



# Scotland's Flood Risk Management Conference 2019

## Conference slides



# Scotland's Flood Risk Management Conference



## From policy to implementation – an overview of achievements, challenges and opportunities

Antje Branding (*FRM Team Leader*) - Scottish Government

Will Burnish (*Senior Engineer, Flood & Coastal Team*) – Moray Council

Ruth Ellis (*FRM Planning & Policy Unit Manager*) - SEPA

Dawn Lochhead (*Flooding Manager*) - Scottish Water



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What did we set out to achieve way back in  
2009?

# What did we set out to achieve way back in 2009?

9 & 10 ELIZ. 2    *Flood Prevention (Scotland)  
Act, 1961*    CH. 41



## CHAPTER 41

An Act to enable the councils of counties and burghs in Scotland to take measures for the prevention or mitigation of flooding of non-agricultural land in their areas; and for purposes connected with the matter aforesaid.  
[19th July, 1961]

**B**E it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

### *Flood Prevention Operations*

1.—(1) For the purpose of preventing or mitigating the flooding of land in their area, not being agricultural land, any council to whom this section applies may, so far as they think fit and subject to the provisions of this Act, exercise all or any of the powers specified in subsection (1) of the next following section.

(2) This section applies to all town councils and county councils; and in this Act any reference to a local authority is a reference to a council to whom this section applies, and "area" in relation to a local authority means, in the case of a town council, the burgh and, in the case of a county council, the county exclusive of any burgh situated therein.

2.—(1) The powers referred to in subsection (1) of the foregoing section are powers to carry out operations of the following descriptions—

- (a) the cleansing, repairing and otherwise maintaining in a due state of efficiency of—
  - (i) any watercourse;
  - (ii) any barrier, embankment or other work for defence against flooding;
  - (iii) any apparatus ancillary to any such work or to any watercourse;

A 2

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## The Flood Prevention (Scotland) Act 1961

- Lack of co-ordination between different powers, duties and legislation
- Emphasis on large scale engineering solutions, which are difficult to implement in a catchment wide approach.
- Only permitted measures suitable for addressing river and coastal flooding
- Statutory process lengthy and protracted, not integrated with the Planning and Controlled Activities Regulation (CAR) process.
- Promotion of sustainable flood management under WEWS difficult



# What did we set out to achieve way back in 2009?

6.11.2007 201 Official Journal of the European Union L 288/27

## DIRECTIVES

### DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2007 on the assessment and management of flood risks (Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE  
EUROPEAN UNION,

coordinated throughout a river basin if they are to be  
effective.

Having regard to the Treaty establishing the European  
Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the Opinion of the European Economic and  
Social Committee<sup>(1)</sup>,

Acting in accordance with the procedure laid down in Article  
251 of the Treaty<sup>(2)</sup>,

Whereas

(1) Floods have the potential to cause fatalities, displacement  
of people and damage to the environment, to severely  
compromise economic development and to undermine  
the economic activities of the Community;

(2) Floods are natural phenomena which cannot be  
prevented. However, some human activities (such as  
increasing human settlements and economic assets in  
floodplains and the reduction of the natural water  
retention by land use) and climate change contribute to  
an increase in the likelihood and adverse impacts of flood  
events;

(3) It is feasible and desirable to reduce the risk of adverse  
consequences, especially for human health and life, the  
environment, cultural heritage, economic activity and  
infrastructure associated with floods. However, measures  
to reduce these risks should, as far as possible, be

(4) Directive 2000/60/EC of the European Parliament and of  
the Council of 23 October 2000 establishing a  
framework for Community action in the field of water  
policy<sup>(3)</sup> requires river basin management plans to be  
developed for each river basin district in order to  
achieve good ecological and chemical status, and it will  
contribute to mitigating the effects of floods. However,  
reducing the risk of floods is not one of the principal  
objectives of that Directive, nor does it take into account  
the future changes in the risk of flooding as a result of  
climate change;

(5) The Commission Communication of 12 July 2004 to the  
European Parliament, the Council, the European  
Economic and Social Committee and the Committee of  
the Regions 'Flood risk management — Flood  
prevention, protection and mitigation' sets out its  
analysis and approach to managing flood risks at  
Community level, and states that concerted and coor-  
dinated action at Community level would bring consid-  
erable added value and improve the overall level of flood  
protection;

(6) Effective flood prevention and mitigation requires, in  
addition to coordination between Member States, coop-  
eration with third countries. This is in line with Directive  
2000/60/EC and international principles of flood risk  
management as developed notably under the United  
Nations Convention on the protection and use of trans-  
boundary water courses and international lakes, approved  
by Council Decision 93/309/EC<sup>(4)</sup>, and any succeeding  
agreements on its application;

(7) Council Decision 2001/792/EC, Bureau of 23 October  
2001 establishing a Community mechanism to facilitate  
reinforced cooperation in civil protection assistance inter-  
ventions<sup>(5)</sup> mobilises support and assistance from  
Member States in the event of major emergencies,  
including floods. Civil protection can provide adequate  
response to affected populations and improve prepara-  
tiveness and resilience;

<sup>(1)</sup> OJ C 195, 18.8.2006, p. 37.

<sup>(2)</sup> Opinion of the European Parliament of 13 June 2006 (OJ C 100 E,  
9.12.2006, p. 128). Council General Position of 23 November  
2006 (OJ C 311 E, 19.12.2006, p. 18) and Position of  
the European Parliament of 25 April 2007. Council Decision of  
18 September 2007.

<sup>(3)</sup> OJ L 327, 22.12.2000, p. 1. Directive as amended by Decision  
No 2443/2000/EC (OJ L 311, 15.12.2001, p. 1).

<sup>(4)</sup> OJ L 188, 9.8.1993, p. 42.

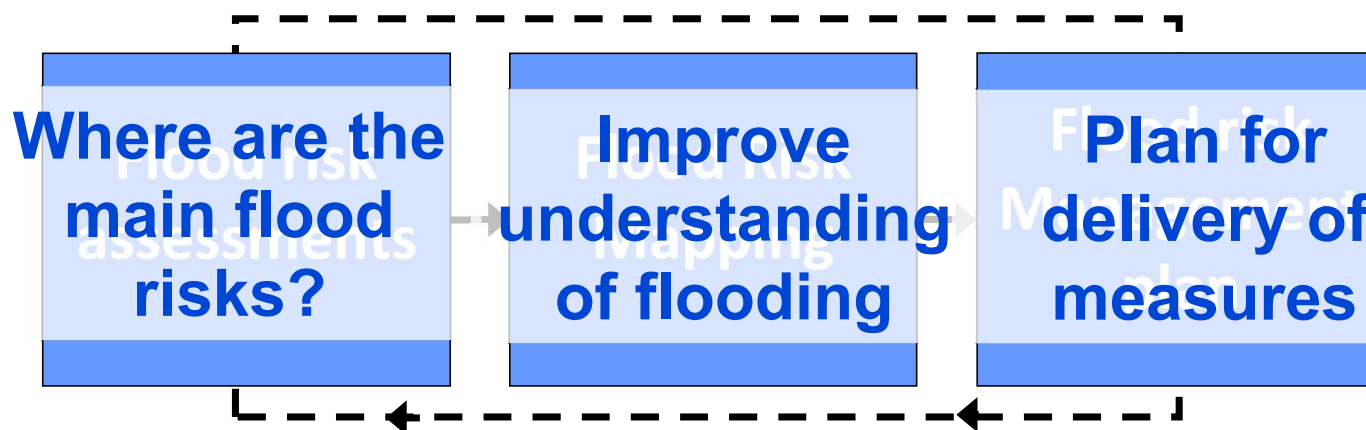
<sup>(5)</sup> OJ L 297, 15.11.2001, p. 7.

## European Directive 2007/60/EC on the Assessment and Management of Flood Risks

- Establish a framework for the assessment and management of flood risks
- Aim is to reduce/mitigate the adverse consequences of flooding on:
  - human health,
  - the environment,
  - cultural heritage
  - economic activity

# What did we set out to achieve way back in 2009?

## Floods Directive



# What did we set out to achieve way back in 2009?

## Flood Risk Management (Scotland) Act 2009



### Flood Risk Management (Scotland) Act 2009 2009 asp 6

#### CONTENTS

Section

#### PART 1

##### GENERAL DUTY, DIRECTIONS AND GUIDANCE

- 1 General duty
- 2 Directions and guidance

#### PART 2

##### PRINCIPAL EXPRESSIONS

- 3 "Flood" and "flood risk"
- 4 SEPA
- 5 Responsible authorities
- 6 "The Directive"

#### PART 3

##### FLOOD RISK ASSESSMENT, MAPS AND PLANS

##### *Purpose of Part*

- 7 General purpose of Part 3

##### *Flood risk management districts*

- 8 Flood risk management districts

##### *Flood risk assessment*

- 9 SEPA to prepare flood risk assessments
- 10 Flood risk assessments: review
- 11 Flood risk assessments: regulations
- 12 Flood risk assessments: availability for public inspection

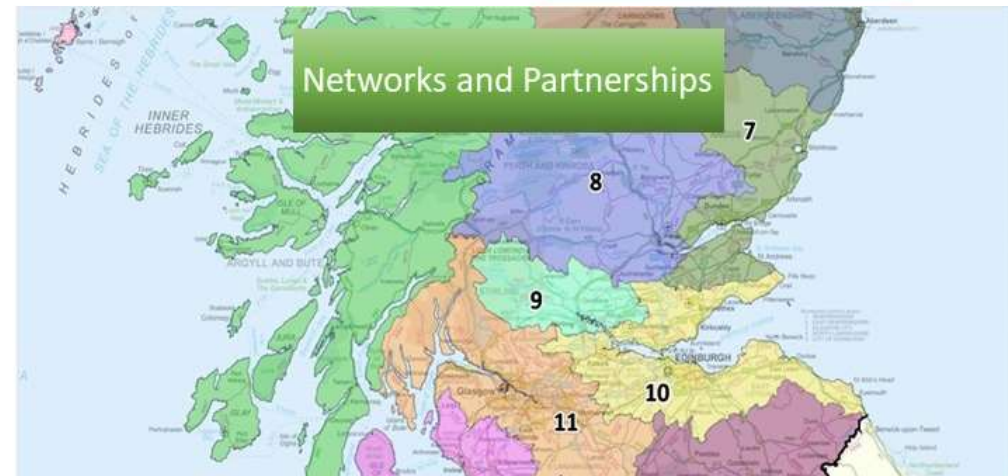
##### *Identification of potentially vulnerable areas and local plan districts*

- 13 SEPA to identify potentially vulnerable areas and local plan districts
- 14 Potentially vulnerable areas and local plan districts: review
- 15 Potentially vulnerable areas and local plan districts: regulations

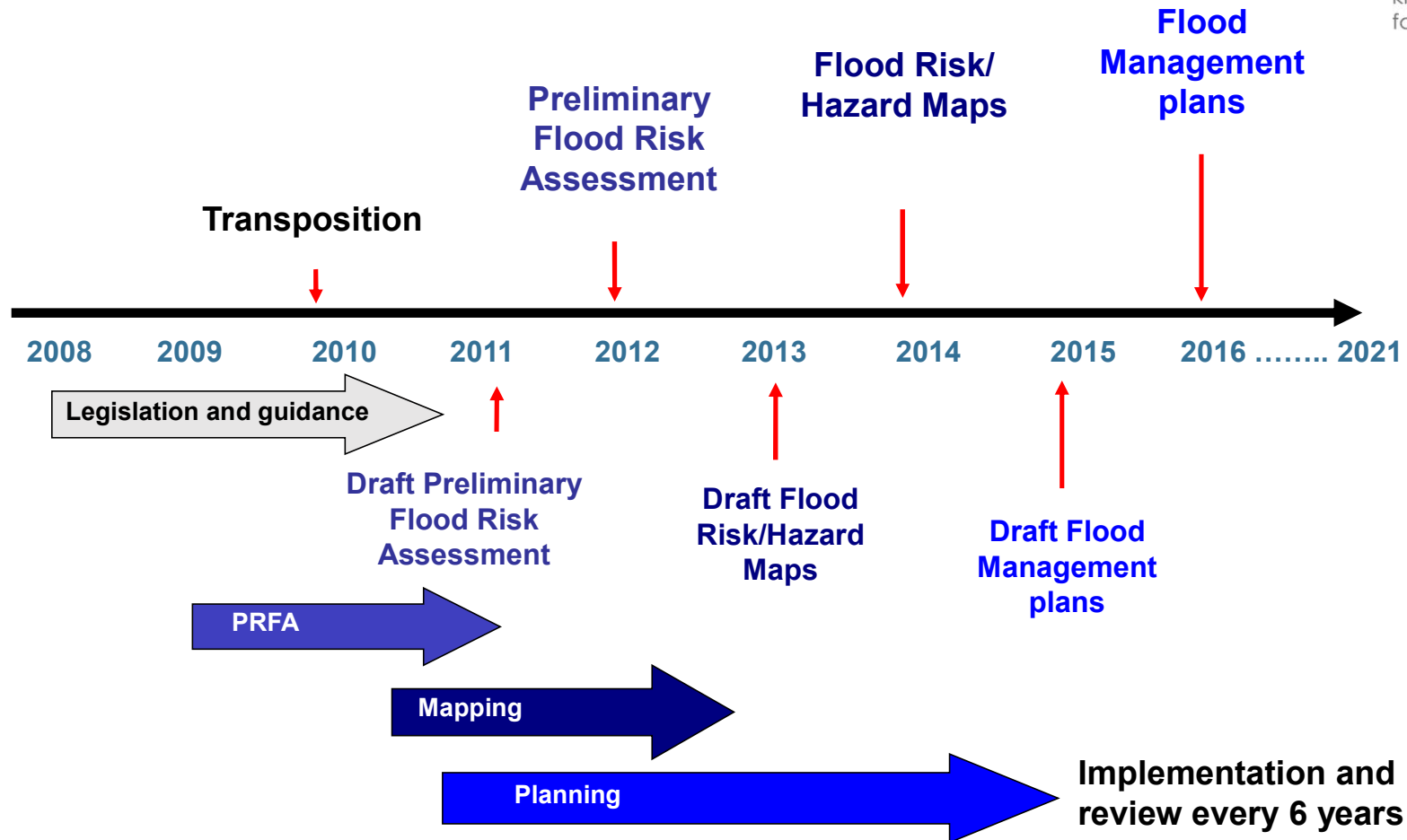
- Ministers, LA's, SEPA, SW (and other bodies designated by Ministers) have new duties to:
  - to act to reduce flood risk
  - raise awareness of flooding
  - to cooperate and coordinate efforts
  - to act sustainably
- Authorities have powers to co-ordinate measures
- New measures to provide portfolio of responses to improve sustainable flood management at catchment scale
- Enables better information to public and responsible authorities on the risk and consequences of flooding
- Improves flood risk management planning at strategic level by ensuring flood risk management plans are prepared for all areas at significant risk of flooding
- Prepares the ground for a plan-led, risk-based approach to flood risk management

# What have we achieved?

# Reasons to be cheerful – 10 years on!



# Timeline





# National Flood Risk Assessment

## 1 Likelihood selection

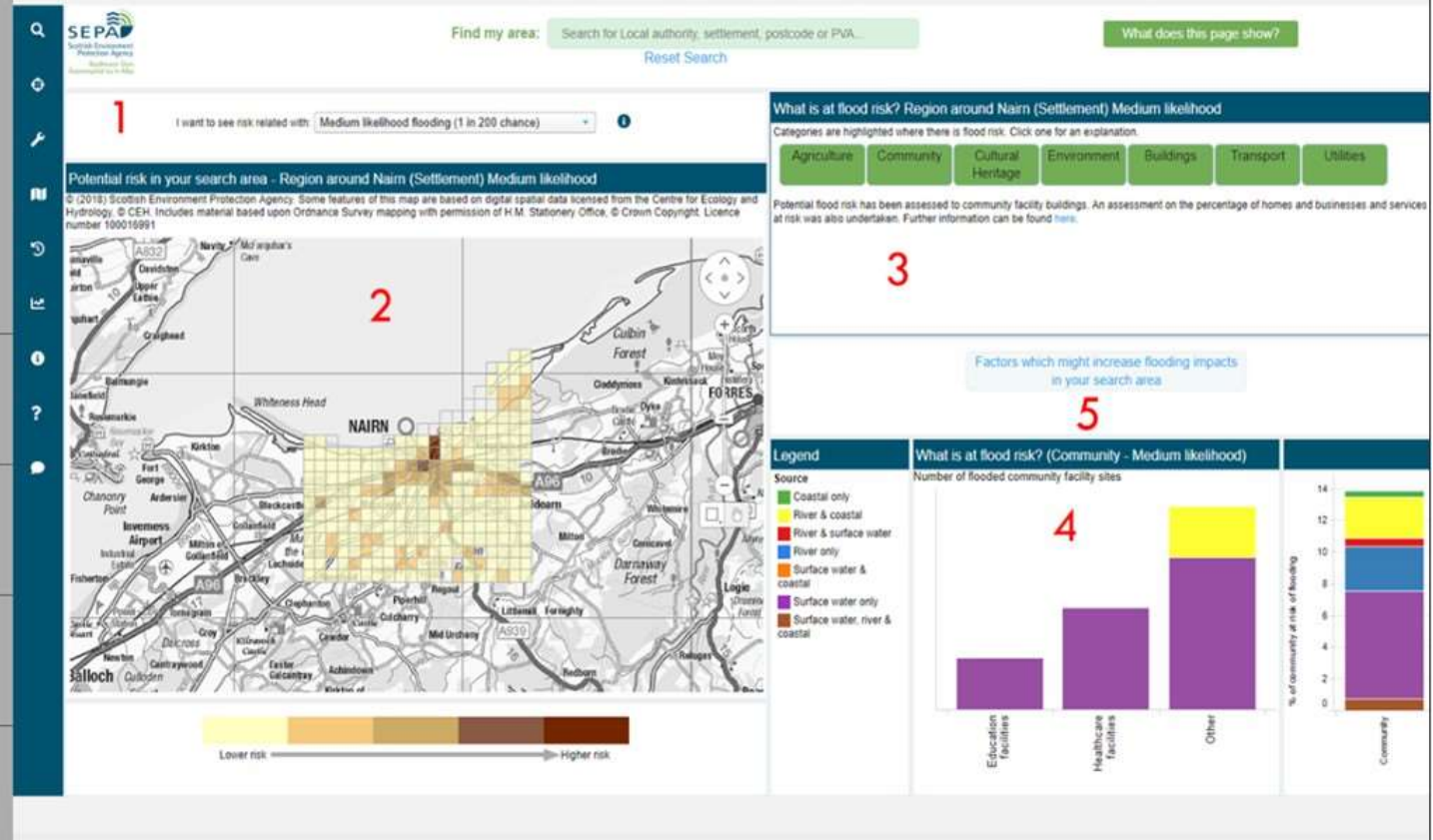
Box 1 allows you to choose from low, medium and high flood likelihood. The information on this page then changes depending on which flood likelihood you have selected. A low likelihood of flooding means there is up to a 1 in 1000 chance of flooding in any given year, a medium likelihood of flooding means there is up to a 1 in 200 chance of flooding in any given year and a high flood likelihood means there is up to a 1 in 10 chance of flooding in any given year. The information icon also explains what is meant by flood likelihood.

## 2 Main risk grid

## 3 Receptors at risk

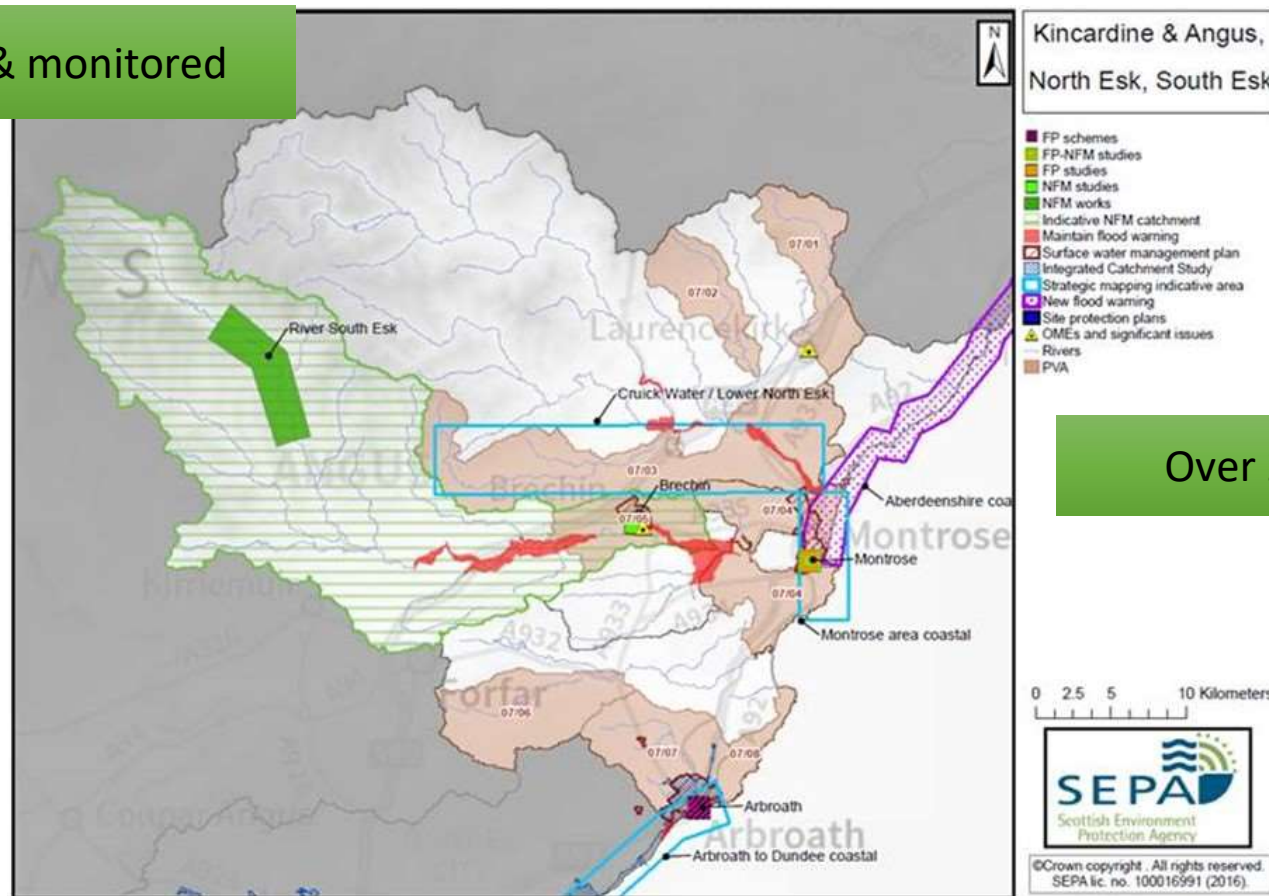
## 4 Breakdown of risk

## 5 Influencing Factors



# Flood Risk Management Strategies 2015

Published & monitored



Over 2500 actions



# Local Flood Risk Management Plans

## Local FRM Plan – June 2016

PVA	Location	Flood protection scheme/ works	Natural flood management works	New flood warning	Flood protection study	Natural flood management study	Surface water plan/study	Strategic mapping and modelling	Maintain flood protection scheme*	Maintain flood warning*	Flood forecasting	Property level protection scheme	Community flood action groups	Self help	Awareness raising	Maintenance	Site protection plans	Emergency plans/ response	Planning policies
08/01	Blair Atholl							✓	N/A	N/A	✓	✓	✓	✓	✓	✓	✓	✓	✓
08/02	Kinloch Rannoch								N/A	N/A	✓			✓	✓	✓	✓	✓	✓
08/03	Aberfeldy & Pitlochry				✓						✓	✓	✓	✓	✓	✓	✓	✓	✓
08/04	Alyth				✓			✓	N/A	N/A	✓			✓	✓	✓	✓	✓	✓
08/05	Kirriemuir & Forfar				✓		✓	✓	✓	N/A	✓			✓	✓	✓	✓	✓	✓
08/06	Blairgowrie					✓	✓	✓	N/A	✓	✓			✓	✓	✓	✓	✓	✓
08/07	Coupar Angus							✓	N/A	N/A	✓			✓	✓	✓	✓	✓	✓
08/08	Luncarty, Stanley, Bankfoot, Dunkeld & Birmam				✓			✓	N/A	✓	✓			✓	✓	✓	✓	✓	✓
08/09	Tyndrum & Crianlarich							✓	N/A	N/A	✓			✓	✓	✓	✓	✓	✓
08/10	Almondbank	✓						✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
08/11	Scone	✓			✓		✓	✓	N/A	N/A	✓			✓	✓	✓	✓	✓	✓
08/12	Perth to Kinfauns (north of A90)	✓				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
08/13	Perth Centre				✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
08/14	Comrie	✓						✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
08/15	Forteviot							✓	N/A	✓	✓			✓	✓	✓	✓	✓	✓
08/16	Dunning							✓	N/A	✓	✓			✓	✓	✓	✓	✓	✓
08/17	Bridge of Eam							✓	✓	✓	✓			✓	✓	✓	✓	✓	✓



## 2015-2022 Interim Report

PVA	Location	Flood protection scheme/ works	Flood protection study	Maintain flood protection scheme*	Natural flood management study	Natural flood management works	Strategic mapping and modelling	New flood warning	Maintain flood warning*	Flood forecasting	Community flood action groups	Awareness raising	Self help	Property level protection scheme	Surface water plan/study	Maintenance	Site protection plans	Emergency plans/ response	Planning policies
08/01	Blair Atholl			N/A			A		N/A	G	G	G	G			G		G	G
08/02	Kinloch Rannoch			N/A					N/A	G		G	G			G		G	G
08/03	Aberfeldy & Pitlochry		G	G				A		G	G	G	G			G		G	G
08/04	Alyth			N/A	G		R A		N/A	G		G	G			G		G	G
08/05	Kirriemuir & Forfar		G	G			A G		N/A	G		G	G			G		G	G
08/06	Blairgowrie			N/A			G		G	G		G	G			G		G	G
08/07	Coupar Angus			N/A			G		N/A	G		G	G			G		G	G
08/08	Luncarty, Stanley, Bankfoot, Dunkeld & Birmam		G	N/A			A G		G	G		G	G			G		G	G
08/09	Tyndrum & Crianlarich			N/A			A		N/A			G	G			A		G	G
08/10	Almondbank		A	G			A R		G	G		G	G			G		G	G
08/11	Scone		G	G	N/A		A		N/A	G		G	G			G		G	G
08/12	Perth to Kinfauns (north of A90)		G		G			A		G	G		G			G		G	G
08/13	Perth Centre			A	G			A		G	G	G	G			G		G	G
08/14	Comrie		A	G			A		G	G	G	G	G			G		G	G
08/15	Forteviot			N/A			R A		G	G		G	G			G		G	G
08/16	Dunning			N/A			A G		G	G		G	G			G		G	G
08/17	Bridge of Eam			G			A R		G	G	G	G	G			G		G	G

# Decreasing Flood Risk

Musselburgh



Selkirk



Kirkwall Harbour



Dundee



# Collaboration & Partnership Working





# Collaboration & Partnership Working

## The Proposal



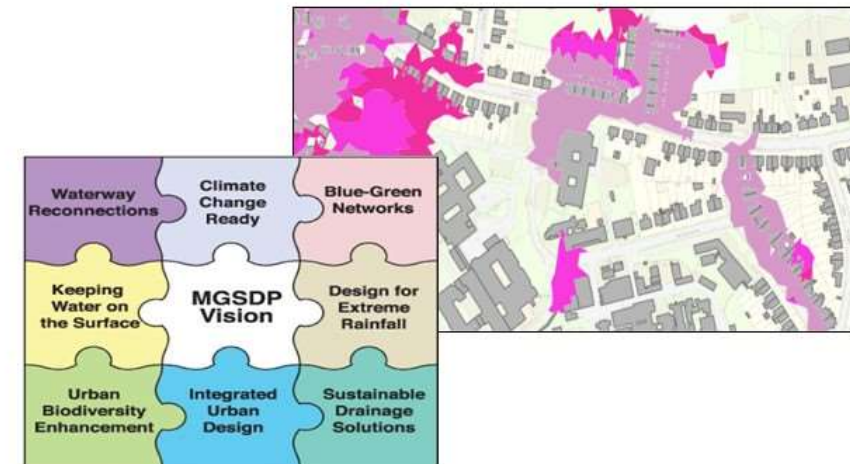
## The Commitment



## The Joint Purchase



Flood Risk Management (Scotland) Act 2009



# Collaboration & Partnership Working

National Flood  
Management  
Advisory Group  
(NFMAG)

14 Local Plan  
District  
(LPD)  
Partnerships

Cross-Border  
Advisory Group  
(CBAG)

Scottish Advisory and  
Implementation Forum for Flooding  
(SAIFF) Groups



Lead Local  
Authority  
Forum  
(LLAF)

Communities

10 Flood Risk Management  
Local Advisory Groups  
(FRM LAGs)

Society of Chief Officers  
of Transportation in  
Scotland  
(SCOTS)  
FRM Group

Scottish Flood  
Forum  
(SFF)

