEM.

#### Paul Shaffer



[paul.shaffer@ciwem.org](mailto:paul.shaffer@ciwem.org)

07435 025818



# Scotland's Flood Resilience Conference 2025

**Breakout G – Supporting long-term transition planning for our most  
exposed communities**

John Wright, Mott MacDonald(Chair); Leigh Martin, SEPA; Richard Jackson,  
East Riding Council; Dave Gowans and James McLeod, Scottish Flood  
Forum

**THIS SESSION DID NOT USE SLIDES**



# Scotland's Flood Resilience Conference 2025

## Breakout H – Training on data, evidence base, flooding scenarios

Susan Veitch, Highland Council (Chair); Nigel Arnell, University of Reading;  
Prof Matt Palmer, The Met Office; Alistair Rennie, NatureScot and Steve  
McFarland, SEPA



# High-impact low-likelihood climate scenarios for the UK

Professor Nigel Arnell

*Department of Meteorology*

*University of Reading*

Flood Resilience Conference, Edinburgh

January 28<sup>th</sup> 2025

Copyright University of Reading





# Outline

- Underpinning concepts
- Brief summary of the scenarios



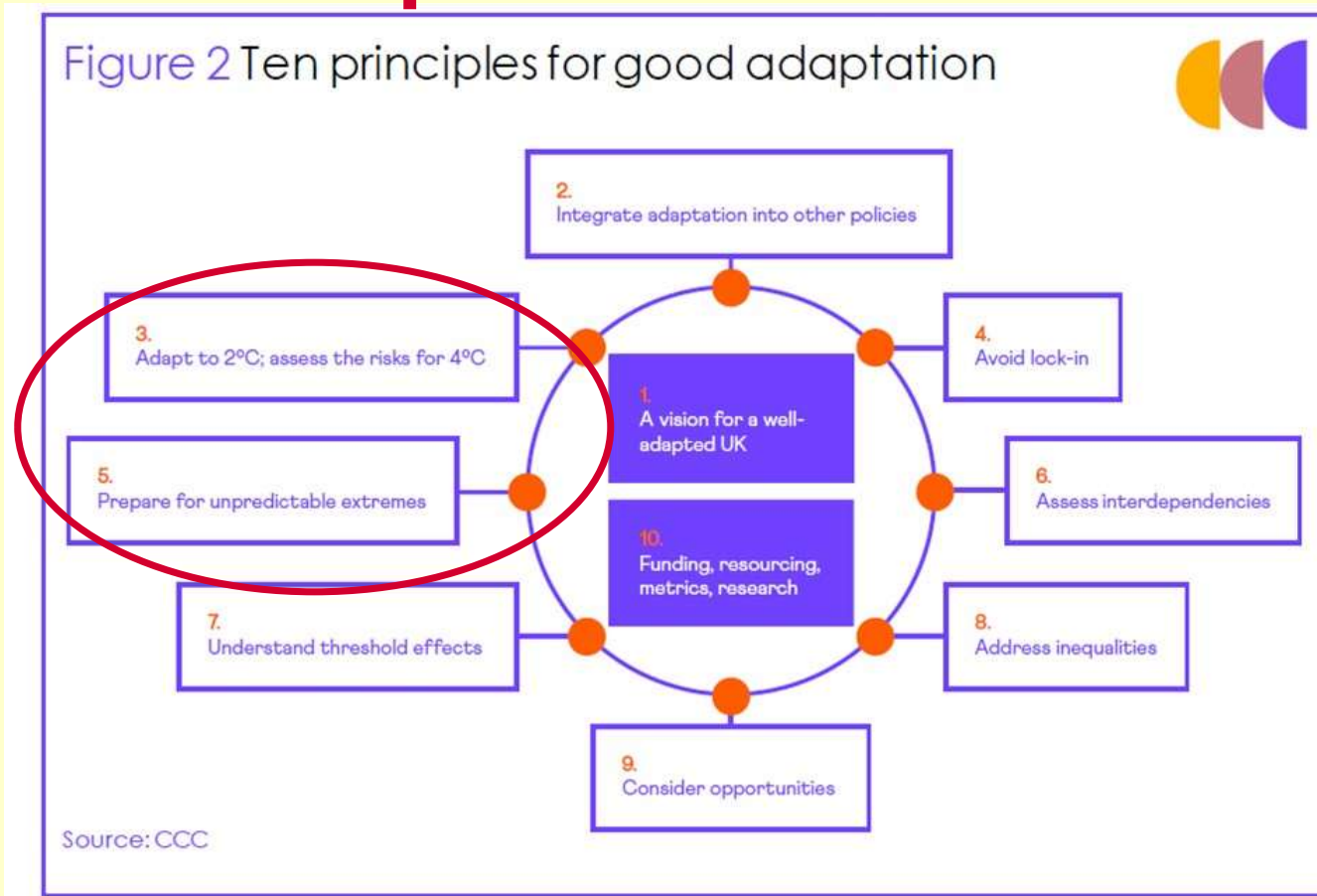
Nigel Arnell  
Ted Shepherd  
Ed Hawkins  
Len Shaffrey  
Ivan Haigh  
Ben Harvey  
Laura Wilcox  
Andy Turner





# Concepts

Figure 2 Ten principles for good adaptation



HILL scenarios:

“changes beyond those which are conventionally assumed”

- **Causes** of change are different
- Climate **system response** is different



## Underpinning principles

- The scenarios are based on physically-plausible **storylines**
- The scenarios are based on theory, observations and models
- The scenarios focus on High-Impact Low-Likelihood **drivers** of climate change for the UK, rather than on High-Impact Low-Likelihood outcomes
- Two sets of scenarios describe **transient changes** over time and **extreme months**
- The scenarios are not assigned probabilities or likelihoods
- The scenarios are presented as **narratives** with illustrative quantifications
- The scenarios **complement UKCP18**



# Overview of the six HILL transient scenarios

	Scenario	Summary
<b>HILL-1</b>	Enhanced warming	Global temperature increase well above 4°C
<b>HILL-2</b>	Reduced aerosols	Lower aerosol emissions increase warming
<b>HILL-3</b>	Volcanic eruption	Cooling follows major volcanic eruption
<b>HILL-4</b>	Stronger Arctic Amplification	Enhanced changes to atmospheric circulation
<b>HILL-5</b>	Ocean circulation change	Circulation collapse leads to cooling
<b>HILL-6</b>	Accelerated sea level rise	Significant collapse of Antarctic and Greenland ice



## HILL-1 Enhanced warming

### Storyline narrative

The rate and magnitude of climate change is greater than assumed, resulting in global warming in excess of 4°C above pre-industrial levels by 2100.

### Description

Future global warming is considerably greater than 4°C by 2100. This is because future emissions increase more rapidly than anticipated, because the climate system is more sensitive to emissions than conventionally assumed and/or because positive feedbacks which release stored carbon and methane are stronger than conventionally assumed.

### Storyline type

The storyline describes a **forcing of climate change** outside the conventional range and/or a **climate system response** outside the conventional range.

### Variants

There are no variants to this storyline, although there are several options for its application.

### Links to other scenarios

This scenario affects the plausibility of HILL-4, HILL-5 and HILL-6, and affects the consequences of HILL-2 and HILL-3.

## HILL-2 Rapid aerosol reductions

### Storyline narrative

Air quality concerns result in large, rapid reduction to anthropogenic aerosol emissions, which accelerate greenhouse gas driven warming for a few decades.

### Description

Anthropogenic aerosols act to cool the climate, primarily by scattering incoming solar radiation back to space, and by altering the properties of clouds to make them more reflective. Aerosols have offset some of the warming due to increases in greenhouse gases, and rapid reductions in their emissions will unmask this warming.

### Storyline type

This storyline describes a **forcing of climate change** at the limit of conventional ranges.

### Variants

There are no variants to this storyline.

### Links to other scenarios

The scenario is independent of the other scenarios.

## HILL-3 Volcanic cooling

### Storyline narrative

A major volcanic eruption ejects large quantities of aerosol into the stratosphere, cooling the earth for several years.

### Description

Some volcanic eruptions emit large quantities of aerosol directly into the stratosphere, where they remain for several years. These aerosols reflect incoming solar radiation, leading to cooling at the surface of the earth, changes to the hydrological cycle and potentially changes to atmospheric circulation patterns.

### Storyline type

The storyline describes a **forcing of climate change** outside the conventional range.

### Variants

There are no variants to this storyline.

### Links to other scenarios

There is a potential link to HILL-5.

## HILL-4 Stronger Arctic Amplification

### Storyline narrative

More extreme Arctic Amplification and/or a more extreme response to it, lead to changes in the position of the Jetstream and therefore UK weather and climate.

### Description

It is well established that high latitudes warm more rapidly than lower latitudes, partly due to amplified feedbacks due to loss of snow and sea ice cover ("Arctic Amplification"). This alters temperature and pressure gradients and leads to a shift in the winter jetstream to the south. This reduces the frequency of westerly weather patterns and increases the exposure of the UK to cool weather events.

### Storyline type

The storyline describes a **climate system response** outside the conventional range.

### Variants

There are no variants to this storyline.

### Links to other scenarios

The plausibility of this scenario is influenced by HILL-1.

## HILL-5 Change in ocean circulation

### Storyline narrative

A step change in ocean circulation in the North Atlantic leads to cooling across western Europe.

### Description

The temperature of the Atlantic Ocean influences temperatures in the UK and the position of storm tracks. Changes in ocean circulation in the North Atlantic lead to lower sea surface temperatures, and therefore lower temperatures, lower rainfall and stronger storms. Ocean circulation change can be triggered by collapse of the Atlantic Meridional Overturning Current (AMOC) or a collapse of the sub-Polar Gyre (SPG).

### Storyline type

The storyline describes a **climate system response** outside the conventional range.

### Variants

There are two variants to this storyline:  
HILL5a: AMOC collapse  
HILL5b: SPG collapse

### Links to other scenarios

The plausibility of this scenario is influenced by HILL-1.

## HILL-6 Enhanced sea-level rise

### Storyline narrative

Accelerated ice loss from Antarctica and Greenland will substantially enhance sea-level rise.

### Description

Enhanced sea-level rise is driven by changes in the surface mass balance in Greenland, which changes outlet glaciers and dynamics of the main ice sheet, and disintegration of marine ice shelves in Antarctica and the onset of marine ice sheet instability and marine ice cliff instability.

### Storyline type

The storyline describes a **forcing of climate change** outside the conventional range.

### Variants

Variants will depend on whether ice loss contributions from Greenland, Antarctica or both dominate the contribution to sea-level rise and associated gravitational fingerprint effects, along with differences in regional and local ocean dynamics and vertical land movements.

### Links to other scenarios

Enhanced sea-level rise will be driven primarily by HILL-1.

### Implications

AMOC collapse otherwise hampers summer rainfall increase in UK. Weakening reduction in below what occurred, a up to 20%, frequency of

### Confidence

Reduction in sea level rise. Increase in sea level rise. Reduction in sea level rise. Increase in sea level rise.

### Sources of evidence

The specific climate model confidence historical evidence model simulations

### Implications for UK sea level

Average sea level increases around the UK coastline by between 1.8 and 2.2m by 2100, relative to the 1981-2000 average, with very high emissions. The increase is greatest in southern and eastern England. In a 2°C world the increase is between 0.8 and 1.1m by 2100. Under both emissions scenarios sea level continues to increase after 2100.

### Confidence

Plausibility of driver: **Low**  
Confidence in UK effects: **High**

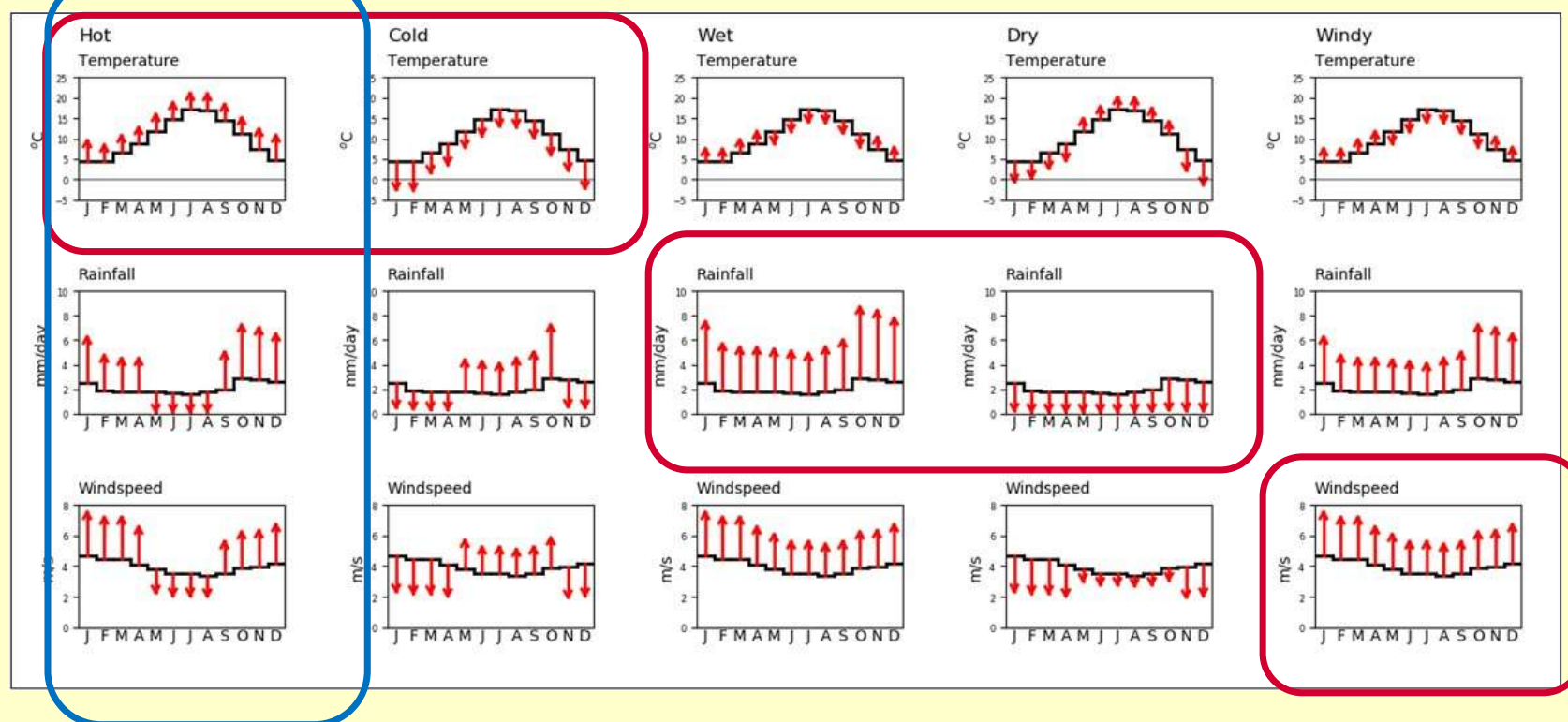
### Sources of evidence

The specific scenario is based on climate and ice-sheet model simulations and structured expert evaluation of multiple lines of physical evidence and is taken directly from the IPCC AR6 report. Plausibility and confidence are based on a combination of historical experience, theory and climate and ice-sheet model simulations.



# Extreme months and seasons

1: Individual months: apply anomalies to the mean



Varies with spatial scale!



# Extreme months and seasons

## Backstories

	Winter	Summer
Hot	Strongly cyclonic	Strongly anticyclonic
Cold	Strongly anticyclonic	Strongly cyclonic
Wet	Strongly cyclonic	Strongly cyclonic
Dry	Strongly anticyclonic	Strongly anticyclonic
Windy	Strongly cyclonic	Strongly cyclonic

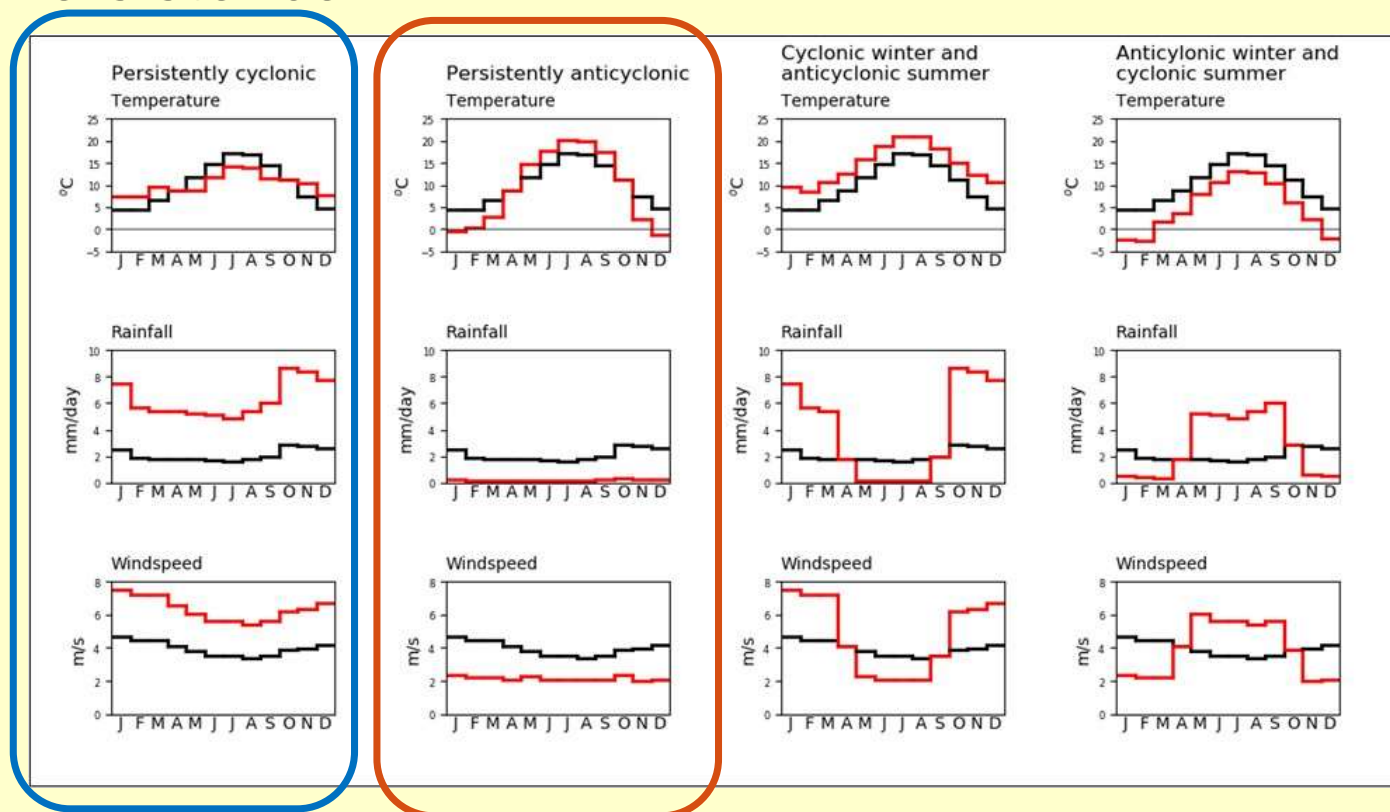
Spring and autumn

Strongly cyclonic	Strong Jetstream, westerly flows, positive NAO, warm seas
Strongly anticyclonic	Weak meandering Jetstream, persistent blocking, strong Scandinavian High pressure



# Extreme months and seasons

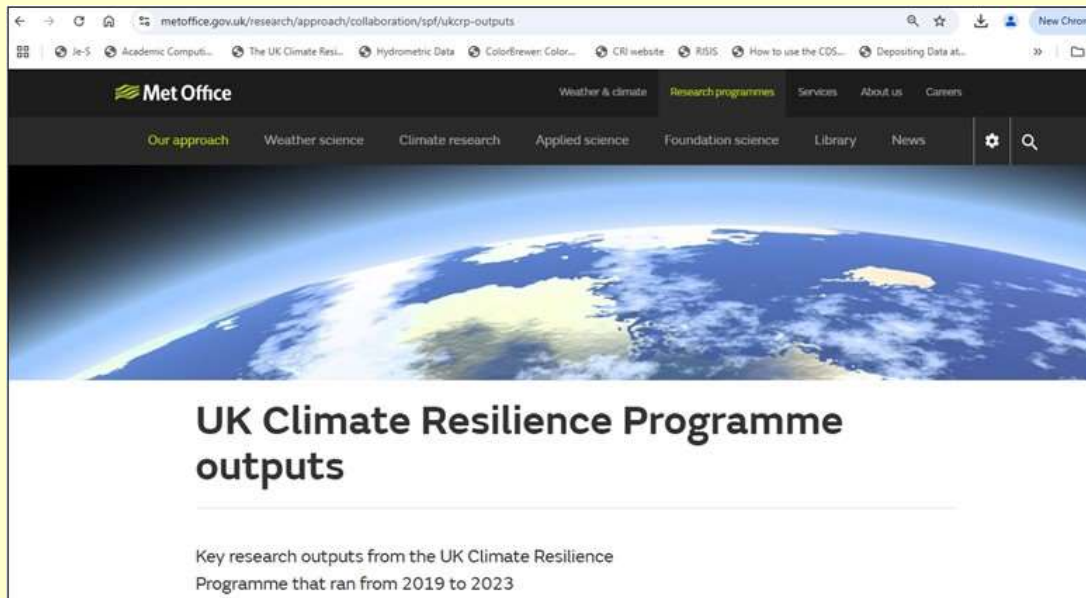
## 2: Persistence



Varies with spatial scale!



# Summary



Reports will be available from:

<https://www.metoffice.gov.uk/research/approach/collaboration/spf/ukcrp-outputs>

[n.w.arnell@reading.ac.uk](mailto:n.w.arnell@reading.ac.uk)



# Observations and projections of sea level rise for Scotland

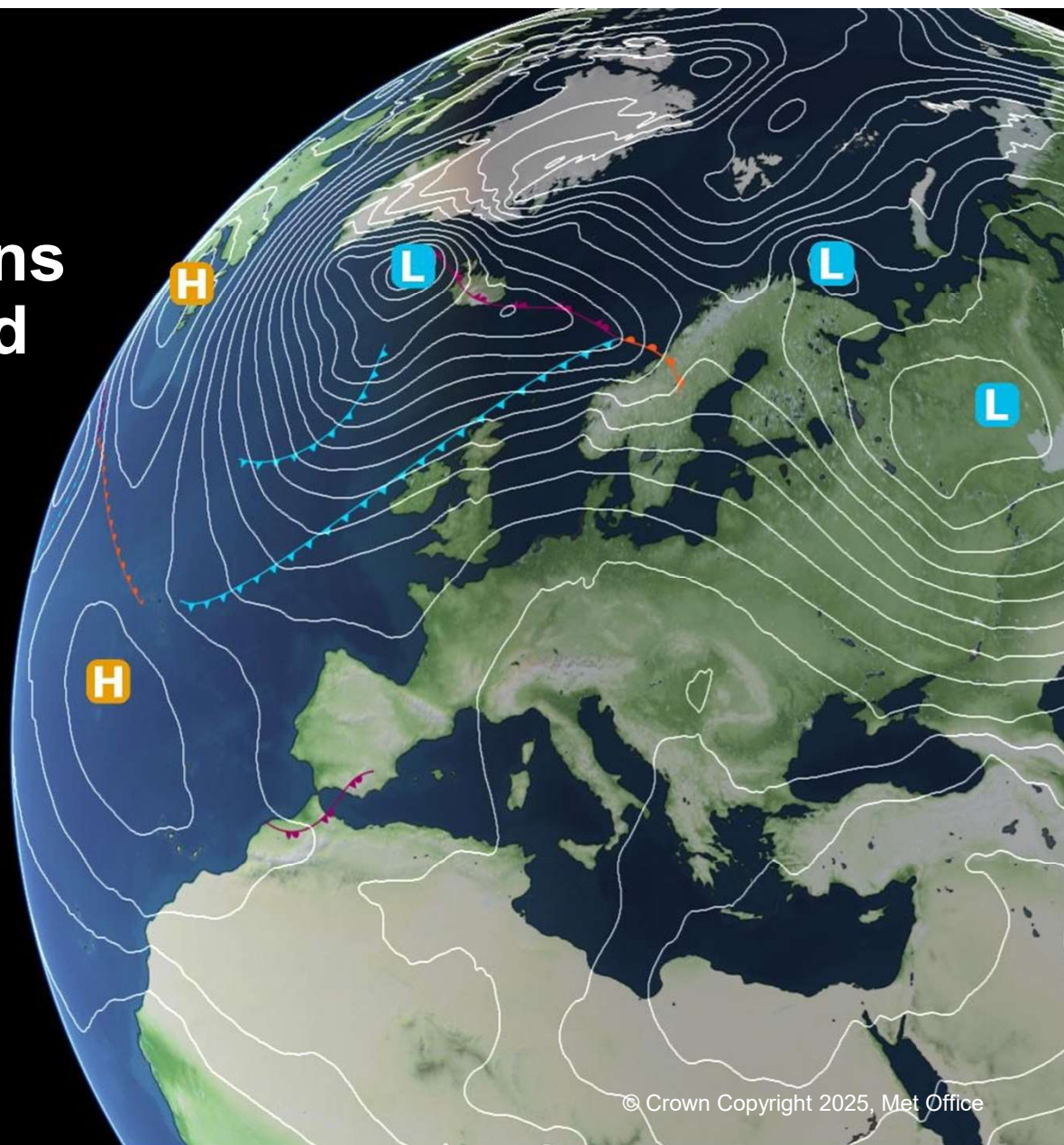
Dr Matt Palmer

Met Office Hadley Centre, Exeter, UK

School of Earth Sciences, University of Bristol, UK

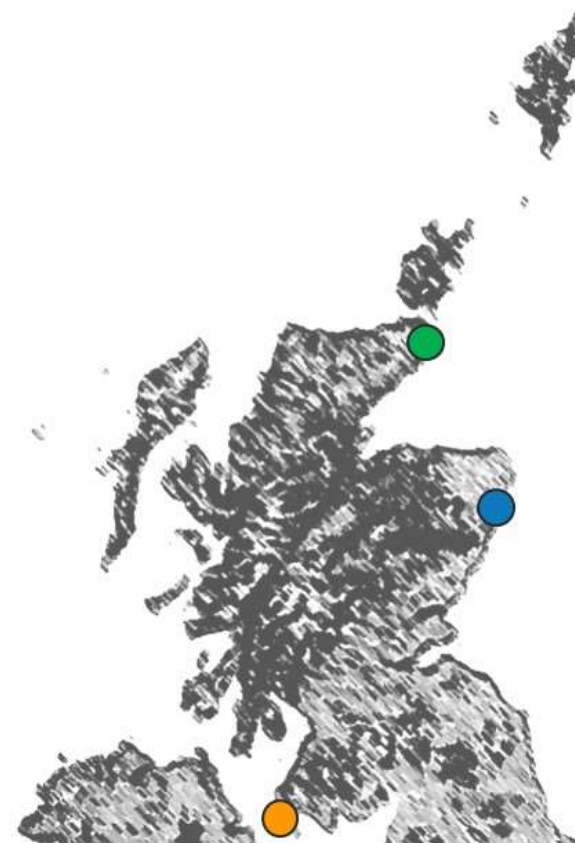
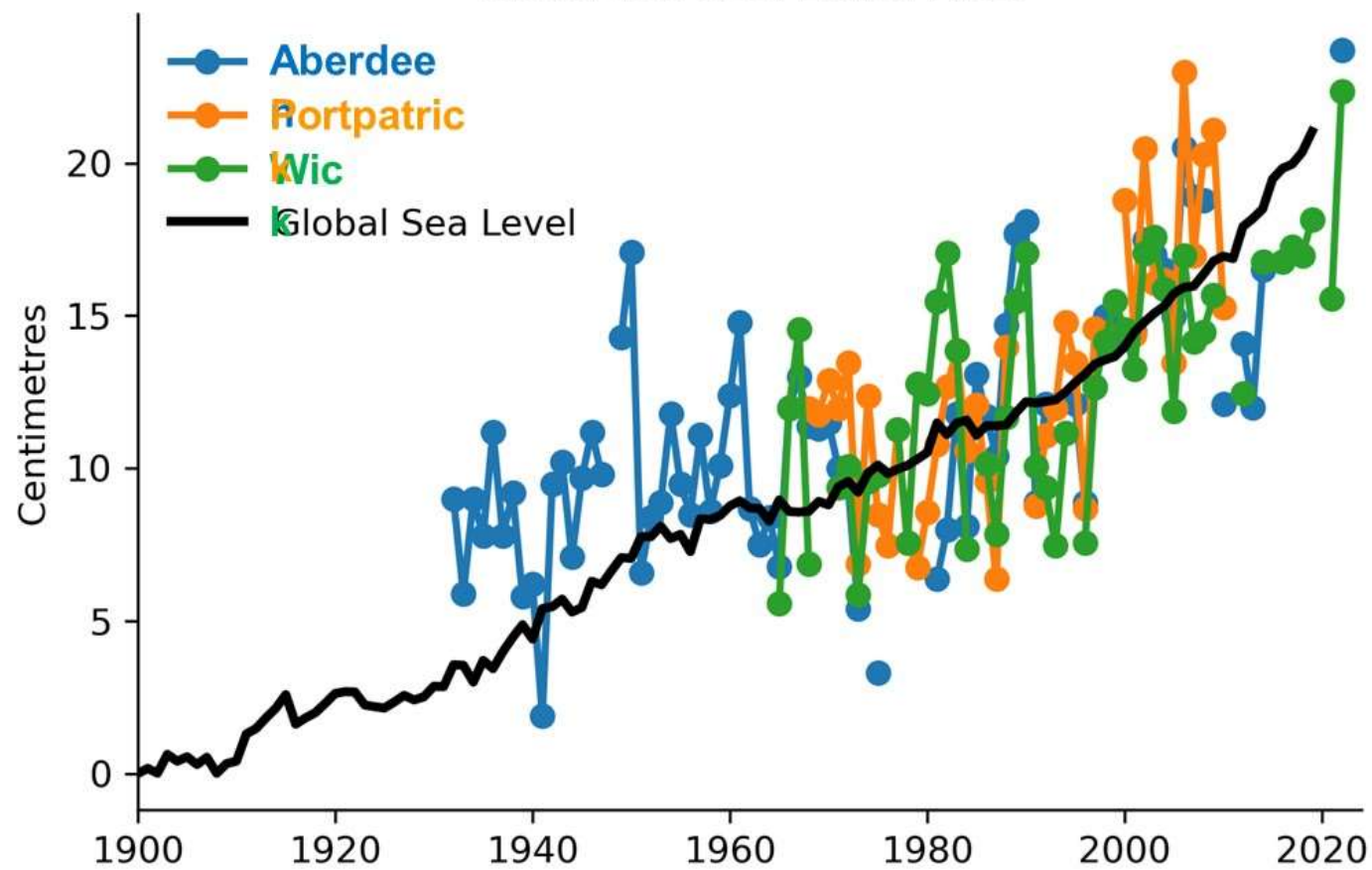
Scotland's Flood Resilience Conference

