Scotland's Flood Risk Management Conference 2018
Conference slides

Working together to manage flood risk

Flood Risk Management Conference 2018

5 – 6 February 2018

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Working together to manage flood risk

Ruth Wolstenholme, Sniffer

Chair session 1a Scotland's FRM policy landscape

5 – 6 February 2018

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Working together to manage flood risk

Four conference themes:

Monday am – Scotland's FRM policy landscape
Monday Pm –- Coastal flood risk management
Tuesday am – Surface Water Management
Tuesday pm - Innovation

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Working together to manage flood risk

The Flood Risk Management (Scotland) Act 2009 promotes coordination and cooperation between all organisations involved in flood risk management

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Working together to manage flood risk

Who's who in Scotland FRM

SNIFFER Conference 2018

James McLeod

National Flood Management Advisory Group (NFMAG)

* Brings together a number of key organisations - representatives from SEPA, Scottish Water, Local Authorities, FCS, SNH and many others to consider the progress that is being made to implement flood management protocol and strategies.

Chair: David Pirie, SEPA

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SCOTS - Society of Chief Officers Of Transportation In Scotland - FRM Group

Membership:

* Local Authorities, Scottish Water, SEPA, Scottish Government, Network Rail, COSLA, Emergency Resilience, Heads of Planning Scotland (HoPS)

Aims:

* The group enables sharing of good practice, development of guidance, partnership working and dissemination of information relating to Flood Risk Management in Scotland.
* www.scotsnet.org.uk

Chair: Susan Veitch

Vice Chair: Ross Speirs

Secretary: David MacPherson

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Lead Local Authority Forum (LLAF)

* Shares good practice, exchanges information and addresses common issues arising through the work of the Local Partnerships in Scotland.
* Membership includes Lead Local Authorities, Scottish Water, Scottish Government and SEPA.

Joint chairs: Walter Scott, Angus Council; Elliot Robertson, SEPA

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The Scottish Advisory and Implementation Forum for Flooding (SAIFF)

A partnership between the Scottish Government, Scottish public bodies and stakeholders and comprises a series of **working groups** convened to help develop specific guidance or undertake further analysis of important technical issues.

http://www.gov.scot/Topics/Environment/Water/Flooding/FRMAct/saif

(I don't know why the link only has one "f" in SAIFF)

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SAIFF – Policy Management Group (PMG)

Membership:

* COSLA, SCOTS, Scottish Water, Heads of Planning Scotland, Lead Local Authorities, SEPA and Scottish Government.

Role:

* To support the delivery of the first cycle and preparation for the second and those organisations involved.
* In doing so it commissions and supports individual task and finish groups.

Chair: Neil Ritchie

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SAIFF - Surface Water Management Plans (SWMP) Group

Membership:

* Local Authority (Flooding and Roads), Scottish Water – FRM Team and SW Strategy Team, Scottish Government, SEPA

Aims:

* Act as a forum to support responsible authorities with the implementation of SWMP and integrated drainage;
* Support capacity building to enable the implementation of surface water management planning;
* Provide advice on the production and implementation of surface water management plans;
* Provide advice to responsible authorities on potential funding routes for surface water flooding measures;
* Identify and share best practice in relation to surface water management and integrated drainage e.g. identify and collect best practice case studies, consider emerging issues and opportunities; and
* Review progress of SWMP in Scotland

Chair: Graeme Hedger, West Lothian Council

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SAIFF – Quality and Standards (Q&S) Group

Aims:

* Make recommendations to the Scottish Government and Scottish Ministers on objectives for the Quality and Standards Ministerial Directions in the specified investment period to ensure Scottish Water duties under the Flood Risk Management Act are met.
* Monitor the progress of projects in the Technical Expression to ensure Scottish Water meets the Ministerial Quality and Standards Objectives in relation to the FRM Act.
* Sign off projects in the Technical Expression on behalf of the Scottish Government to confirm that Ministerial Quality and Standards Objectives have been met in relation to the FRM Act.
* SAIFF Q&S group recommendations require agreement by the SAIFF PMG before being presented to Scottish Water.

Chair: Ruth Ellis, SEPA

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SAIFF – Appraisal and Prioritisation Group

Aims:

* Provide advice on the development of strategic appraisal and prioritisation methods for the Flood Risk Management Strategies. This may include revised appraisal and re-prioritisation of actions from the current Flood Risk Management Strategies and Local Flood Risk Management Plans, as well as new actions proposed for the next sets of Strategies and Plans.
* Support method development during current and future flood risk management planning cycles
* Focus on developing technical, evidence-based methods
* Have an awareness of the implications of strategic appraisal and prioritisation on funding and other political decisions (but will not be responsible for making decisions on funding or aspects of flood risk management that require political input)

Chair: Ruth Ellis, SEPA

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SAIFF – Natural Flood Management (NFM) Group

Membership:

* SEPA, Scottish Government, SNH, FCS, CPE Consultancy, Cairngorms National Park, PKC, Scottish Land and Estates, RSPB, Tweed Forum, James Hutton Institute.

Aims:

* Identifying areas where further work is required to inform policy and practice, and support the delivery of NFM;
* Promoting and facilitating engagement and collaboration between organisations and individuals with an interest in NFM;
* Disseminating reliable, practical, evidence-based information and guidance to the wider NFM community;
* Helping those participating in the work of the Group to keep abreast of emerging issues, share best practice and develop new knowledge and understanding;
* Providing a strategic review of delivery of NFM actions in FRM Strategies and Local FRM Plans and associated deliverables such as NFM mapping updates and NFM action appraisal;
* Identifying any other activities and/or outputs that would help support responsible authorities in the delivery of the NFM actions identified in the Local Flood Risk Management Plans.

Chair: Heather Forbes, SEPA

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Land Use Planning and Flooding (LUPF) Group

Membership:

* includes SEPA (Flood Risk, Hydrology, & Planning), Scottish Government, Heads of Planning Scotland (HoPS) and Royal Town Planning Institute Scotland (RTPIS)

Aims:

* To strengthen the links between the Land Use Planning and Flood Risk Hydrology functions within SEPA to enable the development of a clear, robust and managed approach to providing appropriate advice on flood risk to Planning Authorities
* The group also seeks to strengthen links between SEPA and external stakeholders involved in the land use planning process

Chair: Marc Becker, SEPA

SAIFF Flood Risk Management (FRM) Planning group (Phase 4)

Membership:

* Local Authorities, Scottish Government, SEPA, SCOTS (although can be changed as considered necessary when the focus of the group changes from interim reporting to consultation and final publication arrangements)

Aims:

* Addresses Section 37 of the FRM(S)A09 regarding interim reporting on the Local Flood Risk Management Plans.
* However, the group will progress to look at consultation and final publication arrangements of the Local FRM Plans.

Chair: David Hay, Glasgow City Council

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SAIFF – Local Authority Implementation Group (LAIG)

Membership:

* Scottish Government, Local Authorities, (SEPA as appropriate)

Aims:

* To develop further detail on the implementation of Part 4 of the FRM Act, including considering whether further provision should be made by Regulation and/or guidance to better assist local authorities.
* The Group will also consider other aspects of local authority work involved in implementation of the Act, including mechanisms to ensure co-operative working and sharing resources where necessary.
* Published Part IV Guidance and Clearance and Repair Guidance

Chair: Antje Branding, Scottish Government

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SAIFF Flood Risk & Climate Change Group

Membership:

* SEPA, Local Authority, Scottish Water, Adaptation Scotland, Scottish Government (Flood Policy, Climate Change Hub)

Aims:

* Provide a forum for the consideration of climate change in relation to flood risk from all sources;
* Steer the development of new information on climate change and flood risk;
* Provide direction and consistency to support flood risk management including the development of guidance;
* Inform the development of a plan for the effective communication of climate change and flood risk information;
* Strengthen links with other stakeholders and areas of research into the potential impacts of climate change on flood risk

Chair: Mark McLaughlin, SEPA

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Cross Border Advisory Group (CBAG)

* This Group advises relevant authorities (Environment Agency, SEPA and local authorities) on the manner in which they should exercise certain functions with respect to English and Scottish cross border areas within the Solway Tweed River Basin District.

Chair: Elliot Robertson, SEPA

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Local Partnerships

* There are 14 Local Partnerships corresponding with the Local Plan Districts.
* Membership includes key partners (local authorities, SEPA and Scottish Water)
* Inform the production of FRM Strategies and Local FRM Plans.

Contact: Elliot Robertson, SEPA

Managers: David, Steve and Andrea

Bannermans in the Cowgate

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SAIFF - Communications

Membership:

* SEPA, Scottish Government (and previously Local Authorities, Scottish Water)

Aims:

* Flood Risk Management – celebrating success; refreshing the FRM Glossary and a flooding literature review (particularly across SEPA, SW, LAs, SG and SFF) to improve clarity and consistency across RAs, for public
* National FRA – clear messaging and consultation/engagement coordination
* NFM - products: generally celebrate successes; encouraging scrutiny of draft products (e.g. guidance docs) encouraging best practice through publications and workshops (e.g. SFF and use/workshops around NFM film)

Chair: Stewart Prodger, SEPA

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Flood Risk Management Local Advisory Groups (FRM LAGs)

* There are currently 10 FRM LAGs corresponding with the Area Advisory Groups used for river basin management planning and help provide a key link between the two processes.
* These groups include wider stakeholders with an interest in flood risk and provide advice to Lead Local Authorities on the preparation of the Local FRM Plans.

Contact: Elliot Robertson, SEPA

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Co-ordination and Co-operation

* This conference was co-created by a number of organisations:
  * SNIFFER, Scottish Government, SEPA, Local Authorities and Scottish Water.
* We value cooperation
* We welcome ideas for how to be even more inclusive
* Interested in being involved in current or future SAIFF groups:
  * contact Scottish Government (Antje Branding)

Scottish Flood Forum

* The Scottish Flood Forum is a Scottish based Charitable Organisation that provides support for and represents those who are affected by or are at risk of flooding and is funded by the Scottish Government.

Kirsty MacRae, Director

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Working together to manage flood risk

Roseanna Cunningham, MSP

Cabinet Secretary for Environment, Climate Change and Land Reform

5 – 6 February 2018

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Programme for Government
&
Scotland's Economic Strategy

Antje Branding
Scottish Government

The Scottish Government
Riaghaltas na h-Alba

A NATION WITH AMBITION

THE GOVERNMENT'S PROGRAMME FOR SCOTLAND

2017-18

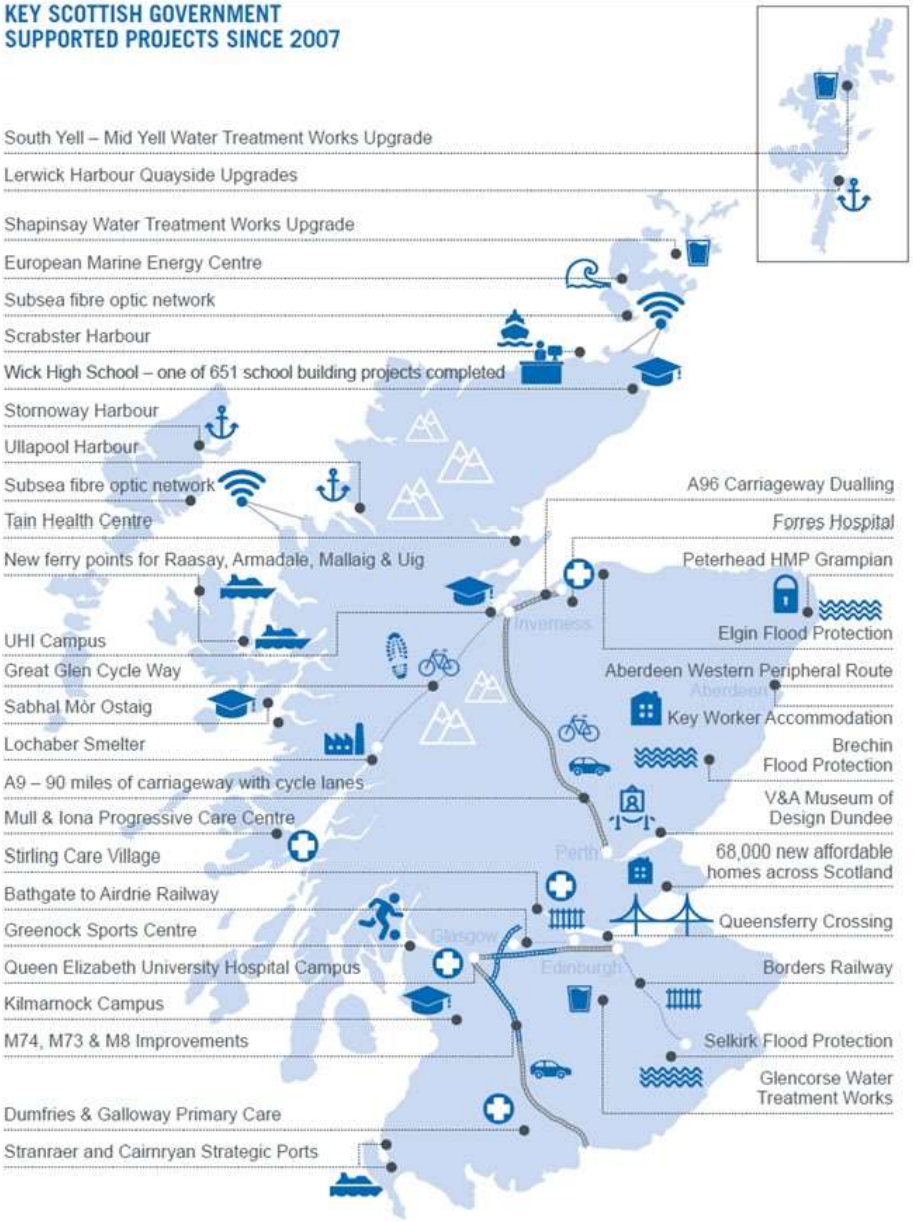
Scottish Government
Riaghaltas na h-Alba
gov.scot

Programme for Government (PfG)

Why do we do it?

- The new parliamentary year starts in September after the summer recess
- The First Minister sets out her government's priorities for the next parliamentary year
  - The policies the government will deliver
  - The legislative programme the government will pursue
  - First debated by opposition parties 5 – 7 September, then rolled out until June 2018

KEY SCOTTISH GOVERNMENT SUPPORTED PROJECTS SINCE 2007



The legislative programme

BILLS FOR INTRODUCTION IN 2017-18

- BUDGET BILL
- CLIMATE CHANGE BILL
- CROWN ESTATE BILL
- DAMAGES BILL
- EDUCATION BILL
- LAND AND BUILDINGS TRANSACTION TAX BILL
- MANAGEMENT OF OFFENDERS BILL
- MINIMUM AGE OF CRIMINAL RESPONSIBILITY BILL
- ORGAN AND TISSUE DONATION BILL
- PLANNING BILL
- PRESCRIPTION BILL
- SAFE STAFFING BILL
- SEXUAL OFFENCES (PARDONS AND DISREGARDS) BILL
- TRANSPORT BILL
- VULNERABLE WITNESSES AND PRE-RECORDED EVIDENCE BILL
- WARM HOMES BILL

BILLS ALREADY ANNOUNCED

- CHILDREN AND YOUNG PEOPLE (INFORMATION SHARING) BILL
- CHILD POVERTY BILL
- CIVIL LITIGATION (EXPENSES AND GROUP PROCEEDINGS) BILL
- CONTRACT (THIRD PARTY RIGHTS) BILL
- DOMESTIC ABUSE BILL
- FORESTRY AND LAND MANAGEMENT BILL
- GENDER REPRESENTATION ON PUBLIC BOARDS BILL
- HOUSING (AMENDMENT) BILL
- ISLANDS BILL
- SOCIAL SECURITY BILL
- WILD ANIMALS IN TRAVELLING CIRCUSES BILL

BILLS PASSED SINCE 2016-17 PROGRAMME FOR GOVERNMENT

- AIR DEPARTURE TAX BILL
- BUDGET BILL
- LIMITATION (CHILDHOOD ABUSE) BILL
- RAILWAY POLICING BILL

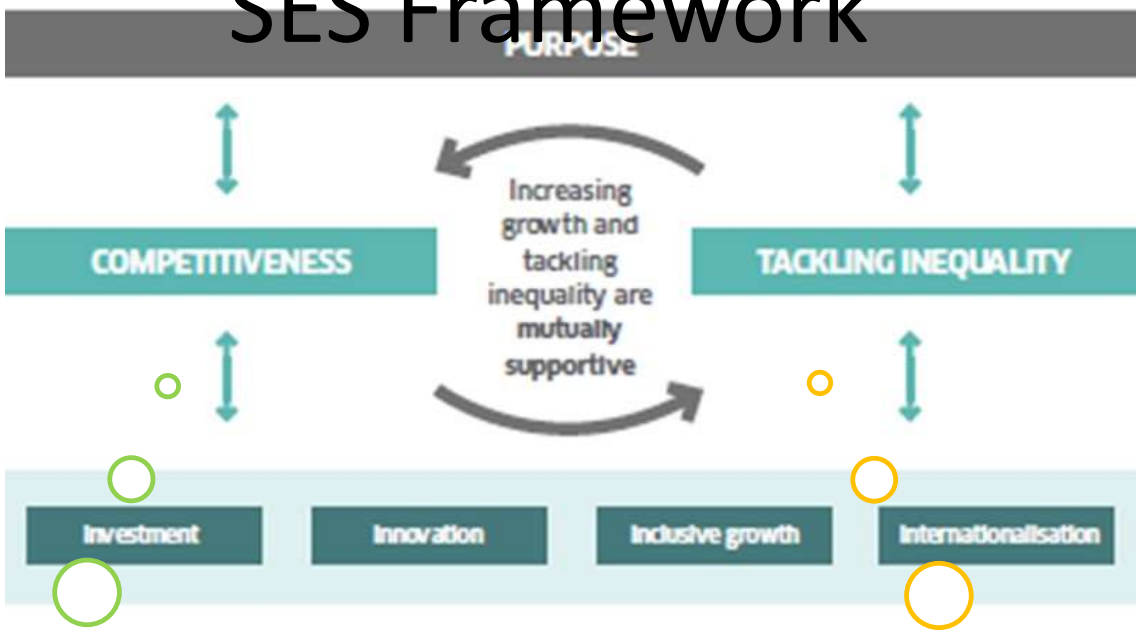
Scotland's Economic Strategy (SES)

- sets ambition to create a more cohesive and resilient economy that improves the opportunities, life chances and wellbeing

- Government's purpose is to create a more successful country with opportunities for all to flourish, through increasing sustainable economic growth

- Approach based on two key pillars
  - Increasing competitiveness
  - Tackling inequality

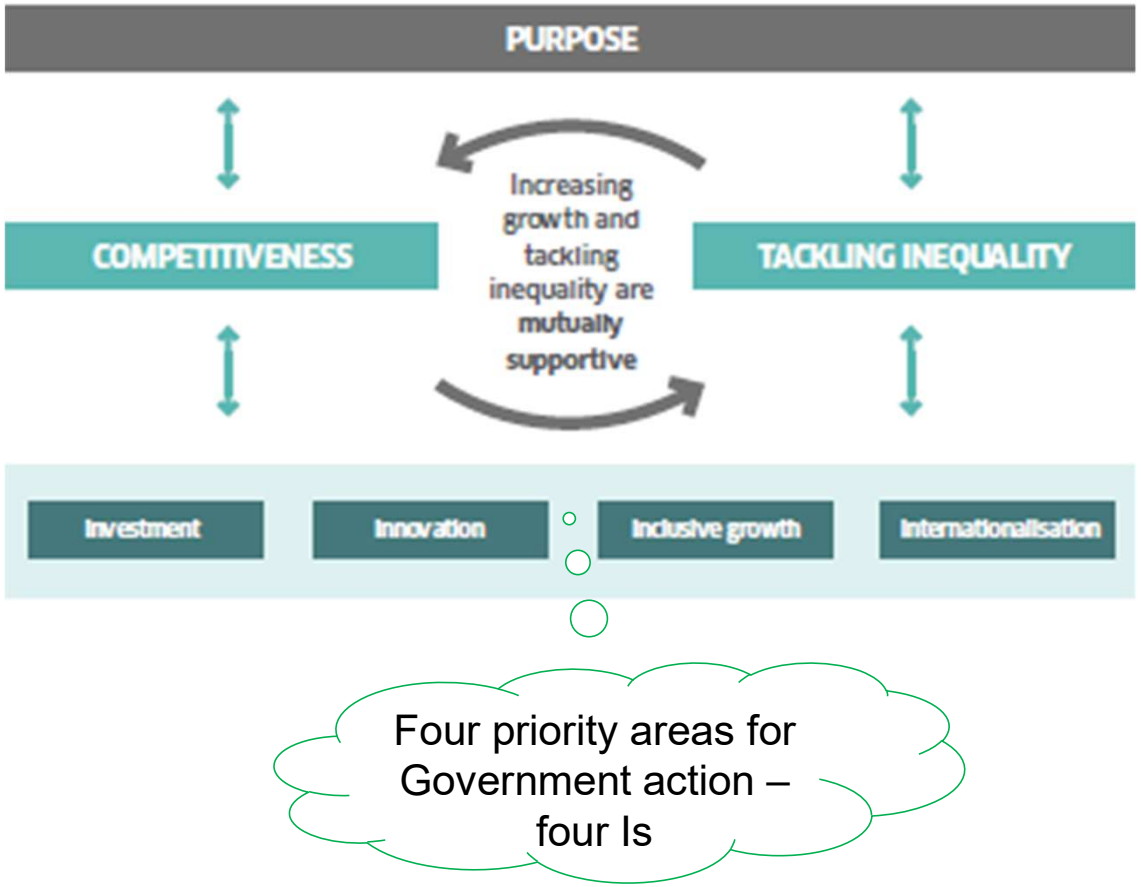
SES Framework



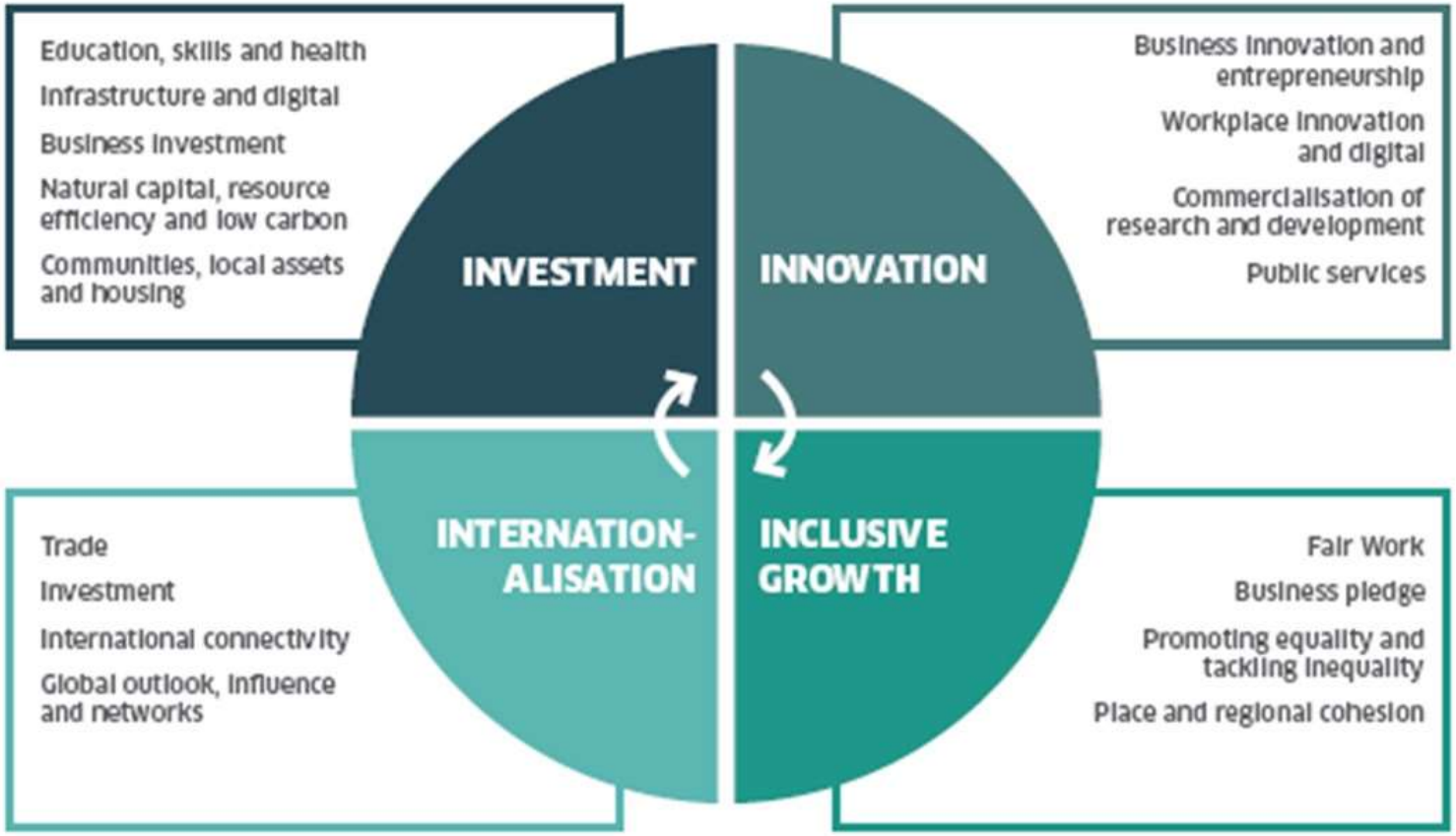
Helping businesses to grow and expand at home and overseas

Increasing the ability of people to participate and to benefit from economic growth

SES: The Framework



Key Priorities And Focus



PfG – Flood Risk Management

Roads

We have just seen the Queensferry Crossing open to the public and earlier in the summer the opening of the upgrade to the M8, M73 and M74 motorways. We continue to deliver the Aberdeen Western Peripheral Route and progress the dualling of the A9, underlining our commitment to major infrastructure across Scotland.

This year, we will also focus on maintaining the trunk road network in line with international best practice.

This approach will help to sustain the economic health of our nation and meet the expectations of the travelling public. We will invest in further essential road maintenance schemes, our bridge strengthening programme and ancillary assets and increase the resilience of the network to unplanned events such as flooding and high winds. The Transport Bill will contain provisions on obstructive and inconsiderate parking. It will also enhance and improve the role of the Scottish Road Works Commissioner and the wider regulation of road works.

Transport Scotland will continue its work to deliver a national 'e-purse' system for use on saltirecards allowing cash free travel on public transport across Scotland.