# Collaboration & Partnership Working



# Challenges/Opportunities

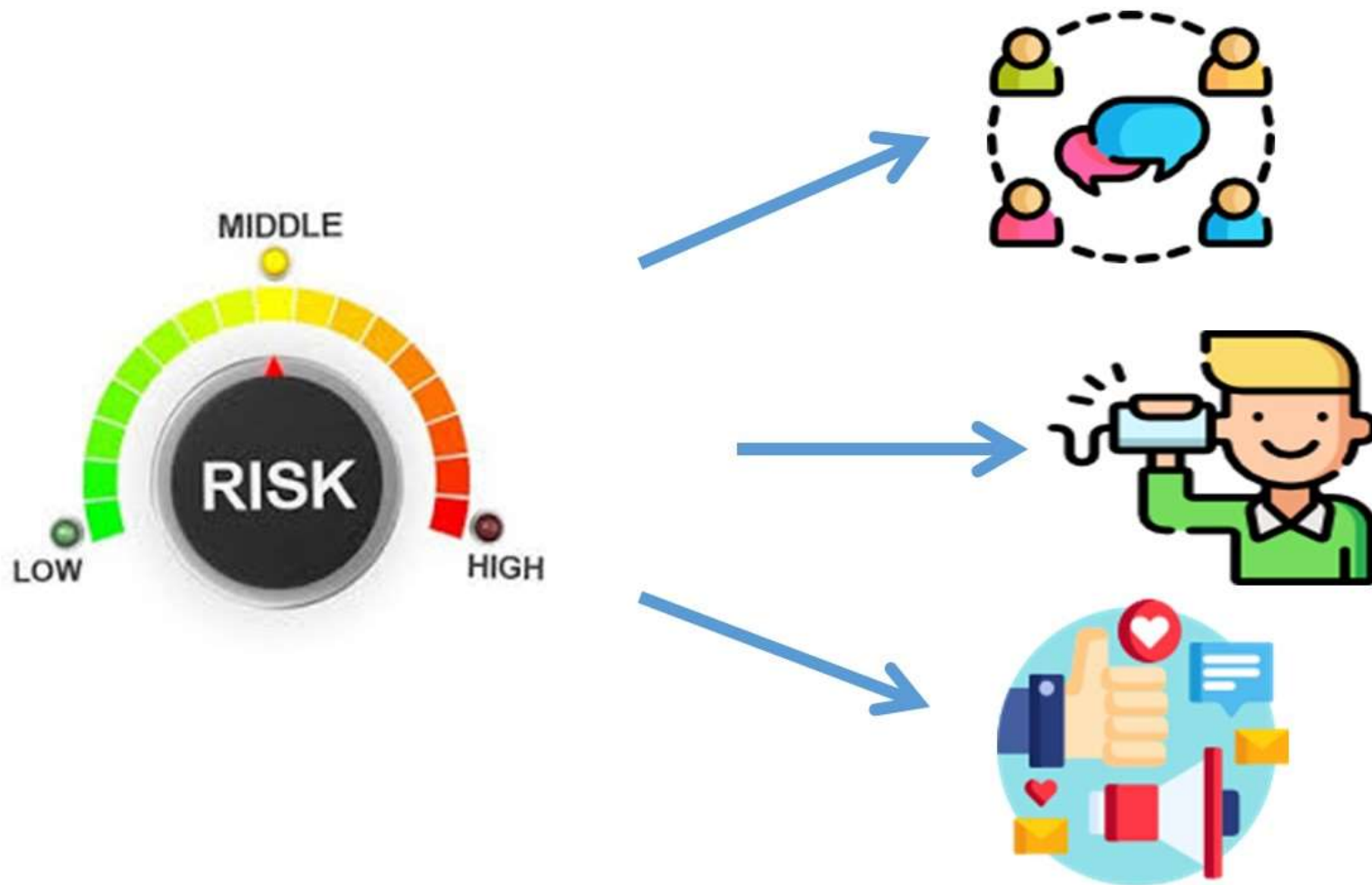
# Community Engagement



- ✓ Empowered
- ✓ Resilient
- ✓ Enabled



# Community Engagement



# Community Engagement



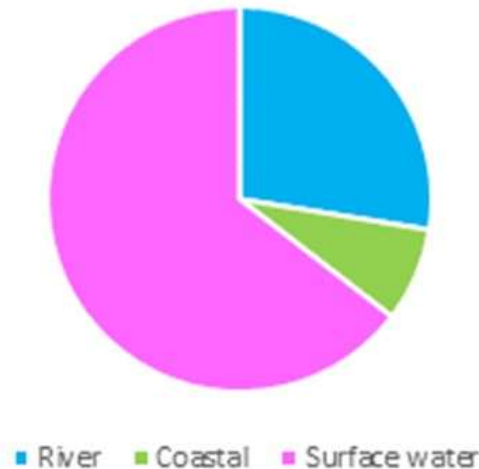
**SUPPORT**  
COMMUNITY  
EMPOWERMENT



# Surface Water Management/SUDS: Challenges

## NFRA 2: Pluvial Flood Risk

Residential properties at  
medium flood risk  
2018

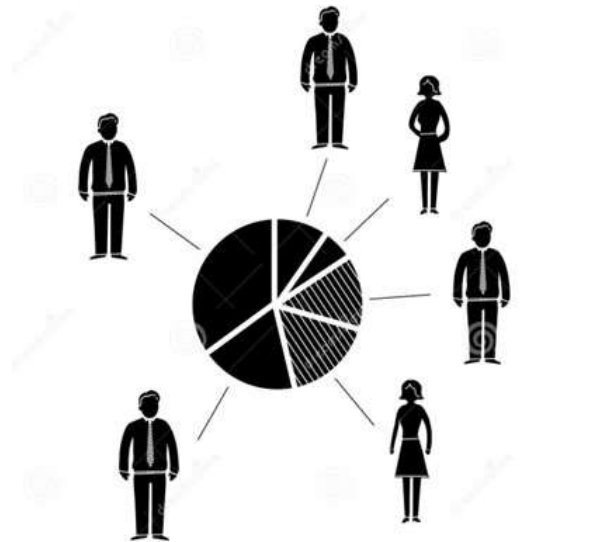


**Harder to  
reduce surface  
water flood risk  
and it may take  
a long time!**

# Surface Water Management/SUDS: Challenges



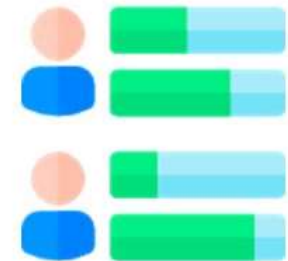
Cost/Benefits



Complex  
Governance/  
Responsibilities



Hard to forecast  
& Plan for



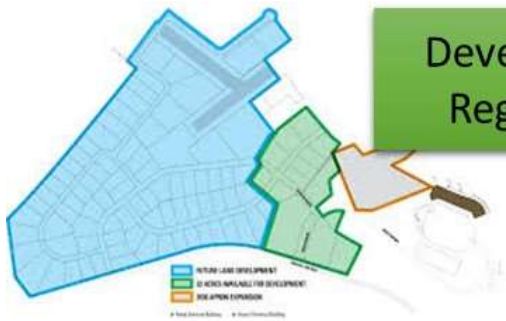
Capacity



# Surface Water Management/SUDS: Opportunities



Development &  
Regeneration



**Legislation**



Guidance & Standards



Surface Water  
secondment



Integrated Drainage  
Planning  
Drainage Partnership

SEPA Sector Plans

Water Supply and Waste Water Sector Plan



Consultation

Housing Sector Plan



Consultation

## Competencies & Skills



## 10 Years of Integration



Planning

Internal Policy

Planning Act

SUDS

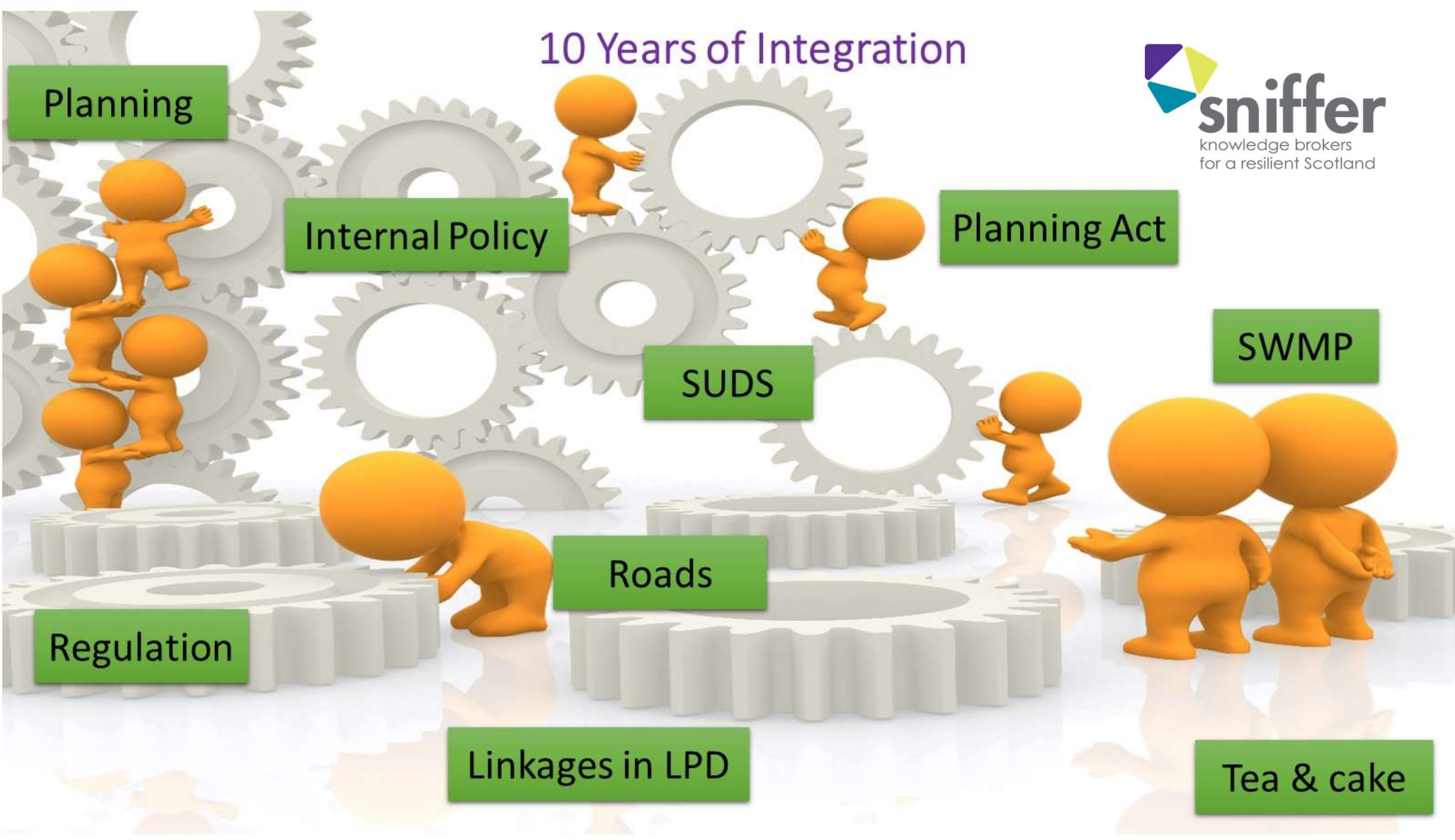
SWMP

Roads

Regulation

Linkages in LPD

Tea & cake





## 10 Years of Funding

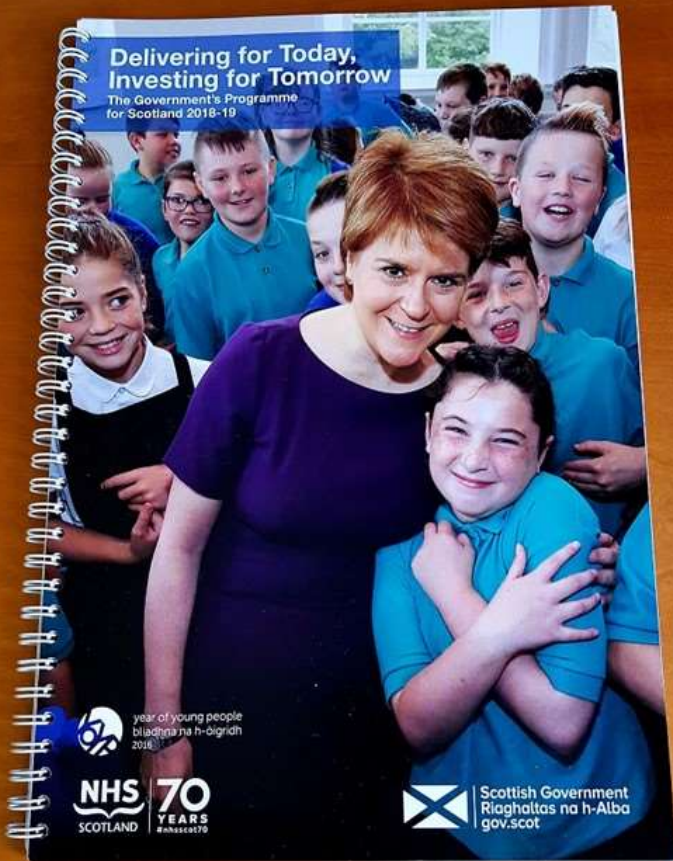




## Sum up

## Programme for Government 2018/19

Sets out specific ambitions  
for flood risk management



#### Flood protection

Flooding is currently one of our biggest climate risks. Too many communities have felt the devastating effect of flooding on their homes, businesses and communities, and our work with local government and others on the delivery of flood protection is critical to supporting successful climate change adaptation. In the last year the Huntly Flood Protection Scheme was completed, reducing the flood risk to around 45 properties and a care home. This year we will see progress by local authorities on the delivery of flood protection schemes, including on the Stonehaven and New Cumnock schemes.

In the coming year we will also:

- develop an action plan to promote the economic and social benefits of flood resilient properties and fund the Scottish Flood Forum to raise awareness and increase resilience of communities at risk
- publish, in partnership with the Scottish Environment Protection Agency (SEPA), an updated National Flood Risk Assessment which embeds climate change and social justice in Scotland's flood risk management planning approach and puts communities at the heart of the assessment



## The Hydro Nation

# Sets out specific ambitions for flood risk management

**INVEST**  
AROUND £600 MILLION IN SCOTLAND'S WATER  
INFRASTRUCTURE, PROVIDING 1.35 BILLION  
LITRES OF FRESH WATER EVERY DAY



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# Questions for you.....

Sli.do code: **FRM19**



- Do you agree with the main achievements that have been highlighted?
- Are there any other achievements that you would like to highlight to the conference?
- Do you agree with the main challenges that have been highlighted?
- Are there any other challenges that you would like to highlight to the conference?
- Do you agree with the main opportunities that have been highlighted?
- Are there any other opportunities that you would like to highlight to the conference?

# Scotland's Flood Risk Management Conference



## Ten Years of the FRM (Scotland) Act – Communities' Experience

Kirsty MacRae  
Scottish Flood Forum

Paul Laidlaw  
Scottish Flood Forum

Gail Walker  
TIDECO

Stuart Cullen  
Clackmannanshire  
Council

with thanks to  
CFRGs across Scotland



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# Scotland's Flood Risk Management Conference



- Scottish Flood Forum overview
- Case study – learnings from Tillicoultry
- Talking heads – views from the ground
- Overview of key challenge and big asks for next 10 years



# Scotland's Flood Risk Management Conference



2009 – a year of new starts



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# Scotland's Flood Risk Management Conference



- Many community groups with SFF links - at many different stages of development
- Resilient Communities initiative
- More local authorities focusing on community engagement/ building resilience
- FRM Plans – giving structure
- SFF - Recovery Manager; Resilience Manager and now employing the Project Coordinator for the newly set up Flood Resilient Properties Delivery Group





# Scotland's Flood Risk Management Conference



- Scottish Flood Forum overview
- Case study – learnings from Tillicoultry
- Talking heads – views from the ground
- Overview of key challenge and big asks for next 10 years



# Scotland's Flood Risk Management Conference



## Tillicoultry case study

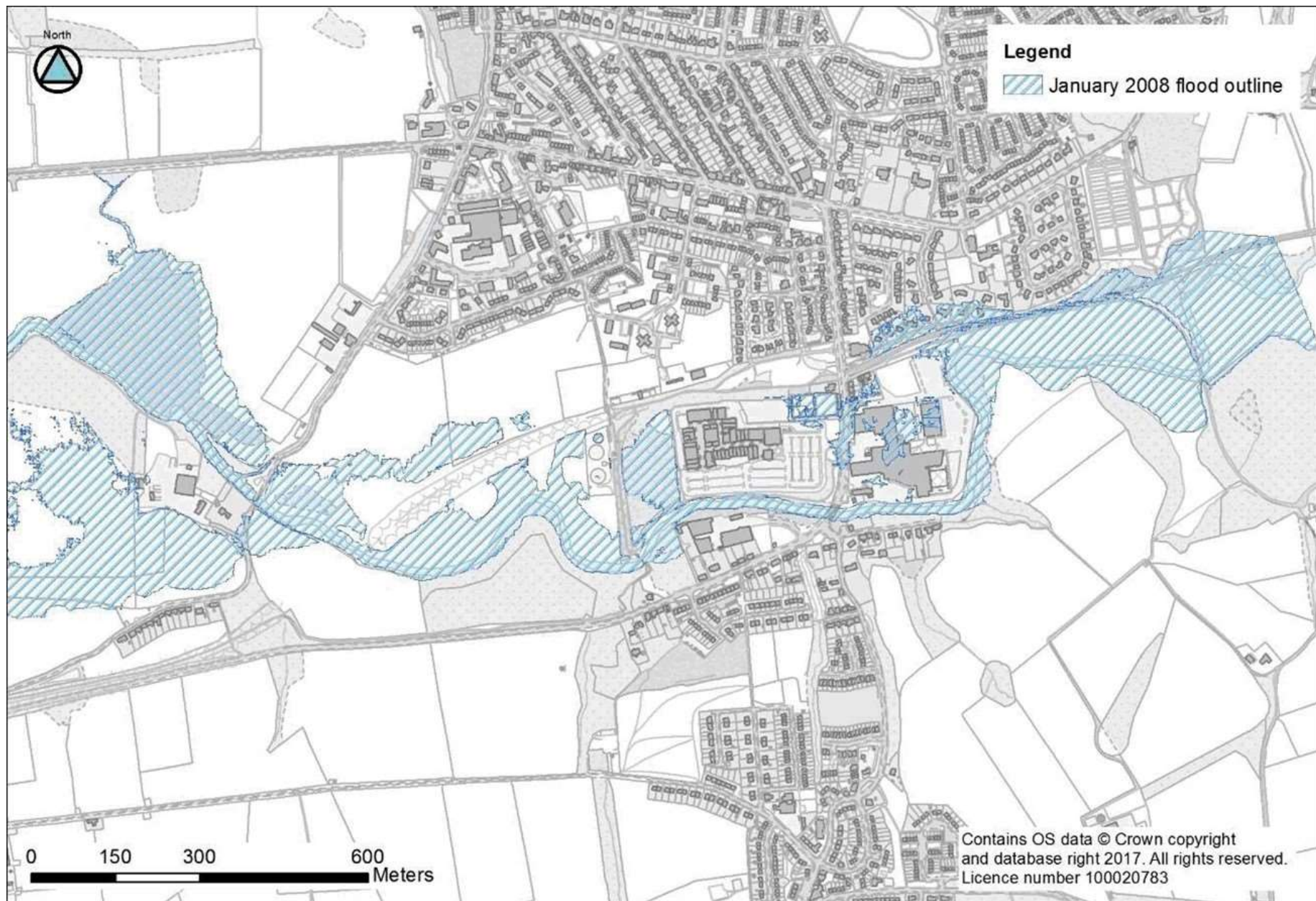


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# Scotland's Flood Risk Management Conference



- Establishing a community flood group has been a partnership effort. The group acts as a lightning rod for other resilience benefits to come to the area.
- The effort to bring our two local groups into being has been repaid many times over not least in establishing locally focused resources to help better manage flood risk.
- Identify and support local champions who can drive the group's development. Individuals are encouraged if they have confidence they will be supported and the Council demonstrates it is to stay involved.
- Initial secretariat skills to build the group's structures is key to have. SFF's knowledge here is fundamental to have available.
- As LA officers we should be "bought in" group members to actively support the group
- Gather and use the professional talents (EPO, TCV, SFRS, SW, SEPA). Each have their own community engagement drivers so they must come willingly.
- Small steps often lead to beneficial journeys....

# Scotland's Flood Risk Management Conference



Royal Burgh of Falkland and Newton of Falkland Community Council.  
Constitution for Flood Action Group  
(a sub-committee of F & N of F C C)

## Community group chairs' perspective

**EDZELL**  
Community Flood Plan

IF YOU ARE IN  
IMMEDIATE DANGER  
CALL 999



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# Scotland's Flood Risk Management Conference



## Key challenges

- **Communication and trust building**
  - Resource to do it well
  - Getting people involved in wider community
  - Different understandings of partnership working
- **Funding/resources**
  - Slippage in FRMP actions due to resources
  - Expectation management / FRM Actions
  - Funding accessible to community groups
- Property Flood Resilience – mainstreaming...
- Climate Change
- Awareness of the speed and devastation of flooding

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# Scotland's Flood Risk Management Conference



## Communities' priorities:

- Better community engagement –transparent and trust building
- Develop genuine partnership working
- Planning and new developments – no increase to existing flood risk
- Psychosocial impact - acknowledged, costed and supported
- Funding - realistic , how prioritised, how communicated.

# Scotland's Flood Risk Management Conference



## Our big question

- How do we (Scotland) take into account and communicate the social value of resilient communities?

## Our challenges/ suggested opportunities

- Greater partnership working /community engagement. Use intermediaries such as SFF to increase resource and who are seen as neutral.
- A great focus on the health and wellbeing impacts of flooding from recovery planning onwards – use the voluntary sector to coordinate and deliver.
- Planning and new (and recent) development
- Help people help themselves – the future is coming

[www.sniffer.org.uk](http://www.sniffer.org.uk)



# Scotland's Flood Risk Management Conference



## Thank you!

[www.scottishfloodforum.org](http://www.scottishfloodforum.org)



[www.sniffer.org.uk](http://www.sniffer.org.uk)

# Scotland's Flood Risk Management Conference



## Future Scenarios in a Changing Climate

**Mark McLaughlin** (SEPA)

**Lizzie Kendon** (Met Office)

**Fiona McLeod** (SEPA)

**Alistair Rennie** (SNH, Dynamic Coast)

**Joseph Hagg** (Adaptation Scotland)

**Oliver Walker** (Vivid Economics)

**Mark Westcott** (Vivid Economics)

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**Mark McLaughlin (SEPA)**

Scot

- Recognition of flooding as a major hazard
- Enable funding allocation
- Local information
- Reactive
- Future view? Climate change?
  - +20%?

## Flood Prevention (Scotland) Act, 1961

9 & 10 ELIZ. 2 CH. 41

### ARRANGEMENT OF SECTIONS

#### *Flood Prevention Operations*

- Section
1. Purposes for which powers of local authorities under Act are exercisable.
  2. Powers of local authorities.
  3. Supplementary provisions as to powers of local authorities.
  4. Flood prevention schemes.
  5. Combinations of local authorities.

#### *Prevention of obstruction of watercourses, etc.*

6. Byelaws.

#### *Supplementary*

7. Acquisition of land.
8. Powers of entry on land.
9. Provision and obtaining of information.
10. Unjustified disclosure of information.
11. Compensation.
12. Contributions to and by local authorities.
13. Financial provisions.
14. Crown rights.
15. Interpretation.
16. Short title, commencement and extent.

#### SCHEDULES:

First Schedule—Provisions which may be incorporated in flood prevention schemes.

Second Schedule—Provisions as to confirmation, coming into operation and validity of flood prevention schemes.

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## WHERE WE WERE



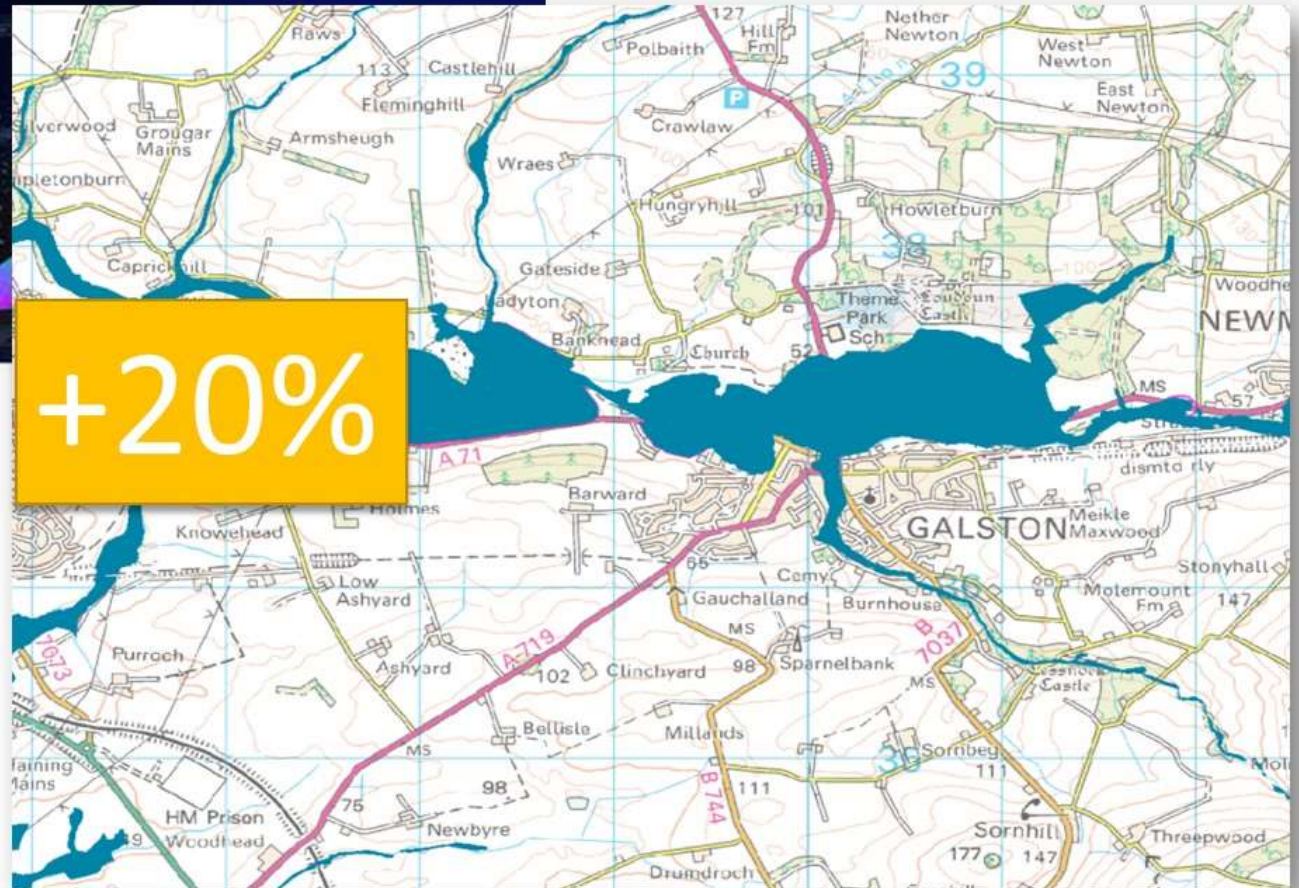
SCOTTISH PLANNING POLICY

SCOTTISH EXECUTIVE  
Development Department

**7** PLANNING AND FLOODING

**spp**

PLANNING SERIES

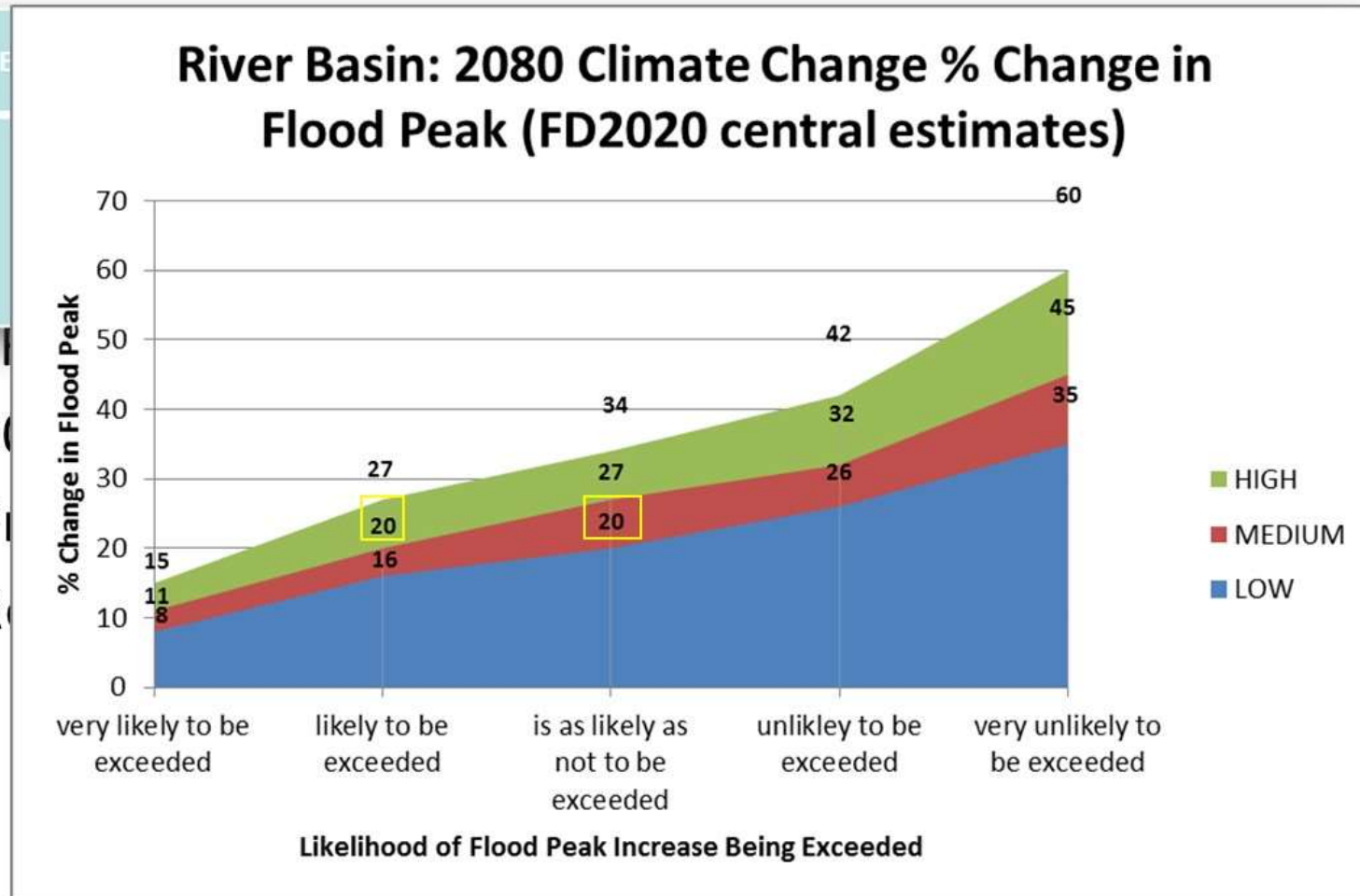




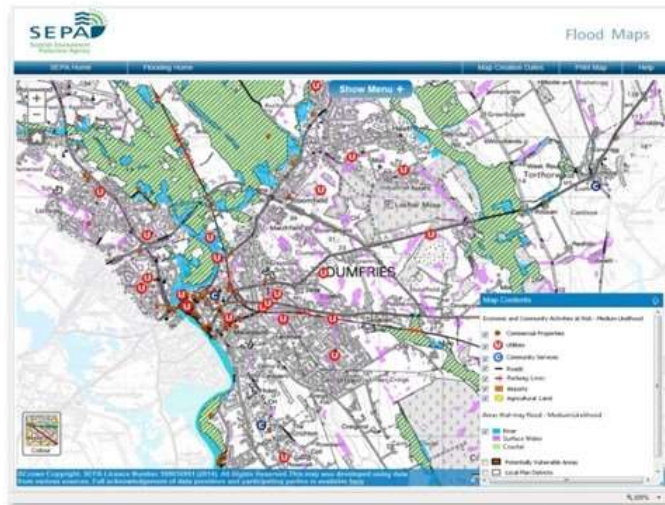
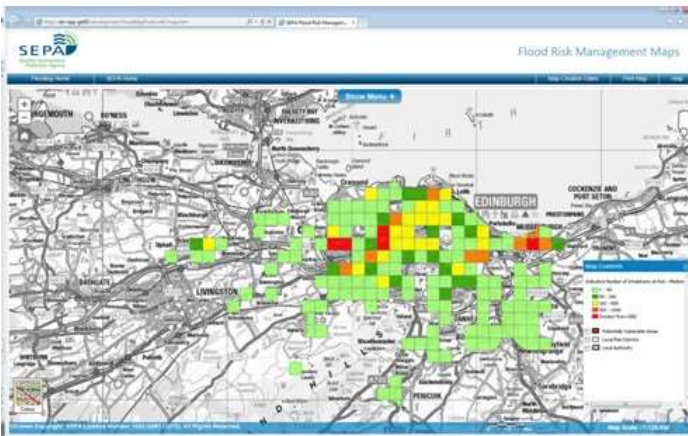
WHERE WE ARE