28-29 January 2025



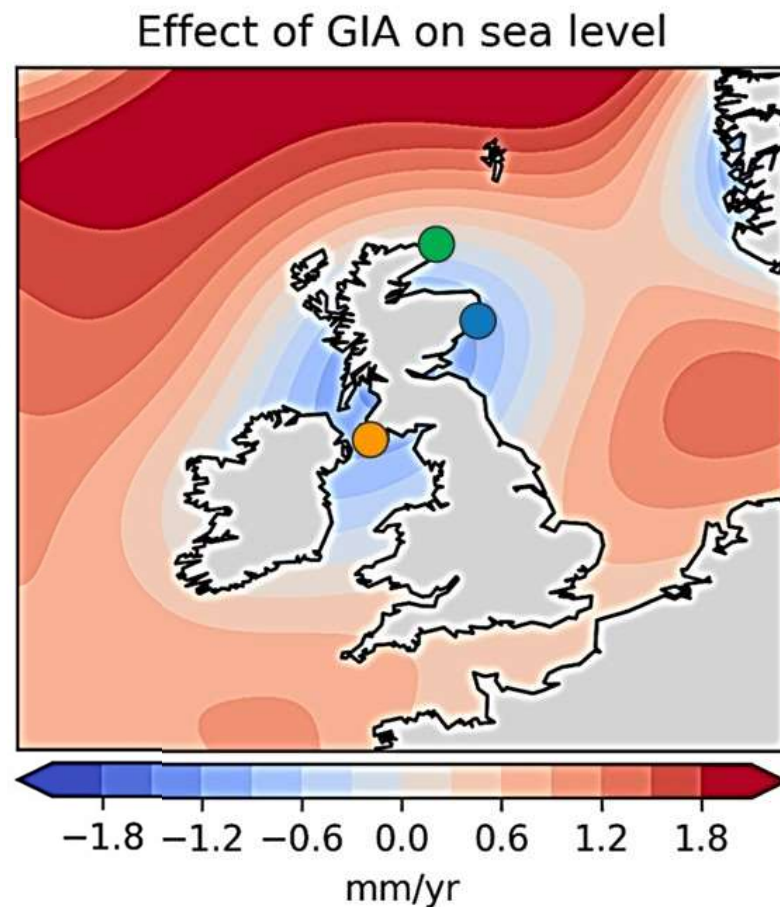
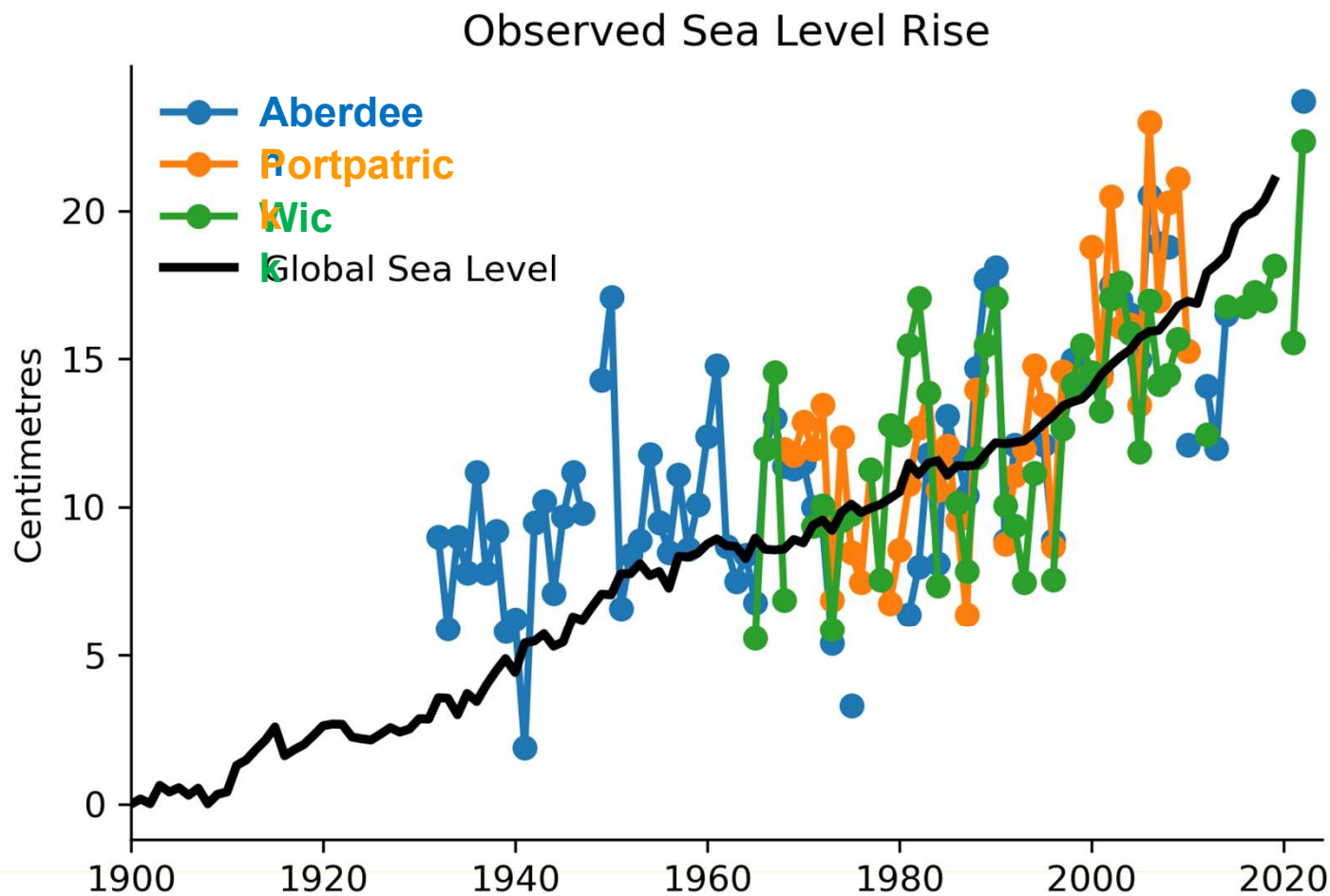


## Observed Sea Level Rise



Data sources: IPCC AR6; psmsl.org



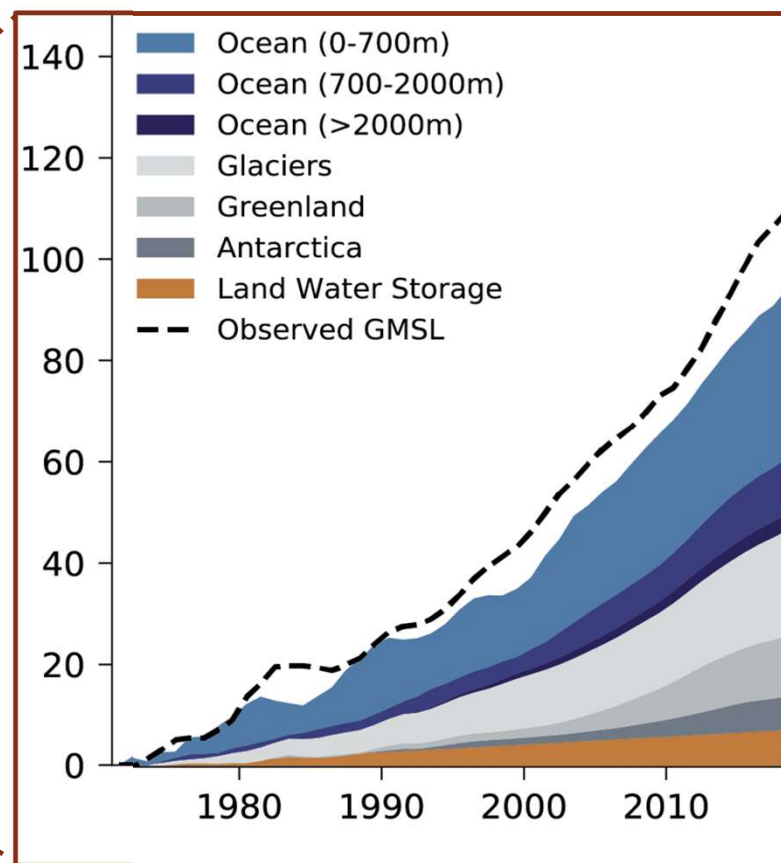
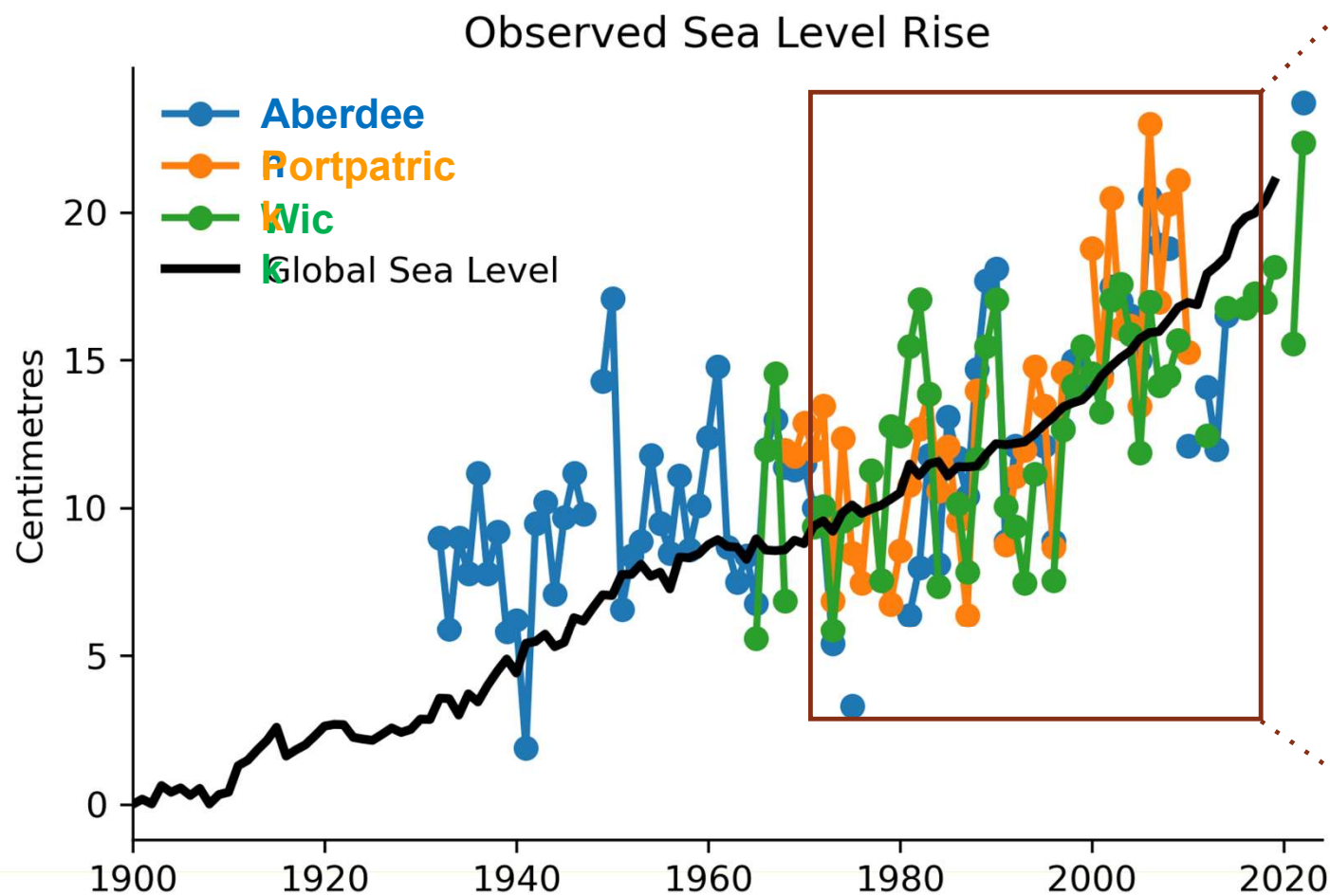


**Glacial Isostatic Adjustment**

a.k.a. "post-glacial rebound"

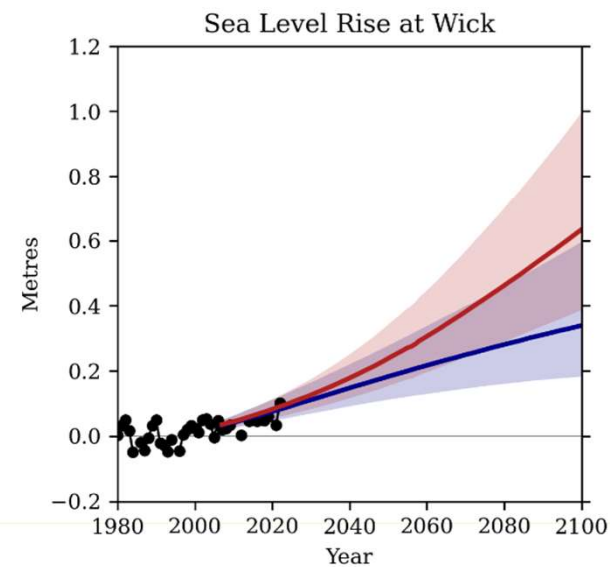
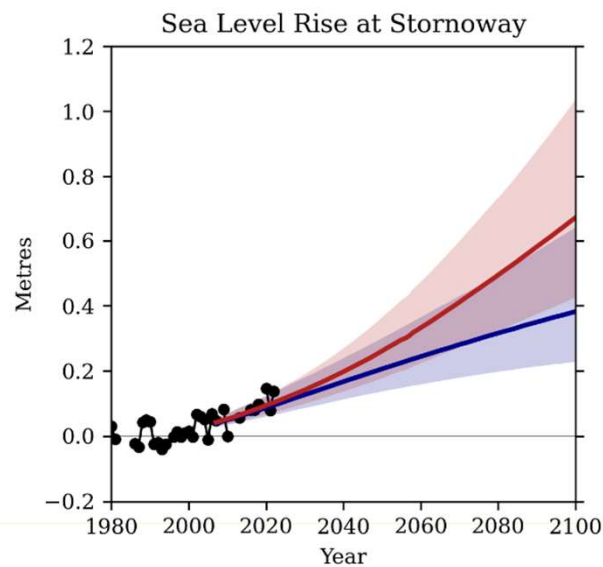
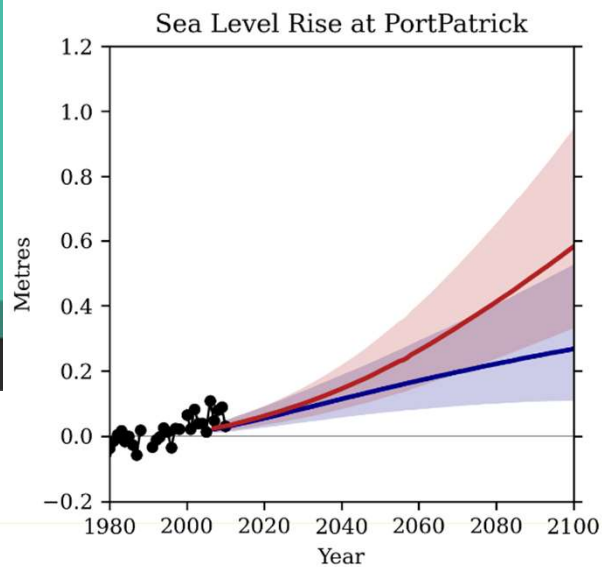
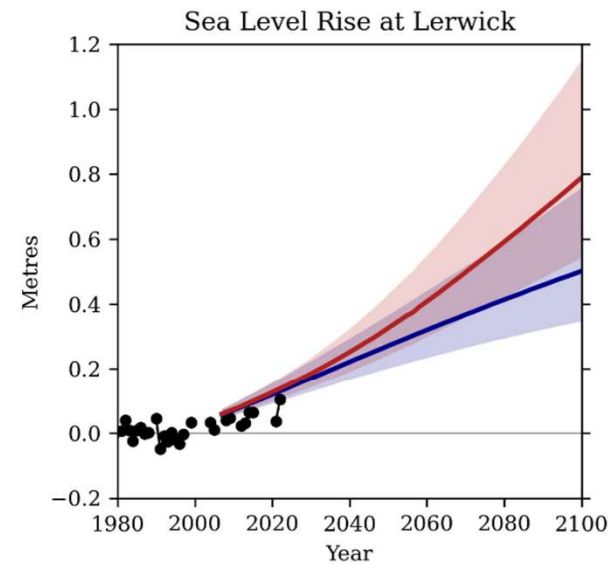
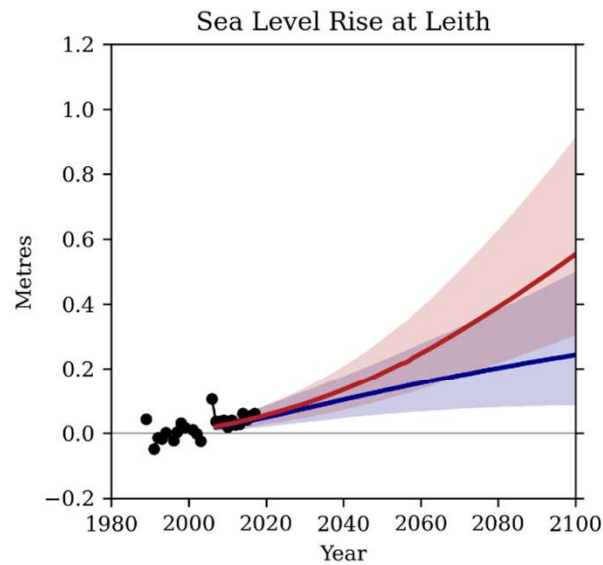
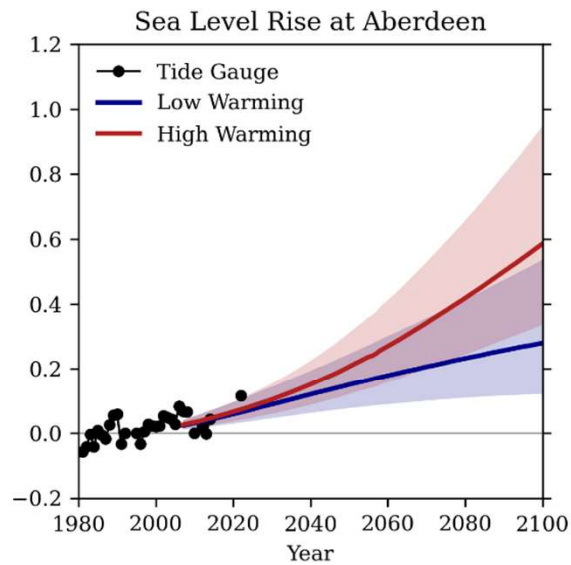
Data sources: IPCC AR6; psmsl.org; UKCP18







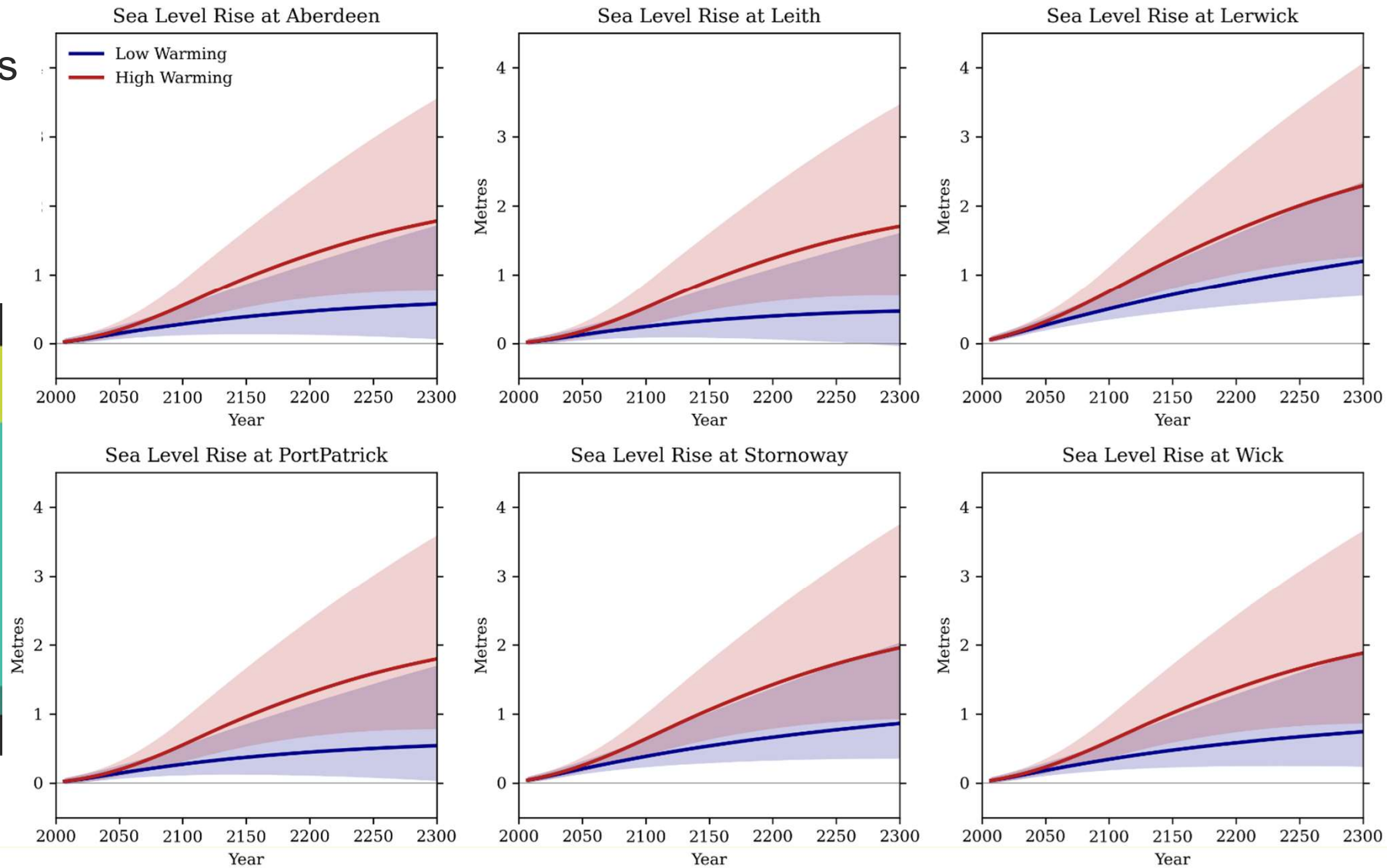
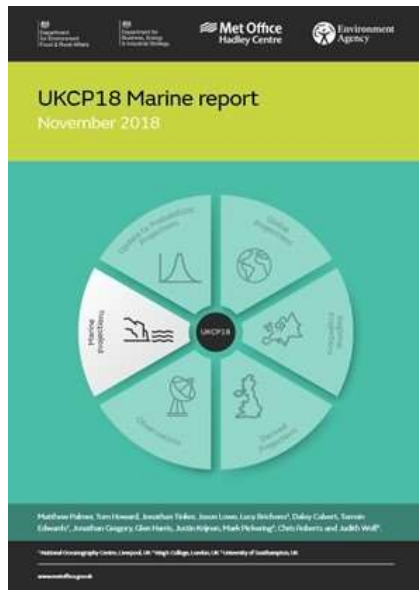
# UKCP18 sea level projections for coastal locations to 2100



Data source: UKCP18; Palmer et al (2018)



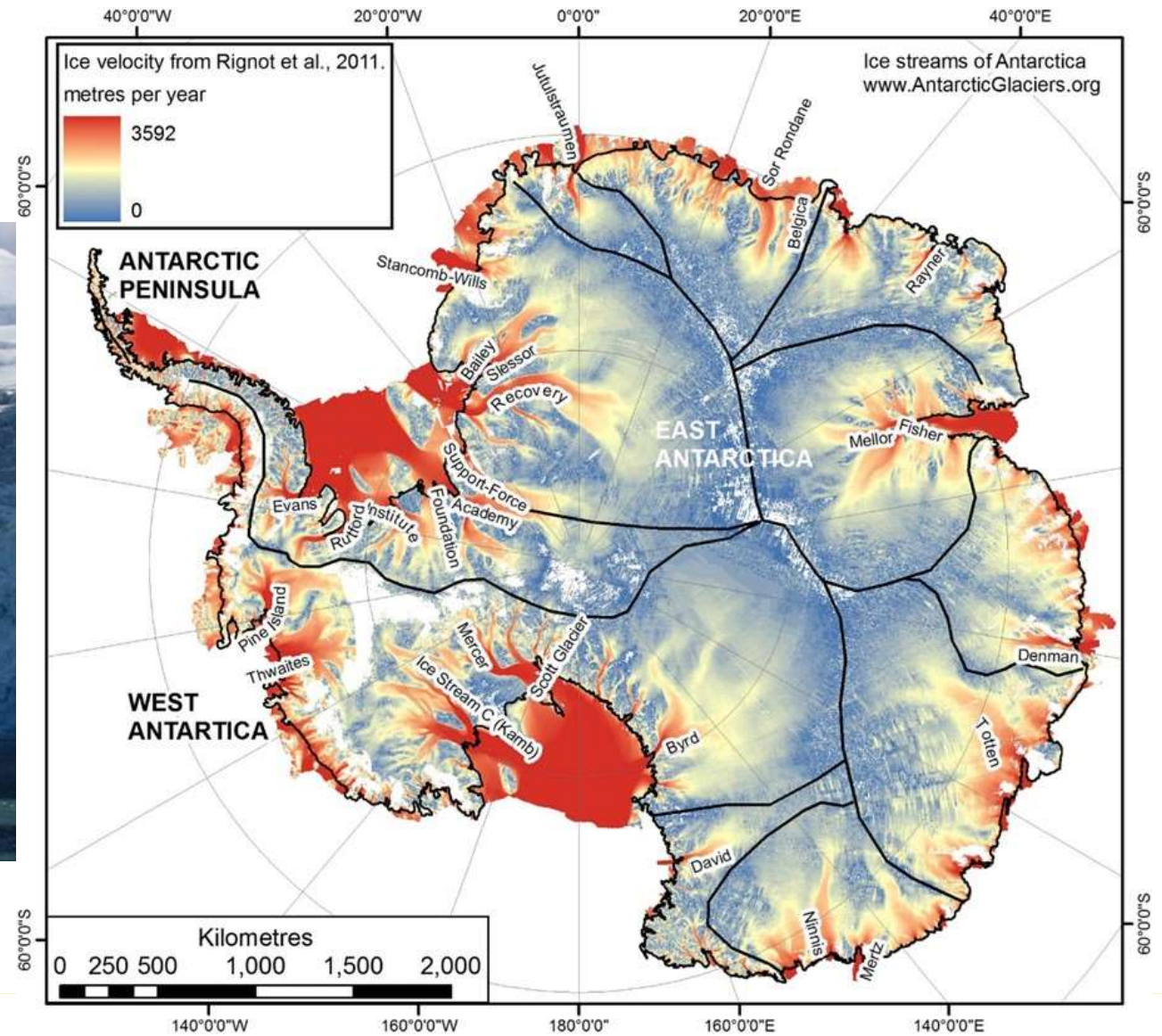
# UKCP18 sea level projections for coastal locations to 2300



Data source: UKCP18; Palmer et al (2018)



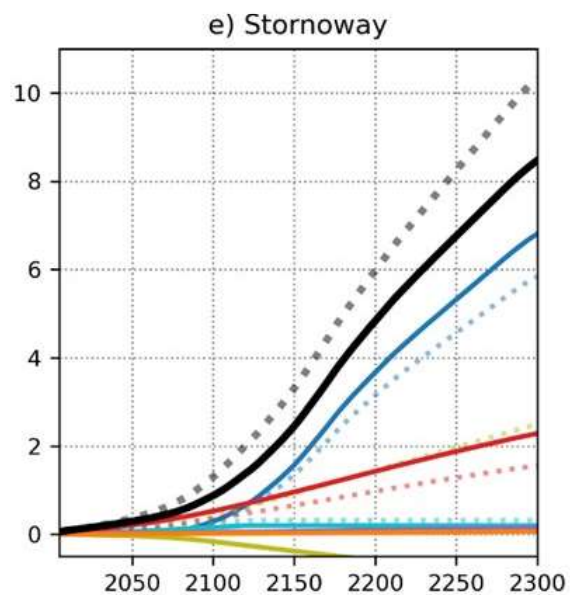
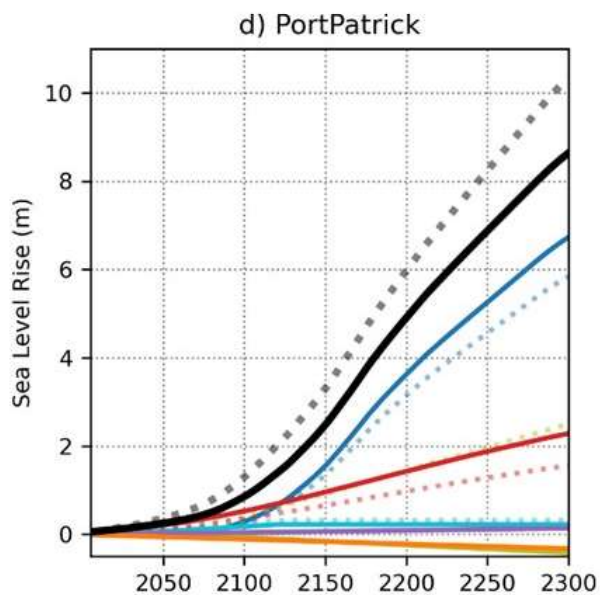
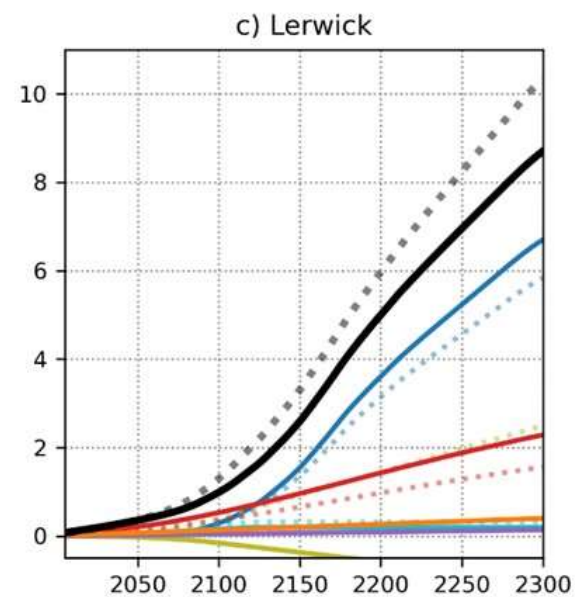
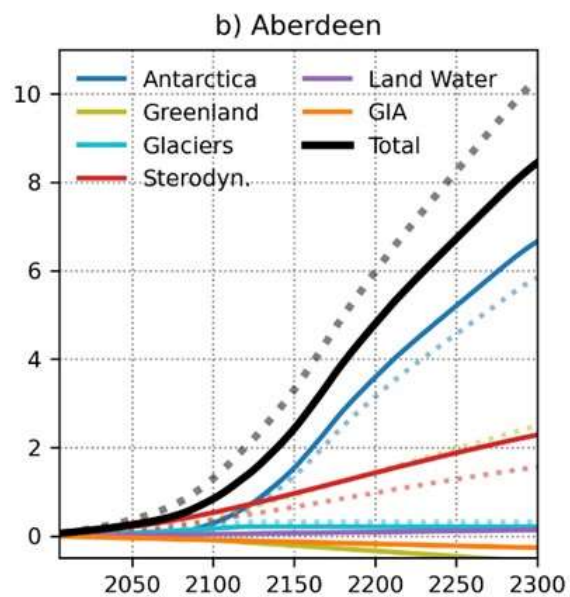
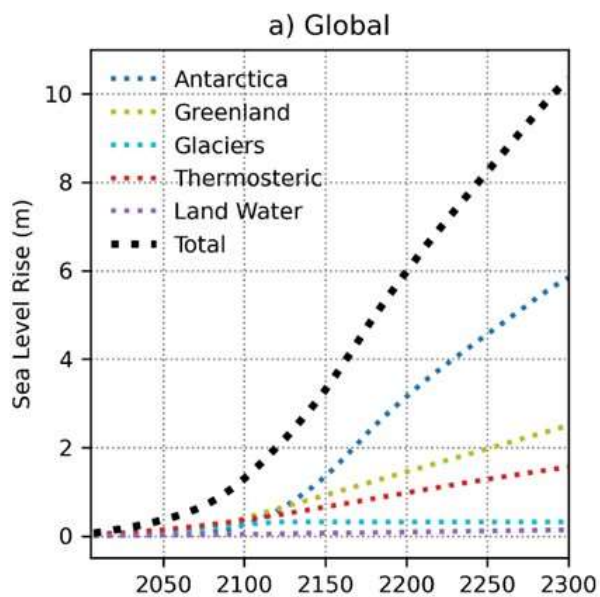
## Key uncertainty: Antarctica







High Impact  
Low  
Likelihood  
scenario (H1)