IN 2017-18 WE WILL PRESS FOR FURTHER DEVOLUTION OF NETWORK RAIL IN SCOTLAND

Buses

The Transport Bill will provide local transport authorities with improved options to influence the provision of bus services in their area to better meet local users' needs, through partnerships with

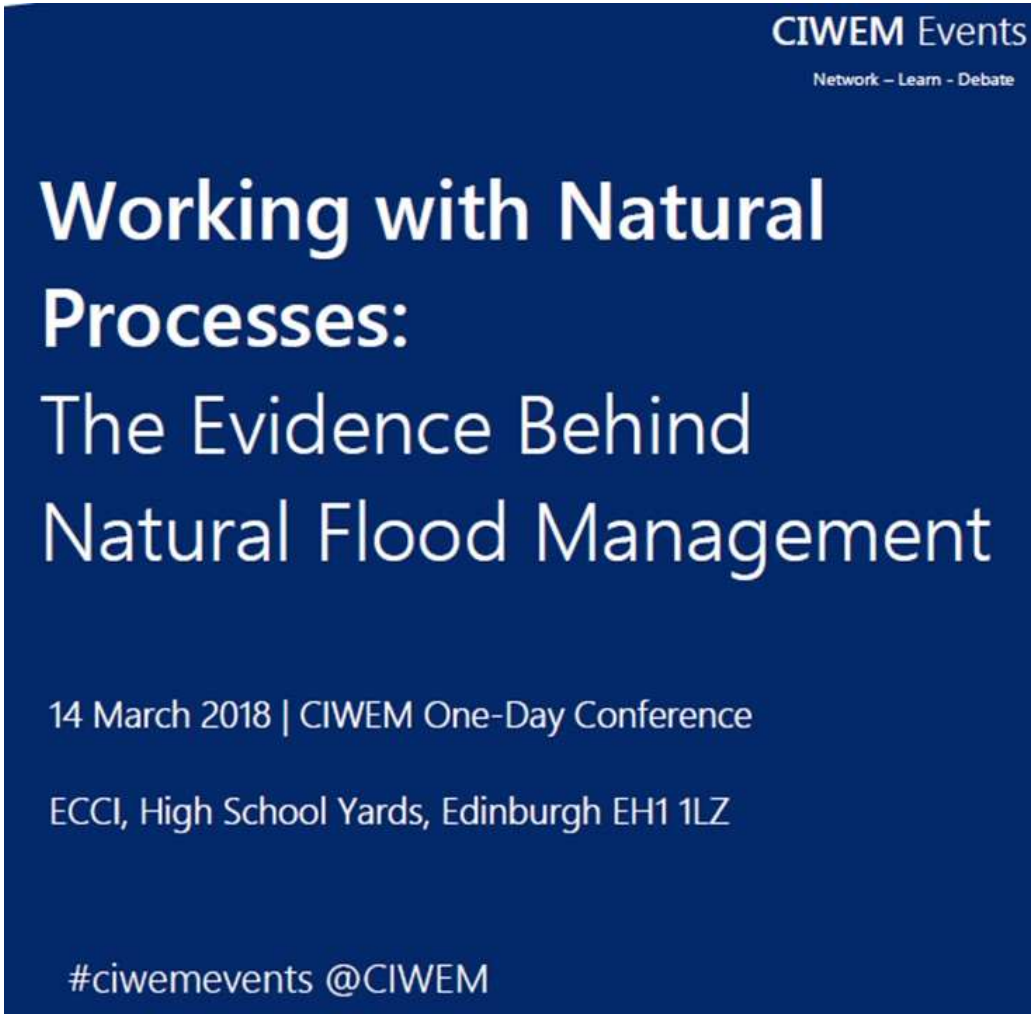
Flood risk and the water environment

We have supported delivery of flood protection and improvements to Scotland's rivers and lochs as set out in the second River Basin Management Plans. We will continue to invest in the Water Environment Fund to deliver further improvements and associated additional community and economic benefits.

We will work with partners to deliver the first round of flood risk strategies. This will be supported by funding to projects and initiatives like the Scottish Flood Forum, to raise awareness of flooding and share information on how to be prepared. This will improve Scotland's resilience to an increasing likelihood of severe weather events and the associated risk of flooding. We will also support the Scottish Environment Protection Agency in their development of the second National Flood Risk Assessment, due in 2018.

2018 – an important year

The Scottish Government
Riaghaltas na h-Alba



NFM Network Launch:

Improving the evidence base

Sea

PUBLICATION - SPEECH / MINISTERIAL STATEMENT

Compulsory Purchase Order National Assembly 2017: minister's speech

Published: **12 Dec 2017**

Directorate: Local Government and Communities Directorate

Part of: Building, planning and design

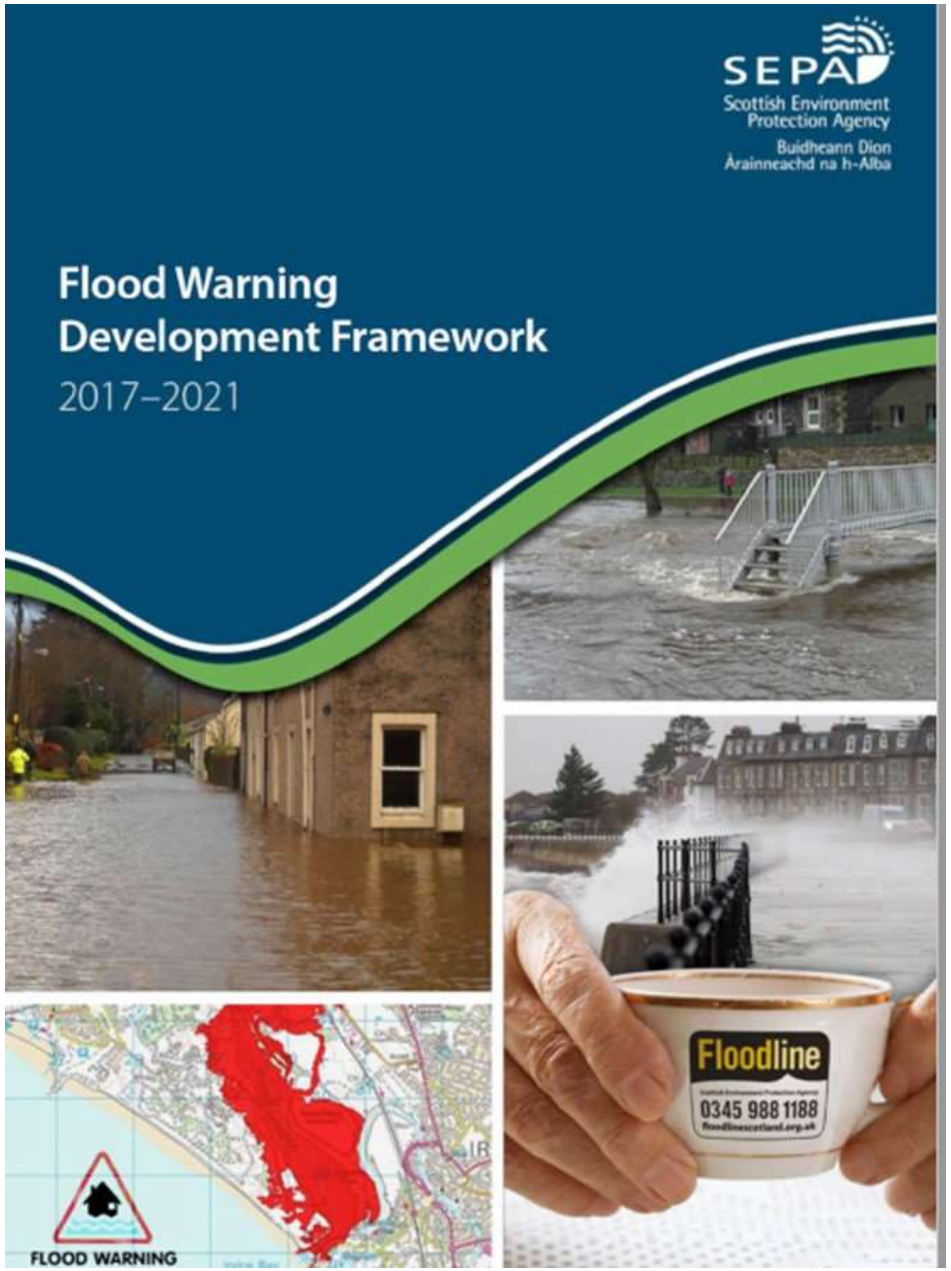
Date of speech: **12 Dec 2017**

Delivered by: **Minister for Local Government and Housing, Kevin Stewart**

Location: **Edinburgh**

The Minister for Local Government and Housing's speech at the Compulsory Purchase Order (CPO) National Assembly held on 12 December 2017.

- https://beta.gov.scot/publications/compulsory-purchase-order-national-assembly-2017-ministers-speech/
- https://beta.gov.scot/publications/compulsory-purchase-orders-introduction/



New Flood Warning Schemes in 2017:

- Loch Lomond & River Leven
- River Garnock
- Upper Nith, River Esk and River Cree
- Coastal areas of the Firth of Forth around Airth and Alloa

To sum up:

Flood Risk Management is key to the PfG and the delivery of Scotland's Economic Strategy.

The Scottish Government
Riaghaltas na h-Alba

Adaptation Scotland

supporting climate change resilience

Update on Climate Change Adaptation Policy

Anna Beswick | Adaptation Scotland Programme Manager

FRM conference | 5 February 2018

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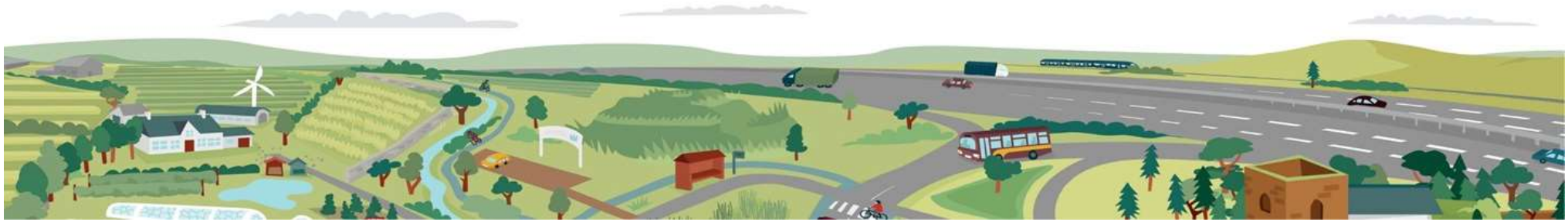

Adaptation Scotland
supporting climate change resilience

Enabling organisations, businesses and communities to adapt to the impacts of climate change

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

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Adaptation Scotland

Adaptation Scotland
supporting climate change resilience

- Advice service
- Guidance
- Adaptation Learning Exchange
- Task groups
- Case studies
- Partnership projects

The Scottish Government

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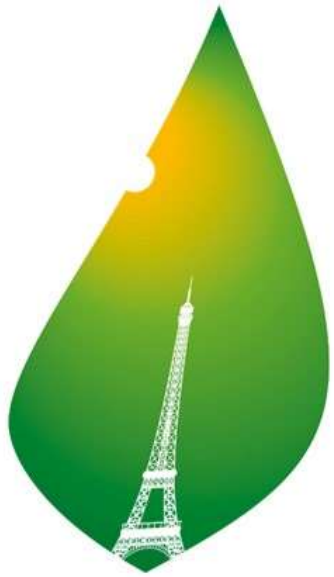
International Context

Adaptation Scotland
supporting climate change resilience

Paris Agreement:

- Put adaptation on a par with mitigation, and linked the two.
- Set a global goal of *'enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change*'.
- All countries expected to undertake adaptation planning and action, and communicate actions to global community.



COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

The Scottish Government

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Scottish Climate Change Adaptation Programme (I)

Adaptation Scotland
supporting climate change resilience

The Climate Change (Scotland) Act requires a statutory climate change adaptation programme

First Scottish Climate Change Adaptation Programme published May 2014 – risk led approach

Aim: to increase the resilience of Scotland's people, environment and economy to the impacts of climate change

- Annual progress reports and two independent assessments by the CCC Adaptation Sub-Committee

Second Scottish Climate Change Adaptation Programme due 2019

The Scottish Government

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Scottish Climate Change Adaptation Programme (I)

Adaptation Scotland
supporting climate change resilience

Climate Change (Scotland) Act includes Public Bodies Climate Change Duties:

- Requires that Public Bodies exercise their functions in a way best calculated to deliver the statutory adaptation programme;
- Report compliance annually.

Significant progress is being made.

The Scottish Government

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Scotland's historic sites at high risk from climate change, report says

Exclusive: Many of the country's most famous ancient sites, from Holyrood Park to the Neolithic village of Skara Brae, need urgent protection, say experts

Dozens of Scotland's most famous historic sites are at very high risk of being badly damaged by climate change and need urgent protection, an expert survey has found.

Adaptation Scotland
supporting climate change resilience

The Scottish Government

The Ada arity Sniffer.

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Historic Environment

Adaptation Scotland
supporting climate change resilience

- Assessment of climate change risks to Historic Environment Scotland estate – over 300 Properties in Care.
- £6.6 million capital boost to support investment in conservation work and repairs.
- Collaboration – Scottish Water, SEPA, NHS Facilities, Aberdeen City Council

The Scottish Government

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Green Infrastructure Fund

Adaptation Scotland
supporting climate change resilience

Improving Scotland's urban environment

By increasing and enhancing greenspace:

- **Prioritising areas of multiple deprivation**
- **£5.8m awarded in 2017 – match funding = total investment of £19.6 million**

Green Infrastructure
making places for people
a' cruthachadh àitichean do dhaoine

The Scottish Government

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Edinburgh Adapts Vision and Action Plan

100 actions to be implemented between 2015 - 2020

ClimateReadyClyde

Climate and adaptation science

Adaptation Scotland

Climate and adaptation science

Adaptation Scotland
supporting climate change resilience

UKCP18 release
November 2018

The Scottish Government

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Scottish Climate Change Adaptation Programme (II)

Adaptation Scotland
supporting climate change resilience

Second Scottish Climate Change Adaptation Programme due 2019

Scoping Phase

- November 2017 – event with Scottish Government Adaptation Policy leads to review progress and gather feedback on options for SCCAP 2
- January 2018 – Options appraisal to identify preferred structure for SCCAP 2

The Scottish Government

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Scottish Climate Change Adaptation Programme (II)

Adaptation Scotland
supporting climate change resilience

Suggested new approach: Outcomes focused

- Provides a positive narrative and language
- Familiar approach
- Will show how adaptation can enable progress with broader strategic outcomes
- Better reflect how adaptation works in practice

Open and consultative process

The Scottish Government

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Adaptation Scotland

supporting climate change resilience

anna@sniffer.org.uk
@adaptationscotland
www.adaptationscotland.org.uk

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Working together to manage flood risk

Flood Risk Management Conference 2018

5 – 6 February 2018

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Working together to manage flood risk

Katriona Carmichael, Scottish Government

Chair session 1b Scotland's FRM policy landscape (cont)

5 – 6 February 2018

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2018 National Flood Risk Assessment & Potentially Vulnerable Areas Development Update

FRM Conference

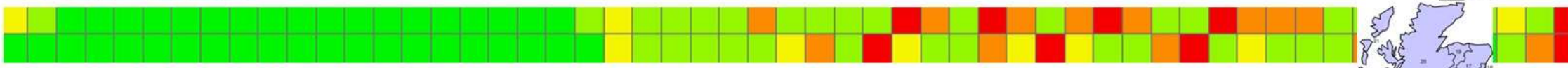
5th February 2018

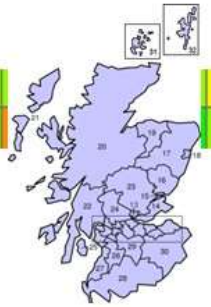
Ruth Ellis – Principal Policy Officer Flood Risk Management

ruth.ellis@sepa.org.uk

SEPA
Scottish Environment Protection Agency

THANKS



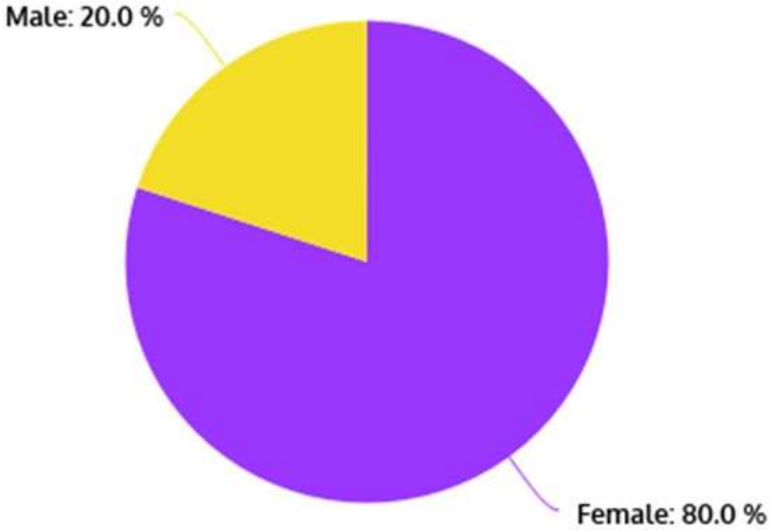


BRINGING THEIR SKILLS IN IMPACT ASSESSMENT, GIS MODELLING, REPORT WRITING, STATISTICAL ANALYSIS, PROJECT MANAGEMENT & MORE:

>44 INDIVIDUALS

RPS

Direction & Method Development



#WomeninSTEM
#womenindata

NetworkRail

Scottish Natural Heritage
All of nature for all of Scotland

HISTORIC ENVIRONMENT SCOTLAND

Scottish Water
Trusted to serve Scotland

TRANSPORT SCOTLAND

SP ENERGY NETWORKS

The Scottish Government
Riaghaltas na h-Alba

sse

SOCIETY OF CHIEF OFFICERS OF TRANSPORTATION IN SCOTLAND

Protection Agency

CONTEXT

Statutory Requirements

- Section 10 & 14
- Review and update Consult on changes
- Publish by December 2018

Lessons Learned

- Proactive
- >400 comments
- Good / bad / indifferent
- Provided focus
- Grounded in reality

Improvement Opportunity

- Comprehensive review
- Gap analysis
- Horizon scanning
- Need and impact based
- Targeted development

Efficiency and Consistency

- Underpins FRMP activity
- Consistency from cycle start
- Focus energy on appraisal and prioritisation earlier
- Robust for partners

CONTINUITY: ASSESSMENT FRAMEWORK

Hazard

Receptors

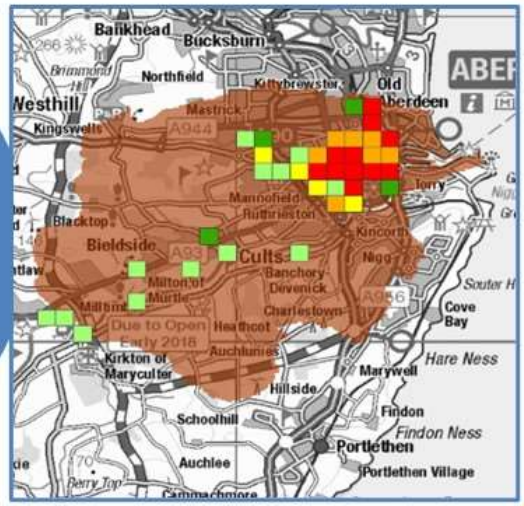
Influences

Likelihood

10 30 50 100 200 1000 30 CC 200 CC

Spatial quantitative, qualitative & economic analysis

NFRA Grid



PVA Units

CONTINUITY: PRINCIPLES

Predictive

- Proactive & forward-looking

Climate Change

- Future hazard & risk

FRM Actions

- Account for FRM Actions
- Role in reducing flood risk

Best Data

- Nationally consistent & informed by observed flood events

Communities

- Impact on people, place, business, heritage & environment
- Flood Disadvantage

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CONTINUITY: RISK GRID & BASE UNITS

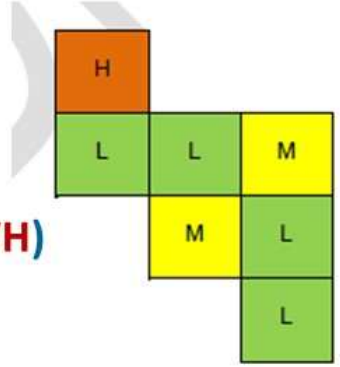
Assess Risk to Receptors

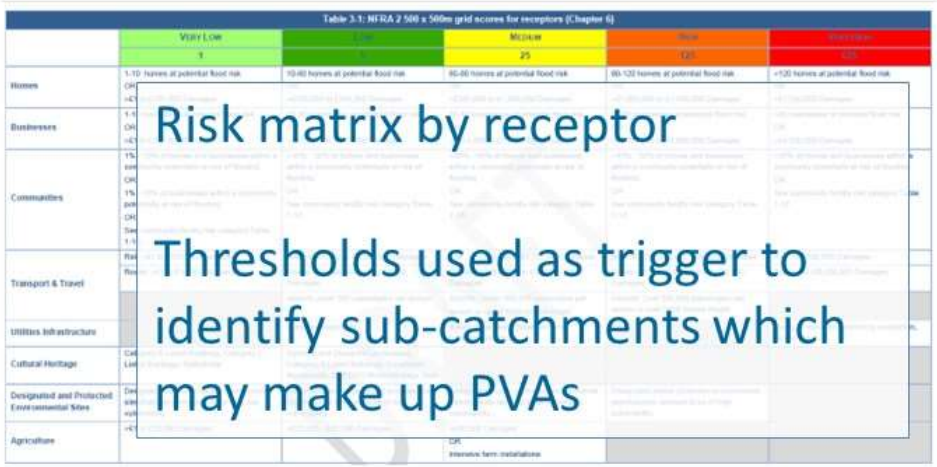
Assess Risk Influences

Apply Thresholds

OUTPUTS: Categorised risk grids (VL/L/M/H/VH)