# s Climate Change Metrics

- 
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## WHERE WE ARE

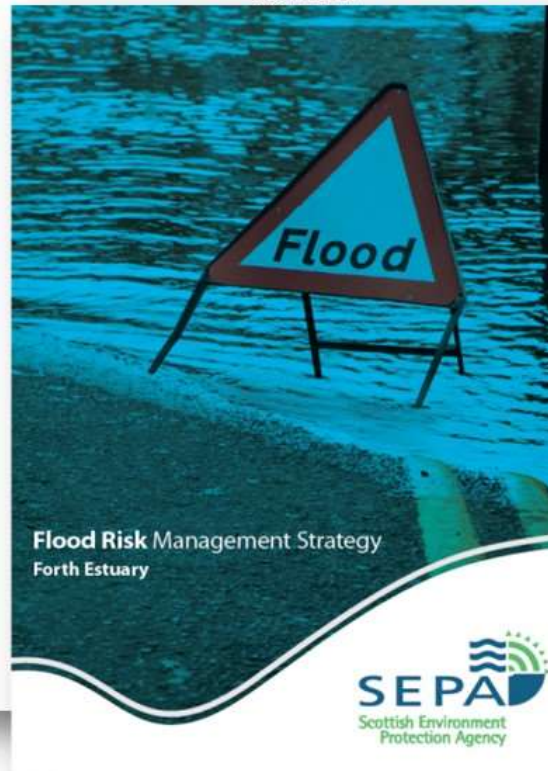


Flood Risk Management (Scotland) Act 2009 (asp 6)



## Flood Risk Management (Scotland) Act 2009 2009 asp 6

### CONTENTS



## National Flood Risk Assessment Grid

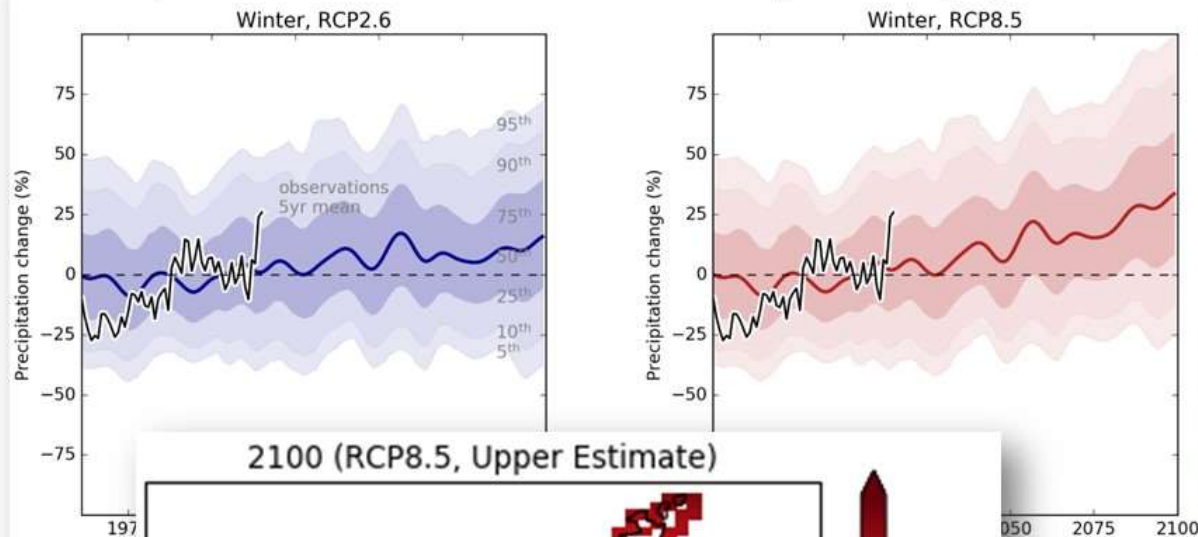




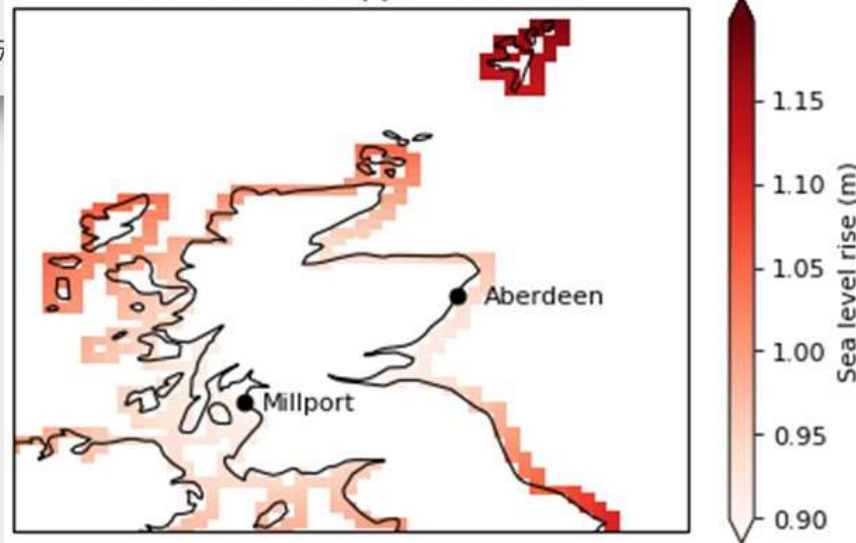
## WHERE WE ARE GOING

UKCP18

Precipitation difference from 1981-2000 average, Edinburgh grid cell



2100 (RCP8.5, Upper Estimate)

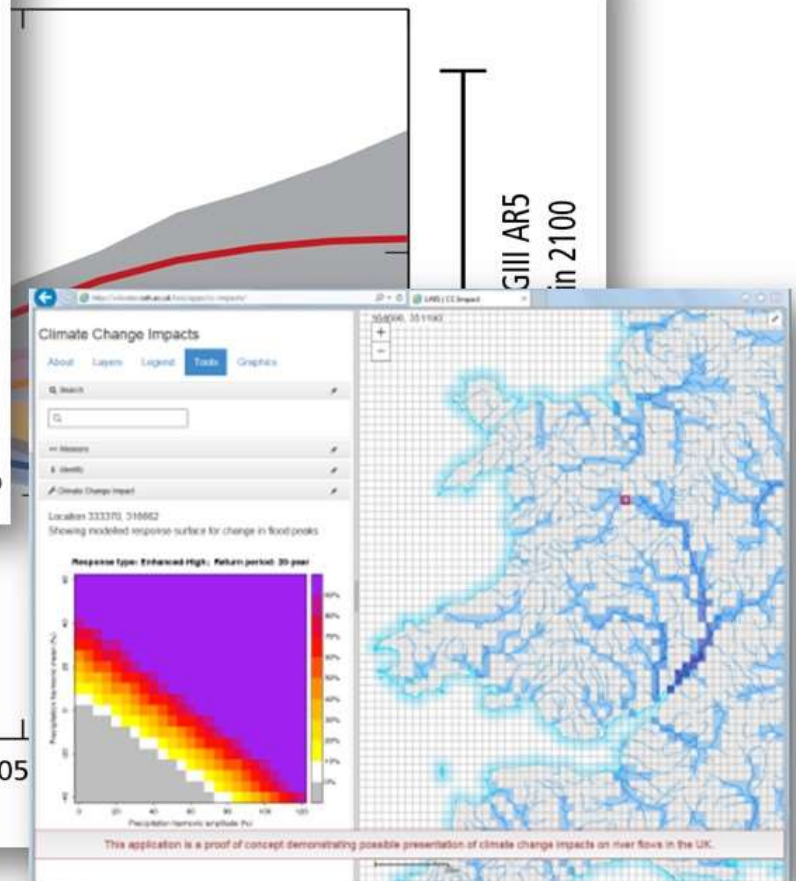


scenarios:

- RCP8.5
- RCP6.0
- RCP4.5
- RCP2.6

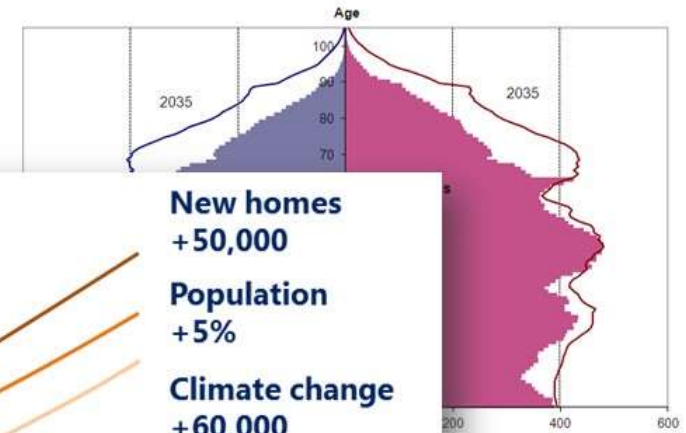
year

missions

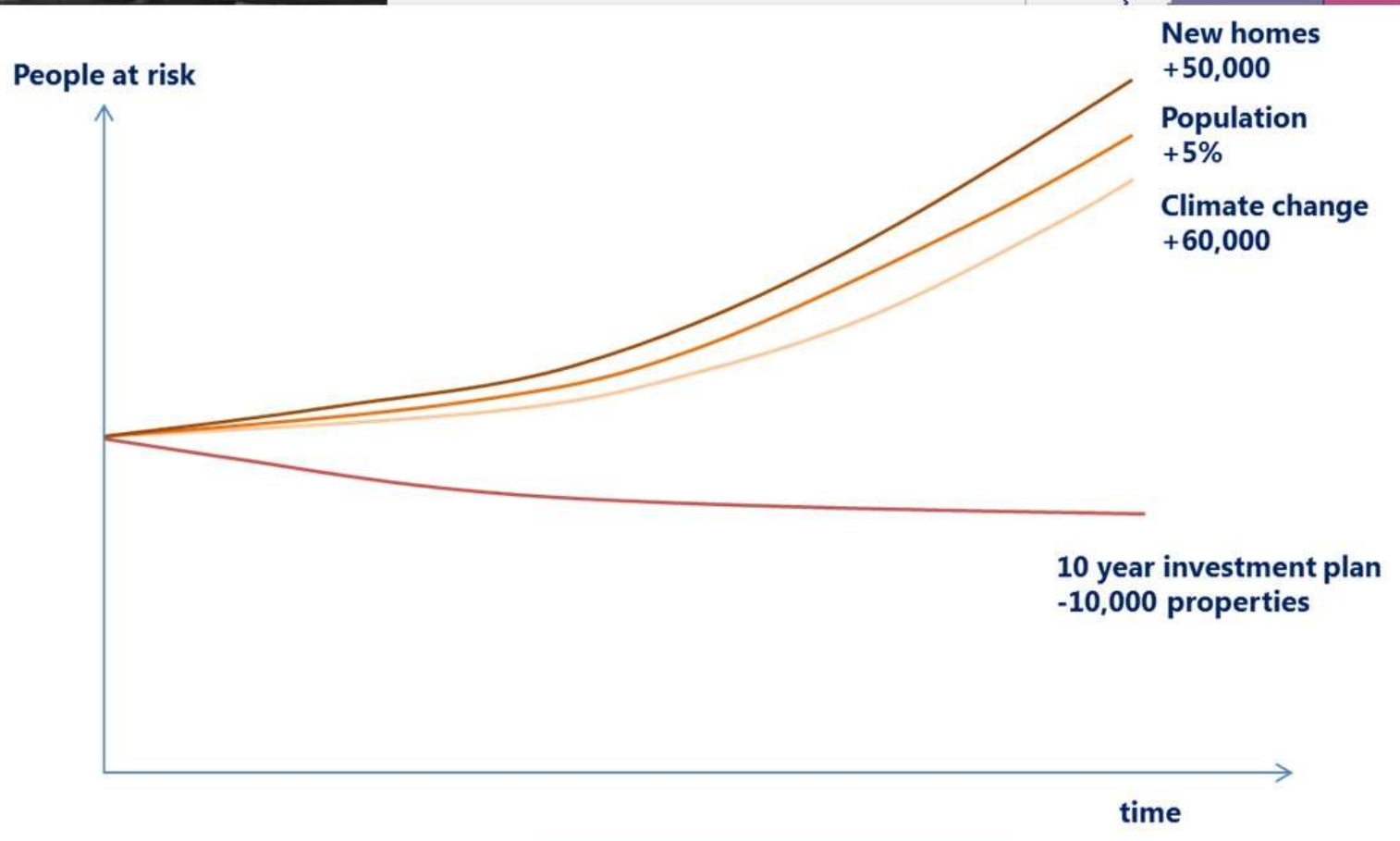


S

# Climate and Population change



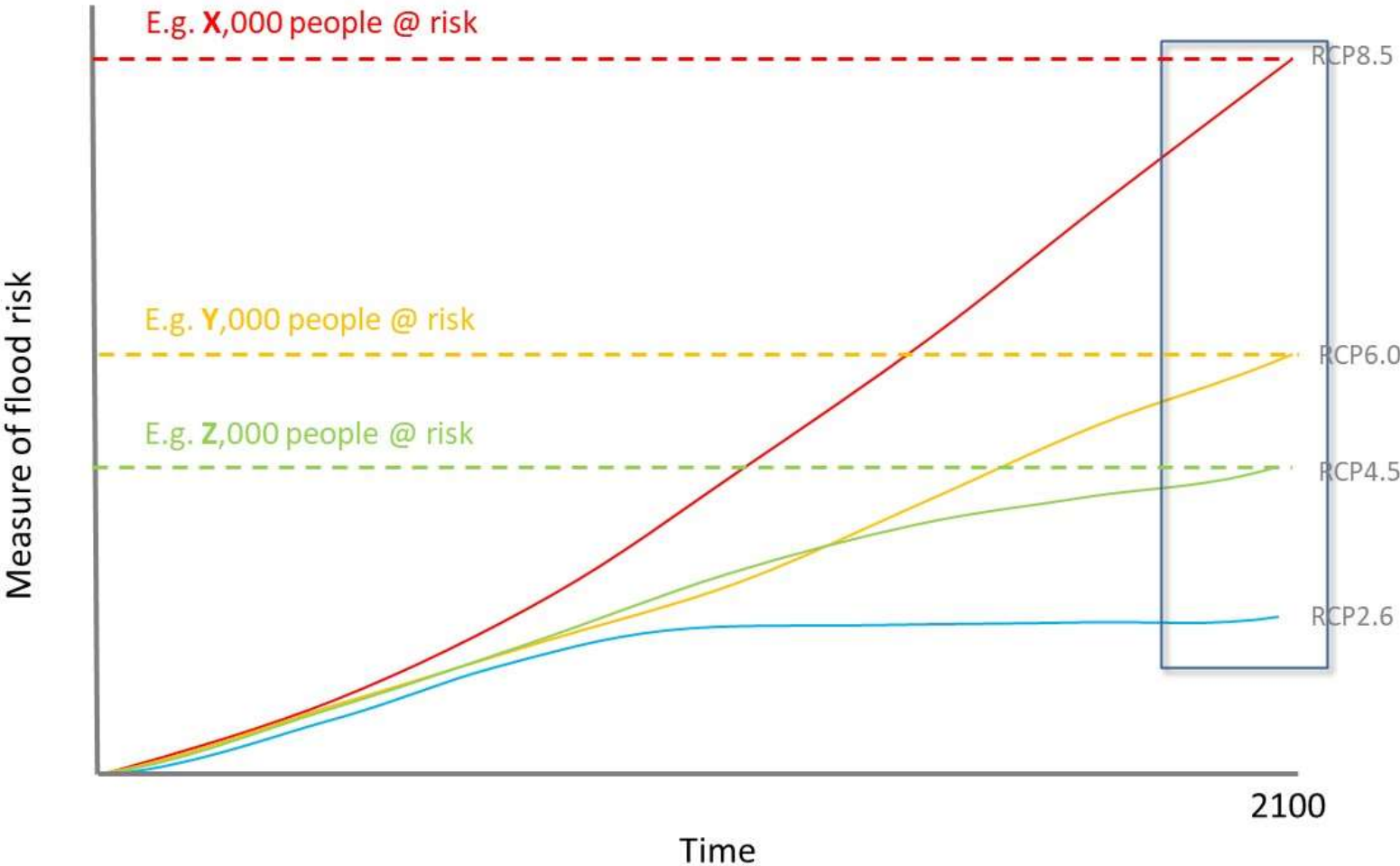
110,000 more people  
at risk by 2035



tion

WHERE WE ARE GOING

Scot



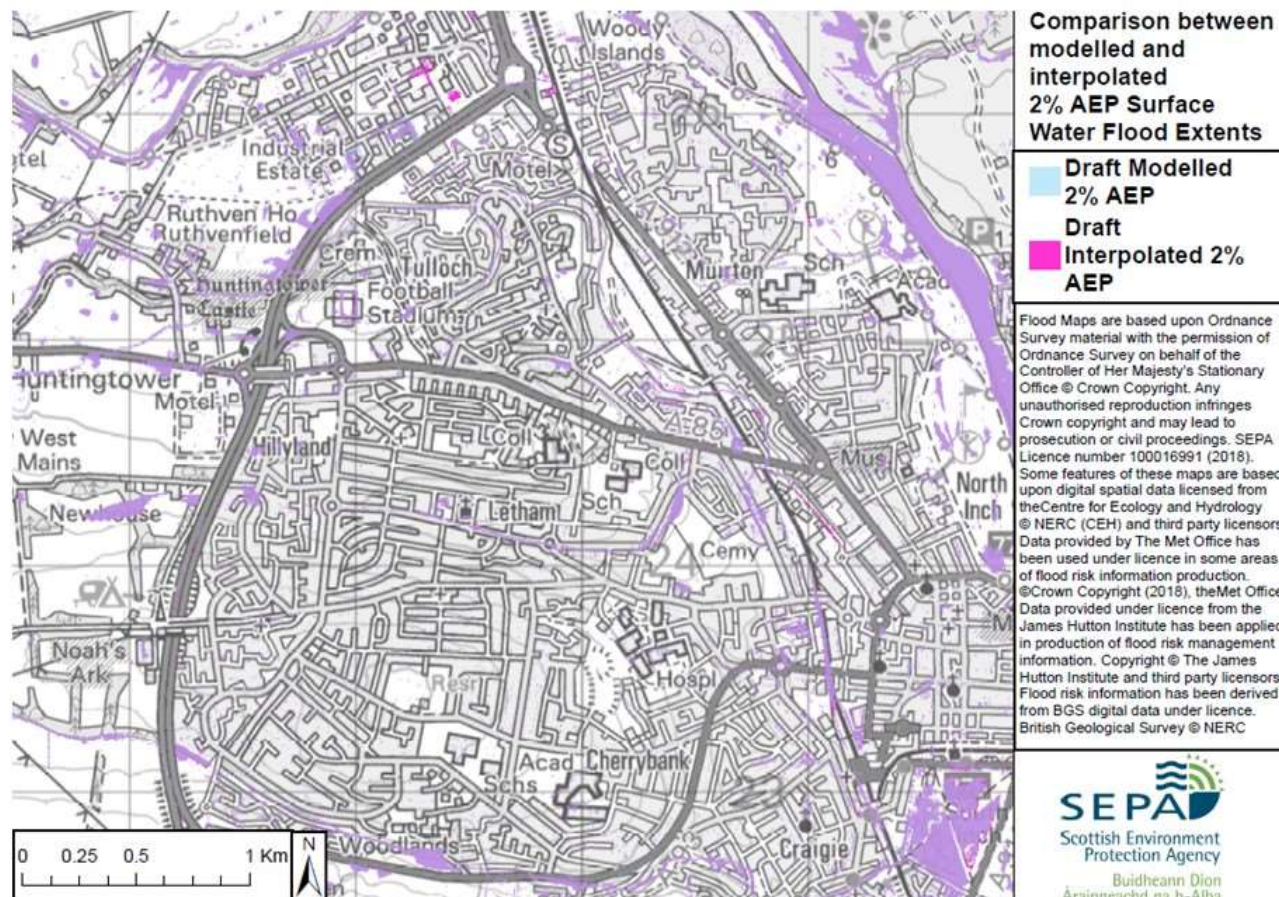
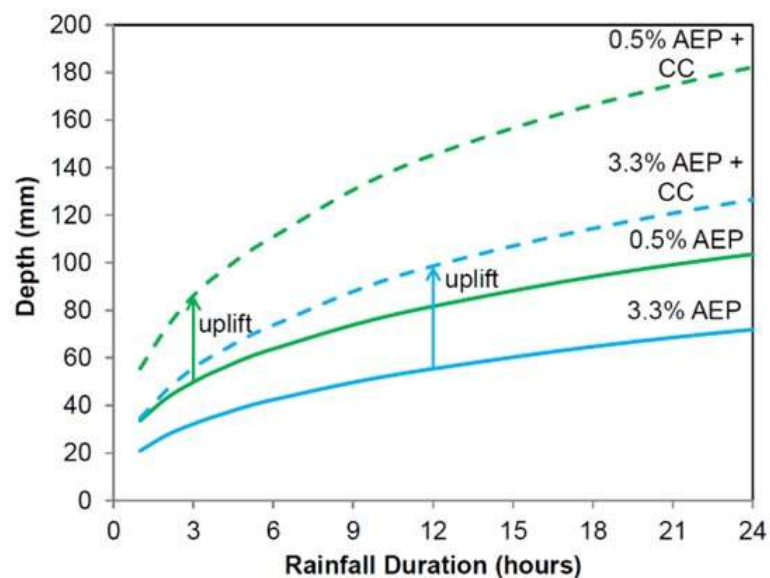


Scotland's F

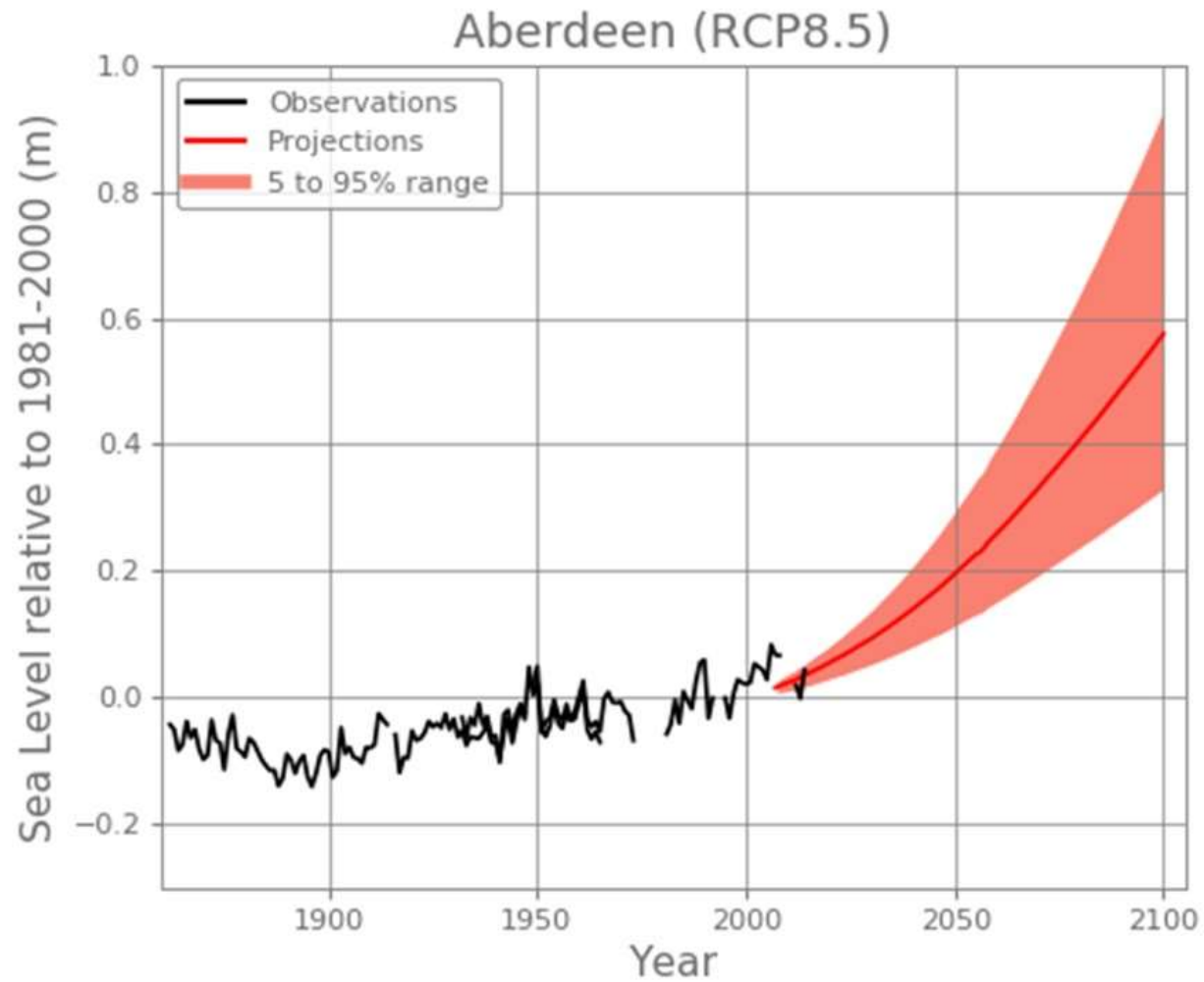




**Fiona McLeod (SEPA)**

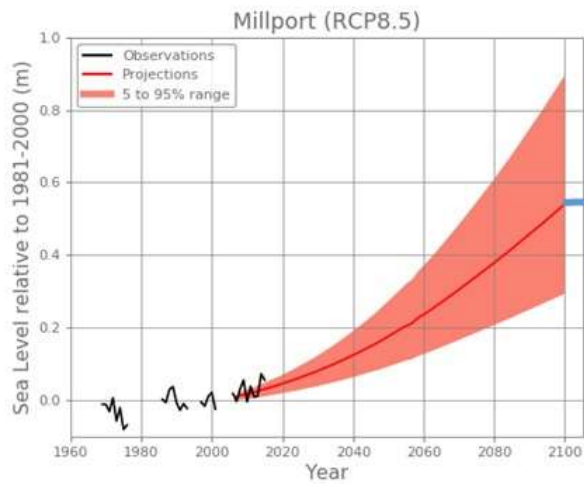
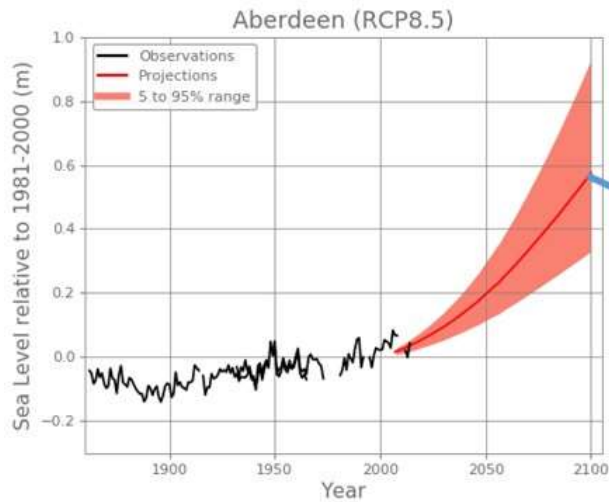