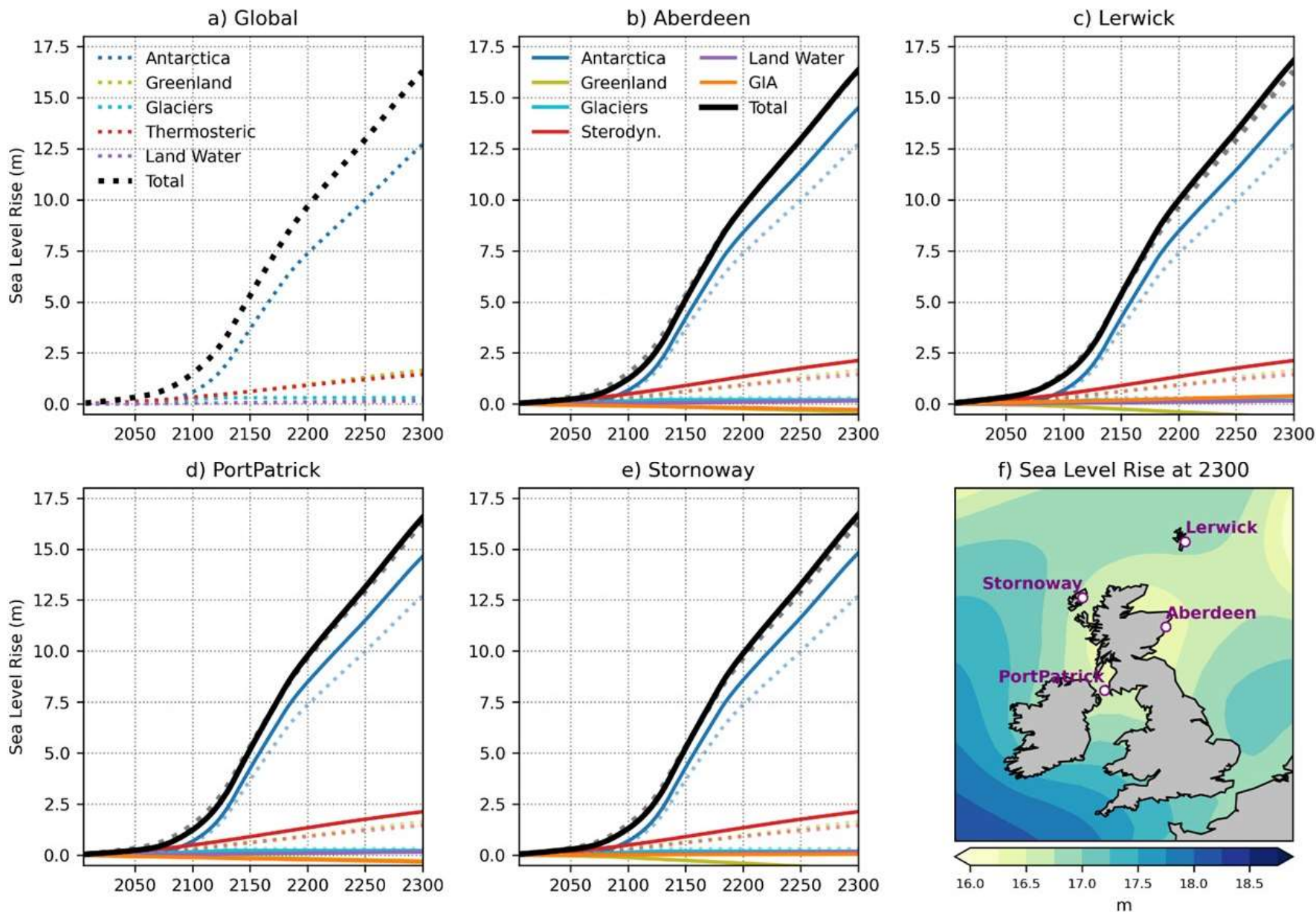
Data sources:  
Palmer et al (2024);  
van de Wal et al (2022)





High Impact  
Low  
Likelihood  
scenario (H2)

Data sources:  
Palmer et al (2024);  
IPCC AR6





## Summary:

- Global sea level has risen by about 20 cm since 1900 – this underlying trend is also seen in tide gauge records in Scotland
- Much of the Scottish coast experiences upward vertical land motion (associated with GIA), which acts to reduce the rate of sea-level rise
- Sea level will continue to rise for centuries => important to consider multi-century time horizons in adaptation planning
- UKCP18 sea level projections for Scotland show 0-2 m of rise under a low warming scenario and 1-4 m of rise under a high warming scenario by 2300
- Under High Impact Low Likelihood (HILL) scenarios we could see many metres of sea level rise post-2100
- Important to monitor sea level rise processes and develop early warning systems for HILL outcomes



# Questions..?



# Coastal Erosion Reporter

Tuesday 28<sup>th</sup> January 2025

10 mins

DynamicCoast.com

Alistair.Rennie@nature.scot

DynamicCoast@nature.scot

@DynamicCoasts



# Why undertake this work?

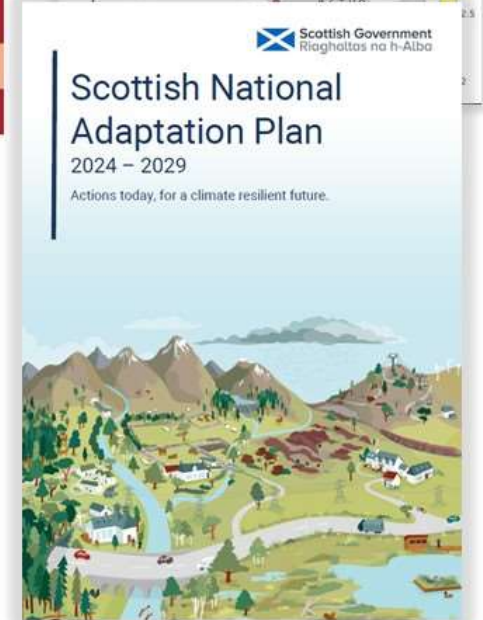
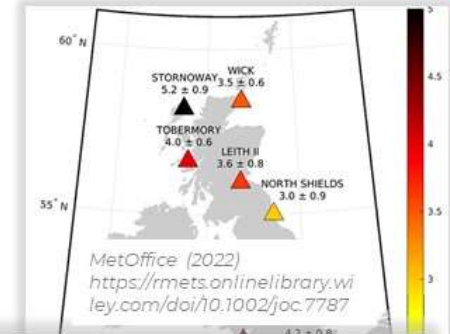
## Science and Policy context:

- **Climate change continues/worsens:**
  - Atmospheric temps (2024 highest on record), Ocean temps, Sea level rise etc
  - Increasing frequency of coastal floods & expected to underpin increased erosion.
- **SNAP3 risks need to be better appraised:**
  - Coastal Communities (C6): Planning (CCAPs), CCA Fund, Maps (DynamicCoast & SEPA) & NBS
  - Monitoring: Explore improvements to storm & Flood Forecasts, coastal change monitoring programme & *Storm Monitoring*
- **Lessons need to be learnt:**
  - Rick Haynes presentation at FRM 2024 ... are we learning from past events, realising the scale of issue before it is too late?



Key temperature statistics for 2024

Region	Anomaly (vs 1991-2020)	Actual temperature	Rank (out of 85 years)
Globe	<b>+0.72°C</b> (+1.60°C vs pre-industrial)	15.10°C	<b>1st highest</b> 2nd - 2023
Europe	<b>+1.47°C</b>	10.69°C	<b>1st highest</b> 2nd - 2023
Arctic	<b>+1.34°C</b>	-11.37°C	<b>4th highest</b> 1st - 2016
Extra-polar ocean	<b>+0.51°C</b>	20.87°C	<b>1st highest</b> 2nd - 2023





# Coastal Erosion Reporter

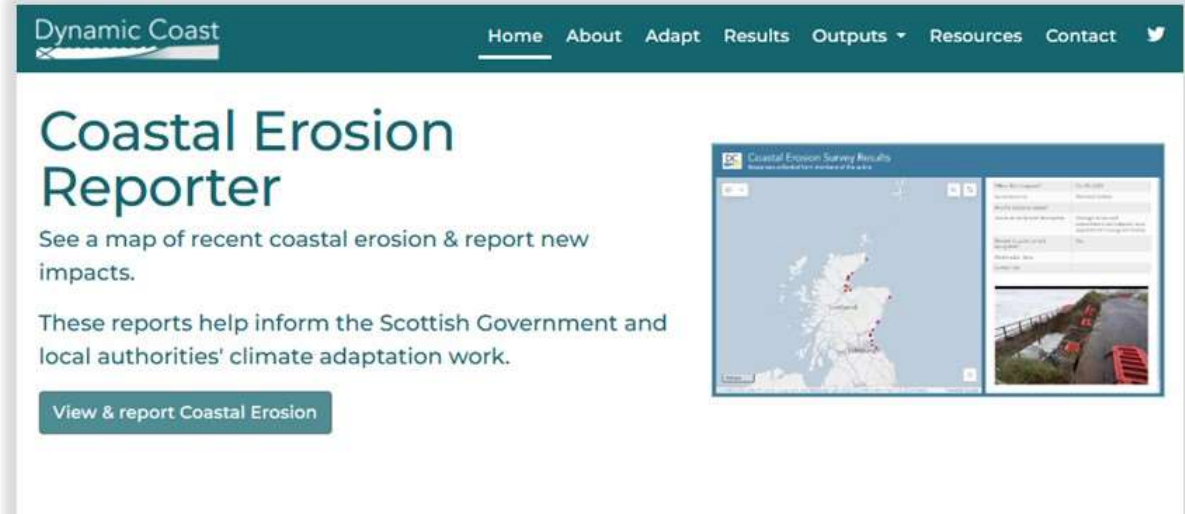
- SNAP3:

*“Storm Monitoring – The Scottish Government will consider the case for establishing a storm impact monitoring programme at the coast allowing the impacts to be quantified to allow for better information to plan for storm events.”*

- Dynamic Coast’s Erosion Reporter support this.

- Colleagues at NatureScot have helped develop a simple online form allows anyone to report and view coastal erosion events.

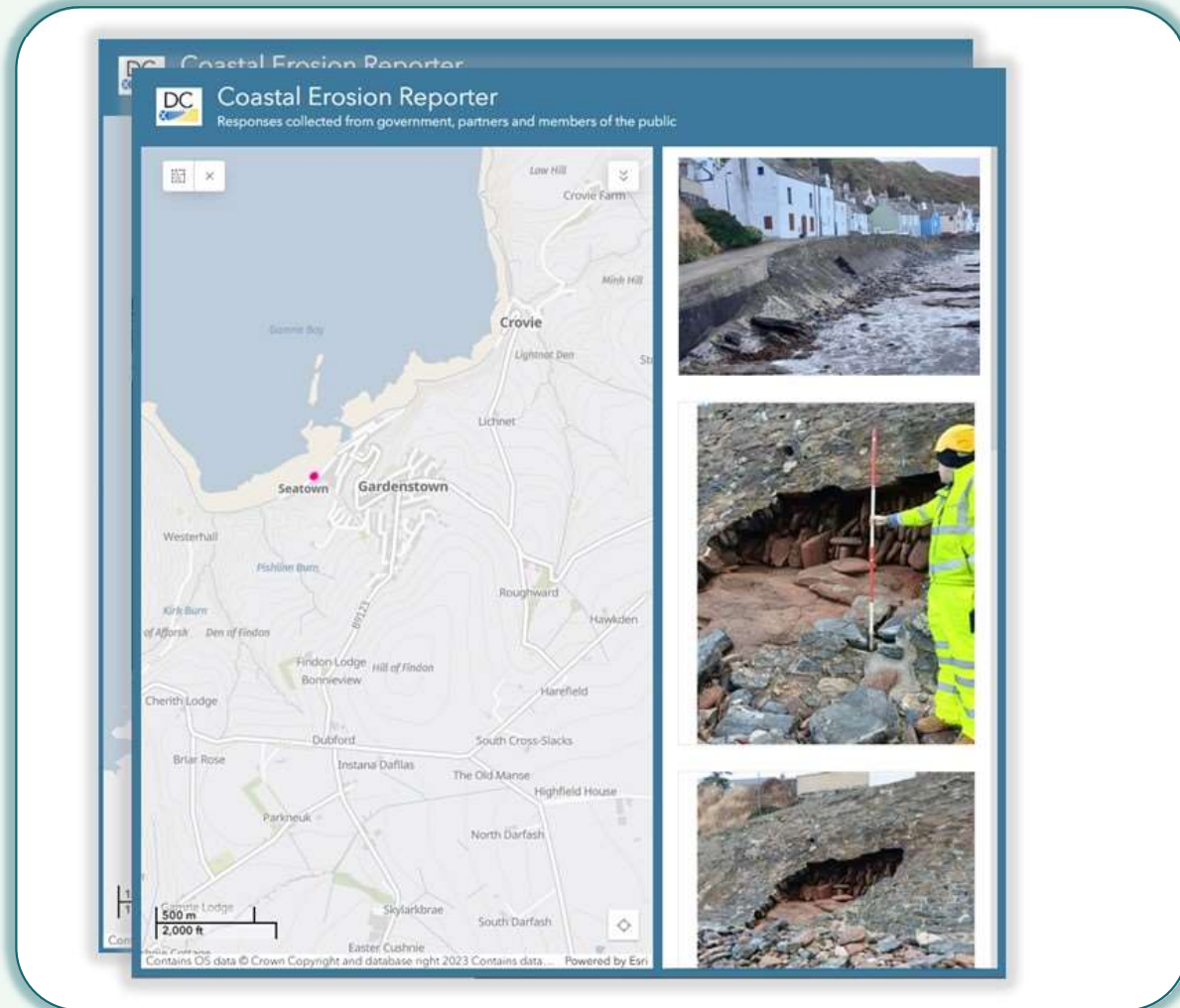
- Visit [DynamicCoast.com](https://dynamiccoast.com) & click on ‘View and report Coastal Erosion’





# How to view reported erosion events

- Initial map shows reported events.
  - Red points/lines recent (< 6 months)
  - Pink points/lines older (> 6 months)
- Zoom to locations, click on them to find out more info (date, description, links and pictures).





# How to report erosion events

- *If the event isn't listed ...*
- Refresh & click 'report it by clicking here'
- Read & answer as many boxes as you can.
- Use the pen to map extent of erosion (to the best of your knowledge)
- Upload pictures (avoid recognisable people) & insert multimedia links etc
- Tick the consent box & Submit.
- Reporting can take 1 min per location.
- QA check ensures it is a legitimate report. Data is then published.

The screenshot shows the 'Report Coastal Erosion' form. On the left is a map of Scotland with a location pin. The form fields include:

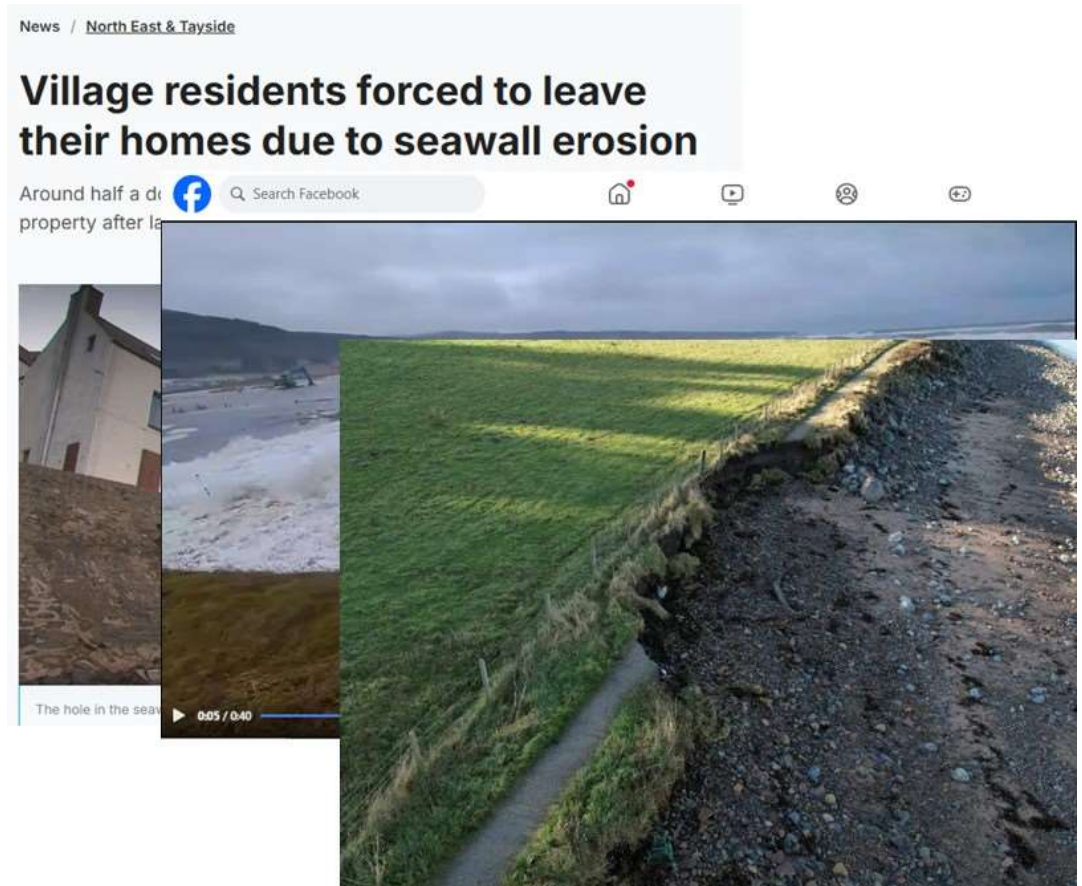
- Location:** A map view with a location pin and a 'Find' button.
- Photo(s):** A section for uploading photos, with a note: 'Upload photos. But don't include any of people unless they have provided consent.' It includes a text box for a caption and a '1000' character limit indicator.
- Multimedia - links:** A section for social media links, with a note: 'Has this been noted on social media? if so, please save hyperlinks in here.' It includes a text box and a '1000' character limit indicator.
- Further info:** A section for additional information, with a note: 'Insert additional info here. Does your organisation have further information which could help?'. It includes a text box and a '1000' character limit indicator.
- Data consent\*:** A section for data consent, with a note: 'By ticking this box, I consent for my data to be used by the Scottish Government, agencies and partners to inform coastal change and related flood risk management activities.' It includes a radio button labeled 'Tick to confirm'.
- Submit:** A green button at the bottom right.



# How to report erosion events

- Interesting examples include:

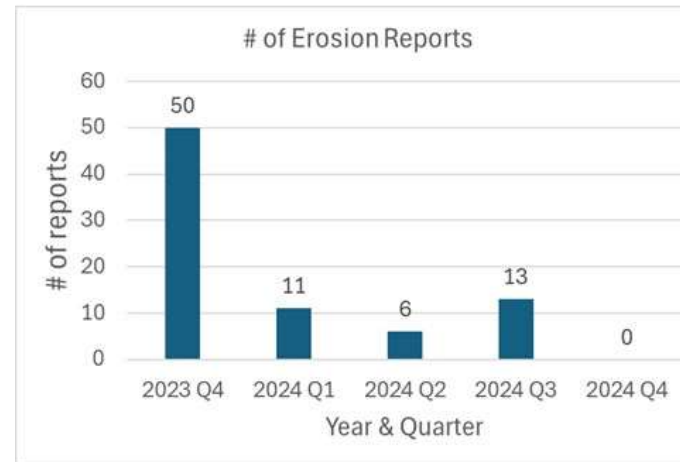
- Publicising formal reports. Eg Aberdeenshire Council Seatown/Gardenstown
- TV news coverage. Eg Aberdeenshire Council Seatown/Gardenstown
- Facebook videos. Eg Golspie Feb 2024. ©Cathy Spearing
- Drone footage. Eg Cromarty Oct 2023. ©Philip Waite



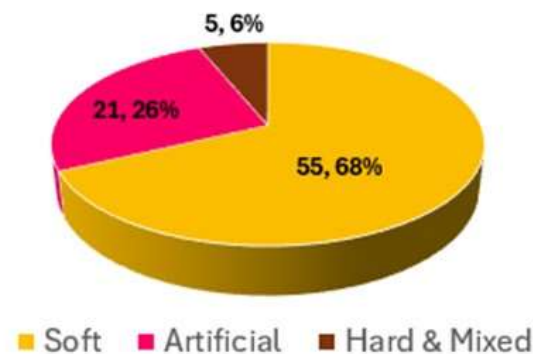


# Results to date

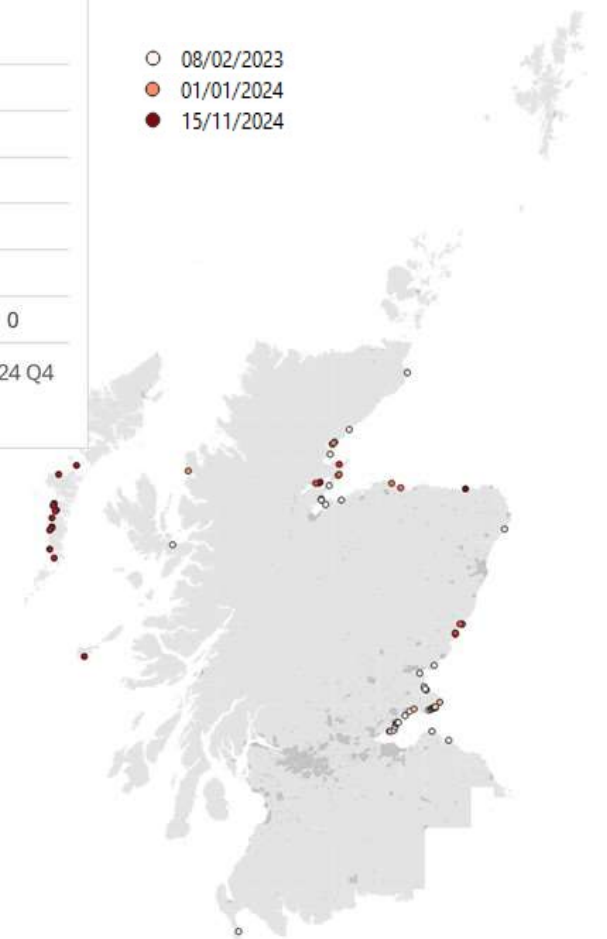
- 81 separate reports, submitted by ca 20 individuals in the 14 months since Oct 2023.
- Winter 2023-24 included 11 named (several unnamed) storms and 50 separate impacts reported.
- Publicised on Knowledge Hub (6<sup>th</sup> Dec), so hopefully reporting will increase.
- Of the 81 reports:
  - 55 on soft shores (67% ... 2/3)
  - 21 on artificial shores (26% ... 1/4)
  - 5 on hard & mixed shores (6%)



Erosion Reports on different coastal types



○ 08/02/2023  
● 01/01/2024  
● 15/11/2024





# Next steps

- Please do report erosion and encourage others to too!
- This helps the Scottish Government, local authorities and wider partners appreciate storm impacts and coastal erosion.
- This fits within our wider Coastal Change Adaptation work, coastal monitoring and adaptation actions.
- Happy to take questions
- Get in contact via [DynamicCoast@nature.scot](mailto:DynamicCoast@nature.scot)



**THANK  
YOU**



# Sea Level Rise, “What does it mean for me?”

**Aoife Williams & Steve McFarland**

January 2025





**Eg, take SEPA coastal flood warning service.**

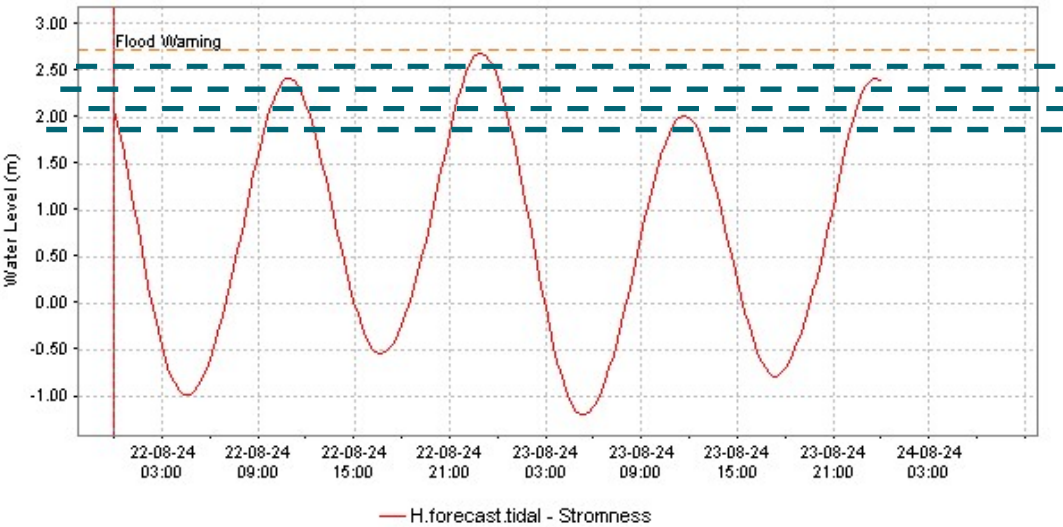
Over 15 months between spring 2023 and summer 2024, we had 193 exceedances of coastal flood warning thresholds for still water level.

***If sea levels are higher (and the same weather occurred), how many more exceedances might we be expecting?***



# Method

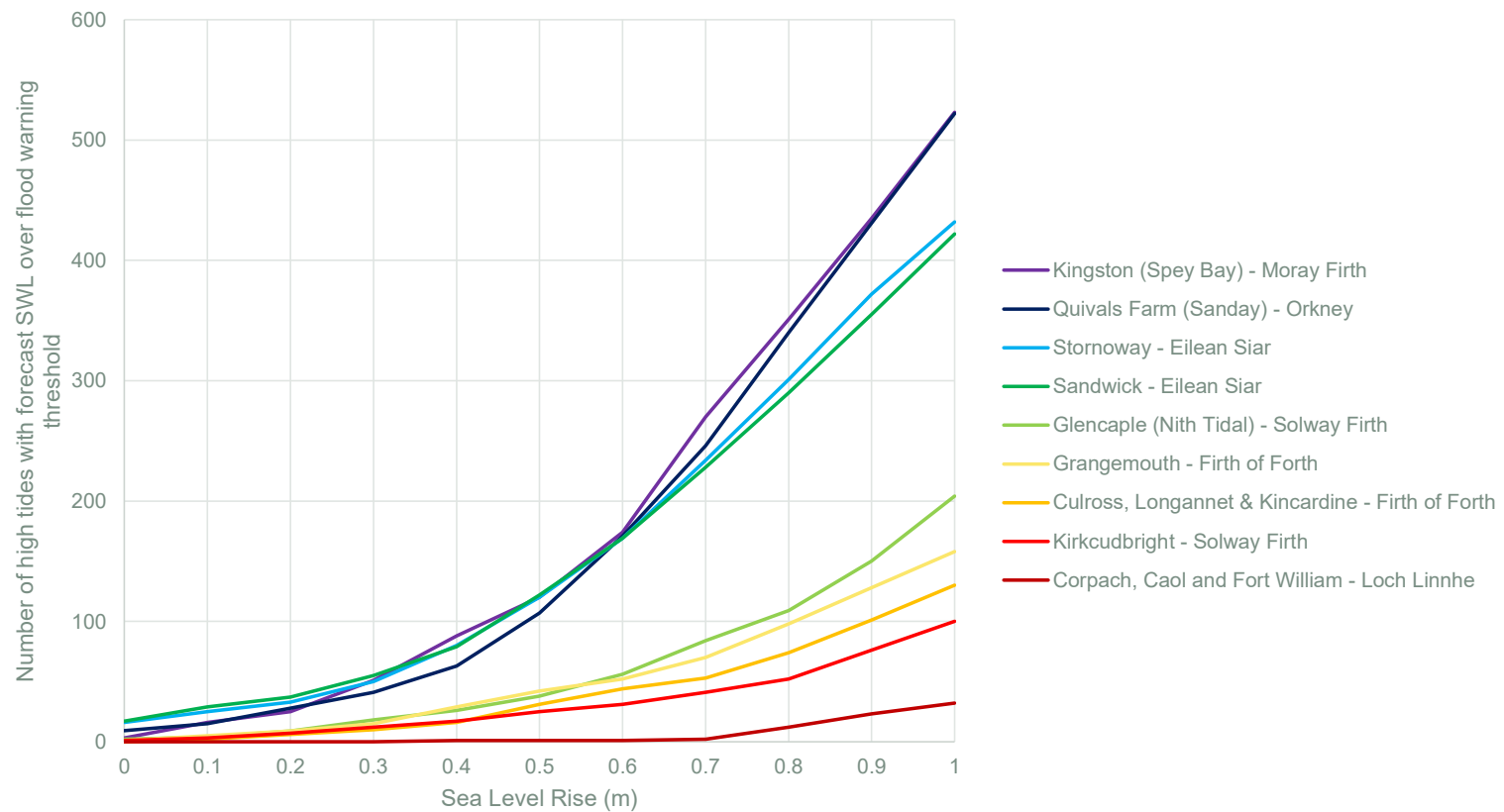
- SEPA’s FEWS produces four deterministic still water level forecasts per day
- Forecasts archived for each forecast point
- Based on forecast data, **not** observed data
- Period of ~15 months (~900 high tides): April 2023-July 2024.
- Calculated number of high tides over flood warning threshold
- 0.1m subtracted from threshold, same analysis carried out – up to 1.0m of sea level rise.