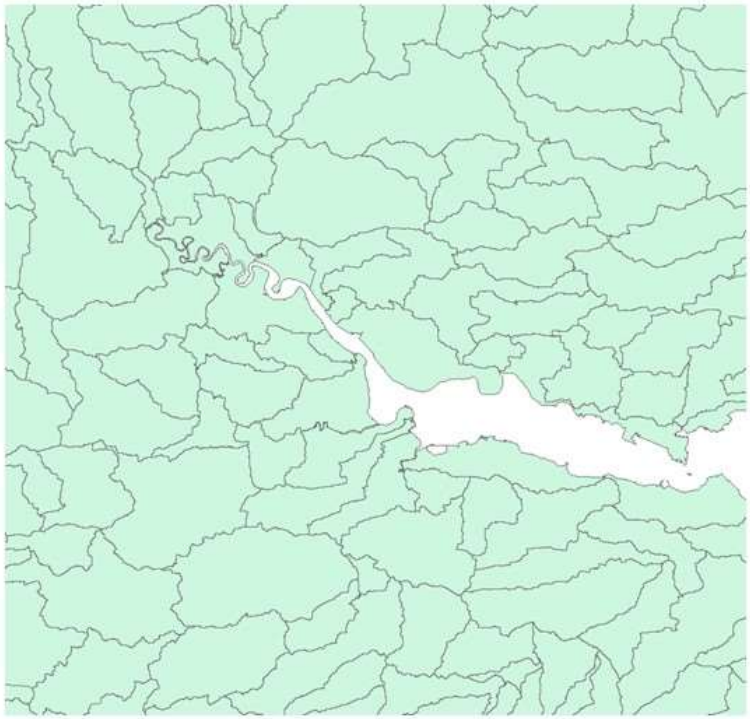
risk clusters





Risk matrix by receptor

Thresholds used as trigger to identify sub-catchments which may make up PVAs

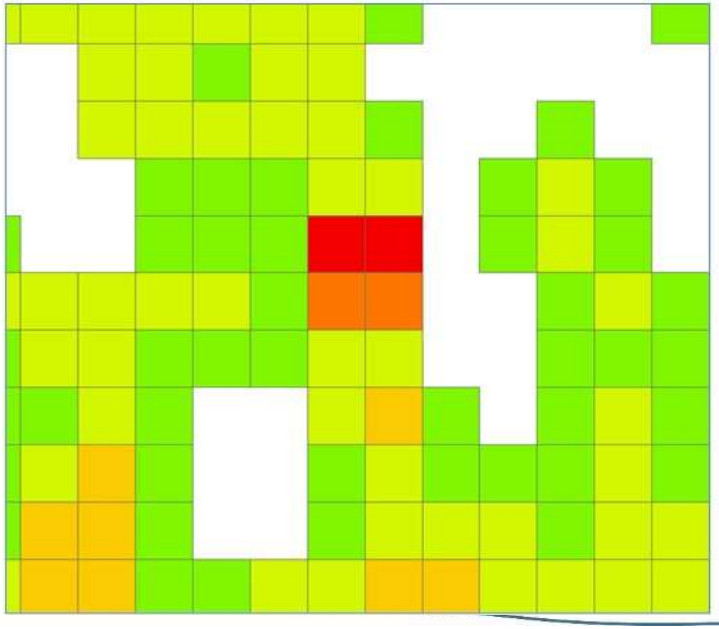


Sub-catchment unit building blocks

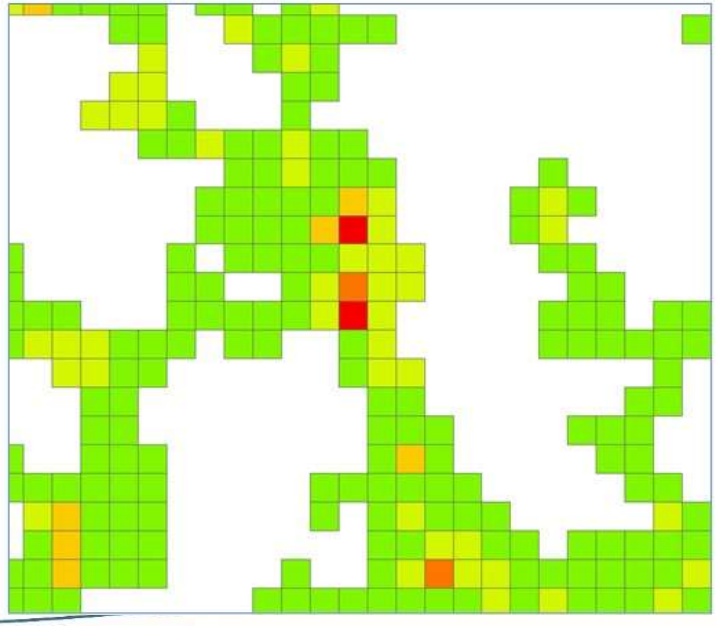
DEVELOPMENTS: GRID SIZE

Striking the balance: flattening risk profile vs appropriate detail

NFRA 2011: 1km x 1km



NFRA 2018: 500m x 500m



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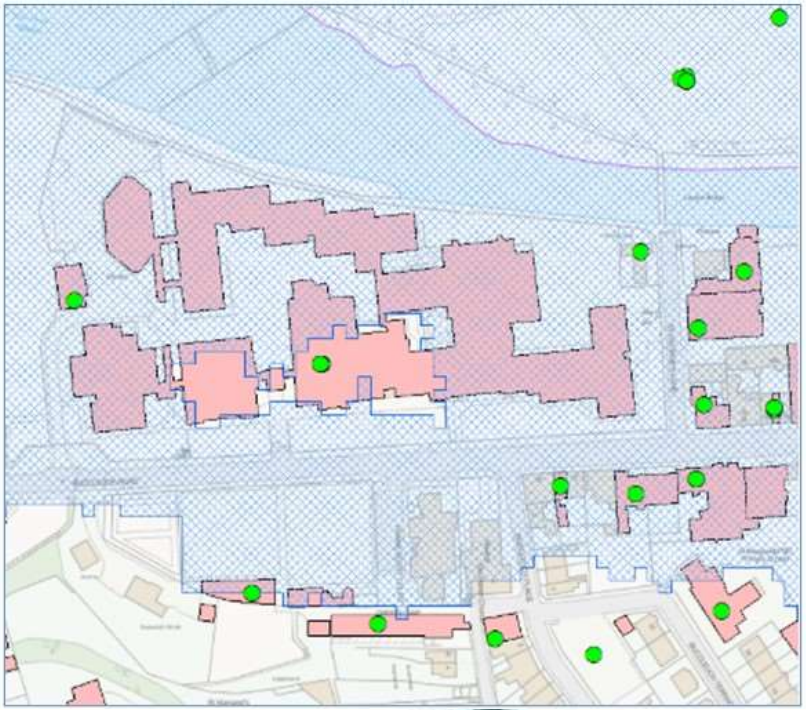
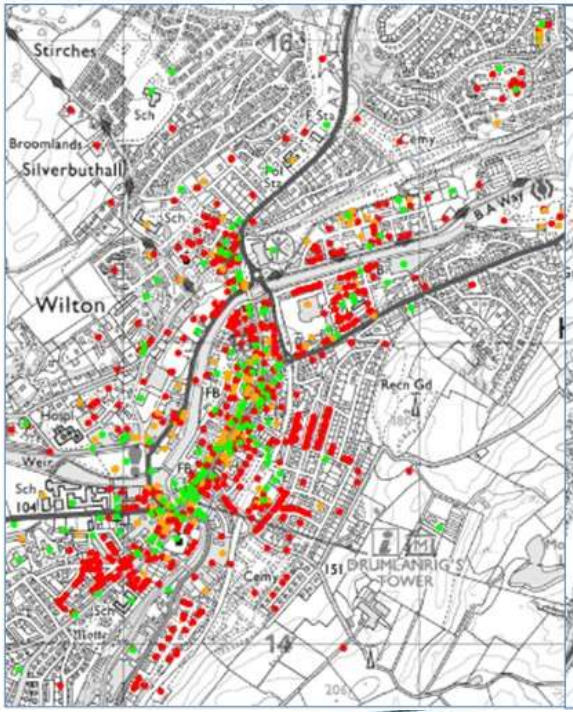
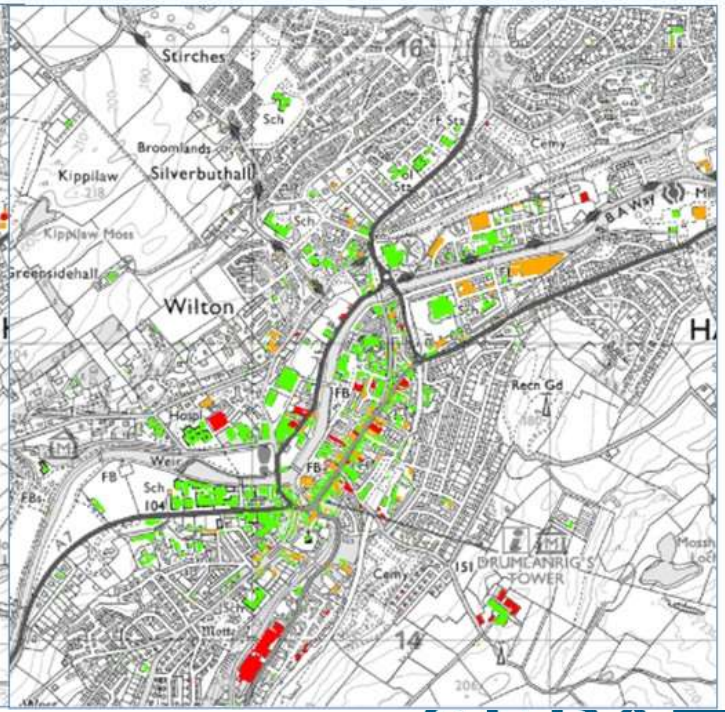
DEVELOPMENTS: PROPERTY COUNTING

Point to building polygon



Improved non-residential building classification





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DEVELOPMENTS: NEW ELEMENTS

Communities

-Receptors expanded to reflect functionality

-Scale of community impacted (resilience)

Climate Change

Data embedded from outset

Absolute and change impacts

Recent Research

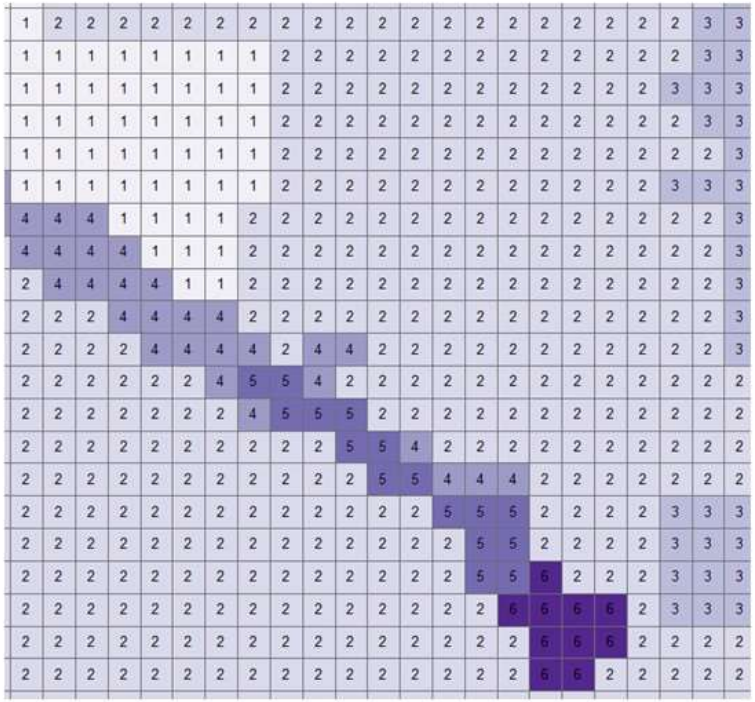
National Coastal Change Assessment

Mapping Flood Disadvantage Scotland

Scottish Environment Protection Agency

DEVELOPMENTS: INFLUENCING FACTORS

- Safety and Wellbeing
- Groundwater
- Erosion (coastal and fluvial)
- Pollution
- Vulnerability
- Remote and Rural Communities



Scottish Environment Protection Agency

OUTPUTS: PVA REVIEW – STRUCTURED EVIDENCE

Filter the map to area of interest:

SCU:	Settlement:	LPD:
(All) 155 values	(All) 220 values	(All) 15 values
1283.00	Adamhill	Argyll
1284.00	Annbank	Clyde and Loch Lo...
1340.00	Ardrossan	England
1341.00	Auchagallon	Findhorn, Nairn an...
1342.00	Auchensoul	Forth

Select SCU/s of interest on the map below

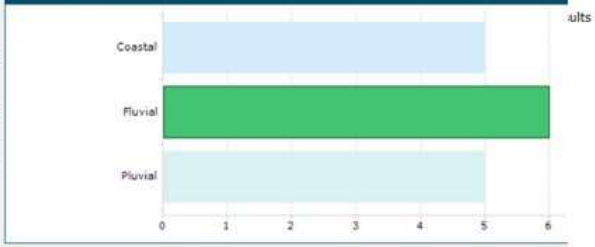
In the current selection:

Risk to settlements (all sources)

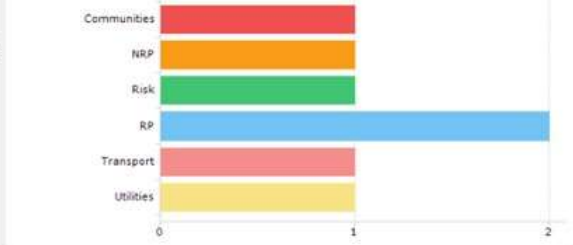
with the risk from all

ults are

Number of reasons per source



Number of reasons per receptor - selected source

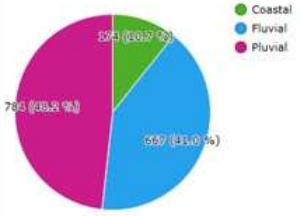


SCU R

Location Description	Overall_Score	Source of Information	Summary Flood Event
Troon, 46 Lugar Place		SEPA Staff	Concern about flooding at the back of property - unsure of extent or impact . Info Source; SCC
Troon, Pearc... Avenue	1.00	SEPA Staff	heavy rain caused flooding of nearby fields . Info Source; member of public via SCC
troon, beach road	0.00	SEPA Staff	flooding in drive of property - 28 beach road troon . Info Source; member of public via SCC

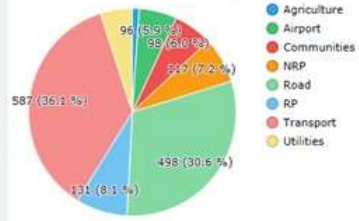
By source (200 year RP)

Grid count where risk score is medium or higher.



By receptor (200 year RP)

Grid count where risk score is medium or higher.



FWTA

Scheme Name	Target Area Name	Type	Quick Dial Code
Irvine	Irvine Waterside and Low Green	Fluvial	24213
Firth of Clyde	Troon Coastal	Coastal	24237
Firth of Clyde	Troon Central	Coastal	24234
Firth of Clyde	Prestwick Links	Coastal	24222

LA Studies

Project Name	Date Produced	Source	Purpose of study
Troon Town Centre FRA	May-12	Coastal	Flood risk assessment

OUTPUT: ANTICIPATED CHANGES

Change	Summary
Increased ‘at-risk’ counts	Due to dataset and counting improvements, numbers at risk will increase.
Better understanding of risk composition	Improved data capture and manipulation – clearer narrative of risk
New PVAs	Hazard or receptor changes – increase in risk Climate change risk
De-designated PVAs	Hazard or receptor changes – decrease in risk
‘No change’ PVAs	Understanding of risk refined – no PVA impacts
Boundary adjustment PVAs	Refinement of existing risk Pragmatic logistical changes

MILESTONES 2018

Partners & Stakeholders

- Phased pre-consultation engagement
- Mid February – May
- Local Authority workshops scheduled 19th Feb – 2nd March
- National stakeholders subsequently
- Formal consultation too

Public

- Web-based consultation
- May/June/July
- Consultation summary
- Post-consultation updates

Publication

- Ministerial review / approval
- Publication by 22nd December 2018

QUESTIONS

- How can we use this understanding to drive forwards sustainable Flood Risk Management?
- How can we maximise the worth of this and future assessments?
- How do we communicate continually evolving risk?

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Scottish Environment Protection Agency

Scotland's Flood Risk Management Conference 2018

Ian Aikman
Chief Planning Officer
Scottish Borders Council

1. To focus on the practical links between planning and flood risk management and SBC's approaches to working together - Projects (Selkirk & Hawick FPS), Development Planning & Development Management

2. A secondary focus on changes to planning regulation and implications for flood risk management – Planning Bill

Selkirk Flood Protection Scheme

£31.4m

Opened 27th Feb 2017

Selkirk Flood Protection Scheme

- In August 2012, the Selkirk Flood Protection Scheme became the first major flood protection scheme with an environmental statement to be approved under the Flood Risk Management (Scotland) Act 2009.
- Learning curve for the authority in terms of process and procedure
- Collaborative and inclusive approach necessary to deliver corporate project

Key Points

- Project Board representation – Environmental Assurance Role
- Development of Environmental Working Group – planning and specialist advice
- Environmental protection and enhancement
- Project Leader (Conor Price) and Team
- Consultants – CH2M (Halcrow) - Steve Vint
- Lessons learned
- Material Variations protocol

Key Points

- Communication plan for public and wider stakeholder engagement
- Consulted 125 organisations and individuals in the form of one to one discussions, working groups, exhibitions, presentations and the Scheme website.
- Public Art Projects / School projects
- Cross fertilisation - Selkirk CARS scheme
- Economic benefits – Riverside Ind Estate

Saltire Civil Engineering Awards

- **Environmental Award 2017**
- This £32.1million flood protection scheme used an extensive consultative framework, it harnessed multi-agency collaborative working, achieving multiple benefits. The scheme protects 595 properties from major flood events. Varying levels of protection up to 0.2% AEP provided. Achieves identifiable economic benefits, demonstrates value for money, and complements the natural and built environment.

Development Planning

- NPF 2 - Supports catchment scale approach to sustainable flood risk management”
- SPP – para’s 254 – 268 - Managing Flood Risk and Drainage
- SESPlan
- Scottish Borders LDP – policy development and site allocation
- Guidance - SG/SPG/SPZ’s
- SEPA guidance

Development Management

- Pre-application consultation
- Formal consultation on applications - internal and with SEPA
- Project workshops
- Practical solutions
- SEPA Guidance

Planning Bill

Introduced to Parliament 4 Dec 2017

The proposals identify four key areas of change:

- Making plans for the future
- People make the system work
- Building more homes and delivering infrastructure
- Stronger leadership and smarter resourcing

Planning Bill

- SPP incorporated into National Planning Framework
- Strategic City-Region Plans abolished
- Local Development Plans revised on 10-year cycle
- Frontloading of process
- Closer alignment with community planning
- New right for communities to prepare Local Place Plan
- Encourages greater use of SDZs

Planning Bill

- Following Parliamentary scrutiny of the Bill work will commence on developing the required secondary legislation and guidance through a longer term, collaborative programme of work

Into the unknown

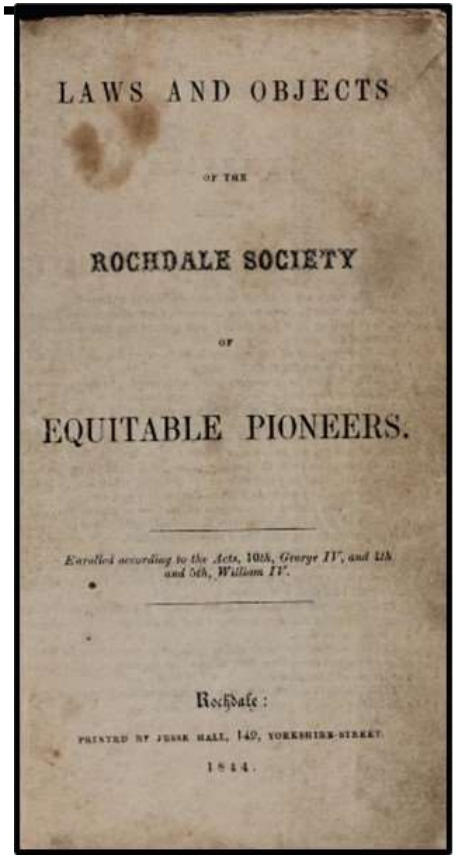
- Brexit – land use implications
- changing regulatory regime
- Impacts of removing subsidies
- Pressure for afforestation
- Opportunities for NFM

Empowering the Community

Frankie Barrett & Heather Claridge

Glasgow City Council

Community Empowerment


LAWS AND OBJECTS

OF THE

ROCHDALE SOCIETY

OF

EQUITABLE PIONEERS.

Enrolled according to the Acts, 10th, George IV, and 4th and 5th, William IV.

Rochdale:

PRINTED BY JESSE HALL, 149, YORKSHIRE-STREET.

1844.


RT. HON. J. WHEATLEY.

A Potted History of Community Empowerment

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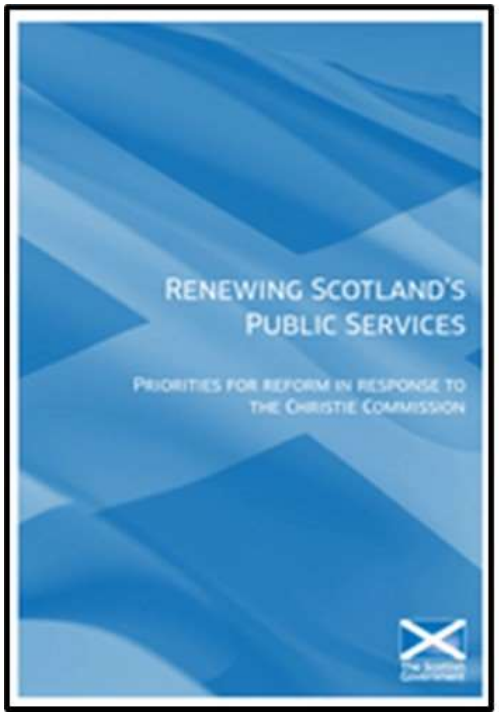

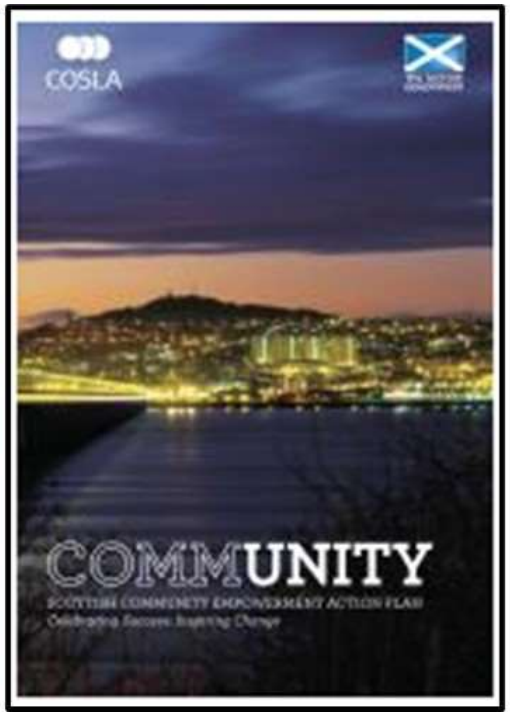

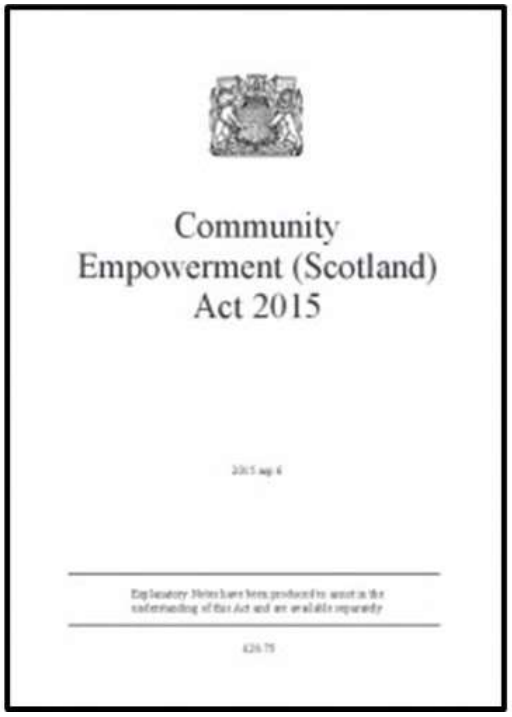

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PEOPLE
MAKE
GLASGOW

Understanding Stories

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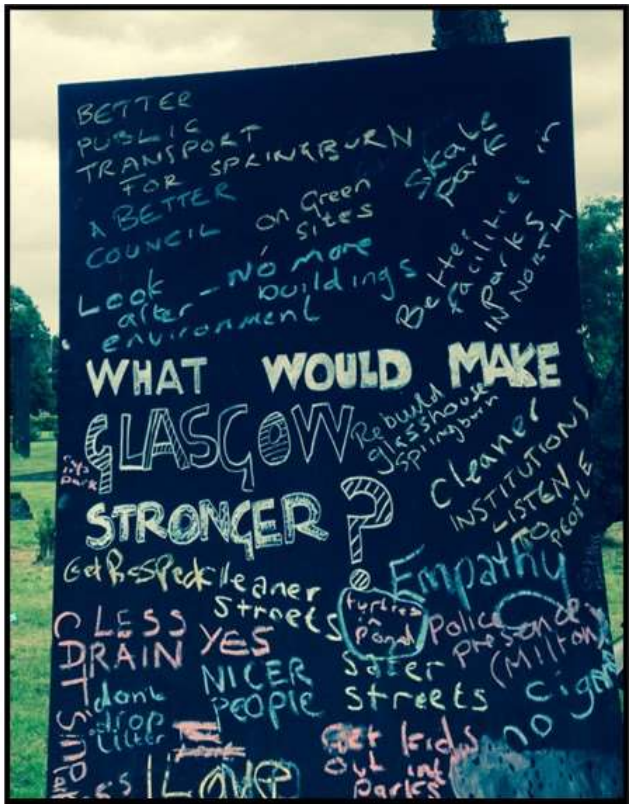

What is your Resilience Story?

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Facilitating Connections

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Weathering Change

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Co-Creating Outcomes

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Resilient Possilpark

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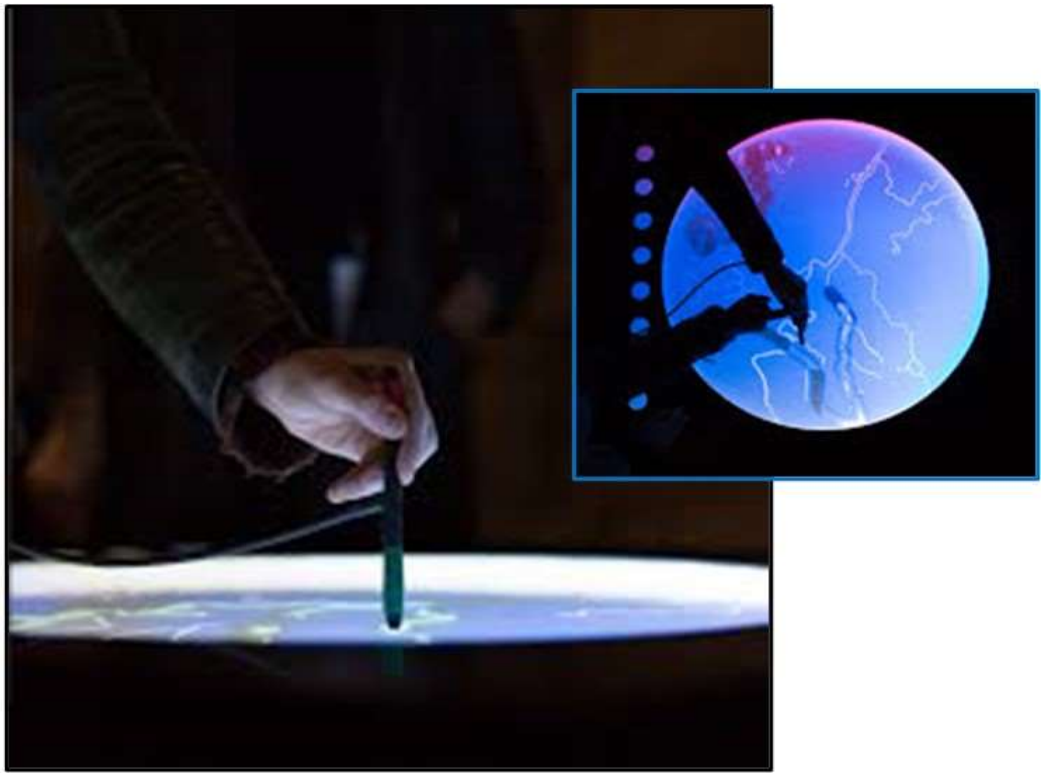
Building Capacity

Stalled Spaces

Building Interest



Submerge

Building Understanding

Living, Working & Playing with Water

Enabling Co-Design

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DIP INTO
PARKWAYS AND
WATERWAYS

Dip In to Waterways & Parkways

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GLASGOW

Concluding Thoughts

- Community Empowerment is not a destination;
- It is complex and does not happen in isolation;
- Multi-disciplinary team – the art & science of engineering places;
- Consider scale & stages of consultations;
- Manage expectation but also inspire;
- Get hands on with the engagement.

Concluding Thoughts

"Dull, inert cities, it is true, do contain the seeds of their own destruction and little else. But lively, diverse, intense cities contain the seeds of their own regeneration, with energy enough to carry over for problems and needs outside themselves."

Jane Jacobs

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Empowering the Community

Thanks for Listening

Any Questions?