# Scotland

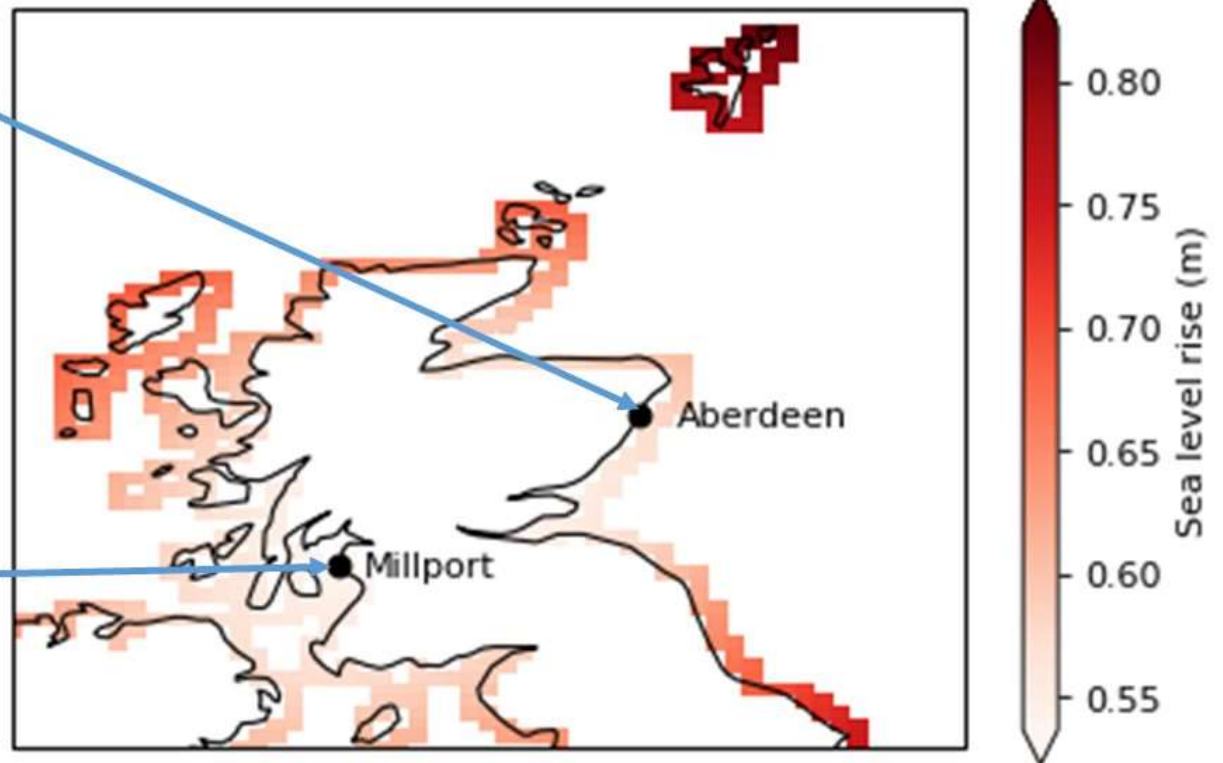




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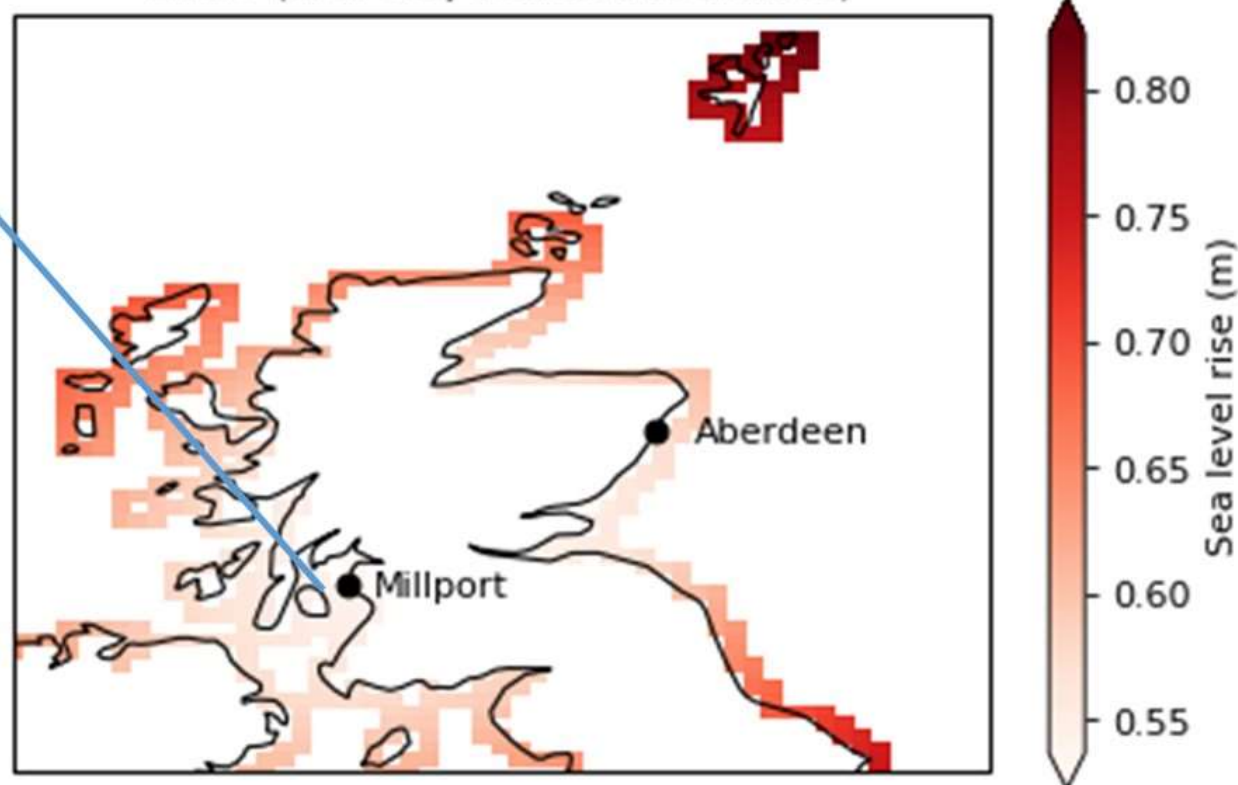


2100 (RCP8.5, Central Estimate)



River Basin District	Sea Level Rise Allowance 2017-2100 in m
Argyll	0.52
Clyde	0.51
Forth	0.52
North East Scotland	0.54
North Highland	0.55
Orkney	0.59
Western Islands	0.59
Shetland	0.69
Solway	0.54
Tay	0.52
Tweed	0.55
West Highland	0.55

2100 (RCP8.5, Central Estimate)





Scottish Government  
Riaghaltas na h-Alba  
gov.scot



Alistair Rennie (SNH, Dynamic Coast)

# Climate projections and adaptation planning on Scotland's coast

## Dynamic Coast



**Joseph Hagg** (Adaptation Scotland)



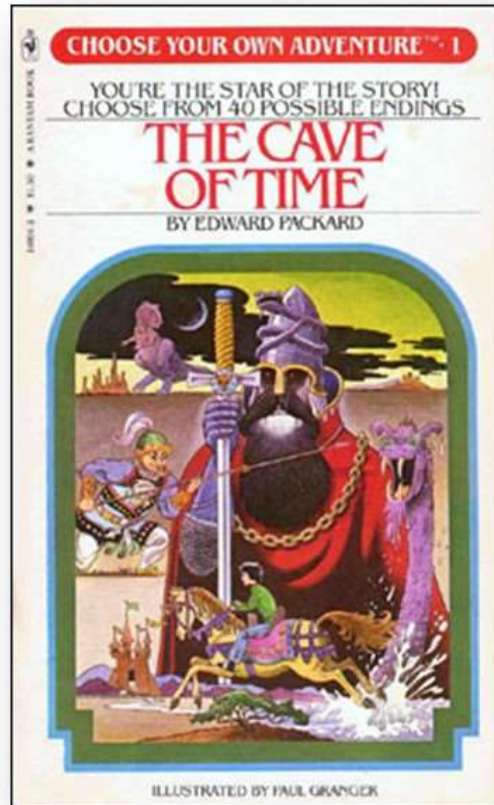
# Scotland's Flood Risk Management Conference

## Adaptation Pathways

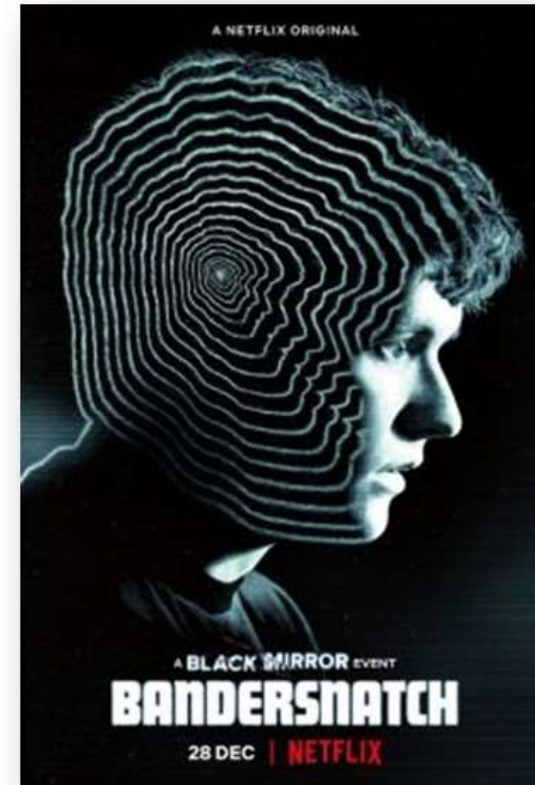
“...SEPA and the responsible authorities should use flexible or adaptive management options.”



# Scotland's Flood Risk Management Conference

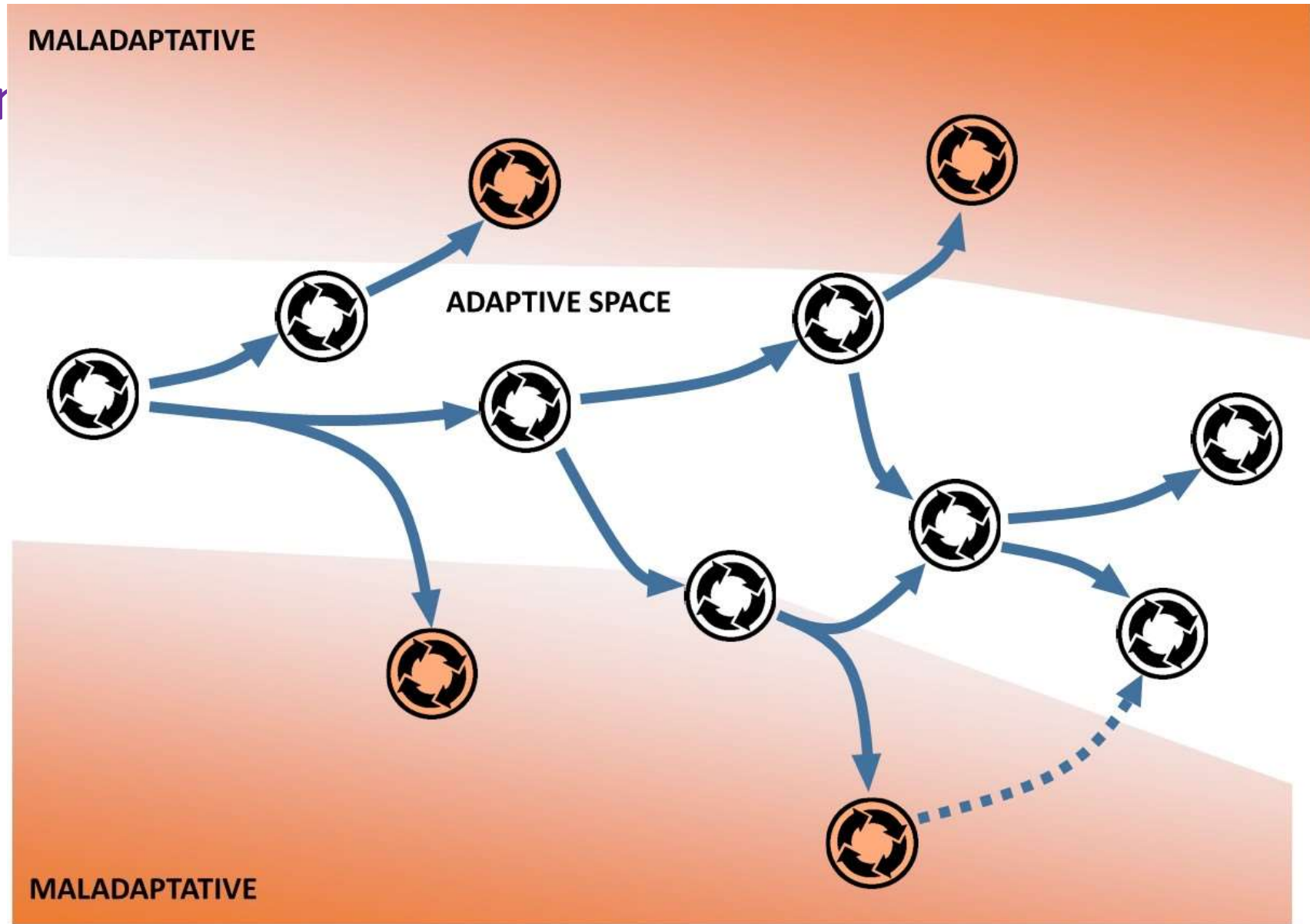


“... choose from 40 possible endings”

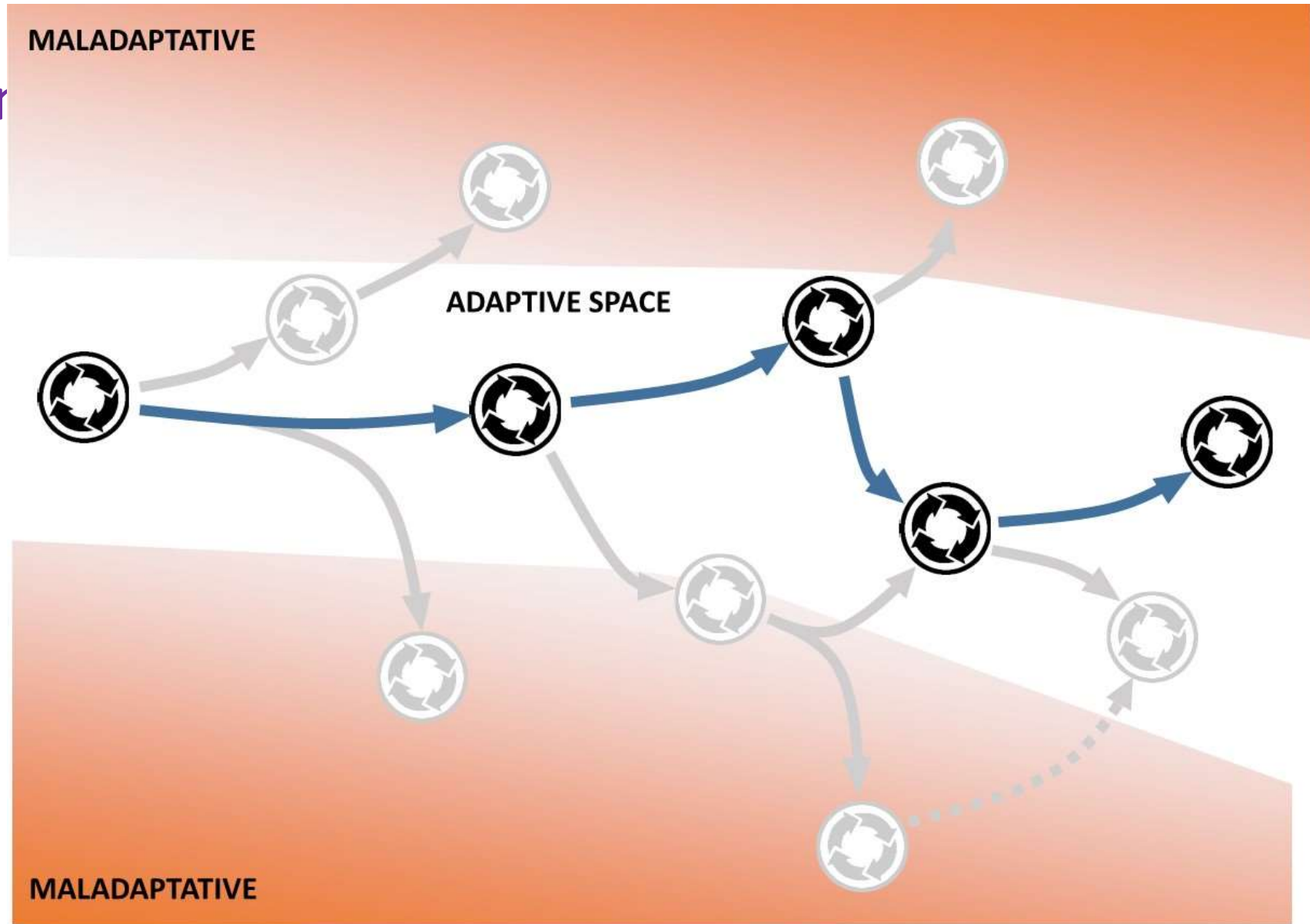


“All 10 main endings... explained”

digitalspy.com



Scotlar

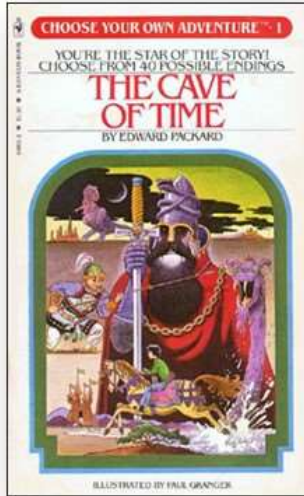


ffer  
brokers  
it Scotland

fer.org.uk



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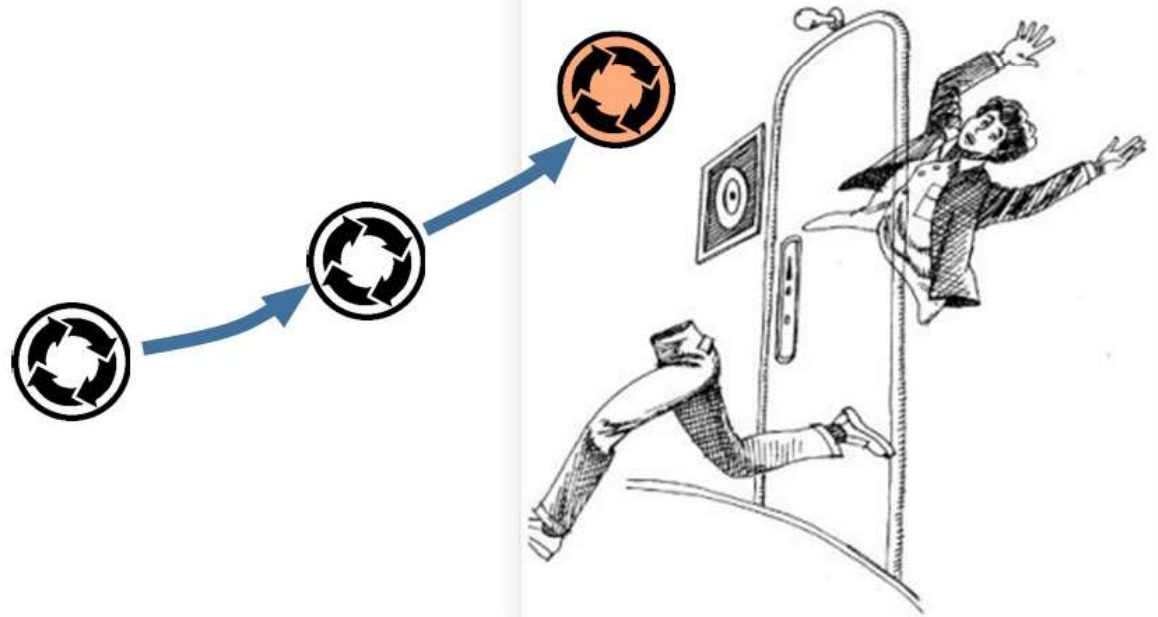
If we don't consider pathways...

“... choose from 40 possible endings”

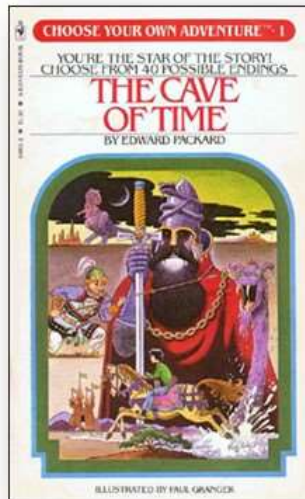


“All 10 main endings... explained”

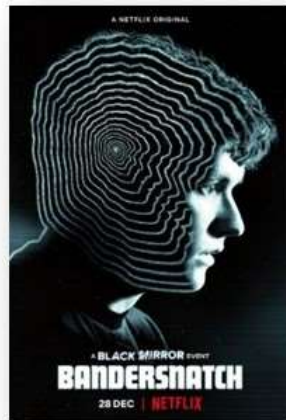
digitalspy.com



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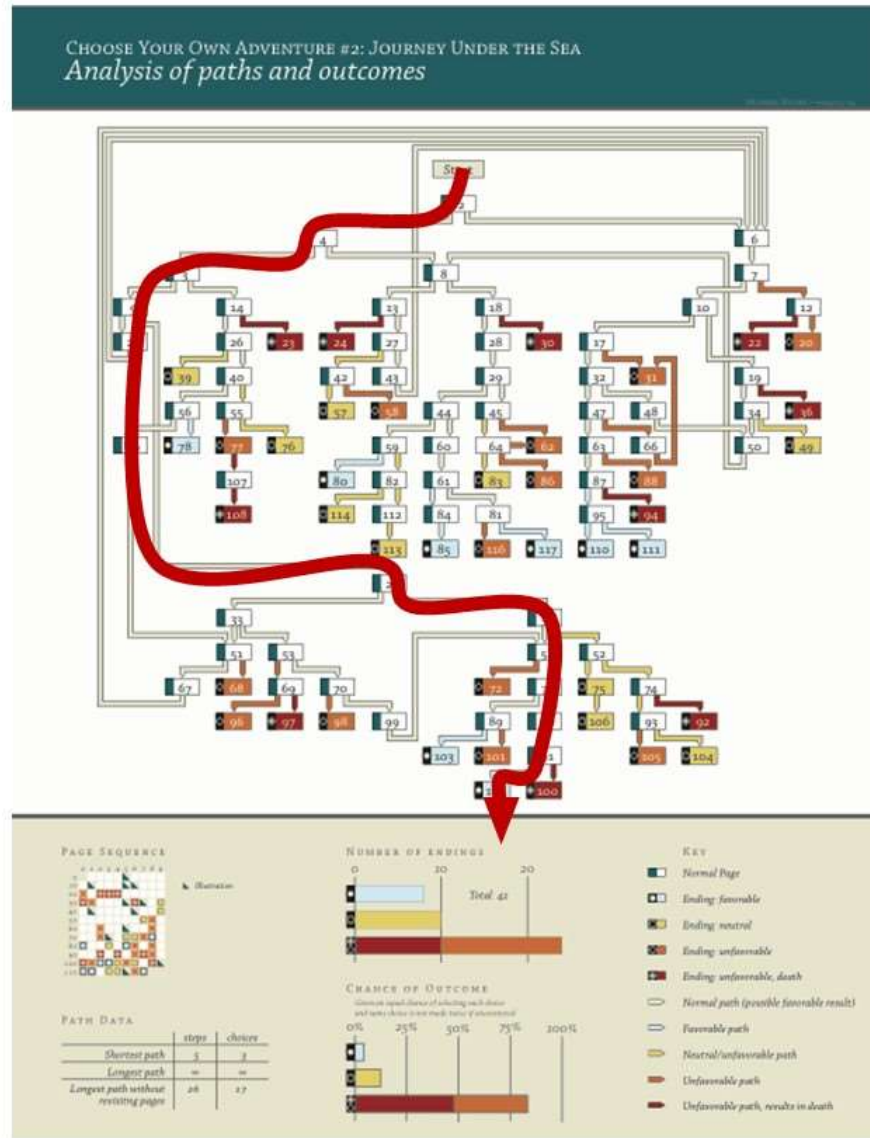


“... choose from 40 possible endings”



“All 10 main endings... explained”

[digitalspy.com](https://digitalspy.com)



... and if we do consider pathways...

“... Niggel finds that **over 75 percent of the book’s endings are unfavorable (50 percent will actually end in death).**”

[blog.adafruit.com/](https://blog.adafruit.com/)

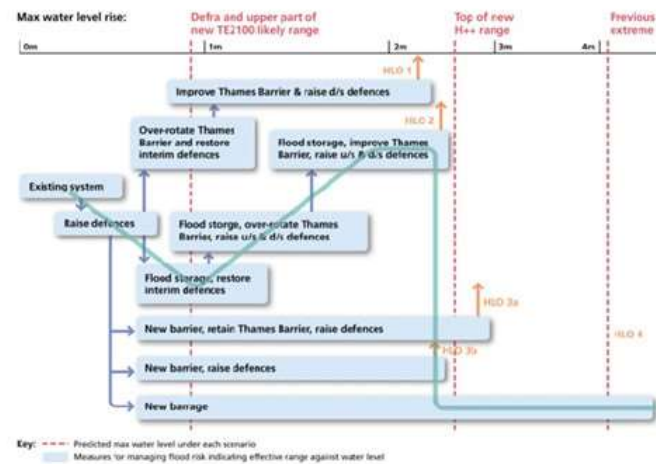
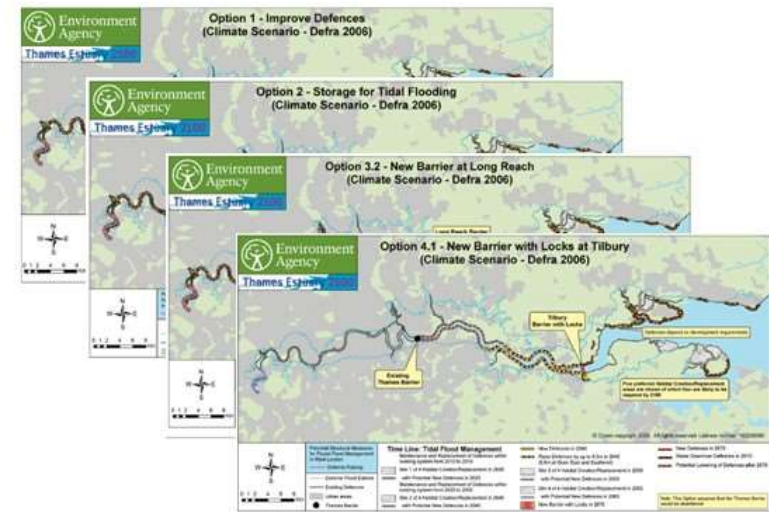
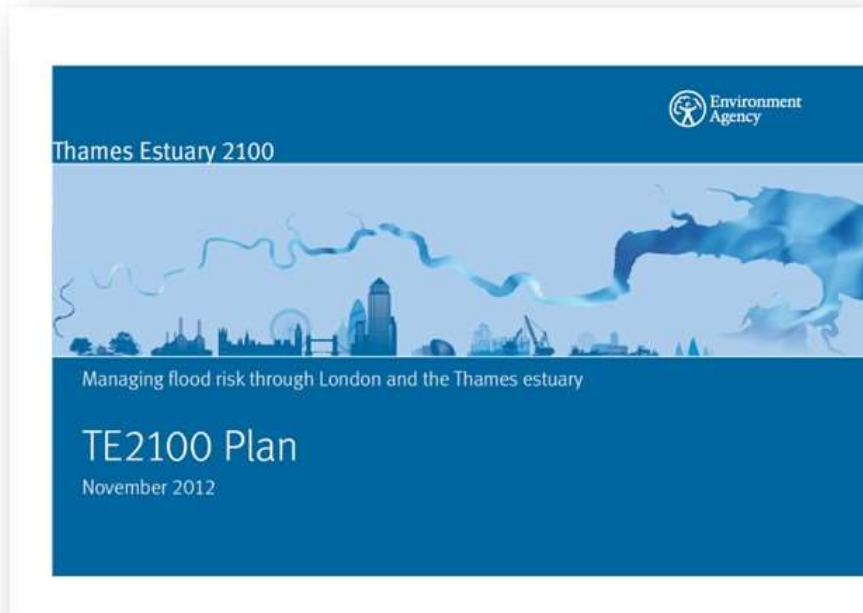
# Thames Estuary 2100... the case study example