SLR from current year	Aberdeen (Esplanade)	Aberdeen (Promenade)	Airth	Alloa	Annan	Anstruther to West Elie	Ardersier	Ardmore	Arran Lamash Cordon	Arran Seafront and Montrose Terrace	Avoch	Ayr Seafield	Baleshare Causeway	Baleshare	Balintore	Balloch
0	0	0	0	0	0	0	0	1	0	0	0	0	3	8	0	
0.1	0	0	0	1	1	0	0	3	0	0	1	0	4	20	0	
0.2	0	0	2	2	1	0	1	3	0	0	10	0	6	31	0	
0.3	0	0	9	9	1	0	11	10	0	0	18	0	19	43	0	
0.4	0	0	12	12	2	0	19	22	2	0	27	0	29	70	0	
0.5	0	0	31	27	3	0	30	30	6	0	43	0	41	123	0	
0.6	0	0	45	41	4	0	46	43	14	0	69	0	66	173	0	
0.7	0	0	57	52	7	0	73	67	26	0	99	0	116	225	0	
0.8	0	0	86	70	8	0	103	98	43	2	141	0	166	303	0	
0.9	0	0	116	98	9	2	145	144	70	5	191	0	223	366	0	
1	0	0	150	128	15	8	199	197	116	9	278	0	294	442	4	




## Results





## Results

All coastal flood warning locations – total number of high tides exceeding flood warning thresholds



SLR from current year	Across all current flood warning locations, across 15 months					Change (compared to base year)
	Min	Max	Mean	Median	Total	
-0.15	0	8	0	0	78	~0.4x
<b>0</b>	<b>0</b>	<b>17</b>	<b>1</b>	<b>0</b>	<b>193</b>	-
0.1	0	29	2	0	383	~2x
0.2	0	38	3	0	749	~4x
0.3	0	55	6	0	1388	~7x
0.4	0	88	11	2	2373	~12x
0.5	0	141	18	5	3886	~20x
0.6	0	217	28	11	6142	~30x
0.7	0	307	43	18	9350	~50x
0.8	0	409	63	29	13793	~70x
0.9	0	508	88	46	19171	~100x
1	0	601	119	75	26087	~135x

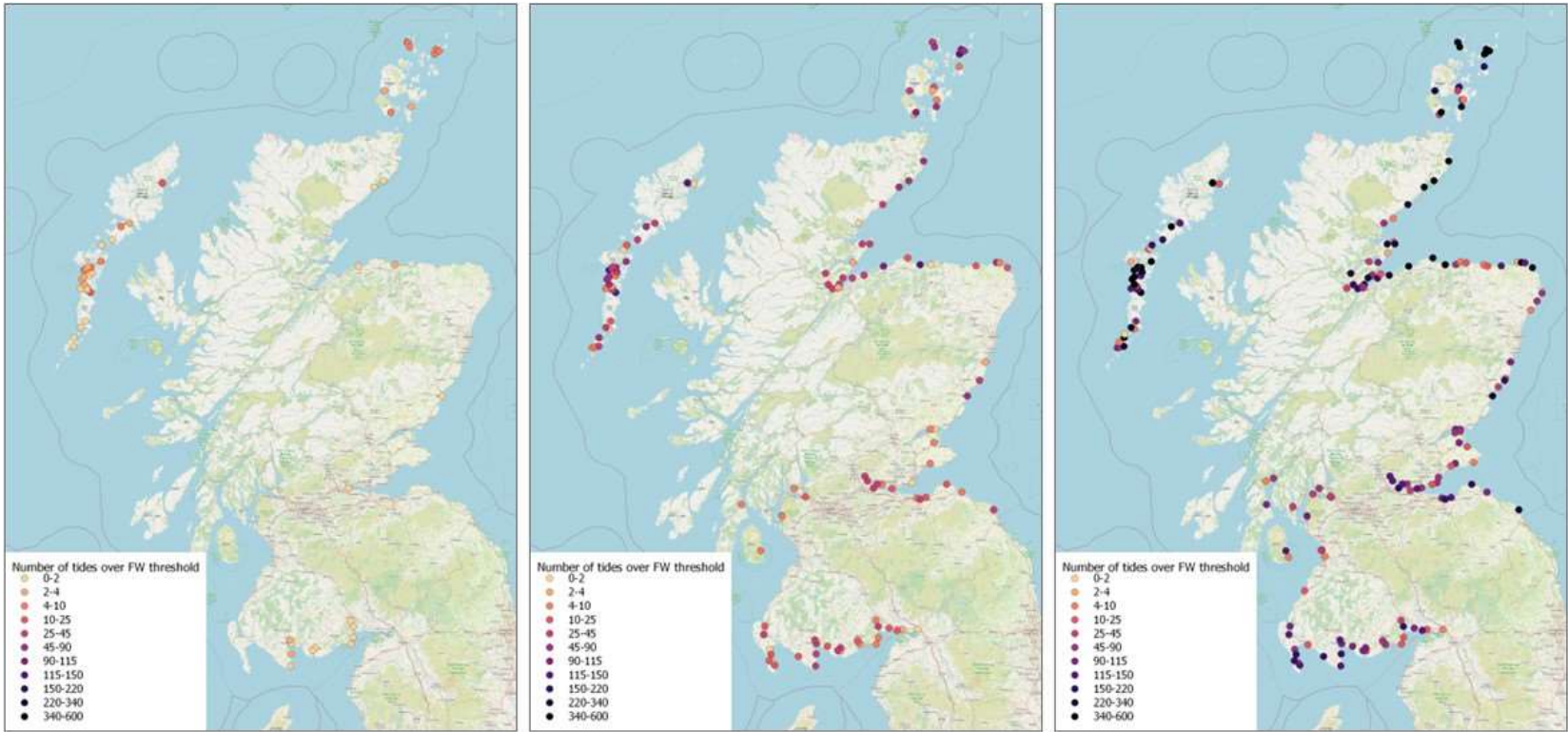


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Last year

Last year + 0.5m

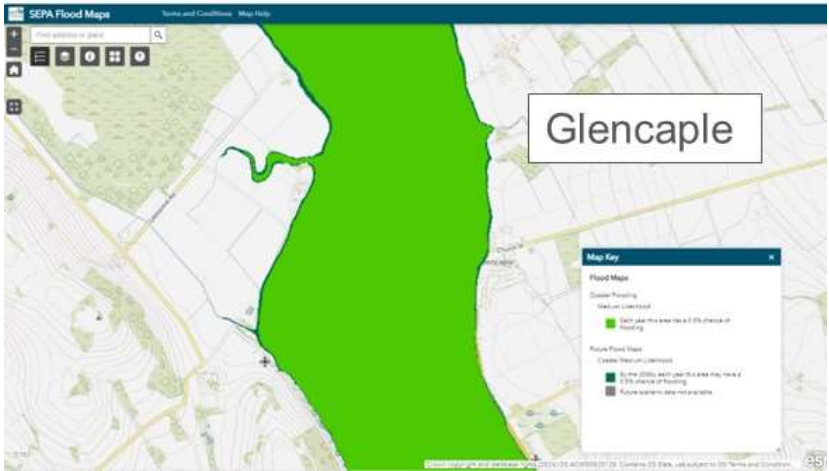
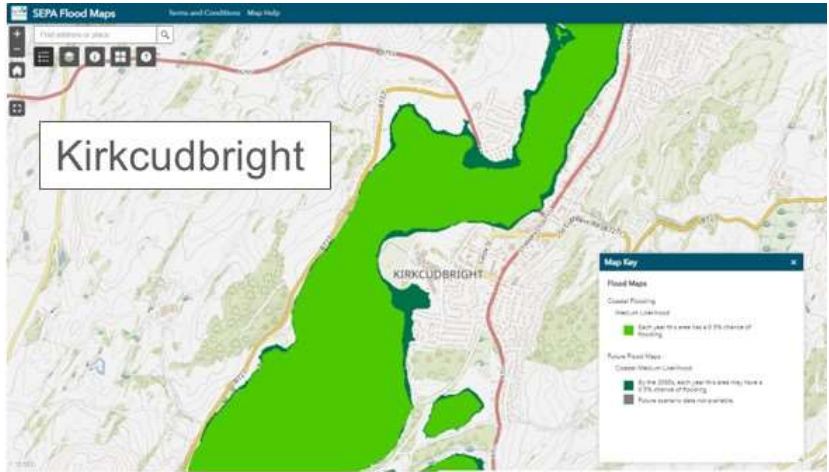
Last year + 1.0m



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# Sea level rise depicted on SEPA flood maps vs looking at frequency of flooding



SLR from current year	Occurrences of flooding	
	Kirkcudbright	Glencaple
0	1	2
0.1	3	4
0.2	7	9
0.3	12	18
0.4	17	26
0.5	25	38
0.6	31	56
0.7	41	84
0.8	53	109
0.9	76	151
1	100	205

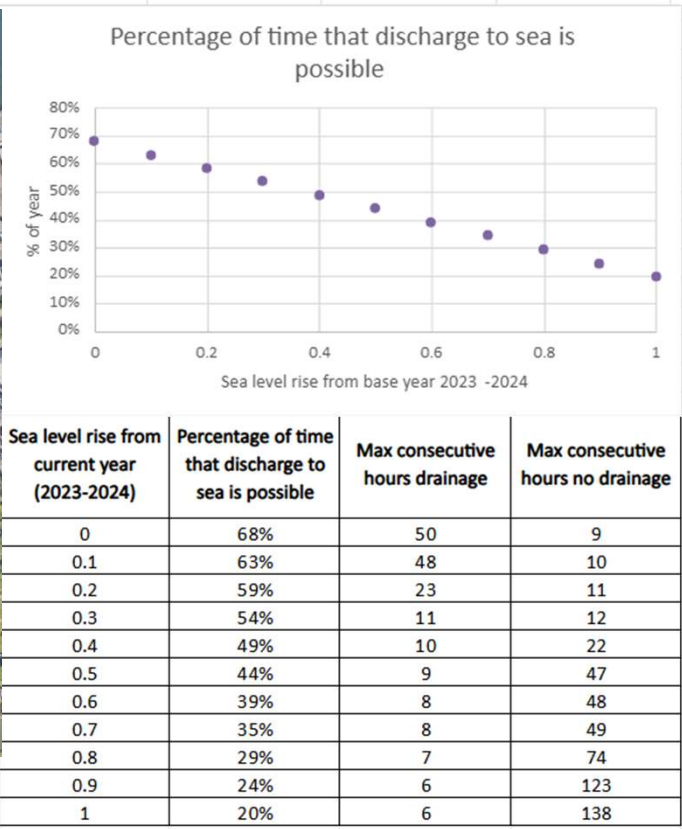
\*Numbers can indicate scale of increase but due to approximations used within method should not be interpreted as representative of actual future events



# What does sea level rise mean for surface water flood risk? Eg Kirkwall, Orkney Islands.



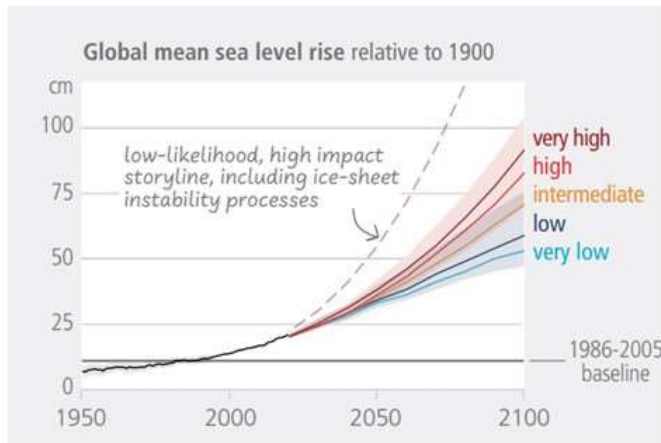
Orkney Islands Council



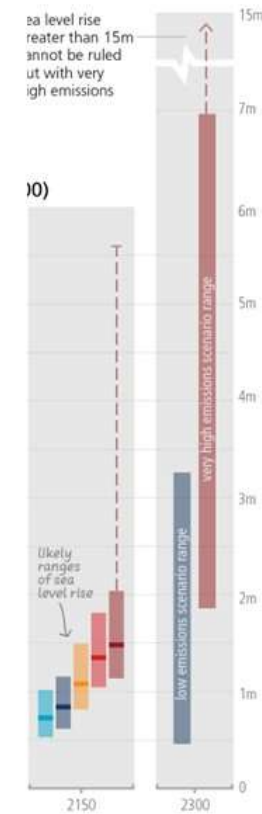
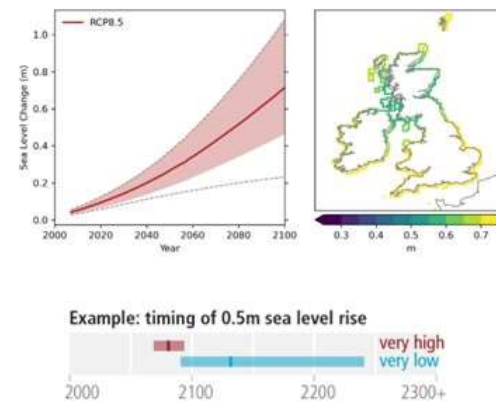


## Conclusion

- Its easy to get lost in the complexity of sea level rise scenarios and timescales that are available.
- Looking at how sea level might impact on something that relates to “me” can help to understand scale of change for fixed increments of sea level rise that are simple to understand.
- Can be beneficial for adaptation and resilience to have those “what if conversations” before linking them into timescales for that thing to happen.



Sources: IPCC 2023 Long Report, UKCP18 Marine Report Updated





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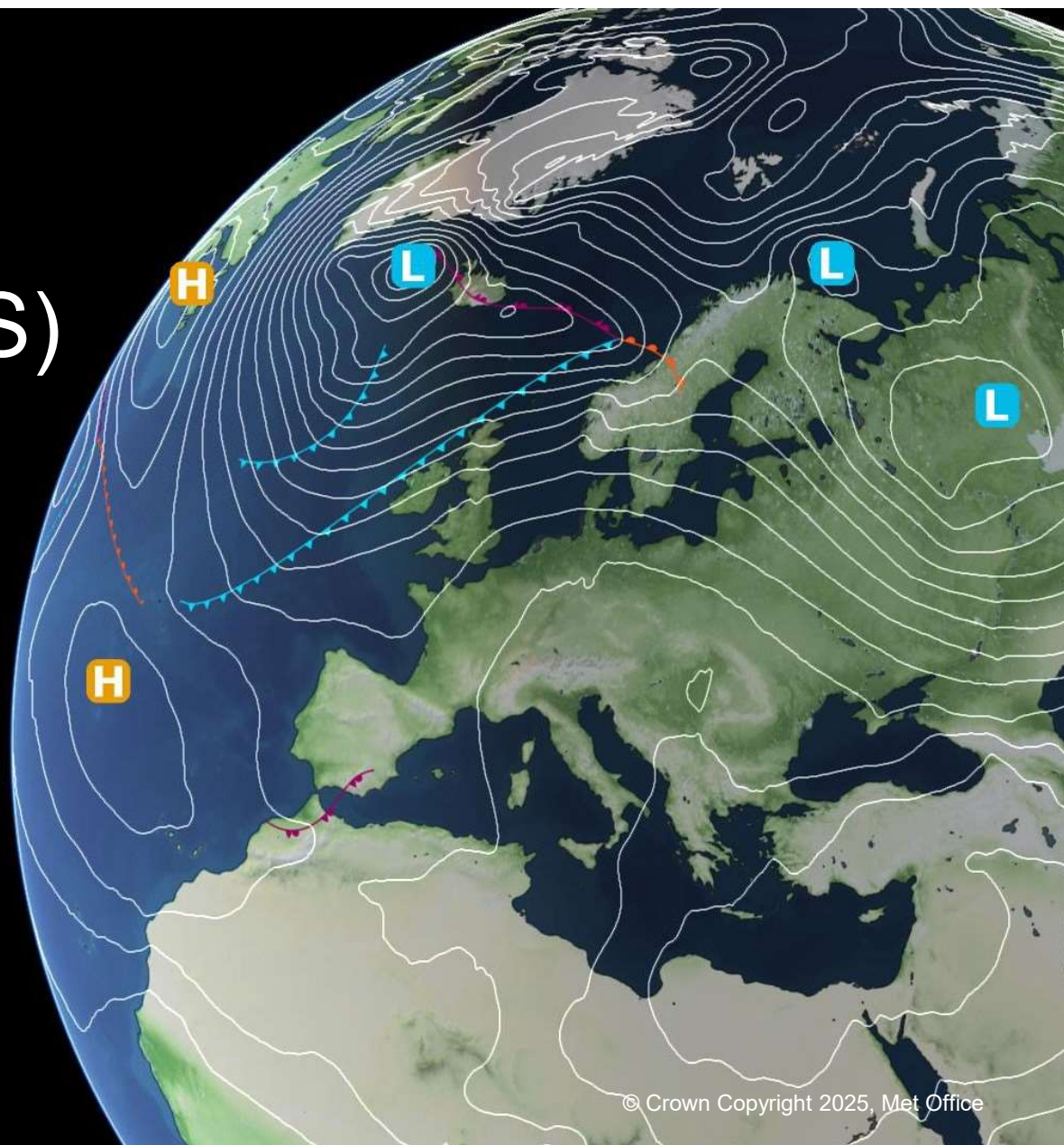


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# Local Authority Climate Service (LACS)

Project Team: Alex Woods, Tim Mitchell, Victoria Ramsey, Katie Hodge, Mike Sanderson, Catherine Marshall, Ant Veal, Mathew Richardson, Lizzie Fuller, Josh Macholl, Emily Wallace, Natalie Garrett, Carol McSweeney, James Pope, Jason Lowe, Melissa Welsh, Hayley Jones, and colleagues at Esri UK







A brand-new beta service for Local Authorities, providing climate information to inform adaptation decision-making in local areas.



- data for decision-making
- building awareness
- a training tool
- a basis to inform further climate-based work

<https://climatedataportal.metoffice.gov.uk/pages/lacs>



## Local Authority Climate Service

### (LACS) key features:

A climate explorer for accessing local climate information

A climate report summarising key results for your local area

Helpful online resources on the LACS and adaptation planning







## Awareness Raising



(Source: Milton Keynes Council)

“If I could say ‘this is going to happen’ and it is backed by science then I’d have a stronger case... get the powers that be to take things seriously”



## Identifying and justifying priority areas for focus



(Source: Sheffield City Council)

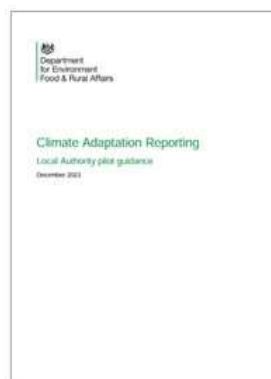


“It’s so massive. Almost too much information. It’s difficult to know where to start, or to know what’s good quality advice or information”





Collecting evidence for  
Local Plans and  
adaptation planning

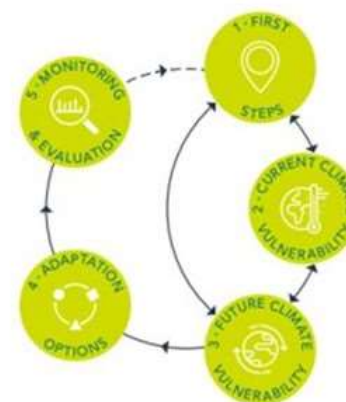


“Planning is a very evidence-based system. Creating a local plan takes years. Policy must be ‘sound’. Local Authorities don’t have the skills or knowhow to use [existing] publicly available information”



Turning evidence into  
action

## ADAPTATION TOOLKIT



“[Climate change is] only one issue”



# From City Packs to LACS





# Local Authority Climate Service

## Local Authority Community Site



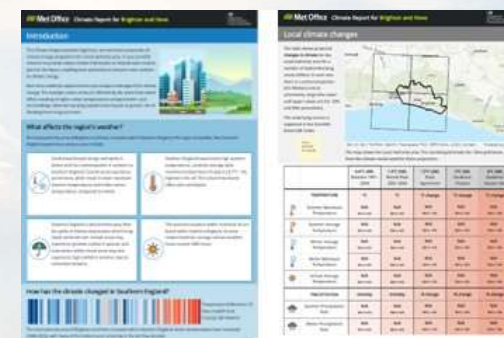
Helpful resources and further support for adaptation planning

## Local Authority Climate Explorer



Ready-to-use climate information for your local area

## Local Authority Climate Report



Summary of key results





# Local Authority Climate Service

Welcome to the Met Office's climate service for Local Authorities in the UK.

This site provides tools and resources that have been specifically designed for Local Authorities to help you better understand climate change in your local area and support your adaptation journey.

This information may be useful for others, not just Local Authorities. It is free and available for all. This is a Beta service and will be developed further.



[Explore the Climate of your Local Authority.](#)



[How to Assess your Climate Risk](#)



[How to Take Action](#)

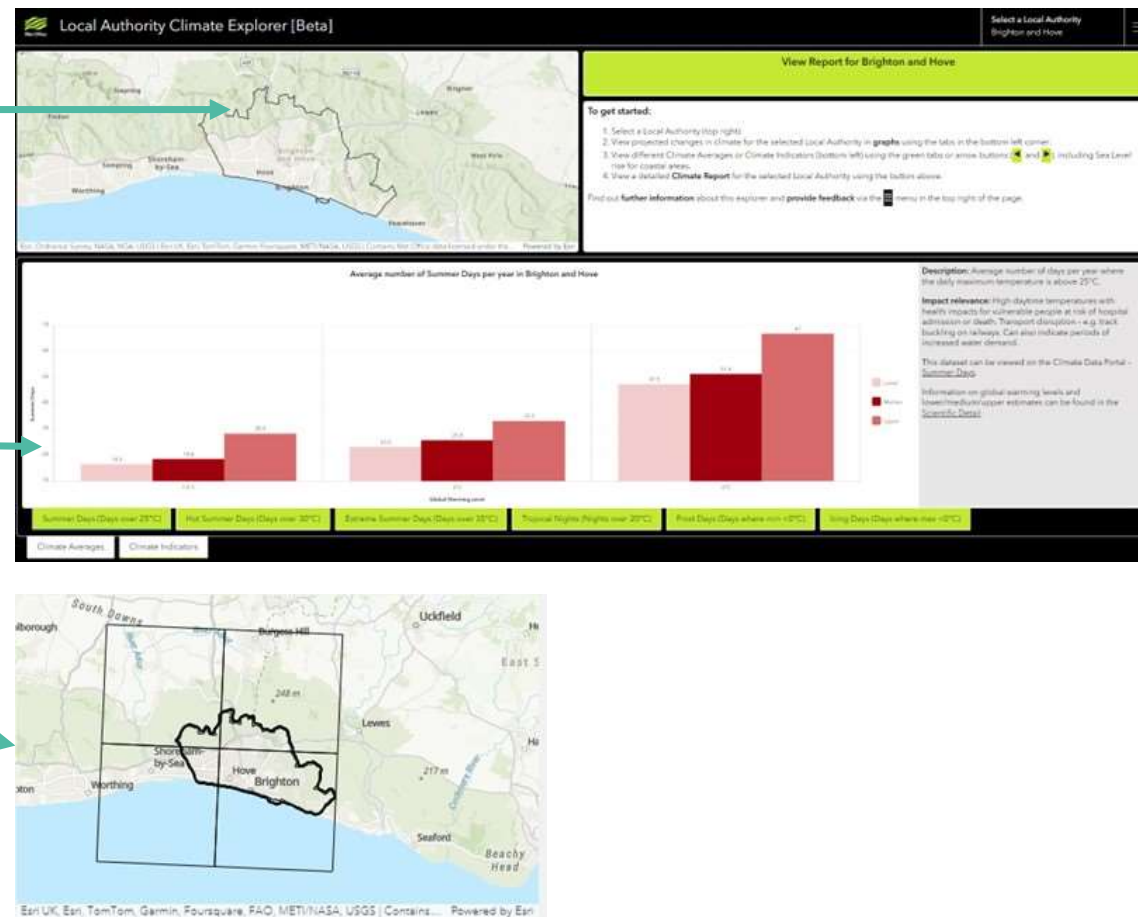


[FAQ and Version History.](#)



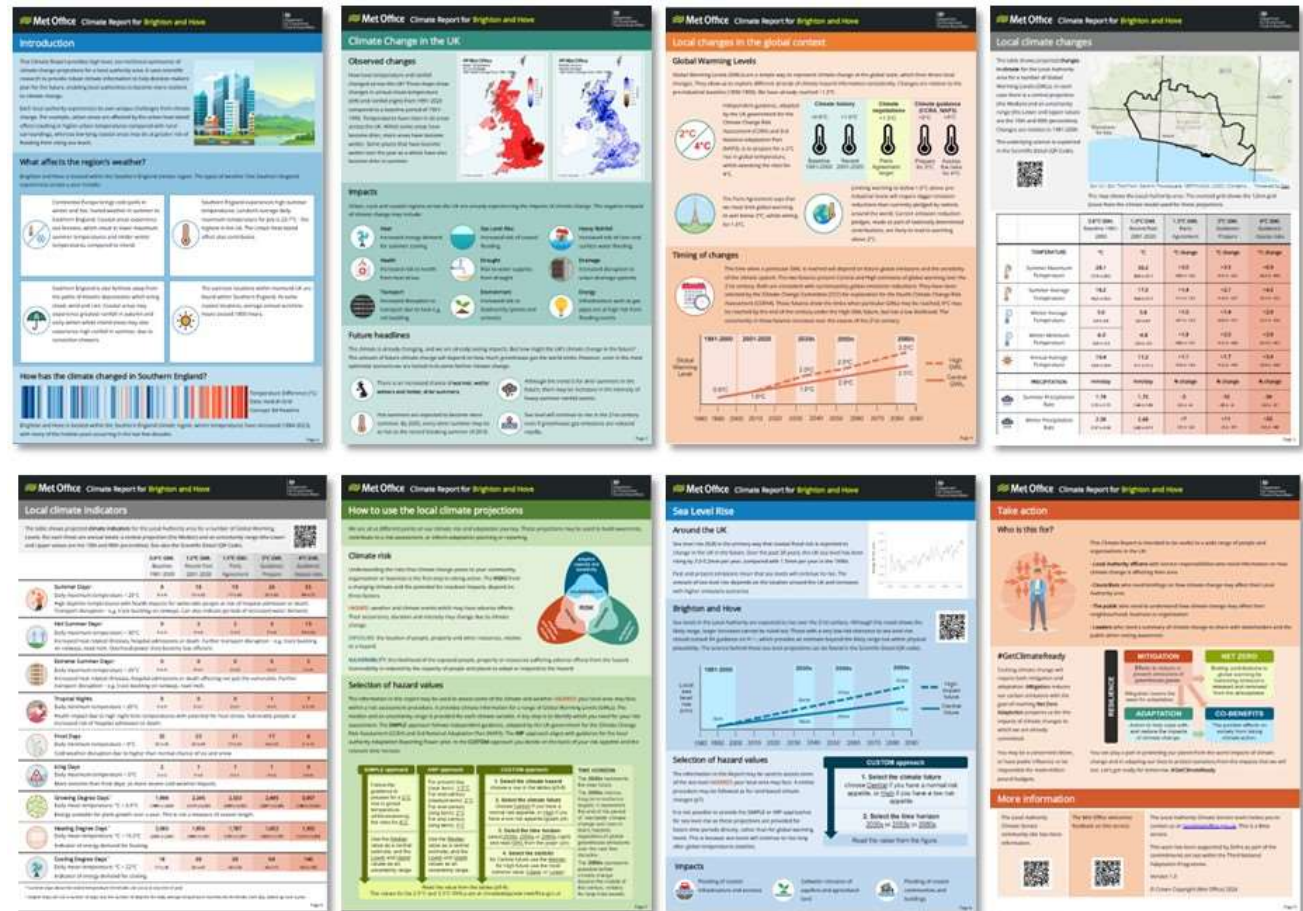
- Key climate variables calculated over your Local Authority area:
  - **Climate Averages:** e.g. summer average temperatures, winter rainfall, sea level rise.
  - **Impact relevant indicators:** e.g. Summer Days (Days over 25°C).
- Information presented for a range of global warming levels consistent with adaptation guidance.
- View data as a graph.
- Based on UKCP Regional (12km resolution) data.

\*Local authority level information will be available at launch. Sub-local authority level information will be provided in future iterations.





- Summarises data for the Local Authority area in a PDF printable, shareable and easy to understand format.
- Summarises change and impact indicators in tables.
- Sea level rise page for coastal LA's





## Introduction

This Climate Report provides high level, non-technical summaries of climate change projections for a local authority area. It uses scientific research to provide robust climate information to help decision makers plan for the future, enabling local authorities to become more resilient to climate change.

Each local authority experiences its own unique challenges from climate change. For example, urban areas are affected by the urban heat island effect resulting in higher urban temperatures compared with rural surroundings, whereas low-lying coastal areas may be at greater risk of flooding from rising sea levels.



## What affects the region's weather?

Brighton and Hove is located within the Southern England climate region. The types of weather that Southern England experiences across a year include:

Continental Europe brings cold spells in winter and hot, humid weather in summer to Southern England. Coastal areas experience sea breezes, which result in lower maximum summer temperatures and milder winter temperatures, compared to inland.

Southern England experiences high summer temperatures. London's average daily maximum temperature for July is 23.7°C - the highest in the UK. The Urban Heat Island effect also contributes.

Southern England is also further away from the paths of intense depressions which bring chills, wind and rain. Coastal areas may experience greater rainfall in autumn and early winter whilst inland areas may also experience high rainfall in summer, due to convective showers.

The sunniest locations within mainland UK are found within Southern England. At some coastal locations, average annual sunshine hours exceed 1800 hours.

## How has the climate changed in Southern England?



Temperature Difference (°C)  
Data: MetUK-Grid  
Concept: Ed Hawkins

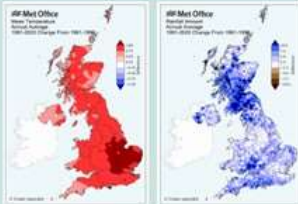
Brighton and Hove is located within the Southern England climate region, where temperatures have increased (1884-2023), with many of the hottest years occurring in the last few decades

Page 2

## Climate Change in the UK

### Observed changes

How have temperature and rainfall changed across the UK? These maps show changes in annual mean temperature (left) and rainfall (right) from 1991-2020 compared to a baseline period of 1961-1990. Temperatures have risen in all areas across the UK. Whilst some areas have become drier, more areas have become wetter. Some places that have become wetter over the year as a whole have also become drier in summer.



### Impacts

Urban, rural and coastal regions across the UK are already experiencing the impacts of climate change. The negative impacts of climate change may include:

**Heat**  
Increased energy demand for summer cooling.

**Sea Level Rise**  
Increased risk of coastal flooding.

**Heavy Rainfall**  
Increased risk of river and surface water flooding.

**Health**  
Increased risk to health from heat stress.

**Drought**  
Risk to water supplies from drought.

**Drainage**  
Increased disruption to urban drainage systems.

**Transport**  
Increased disruption to transport due to heat e.g. rail buckling.

**Environment**  
Increased risk to biodiversity (plants and animals).

**Energy**  
Infrastructure such as gas pipes are at high risk from flooding events.

### Future headlines

The climate is already changing, and we are already seeing impacts. But how might the UK's climate change in the future? The amount of future climate change will depend on how much greenhouse gas the world emits. However, even in the most optimistic scenario we are locked in to some further climate change.

There is an increased chance of warmer, wetter winters and hotter, drier summers.

Although the trend is for drier summers in the future, there may be increases in the intensity of heavy summer rainfall events.

Hot summers are expected to become more common. By 2050, every other summer may be as hot as the record breaking summer of 2018.

Sea levels will continue to rise in the 21st century even if greenhouse gas emissions are reduced rapidly.

Page 3

## Local changes in the global context

### Global Warming Levels

Global Warming Levels (GWLs) are a simple way to represent climate change at the global scale, which then drives local changes. They allow us to explore different strands of climate hazard information consistently. Changes are relative to the pre-industrial baseline (1850-1900). We have already reached +1.2°C.

Independent guidance, adopted by the UK government for the Climate Change Risk Assessment (CCRA) and 3rd National Adaptation Plan (NAP3), is to prepare for a 2°C rise in global temperatures, whilst assessing the risks for 4°C.

Climate history  
+0.8°C Baseline 1981-2000  
+1.2°C Recent 2001-2020

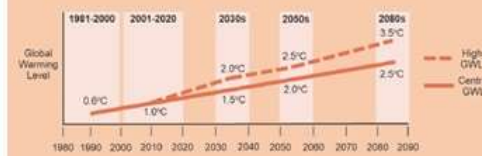
Climate negotiations  
+1.5°C Paris Agreement target

Climate guidance (CCRA, NAP3)  
+2°C Prepare for 2°C  
+4°C Assess the risks for 4°C

Limiting warming to below 1.5°C above pre-industrial levels will require bigger emission reductions than currently pledged by nations around the world. Current emission reduction pledges, made as part of nationally determined contributions, are likely to lead to warming above 2°C.

### Timing of changes

The time when a particular GWL is reached will depend on future global emissions and the sensitivity of the climate system. The two futures present Central and High estimates of global warming over the 21st century. Both are consistent with current policy global emissions reductions. They have been selected by the Climate Change Committee (CCC) for exploration for the fourth Climate Change Risk Assessment (CCRA4). These futures show the times when particular GWLs may be reached; 4°C may be reached by the end of the century under the High GWL future, but has a low likelihood. The uncertainty in these futures increases over the course of the 21st century.



Page 4

## Local climate changes

The table shows projected changes in climate for the Local Authority area for a number of Global Warming Levels (GWLs). In each case there is a central projection (the Median) and an uncertainty range (the Lower and Upper values). Changes are relative to 1981-2000. The underlying science is explained in the Scientific Detail (QR Code).



Map shows the Local Authority area. The overlaid grid shows the 12m grid boxes from the climate model used for these projections.

	0.8°C GWL Baseline 1981-2000	1.0°C GWL Recent Post 2001-2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
<b>TEMPERATURE</b>					
Summer Maximum Temperature	28.1 27.8 to 28.2	30.2 29.8 to 30.7	+2.0 +1.9 to +2.1	+2.1 +2.0 to +2.2	+2.1 +2.0 to +2.2
Summer Average Temperature	16.2 16.0 to 16.3	17.3 16.9 to 17.7	+1.1 +1.0 to +1.2	+1.2 +1.1 to +1.3	+1.3 +1.2 to +1.4
Winter Average Temperature	5.0 4.9 to 5.0	5.8 5.6 to 6.1	+0.8 +0.7 to +0.9	+0.9 +0.8 to +1.0	+0.9 +0.8 to +1.0
Winter Minimum Temperature	-6.0 -6.0 to -5.9	-4.8 -4.8 to -4.7	+0.8 +0.7 to +0.9	+0.9 +0.8 to +1.0	+0.9 +0.8 to +1.0
Annual Average Temperature	10.4 10.4 to 10.4	11.2 11.1 to 11.3	+0.8 +0.7 to +0.9	+0.9 +0.8 to +1.0	+0.9 +0.8 to +1.0
<b>PRECIPITATION</b>					
Summer Precipitation Rate	1.74 1.73 to 1.75	1.72 1.69 to 1.69	-0.02 -0.02 to -0.02	-0.02 -0.02 to -0.02	-0.02 -0.02 to -0.02
Winter Precipitation Rate	2.58 2.57 to 2.58	2.68 2.65 to 2.71	+0.10 +0.08 to +0.12	+0.11 +0.09 to +0.13	+0.12 +0.10 to +0.14

Page 5



Met Office Climate Report for Brighton and Hove					
Local climate indicators					
The table shows projected climate indicators for the Local Authority area for a number of Global Warming Levels. For each these are annual totals: a central projection (the Median) and an uncertainty range (the Lower and Upper values are the 10th and 90th percentiles). See also the Scientific Detail (QR Code).					
	0.6°C GWL Baseline 1981-2000	1.0°C GWL Recent Past 2001-2020	1.5°C GWL Paris Agreement	2°C GWL Guidance: Prepare	4°C GWL Guidance: Assess risks
<b>Summer Days*</b>	9	18	19	26	55
Daily maximum temperature > 25°C	9 to 9	15 to 19	17 to 19	20 to 32	48 to 73
High daytime temperatures with health impacts for vulnerable people at risk of hospital admission or death. Transport disruption – e.g. track buckling on railways. Can also indicate periods of increased water demand.					
<b>Hot Summer Days*</b>	0	2	2	3	13
Daily maximum temperature > 30°C	0 to 0	1 to 3	1 to 3	1 to 4	10 to 12
Increased heat related illnesses, hospital admissions or death affecting not just the vulnerable. Further transport disruption – e.g. track buckling on railways, road melt. Overhead power lines become less efficient.					
<b>Extreme Summer Days*</b>	0	0	0	0	2
Daily maximum temperature > 35°C	0 to 0	0 to 1	0 to 1	0 to 1	1 to 4
Increased heat related illnesses, hospital admissions or death affecting not just the vulnerable. Further transport disruption – e.g. track buckling on railways, road melt.					
<b>Tropical Nights</b>	0	0	0	1	7
Daily minimum temperature > 20°C	0 to 0	0 to 1	0 to 1	0 to 1	0 to 10
Health impact due to high night-time temperatures with potential for heat stress. Vulnerable people at increased risk of hospital admission or death.					
<b>Frost Days</b>	32	23	21	17	6
Daily minimum temperature < 0°C	32 to 39	20 to 28	17 to 23	14 to 22	9 to 13
Cold weather disruption due to higher than normal chance of ice and snow.					
<b>Ice Days</b>	2	1	1	1	0
Daily maximum temperature < 0°C	2 to 2	1 to 1	0 to 1	0 to 1	0 to 0
More extreme than frost days, to more severe cold weather impacts.					
<b>Growing Degree Days*</b>	1,998	2,245	2,333	2,495	3,057
Daily mean temperature: °C > 5.5°C	1,998 to 1,998	2,179 to 2,361	2,091 to 2,472	2,077 to 2,595	2,963 to 3,029
Energy available for plant growth over a year. This is not a measure of season length.					
<b>Heating Degree Days*</b>	2,060	1,856	1,787	1,652	1,303
Daily mean temperature: °C < 15.5°C	2,060 to 2,062	1,884 to 1,811	1,781 to 1,811	1,609 to 1,781	1,273 to 1,478
Indicator of energy demand for heating.					
<b>Cooling Degree Days*</b>	18	38	39	54	140
Daily mean temperature: °C > 22°C	17 to 18	20 to 47	24 to 39	29 to 55	52 to 106
Indicator of energy demand for cooling.					