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Working together to manage flood risk

Flood Risk Management Conference 2018

5 – 6 February 2018

Follow the conversation on Twitter at #FRM2018
Wifi network: WiFi Guest

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In the beginning…

Complex risk scenarios

High quality data required for coastal management:

- *Strategic planning*
- *Operational management*
- *Planning new schemes*
- *Performance evaluation*

Little/no monitoring of undefended coastlines

Historically…

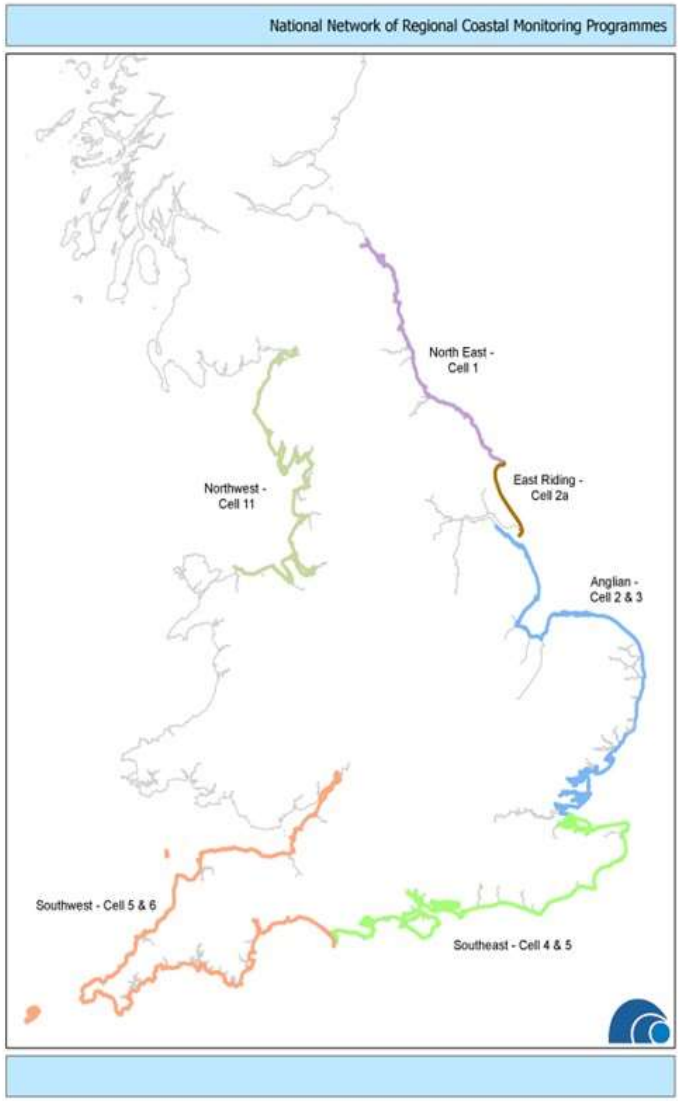
- Inconsistent approach regionally
- No strategic programmes


Aim
To promote a standard, repeatable and cost effective method of monitoring the coastal environment

Risk-based programme design

- Geomorphology
- Exposure
- Tidal range
- Management Policy
  - *Hold the Line*
  - *Do Nothing*
  - *Advance the Line*
  - *Managed re-alignment*

  (Beach Management Plan)

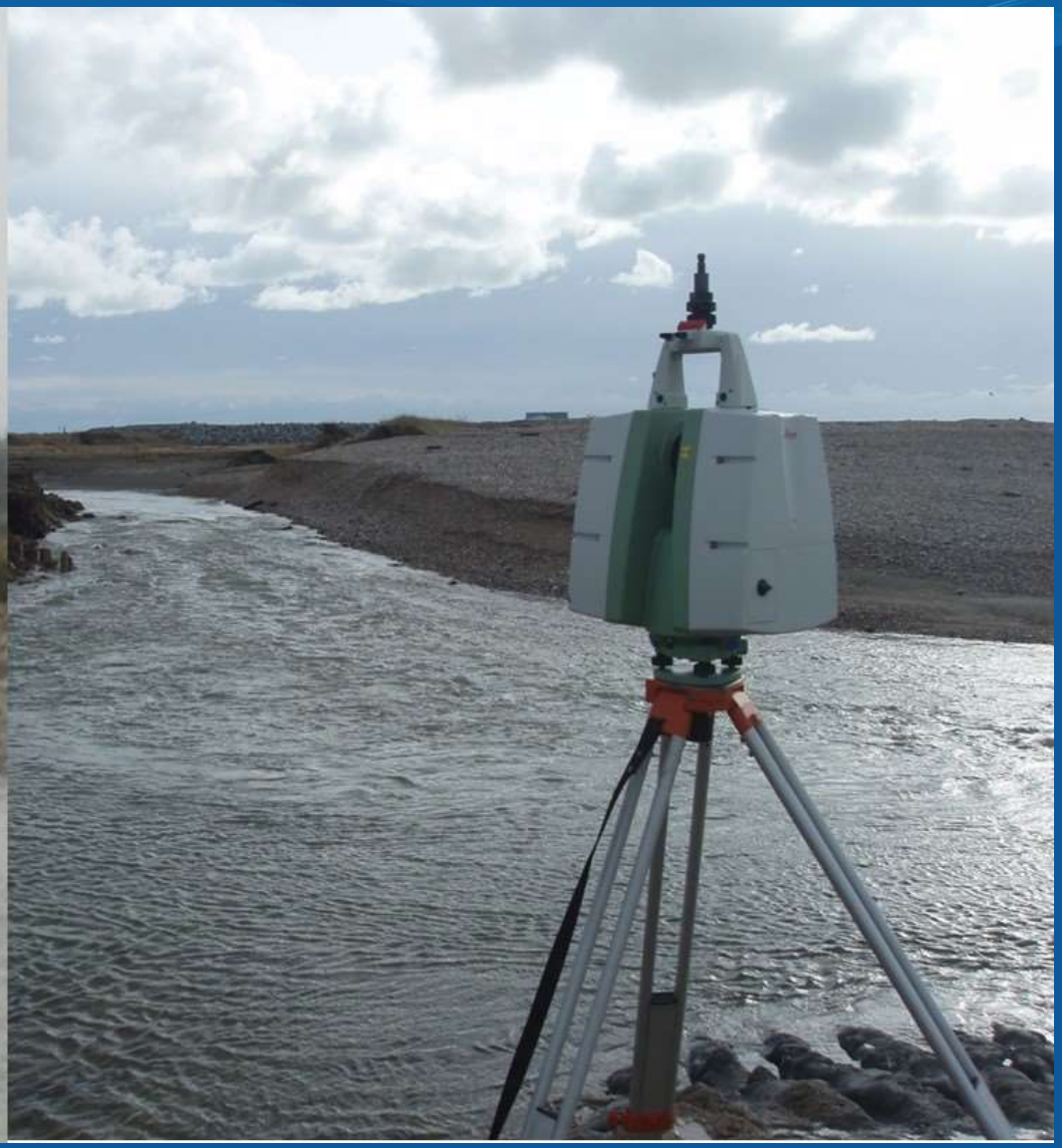


National Network of Regional Coastal Monitoring Programmes

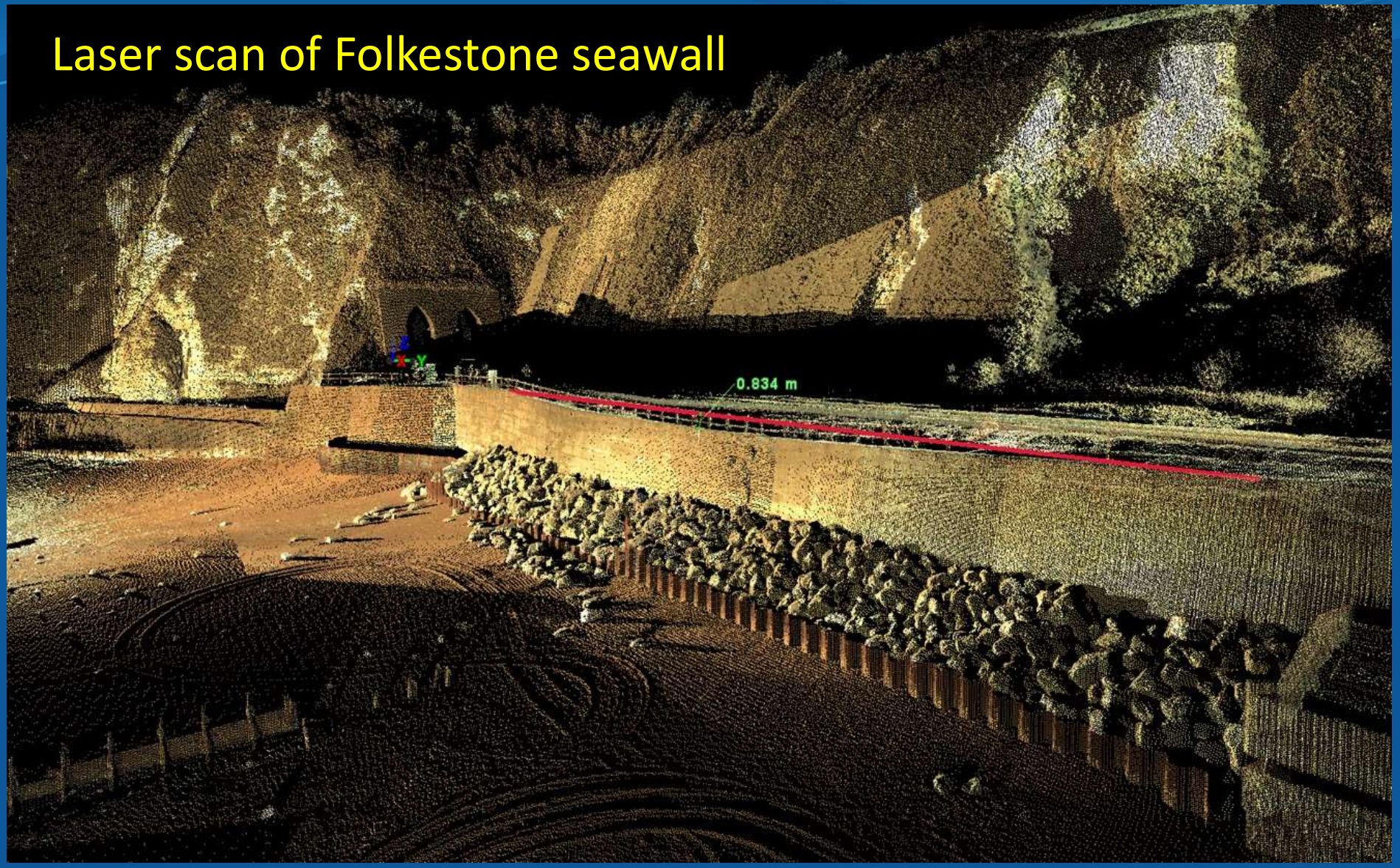
- Northeast
- East Riding of Yorkshire
- Anglian
- Southeast
- Southwest
- Northwest

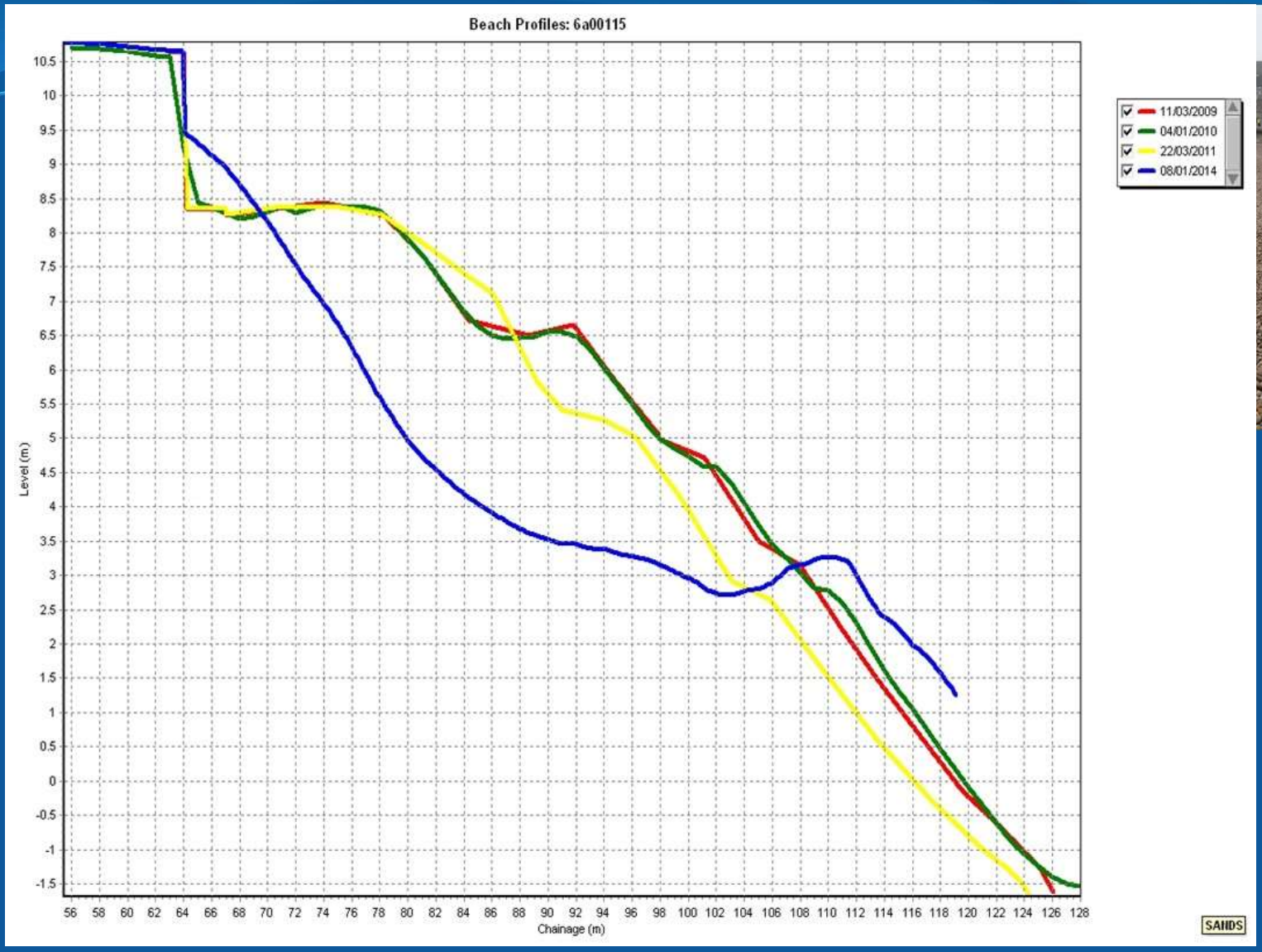
Benefits of approach

- Consistency of data collection, whilst leaving room for local adaptation
- Closer collaboration amongst coastal engineers
- Economies of scale (*e.g.* Waveriders)
- Standard specifications & data management (INSPIRE responsibilities)
- Links with UK-wide institutions *e.g.* MCA, BGS



Laser scan of Folkestone seawall

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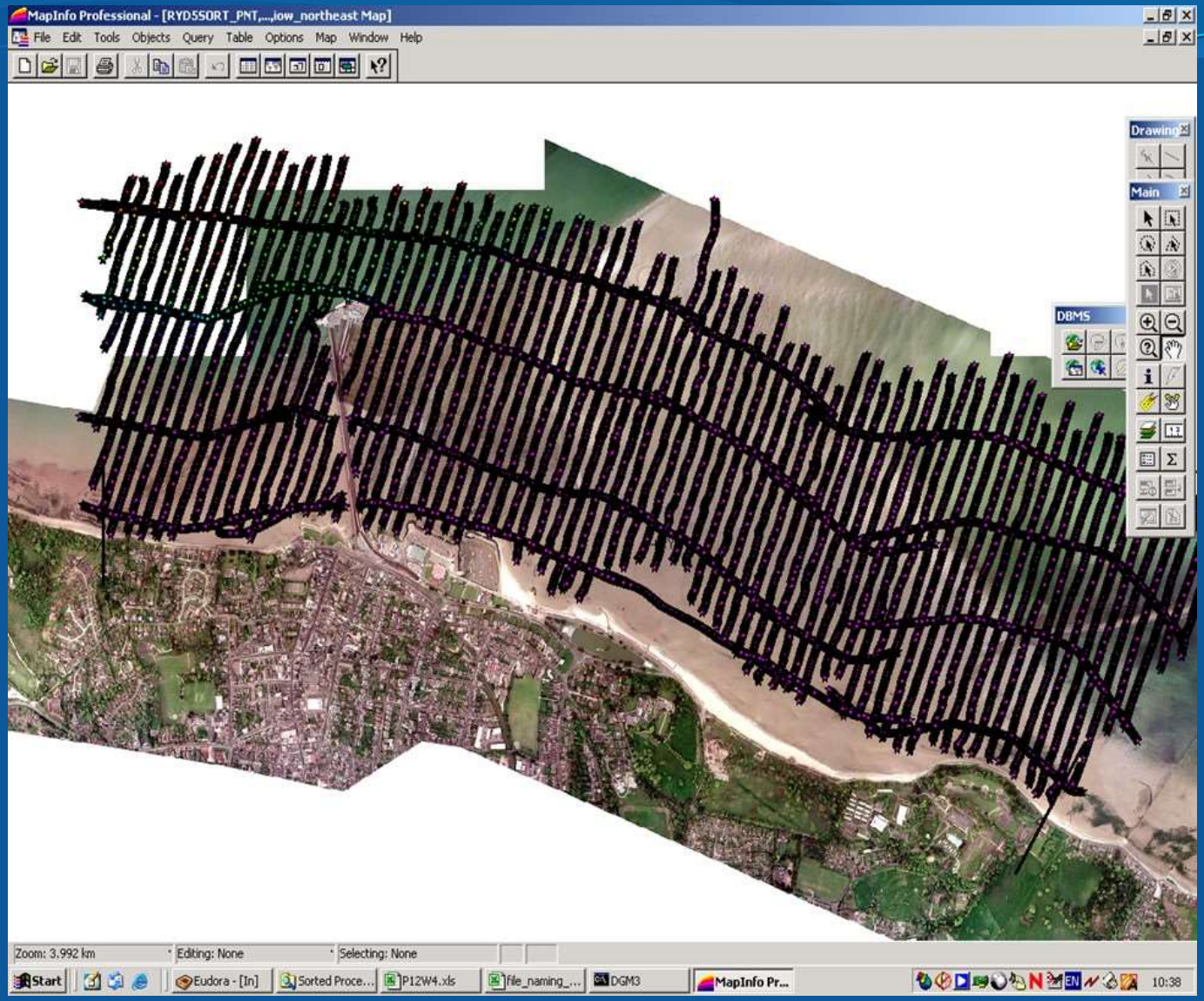
04/01/2010
22/03/2011
08/01/2014
SAHDS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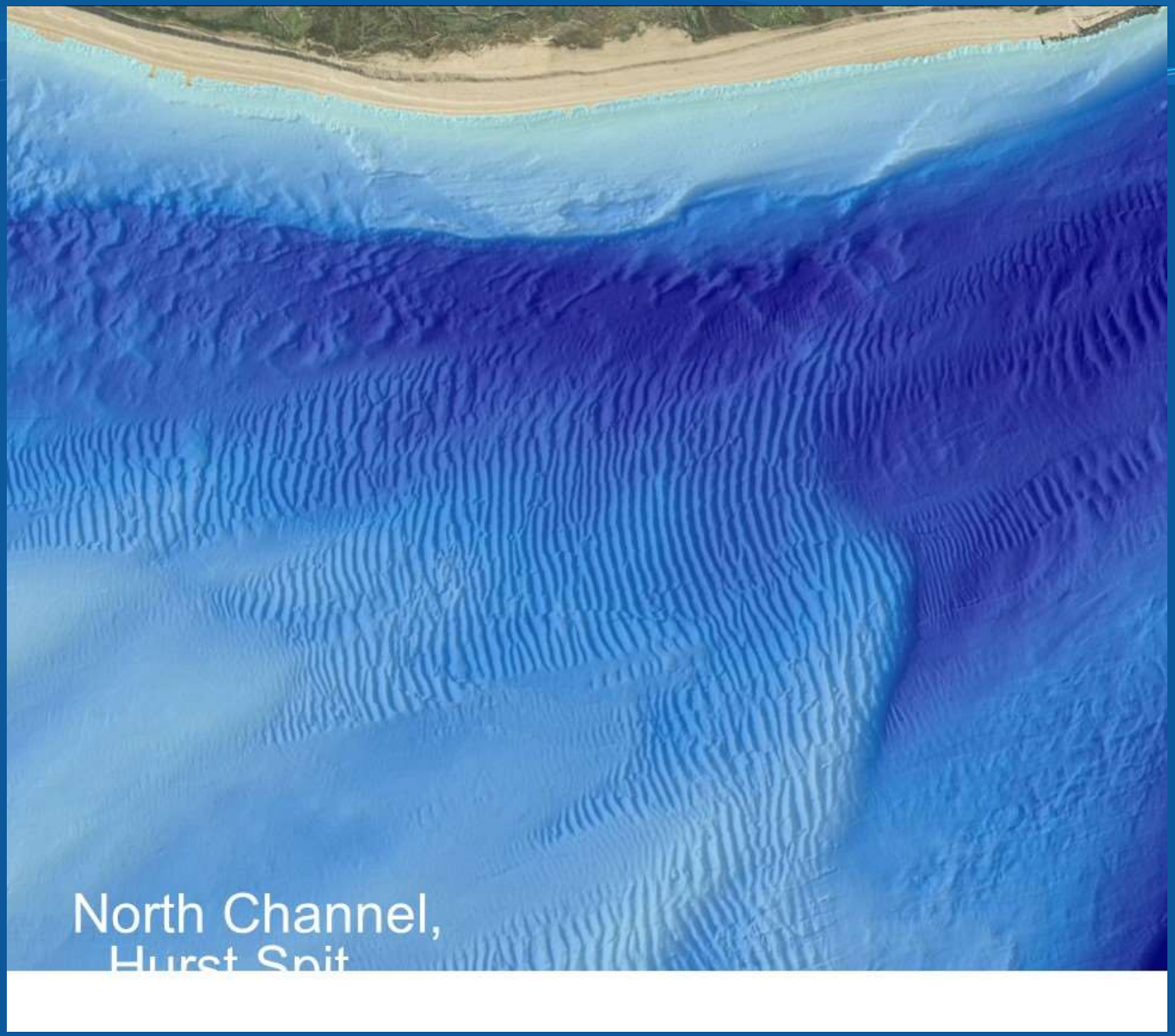
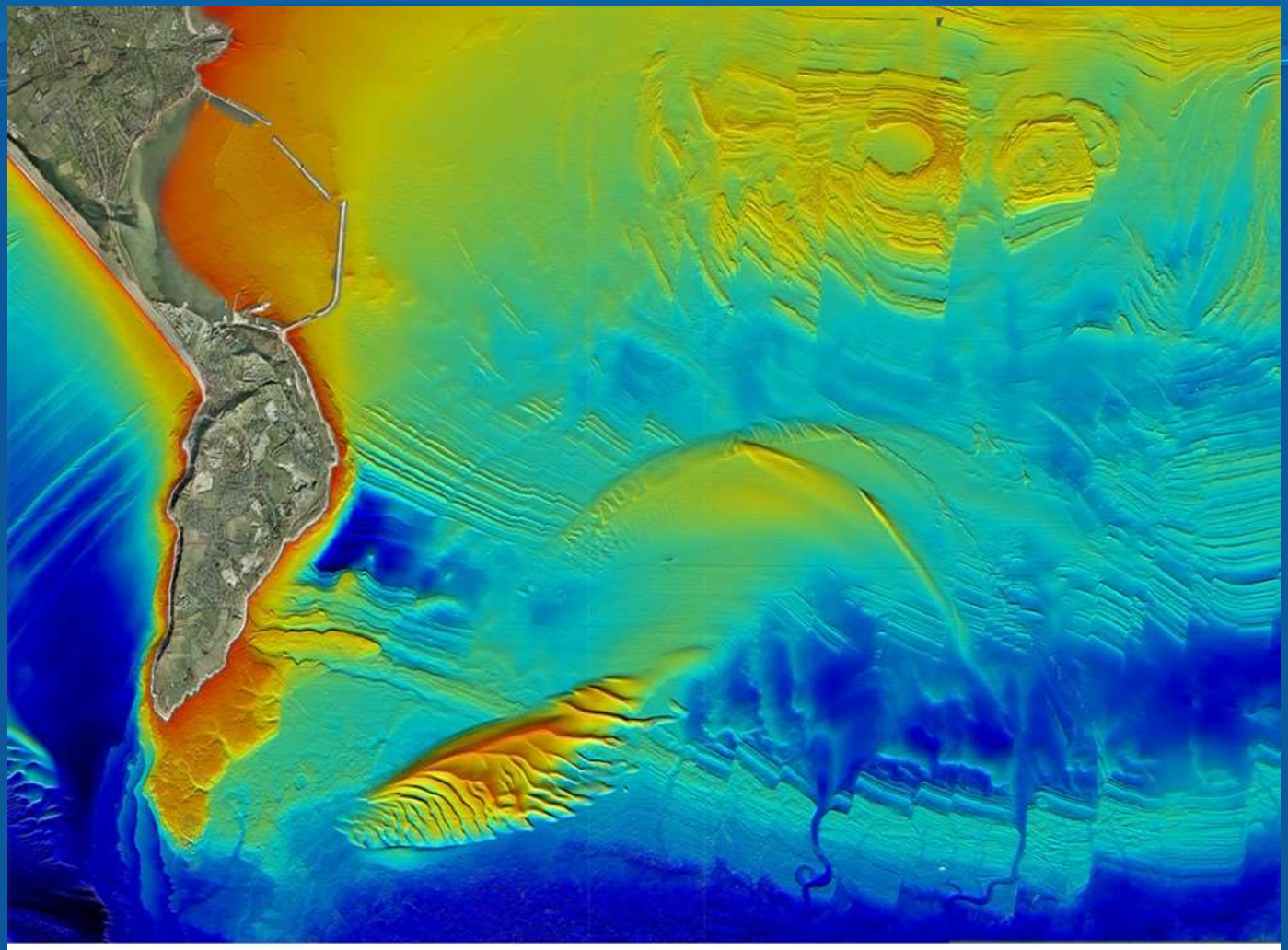