## Scotland's Flood Risk Management Conference



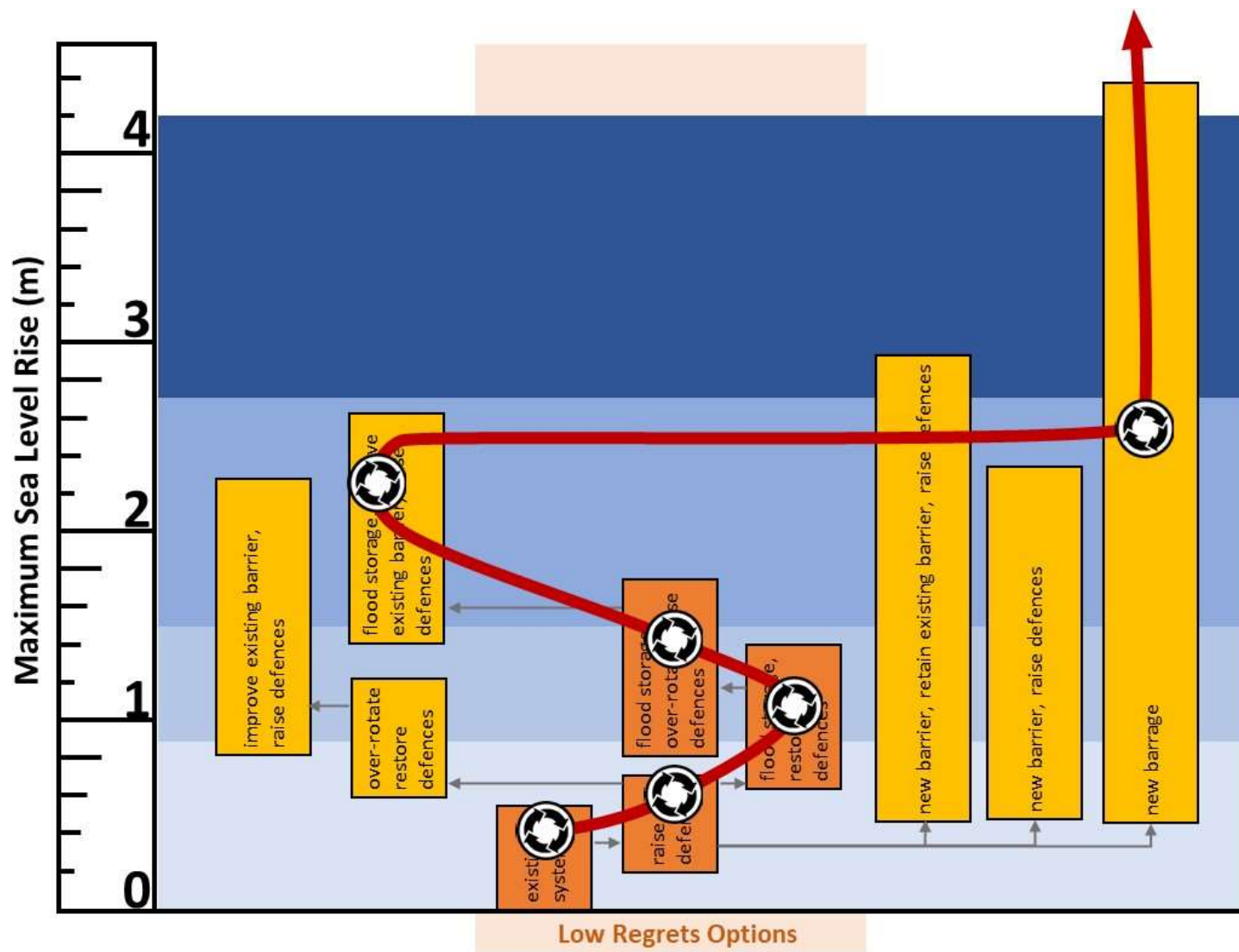


# Thames Estuary 2100... the case study example

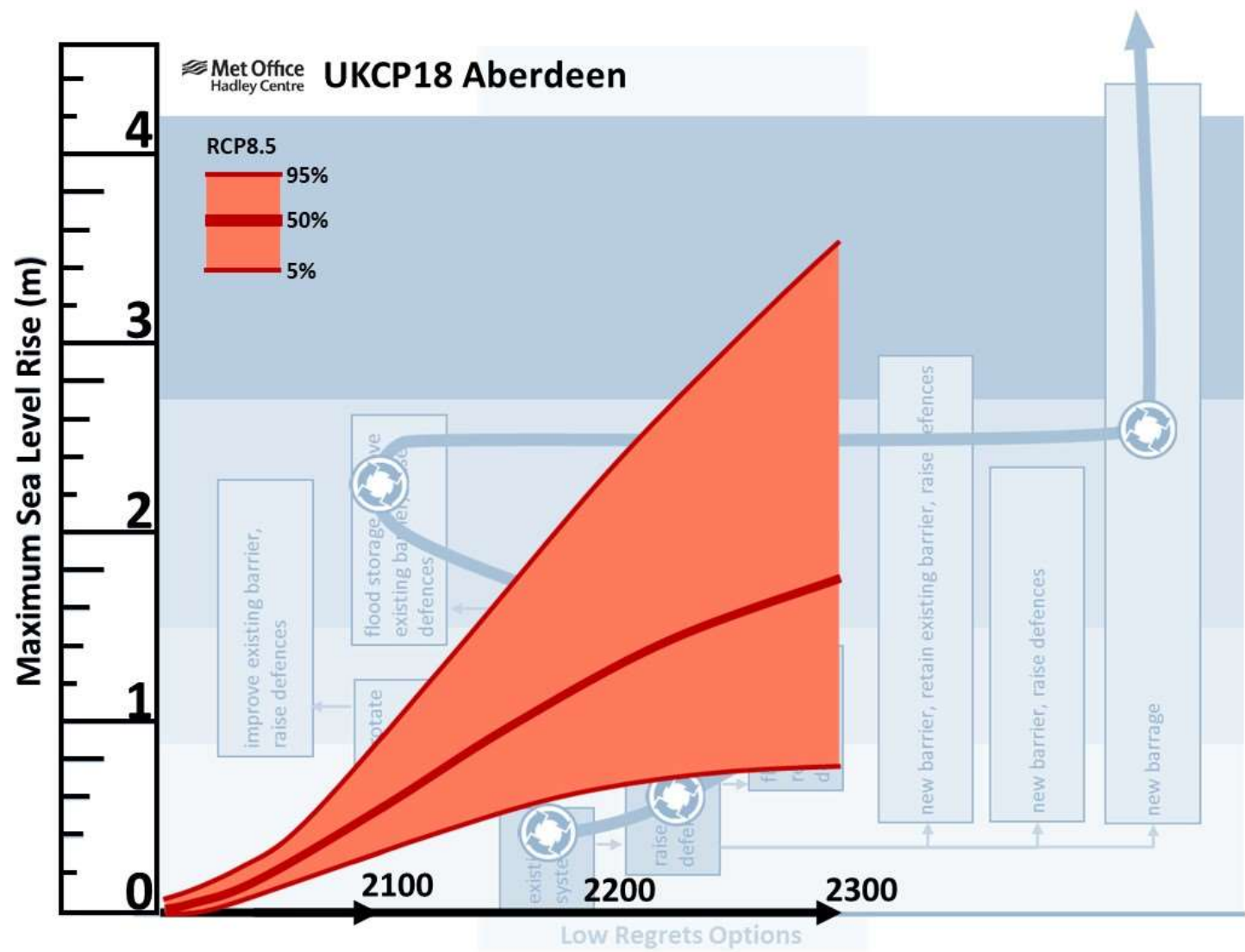




# Scotland's



Scotland'



sniffer  
wledge brokers  
resilient Scotland

Thames Estuary 2100

Source: modified from CoastAdapt.com.au,  
based on HM Treasury & DEFRA 2009 and  
Reeder & Ranger 2011.

sniffer.org.uk

# Adaptation Pathways

- Look at the **big picture** and consider both **short-** and **long-term** interventions
- Requires a **lot of information** on many different **options** to be useful
- Can this **integrate** with FRM practice in Scotland?

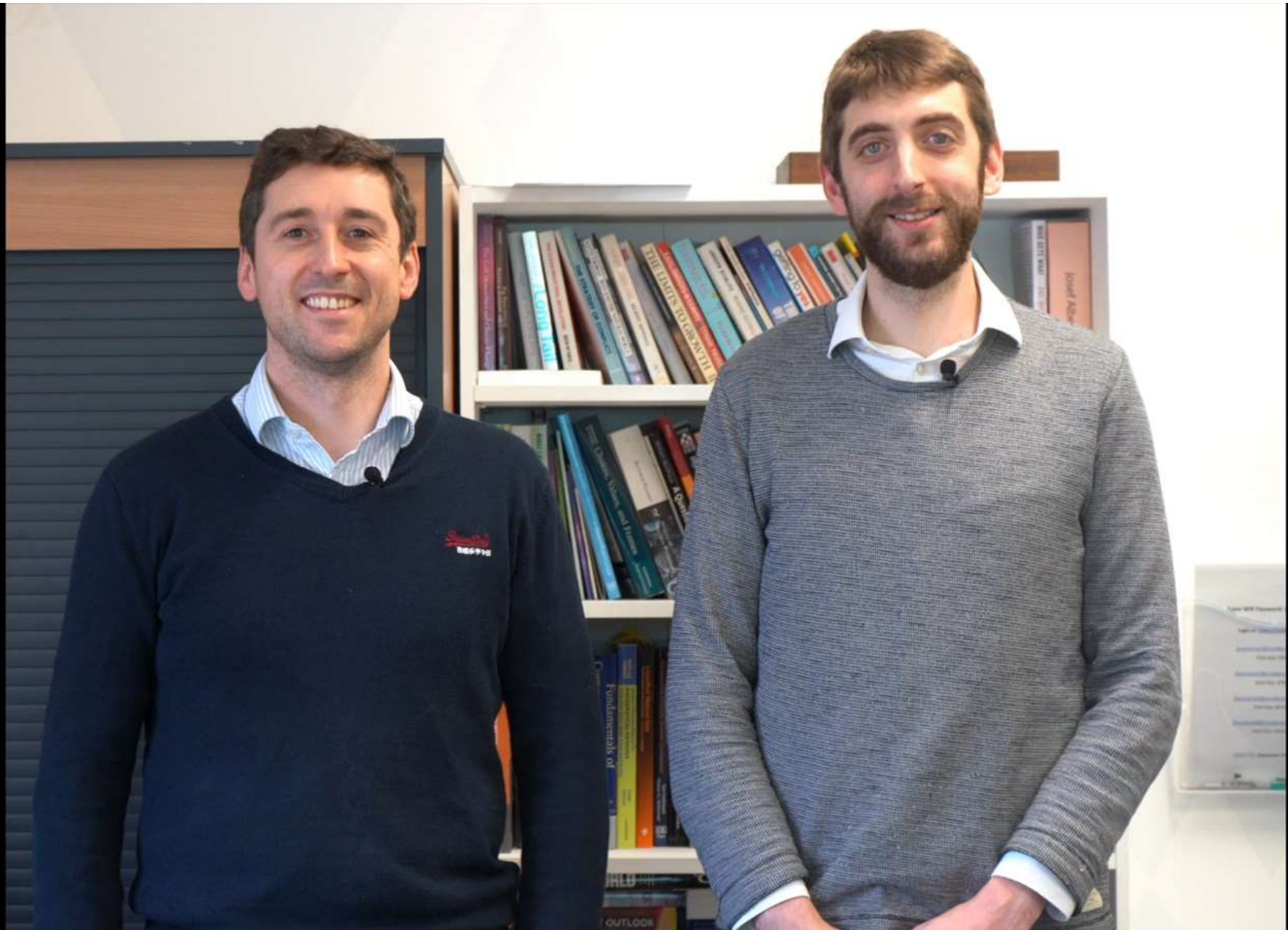
Okay... that's all very nice. But HOW do we do this in Scotland?



Day Two: Workshop C

**Using climate projections in the economic appraisal for Flood Risk Management measures**





### **Challenge 1: Flood risk is more than hazard.**

Evidence for future flood **risk** is improving. This is in part due to advances in climate projections that inform us about change in potential **hazard**. However, there is less evidence available for other components of risk – for example potential changes in **exposure** and **vulnerability** of receptors – this includes socio-economic and demographic change.

*Flood Risk = f (likelihood, **hazard**, vulnerability, exposure, value)*

### **Challenge 2: Communicating future flood risk**

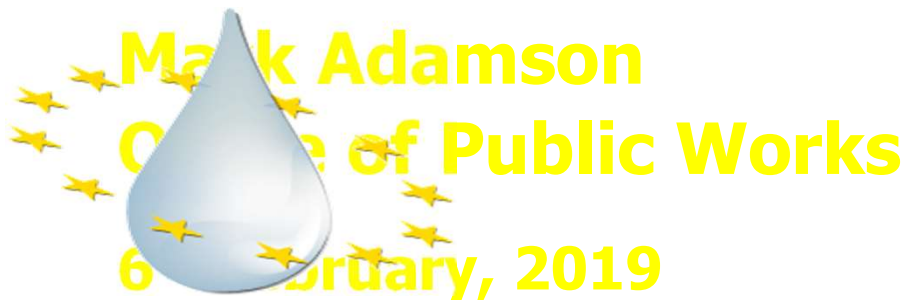
There is a growing body of evidence for future flood risk, including NFRA and Dynamic Coast. However, we need to communicate and engage at the scale at which decisions are being made – which is often local and varied, from planners to community groups. How do we move beyond ‘lines on a map’ to a deeper understanding of changing risk and dynamic, long-term change.

### **Challenge 3: Planning adaptation in the long term.**

FRM would benefit from taking a **managed adaptive approach** (including adaptation pathways), which is flexible for decision-making when faced with uncertainty, complexity and changing conditions. However, it is not always clear how this can be applied in FRM practice – it needs to integrate with procedures from identification of options, to appraisal and long-term delivery.

# ***SCOTLAND'S FLOOD RISK MANAGEMENT CONFERENCE: 2019***

## **FLOOD RISK MANAGEMENT ACROSS EUROPE AND IN IRELAND**



# **FLOOD RISK MANAGEMENT IN EUROPE: THE EU 'FLOODS' DIRECTIVE & WORKING GROUP F**

## **FLOOD RISK MANAGEMENT IN IRELAND**

## **LOOKING FORWARD**

# EU 'FLOODS' DIRECTIVE: HISTORY

- 2002: EXTREME FLOODS IN EUROPE
- 2004: COMMUNICATION (COM/2004/0472)
  - Promote Community-Level Collaboration
- 2005: PREPARATORY WORK
- 2006: FIRST DRAFT AND NEGOTIATION
  - First Draft of the 'FD' Published 18th Jan. 2006
  - Env. Council Agreement June 2006
- 2007: FINALISATION
  - 6 November 2007: Published in Official Journal



# EU 'FLOODS' DIRECTIVE: WHAT IS IT?

- KEY REQUIREMENTS
  - Preliminary Flood Risk Assessment
  - Flood Maps
  - Flood Risk Management Plans
  - Reviews: 6-Yearly Cycle
- OTHER PROVISIONS
  - Co-ordination with WFD Implementation
  - Trans-Boundary Co-operation
  - Public Dissemination / Engagement

# EU 'FLOODS' DIRECTIVE: WHAT IS IT?

- SHORT & FLEXIBLE!
  - Framework: Limited Specific Requirements
  - Large Degree of Subsidiarity on 'How'
    - Important for MS to be able to Define in their Own Context
      - Legal, Governance, Legacy Work, Nature & Degree of Risks
    - Very Varied Approaches by MS in Implementation

# PFRA

- **PAST FLOODS:**
  - Nearly 20,000 Past Flood Events Reported Across EU
- **RISK ASSESSMENT:**
  - Economic Assessment (DK, LT)
  - Assessment for Specific Indicators (Most MS)
    - Population, No. Properties, Infrastructure, Cultural Assets, etc.
  - Integrated, Multi-Sectoral Risk Indicator (IE, PL)
- **DEFINITION OF 'SIGNIFICANT' RISK**
- **No. of APSFRs: >8,000 APSFRs Reported in EU**
  - No. APSFR Per MS: 0 (MT), 2 (HU), 10 (DK) ... 1229 (ES), 2,976 (HR)
  - Defined as Point, Line or Area (Community, River Reach, Catchment)

# FLOOD MAPPING

- APPROACH
  - More Consistency (Extensive Experience, ExCiMap)
  - Areas of Variability:
    - Flood Probabilities & Sources Mapped
    - Approach to Climate Change
    - Approach to Uncertainties
  - Communication:
    - Targeted Mapping (Data Provision) for Specific Audiences, e.g., Public, Planners, Developers, Emergency Planners, ...
    - Shift to Digital Mapping

# FLOOD RISK MANAGEMENT PLANS

- APPROACH
  - >250 FRMPs Prepared across EU (196 UoMs)
  - Very Diverse Approaches
    - Coverage (National, UoM, Local)
    - Defining Objectives (High-Level vs. Specific Targets vs. Actions)
    - Level / Scope of Measures
      - No. Measures per MS range from 10 to 17,568
      - High-Level (National / Catchment) to Community-Specific
    - Degree of Integration / Coordination with WFD



# EU 'FLOODS' DIRECTIVE: WHAT IS IT?

- BENEFITS

- Consensus that 'FD' has Improved FRM in EU
  - Nationally Consistent Approaches / Outputs
  - Creation of Central Databases / Datasets
  - Raised Awareness, Better Engagement
  - Enhanced Coordination between Sectors
- Opportunity to Re-Think Strategic Direction
  - Not a 'Tick-Box', but a Trigger for Reform

# 'WG F': WHAT IS IT?

- WORKING GROUP WITHIN 'CIS'
- MEMBERSHIP
  - EU Member States, COM, Inter-Govt. Bodies, EU Stakeholder Representatives
- OBJECTIVE
  - Forum to Support Implementation of the 'FD'
- ACTIVITIES
  - 6-Monthly Meetings
  - Reporting
  - 'Resource' Documents
  - Thematic Workshops

# 'WG F': WHAT IS IT?

- THEMATIC WORKSHOPS
  - Land Use Planning
  - PFRA
  - Flood Mapping
  - Climate Change
  - Natural Flood Risk Management
  - FRMPs
  - Flash Floods & Pluvial Events
  - Economics
  - Stakeholder Involvement
  - Objectives, Measures and Prioritisation
  - Resilience
  - Coastal Flood Risk

# **'WG F': WHAT IS IT?**

- **WG F: SERVES 'FD' FUNCTION, BUT ALSO:**
  - Forum for Knowledge Sharing and Information Exchange on FRM
  - Focal Point for FRM in Europe
  - Forum for Making Contacts - Network
  - Improved Flood Risk Management in General (Beyond 'FD')

# **FLOOD RISK MANAGEMENT IN EUROPE: THE EU 'FLOODS' DIRECTIVE & WORKING GROUP F**

## **FLOOD RISK MANAGEMENT IN IRELAND**

### **LOOKING FORWARD**



# HISTORIC & POLICY CONTEXT



- HISTORICAL CONTEXT
  - Focus on Drainage for Improvement of Agricultural Land
  - A.D. (Amendment) Act, 1995 – OPW
    - Local, Urban Flood Protection Schemes
    - Major Flood Relief Schemes:
      - 42 Schemes Completed: Appx. 9,500 Properties Protected
      - 35 Schemes in Construction / Design / Planning
    - Minor Works: OPW funding of up to €750k to LAs
      - Appx. 500 Projects Completed Providing Benefits to 6,500 Properties

# HISTORIC & POLICY CONTEXT



- NATIONAL FLOOD POLICY REVIEW: 2004
  - Roles and Responsibilities
  - Proactive, Catchment-based Approach
    - Flood Mapping
    - Flood Risk Management Plans
  - Flood Risk Management, rather than just Flood Protection (Flood Relief Schemes):
    - Prevention
    - Preparedness & Resilience
    - Protection

# ROLES & RESPONSIBILITIES

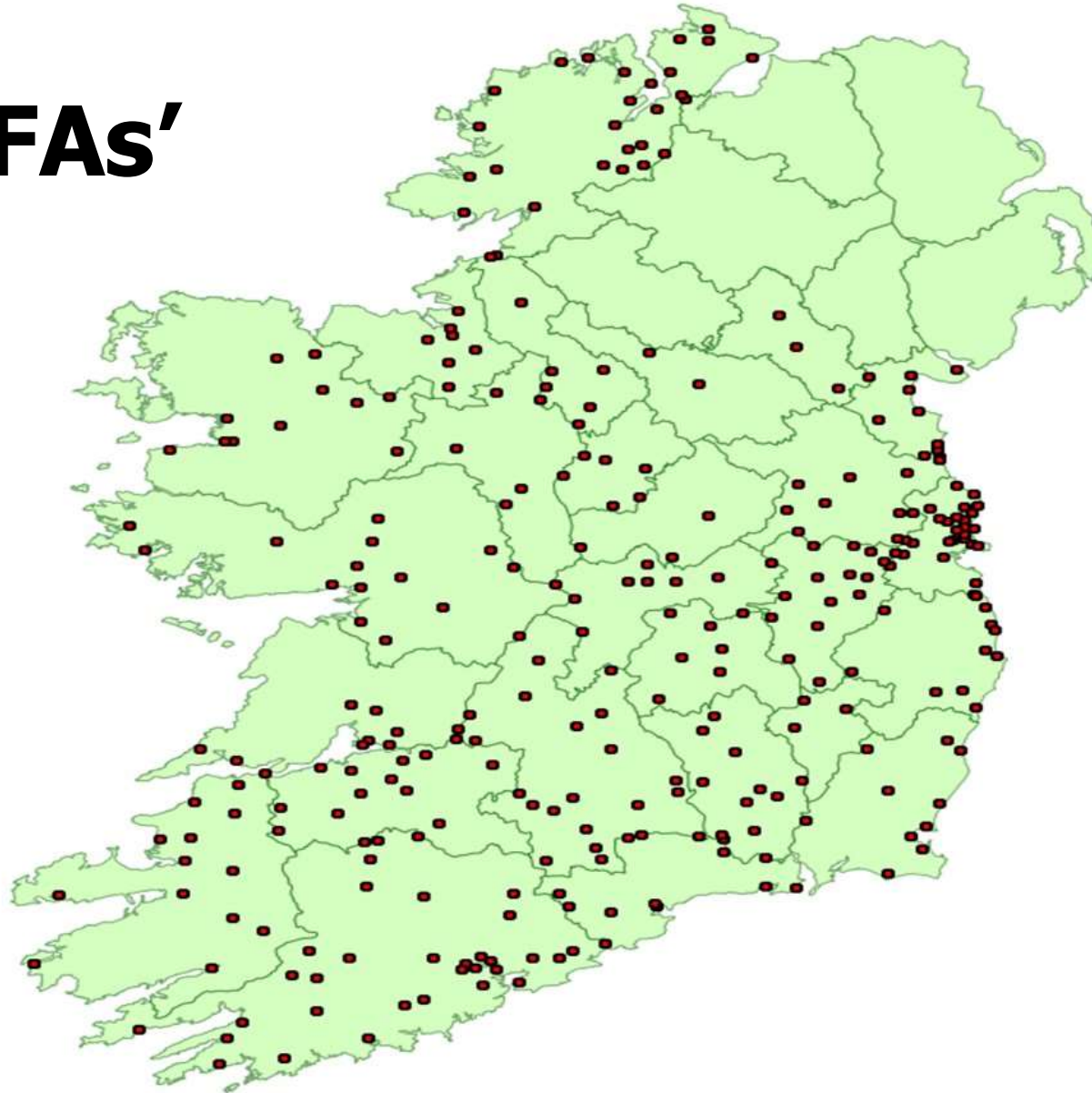


- **OPW**
  - Lead Agency: Policy, Funding, Coordination
  - Implementation: Fluvial, Coastal, Groundwater
    - 'FD', Flood Relief Schemes, Drainage Maintenance, Hydrometric Monitoring, CC Adaptation, ...
- **Local Authorities**
  - Pluvial (Surface Water Flooding), AWBI
  - Other Sources: Powers to Implement Works
  - Planning, Emergency Response
- **Other**
  - Waterways Ireland, Irish Water, ESB: AWBI
  - DHPLG / EPA / Local Authorities: WFD
  - Govt. Depts. / Agencies: Planning, Flood Forecasting, Insurance, ...

# PFRA

- BASED ON:
  - Historical Records
  - Predictive Hazard Assessment & Risk Analysis
  - Stakeholder Consultation (Local Authorities)
- COMPLETED 2011
- PUBLIC CONSULTATION
- 300 'AFAs' (COMMUNITIES)

# 300 'AFAs'







NATIONAL  
**CFRAM**  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



- 'CFRAM' PROGRAMME
  - Outcome of National Flood Policy Review, 2004
  - Compatible with FD Requirements, 2007
    - Flood Maps
    - Flood Risk Management Plans (FRMPs)
  - Pilot Studies:
    - Lee, Dodder, Fingal – East Meath: 2005-2011
  - National Programme: 2011-2017

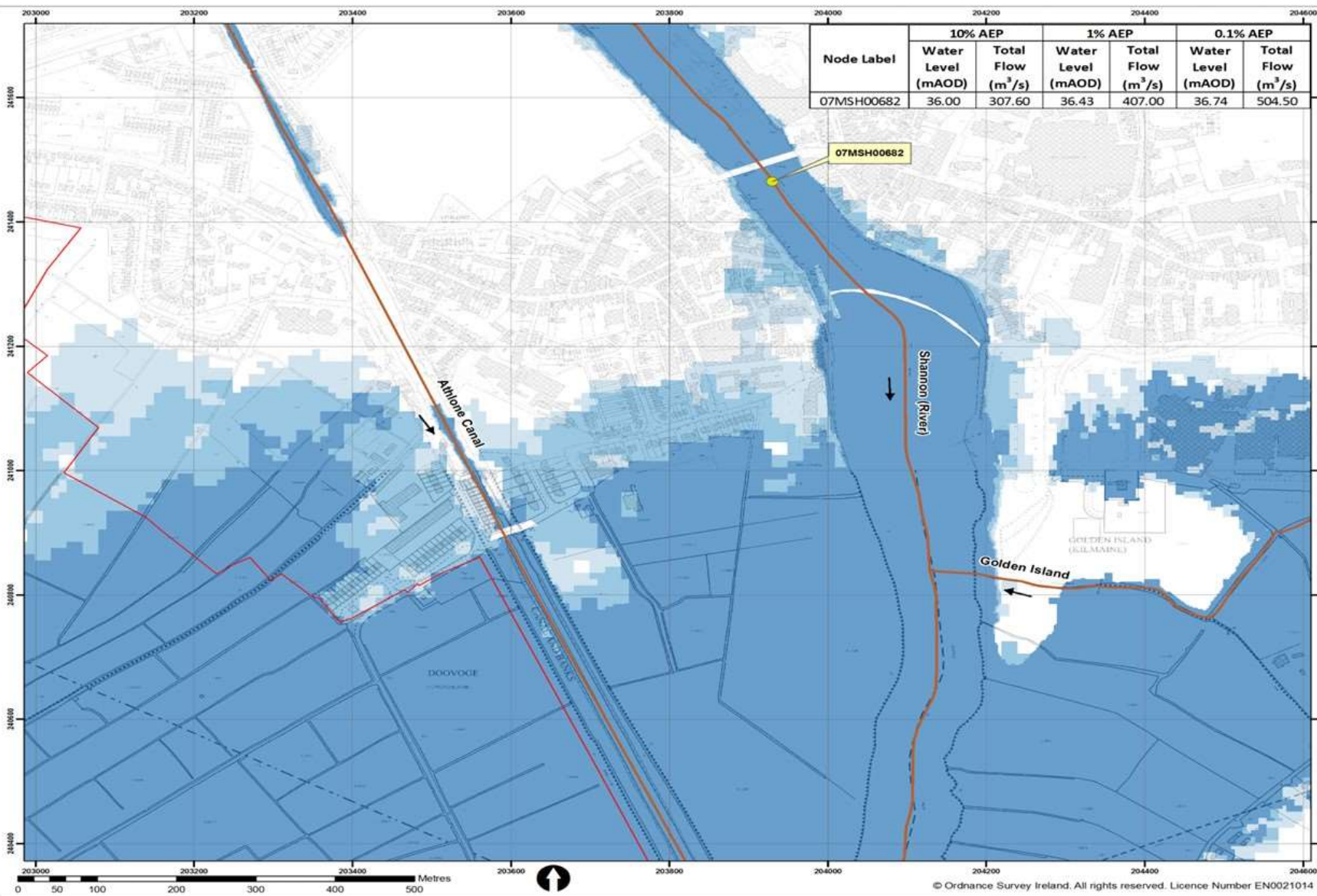


NATIONAL  
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CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT

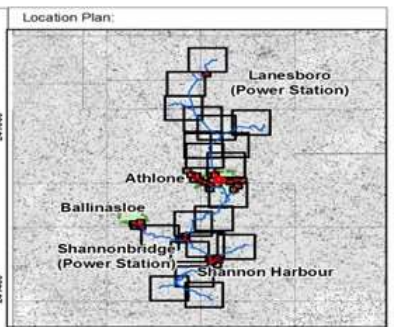


**OPW**  
The Office of Public Works  
Oifig na nOibreacha Poiblí

- SCOPE OF WORK
  - Survey & Data Collection
    - Appx. 6,500kms River Channel
  - Hydrological Analysis
  - Hydraulic Modelling
    - 1D-2D Dynamically Linked Models
  - Flood Mapping
    - Extent, Depth, Velocity, 'Risk-to-Life', Flood Zone & Various Risk Maps



Node Label	10% AEP		1% AEP		0.1% AEP	
	Water Level (mAOD)	Total Flow (m³/s)	Water Level (mAOD)	Total Flow (m³/s)	Water Level (mAOD)	Total Flow (m³/s)
07MSH00682	36.00	307.60	36.43	407.00	36.74	504.50




**Legend:**

- Nodes
- Model Reach
- AFA Boundary
- 10% AEP Fluvial Flood Extent (1 in 10 chance in any given year)
- 1% AEP Fluvial Flood Extent (1 in 100 chance in any given year)
- 0.1% AEP Fluvial Flood Extent (1 in 1000 chance in any given year)


**IMPORTANT USER NOTE:**

THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.