\* Summer days above the lowest temperature thresholds can occur at any time of year

† Degree Days are not a number of days, but the number of degrees the daily average temperature exceeds the threshold; each day, added up over a year.

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## Met Office Climate Report for Brighton and Hove

### How to use the local climate projections

We are all at different points on our climate risk and adaptation journey. These projections may be used to build awareness, contribute to a risk assessment, or inform adaptation planning or reporting.

#### Climate risk

Understanding the risks that climate change poses to your community, organisation or business is the first step to taking action. The **RISKS** from a changing climate and the potential for resultant impacts, depend on three factors:

HAZARD: weather and climate events which may have adverse effects. Their occurrence, duration and intensity may change due to climate change.

EXPOSURE: the location of people, property and other resources, relative to a hazard.

VULNERABILITY: the likelihood of the exposed people, property or resources suffering adverse effects from the hazard. Vulnerability is reduced by the capacity of people and places to adapt or respond to the hazard.

**RISK** = Hazard + Exposure + Vulnerability

#### Selection of hazard values

The information in this report may be used to assess some of the climate and weather **HAZARDS** your local area may face, within a risk assessment procedure. It provides climate information for a range of Global Warming Levels (GWLs). The median and an uncertainty range is provided for each climate variable. A key step is to identify which you need for your risk assessment. The **SIMPLE** approach follows independent guidance, adopted by the UK government for the Climate Change Risk Assessment (CCRA) and 3rd National Adaptation Plan (NAP3). The **ARP** approach aligns with guidance for the local authority Adaptation Reporting Power pilot. In the **CUSTOM** approach you decide on the basis of your risk appetite and the relevant time horizon.

**SIMPLE approach**  
 Follow the guidance to prepare for a 2°C rise in global temperature, whilst assessing the risks for 2°C.  
 Use the Median value as a central estimate, and the Lower and Upper values as an uncertainty range.

**ARP approach**  
 For present day (near term) 1.5°C. For mid-century (medium term) 2°C. For end-century (long term) 2°C. For end-century (long term) 4°C.  
 Use the Median value as a central estimate, and the Lower and Upper values as an uncertainty range.

**CUSTOM approach**  
 1. Select the climate hazard (choose a row in the tables (p5-6)).  
 2. Select the climate future (choose 2020s if you have a normal risk appetite, or 2050s if you have a low risk appetite, or 2080s if you have a high risk appetite).  
 3. Select the time horizon (select 2020s, 2050s or 2080s (high) and read 2020s from the green (p4)).  
 4. Select the statistic for Central future use the Median; for high future use the most extreme value (Upper or Lower).  
 Read the value from the tables (p5-6).  
 The values for the 2.0°C and 3.0°C GWLs are at climateadaptation.metoffice.gov.uk

**TIME HORIZON**  
 The 2020s represents the near future. The 2050s represents long-term resilience targets, if represents the end of the period of 'inevitable' climate change and rises in many hazards, regardless of global greenhouse emissions over the next few decades. The 2080s represents possible further climate change beyond the middle of the century, notably for long-lived assets.

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## Met Office Climate Report for Brighton and Hove

### Sea Level Rise

#### Around the UK

Sea level rise (SLR) is the primary way that coastal flood risk is expected to change in the UK in the future. Over the past 30 years, the UK sea level has been rising by 3.0-5.2mm per year, compared with 1.5mm per year in the 1990s. Past and present emissions mean that sea levels will continue to rise. The amount of sea level rise depends on the location around the UK and increases with higher emissions scenarios.

#### Brighton and Hove

Sea levels in the Local Authority are expected to rise over the 21st century. Although this result shows the likely range, larger increases cannot be ruled out. Those with a very low risk tolerance to sea level rise should consult EA guidance on SLR, which provides an estimate beyond the likely range but within physical plausibility. The science behind these sea level projections can be found in the Scientific Detail (QR code).

#### Selection of hazard values

The information in this Report may be used to assess some of the sea level **HAZARDS** your local area may face. A similar procedure may be followed as for land-based climate changes (p7).

It is not possible to provide the **SIMPLE** or **ARP** approaches for sea level rise as these projections are provided for future time periods directly, rather than for global warming levels. This is because sea levels will continue to rise long after global temperatures stabilise.

#### Impacts

Flooding of coastal infrastructure and services

Saltwater intrusion of aquifers and agricultural land

Flooding of coastal communities and buildings

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## Met Office Climate Report for Brighton and Hove

### Take action

#### Who is this for?

This Climate Report is intended to be useful to a wide range of people and organisations in the UK.

- Local Authority officers with service responsibilities who need information on how climate change is affecting their area
- Councillors who need briefings on how climate change may affect their Local Authority area
- The public who need to understand how climate change may affect their neighbourhood, business or organisation
- Leaders who need a summary of climate change to share with stakeholders and the public when raising awareness

#### #GetClimateReady

Tackling climate change will require both mitigation and adaptation. Mitigation reduces our carbon emissions with the goal of reaching Net Zero. Adaptation prepares us for the impacts of climate changes to which we are already committed.

You may be a concerned citizen, or have public influence or be responsible for multi-million pound budgets.

You can play a part in protecting our planet from the worst impacts of climate change and in adapting our lives to protect ourselves from the impacts that we will see. Let's get ready for tomorrow. #GetClimateReady

#### More information

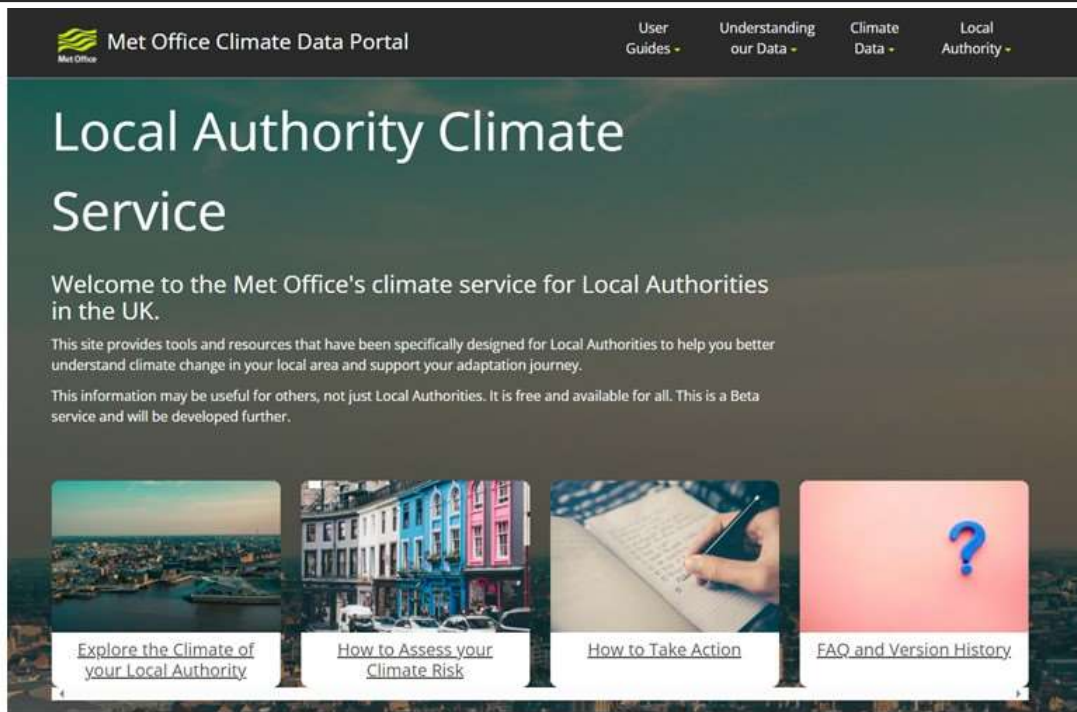
The Local Authority Climate Service community site has more information.

The Met Office welcomes feedback on this service.

The Local Authority Climate Service team invites you to contact us at [climate@brighton-hove.gov.uk](mailto:climate@brighton-hove.gov.uk). This is a Beta service. This work has been supported by Defra as part of the commitments set out within the Third National Adaptation Programme. Version 1.0 © Crown Copyright (Met Office) 2024

Page 1





**Met Office Climate Data Portal**


User Guides - Understanding our Data - Climate Data - Local Authority -

## Local Authority Climate Service


Welcome to the Met Office's climate service for Local Authorities in the UK.

This site provides tools and resources that have been specifically designed for Local Authorities to help you better understand climate change in your local area and support your adaptation journey.


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[Explore the Climate of your Local Authority](#)



[How to Assess your Climate Risk](#)



[How to Take Action](#)



[FAQ and Version History](#)

Explainer videos

Case studies

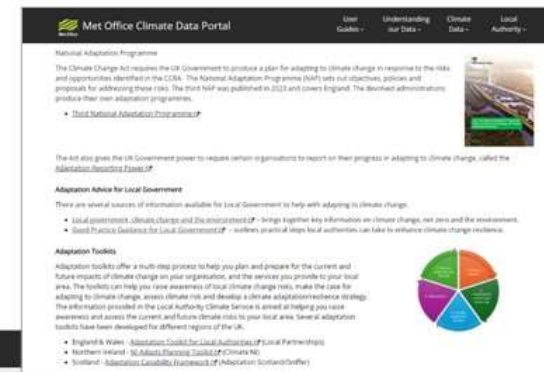
Infographics



Key Concepts

How to Guides

Adaptation Resources



**Met Office Climate Data Portal**

User Guides - Understanding our Data - Climate Data - Local Authority -

### National Adaptation Programme

The Climate Change Act requires the UK Government to produce a plan for adapting to climate change in response to the risks and opportunities identified in the CMA. The National Adaptation Programme (NAP) sets out objectives, policies and proposals for addressing these risks. The first NAP was published in 2013 and covers England. The (Scottish) administration produce their own adaptation programmes.

- [Third National Adaptation Programme \(NAP\)](#)

The Act also gives the UK Government power to require certain organisations to report on their progress in adapting to climate change, called the [Adaptation Resource Pages \(ARP\)](#).

### Adaptation Advice for Local Government

There are several sources of information available for Local Government to help with adapting to climate change.

- [Local government, climate change and the environment \(LCCCE\)](#) - brings together key information on climate change, net zero and the environment.
- [Good Practice Guidance for Local Government \(GPG\)](#) - outlines practical steps local authorities can take to enhance climate change resilience.

### Adaptation Toolkit

Adaptation toolkits offer a multi-step process to help you plan and prepare for the current and future impacts of climate change on your organisation, and the service you provide to your local area. The toolkits can help you raise awareness of local climate change risks, make the case for adapting to climate change, assess climate risk and develop a climate adaptation/resilience strategy. The information provided in the Local Authority Climate Service is aimed at helping you raise awareness and assess the current and future climate risks to your local area. Several adaptation toolkits have been developed for different regions of the UK.

- [England & Wales - Adaptation Toolkit for Local Authorities \(LCCCE\)](#)
- [Northern Ireland - Adaptation Toolkit for Local Authorities \(LCCCE\)](#)
- [Scotland - Adaptation Toolkit for Local Authorities \(LCCCE\)](#)



**Met Office Climate Data Portal**

### Key Concepts

#### Understanding Climate Change

By learning more about climate change, you will be better equipped to understand the climate risks you face locally. The Met Office provides guidance on what climate change is, what it means for the UK, and how it is linked to extreme weather and its impacts.

- [Climate Definition \(LCCCE\)](#)
- [Climate Change in the UK \(LCCCE\)](#)
- [What is climate linked to extreme weather? \(LCCCE\)](#)
- [Climate Impacts \(LCCCE\)](#)
- [The annual State of the UK Climate Report \(LCCCE\)](#) - which provides an up-to-date assessment of the UK climate.

#### UK Climate Projections

Climate information within the Local Authority Climate Service is based on the UK Climate Projections (UKCP). UKCP uses cutting-edge climate science to provide updated observations and climate change projections out to 2100 in the UK and globally. The project equips the UK with information to help adapt to the challenges and opportunities presented by climate change. Use the links below to find out more:

- [UK Climate Projections \(UKCP\)](#)
- [UKCP Reader's Guide \(LCCCE\)](#)
- [UKCP Learning \(LCCCE\)](#)







## Data for decision making:

- An evidence base to inform local adaptation
- Informing climate action and resilience strategies



## As a public engagement and communication tool:

- Raising awareness and understanding of the key issues associated with climate change locally
- Can be embedded into other public outreach resources



## As a training tool:

- Creating shared understanding on local climate change
- A resource for new staff training within planning and policy departments



## To inform the development of future climate-based work:

- A catalyst from which cities may begin to develop their own additional resources
- Scoping and informing other climate-based work within the local area

### LACS usage statistics from first month:

- 5200 unique visitors
- 4000 Local Authority Climate Reports Generated
- 7500 data layer views



# Development Timeline

**9<sup>th</sup> Oct 2024**

Launch of LACS  
as a beta service  
& webinar

**Spring/Summer  
2025**

Further develop  
LACS with UKCP  
Local

**Autumn 2025 &  
beyond**

Further enhancements,  
subject to funding

**Autumn/Winter  
2024**

Gather feedback  
from LAs

Update LACS with sub-  
local authority scale  
information



# Opportunities to engage



**Visit the service**



**Email the team at**  
**[lacs@metoffice.gov.uk](mailto:lacs@metoffice.gov.uk)**

or use the  
**Feedback form**



# Scotland's Flood Resilience Conference 2025

Plenary session

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



# Scotland's Flood Resilience Conference 2025

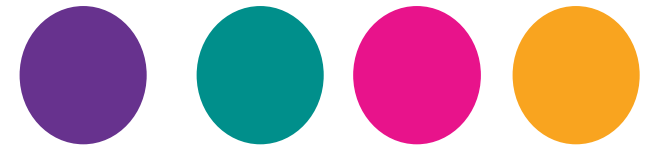
Engaging and involving disabled people in flood resilience

Marianne Scobie and Karen Wylie,  
Glasgow Disability Alliance





**Glasgow Disability Alliance**  
Promoting Equality, Rights and Social Justice



# **Disabled People & the Impact of Climate Change**

## **Scotland's Flood Resilience Conference 2025**

**Marianne Scobie, Depute CEO, GDA**

**Karen Wylie, Policy & Participation Manager, GDA**



# Background to GDA

- Late 1990s – disabled people left out of decision making, particularly in relation to community- led regeneration.
- Small group of disabled people – peer support, capacity building and empowerment = Community Development.
- Early 2000s – 40 members growing to 55 by 2006: engagement, representation, policy/service influence.
- Overwhelming needs identified were social connections, tackling social isolation, and building confidence and voices in decisions that affect us.
- Meaningful participation required bringing together our knowledge of community development **and** disability equality.
- 5500+ members, pan-impairment, 11-100+; DPO Network.





# What we do



1. We **build individual capacity for disabled people** to take a leading role in their own life, their families and their communities.
2. We **amplify marginalised voices of disabled people** as a diverse community, contributing lived experience and participating in dialogue, deliberation and collective advocacy to challenge inequality and exclusion.
3. We **collaborate for change with local and national government**, communities and third sector, sharing insights and evidence to shape policy and co-design services and solutions to poverty, inequality & exclusion.



# Methods of Delivery



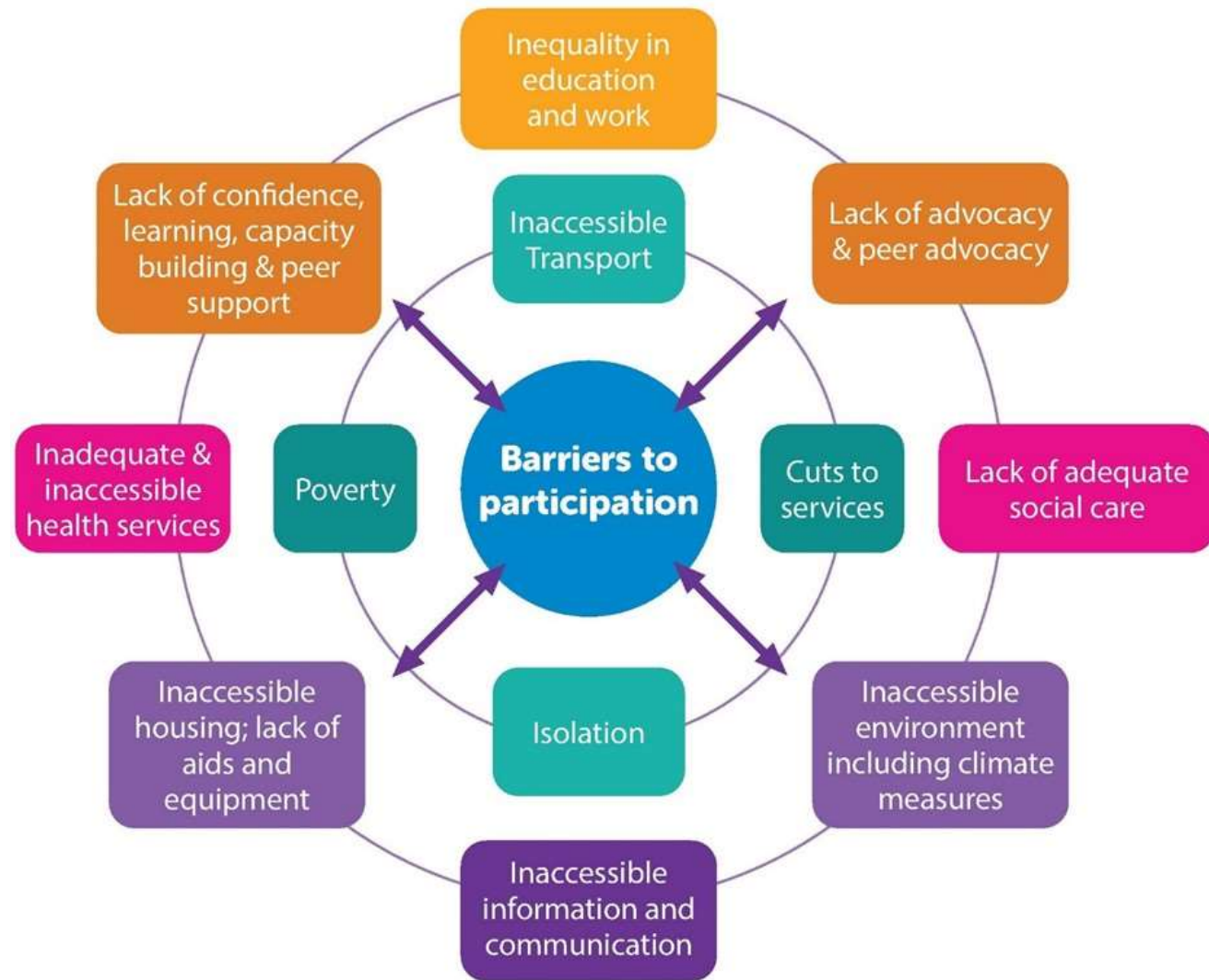
- **Community Development:** accessible programmes of learning, fun activities, peer support, social participation, coaching, capacity building.
- **Outreach and engagement:** finding and engaging people online and offline, phone, mail outs, stalls, networking.
- **Services / Supports:** Welfare Rights, Future Visions for Social Care; Wellbeing, GDA Connects; Third Party Reporting (Hate Crime).
- **Information and Signposting:** accessible and inclusive communication, building community connections; social media and website.
- **Consciousness raising:** community of identity, confidence, peer support, learning about our rights, intersectional networks.
- **Voices:** opportunities and support to engage with power holders – “Nothing About us Without Us”.



## Barriers to Participation

Interconnected barriers disabled people face to participation & life opportunities including:

- **Structural and institutional:** how policies and services are designed and delivered- failing disabled people and interacting to cause inequalities and injustice.
- **Physical and environmental.** housing and the built environment - how these are designed without disabled people in mind.
- **Attitudinal Barriers**—include low expectations, stigma, discrimination, hate crime.





# Climate Change & the Impact on Disabled People

## What we know:

- Those most affected by climate change are those least responsible for climate change.
- Those most affected often have the least capacity to cope with the effects of climate change.
- Those most affected find it hardest to be able to make changes to mitigate climate change.





# Measures to mitigate and adapt to climate change will impact on, e.g.

- Urban and infrastructure planning.
- Housing.
- Transport.
- Energy efficiency.
- Waste management.
- Risk management and emergency planning.





Despite international recognition of the greater vulnerability of disabled people to climate impacts e.g. storms & floods, disabled people's barriers have received little attention from practitioners and policymakers internationally and in the context of climate governance in Scotland.





# Climate Change & the Impact on Disabled People

“Bigger wildfires, longer droughts, and more intense storms and floods can be catastrophic for some disabled people, who are more likely to be marginalised by poverty and other social barriers that make them less likely to be evacuated safely, more prone to health risks and less likely to have insurance that protects their assets and homes.”

Inclusion Scotland, 2021







**Glasgow Disability Alliance**  
Promoting Equality, Rights and Social Justice

# Eco Ableism

A failure to recognise that many of the changes to habits and lifestyle to address climate change can in some cases be difficult or impossible for disabled people to do.





# Examples of Eco-Ableism

- Ignoring disabled people in emergency planning, e.g. flood protections /evacuations.
- Urban planning for low-carbon cities that discriminates against disabled people who need to drive / use a car and find public transport inaccessible to them.
- Removing disabled parking bays and promoting active travel without accepting that some disabled people cannot walk, wheel or cycle.
- Recycling initiatives that do not take account of the support disabled people need to recycle or lack of information about recycling in accessible formats.
- Banning single use plastic without accepting that some disabled people need these to eat or drink safely – or at all.
- Acting with hostility and aggression towards disabled people who speak up.







When we do not get the support we need we cannot make choices that fit with Climate Actions.

When we are not included in decision making - policies, services and decisions continue to exclude us.





Confusing and dangerous street design.

Someone decided it was ok to plant these trees there!







**Parking removed and replaced with areas to socialise.**

**Inaccessible infrastructure. New cycle lanes mean the only drop-off points now in middle of road – no kerbs, or safe place to disembark from taxis; nowhere safe to wait for taxi.**

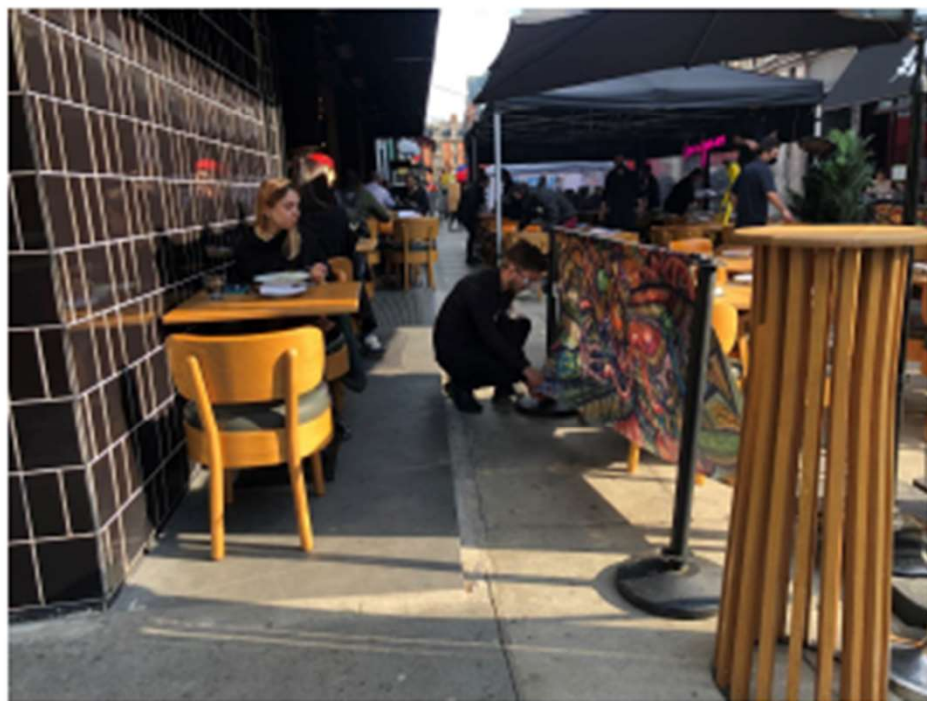
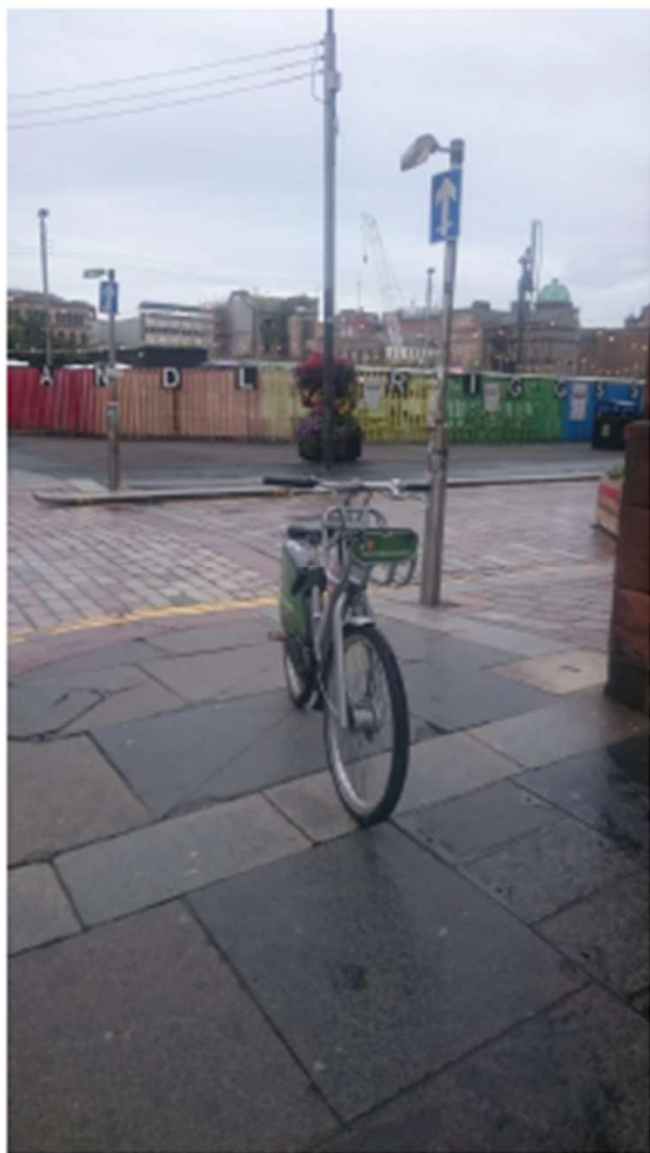




Examples of bad design:  
Inaccessible and dangerous bus stops.  
Now fairly common throughout Glasgow.







Streets blocked.  
Thoughtless.  
Dangerous.  
"Streets for (some)  
People?"  
Further excluding  
disabled people.



# Disabled People & Climate Change Actions

## Addressing eco-ableism:

- Acknowledges many disabled people want to make changes / take action.
- Recognises disabled people have much to lose from climate change.
- Highlights the need for disabled people to have their priorities and lived experiences listened to and accepted by environmentalists and policy- and decision-makers.



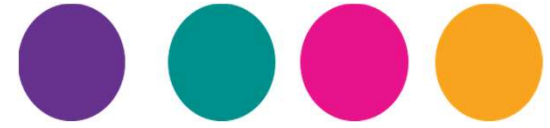
# Concerns re Mitigation Strategies



- **Focus on place-based approaches and local solutions -**
  - emphasis on geographical communities could widen inequalities for disabled people as they do not address structural inequalities that exist nationwide.
- Need parallel regional / national approaches, based on **communities of identity** and **equalities**.
- The Scottish Government is facilitating a national network of Climate Action Hubs to support communities to take forward climate action in their areas.
  - How accessible and inclusive are these?



# Concerns re Mitigation Strategies



- Building 'community resilience' by providing individuals / groups with knowledge and skills they need to effect change.
  - How will this be done with communities of interest which are historically / systematically disadvantaged and discriminated against?



## GDA Members' Concerns re Flooding

“Many people with different mobility needs live in ground floor apartments or on the ground floor of houses. This puts them at significantly higher risk from flooding than those able to live on upper floors of buildings.”

“I have essential medical equipment on the ground floor of my home and worry about what would happen if I got flooded. Who would come to move it upstairs if needed? Could I afford to replace it quickly if it got damaged?”





## GDA Members' Concerns re Flooding

- Many disabled people gave examples of drains not being cleared of leaves causing flooding which leads to the denial of access or blockage of key routes. This makes it especially difficult for people with limited mobility or visual impairment to negotiate public spaces.
- Many were concerned about the impact ground water and deep puddles could have on mobility aid batteries and also increased ice, which stopped them from going outside in bad weather.





# Impact on GDA Members

“When the weather’s so changeable you don’t want to go out. You get stir crazy staying in due to bad weather – you miss being with people.”

“It has a huge impact on my mood if I can’t get out when there’s unpredictable weather – makes me lonely and depressed.”

**Context:** we know from GDA survey (summer 2024), which 621 disabled people completed:

- **91%** concerned about social isolation and loneliness.
- **89%** concerned about mental health.
- **81% concerned about** knowing where to go for accessible support or information in their communities.
- **79%** concerned about access to services.





# Scottish Govt. Flood Resilience Strategy

In line with the **Place Principle** there is a need to shift toward a plan-led, **placed based approach** where all the elements of design and development of our places have the potential to increase our flood resilience and achieve better outcomes for people and communities.

**However - place-based approaches can exacerbate inequalities.**



**Glasgow Disability Alliance**  
Promoting Equality, Rights and Social Justice



# Scottish Govt. Flood Resilience Strategy

- [We will look] at ways to **involve people from the very start** of the flood resilience process.
- Encourage and support **actions by individuals** to improve their own flood resilience and that of their community.
- We can **all as individuals and communities** do something to improve our flood resilience. We will work to **broaden the range** of those that can engage with and deliver flood resilience actions.

**But – what about the barriers to participation?**





# Scottish Govt. Flood Resilience Strategy

## Scottish Flood Forecasting Service

Produces daily forecasts predicting the likelihood and timing of river, coastal and surface water flooding across Scotland up to five days ahead giving organisations, communities and individuals advance warning and time to prepare.

**But available ≠ accessible!**





Let's make the race to rights for disabled people as important as the race to reach Net Zero!