North Channel,
Hurst Spit



The "DORIS" survey

Combined multibeam and lidar

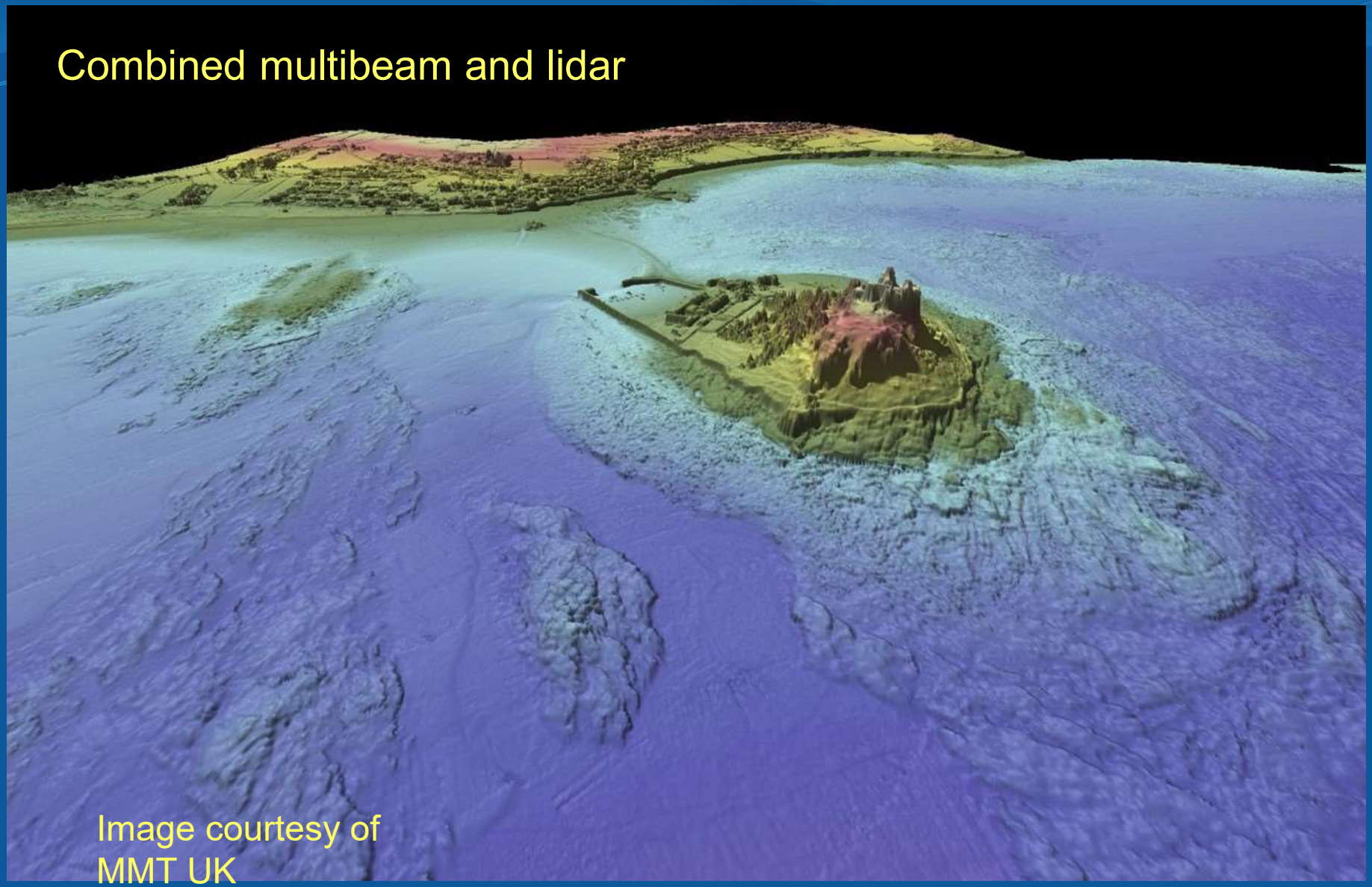
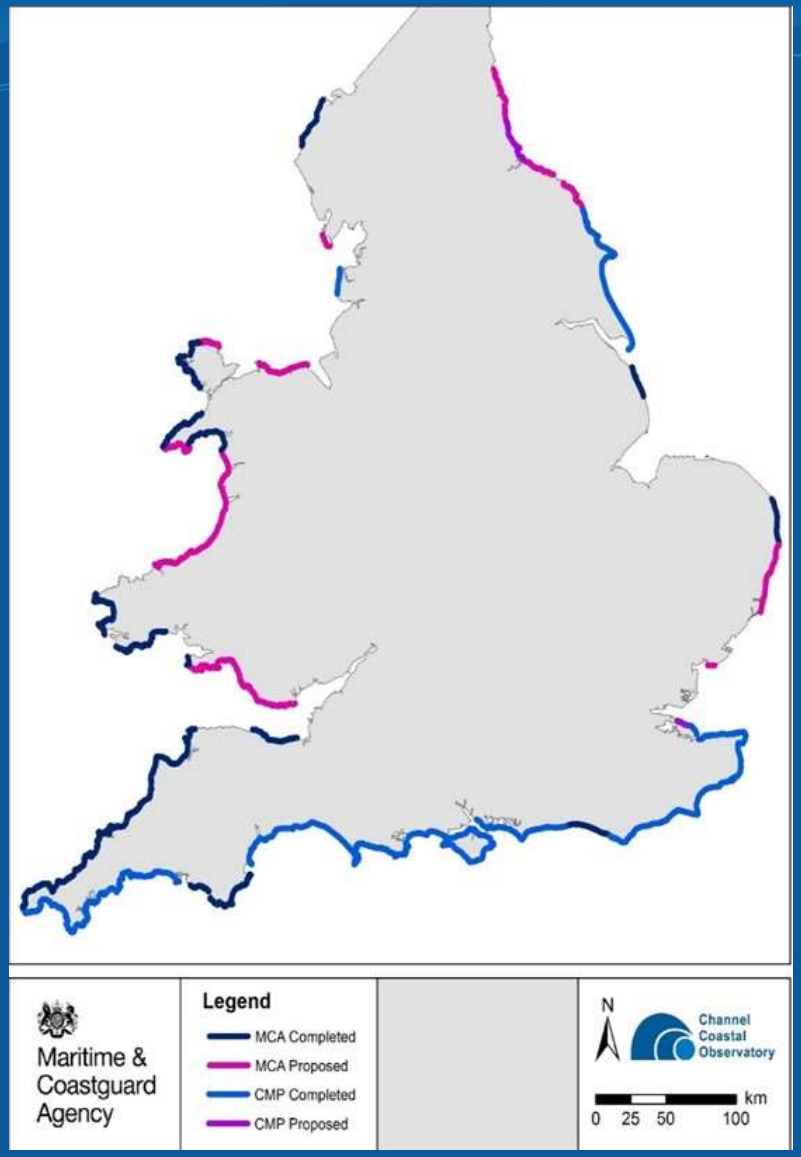
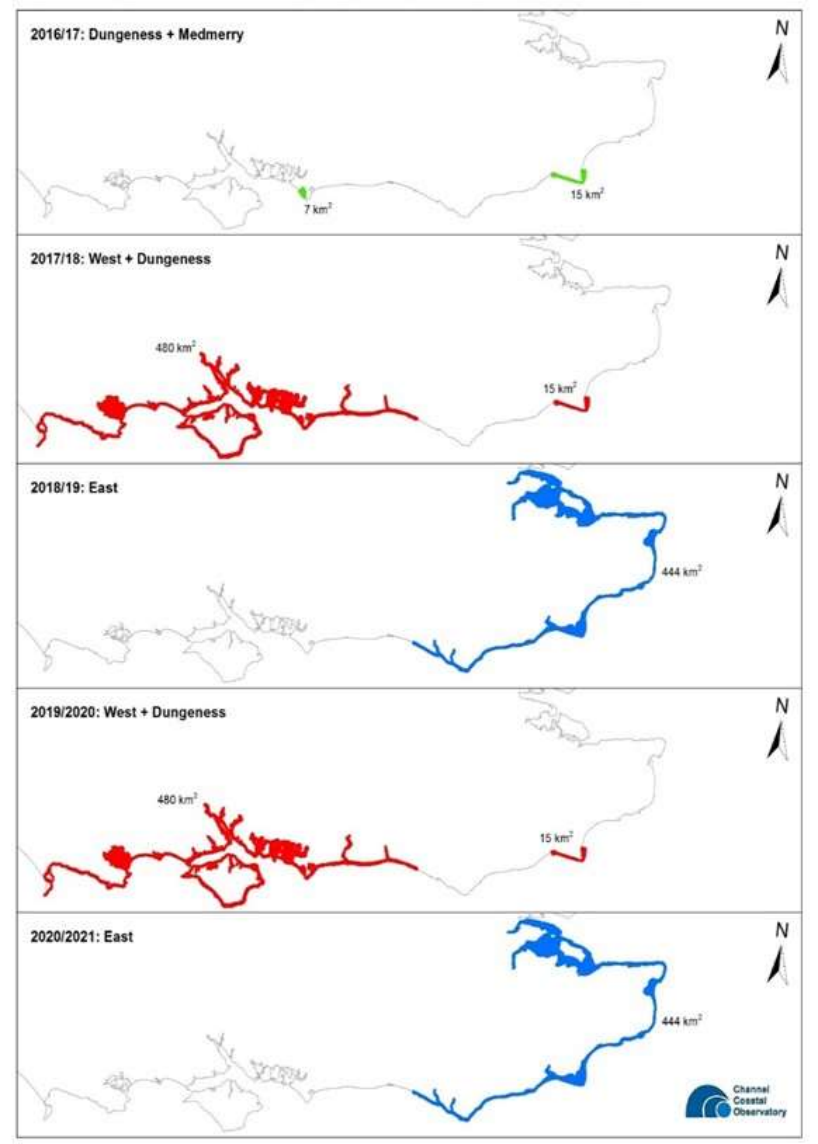


Image courtesy of
MMT UK

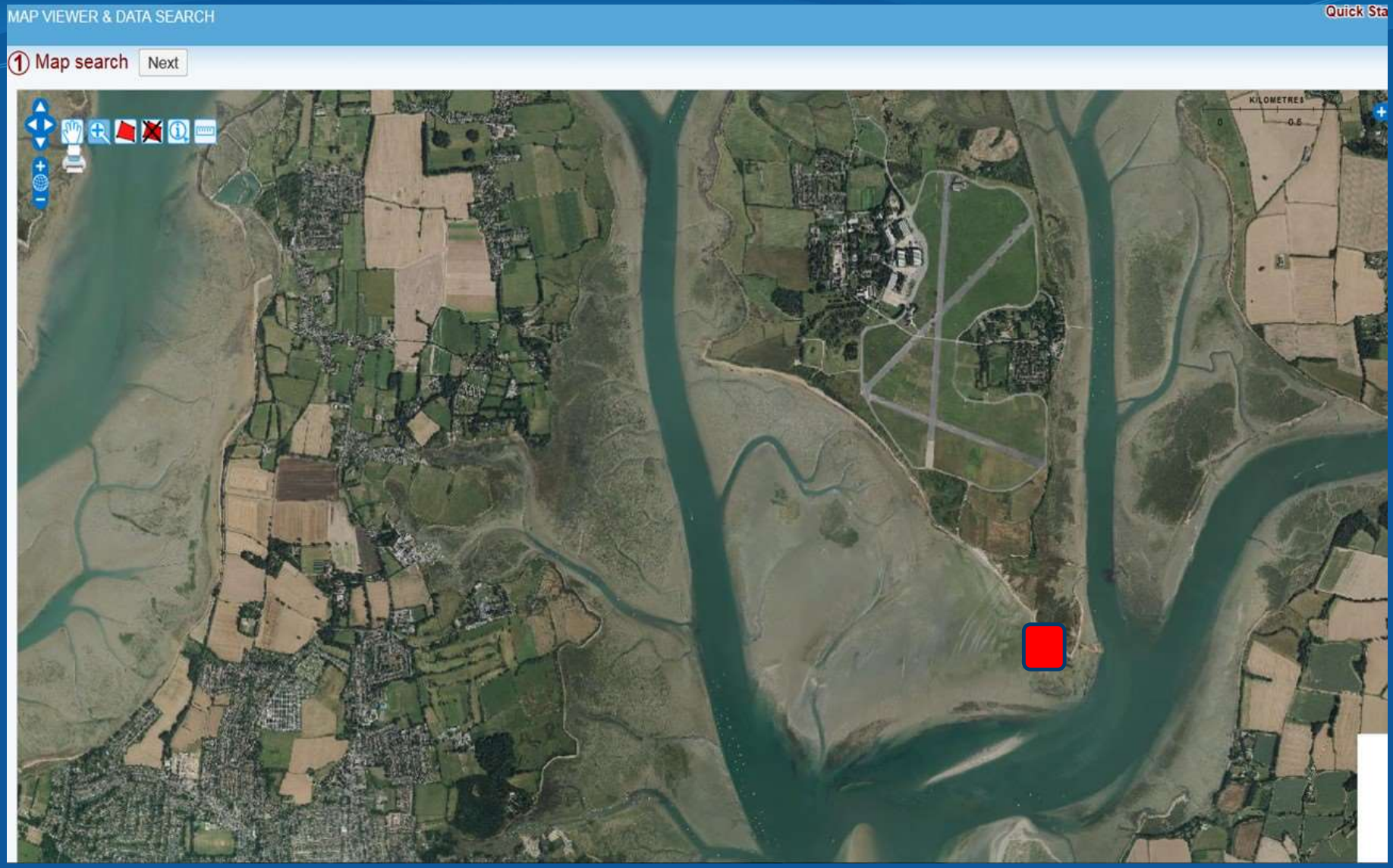


CHP and Coastal Monitoring Programmes

70% of English and Welsh coastline has Order 1a swath bathymetry



5-year survey programmes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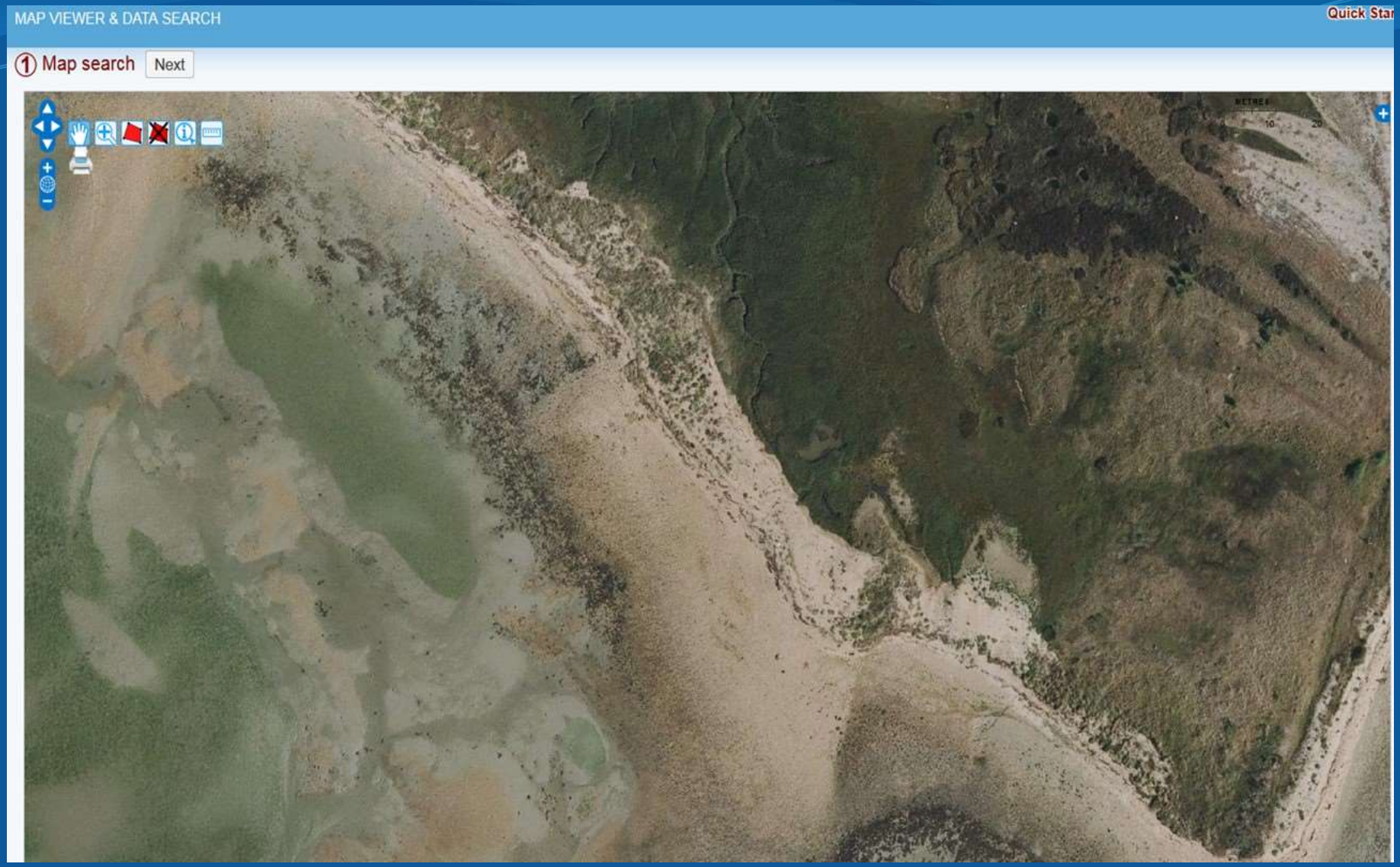
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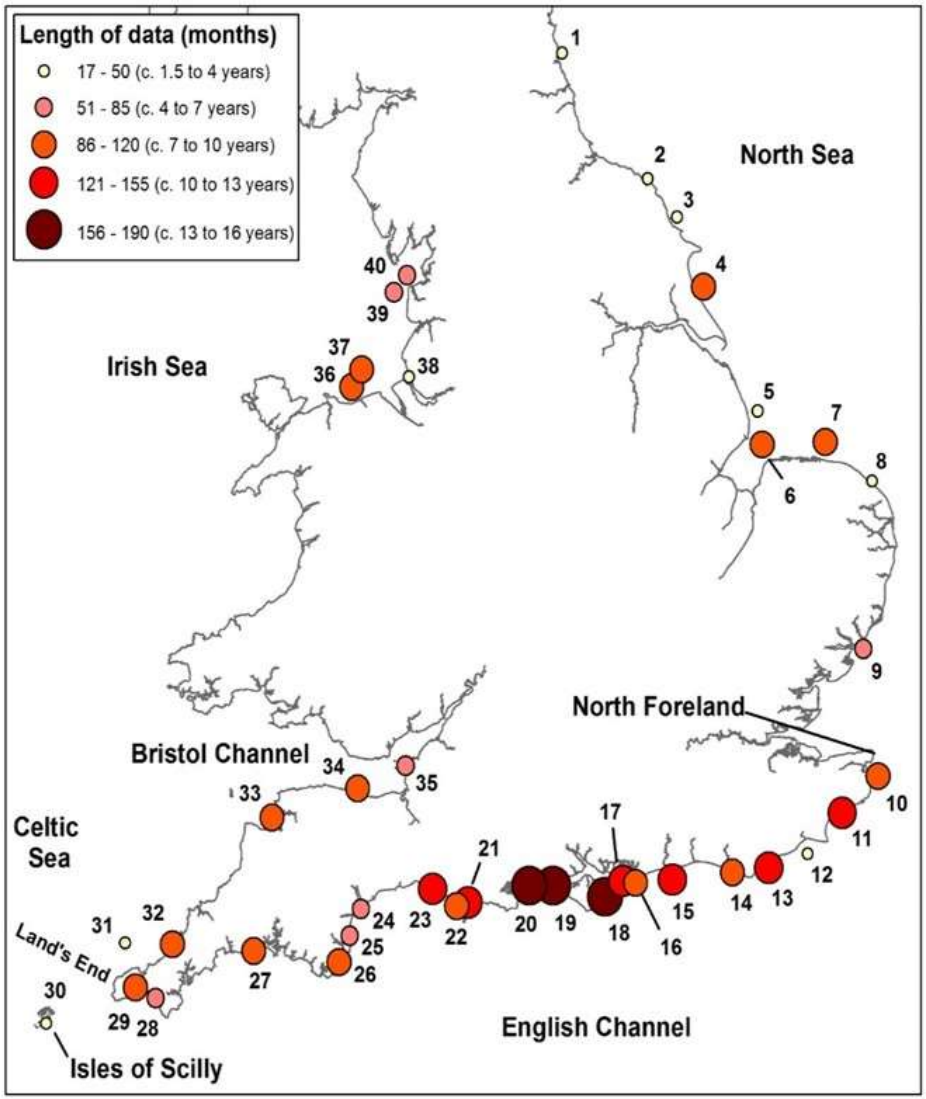
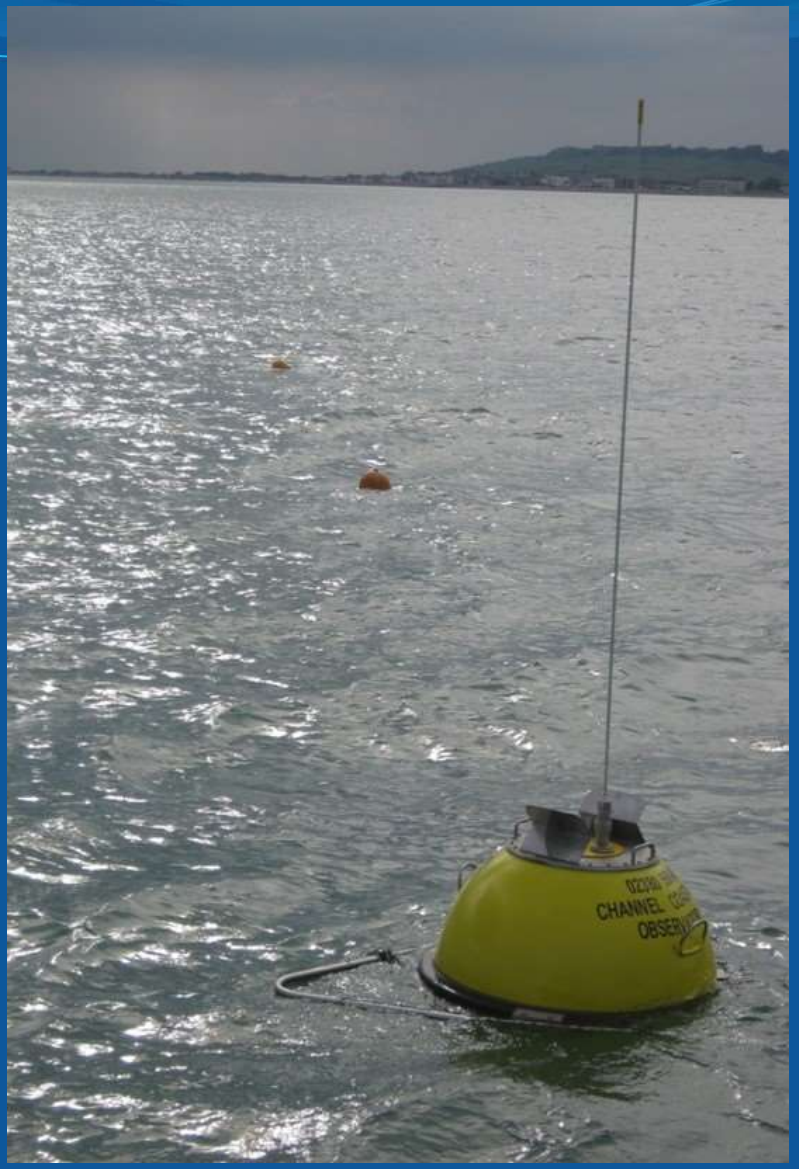


1. Newbiggin
2. Whitby
3. Scarborough
4. Hornsea
5. Chapel Point
6. North Well
7. Blakeney Overfalls
8. Happisburgh
9. Felixstowe
10. Goodwin Sands
11. Folkestone
12. Rye Bay
13. Pevensey Bay
14. Seaford
15. Rustington
16. Bracklesham Bay
17. Hayling Island
18. Sandown Bay
19. Milford
20. Boscombe
21. Weymouth
22. Chesil
23. West Bay
24. Dawlish
25. Tor Bay
26. Start Bay
27. Looe Bay
28. Porthleven
29. Penzance
30. St Mary's Sound
31. Wave Hub
32. Perranporth
33. Bideford Bay
34. Minehead
35. Weston Bay
36. Rhyl Flats
37. Gwynt Y Môr
38. New Brighton
39. Cleveleys
40. Morecambe Bay