The Office of Public Works  
Jonathan Swift Street  
Trim  
Co. Meath



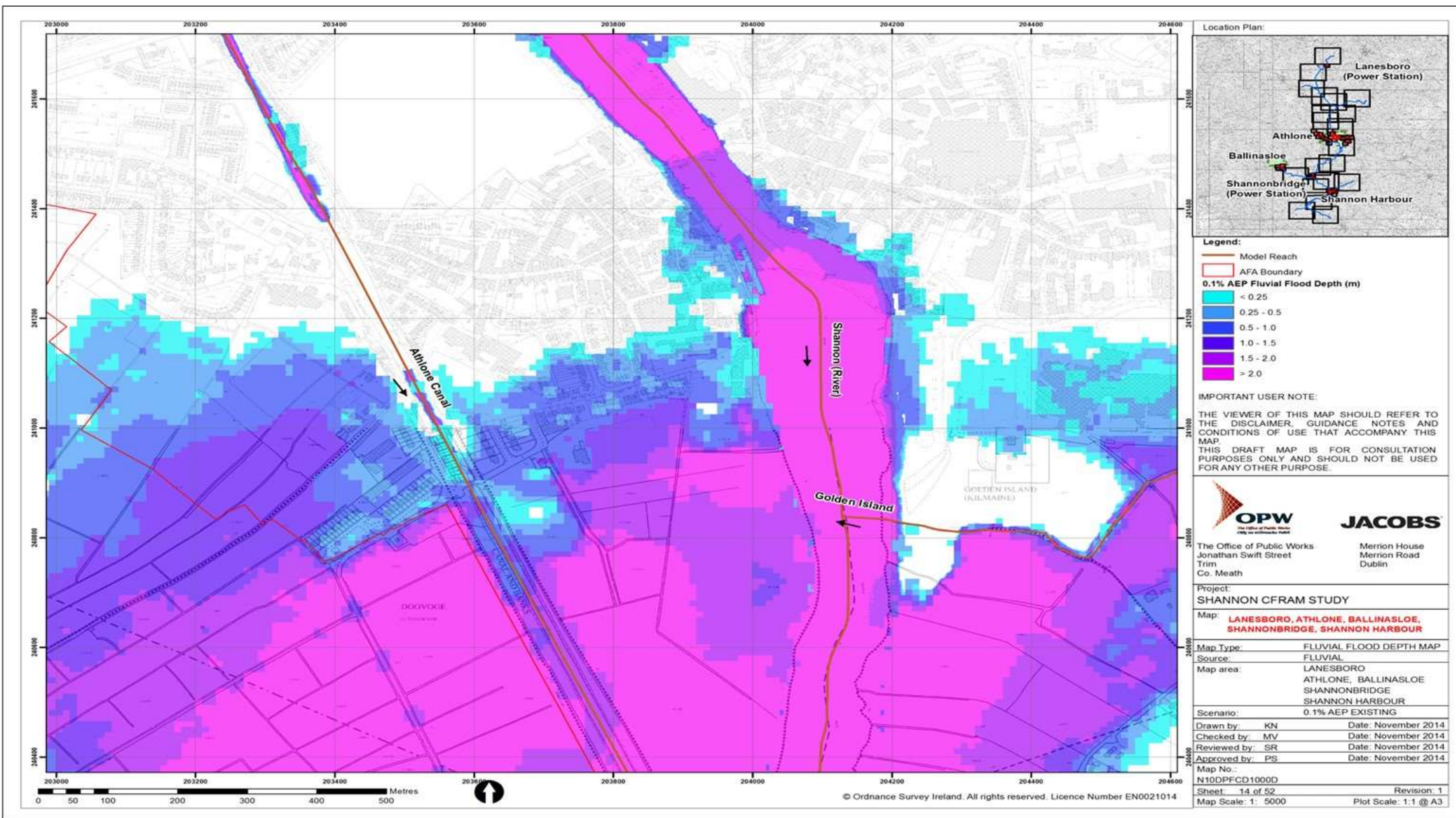
Merrion House  
Merrion Road  
Dublin

**Project:**  
SHANNON CFRAM STUDY

**Map:**  
LANESBORO, ATHLONE, BALLINASLOE, SHANNONBRIDGE, SHANNON HARBOUR

Map Type:	FLUVIAL FLOOD EXTENT MAP		
Source:	FLUVIAL		
Map area:	LANESBORO ATHLONE, BALLINASLOE SHANNONBRIDGE SHANNON HARBOUR		
Scenario:	EXISTING		
Drawn by:	KN	Date:	November 2014
Checked by:	MV	Date:	November 2014
Reviewed by:	SR	Date:	November 2014
Approved by:	PS	Date:	November 2014
Map No.:	N10EXPCDD		
Sheet:	14 of 52	Revision:	1
Map Scale:	1: 5000	Plot Scale:	1:1 @ A3







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PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



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The Office of Public Works  
Oifig na nOibreacha Poiblí

- **FLOOD MAPS ('CFRAM' PROGRAMME)**
  - **Range of Flood Maps Produced**
    - Extent, Depth, Velocity, 'Risk-to-Life', Flood Zone & Various Risk Maps
    - Up to 8 Flood Event Probabilities
  - **Future Scenario Mapping**
    - 2 Representative Climate Futures
      - MRFS: +500mm MSL, +20% Qp
      - HEFS: +1000mm MSL, +30% Qp
    - Future Scenario Risk Assessments
      - No. Properties, € Damage, Etc.





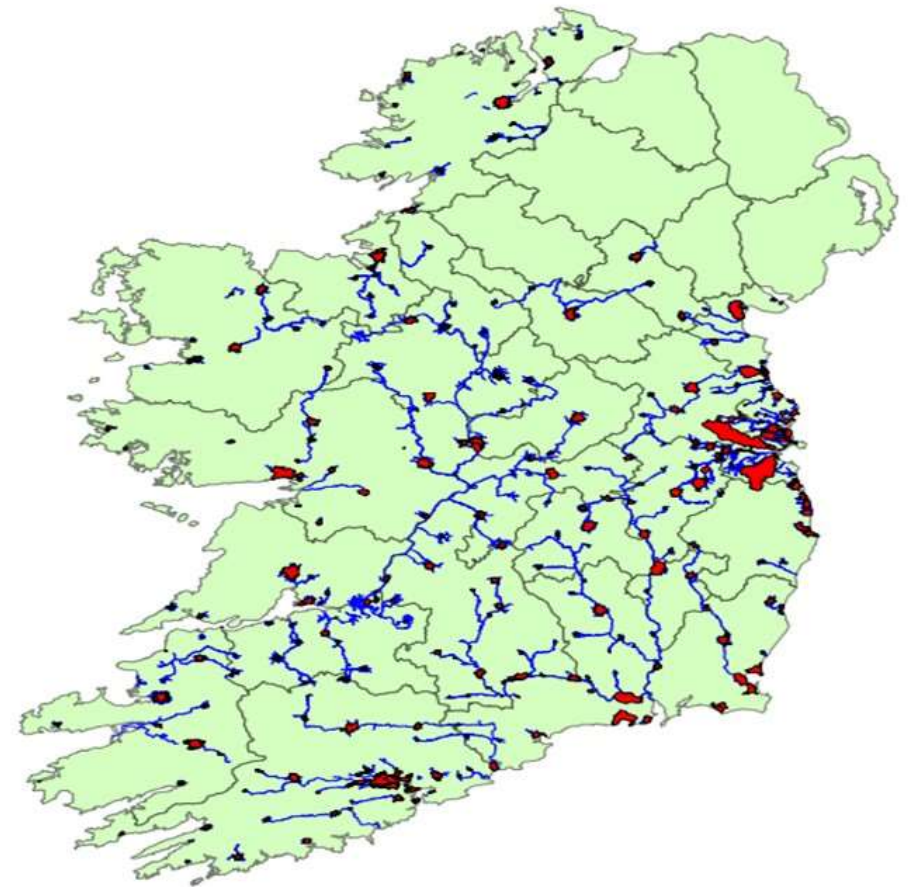
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ASSESSMENT AND MANAGEMENT



**OPW**  
The Office of Public Works  
Oifig na nOibreacha Poiblí

# FLOOD MAPS

- Detailed Mapping for 300 Communities
  - Incl. 90 Coastal Communities
  - **Communities with Appx. 3m People (Appx. 2/3rds Population)**
- Less Detailed Mapping for Appx. 2,500 km Other River
- Inform:
  - Sustainable Planning
  - Emergency Response Planning
  - Community Resilience





NATIONAL  
**CFRAM**  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



- FRMPs – COMMUNITY-LEVEL MEASURES
  - Screening & Option Development
    - Developed to 'Line-&-Level'
    - Costed – Unit Cost Database
  - Appraisal
    - Multi-Criteria Analysis (MCA)
    - Cost-Benefit Analysis (CBA)
    - SEA / AA Environmental Assessment
    - Adaptability to Climate Change
  - Public Consultation: Over 450 PCDs



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ASSESSMENT AND MANAGEMENT



**OPW**  
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- **FRMPs – COMMUNITY-LEVEL MEASURES**
  - **FRS Programme (Protection)**
    - 118 Schemes Proposed in FRMPs
    - Compliments Appx. 75 Schemes Completed / Underway
    - €1bn 2018-27 (National Development Plan)
  - **Protection for Appx. 33,000 Properties:**
    - Appx. 95% Properties in AFAs
    - Appx. 80% Properties Nationally



NATIONAL  
**CFRAM**  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



- FRMPs – NATIONWIDE MEASURES
  - Prevention:
    - Sustainable Planning & Devt. Management
    - Sustainable Urban Drainage Systems
    - Voluntary Home Relocation Scheme
    - Climate Change Adaptation Planning
    - Natural Flood Risk Management (ICM)



NATIONAL  
**CFRAM**  
PROGRAMME  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



- **FRMPs – NATIONWIDE MEASURES**
  - Preparedness & Resilience:
    - Flood Forecasting & Warning
      - National Flood Forecasting Centre
    - Emergency Response Planning
    - Promotion of Individual / Community Resilience
    - Individual Property Protection
    - Flood Event Data Collection





NATIONAL  
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CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT



**OPW**  
The Office of Public Works  
Oifig na nOibreacha Poiblí

- FLOOD RISK MANAGEMENT PLANS
  - Finalised 3<sup>rd</sup> May 2018
  - Published: [www.floodinfo.ie](http://www.floodinfo.ie)

The screenshot shows the homepage of the FloodInfo.ie website. At the top left is the OPW logo. The main heading is "Welcome to FloodInfo.ie". Below this, a text block states: "Providing access to Flood Plans and Flood Maps developed by the OPW and information on flood risk management in Ireland." To the right of this text are two main navigation buttons: "View Flood Plans" with a pencil icon and "View Flood Maps" with a map icon. Below each button is a sub-description: "Access to flood risk management measures" and "Access to flood hazard and flood risk information" respectively. At the bottom left, there is a news item: "Minister 'Boxer' Moran launches new website Floodinfo.ie - 3 May 2018" with a red button labeled "READ KEY MESSAGES". The bottom of the page features a horizontal strip of three small images: a landscape, a building, and a map.

Active Layers

+ Add Layer



Layers



Tools



Search

+ River Flood Extents – Present Day



+ Coastal Flood Extents – Present Day



+ PDF Maps (Printable)

- Past Flood Events

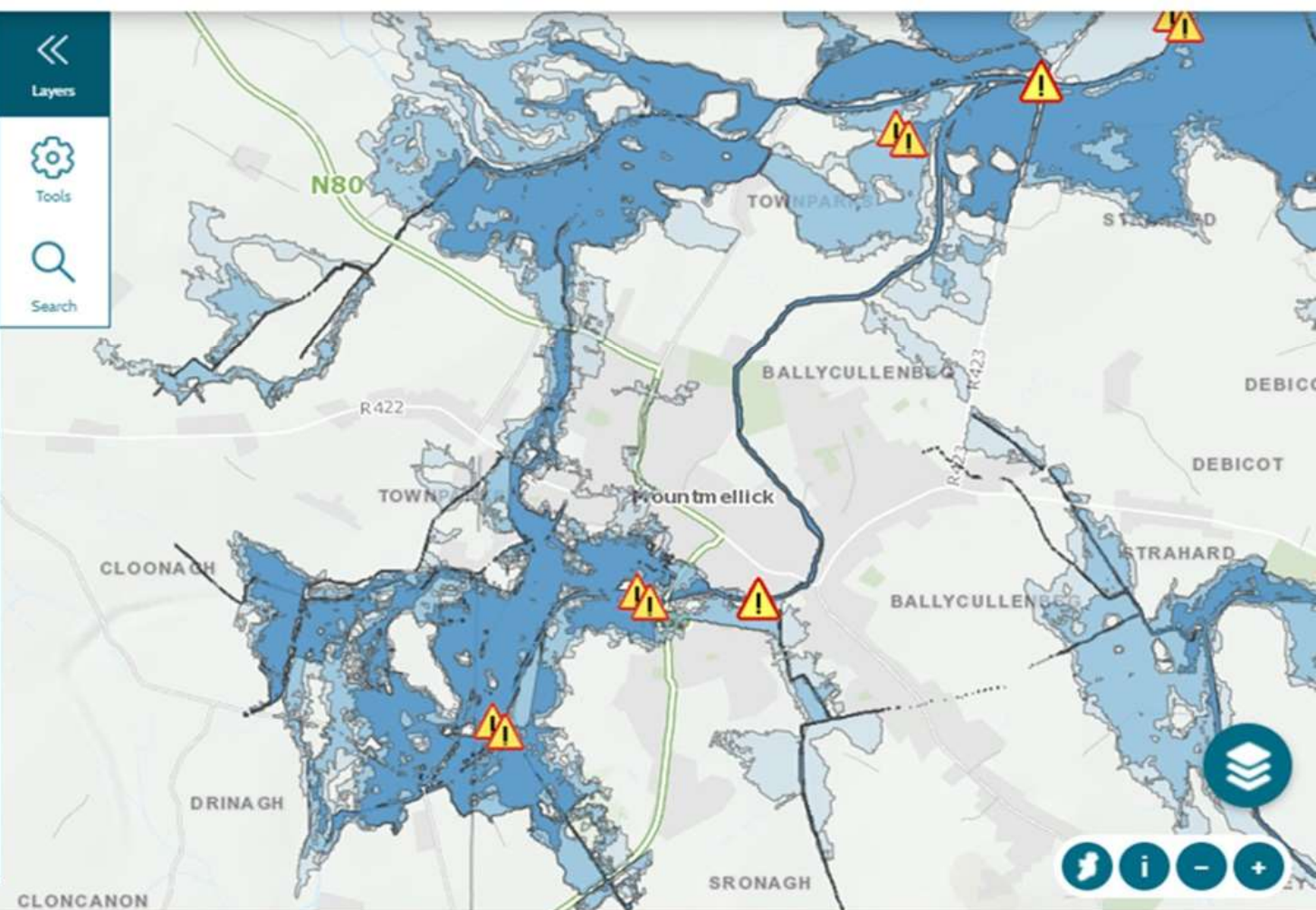
On Past Flood Event



Single Flood Event

Recurring Flood Event

Layer Queryable: Yes



Active Layers

+ Add Layer



Layers



Tools



Search



Info

Flood Risk Management Measures



Mountmellick Measures



Proposed Measure:

Progress the development of a Flood Relief Scheme for Mountmellick

Outline:

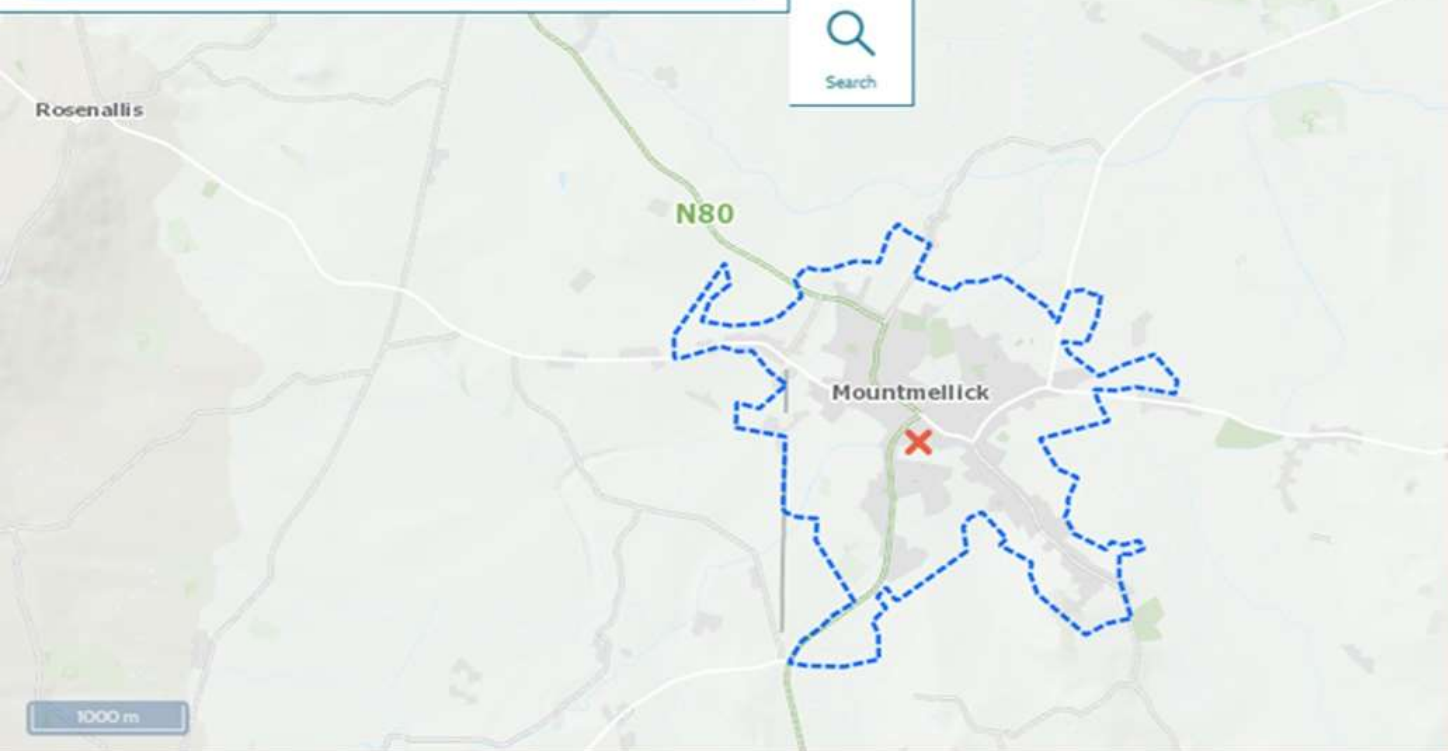
Progress the project-level development and assessment of a Flood Relief Scheme for Mountmellick, including environmental assessment as necessary and further public consultation, for refinement and preparation for planning / exhibition and, if and as appropriate, implementation. [More Info...](#)

+ Barrow Catchment Measures



VIEW FULL PLAN

HOW THE AREA WAS ASSESSED



# **FLOOD RISK MANAGEMENT IN EUROPE: THE EU 'FLOODS' DIRECTIVE & WORKING GROUP F**

## **FLOOD RISK MANAGEMENT IN IRELAND**

### **LOOKING FORWARD**

# EU 'FLOODS' DIRECTIVE

- WHAT IS THE 2<sup>ND</sup> CYCLE?
  - Art. 14:
    - "*.. shall be reviewed, and if necessary updated, ..*"
    - Requirement for Consideration of Climate Change
  - Review and Update 1<sup>st</sup> Cycle, Rather than 'De-Do'
  - Option to Re-Do / Significantly Revise – Informed by Lessons Learned
  - Opportunity to Refine and Improve



# EU 'FLOODS' DIRECTIVE

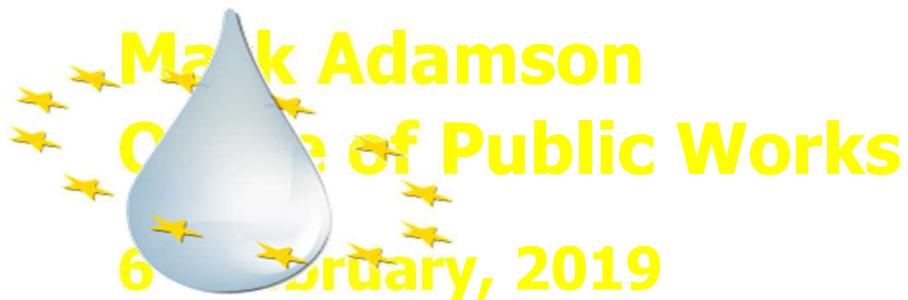
- BUILDING ON THE 1<sup>ST</sup> CYCLE
  - Focus will Vary According to MS Needs
  - (Some) Issues for Ireland:
    - Rural Risk
    - Critical Infrastructure
    - Improved Coordination with WFD (ICM – NFM)
    - Enhance Incorporation of CC Adaptability into FRM Planning / FRS Scheme Design
    - Develop Community Resilience

# SUMMARY

- **'Floods' Directive**
  - Common Framework, with Flexibility and Subsidiarity
  - Improved FRM in Europe
  - 2<sup>nd</sup> Cycle: Opportunity to Further Refine and Improve
- **WG F:** Key Forum for Information Exchange
- **Ireland**
  - Intensive Application in 1<sup>st</sup> Cycle: Scope, Level of Detail
  - 2<sup>nd</sup> Cycle: Review, with Refinement – Range of Issues

# ***SCOTLAND'S FLOOD RISK MANAGEMENT CONFERENCE :2019***

## **FLOOD RISK MANAGEMENT ACROSS EUROPE AND IN IRELAND**



# 2018 National Flood Risk Assessment

FRM Conference  
6th February 2019

Sandie Mann - Senior Specialist Scientist (Flood Risk  
Management)

[sandie.mann@sepa.org.uk](mailto:sandie.mann@sepa.org.uk)

# 2018 National Flood Risk Assessment - Background

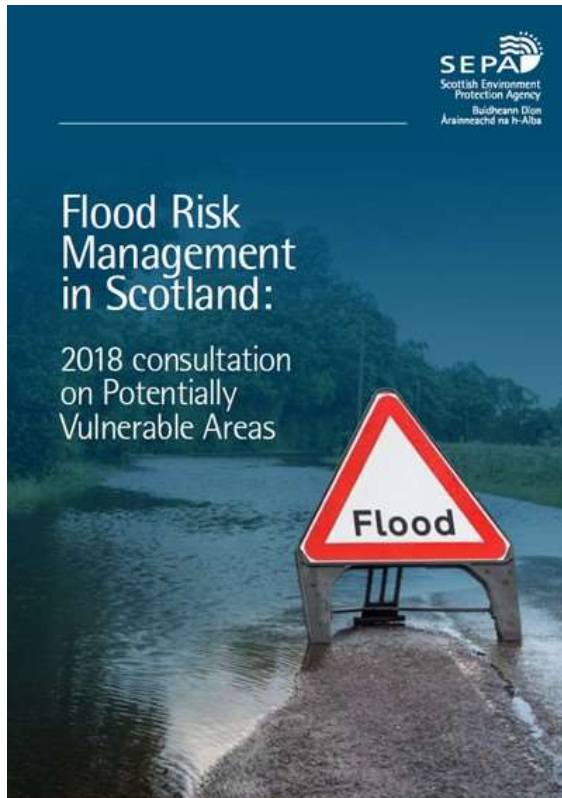
## 2018 NFRA Animation



# 2018 NFRA - main changes

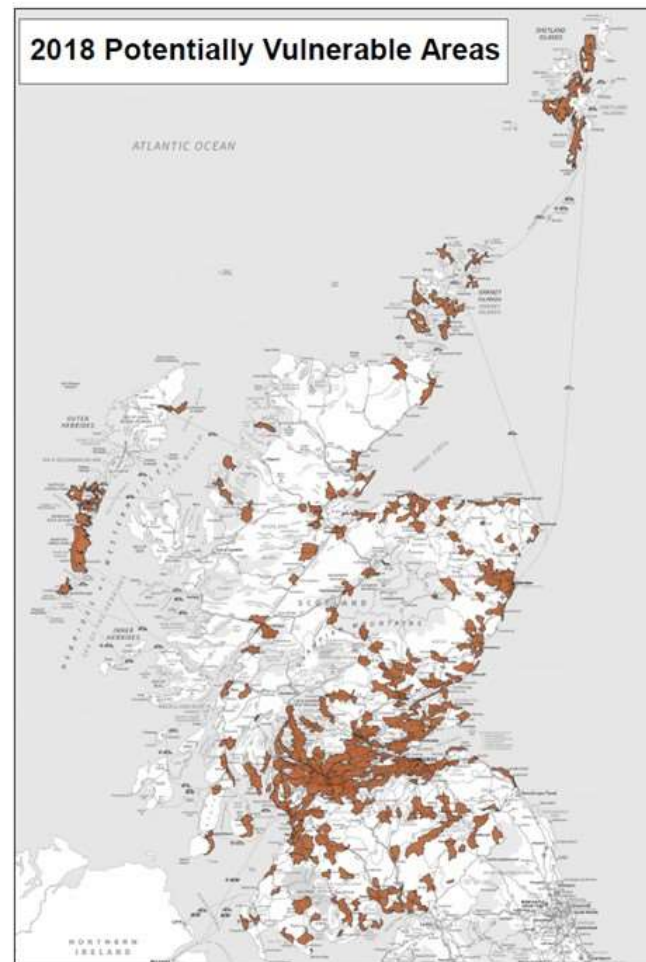
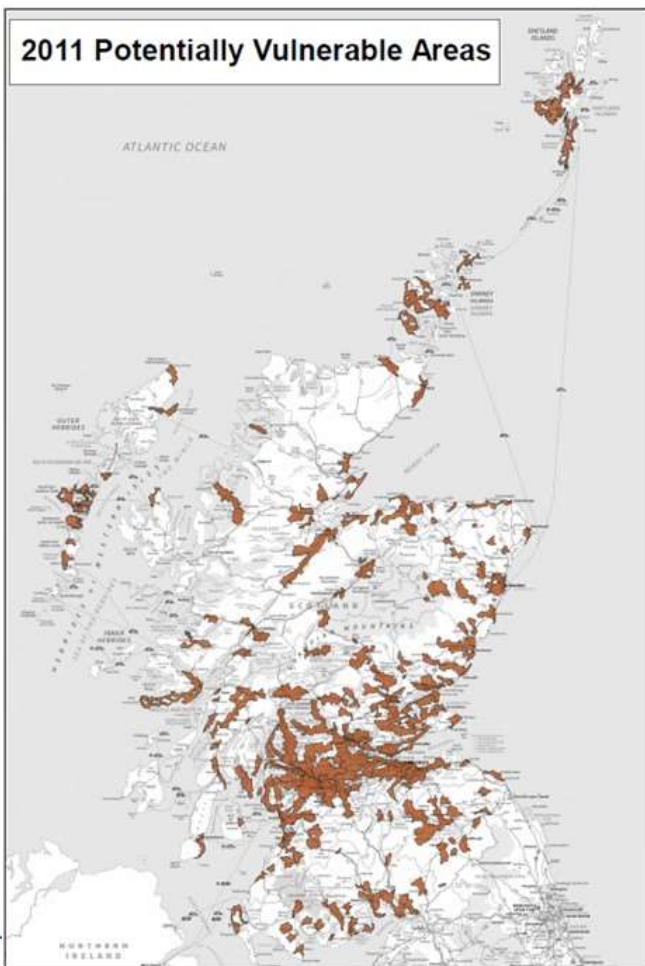
Change	Summary
Increased 'at-risk' counts	Due to dataset and counting improvements, numbers at risk have increase
Better understanding of risk composition	Improved data capture and manipulation – clearer narrative of risk
Climate change analysis	Improved climate change assessment PVAs identified due to future risk
Changes in PVAs	Hazard or receptor changes Refined understanding of risk PVAs identified due to current and future risk

# Flood Risk Management in Scotland – 2018 consultation on potentially vulnerable areas



- 417% increase in responses compared to 2011
- General agreement from respondents. Only 13% of respondents challenged the proposed PVA designations
- Feedback lead to the identification of two new PVAs and an alteration to an existing PVA