## Calls to action: Just Transition

- A. Support disabled people's participation in co-designing inclusive policies and actions to achieve a Just Transition** across the full range of interrelated policy areas e.g. employment, social care, transport, housing, education.
- B. Co-design with disabled people and DPOs the citywide and local plans, actions and decisions to tackle climate change** e.g. Low Emission Zones, Active Travel Schemes, Avenues Project, Liveable Neighbourhoods.
- C. Take action and invest in communities of identity** as well as place to avoid unintentionally widening inequalities in public realm and climate action schemes.



# Post presentation notes: Summary of Q&A

## **Q: Do EQIAs do anything to help?**

In our experience EQIAs are not as effective as they should be. They are often seen as inconvenient and/or 'tick-box' exercises. Recommendations are not often followed up, rendering the process meaningless. We know that some public sector organisations only do EQIAs when developing new policies, not when these policies are amended or when the implementations of them changes – so how effective can they ever be?

We believe that even the best EQIA process cannot be effective if the people conducting them have not received in-depth Disability Equality Training, delivered by experienced disabled trainers. The session delivered by GDA at the event was a taster of DET but likely more than most people who conduct EQIAs receive!

EQIAs also need to be part of a wider process to embed equalities competence across organisations and policy making – this should involve training about and links to equalities organisations.

The ideal scenario would be to have independent assessors conducting EQIAs, rather than the very people proposing a policy, which tends to be the case.

## **Q: Would having lived experience as part of the process improve outcomes?**

If done properly, including being properly resourced, then incorporating lived experience can improve policy and implementation of policy. However, there are not many examples of this being done well, outside of Disabled People's Organisations.

Meaningful lived experience requires all the barriers discussed earlier in the presentation to be removed, reduced and/or mitigated. E.g. GDA provides free accessible transport, Personal Assistance, Communication Support, Accessible & Inclusive Information; participation is facilitated, with capacity building ongoing to ensure disabled people have the skills, knowledge and confidence to participate.

Genuine, meaningful participation takes commitment to resources and an ongoing, whole systems approach.



# Post presentation notes: further information

GDA: [Participation of Disabled People – a model for involvement](#)

GDA: [Budgeting for Equality](#) – includes recommendations and rough guide to inclusive engagement.

GDA : [Transforming Participation for disabled people in Glasgow](#)

Glasgow Centre for Population Health: [The impacts of the cost-of-living crisis on disabled people](#)

Inclusion Scotland: [It's Our Planet Too!](#)

BBC News: [Climate change: Why are disabled people so affected by the climate crisis?](#)

Office of the United Nations High Commissioner for Human Rights: [The impact of climate change on the rights of disabled people](#)





**Glasgow Disability Alliance**  
Confident Connected Contributing

**Thank you – please feel free to keep in touch!**

**[info@gdaonline.co.uk](mailto:info@gdaonline.co.uk)**

**[www.gda.scot](http://www.gda.scot)**

**Tel: 0141 556 7103**

**Text: 07958 299 496**

**[X / Instagram: @GDA\\_\\_online](#)**

contact  
**SCOTLAND**  
**BSL**

**[Facebook: Glasgow Disability Alliance](#)**



# Coming up next...

Launch of the Scottish Flood Bus followed by evening reception

Sponsored by Scottish Flood Forum

**FLOODRE**



 **AtkinsRéalis**





# Scotland's Flood Resilience Conference 2025



## Scotland's Flood Resilient Future



Scottish Government  
Riaghaltas na h-Alba  
gov.scot





# Scotland's Flood Resilience Conference 2025



## Scotland's Flood Resilient Future



Scottish Government  
Riaghaltas na h-Alba  
gov.scot



# Scotland's Flood Resilience Conference 2025

Welcome

Chair: Jo Kerr, Sniffer

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



Join at:  
[slido.com](https://slido.com)  
[#Floodresilience2025](https://twitter.com/Floodresilience2025)





# Scotland's Flood Resilience Conference 2025

**Reflections from Day 1 from our early career keynote listeners**

Jo Kerr, Sniffer; Anna Moreau, SEPA; Ben Cooper, AECOM; Joshua Bishop, RPA Ltd;  
Eilidh Guthrie, Dundee University and Rhiannon Wilson, Mott MacDonald

**FLOODRE**

**Balfour Beatty**

 **AtkinsRéalis**



# Scotland's Flood Resilience Conference 2025

Diarmuid O'Neill  
Scottish Government

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



# Questions & Discussion

[www.slido.com](https://www.slido.com)  
#Floodresilience2025





# Scotland's Flood Resilience Conference 2025

## Breakout I – Ways of financing flood resilience

Jonny Casey, Sniffer; Ruchir Shah, Scottish Wildlife Trust; Alice Slattery, Savills  
and Ed Heather-Hayes, Fife Coast & Countryside Trust



# Adaptation Scotland

supporting climate change resilience

## Climate Adaptation Finance

Jonny Casey  
Head of Climate Ready Leadership



The Adaptation Scotland programme is funded by the Scottish Government and delivered by sustainability charity Sniffer.

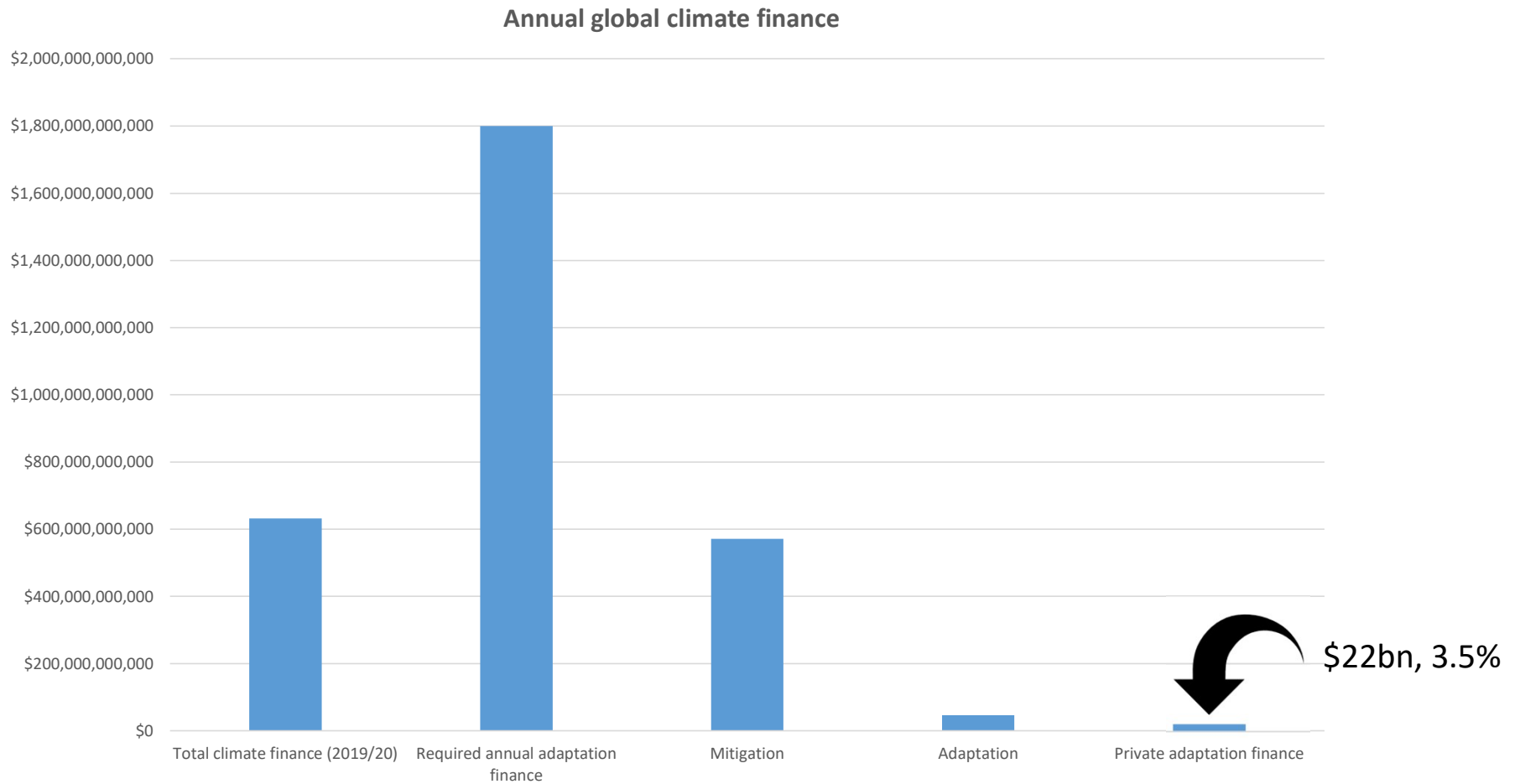


Venture trading as Sniffer  
Scottish Charity No SC022375, Company No SC149513  
Registered Office: Caledonian Exchange, 19a Canning Street, Edinburgh, EH3 8HE





# Adaptation finance globally



The Adaptation Scotland programme is funded by the Scottish Government and delivered by sustainability charity Sniffer.



Data source: CPI, 2021



# A Guide to Adaptation Climate Finance

Adaptation  
**Scotland**  
supporting climate change resilience

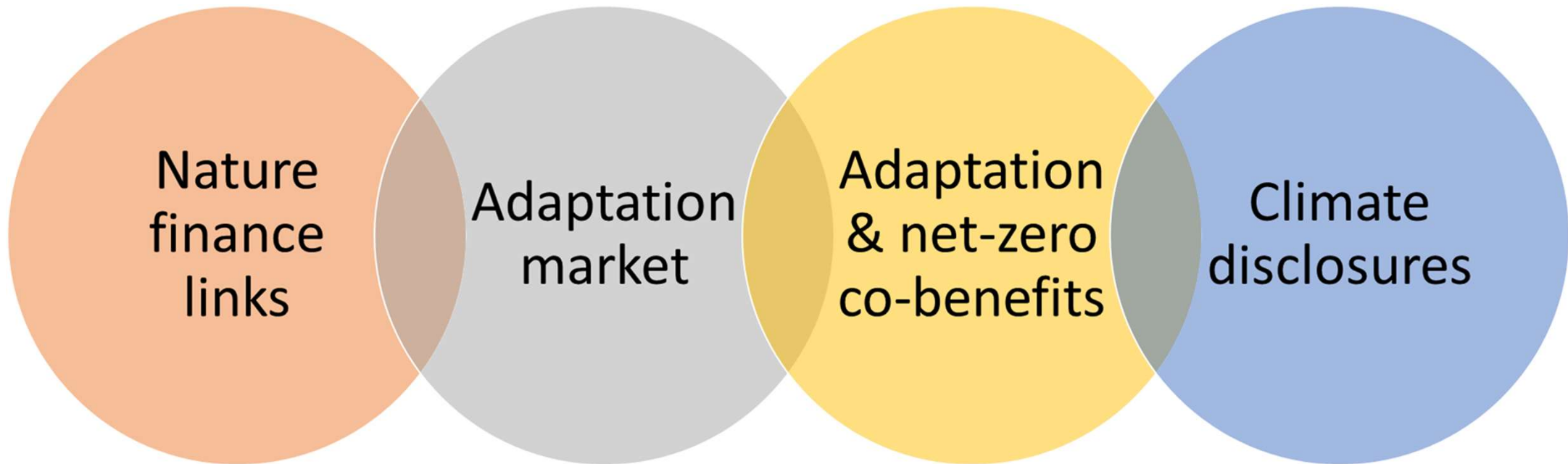


**A Guide to Adaptation  
Climate Finance**

Adaptation  
**Scotland**  
supporting climate change resilience



# Financing adaptation – key themes





# Opportunities for Scotland

**Adaptation  
Scotland**  
supporting climate change resilience



**Synergies with nature  
recovery & biodiversity  
investment**



**Maximising co-benefits in  
building & infrastructure  
net-zero investments**



**High integrity, values led  
approach to market  
development**



**Supporting place-based  
approaches**



The Adaptation Scotland programme is funded by the Scottish Government and delivered by sustainability charity Sniffer.





# Innovative approaches to overcoming barriers to financing flood resilience



The Adaptation Scotland programme is funded by the Scottish Government and delivered by sustainability charity Sniffer.





At your tables, discuss the  
question on your table.  
Please return in 20  
minutes



# How can we advance action and scale up finance for flood resilience in Scotland?



The Adaptation Scotland programme is funded by the Scottish Government and delivered by sustainability charity Sniffer.





# Scotland's Flood Resilience Conference 2025

## Breakout J – Changing processes in public bodies and infrastructure

David Harkin, Network Rail Scotland (Chair); Rachel Long, Network Rail  
Scotland; Mark Williams, Scottish Water; Craig Thom, SSE and Olivia  
Lassiere, Scottish Canals



# CLIMATE READY INFRASTRUCTURE

SESSION J: processes / infrastructure



SCOTLAND'S RAILWAY



# Agenda

## Session 1: Presentations

- **Rachel Long** – Network Rail – **developing tools to support decision making**
- **Laura Burnett**– Scottish Water – **planning for the future**
- **Craig Thom** – SSE – **building climate risk and flood mitigation into business plans**
- **Olivia Lassiere** – Scottish Canals – **the power of partnerships**

## Session 2: Workshop

- Infrastructure as a system of systems and pain points
- Building a water management stakeholder map for Scotland



SCOTLAND'S RAILWAY





# Rachel Long

Network Rail



SCOTLAND'S RAILWAY





# Flood Resilience Conference

Session J: Changing processes in public bodies and infrastructure providers

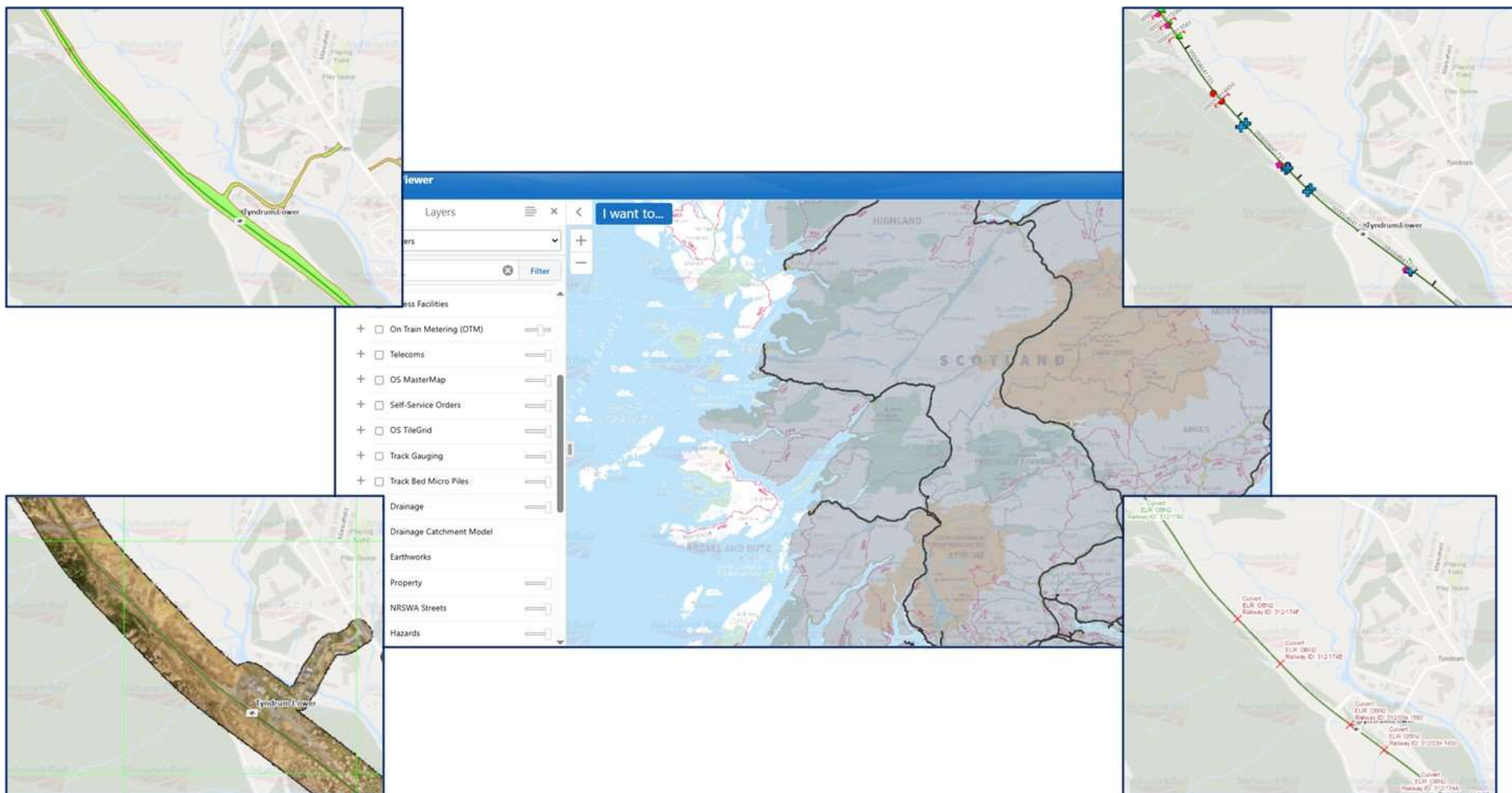


SCOTLAND'S RAILWAY  
BETTER IN THE MAKING

Rachel Long - Regional Asset Manager Drainage and Lineside



# GeoRINM Viewer





## StrEAMS – the launchpad to all your drainage and lineside information

NetworkRail

### Catchment analysis

supporting diagnosis of your drainage issues

Easy diagnosis  
of off-track  
issues

Drainage as a system



Catchment Areas

Helping you understand how drainage  
assets work together to manage surface  
water that flows towards the railway

### StrEAMS

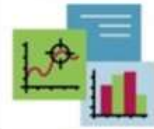
A new web app to support off-track teams

StrEAMS will include:

Assurance Pack  
information



KPI  
reporting



Content  
management



Access all your data in one place



To support  
faster  
responses

### Asset risk evaluation

Understand asset  
risk based on data

Effective prioritisation  
of work

Submit schemes  
of work



### Workbank management tool

Asset management teams will prioritise  
their drainage and lineside workbank



Understand and update  
total workbank  
volumes



Improved visibility of information



Improves reliability of  
drainage and lineside  
assets and reduces  
passenger/freight delays



INTELLIGENT  
INFRASTRUCTURE



Scan for more information



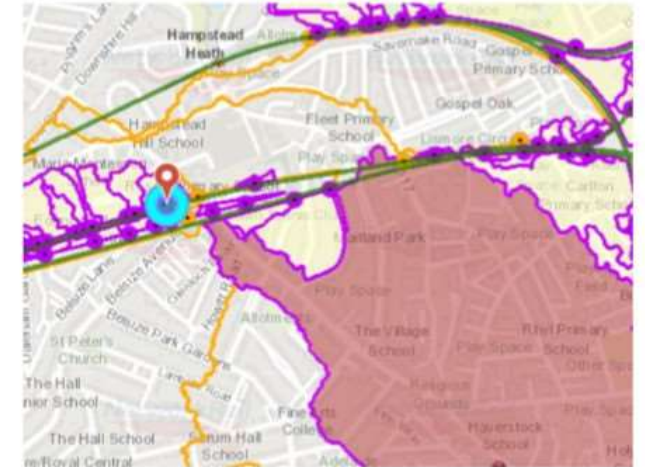
# Catchment Tool



Land Use data layer



Water Threat Index (WTI)



### Catchment Delineation Polygons & Outflow Points



# Catchment Delineation Polygons

*Catchment delineation polygons (2-dimensional shapes) which indicate drainage catchment zones*

What are the Catchment Delineation Polygons

Catchments that drain towards the rail network are provided in the dataset. Some lengths of the network will not have any catchments associated with them, whilst other lengths may only have catchments shown on one side of the line

Catchments have been differentiated by type, Pluvial (catchment where the dominant runoff mechanism is via surface water) and Fluvial (catchment that is drained by a watercourse). Pluvial catchments are the focus of the dataset

How Have they been Calculated

Catchment delineation are shown as Geographic Information System (GIS) datasets.

Datasets used include; Digital Terrain Model (DTM) data, Water Framework Directive (WFD) catchment boundary data, Network Rail's network links data, Network Rail's earthworks data and Ordnance Survey (OS) mapping data.



*Example of catchment delineation polygons as they will be displayed on GeoRINM Viewer*



# Catchment Outflow Points & Peak Flow (QMED Urban)

*Point locations on a map identifying the peak outflow from the linked pluvial catchment*

What are they	<p>Each catchment polygon has an associated outflow point that is located on or near to the earthwork's boundary</p> <p>Outflow points represent the location where the flow from a catchment is expected to cross the railway.</p> <p>A catchment outflow point in this model is the lowest point in the catchment as identified from the Digital Terrain Model.</p>
How Have they been Calculated	<p>They have been identified for each catchment using Terrain Model. This layer has been used to identify the highest flow accumulation value.</p> <p>Where the outflow point from one catchment is on a shared boundary with another catchment, the two catchments have been merged</p>



*Example of catchment outflow points as they will be displayed on GeoRINM Viewer*



# Pluvial Catchment Slope

*Polygons to be highlighted in different colours to identify slope severity banding*

What are the Pluvial Catchment slopes?	<p>Slope severity affects the rate of catchment (water) runoff. The average catchment slope (in degrees) has been and is available in the 'Pluvial Catchment Slope'</p> <p>There are national and regional variances in the banding, details of these are available in the GRV key alongside the respective layers.</p>
How Have they been Calculated	<p>Within each region, the average catchment slope has been banded by potential threat.</p> <p>The bands are low (2), low/mid (3), mid (5), mid/high ranges associated with each band varies by region. assess the potential threat posed by the average. catchment slope in the Water Threat Index (WTI) layer.</p>



*Example of pluvial catchment slope colouration as they will be displayed on GeoRINM Viewer*



# Pluvial Land Use

*Polygons to be highlighted in different colours to identify 'land use' banding*

What is the Pluvial Land Use?	<p>Land use affects the rate of catchment runoff.</p> <p>The dominant land use class for each pluvial 2021 data.</p> <p>Land uses are Water, Trees, Flooded vegetation, Crops, Built area, Bare ground, Snow-ice, Clouds and Rangeland.</p>
How Have they been Calculated	<p>To quantify the threat posed by a given land use, each land use class has been assigned a 'Manning's 'n' value'. The Manning's values were assigned by looking at the roughness values of different floodplains, to help us consider surface water catchments</p> <p>The Manning's value helps inform the potential threat by the land use in the Water Threat Index layer.</p>



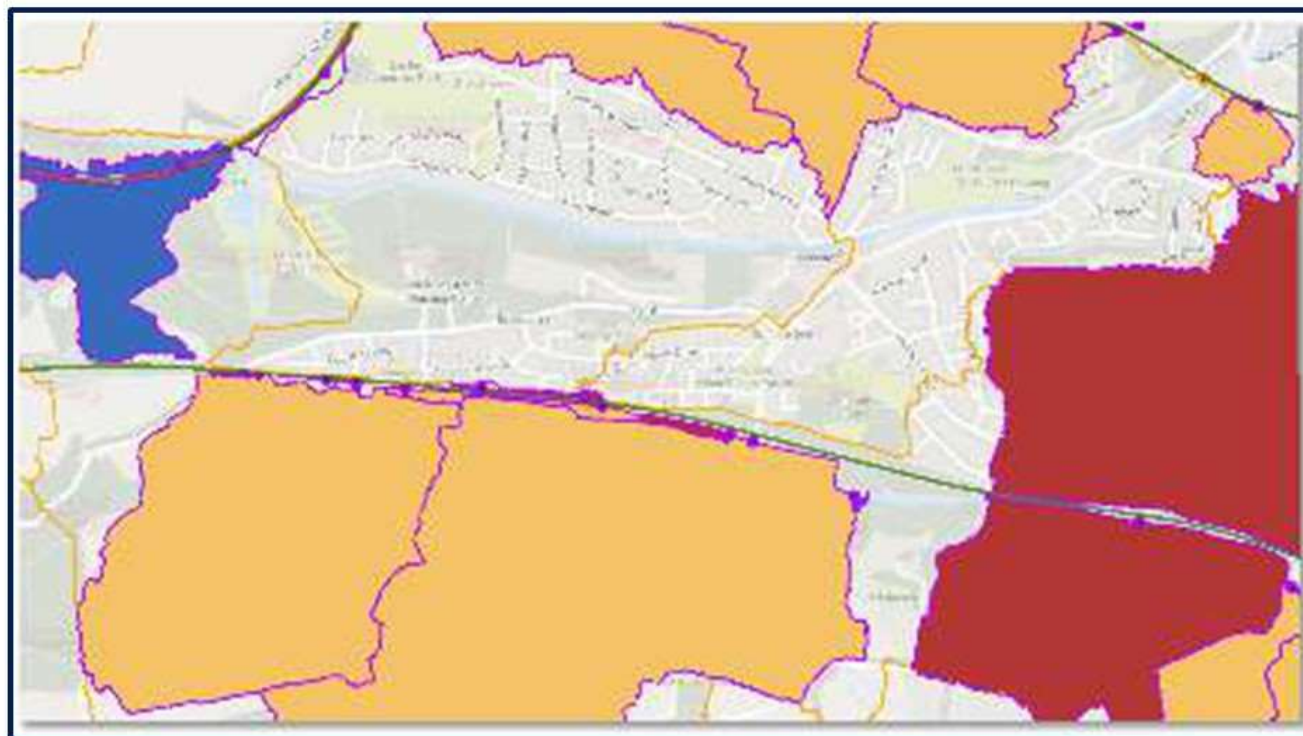
*Example of pluvial land use colouration as they will be displayed on GeoRINM Viewer*



# Water Threat Index

*Colouration applied to each polygon to identify composite water threat index banding*

<b>What is the Water Threat Index</b>	<p>Peak flow, slope and land use have been assumed to be the key parameters when considering the threat posed by surface water runoff to the railway.</p> <p>Using these inputs an indicative and regionally variable Water Threat Index has been derived.</p> <p>There are 5 tiers for the Water Threat Index in these catchment layers, each shown on as a map layer in a different colour.</p>
<b>How Have they been Calculated</b>	<p>For each catchment, the value of each criteria (Slope, Peak Flow and Land Use) is assigned a threat rating. These threat ratings are then multiplied (and weighted) to determine the WTI value for that catchment. Once WTI values have been calculated across all catchments an algorithm is applied to create WTI bands.</p> <p>This is done on a regional scale for regional data and national scale for the national data.</p>



*Example of water threat index colouration as they will be displayed on GeoRINM Viewer*



## *How does Catchment analysis data bring value?*



Repeatable automation and improved Hydrology data to understand threat



More efficient catchment related inspections and portfolio-wide threat detection



Ease of use of output data provided within NR tools



Reduction of 'Schedule 8 delay' impacts due to drainage failures



Reduced requirement for topographic survey / persons on site



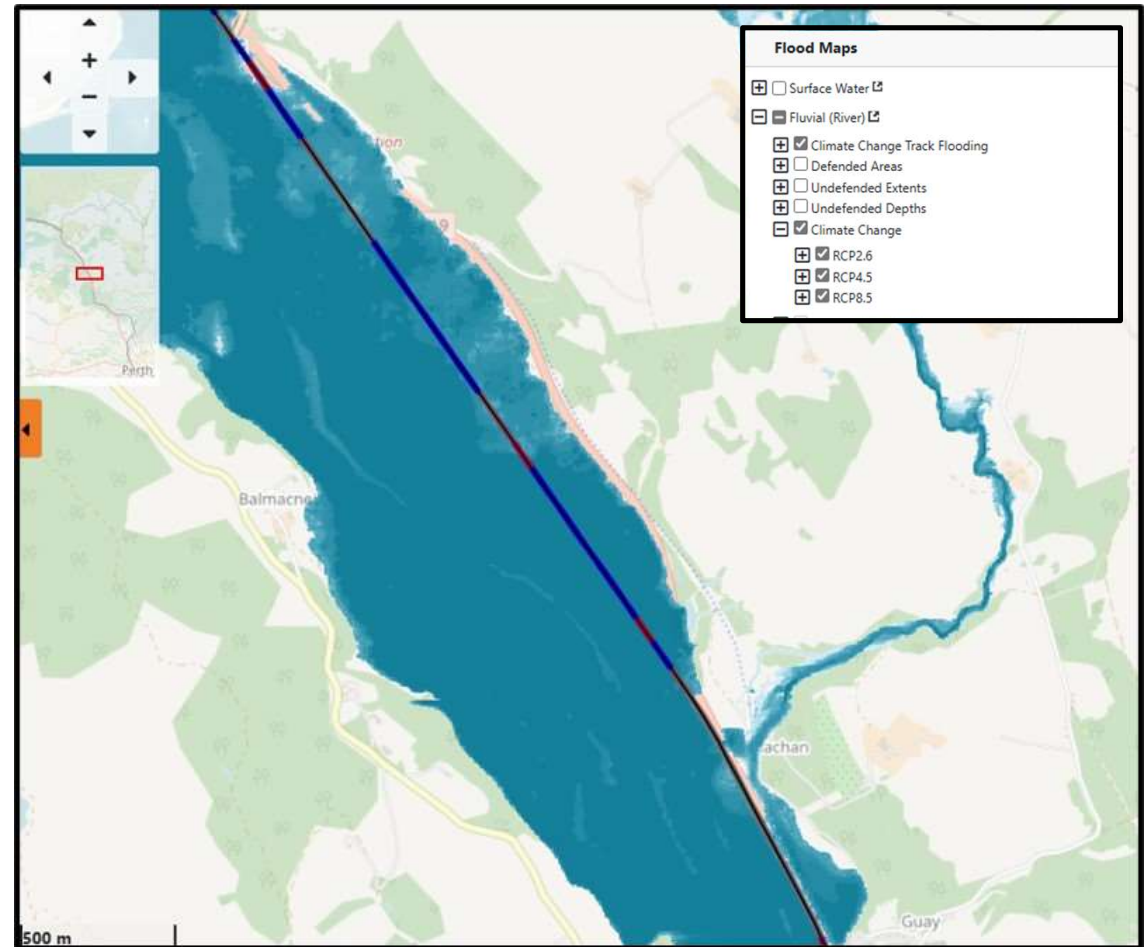
Increase two-way engagement and information sharing



# JBA Flood Risk Maps

Flood risk layers integrated into our Earthworks workbank manager system.