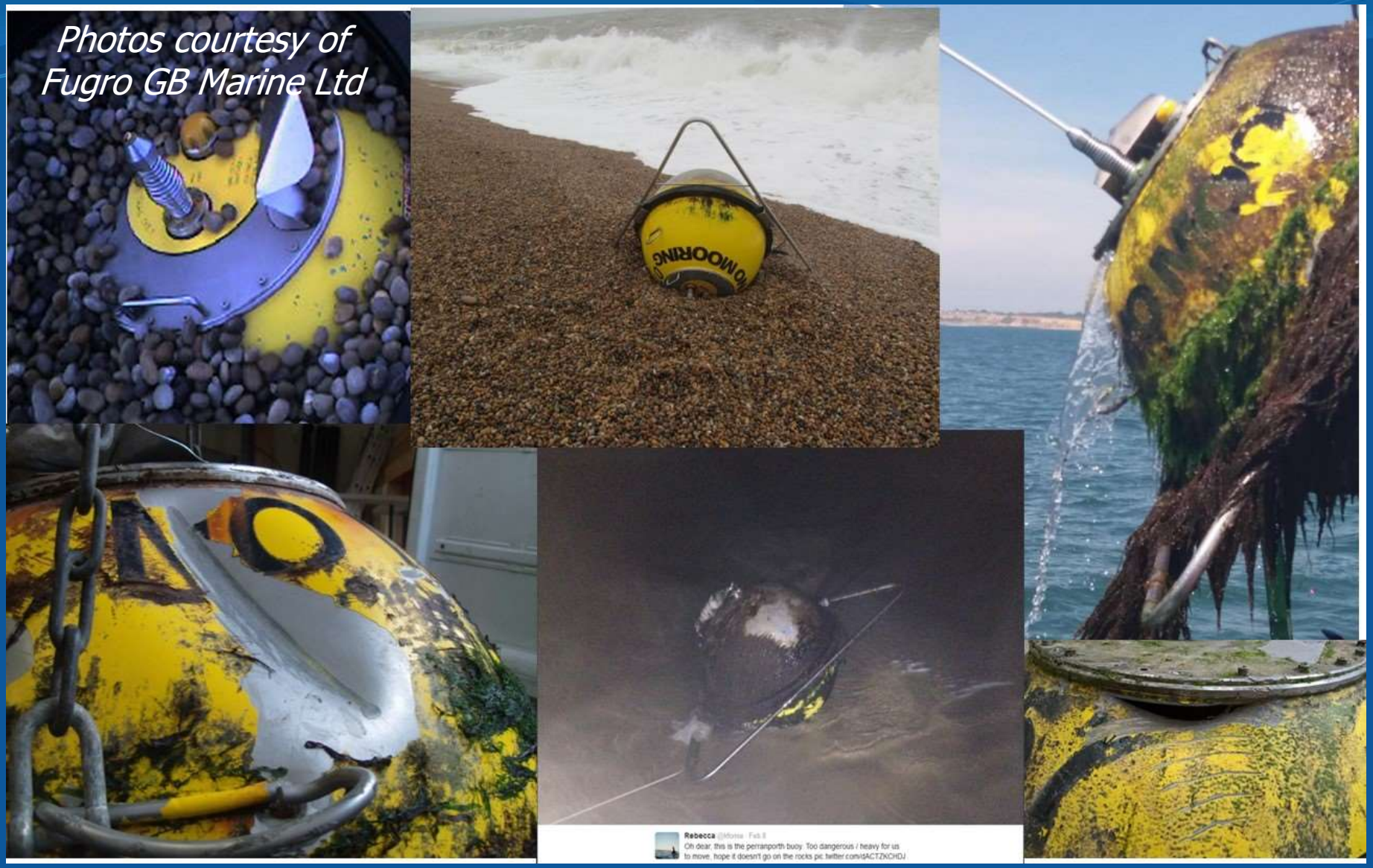
37
Directional
Waveriders

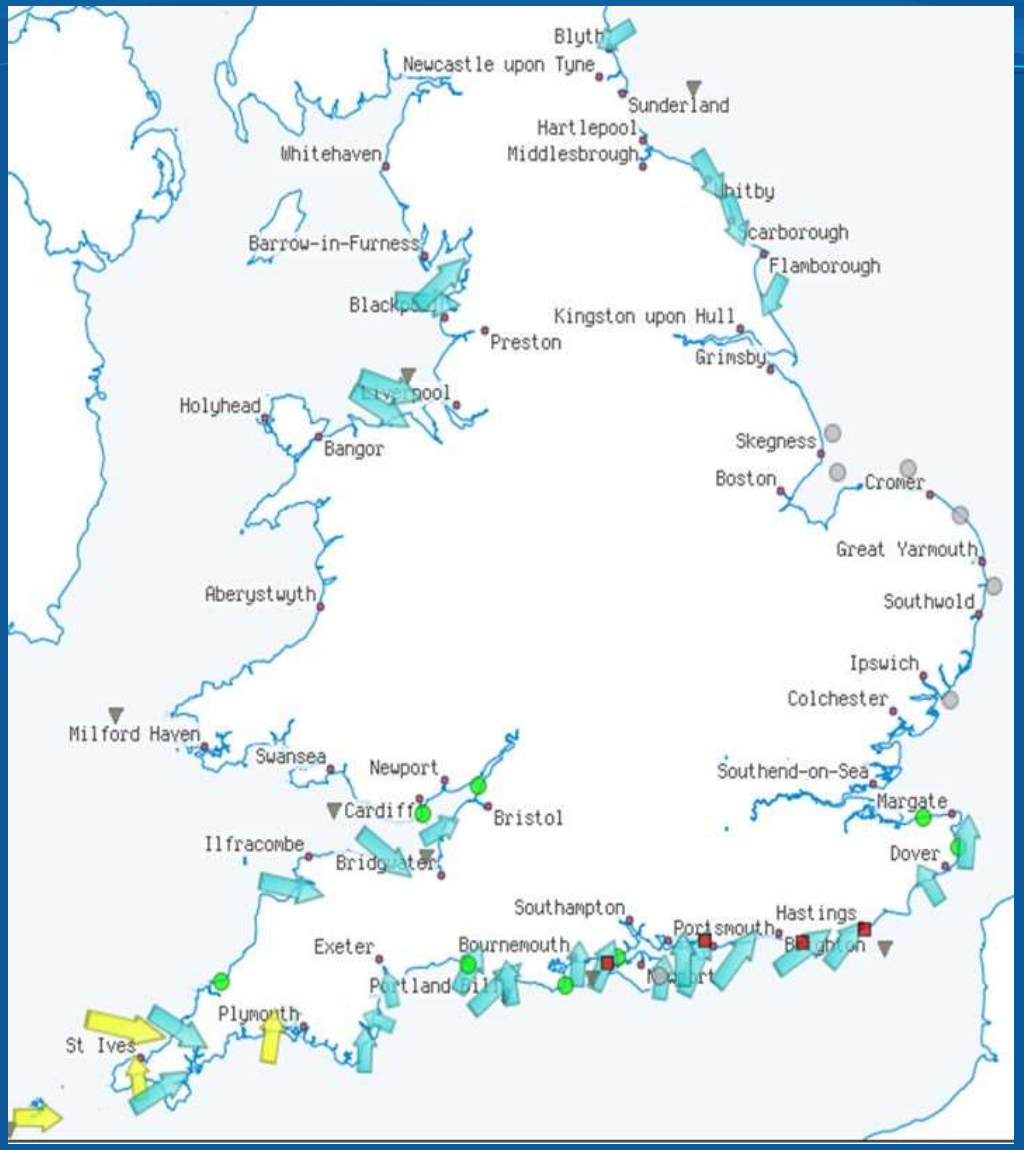
Measured waves

Datawell Directional Waverider buoys



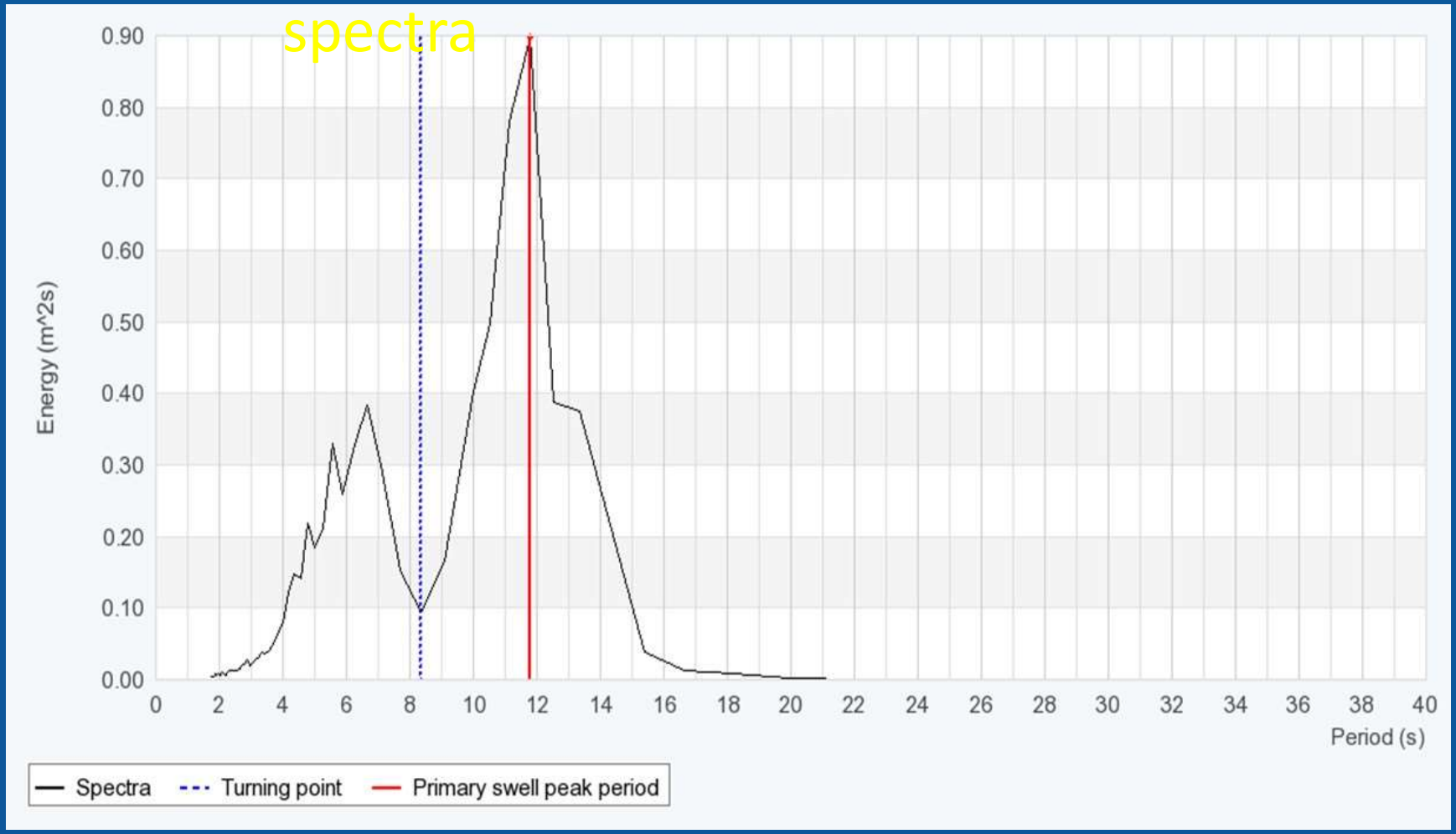
Half-hourly wave parameters in real-time


Photos courtesy of
Fugro GB Marine Ltd
NO MOORING
Rebecca @Morisa · Feb 8
Oh dear, this is the perranporth buoy. Too dangerous / heavy for us
to move. hope it doesn't go on the rocks pic.twitter.com/dACTZKCHDJ

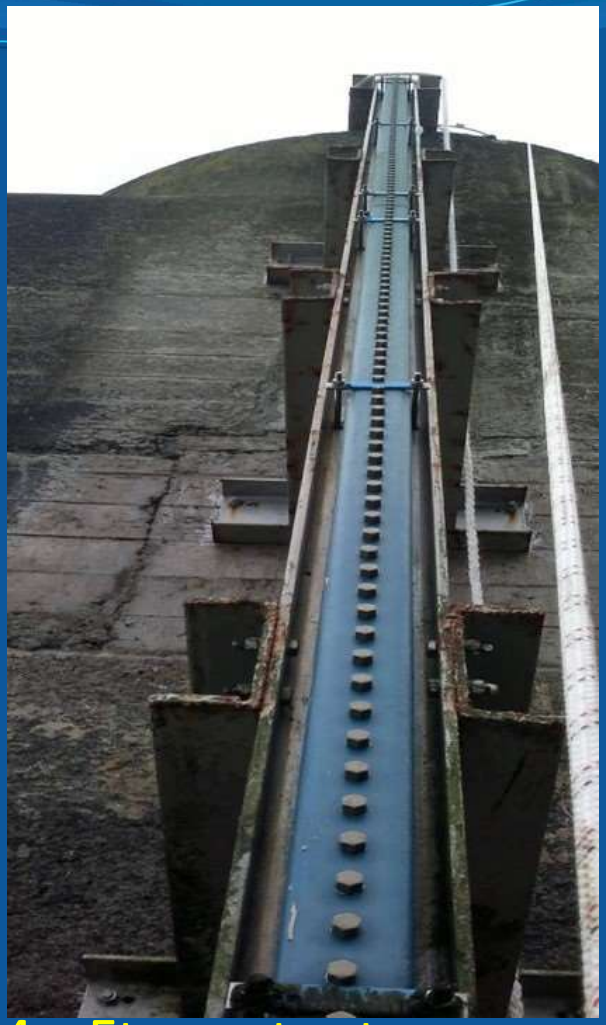


Real-time wave buoy sites

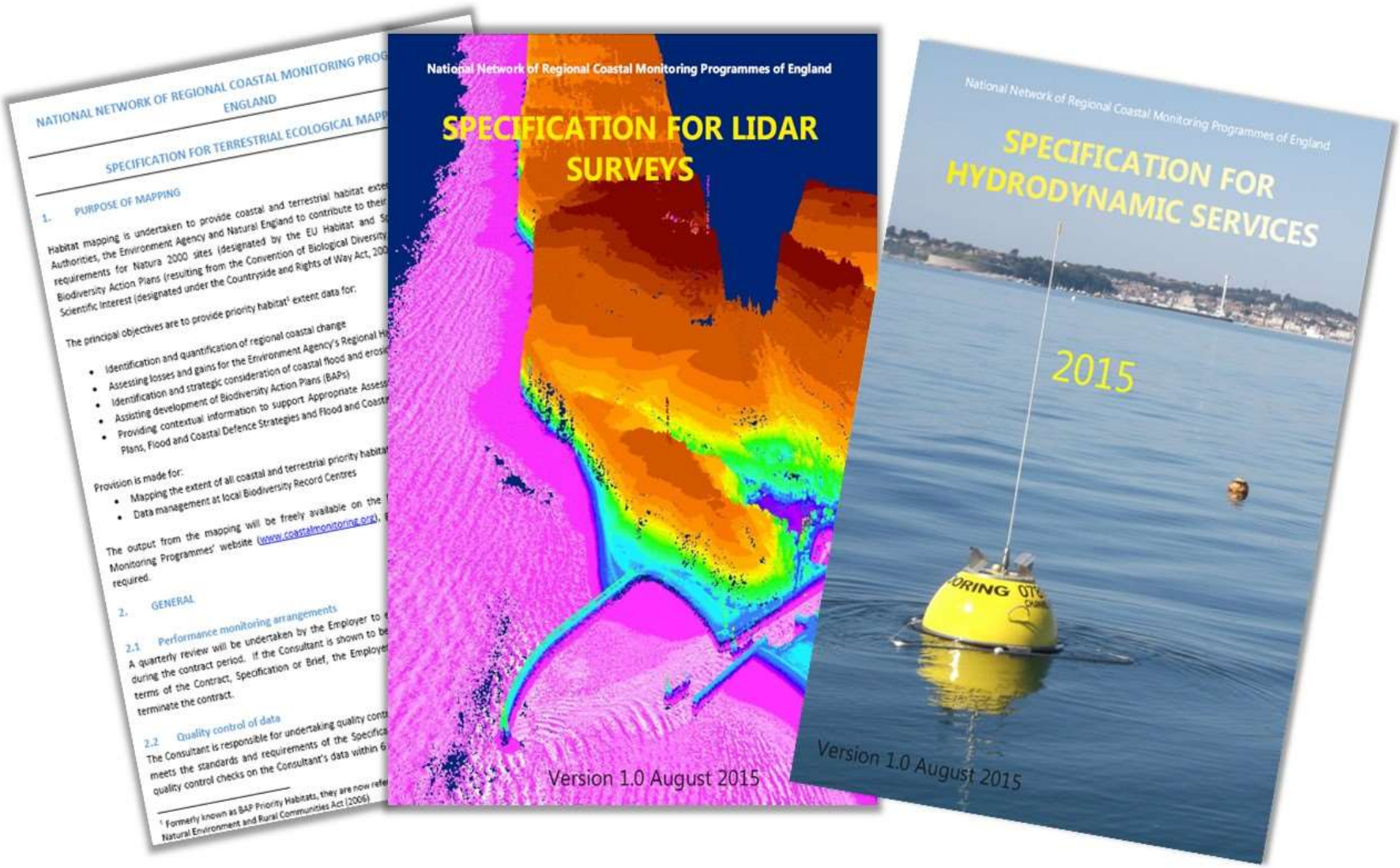
Real-time data includes wave spectra



5 x Rosemount WaveRadar REX

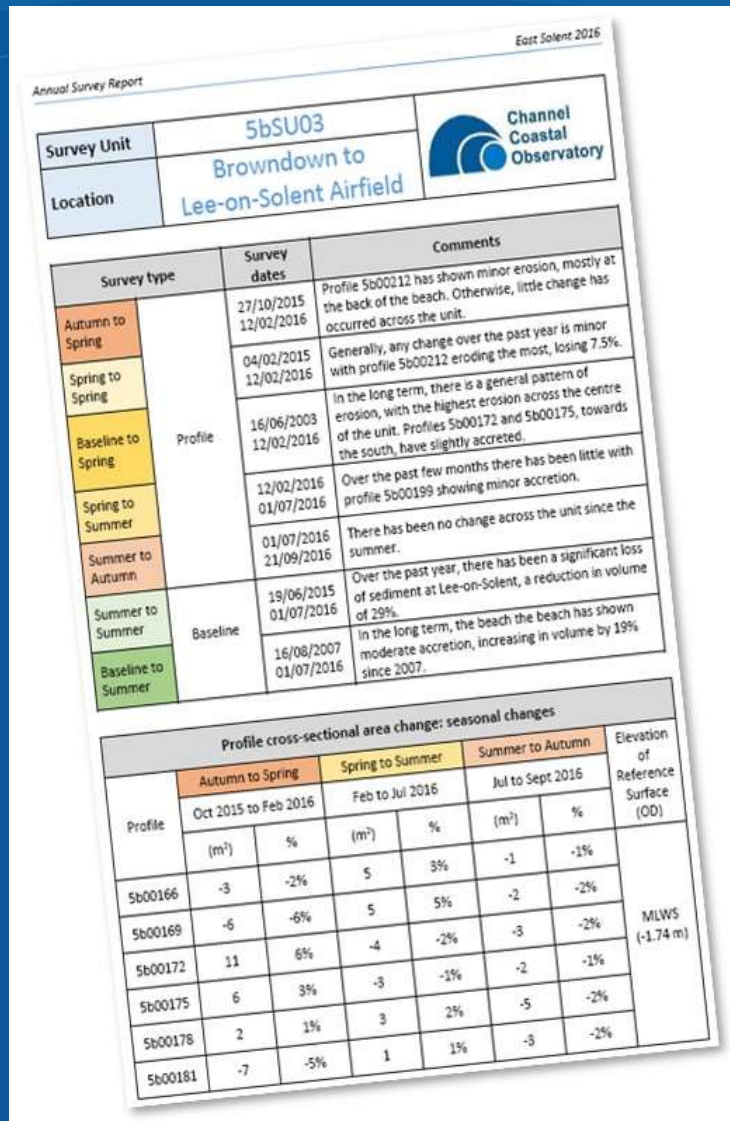


4 x Etrometa step gauge


NATIONAL NETWORK OF REGIONAL COASTAL MONITORING PROG
ENGLAND
SPECIFICATION FOR TERRESTRIAL ECOLOGICAL MAPP
1. PURPOSE OF MAPPING
Habitat mapping is undertaken to provide coastal and terrestrial habitat exte
Authorities, the Environment Agency and Natural England to contribute to their
requirements for Natura 2000 sites (designated by the EU Habitat and S
Biodiversity Action Plans (resulting from the Convention of Biological Diversity
Scientific Interest (designated under the Countryside and Rights of Way Act, 200
The principal objectives are to provide priority habitat[1] extent data for:
Identification and quantification of regional coastal change
Assessing losses and gains for the Environment Agency's Regional H
Identification and strategic consideration of coastal flood and erosi
Assisting development of Biodiversity Action Plans (BAPs)
Providing contextual information to support Appropriate Assess
Plans, Flood and Coastal Defence Strategies and Flood and Coast
Provision is made for:
Mapping the extent of all coastal and terrestrial priority habita
Data management at local Biodiversity Record Centres
The output from the mapping will be freely available on the
Monitoring Programmes' website (www.coastalmonitoring.org),
required.
2. GENERAL
2.1 Performance monitoring arrangements
A quarterly review will be undertaken by the Employer to
during the contract period. If the Consultant is shown to be
terms of the Contract, Specification or Brief, the Employer
terminate the contract.
2.2 Quality control of data
The Consultant is responsible for undertaking quality cont
meets the standards and requirements of the Specifica
quality control checks on the Consultant's data within 6
[1] Formerly known as BAP Priority Habitats, they are now refe
Natural Environment and Rural Communities Act (2006)
National Network of Regional Coastal Monitoring Programmes of England
SPECIFICATION FOR LIDAR SURVEYS
Version 1.0 August 2015
National Network of Regional Coastal Monitoring Programmes of England
SPECIFICATION FOR HYDRODYNAMIC SERVICES
2015
Version 1.0 August 2015


National Network of Regional Coastal Monitoring Programmes of England
Quality Control of Wave Dat
2016
Version 1.0 March 2017
National Network of Regional Coastal Monitoring Programmes of England
Quality Control of Lidar Data
Version 1.0 August 2017
National Network of Regional Coastal Monitoring Programmes of England
Quality Control of Aerial Photography
Version 1.0 August 2017

What do we use the data for?



Survey Unit	5bSU03
Location	Browndown to Lee-on-Solent Airfield

Channel Coastal Observatory

Survey type		Survey dates	Comments
Autumn to Spring	Profile	27/10/2015 12/02/2016	Profile 5b00212 has shown minor erosion, mostly at the back of the beach. Otherwise, little change has occurred across the unit.
Spring to Spring		04/02/2015 12/02/2016	Generally, any change over the past year is minor with profile 5b00212 eroding the most, losing 7.5%.
Baseline to Spring		16/06/2003 12/02/2016	In the long term, there is a general pattern of erosion, with the highest erosion across the centre of the unit. Profiles 5b00172 and 5b00175, towards the south, have slightly accreted.
Spring to Summer		12/02/2016 01/07/2016	Over the past few months there has been little with profile 5b00199 showing minor accretion.
Summer to Autumn		01/07/2016 21/09/2016	There has been no change across the unit since the summer.
Summer to Summer	Baseline	19/06/2015 01/07/2016	Over the past year, there has been a significant loss of sediment at Lee-on-Solent, a reduction in volume of 29%.
Baseline to Summer		16/08/2007 01/07/2016	In the long term, the beach the beach has shown moderate accretion, increasing in volume by 19% since 2007.

Profile cross-sectional area change: seasonal changes

Profile	Autumn to Spring		Spring to Summer		Summer to Autumn		Elevation of Reference Surface (OD)
	Oct 2015 to Feb 2016		Feb to Jul 2016		Jul to Sept 2016		
	(m^3)	%	(m^3)	%	(m^3)	%	
5b00166	-3	-2%	5	3%	-1	-1%	MLWS (-1.74 m)
5b00169	-6	-6%	5	5%	-2	-2%	
5b00172	11	6%	-4	-2%	-3	-2%	
5b00175	6	3%	-3	-1%	-2	-1%	
5b00178	2	1%	3	2%	-5	-2%	
5b00181	-7	-5%	1	1%	-3	-2%	

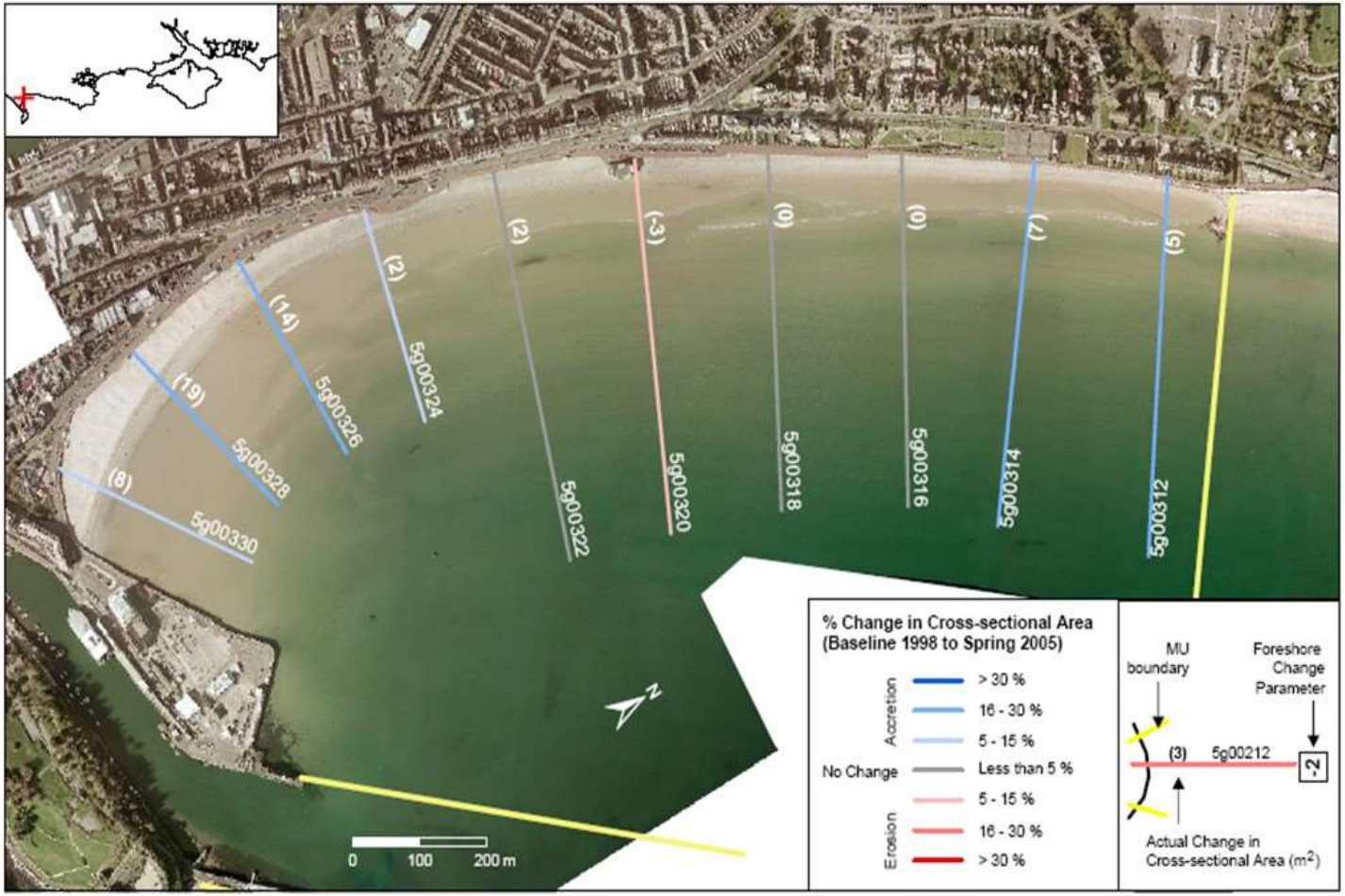
Survey Unit	5cSU05
Location	Cliff House to Woolston Sewage Works

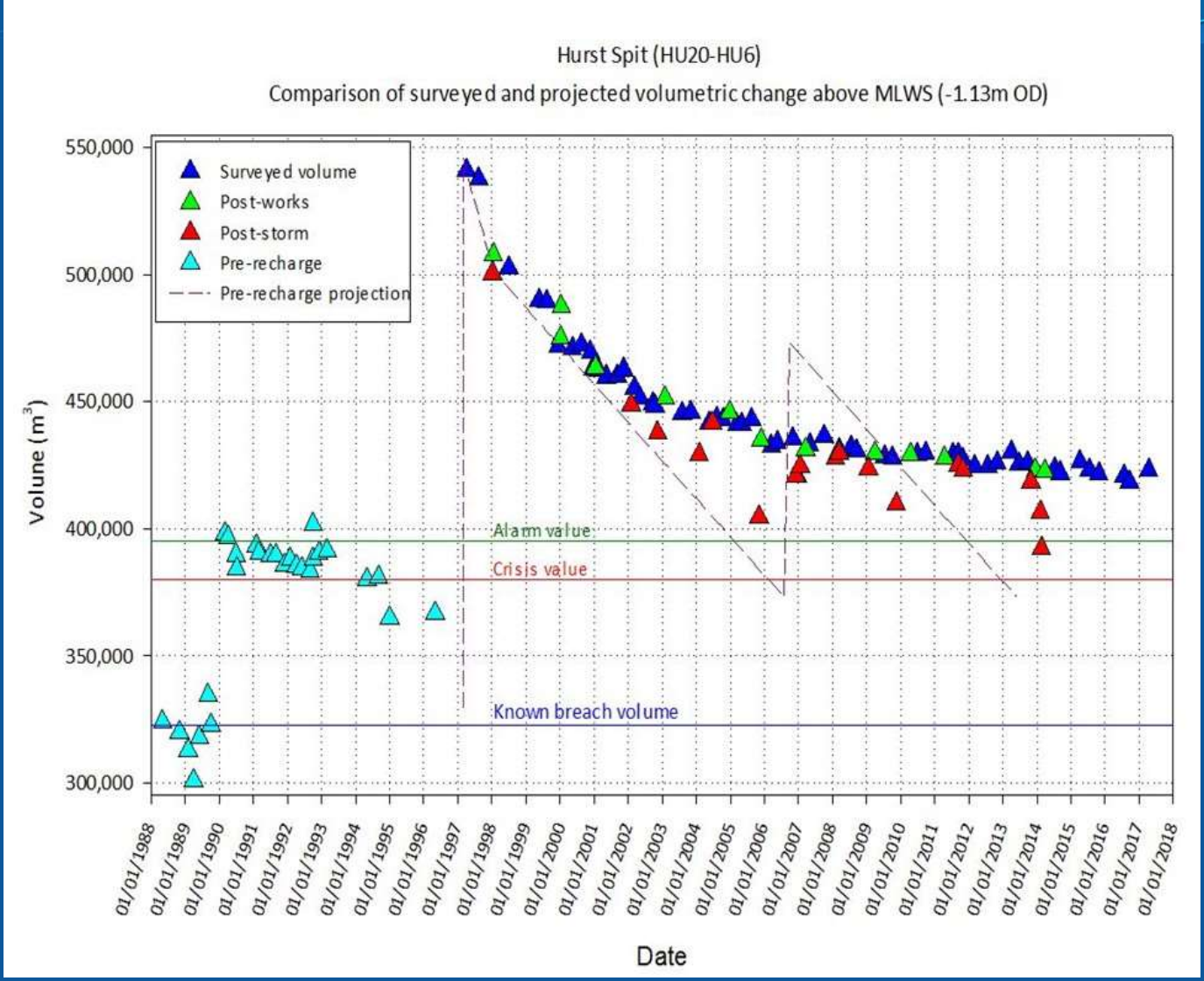
Channel Coastal Observatory

Survey type		Survey dates	Comments
Spring to Spring	Profile	21/05/2015 09/05/2016	This unit has remained stable over the past year with slight erosion observed along profile 5c00076.
Baseline to Spring		29/04/2005 09/05/2016	In the longer term, the unit has remained stable with the exception of profile 5c00152 which has significantly accreted across the whole length of the profile.