## Final 2018 Potentially Vulnerable Areas



Cycle	number of PVAs	area coverage (km2)
2011 NFRA	243	13700
2018 NFRA	235	14000

## 2011 – 2018 PVA Changes

- No change - 86
- Boundary Change - 120
- New PVA - 29
- De-designated – 37

~90% of Scotland's flood risk is contained within PVAs

# 2018 NFRA – what is at risk of flooding? (1:200yr)

**284,000 homes, businesses and services**



- 229,000 homes



- 55,000 businesses and services



**An additional 110,000 by 2080 due to Climate change**



# 2018 NFRA – what is at risk of flooding? (1:200yr)

**2,000km of roads**



- 30km of motorway
- 260km of A roads

**500km of rail network**



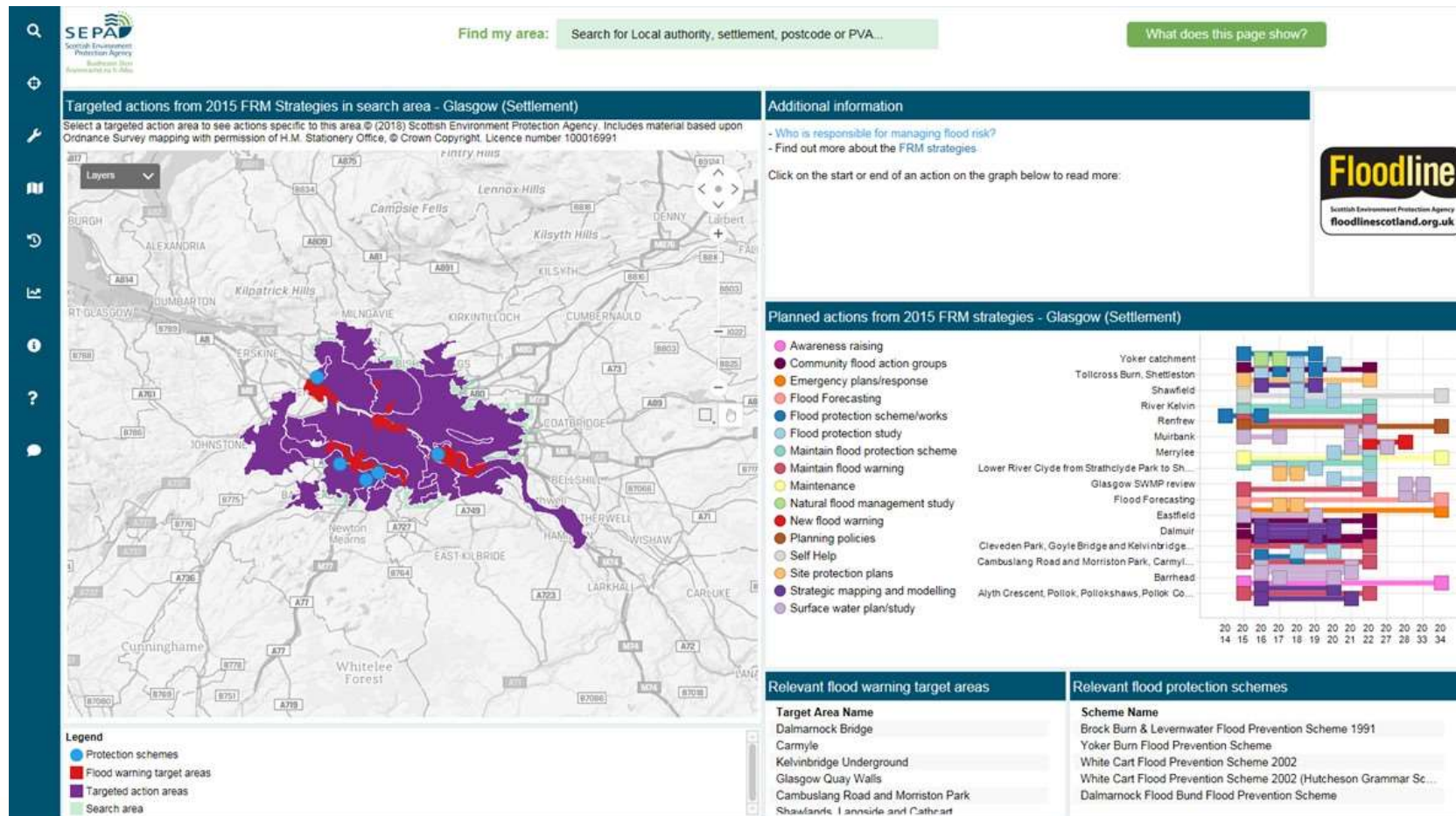
**200,000ha of agricultural land**



- 50,000ha arable and horticulture
- 150,000ha mix of pasture and grazing land types
- 2,800 clusters of agricultural buildings



# 2018 National Flood Risk Assessment data tool



## What's next?

- European Commission reporting in March
- Continued NFRA data tool development
  - Please provide feedback – [frmplanning@sepa.org.uk](mailto:frmplanning@sepa.org.uk)
- More detailed analysis, including:
  - Analysis of flood damages
  - Analysis of risk broken down by sector
  - Analysis broken down by social vulnerability
  - Analysis by different geographic scales – by PVA, Local Authority, Settlement etc

# Any Questions?



[sandie.mann@sepa.org.uk](mailto:sandie.mann@sepa.org.uk)

# Scottish Data Projects Supporting Flood Risk Management

Alan Corbett

GIS Operations Manager

Geographic Information Science & Analysis Team (GI-SAT)

Directorate for Digital

The Scottish Government

*Sniffer Conference, Glasgow – February 2019*



 The Scottish Government

**nent**

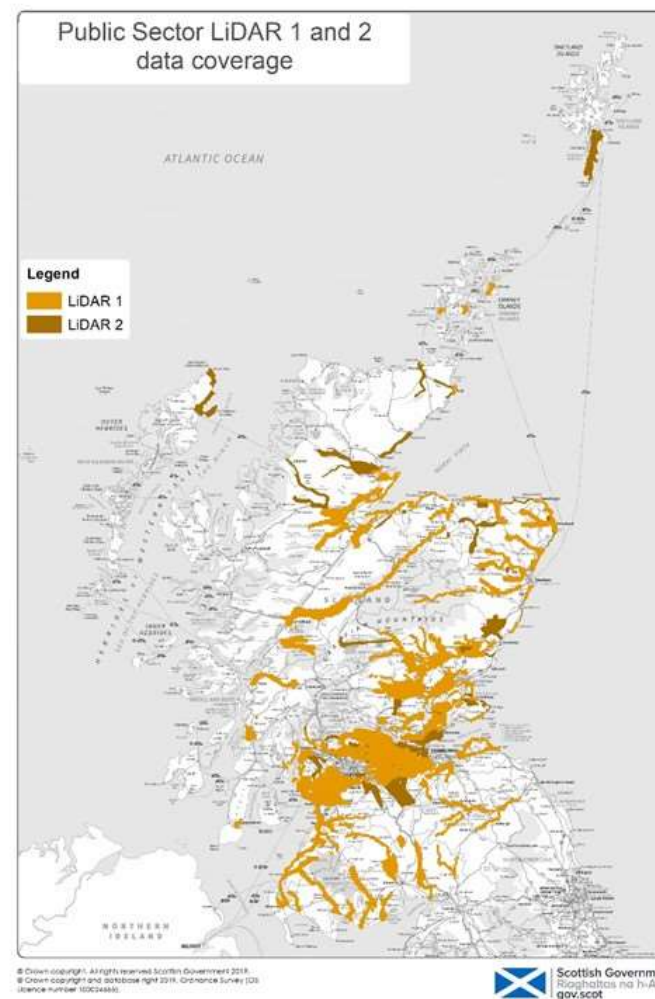
## LiDAR Business Cases

- SG / Digital for Scotland - Invest in new collective data agreements ie LiDAR
- SEPA - Statutory Flood Risk Management duties, Waste Crime and Landfill tax related activities.
- SNH – Coastal Change, Woodland Regeneration, Peatland Restoration, River Management, ad hoc casework
- HES - Conservation and Management of Properties in Care, Coastal Erosion monitoring & Archology
- FC - Inventory and Forecasting, General Operations (restocking and felling) and Forestry Research Improving Carbon Stock Assessment



## Existing Scottish Public Sector LiDAR Coverage

- LiDAR Phase I - 10 areas
  - Area = 10,952 km<sup>2</sup>
  - March 2011 and May 2012
  - DTM and DSMs at 1m spatial resolution.
- LiDAR Phase II - 66 sites
  - Area = 5,141 km<sup>2</sup>
  - November 2012 and April 2014.
  - DTM and DSMs at 1m spatial resolution
- The phase 1 and 2 areas equate to 20% Scotland



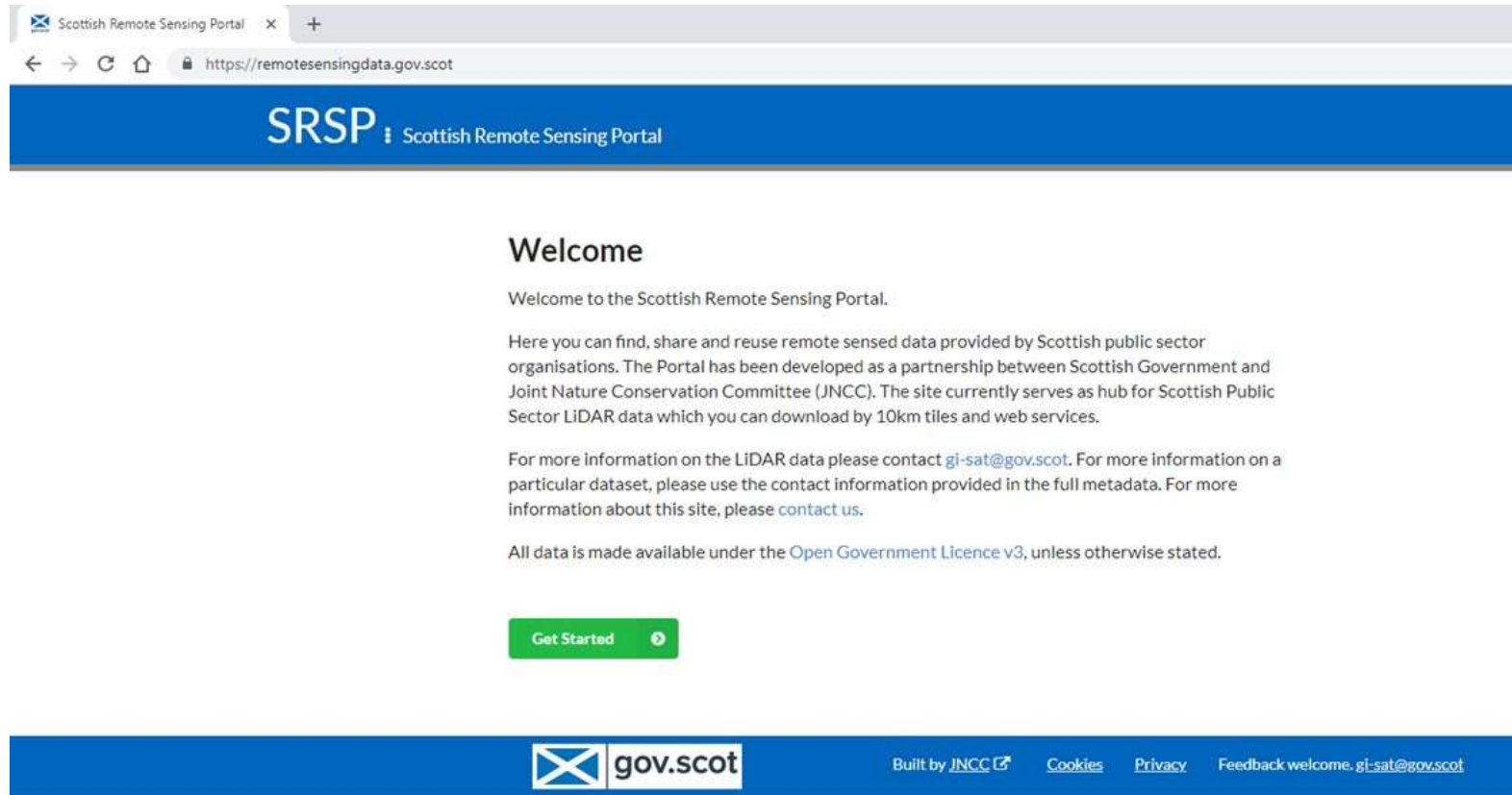
## Scottish Remote Sensing Portal

- The vision to build at Infrastructure to host RS data for Scotland.
- Developed in 2017 in partnership SG & JNCC — Encourage data sharing of public sector RS data through the Scottish RS Portal.

### Ambitions

- **Short Term** to provide open access (through OGL) to public sector LiDAR datasets.
- **Longer Term** to host other RS datasets - details can be found in the Scottish Remote Sensing Index at [www.spatialdata.gov.scot](http://www.spatialdata.gov.scot)

# Scottish Remote Sensing Portal



The screenshot shows a web browser window with the address bar displaying "https://remotesensingdata.gov.scot". The page has a blue header with the "SRSP" logo and the text "Scottish Remote Sensing Portal". The main content area is white and contains a "Welcome" section. It explains that the portal provides remote sensed data from Scottish public sector organisations, developed as a partnership between the Scottish Government and the Joint Nature Conservation Committee (JNCC). It mentions that the site serves as a hub for Scottish Public Sector LiDAR data, available in 10km tiles and via web services. Contact information for more details is provided, including an email address and a link to contact information. A green "Get Started" button is located below the text. The footer is blue and features the "gov.scot" logo, a list of links (Built by JNCC, Cookies, Privacy, Feedback welcome), and an email address.

Scottish Remote Sensing Portal

SRSP : Scottish Remote Sensing Portal

## Welcome


Welcome to the Scottish Remote Sensing Portal.

Here you can find, share and reuse remote sensed data provided by Scottish public sector organisations. The Portal has been developed as a partnership between Scottish Government and Joint Nature Conservation Committee (JNCC). The site currently serves as hub for Scottish Public Sector LiDAR data which you can download by 10km tiles and web services.

For more information on the LiDAR data please contact [gi-sat@gov.scot](mailto:gi-sat@gov.scot). For more information on a particular dataset, please use the contact information provided in the full metadata. For more information about this site, please [contact us](#).

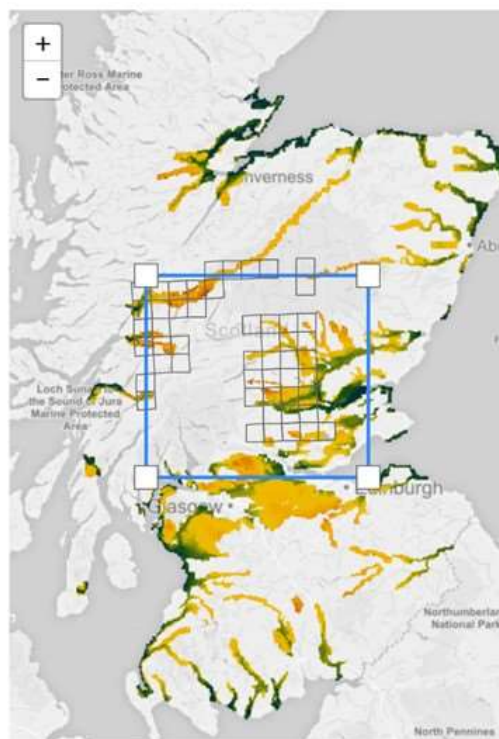
All data is made available under the [Open Government Licence v3](#), unless otherwise stated.

[Get Started](#)

 Built by [JNCC](#) [Cookies](#) [Privacy](#) Feedback welcome. [gi-sat@gov.scot](mailto:gi-sat@gov.scot)

# Scottish Remote Sensing Portal

SRSP



## LiDAR for Scotland Phase I DSM

bounding box [-5,56;-3,57]

**50+** products found Only the first 50 are shown

LiDAR for Scotland Phase I DSM NN12 gridsquare NN12	<a href="#">Download</a> 80.3 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN13 gridsquare NN13	<a href="#">Download</a> 8.7 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN15 gridsquare NN15	<a href="#">Download</a> 118.1 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN16 gridsquare NN16	<a href="#">Download</a> 72.7 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN17 gridsquare NN17	<a href="#">Download</a> 129.7 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN18 gridsquare NN18	<a href="#">Download</a> 80.5 MB GeoTIFF
LiDAR for Scotland Phase I DSM NN24 gridsquare NN24	<a href="#">Download</a> 1.2 MB GeoTIFF



**Scottish Natural Heritage**  
**Dualchas Nàdair na h-Alba**

All of nature for all of Scotland  
Nàdar air fad airson Alba air fad



**The Scottish Government**




# Scottish Remote Sensing Portal

SRSP  Scottish Remote Sensing Portal

## Collections


Browse the available collections of data products

### LiDAR for Scotland Phase I DSM


The Scottish Public Sector LiDAR (Phase I) dataset was commissioned in response to the Flood Risk Management Act (2009) by the Scottish Government, Scottish Environmental Protection Agency (SEPA), and Scottish Water collaboratively. Airborne LiDAR data was collected across 10 sites totalling 11,845 km<sup>2</sup> (note the dataset does not have full national coverage) between March 2011 and May 2012. Aside from flood risk management, this data has also been used for archaeological and orienteering purposes. This dataset reflects the Digital Surface Model (DSM) produced from the point cloud data. [Metadata](#) 

[Open Government Licence v3](#)  **OGL**

[View on Map](#) 


 WMS

### LiDAR for Scotland Phase I DTM


The Scottish Public Sector LiDAR (Phase I) dataset was commissioned in response to the Flood Risk Management Act (2009) by the Scottish Government, Scottish Environmental Protection Agency (SEPA), and Scottish Water collaboratively. Airborne LiDAR data was collected across 10 sites totalling 11,845 km<sup>2</sup> (note the dataset does not have full national coverage) between March 2011 and May 2012. Aside from flood risk management, this data has also been used for archaeological and orienteering purposes. This dataset reflects the Digital Terrain Model (DTM) produced from the point cloud data. [Metadata](#) 

[Open Government Licence v3](#)  **OGL**

[View on Map](#) 

 WMS

### LiDAR for Scotland Phase I LAS (LAZ)

The Scottish Public Sector LiDAR (Phase I) dataset was commissioned in response to the Flood Risk Management Act (2009) by the Scottish Government, Scottish Environmental Protection Agency (SEPA), and Scottish Water collaboratively. Airborne LiDAR data was collected across 10 sites totalling 11,845 km<sup>2</sup> (note the dataset does not have full national coverage) between March 2011 and May 2012. Aside from flood risk management, this data has also been used for archaeological and orienteering purposes. This dataset reflects the LAS format point cloud data. [Metadata](#) 

[Open Government Licence v3](#)  **OGL**

[View on Map](#) 

 WMS



**The Scottish Government**



## SRSP : Scottish Remote Sensing Portal

### Story so far ...

- Launched September 2017
- Stats from Sept 2017- December 2018:
  - Over 6000 users (23% returning visitors)
  - 98% from Scotland and England
  - 21,881 downloads (through the web front end)
- Further Development
  - Ability to download more than a single square of data at a time
  - A custom download
  - Improved map tools (eg transparency slider)
  - label 10km square on map
  - Improved naming convention
  - Geographic Search

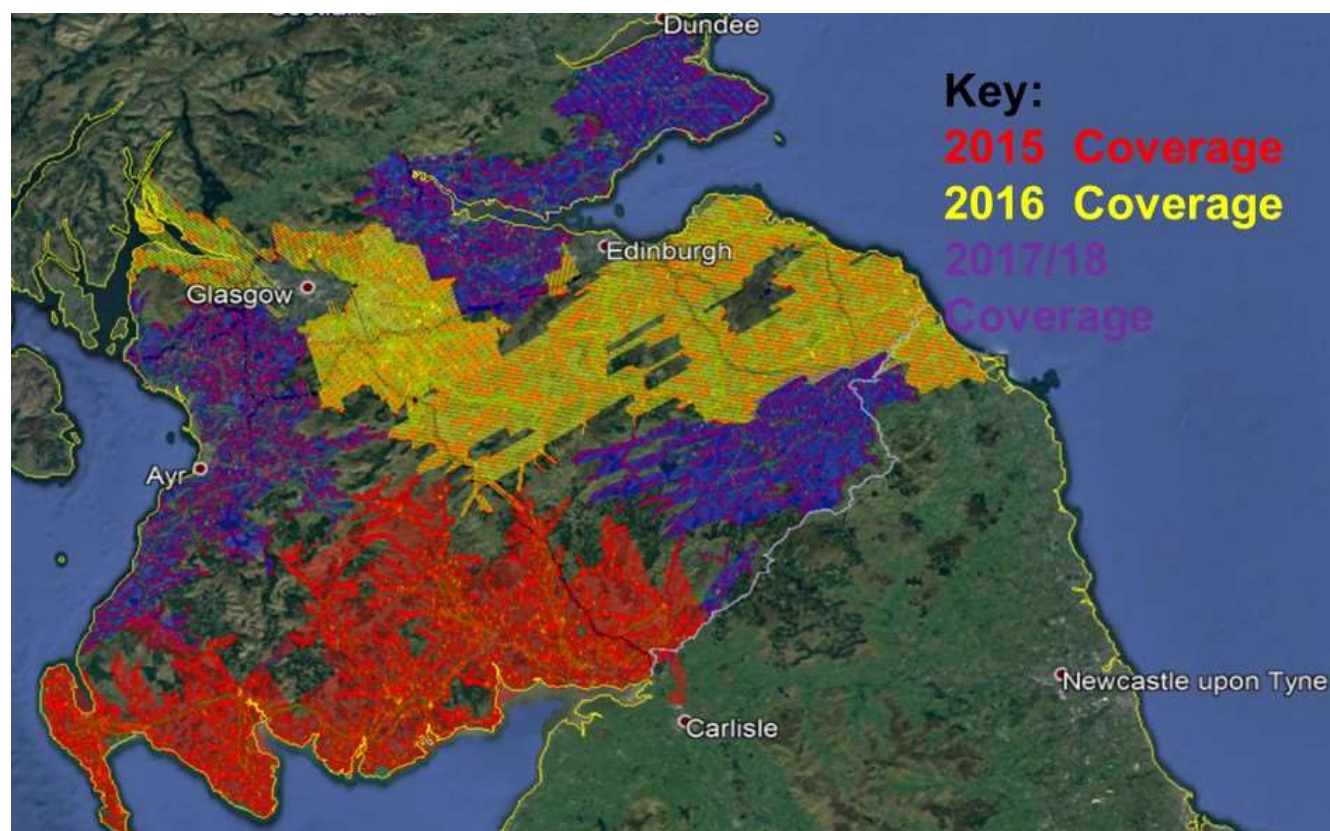
## Potential Additional LiDAR Data Procurements

- Southern Scotland – DTM / DSM and Point Cloud
- Western Isles – DTM / DSM and Point Cloud

All procured as open data and available through Open Government License (OGL)

- Collaborative approach to funding through the Scottish Public Sector organisations and coordinated by the RSWG

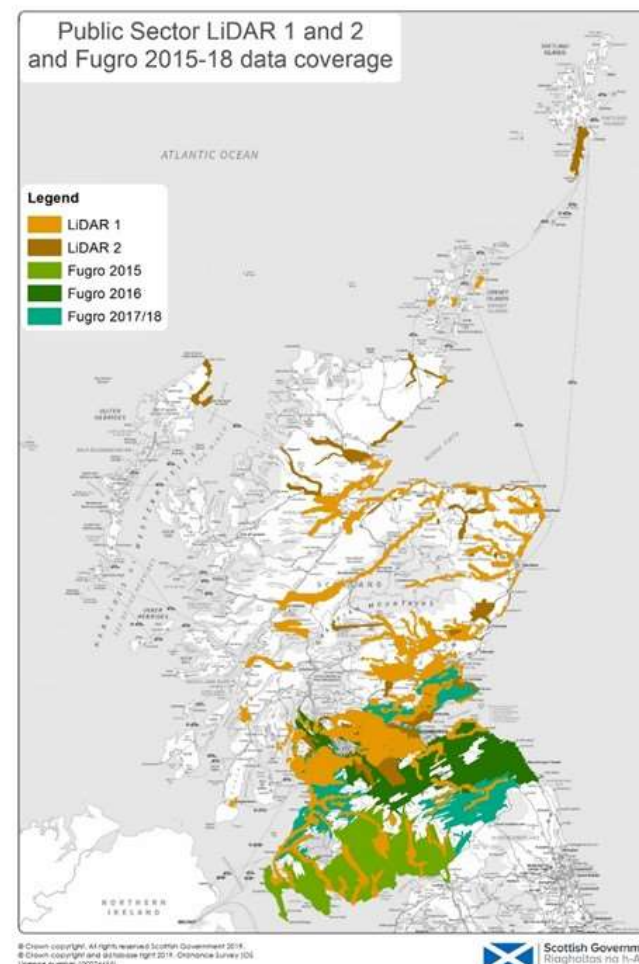
## Data Coverage Available





## Proposed Scottish Public Sector LiDAR Coverage

- Data hosted on the SRS Portal
- Data made available as Open Data through OGL Licensing
- Collaborative approach to funding



# OS MasterMap Water Network Layer

Working with Scottish Government, Scottish Environment Protection Agency and the Environment Agency the OS created OS MasterMap Water Network Layer.

The most comprehensive GB set of water courses.

OS MasterMap – Water Layer data is a three-dimensional link node network for water features across Great Britain. It contains over 3.5m sections of river network from River source to sea and everything in-between.





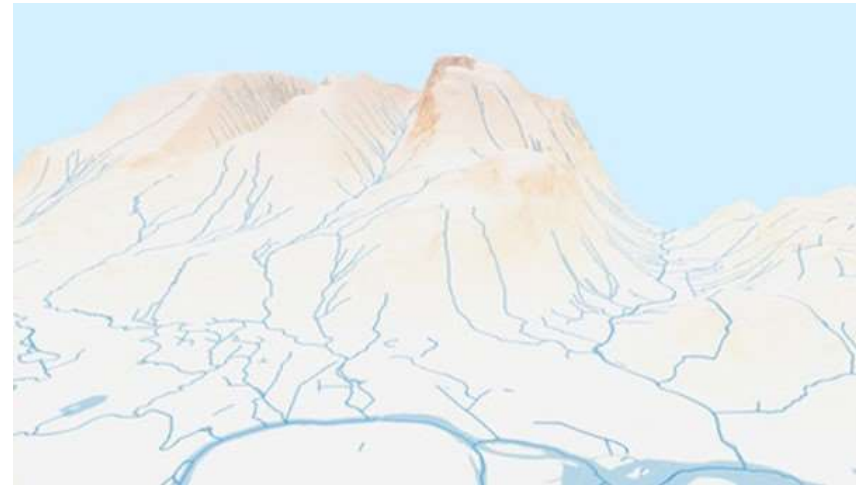
## What did we create

- Full coverage of the spatial extent of the current 1:50k river network.
- Fully topologically structured
- Flow and connectivity focused
- Additional attribution (Gradient)
- Catchment Information data
- Names of primary watercourse in native languages
- Additional information provided by local authorities, for example – culverts



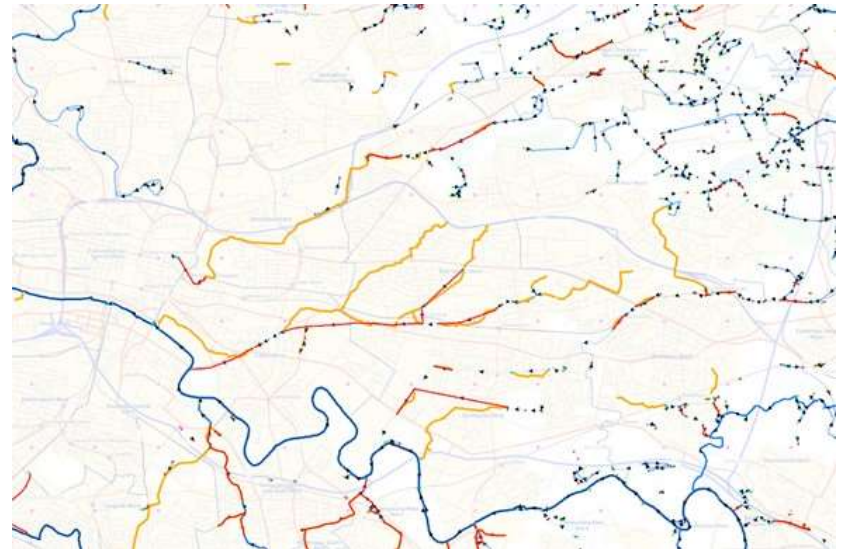
# Water Network Improvement Programme

Feature	Benefit
<b>GB coverage</b>	<ul style="list-style-type: none"><li>• First and only fully GB network that does not stop at national boundaries.</li></ul>
<b>All water courses</b>	<ul style="list-style-type: none"><li>• Understand the full water network not just a subsets.</li><li>• Fully trace contamination to understand exposed areas.</li></ul>
<b>Connected network</b>	<ul style="list-style-type: none"><li>• Understand the water network from source to mouth of water courses.</li><li>• flood modelling.</li><li>• Clearly trace contamination.</li></ul>
<b>3D</b>	<ul style="list-style-type: none"><li>• First GB Heighted water network to understand velocity of flow and model areas of greater exposure.</li></ul>
<b>Water course name</b>	<ul style="list-style-type: none"><li>• Definitive naming.</li></ul>
<b>Watercourse form</b>	<ul style="list-style-type: none"><li>• Search and manage data by watercourse type, understand type of water</li></ul>
<b>Width</b>	<ul style="list-style-type: none"><li>• Identify and model bottle necks due to reduced width in water.</li></ul>
<b>Catchment information</b>	<ul style="list-style-type: none"><li>• Identify water catchments and connected water ways.</li></ul>



# Culverts

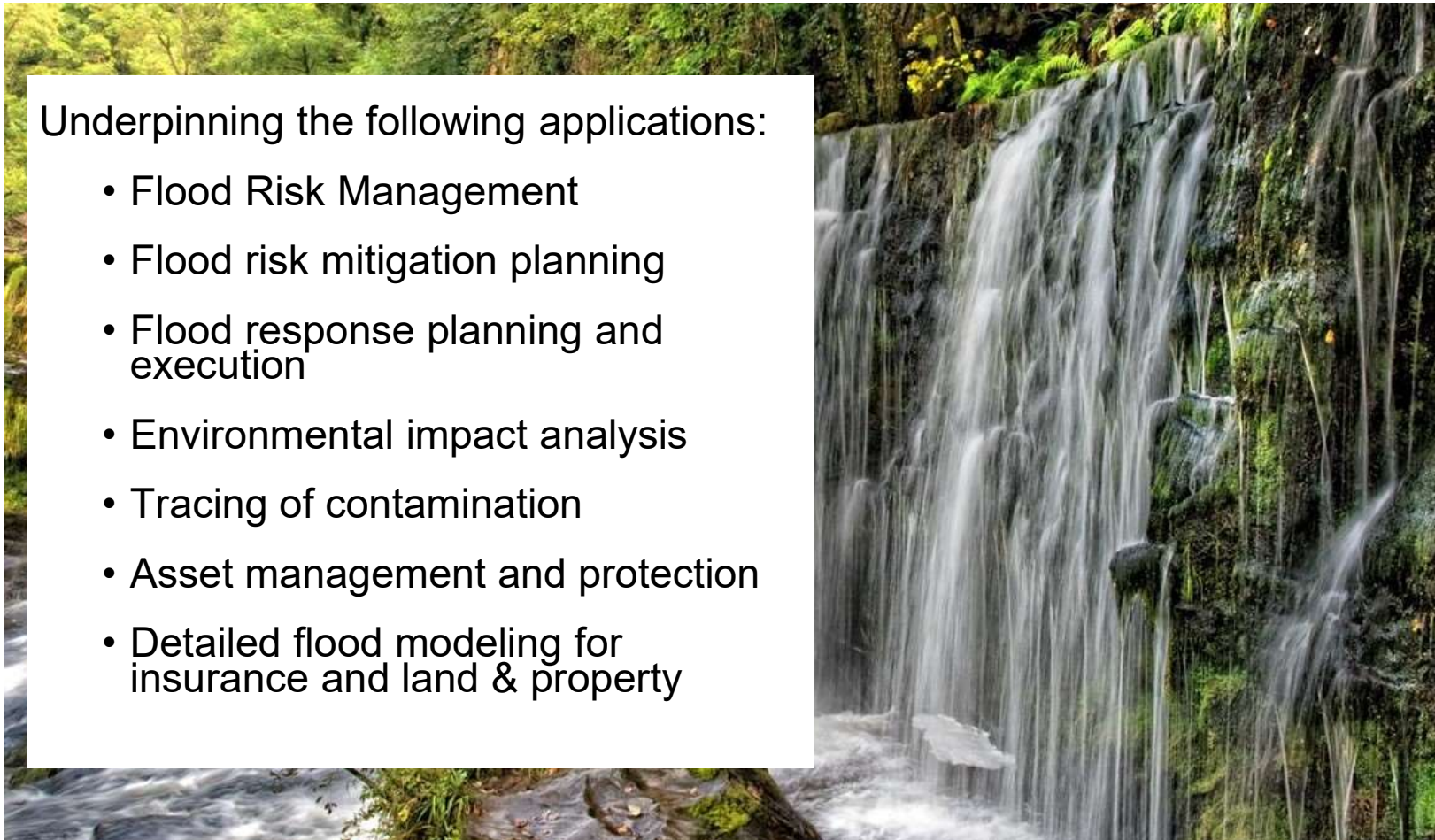
- Culverts are included
- Underpinned by an agreed update process for maintaining and updating the data.....this is managed by the Improvement Service