- Spatial layers for fluvial, surface and coastal flooding
- Mapped for three plausible futures (RCP2.6, 4.6 and 8.5)
- Each mapped to three future epochs (2030's, 50's and 80's)
- With three return periods calculated (1:75, 1:200, and 1:1000)



Example of flood risk layer accessible to NR colleagues



# Thank you

[Rachel.long@networkrail.co.uk](mailto:Rachel.long@networkrail.co.uk)



**SCOTLAND'S RAILWAY**  
BETTER IN THE MAKING



# Laura Burnett

Scottish Water



SCOTLAND'S RAILWAY







## Climate Resilience SNIFFER Flooding conference 2025

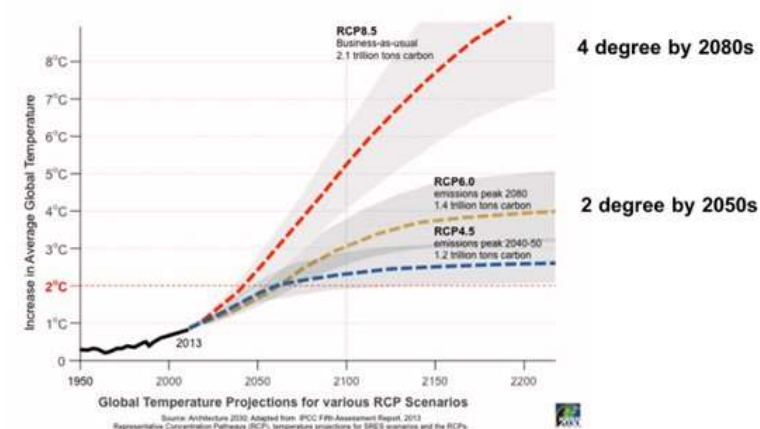
Laura Burnett

Head of Sustainability and Climate Change

<https://www.scottishwater.co.uk/About-Us/News-and-Views/2024/02/290224-Climate-Change-Adaptation>



# What future are we planning for?



*Planning for 2 degrees by 2050*

*Preparing for 4 degrees beyond 2080*



# Adaptation Approaches

2 and 4 degrees to the 2080s

## Operational Resilience

Vulnerabilities, extremes and dependencies  
Incident response  
Emergency planning  
Standby power, services, tankering, support



## Asset Resilience

Understand climate impact on long term service  
Embed climate risk models in asset management  
Asset and system adaptation pathways support cost effective investment in long-term resilience



## Service Transformation

'Value' of water as a precious resource  
Blue-green urban futures  
Resilient, regenerative natural catchments  
Intelligent Networks



Integrate with all Sectors



# Adaptation Approaches

2 and 4 degrees to the 2080s

## Operational Resilience

Vulnerabilities, extremes and dependencies  
Incident response  
Emergency planning  
Standby power, services, tankering, support

Service Continuity and Recovery:

Resilience to weather extremes



## Asset Resilience

Understand climate impact on long term service  
Embed climate risk models in asset management  
Asset and system adaptation pathways support cost effective investment in long-term resilience

Long Term Service and Investment Planning:

Climate Resilient Assets and Services



## Service Transformation

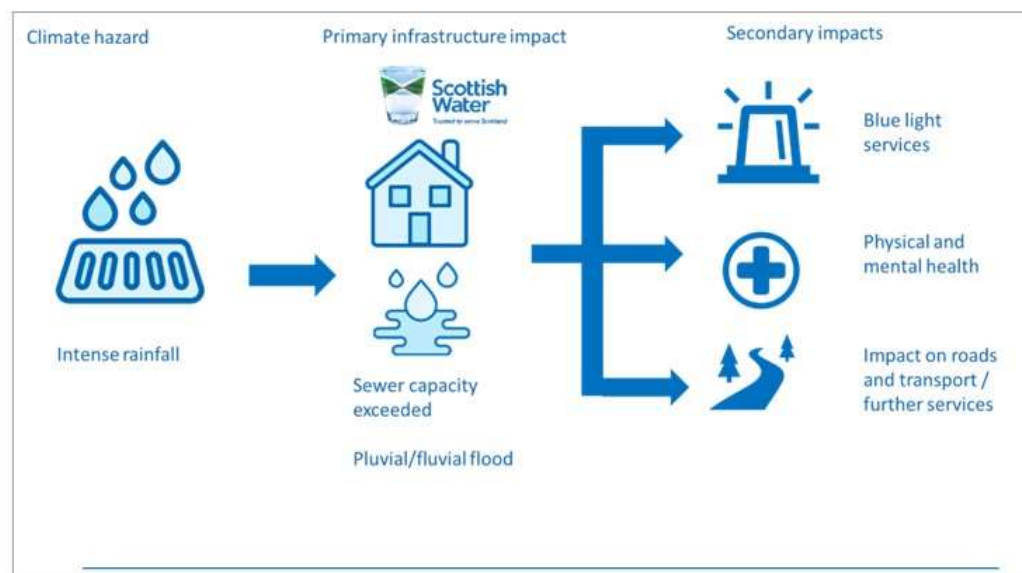
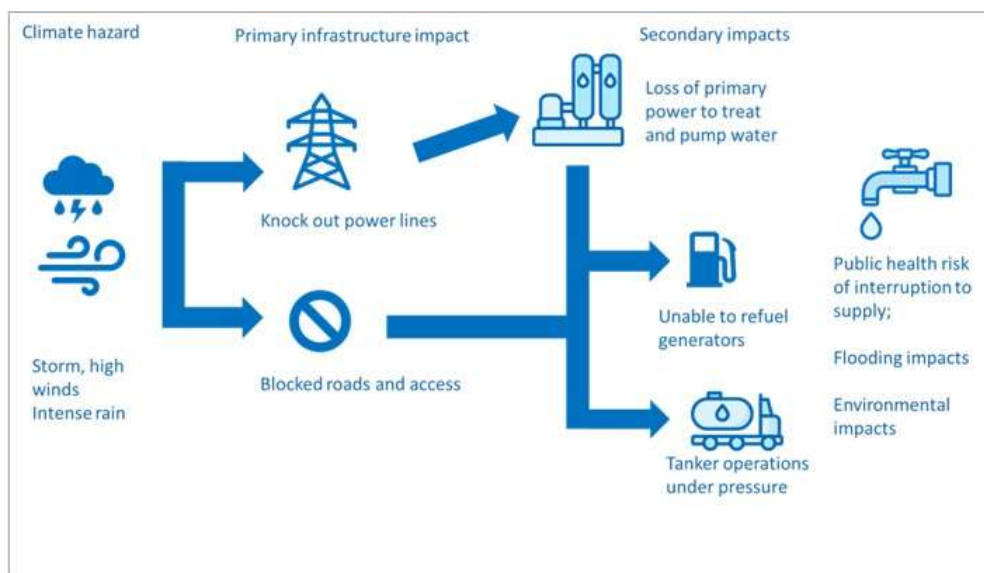
'Value' of water as a precious resource  
Blue-green urban futures  
Resilient, regenerative natural catchments  
Intelligent Networks



Integrate with all Sectors



# Example Dependencies





# Craig Thom

Scottish and Southern  
Energy Networks (Distribution)



SCOTLAND'S RAILWAY







SSEN Distribution

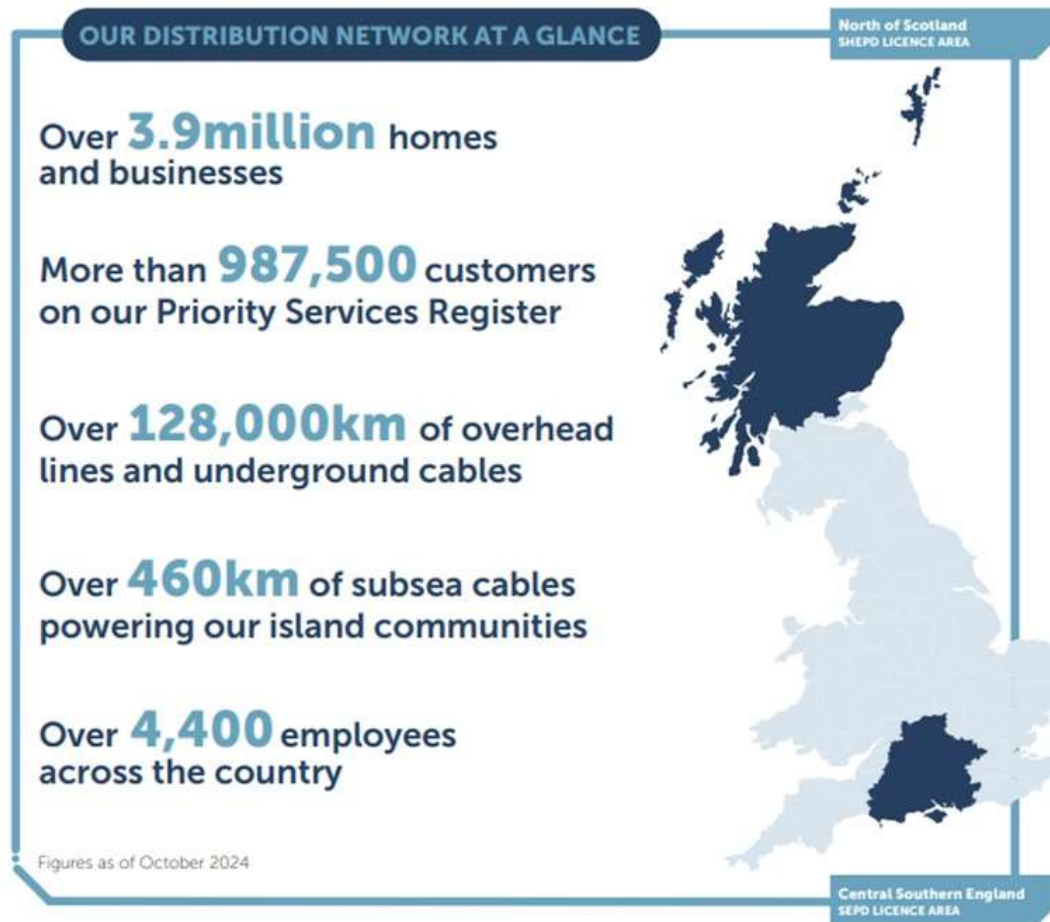
climate resilience / flood mitigation

Flood resilience conference 2025

29/01/2025



# Who we are



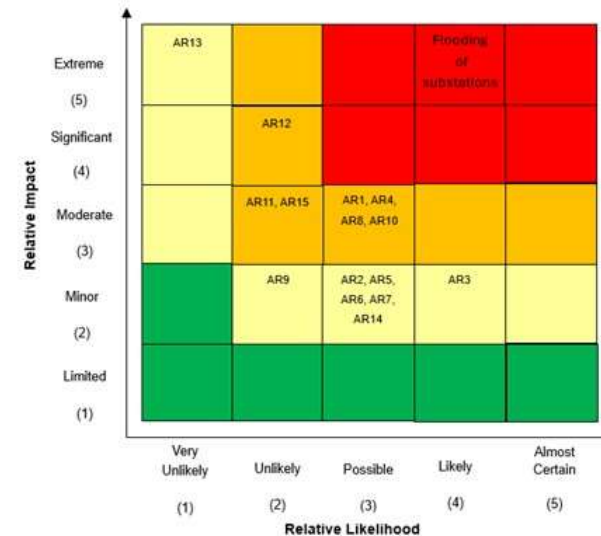
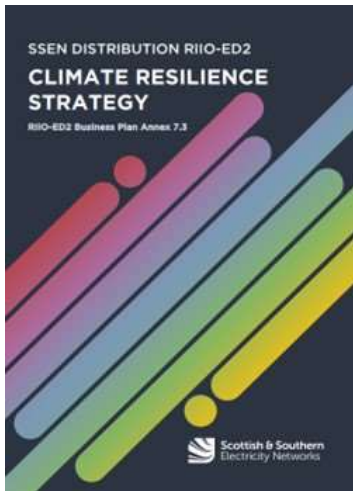
**Scottish & Southern**  
Electricity Networks



# Climate resilience

Substations affected by:

- River flooding due to increased winter rainfall.
- Pluvial (flash) flooding due to increased rainstorms in summer and winter.
- Sea flooding due to increased sea levels and/or tidal surges.
- Water flood wave from dam burst.





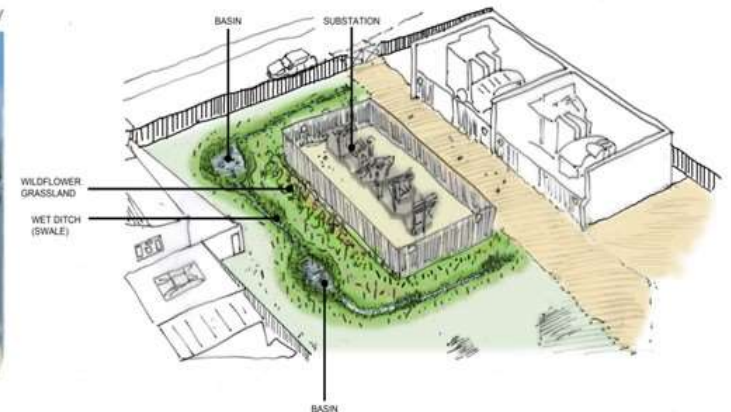
# ED2 Action – Flood Resilience

- £21.8 million pounds of funding to implement flood mitigation measures to improve the resilience of key grid and primary substations from flooding between 2023-2028.
- Assess risk and resilience of substations affected by flooding.
- Build and invest in flood mitigation measures for critical Substations affected by flooding.

Wildflowers and grass mix



Elevated substation at Drakes Way





# Olivia Lassiere

Scottish Canals



SCOTLAND'S RAILWAY





# Dr Olivia Lassiere Environment Manager



[Olivia.lassiere@scottishcanals.co.uk](mailto:Olivia.lassiere@scottishcanals.co.uk)



# Scottish Canals- who where what



## Our Assets & Visitors



**141 miles**  
of traffic free  
pathways



**19 reservoirs**  
3<sup>rd</sup> largest holder of  
reservoir water in  
Scotland



**299 properties**  
Commercial and  
operational



The Falkirk Wheel  
World's only boat lift  
The Kelpies  
World's largest equine sculptures



**1,500 hectares**  
land and water



**2,700**  
Engineering assets  
including bridges,  
aqueducts and locks

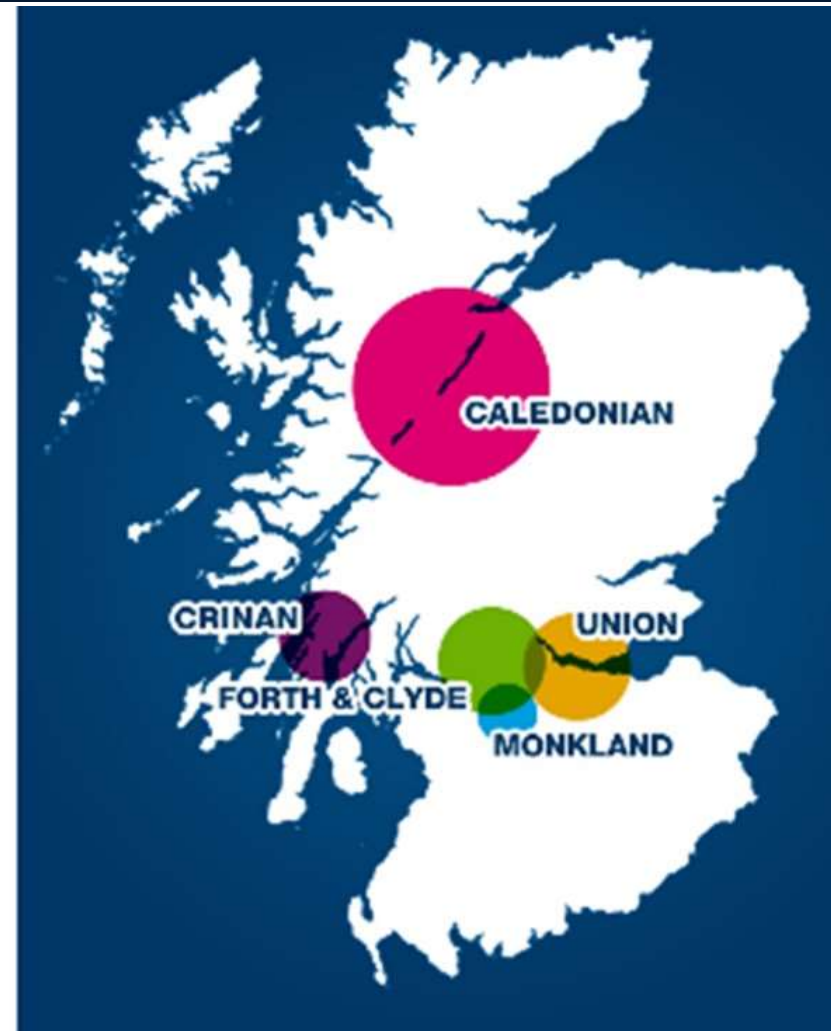


**5**  
lighthouses



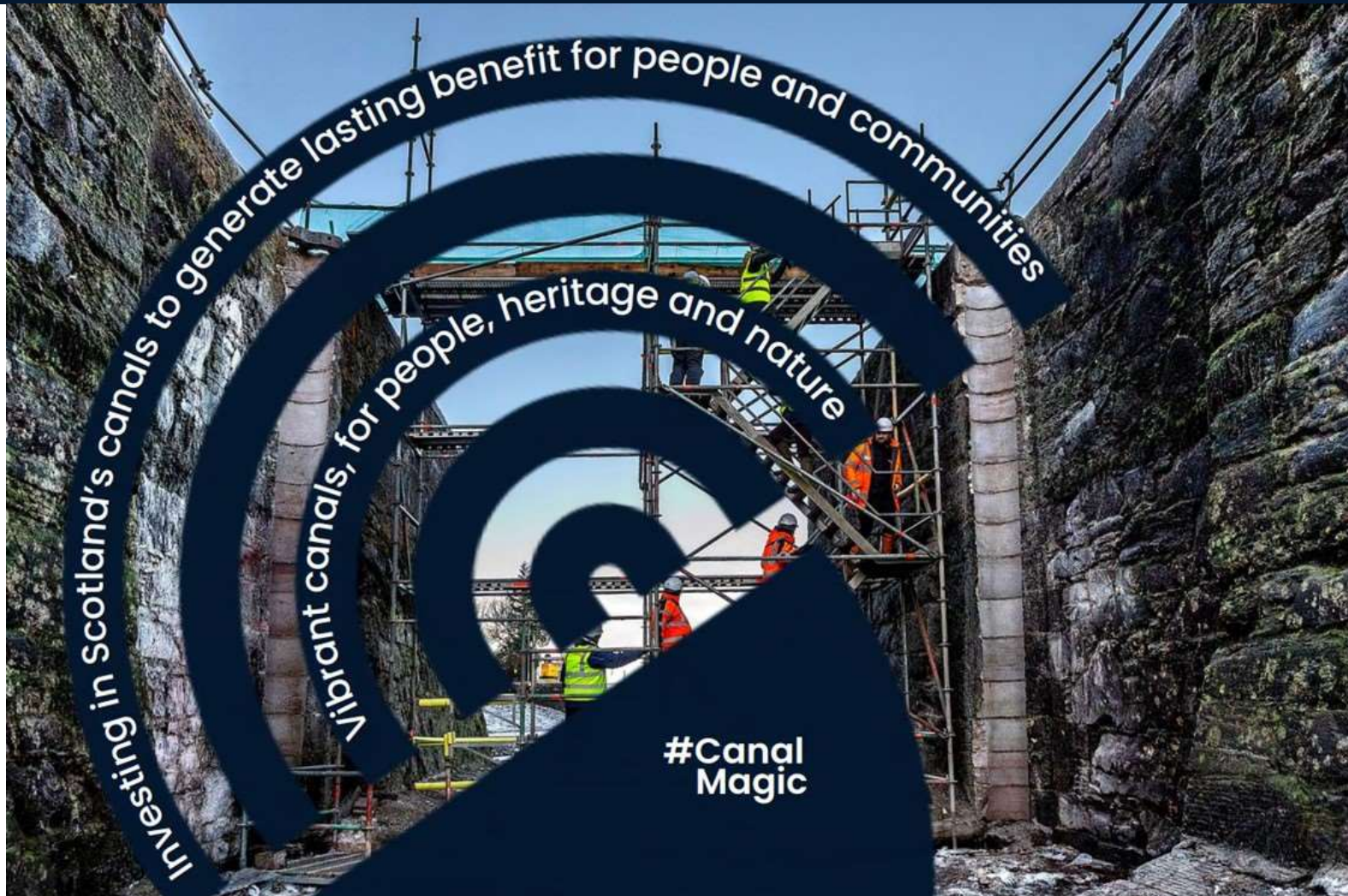
Diverse  
ecosystems

**20 million** visits per year from a diverse group...





# Better lives by water





# Scottish Canals – our places





# Scottish Canals– flooding impacts



Union Canal east of  
Linlithgow – breach 2020,  
repair, adaptation





# Asset management



## Climate risk assessment

We completed a desk-based assessment of climate risk on our built assets in 2019 which informs asset maintenance priorities.

## Adaptation planning

Our 2023-28 Corporate Plan commits to the development of:

- a Climate Change Resilience Strategy by 2028.
- Water Stewardship Action Plans by 2028

Asset Management Strategy 2018-2030  
Asset Management Plan 2021-24 and Asset Investment Tool to inform asset investment decisions

Draft Scottish National Adaptation Plan 2024-29 – Scottish Canals p. 65-66

Adaptation Scotland : Capability Framework- case study p.27

## CASE STUDY: SCOTTISH CANALS

Flexible planning to manage uncertain climate impacts: Peter Robinson is the Head of Engineering at Scottish Canals. A flexible and responsive approach to asset management is helping ensure that Scotland's network of canals is maintained to ensure long term safety and sustainability.

'We are responsible for managing over 4100 assets that comprise our five Scottish canals, as well as the landmarks like the Falkirk Wheel and the Kelpies that make up Scotland's inland waterways network. Much of this 140-mile network is inland, with only 6 coastal miles of the network vulnerable to rising sea levels. The rest of the network is resilient to climate change impacts in the short term, and can even contribute to resilience more broadly through initiatives such as the Glasgow Smart Canal Project. The Smart Canal is helping to manage flood risk and move water resources during projected hotter and drier summers (PI18).

Each one of our diverse assets has unique management and maintenance challenges which must be addressed to ensure that they remain safe and available for the millions of visitors who use our network each year. In the long term climate change will alter the way our assets deteriorate, and our

Asset Management Strategy ensures that when making management decisions we now take climate impacts into consideration, such as potential changes in rainfall, temperature and extreme weather that will contribute to the deterioration of assets. (PI20)

To respond to uncertainty around how climate change will interact with our assets in the long term, we have developed a flexible planning approach to emerging risks (PI20). The Asset Management Strategy outlines how we will manage our priorities until 2030 to ensure the safety and long term sustainability of our assets. This long-term strategic Asset Management Plan that is reviewed and updated on an annual basis. This flexible management cycle allows us to take new and emerging risks into account, including those related to climate change (PI4A).



Our approach combines long term planning with short-term flexibility and risk-based responsiveness. Climate change will bring new, and sometimes unexpected, challenges that may threaten the safety of the public or cause disruption to interconnected transport infrastructure if not addressed. Our flexible, risk-based approach to asset management is agile and responsive to direct and indirect climate impacts, allowing us to prioritise and plan a work programme that keeps Scotland's canals safe and productive.'

Scottish  
Canals

Using Adaptation Scotland's Capability Framework – indicate where you think your organisation is on its adaptation journey – but feel is encouraged! Move the red boxes to the position that best reflects your thoughts.





# Scottish Canals – multiple benefits through partnership



Metropolitan  
Glasgow  
Strategic  
Drainage  
Partnership



# What is the Glasgow Smart Canal?

Also known as

## North Glasgow Integrated Water Management System



### Flood mitigation and regeneration enabler

Uses 250-year-old Forth & Clyde Canal in Glasgow to manage storm water run-off in North Glasgow



### Digital surface water drainage system

Unlocks 110ha land in North Glasgow – potential for regeneration and development of 3000 homes



### £17m partnership project

Scottish Canals, Glasgow City Council, Scottish Water under auspices of Metropolitan Glasgow Strategic Drainage Plan



### Flood water capacity

100mm canal level lowered  
55,000 m<sup>3</sup> capacity  
22 Olympic swimming pools  
CO<sub>2</sub> emissions reduction

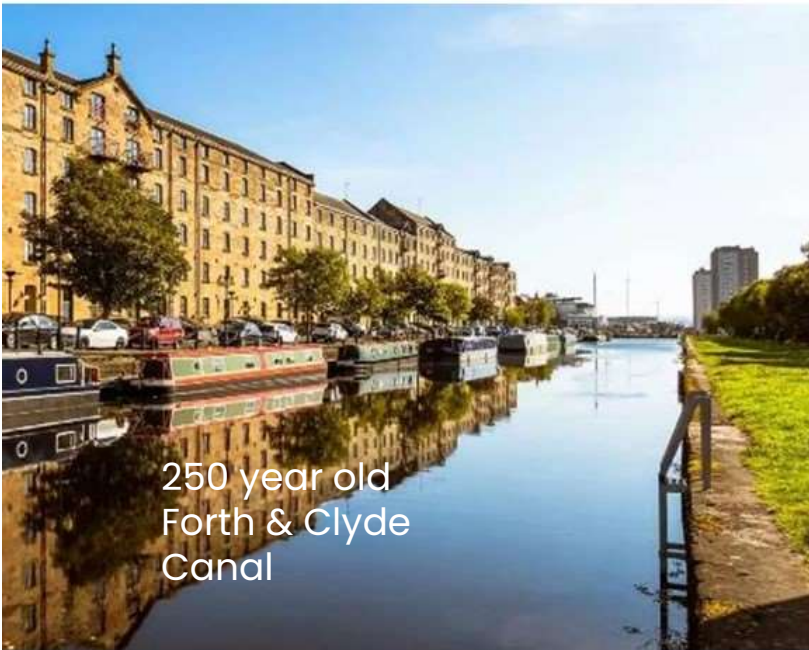


### Spaces for nature and people

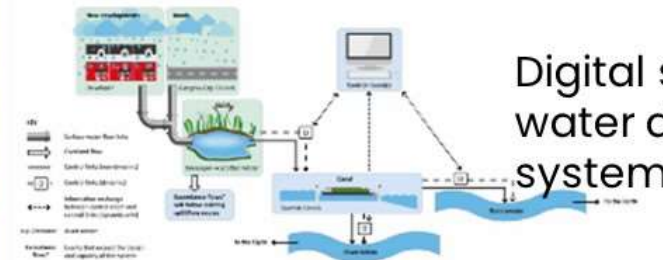
Sustainable urban drainage infrastructure  
Hamiltonhill Claypits inner city nature reserve



# Glasgow Smart Canal: European first



250 year old  
Forth & Clyde  
Canal



Digital surface  
water drainage  
system



Upgraded  
existing  
infrastructure



New Sustainable Urban Drainage

Urban space for  
nature and people



Unlocks  
development  
potential 3000  
homes



<https://youtu.be/MFykgGeee1o>



# Glasgow Smart Canal

Short film

30 secs



# Other partnership projects



North Lanarkshire Council

## Kilsyth Flood Protection Study

Non-Technical Summary Report

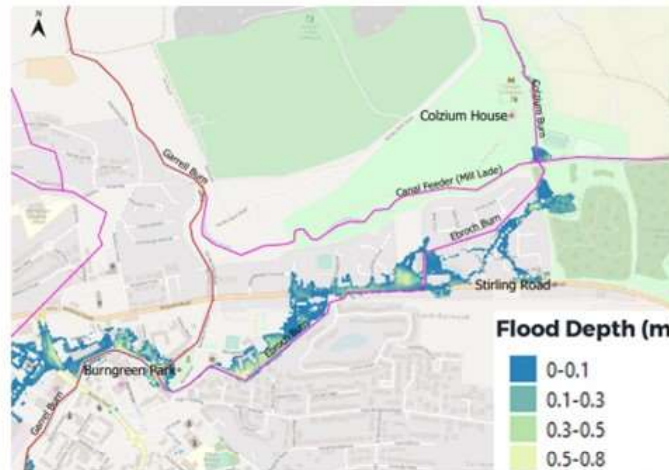


Figure 2-4 - 1 in 200 year plus climate change (+44%) flood depth and extent



Figure 4-1 - Preferred Long Term Option



Part of  
**SCOTLAND'S RAILWAY**  
BETTER IN THE MAKING

Glasgow



# Workshop



SCOTLAND'S RAILWAY



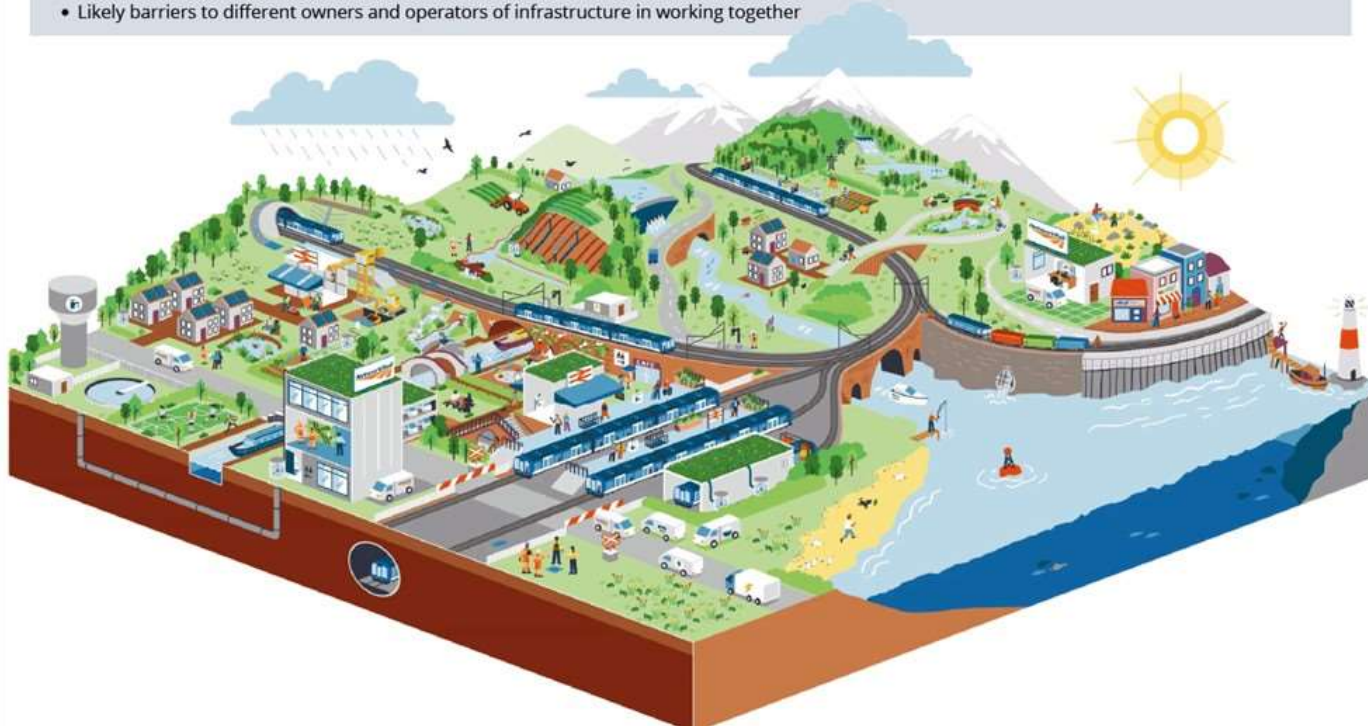


# Activity 1

## Water Management Workshop - Activity 1

We depend on a complex system of infrastructure and services in our day to day lives - some visible, some hidden. All of which can be vulnerable and/or exposed to the presence of too much, or too little, water. On the scene below, highlight pinch points where having too much, or too little, water could result in disruption to infrastructure and associated services. Consider:

- Varying levels of exposure and vulnerability of different infrastructure types to too much (e.g., flood) or too little (e.g., drought) water.
- Interdependencies between different types of infrastructure
- Likely barriers to different owners and operators of infrastructure in working together





## Water Management Workshop - Activity 2

**Task:** Set a scenario in which you are a national infrastructure operator or owner with a water-related issue (too much or too little). Build a map of stakeholders you would want to engage with to resolve the issue you have set. Annotate the map where helpful, and use the boxes to group stakeholders.

National

Write your scenario here

Regional

Local

Other

Feel free to use this scenario if struggling to come up with one

**Example scenario:** An infrastructure operator has a particular asset that is frequently impacted by flooding. The preferred solution to addressing this issue would be a catchment scale initiative to address not only the impact on the asset directly, but issues with flooding in the surrounding area.