Profile cross-sectional area change: annual and longer-term changes

Profile	Spring to Spring		Baseline to Spring		Elevation of Reference Surface (OD)
	May 2015 to May 2016		Feb 2003/Apr 2005 to May 2016		
	(m^3)	%	(m^3)	%	
5c00065	-1	-2%	-2	-3%	MLWS (-2.24 m)
5c00076	-1	-5%	0	1%	
5c00089	2	2%	0	0%	
5c00100	0	0%	1	2%	
5c00107	-1	-1%	-1	-1%	
5c00119	-6	-2%	-3	-1%	
5c00132	0	0%	3	4%	
5c00145	-1	-2%	-2	-4%	
5c00152	-2	-2%	26	31%	


(14)
(2)
(2)
(-3)
(0)
(0)
(7)
(5)
(19)
(8)
5g00324
5g00326
5g00328
5g00330
5g00322
5g00320
5g00318
5g00316
5g00314
5g00312
N
0
100
200 m
% Change in Cross-sectional Area
(Baseline 1998 to Spring 2005)
Accretion
> 30 %
16 - 30 %
5 - 15 %
No Change
Less than 5 %
Erosion
5 - 15 %
16 - 30 %
> 30 %
MU boundary
Foreshore Change Parameter
(3)
5g00212
-2
Actual Change in Cross-sectional Area (m²)


Hurst Spit (HU20-HU6)
Comparison of surveyed and projected volumetric change above MLWS (-1.13m OD)
Surveyed volume
Post-works
Post-storm
Pre-recharge
Pre-recharge projection
Alarm value
Crisis value
Known breach volume
Volume (m³)
550,000
500,000
450,000
400,000
350,000
300,000
01/01/1988
01/01/1989
01/01/1990
01/01/1991
01/01/1992
01/01/1993
01/01/1994
01/01/1995
01/01/1996
01/01/1997
01/01/1998
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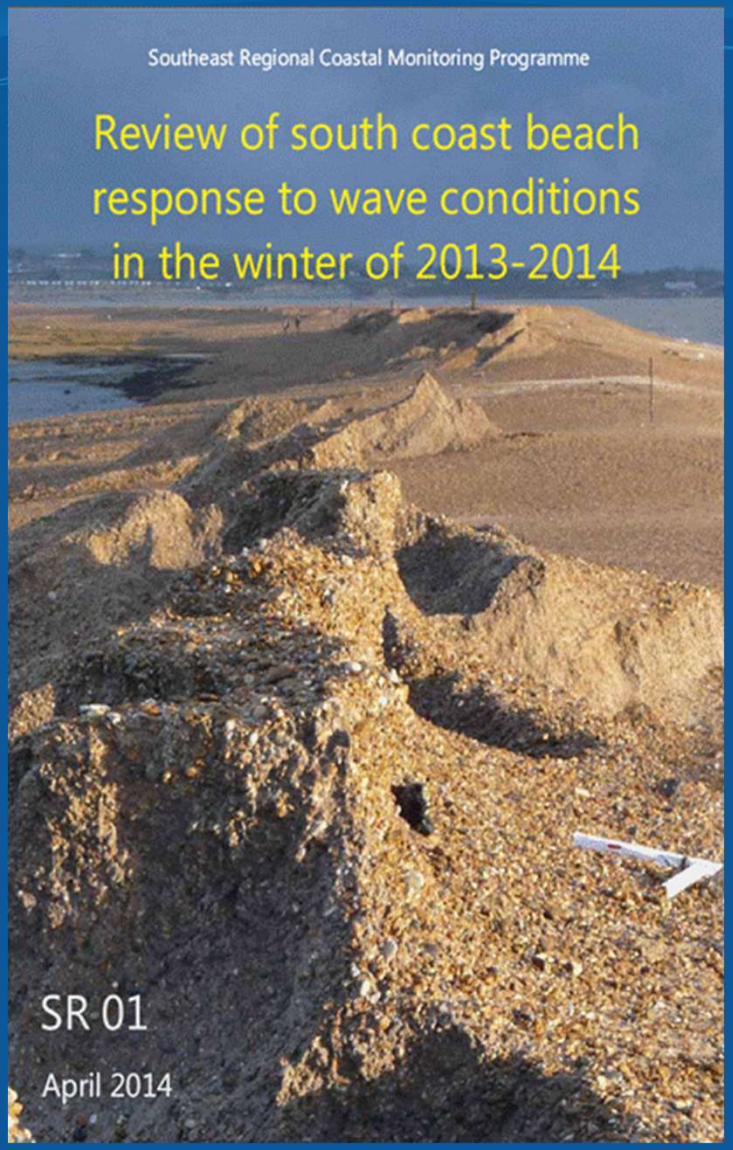
01/01/2003
01/01/2004
01/01/2005
01/01/2006
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
01/01/2012
01/01/2013
01/01/2014
01/01/2015
01/01/2016
01/01/2017
01/01/2018
Date

Storm season October 2013 to February 2014



- ***Erosion rates greater than 25 times the annual average observed at numerous sites***

- ***Large scale erosion found at all the sites analysed, except one. Average beach volume losses of 25,000 m^3 per km of coastline length were typical****

- ***More than 470,000 m^3 losses in total observed across just 25 km of frontage***

*At beaches where there was enough material to permit this level of erosion

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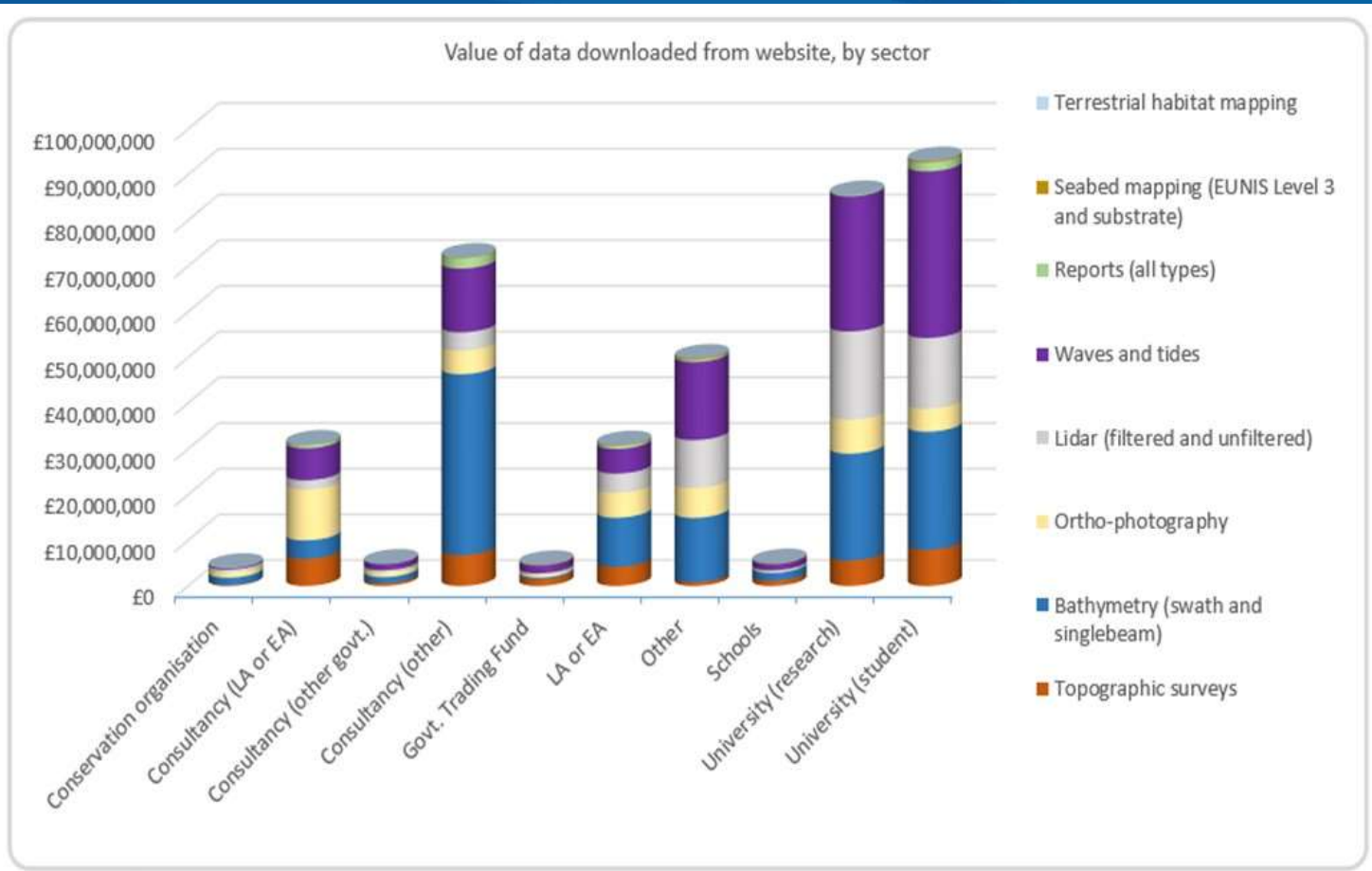
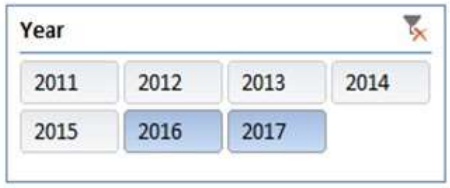
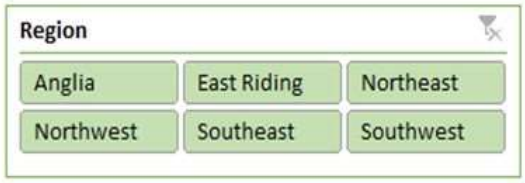
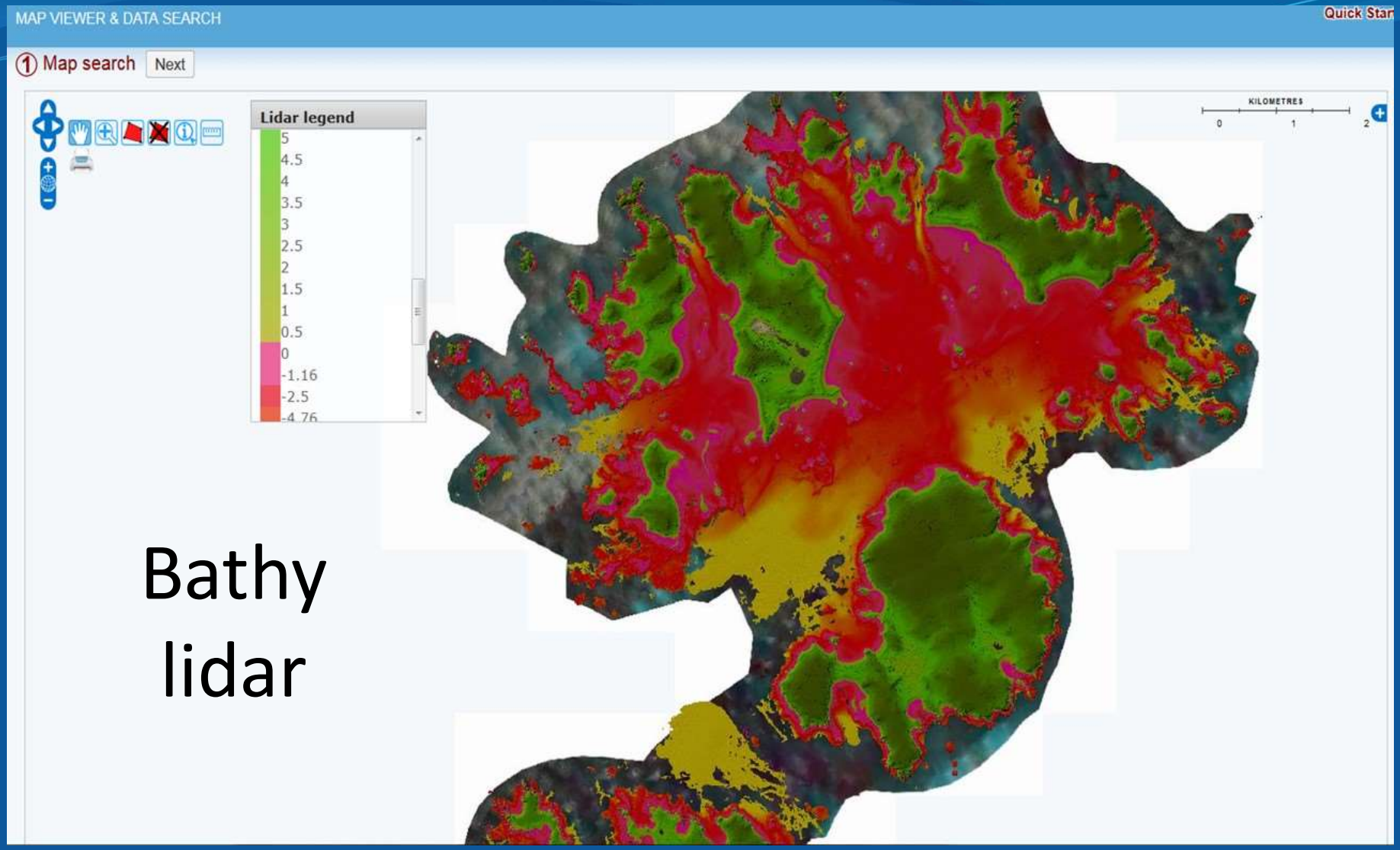

Value of data downloaded from website, by sector
£100,000,000
£90,000,000
£80,000,000
£70,000,000
£60,000,000
£50,000,000
£40,000,000
£30,000,000
£20,000,000
£10,000,000
£0
Conservation organisation
Consultancy (LA or EA)
Consultancy (other govt.)
Consultancy (other)
Govt. Trading Fund
LA or EA
Other
Schools
University (research)
University (student)
Terrestrial habitat mapping
Seabed mapping (EUNIS Level 3 and substrate)
Reports (all types)
Waves and tides
Lidar (filtered and unfiltered)
Ortho-photography
Bathymetry (swath and singlebeam)
Topographic surveys


Year
2011
2012
2013
2014
2015
2016
2017


Region
Anglia
East Riding
Northeast
Northwest
Southeast
Southwest


MAP VIEWER & DATA SEARCH
Quick Star
① Map search
Next
Lidar legend
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-1.16
-2.5
-4.76
KILOMETRES
0
1
2

Bathy lidar


4D Ocean's
ASV Harry

View from the beach

The same view from the UAV collected data

Combined with AUV data to provide a seamless nearshore DTM

How to make coastal monitoring data work for operational beach management in the short- and long-term

Channel Coastal Observatory

COASTAL FLOOD PROTECTION

Low lying, far below average sea level.

Larger urbanized dike rings.

Therefore high safety standards (up to 1 in 10000 storms).

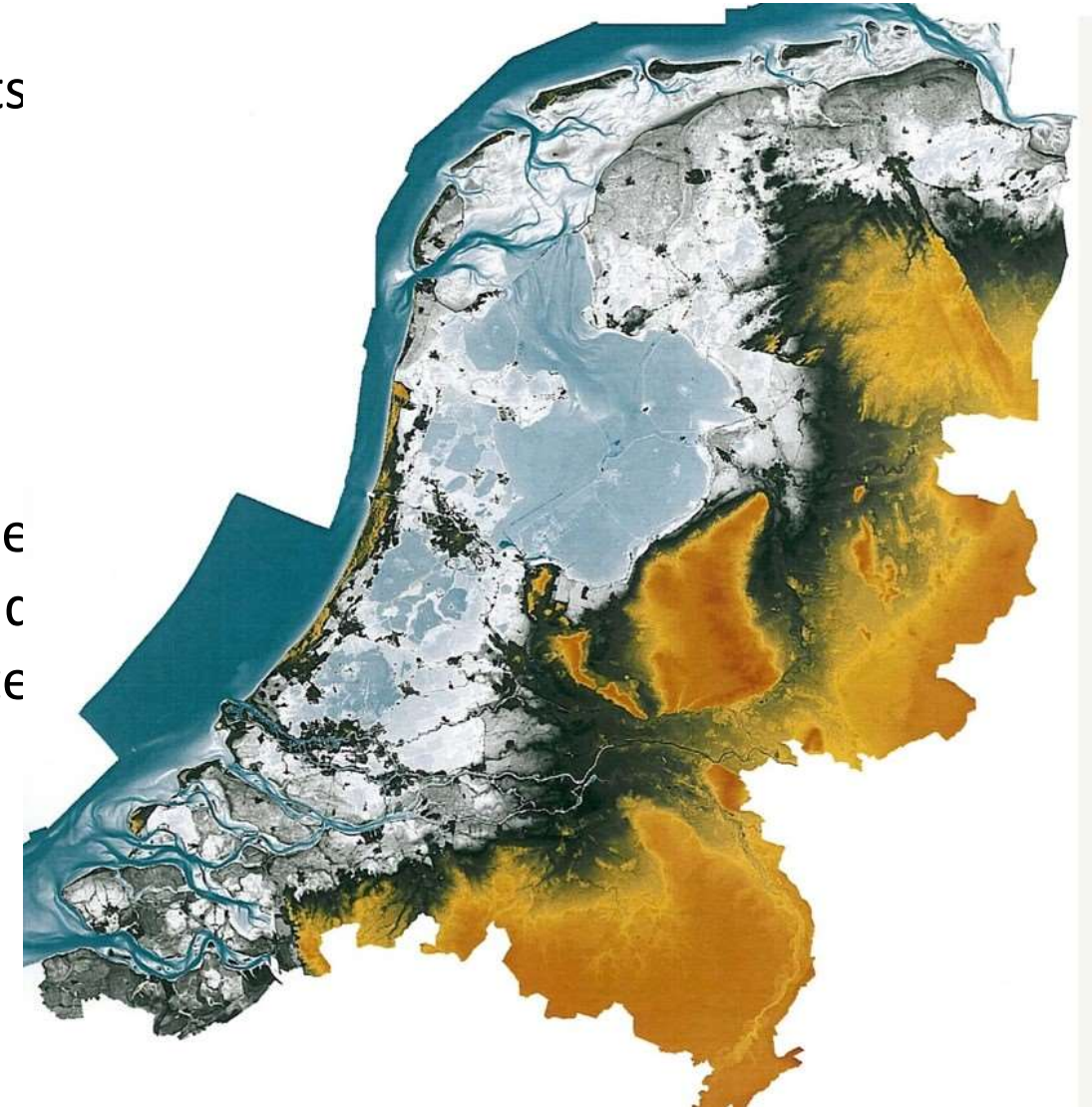
The coast is property of the state.

COASTAL FLOOD PROTECTION

State is responsible for upgrading and nourishments

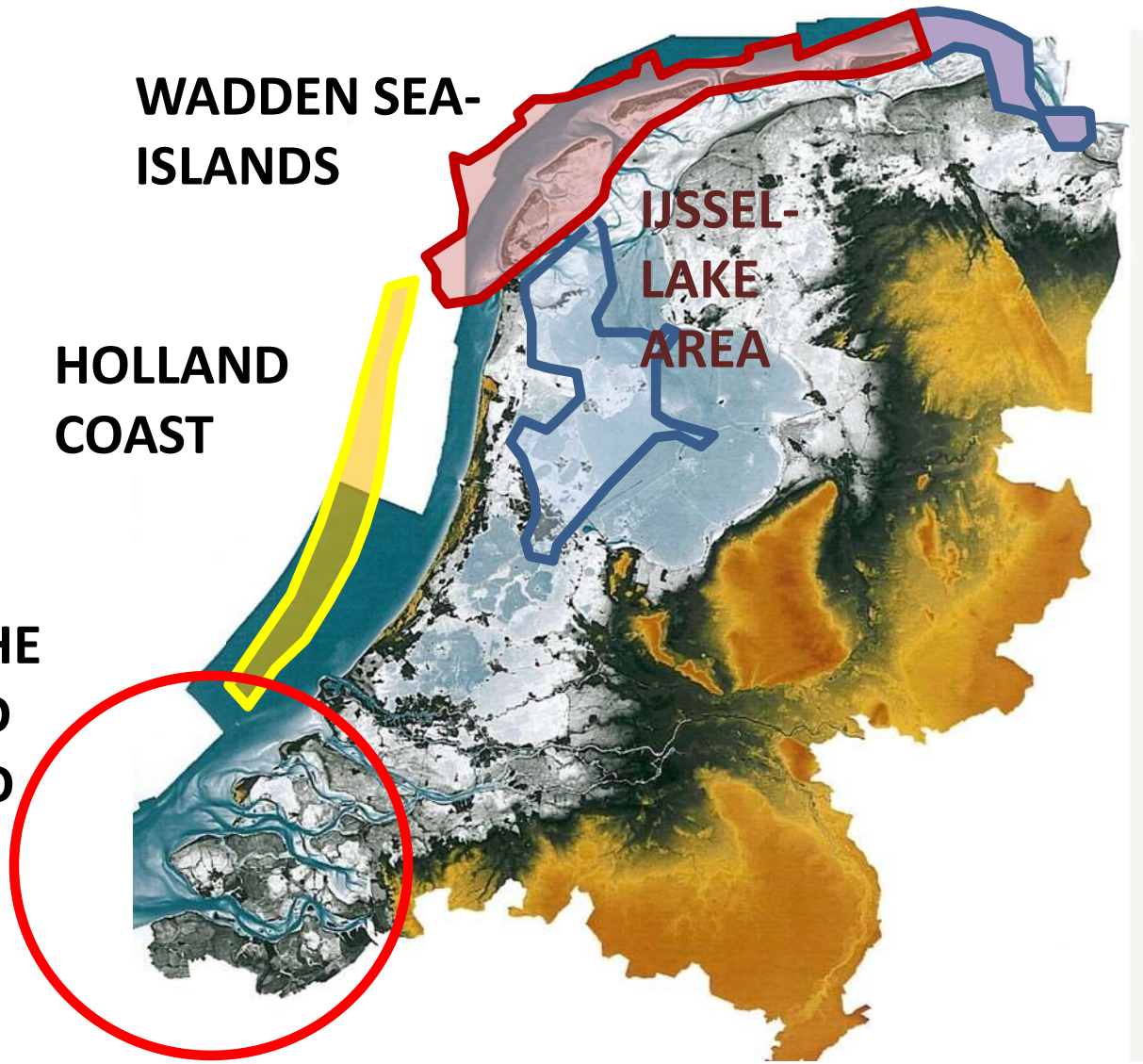
State is not responsible for maintaining recreational beaches.

Waterboards are responsible for maintenance of dikes and the management of the outer dunes.