# Water Network Layer Business Uses

Underpinning the following applications:

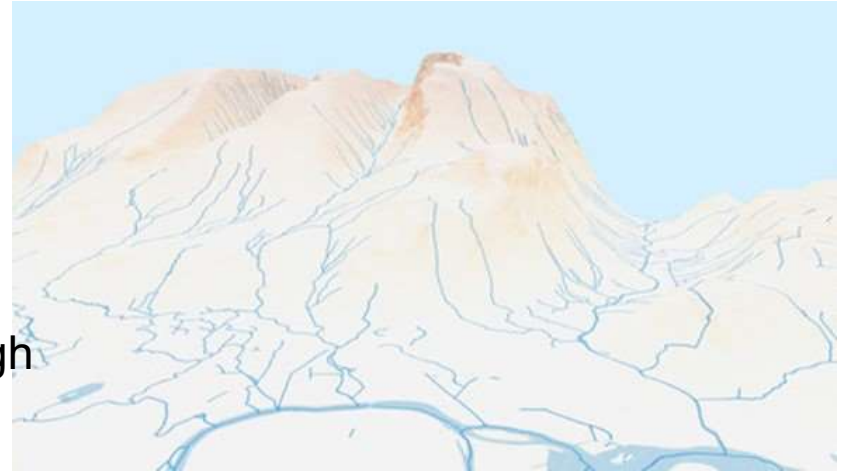
- Flood Risk Management
- Flood risk mitigation planning
- Flood response planning and execution
- Environmental impact analysis
- Tracing of contamination
- Asset management and protection
- Detailed flood modeling for insurance and land & property





## Key Messages

- Culverts Included
- Dataset underpinned by update process
- Dataset available as Open Data or through the OSMA
- Digital data and technology is an enabler of public service reform and promotes economic growth
- We are running workshops to promote Water Layer? We need your help and feedback





# *Thank You !*

Alan Corbett

GIS Operations Manager

Geographic Information Science & Analysis Team (GI-SAT)

Directorate for Digital

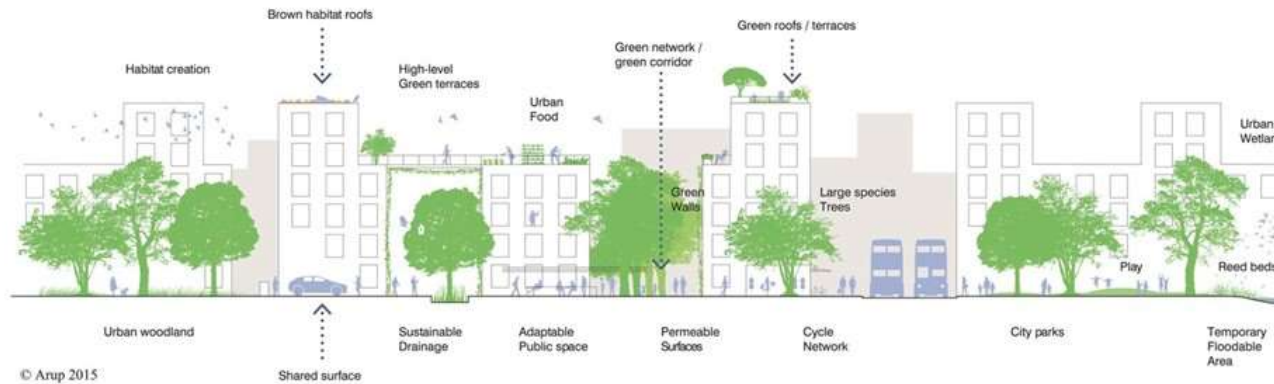
The Scottish Government

[alan.corbett@gov.scot](mailto:alan.corbett@gov.scot)

*Sniffer Conference, Glasgow – February 2019*

# PAS, Planning and Flood Risk Management

Wednesday 6 February 2019



Chris Sillick and Gordon Roger

# PAS: How We Help

## Advice

- Free, impartial and confidential planning advice: visit our website to submit your enquiry

## Skills training

- Training on the planning system for Community Councils and elected members
- Community engagement skills training for planners and communities

## Inclusive

- Making decision-making processes more open and inclusive
- Involving young people and other seldom-heard groups



## Supporting community visions

- Working with communities to articulate their vision and develop community-led plans for improvement
- Supporting local authorities and public bodies to improve public participation in decision-making

# PAS & Adaptation Scotland

## Projects so far

### 2014-15

- Skills training for planning professionals – introducing adaptation in planning context.
- Testing and development of Climate Ready Places visuals.

### 2016

- Early trial of incorporating climate adaptation in Place Standard tool, to help weave adaptation into everyday planning / placemaking.
- Development of schools materials to seek young people's views on adaptation issues relating to their place.
- Partner to *Edinburgh Adapts* action plan.

### 2017

- Assisted with Aberdeen Adapts strategy, engaging school pupils.
- Published series of lesson plans for primary and secondary schools.

### 2019

- Updating the Place Standard tool to fully incorporate climate adaptation.



## Context



- 1947 Establishment of planning system
- 1970s Public consultation agenda
- 1990s Climate change agenda
- 2006 Planning Act & focus on engagement
- 2017 Planning Bill (ongoing)

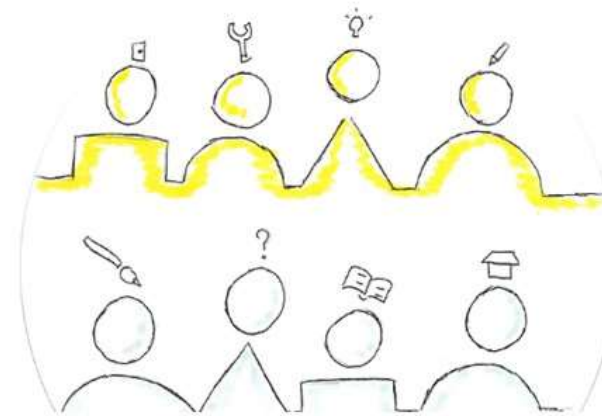
**Public interest - Health - Placemaking**



# Planning and Flood Risk Management

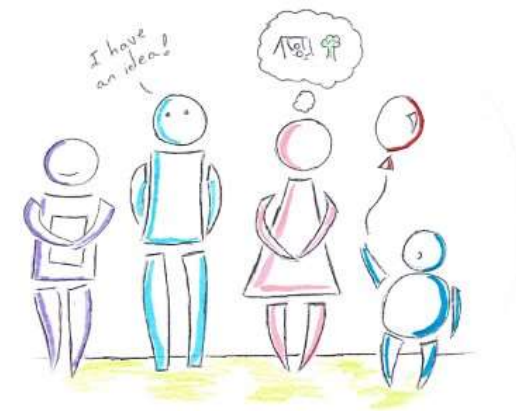
Flood Risk Management Act + Climate Change Act + Water Environment & Water Services Act  
- Require Planning Authorities to take account of Flood Risk in their operations

- **Development Plan Engagement:** Raising the issue
- **Allocations** – Avoiding areas at risk – taking account of PVAs – Setting aside land for flood management
- **Policies:** to support allocations – promote sustainable flood management measures – approaches to Flood Risk Assessments
- **Development Management** – Decisions taken to support LDP allocations & policies
- **Projects** – usually undertaken in partnership within Councils or with Partners such as SEPA, CSGN to promote environmental enhancement



# Involving Communities

- PAS Interacts with a large number of parties in Scottish Society from individuals , councillors, community groups and councils to school pupils
- Placemaking is becoming a core element of planning
- Designing safe and resilient spaces which achieve multiple benefits
- Must engage with communities
- Through our contacts we can promote two essential components of FRM -  
**AWARENESS + AVOIDANCE**
- Grow confidence in individuals and communities to be involved in the process of FRM





## Societal perspectives on flood risk management and working together

Gail Walker  
Water Policy Team Manager

# Introduction to CAS and the bureaux network

---

Evidence based representation and advocacy

60 Citizens advice bureaux (CAB) across Scotland

Over 2500 CAB advisors

8 CABs in communities at high risk of flooding



# CAS work on flooding

---

Identifying a role for CABs to support flood risk communities

Pre Flood-Re report: 'Bailed out'

eLearning module on flooding

Community engagement framework: 'Riding the Waves: Keeping the community on board'

Resilient communities pilot 'CAB engagement' proposal



## Bailed Out

Issues affecting flooded consumers and ability to access affordable insurance



## Riding the Waves: Keeping the community on board

Lessons for community involvement in investment work to mitigate flooding

Consumer Futures Unit publication series: 2017/18 - 18

**citizens  
advice  
scotland**



# Roundtable outcomes 2018

---

Clear role for bureaux

Tailored approach to each community

Integration into existing flood networks

Essential resources required

## Next steps

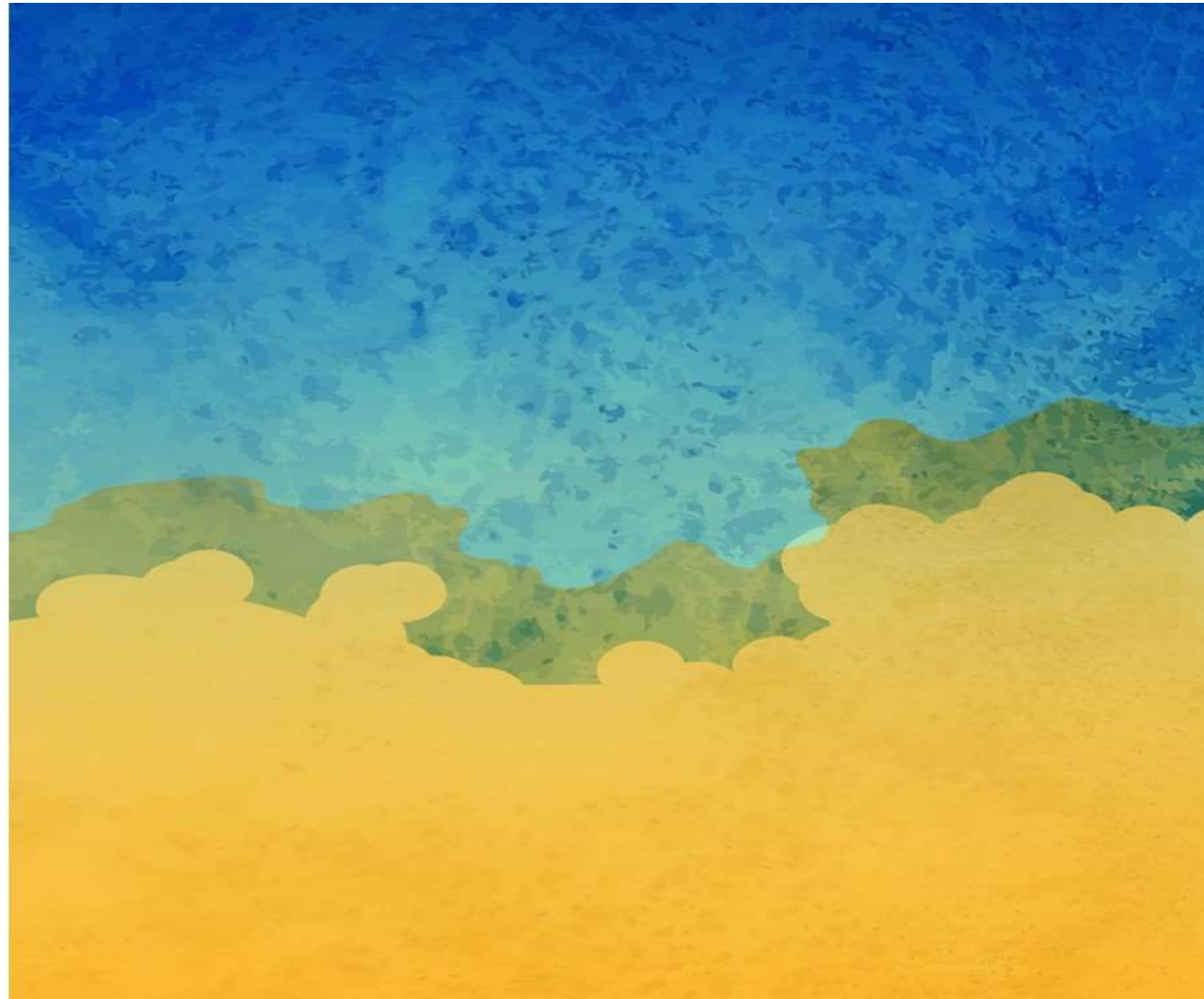


**[www.cas.org.uk](http://www.cas.org.uk)**

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Produced by Citizens Advice Scotland January 2019  
Scottish charity SCO 16637 and company limited by guarantee 89892





# Community Participation in Flood Risk Management

**Zarina Ahmad**

**Climate Change & Environment Specialist**



# Understanding of Flood Risk – Point of Reference

**Africa 2018**



**Scotland 2018**





**Iran 2018**



**Perthshire 2018**



# Worst Case Scenario







Zarina Ahmad  
07818533370  
zarina.ahmad@  
cemvoscotland.org.uk



# Creative Engagement in the Den Burn Valley

**Flood Risk Management Conference 2019**

Rebecca DeVivo

*Engagement & Communications Officer*



# SEPA's Public Engagement

## Flood Risk Management in Scotland:

2018 consultation on Potentially Vulnerable Areas

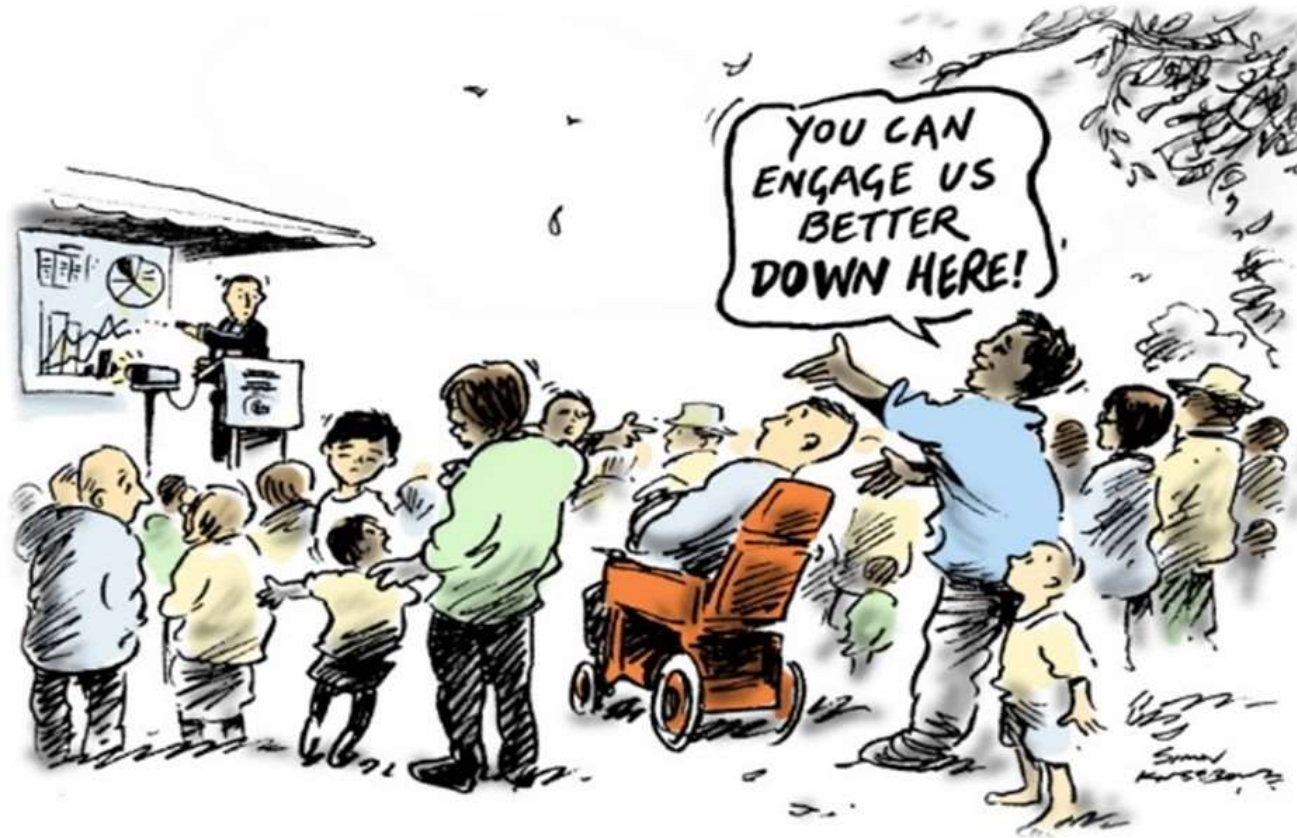


# Public Engagement is Key!

*“Public engagement and participation **needs to be ongoing and regularly refreshed**, seeking to attract attention and changes in behaviour **without causing undue alarm**. At all times, it must be based on **clear, accurate information**, and presented in simple and engaging language.”*

- Scottish Government, 2011. *Delivering Sustainable Flood Risk Management: Guidance*

# Dissemination ≠ Engagement





# Trying a Creative Approach in the Den Burn Valley



# What Creative Approaches Could Do

*“Public engagement and participation needs to be ongoing and regularly refreshed, seeking to **attract attention** and changes in behaviour without causing undue alarm. At all times, it must be **based on** clear, accurate information, and **presented in simple and engaging language**.”*

- Scottish Government, 2011. *Delivering Sustainable Flood Risk Management: Guidance*



Who am I?

# SEPA & CCS Project

- Raise Awareness of Flooding around the Denburn and more generally
- Increase Flood Preparedness and Resilience
- School Group (P6) & Adult Group
- Bespoke Session

## 3 Areas of Focus

- Familiarisation with the subject(s) and object(s)
- Quality and memorable learning experience
- Creation of material that lives beyond project

# How Will It Be Done?

- Singing walk along the burn
- Creation of soundscape
- Learning a simple song
- Writing a memory song with children
- Performance to parents
- Dissemination of the songs

# Creative Learning



## Creative approaches to community engagement

Gemma Lawrence, Producer, Creative Carbon Scotland







## Library of Creative Sustainability

A database of inspiring case studies demonstrating the benefits of collaborating with artists to achieve sustainability outcomes. Browse, read and share case studies on a range of environmental issues including climate adaptation, food sustainability, urban regeneration, water management, and environmental protection.

Is there a project you feel ought to be in the library? [Let us know!](#)

Search library here



Filter by location type

Select ▼

Issues

Select ▼

Types of Organisations

Select ▼

Community Involvement

Select ▼

[RESET FILTERS](#)



### Dundee Urban Orchard

Dundee Urban Orchard, or DUO, is a collaborative project that supports the planting of small-scale orchards across the city of ...



### SLOW Clean-UP civic experiments

SLOW Clean-UP civic experiments tackles abandoned petrol stations through phytoremediation and community involvement. Offering an alternative to the 'dig and ...



### Invisible-5

A collaborative project between a group of artists and two not-for-profit organisations resulted in the creation of audio guides exploring ...



### Glenrothes Town Artist

The Glenrothes Development Corporation employed David Harding as Town Artist over a period of ten years. Harding was employed as ...



### The Stove Network

The Stove Network is a membership based arts-led project contributing to the regeneration of Dumfries. The Stove aims to use ...



### HighWaterLine

HighWaterLine - drawing a line on the cityscape to open up community dialogue on climate change and the impact of ...

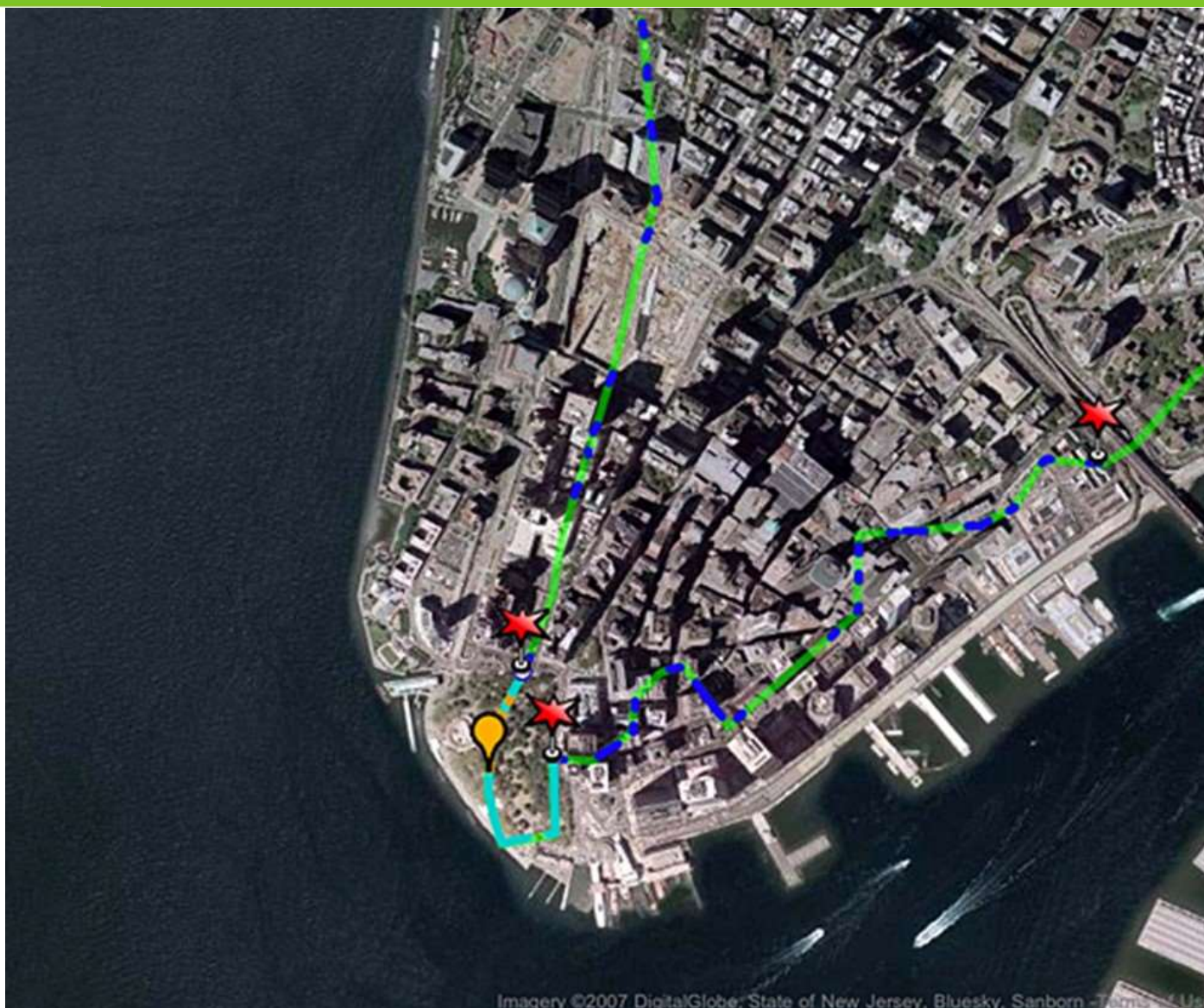
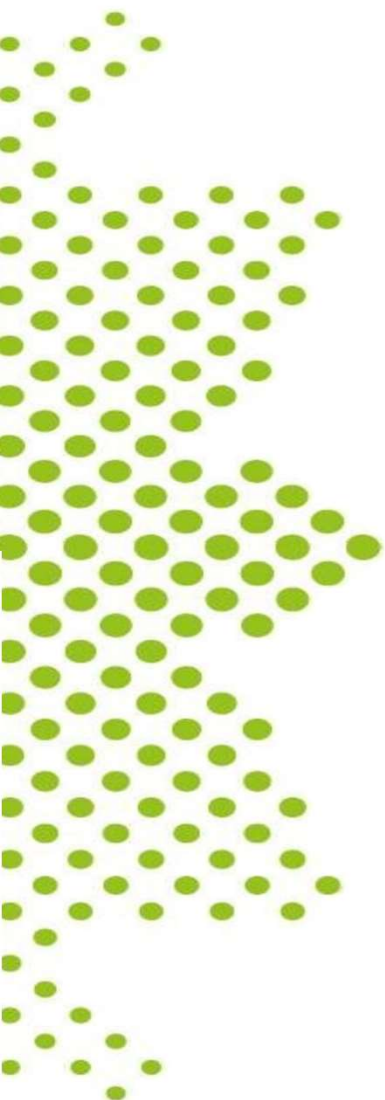
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carbon  
scotland

“We wanted to put the power of creative thinking in the hands of community organisations and give people a chance to think positively in the face of climate change.”  
**HighWaterLine artist, Eve Mosher**













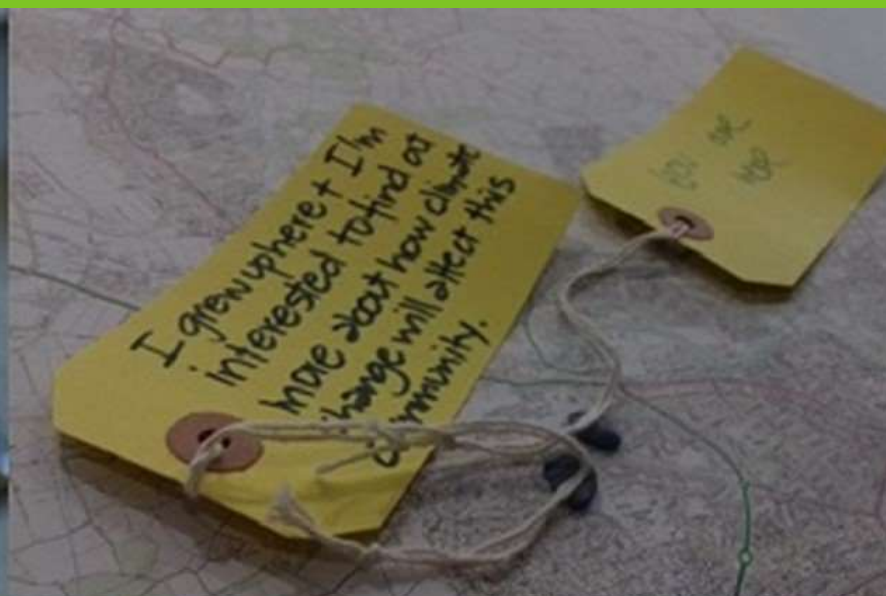
“I wanted to leave this visually interesting mark, to open up a space for conversation.”  
“HighWaterLine artist, Eve Mosher











# Evaluating creative approaches

Competency	Issues
Systems thinking	How well the artistic activities helped participants to think about the social and ecological systems within which they lived, and about how these may alter as a result of climate change

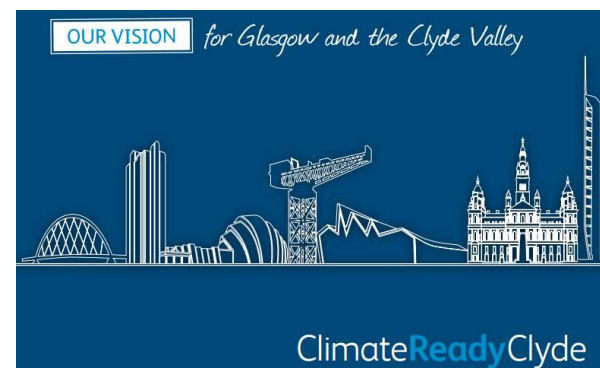
Dr Leslie Mabon, Robert Gordon University,  
applying Weik et al. Sustainability Competencies (2011)



## Key lessons learned

- Arts-based approaches offer a whole different way of thinking about climate change and adaptation
- Follow-on work may wish to identify pathways to facilitate discussions with more empowered stakeholders
- Participants may be self-selecting, taking part on the basis that they are already interested in and know about climate change
- Important not to over-state artists as having a privileged role in engagement, but can complement other perspectives and approaches

Dr Leslie Mabon, Robert Gordon University



**Thanks for listening!**

[Library of Creative Sustainability](#)

[Arts & Climate Adaptation](#)

[Levenmouth Adapts](#)

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Walking?  
Attention?  
FRM?

Iryna  
Zamuruieva



## Walking - one sense at a time







# What could such creative approaches bring to flood risk management?





**Iryna Zamuruieva**  
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what does pollution feel like on your fingertips?