# Activity 2





# Roundup



SCOTLAND'S RAILWAY



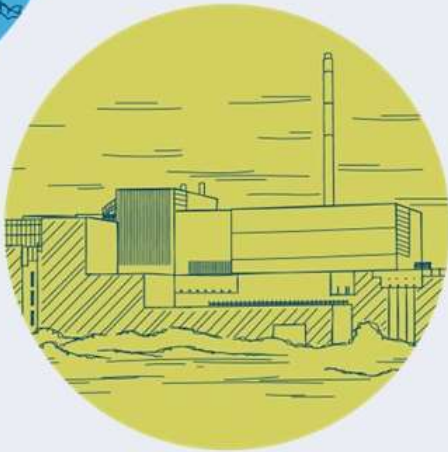


# Scotland's Flood Resilience Conference 2025

## Breakout K – Tools to support creating flood resilient places

Ruth Wolstenholme, Sniffer (Chair), Cat Payne, Sniffer; Kat Hasler, Scottish Government and Laura Hainey, Architecture & Design Scotland





# Using story maps: To create flood resilient places

29 January 2025



# CRSES overview

- The Edinburgh and southeast Scotland City Region:
  - home to 26% of Scotland's population, an important centre of commerce, culture and government, and has landscapes and heritage of global significance.
- **CRSES is the first Climate Risk and Opportunity Assessment for the Edinburgh and South-East Scotland City Region, combines multiple strands of evidence**
- 18-month collaboration - results to be published end March 2025
- Will enable the 6 local authorities (Fife, Borders, Midlothian, City of Edinburgh, West Lothian and East Lothian) **to identify priority actions needed regionally to increase resilience**
- **Where can progress be best made by working together?**
- **Not a replacement for local adaptation action**
  - builds on work being done in each local authority and
  - provides a regional framework / economies of scale / builds the evidence base / case for cross-boundary collaboration

## Project partners

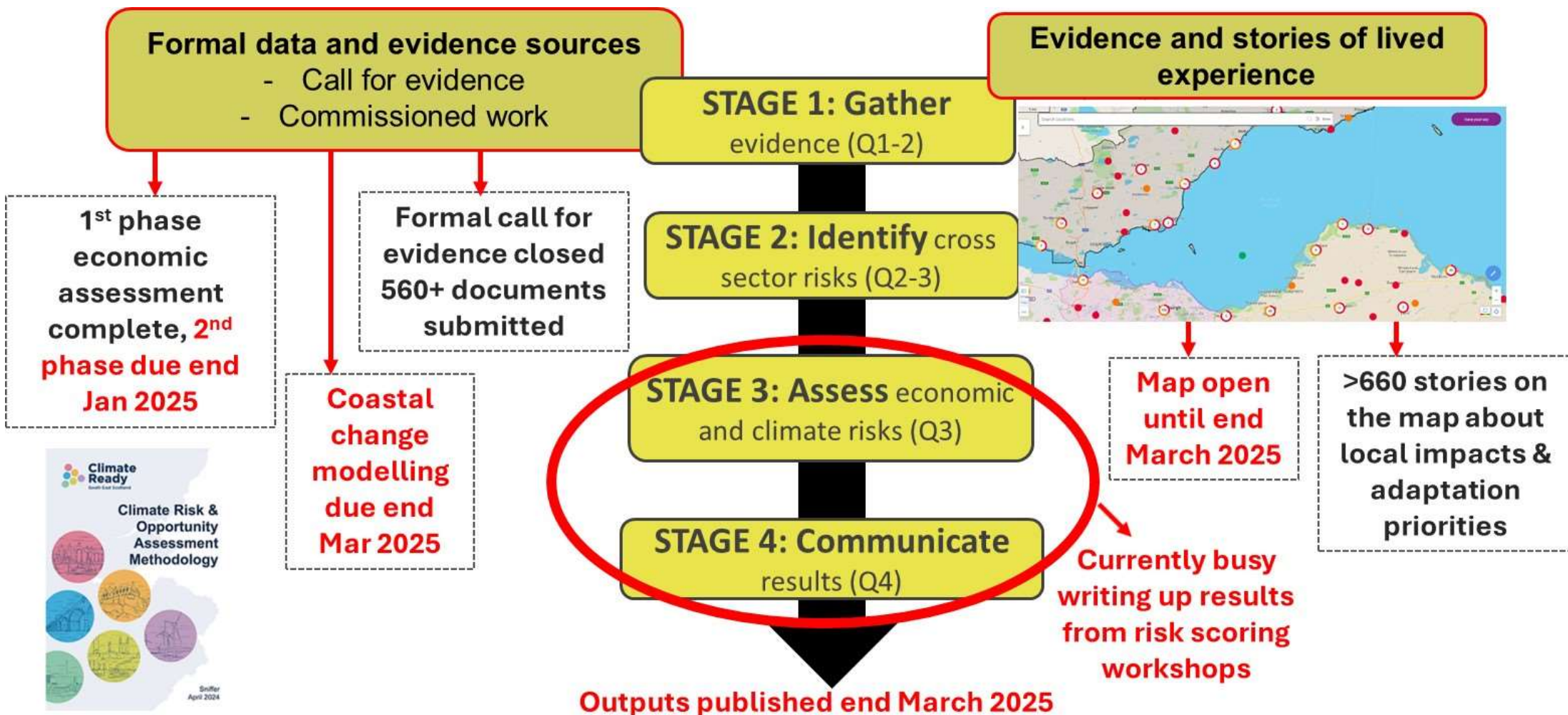


## Project funders





# Timeline and approach





# Why collect 'weather & climate stories?'

- Climate change will be experienced differently across the region, and within communities
  - Impacts could cascade across sectors and organisations, and across regional boundaries
  - Marginalised and disadvantaged segments of the population likely to **be most vulnerable but also least likely to engage with formal consultation activities**
- Academic studies and formal risk assessments don't capture the human stories of flooding and climate change
  - These are powerful motivators for action (more so than facts and graphs)
  - Collecting stories provides valuable opportunities to raise awareness of resilience actions people can take themselves, and raise awareness of adaptation
- Vital that the risk assessment gathers local knowledge and organisational experiences so that regional adaptation action is prioritised where it is most needed and has broad support from the public



# What are story maps good for?

- Gathering local sentiment:
  - What are people worried about? Where? Are people seeing positive changes? Why?
  - How are impacts cascading and affecting peoples' daily lives and wellbeing?
- Identifying locally-appropriate adaptation that has community support:
  - What do people want done? Have previous actions not achieved the desired results?
  - What other issues are communities worried about? Can we find win-win solutions?
- Gauging levels of understanding around climate issues:
  - Do people understand the issue/s? Is there understanding of appropriate adaptation?
  - Or are people blaming scapegoats? Do we need to raise awareness / educate?
- If a map is in place long-term, creating a record of change (either in climate conditions or sentiment)
- All the above can help identify priority communities (whether demographic or geographic) for adaptation support



# Which platform?

- CRSES used Commonplace
- We found the process smooth and user-friendly,
- good support from the Commonplace team,
- much easier to use for novices than ArcGIS or QGIS
- but not the cheapest option
- Other projects have had good results from
  - Green map
  - Social pinpoint
  - Placebuilder

Link	Google Earth/Maps	Mapbox	QGIS	ArcGIS	Green Map	Bang the Table etc.	Common Place	Social PinPoint	Placebuilder
Platform	Google Earth/Maps	Mapbox	QGIS	ArcGIS	Green Map	Bang the Table etc.	Common Place	Social PinPoint	Placebuilder
Cost	Free	Free (for what we want)	Free	Subscription	Free	Subscription	Subscription	Subscription	Subscription, paid screens available
Financially viable at small scale?	Yes	Yes	Yes	Mod	Yes	No - TBC (City scale)	No - TBC (City scale)	No - TBC (City scale)	TBC
User-friendly?	Simple	Moderate-Challenging	Moderate-Challenging	Challenging	Simple	Moderate	Easy - access to support team	Easy - access to support team	Easy - access to support team
Longevity - can be continually updated?	Yes	Yes	Yes, LA use?	Yes	Yes	No, only available during consultation events (not controlled)	No, only available during consultation events (not controlled)	No, only available during consultation events (not controlled)	No, only available during consultation events (not controlled)
Public access to content	Yes	TBC	No	No	Yes	Yes, can be controlled	Yes, can be controlled	Yes, can be controlled	Yes, can be controlled
Plot? Mark? Glow?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Visual engagement	Basic	Basic or ads but requires coding	Technical but can set up visual styles	Technical but can set up visual styles	Moderate	Advanced	Advanced	Advanced	Advanced
Tag Photo?	Yes, basic	Yes	Yes, basic	Yes	Yes	Yes? TBC	Yes? TBC	Yes? TBC	Yes? TBC
In-Built Knowledge/Reporting Capacity?	No	Yes, limited	No	Yes	Limited - can run campaigns	Yes	Yes	Yes	Yes
Knowledge sharing capacity (Direct + Knowledge Base + Reportable Format?)	Indirect	Indirect	Direct	Direct	Indirect	TBC - investigate the format and ownership details	TBC - investigate the format and ownership details	TBC - investigate the format and ownership details	TBC - investigate the format and ownership details
Ability to incorporate other info, e.g. technical layers	No	Limited	Yes	Yes	No	No? TBC	No? TBC	No? TBC	No? TBC
Data Protection/ Consent	No	Yes	Yes, but further agreement would need to be in place	Yes, but further agreement would need to be in place					



# Engagement via trusted partners

- **‘If you build it, they will come’**
  - No, this isn't field of dreams
- Need to drive people to the map
- Vital to work with local partners who know communities
- We provided small grants to the region's climate hubs to support them to gather stories through a range of approaches
  - We also created a shared engagement toolkit and training for hubs to reach out on climate risk and adaptation
- If there are specific groups, you want to reach, best to piggy-back on existing events where you'll find them
- Reach out to organisations with large numbers of staff and important facilities within a location
  - Newsletter text, social media posts, physical posters!



**East Lothian Climate Hub**



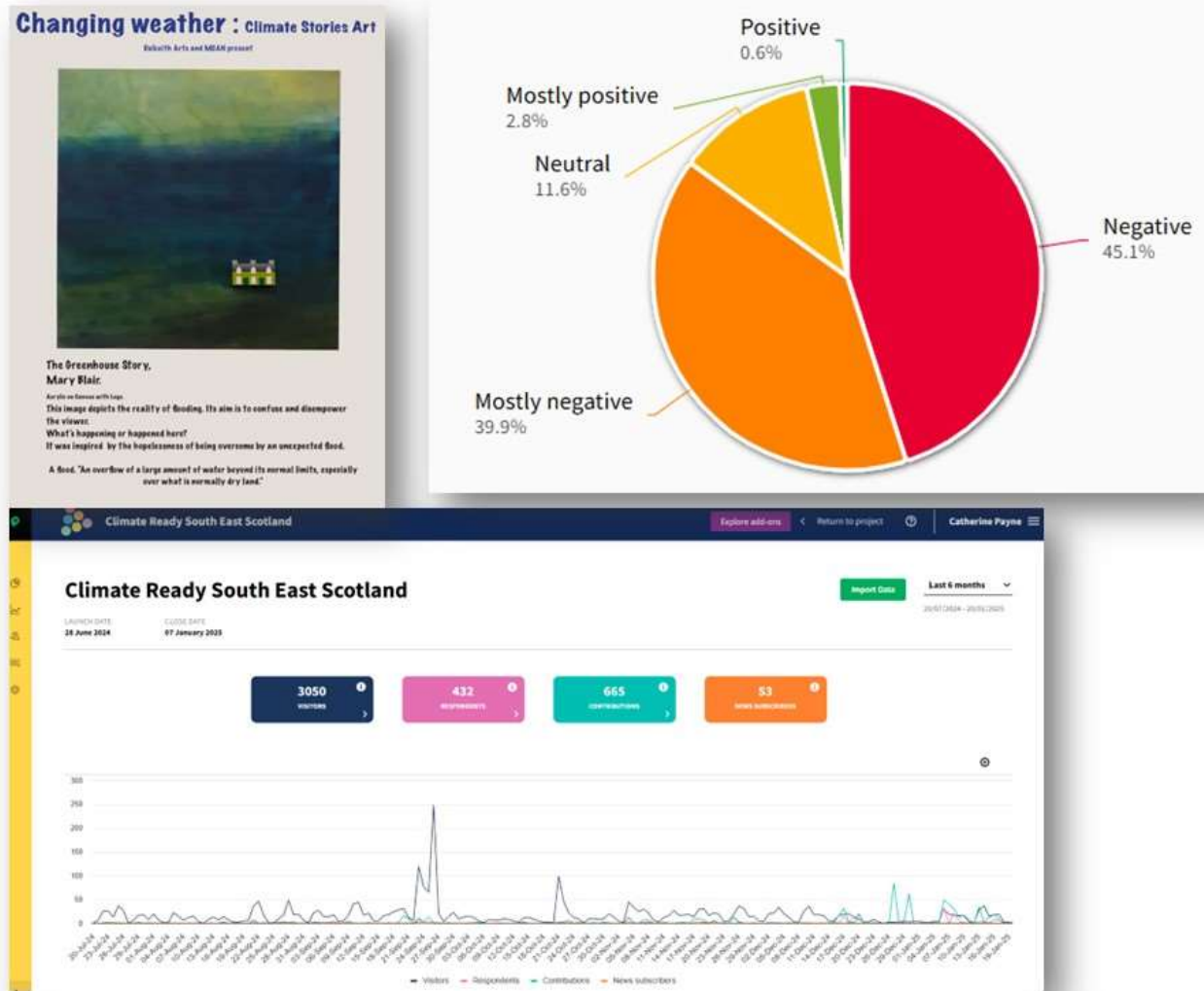
# Accessibility

- Plain English, clear simple questions – no jargon
- Framing is important
  - Talking about “extreme weather” and “changes at the coast” was more helpful than “climate change impacts” or “pluvial flooding”
  - Not asking directly if people thought an impact was a result of climate change, better to ask, “how is your place coping with extremes today?” “Are you noticing change?”
- Provide alternative analogue means for people to add stories
  - 1000 blank story map postcards used at events
  - Approximately 50% of stories gathered this way
  - Deciphering handwriting is a lost art and can be time intensive - but back end of platform allows them to be added in bulk
- Invaluable for building relationships with communities and understanding nuance

A photograph of a single story map postcard that has been filled out with handwritten text in black ink. The postcard is divided into sections with bold headings. The text describes a flooding event in December 2022 near Mavisbank Estate, where the river North Esk flooded about 6 feet higher than usual, washing out most of the path. The writer suggests creating a new path along higher ground and helping homeowners install flood defences or create overflow catchments. The postcard also includes a footer with the website [climatereadysyes.commonplace.io](http://climatereadysyes.commonplace.io) and [climatereadysyes.org.uk/about/](http://climatereadysyes.org.uk/about/).



# More than just 'stories'



- A picture says a thousand words
  - Not just stories, platform allows people to share photos too
  - Climate hub events provided great opportunities for gathering images
- Platform supports sentiment analysis
  - 85% of those adding stories felt negative or mostly negative about the changes they were seeing
- Platform analytics help maximise engagement
  - When are we seeing the most stories?
  - Who is missing?
  - What encourages people to share their observations?



# The stories speak for themselves

- Change is happening now, and impacts are being seen across the region
- People are scared by the pace and scale of change they are seeing
- People living on the coast or in areas at risk of flooding are worrying that their homes will be worthless or gone, some are actively considering selling up
- Seeing impacts on wellbeing not just from being directly affected by flooding, but also from fear of flooding
- Vulnerable population groups are being isolated by the fear of, or reality of extreme rainfall, coastal change and flooding
- Cascading consequences of flooding are myriad, varied, unequally distributed and hard to predict



# Lives are being impacted today

I have a mobility scooter, and I used to go out every day, now I only go out on Thursdays because it's too wet for it. I can't risk being stuck in a flood - I'm isolated now

It floods so bad now that the road gets shut ... Sometimes I can't get out of the village to pick up my daughter from school in the other village. This is really stressful.

Higher sea levels and a succession of autumn storms from the north and the east are causing erosion on the sea front - it is very disturbing when you see the changes happening and so fast.

Very heavy rainfall brought down a lot of water from the Bathgate Hills, and caused our garden to flood. Had we not broken down a garden wall, the whole house would have been flooded.



# People are worrying for the future

I work for an estate agency ... We are becoming wary of showcasing coastal properties on social media as ... they get hundreds of (public) comments about ... damage to Fife's coast, or that the house won't be there in 20 years time.

*This is alarming vendors and probably also putting off buyers.*

Increasing bouts of heavy rainfall have led to overtopping of defences... and flooding of doorsteps and halls... The community feel insecure, uncertain and unprepared. *How much worse is this going to get?*

We have a coastal home and ... *we wonder how long this home will be safe* and if in the future it will be possible to get a mortgage or insurance. *Should we sell?* But I feel guilty that this is passing the problem onto someone else.



# Impacts cascade

The road between Blackridge and Armadale is often flooded. ... You have to stop to let others pass in the middle of the road and others who are not paying attention bombing along at 50+ are at **risk of crashing into the back of other cars.**

I organise a local football group, and it is increasingly difficult to organise matches and practice sessions as the wind and the rain is so unpredictable. It makes playing conditions unpleasant and travel potentially dangerous. I am concerned about how **these changes are affecting day to day activities that we used to take for granted.**

Working on a construction site in East Lothian, we were overwhelmed by a serious storm which caused lots of damage to roofs and houses partly constructed. The groundworks were flooded. It impacted every trade on the job, it was too dangerous to work and caused lots of setbacks to the work programme which is **very costly as we are self employed.**



# Low awareness

- There is a lack of understanding of how flooding can be managed and on climate change generally
- Not uncommon to see responses such as 'clear the drains' or 'build a flood wall'
- People want to make their place more resilient but don't know what the options are
- **When people do understand holistic methods to mitigate flood risk, they are keen!**
- But real support for greening the grey in an urban setting, and landscape management for water resilience rurally
- **We have work to do on comms and engagement**

Prestonpans and Edinburgh have recently been experiencing aurora borealis and as gorgeous as they are, it goes to show how much the climate is changing if we are seeing them all the way out here.

I can't wait for this mythological global warming to kick in so that we can ... grow vineyards like the romans used to along the Antonine wall - what saw the end of that?  
The rise in popularity of 4 horse aurigae?

...lack of maintenance of the drainage system so autumn leaves clogged drains resulting in flooding that would have been handled by clear drains

I can't say I've seen any change over my lifetime... all I have seen is a decrease in the quality of our weather reports ... We now scare people by putting Yellow, Amber or Red warnings out for weather that was once deemed 'normal'.



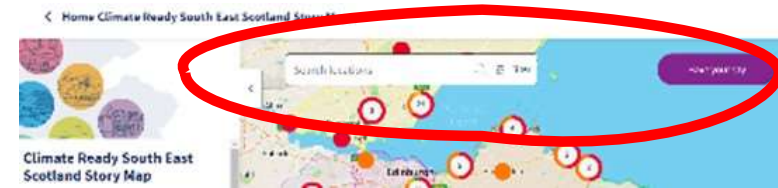
# Useful lessons for flood practitioners

- We are still gathering stories, and have yet to do a deep dive analysis of the story map contributions, but a quick data review of stories collected by 20/01/25 shows:
- 281 stories about flooding observed directly or in their community (41% of all stories)
- 328 stories concerned about heavy rainfall and have observed a shift toward more intense rainfall events (48%)
  - It's not just those who have been flooded who are worried
- 100 stories about coastal change observed in their locality (15%),
  - 99% of whom saw this as negative / very negative. Clearest cut indication of sentiment
- Surprisingly few climate sceptic comments (<2%), people from all walks of life are seeing changes and are feeling unsafe / worried

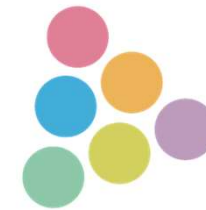
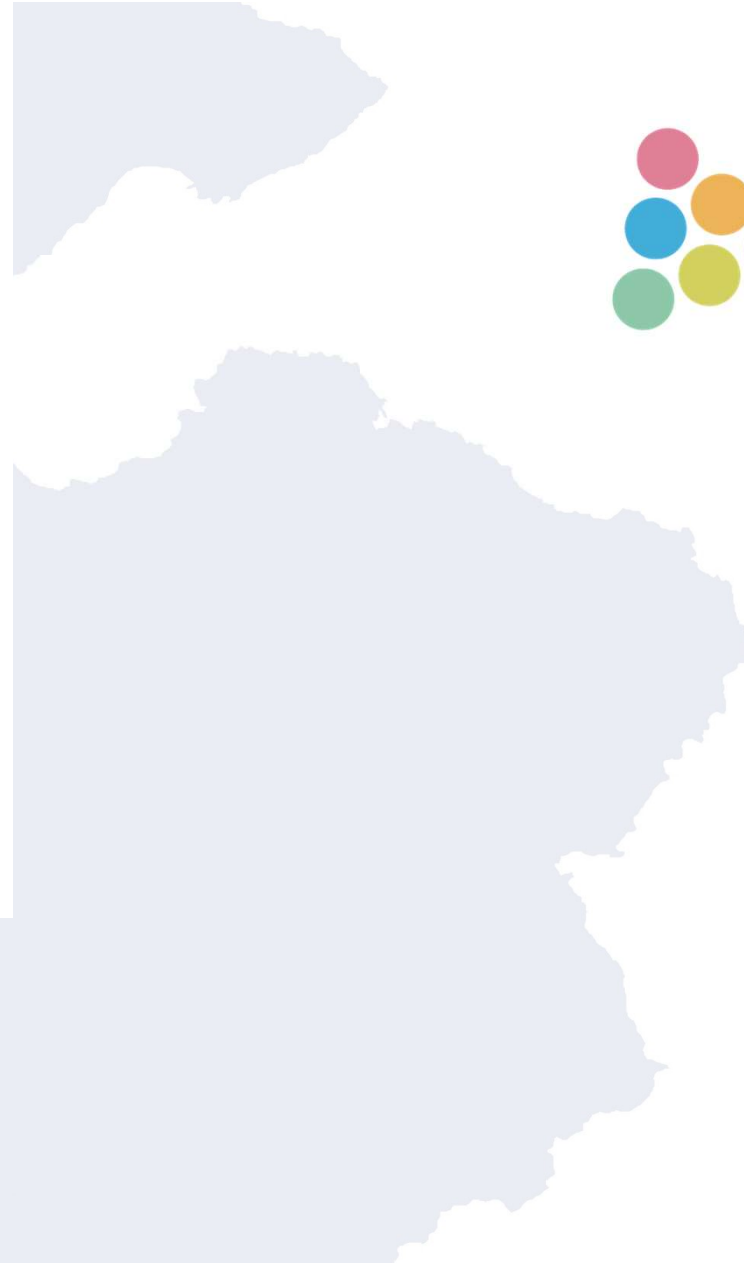


# Put your story on our map

- It takes 2 minutes to share your experiences and / or photos climate impacts **via our story map**
  1. Scan this QR code with your phone camera or use this <https://climatereadyses.commonplace.is/map/climate-ready-south-east-scotland-story-map>
  2. Click the purple 'Have your say' button, or type the place name into the search box
  3. Answer the questions, add photos if you have them, please provide as much detail as you can
  4. You will receive a confirmation email to the email address you used **PLEASE CLICK THIS LINK** otherwise your story won't be added to the map
- If you are not sure what a climate story is, have a look at some of the other stories already on the map







**Climate  
Ready**  
South East Scotland

**Thank you**

[cat@sniffer.org.uk](mailto:cat@sniffer.org.uk)

[climatereadyses@sniffer.org.uk](mailto:climatereadyses@sniffer.org.uk)



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for a resilient Scotland

Venture trading as Sniffer  
Scottish Charity No SC022375  
Company No SC149513



**Architecture &  
Design Scotland**

Ailtearachd is Dealbhadh na h-Alba

# Climate Action Towns Toolkit



Tools to support creating flood  
resilient places

Laura Hainey, A&DS





# At Architecture and Design Scotland we



Promote the value of good architecture and design



Support policy implementation through people-centred design



Facilitate collaborative, place-based design processes



Provide climate conscious design advice on places and buildings



Gather and share learning for lasting change in policy and design practice



# Climate Action Towns

As half of Scotland's population lives in towns, it is vital that they are part of the climate conversation.

The aim of Climate Action towns was to work with communities and other stakeholders to identify the best ways to embed climate actions in their towns.

The focus was to start with people and place, to understand what was right for both





**Climate**

**Action Towns**

**Toolkit**





# 1. Start with what matters to your community



Stakeholder Mapping to understand who should collaborate



Launch meeting template/ Working together agreement





## 2.

## Understand the Climate Risks in your place



Place Standard with  
a Climate Lens



Adaptation  
workshop template



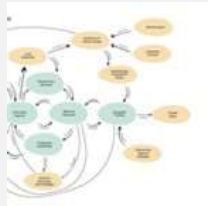


# 3

## build Capacity and Collaboration



Community  
Capacity Building



Systemic enablers  
and barriers to  
climate action

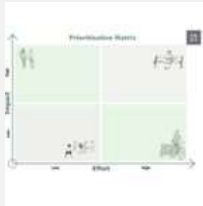




## 4. Develop Ideas for Action



Crazy 8 ideation game or 8 Principles of a Carbon Conscious Place Mapping



Prioritisation and ownership workshop (adaptation workshop 2)





## 5.

# Making Climate Actions Happen



Develop a Local Place plan to embed climate actions



Learn from others' examples and learning



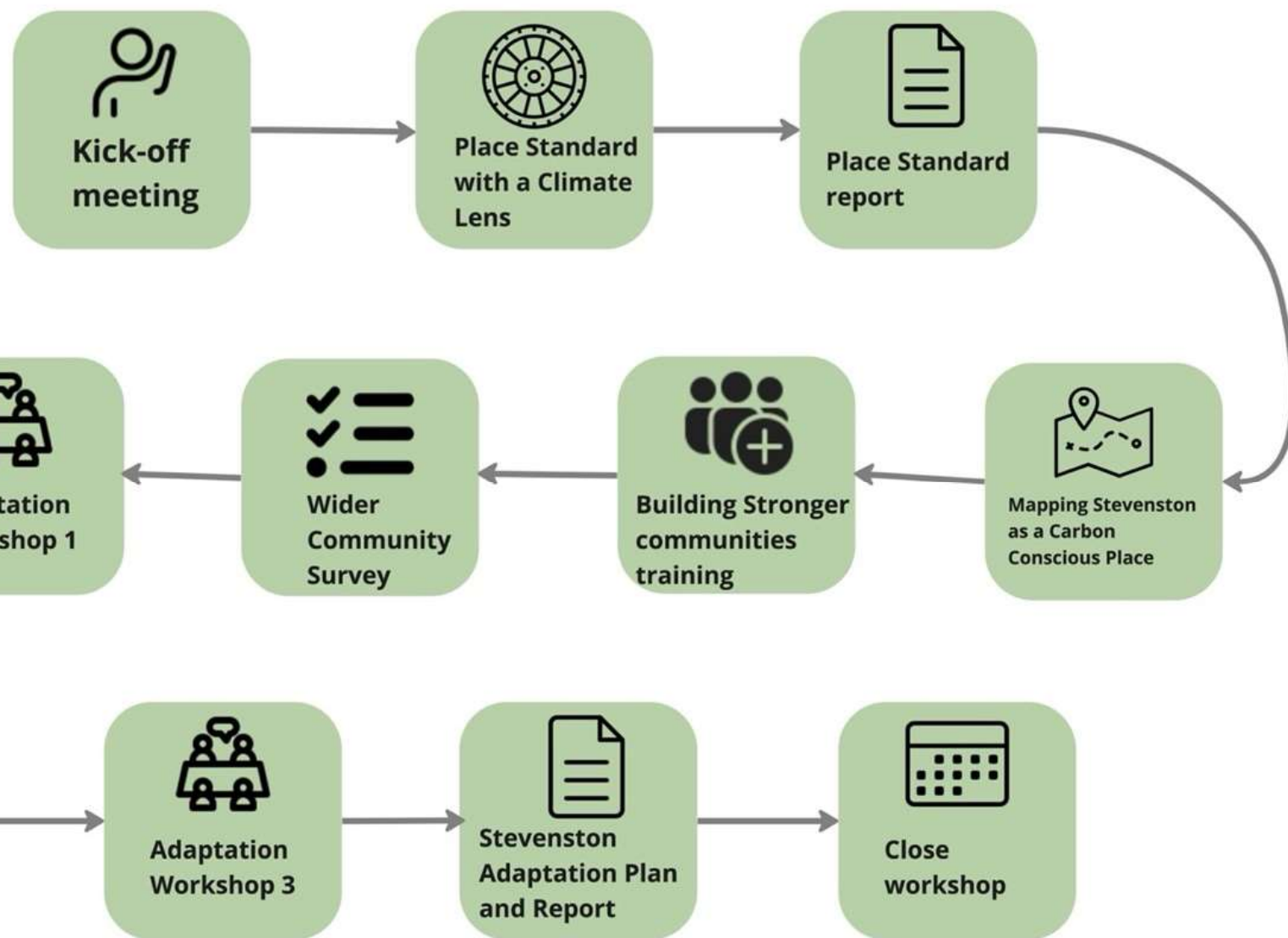


# Stevenston Climate Action Town as a Coastal resilience Case Study





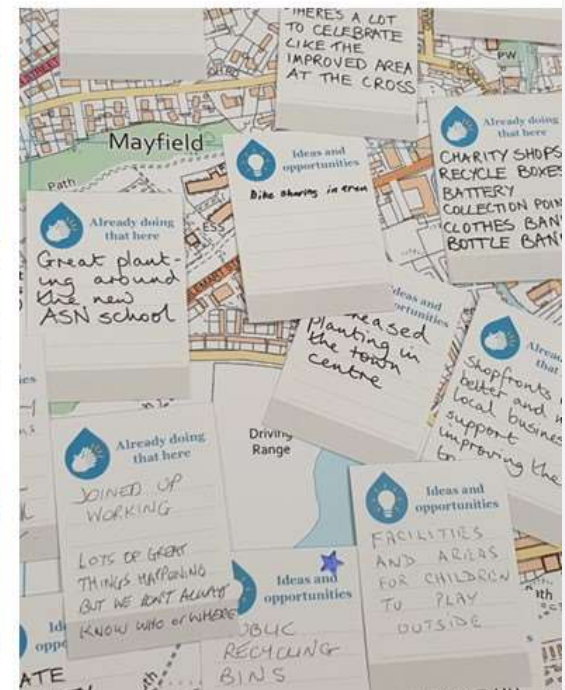
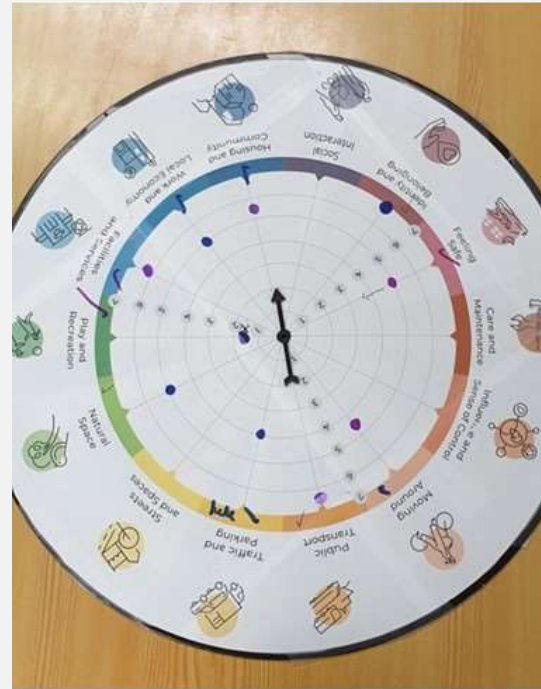
# CAT Timeline in Stevenston





# 1. Stevenston – project process

- Place Standard with a Climate lens was carried out at the outset of the project, particularly helpful with regards to less technical/ intangible issues like community coherence
- Considering A&DS Climate Conscious Places Principles. Identifying strong aspirations for biodiversity and adaptation to the changing climate in Stevenston





## 2. Stevenston- Subsequent CAT process

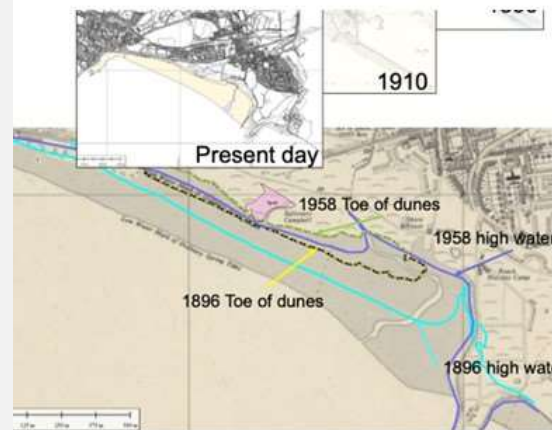
- Series of three adaptation workshops focussing on the impacts of the changing climate on Stevenston, prioritising actions and understanding collaborations needed.
- Improved collaboration and trust between community groups and Local Authority
- Better understanding of who can do what and who to speak to.
- Climate Action plan outcome and mapped aspirations





### 3. Stevenston- Outcomes for flood resilience

- Expedited Coastal Adaptation Study by LA in closer collaboration with community
- Stevenston Community Company newly formed and seeking asset transfer of Kerelaw Estate from GCC, this can have upstream impacts on the coast and moves recreation options inland .
- Place Based Investment funding for biodiversity projects- improved wetlands
- Stevenston Local Place Plan was developed.





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# Coming up after refreshments...

Closing plenary



# Scotland's Flood Resilience Conference 2025

Refreshments



# Scotland's Flood Resilience Conference 2025

## Closing plenary

Jo Kerr, Sniffer(Chair);

Anna Moreau, SEPA; Ben Cooper, AECOM; Joshua Bishop, RPA Ltd; Eilidh Guthrie, Dundee University and Rhiannon Wilson, Mott MacDonald

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



# Scotland's Flood Resilience Conference 2025

Closing notes

Jo Kerr, Sniffer(Chair)

**FLOOD**RE

**Balfour Beatty**

 **AtkinsRéalis**



# Cultivate Tomorrow

Registered Office:  
Caledonian Exchange,  
19a Canning Street, Edinburgh, EH3 8HE

[info@verture.org.uk](mailto:info@verture.org.uk)  
[verture.org.uk](http://verture.org.uk)

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