REGIONAL ARENA'S

Sea level rise and ecological restoration are major challenges



ZEEUWSCHE DELTA/RIJNMOND

RETHINKING THE DELTA WORKS,REINTRODUCING THE SEA, FLOOD-ENERGY NEXUS

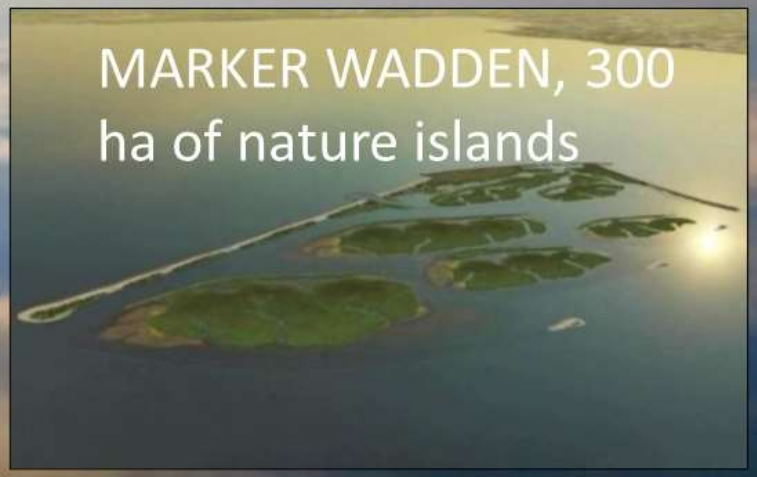
HARINGVLIET, restoring tidal areas

DUTCH COAST

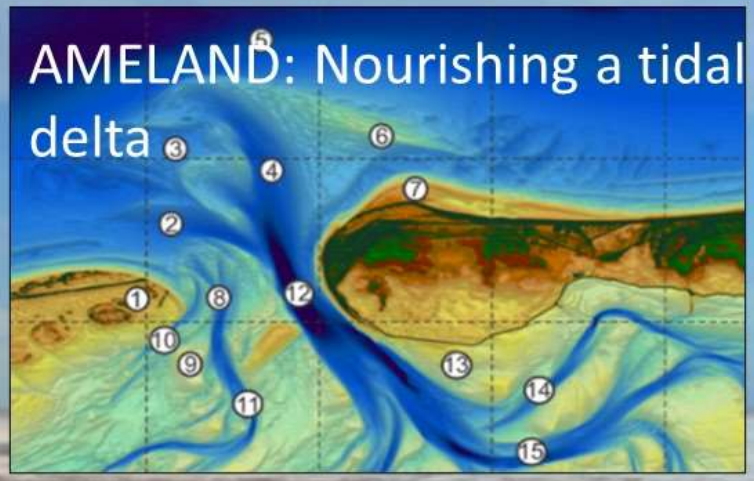
OPTIMIZING NOURISHMENT REGIMES AND NATURAL DUNE FORMATION

LAKE IJSSEL AREA

COMBINING SOFT DEFENCES, ECOSYSTEM RESTORATION AND MINERAL MANAGEMENT

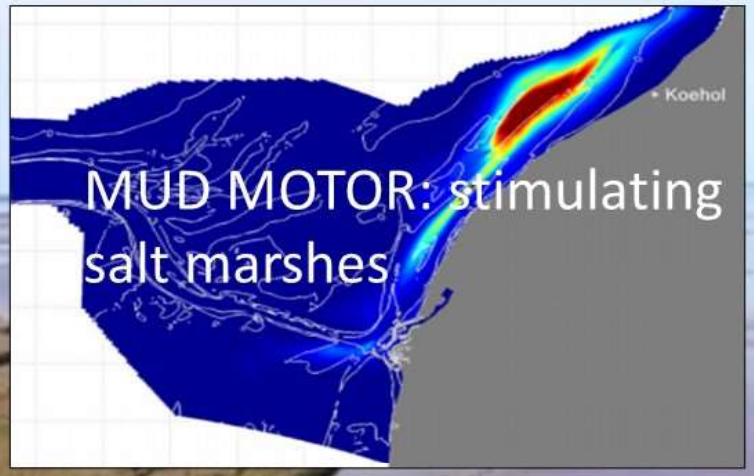


WADDEN SEA



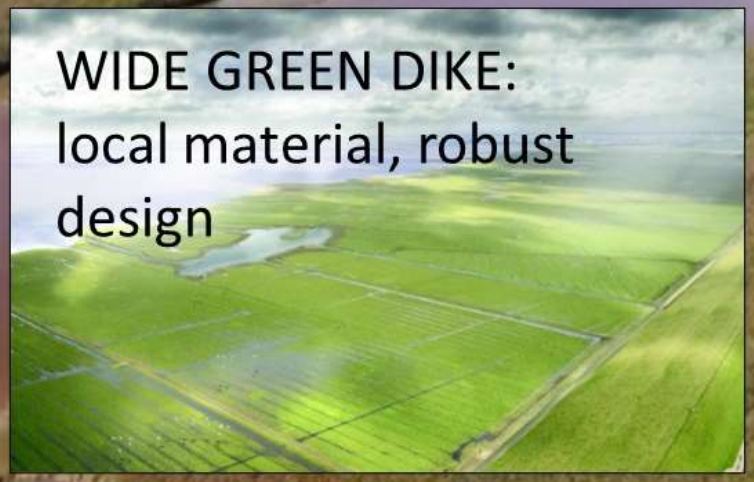
BUILDING SALT MARSHES AND LONGER TERM PERSPECTIVES

EEMS-DOLLARD



MUD MOTOR: stimulating salt marshes

MANAGING MUD AND BUILDING WITH MUD



WIDE GREEN DIKE: local material, robust design

CLAY FACTORY: mud to building clay

NEW SAFETY STANDARDS (WBI 2017)

Based on dike failure and risks
Safety aligned with environmental safety standards
New instruments and hydraulic conditions

RISKS REDUCTION FACTOR 20

DEATH REDUCTION FACTOR 17

DEATHS 2017

DEATHS 2050

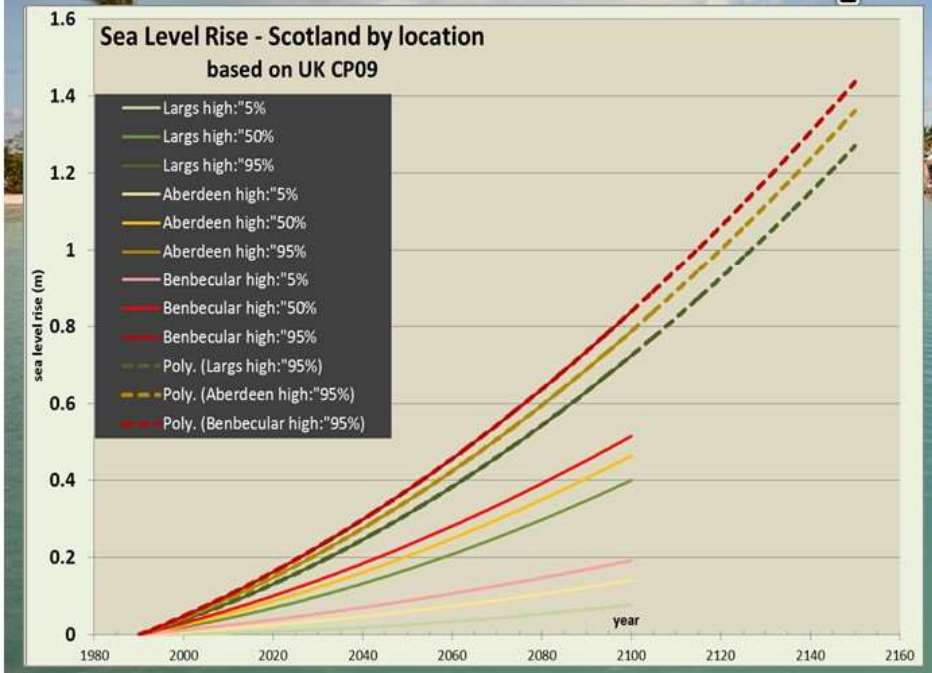
Royal HaskoningDHV
Enhancing Society Together

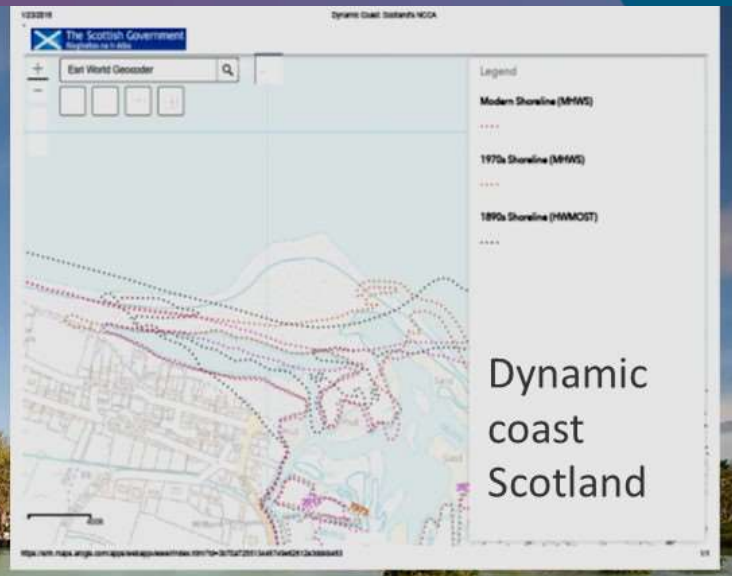
Changing Policy on a Changing Coast

It is the customary fate of new truths to begin as heresies and end as superstitions

Gregor Guthrie
5th. February 2018

In a galaxy far far away





Dynamic coast Scotland

Far far closer to home

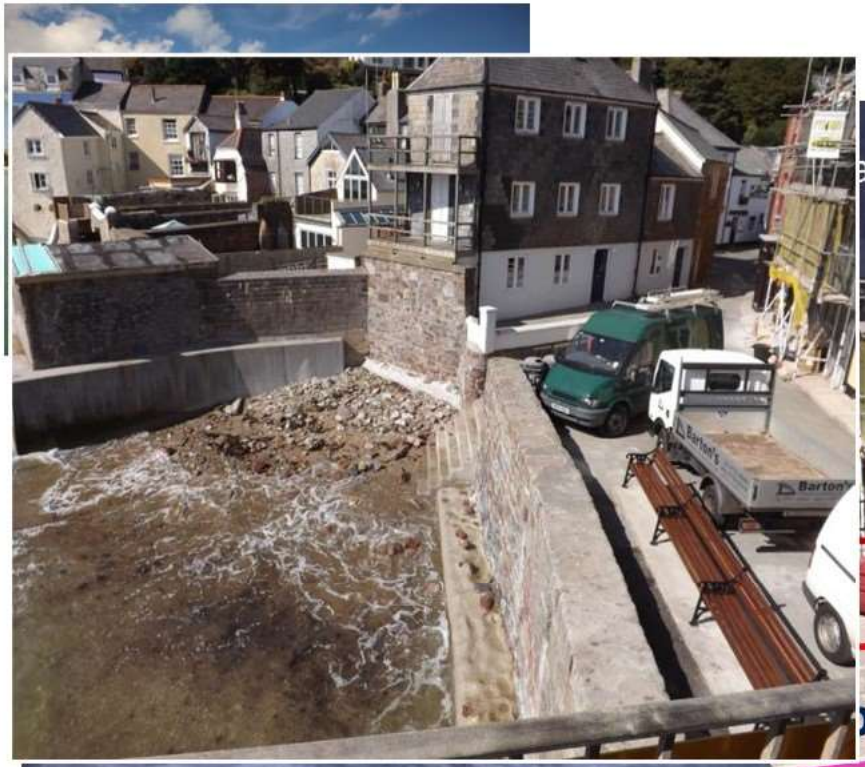
Coastal Change happens

Climate change is happening

But in different ways

Requiring different ways of thinking

What does this look



"adaptation cannot be solved through a single action, but is rather a process to be managed over time."

Same problem,
Different scales
Different solutions.

Coastal change and interactions

Liniclate and Gualan Islan

Dinas
Dinlle

Requiring different ways of thinking

At war with the sea?

Local decisions pre - 1900

Coast Protection Act 1949 – taking time by the forelock

- Focus on defences
- Partnership funding

Coastal Zone Protection and Planning 1992

- inextricably linked

Risk management

Focused on the past

Hard policy

Fundamental changes and new challenges

That works should form part of a properly co-ordinated scheme for the frontage as a whole. The sea coast is an amenity…for its health and recreation.
Duvivier 1947

Coastal management

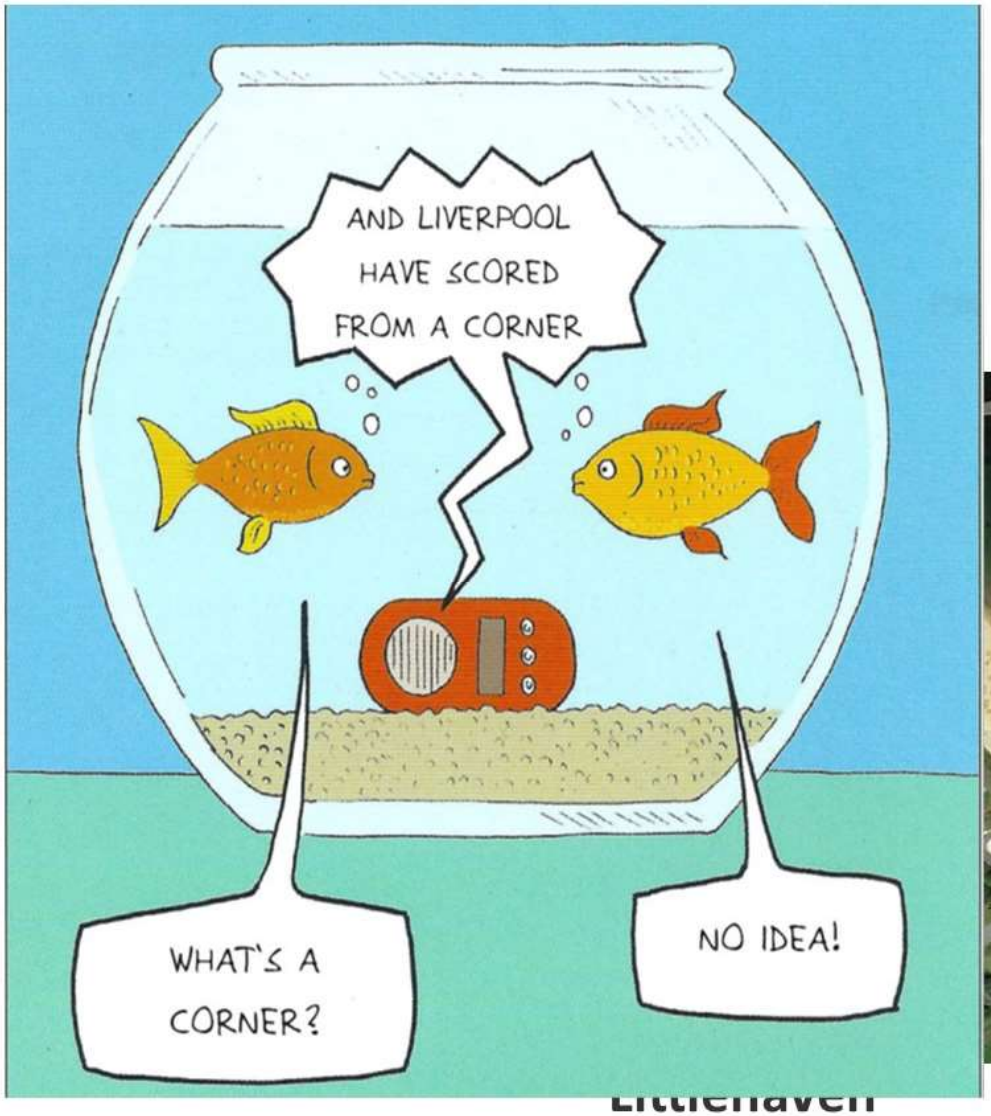
Shoreline management

Really looking forward

"adaptation cannot be solved through a single action, but is rather a process to be managed over time."

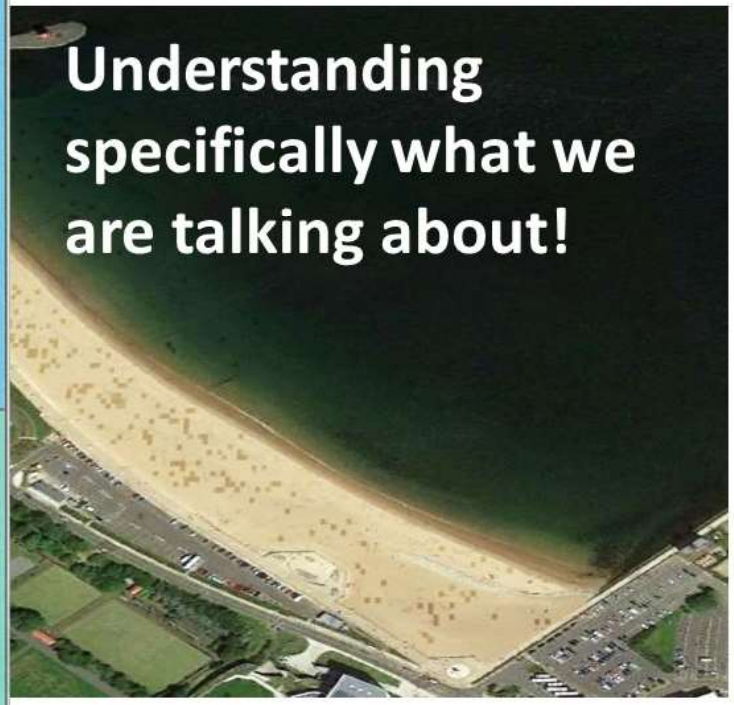
Understanding where we are going,

A starting point for change!



Fundamental changes and new challenges

Managed Realignment?



Littlehaven

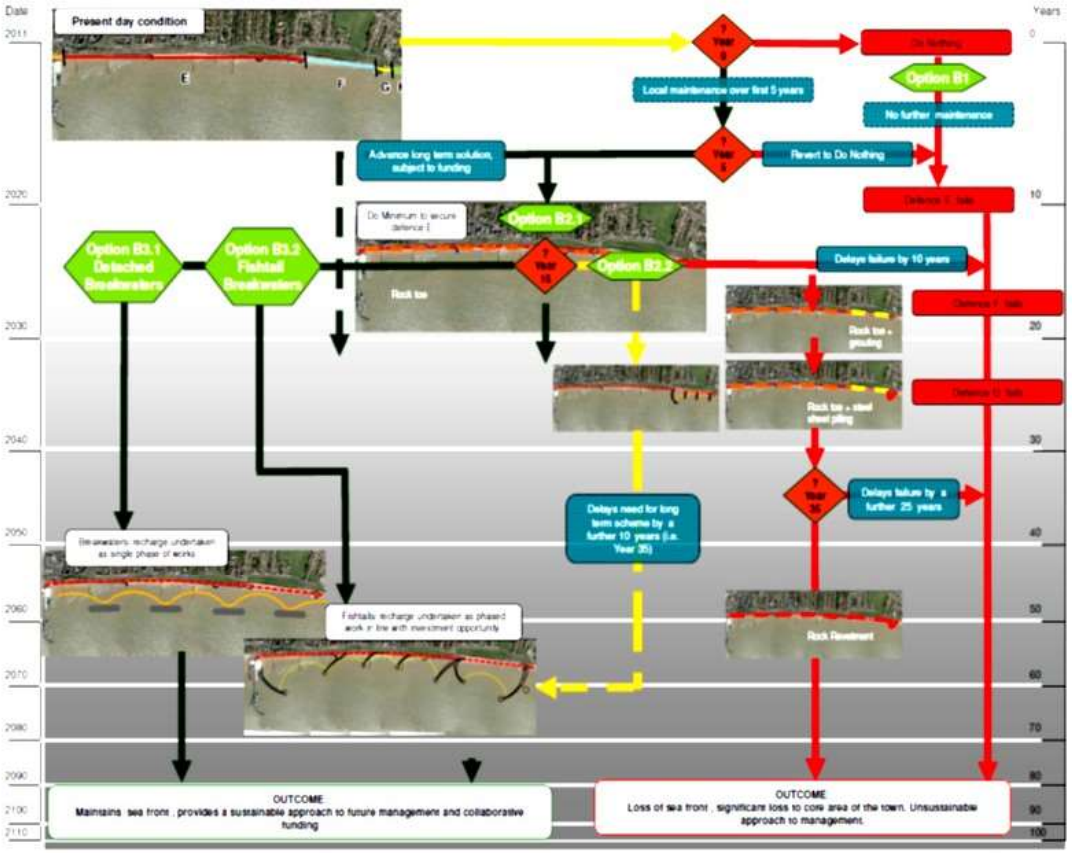


Figure 6-12: Zone B Decision Pathway

103

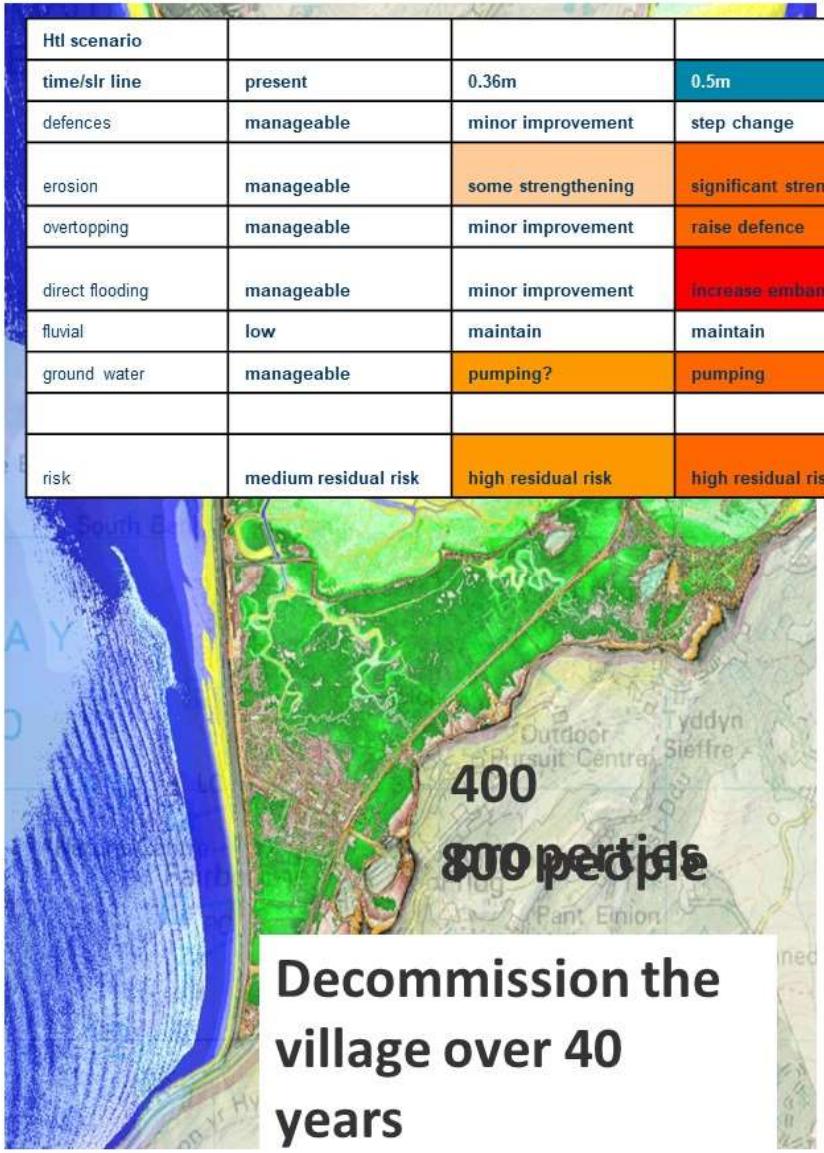
Adaptation pathways, looking for possibilities

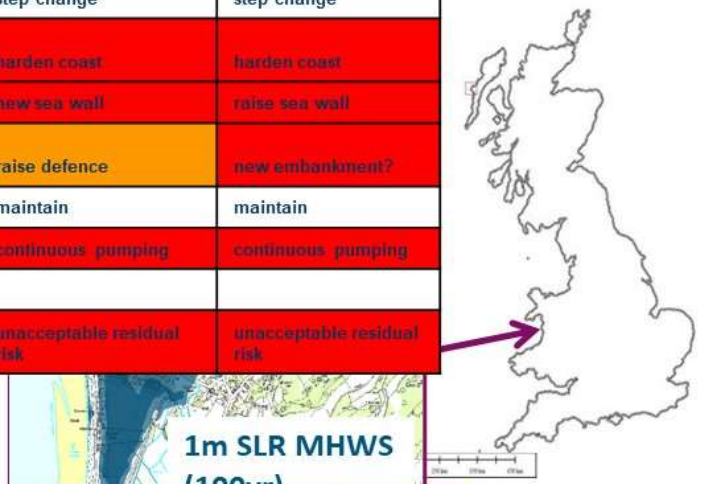
"adaptation cannot be solved through a single action, but is rather a process to be managed over time."

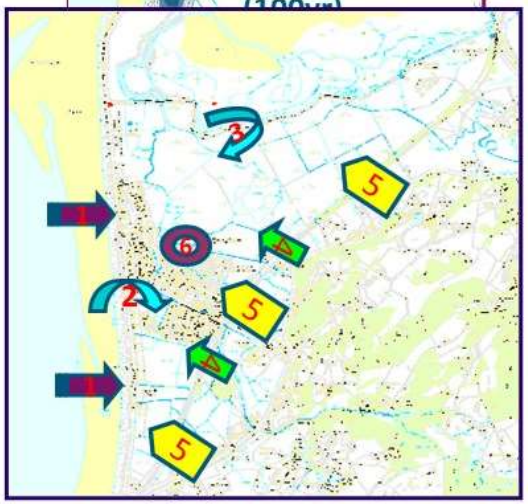
"Clacton has the capacity to reinvent itself as a truly 21st Century Resort offering a high quality all round visitor experience,

Fundamental changes and new

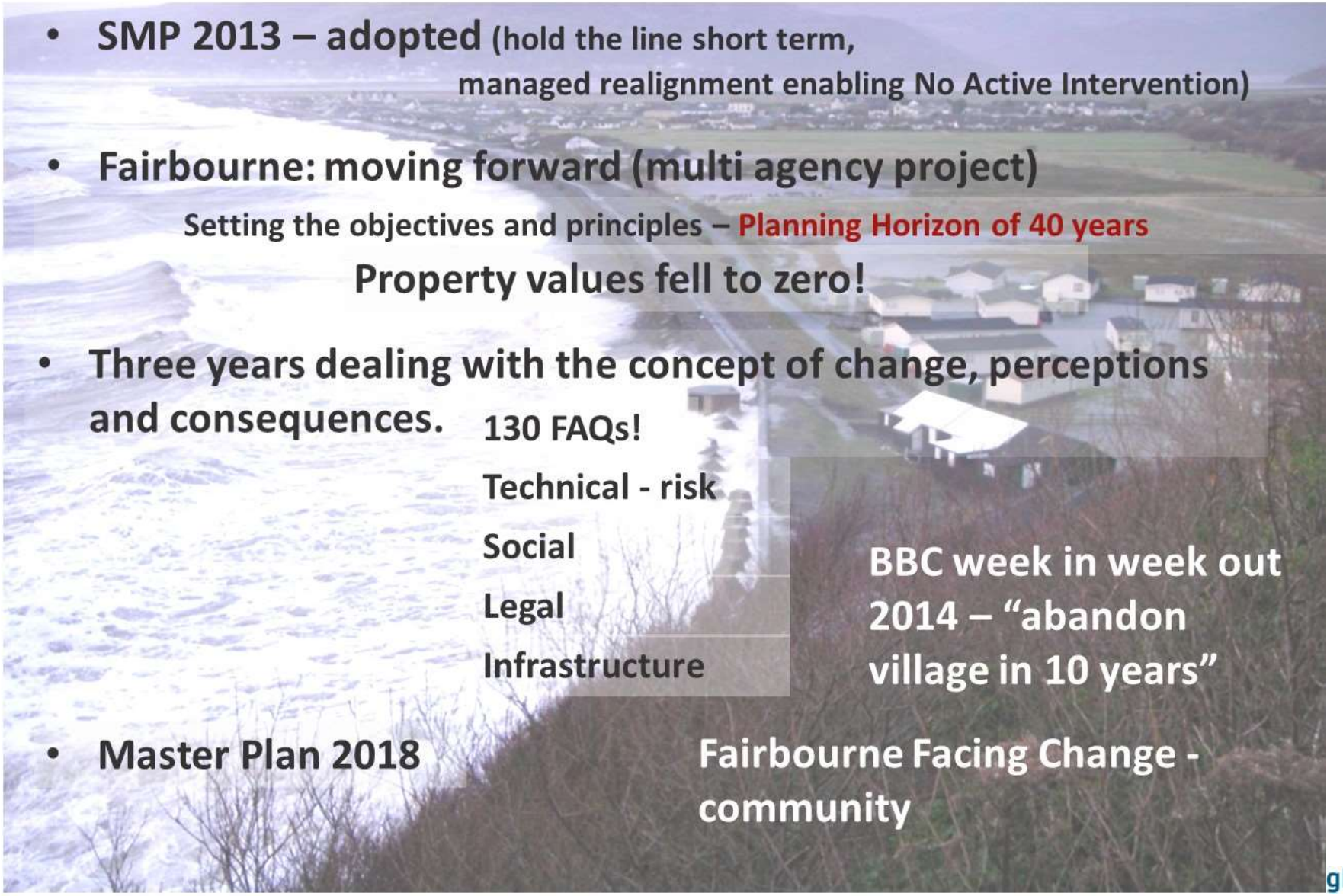
Htl scenario					
time/slr line	present	0.36m	0.5m	1m	2m
defences	manageable	minor improvement	step change	step change	step change
erosion	manageable	some strengthening	significant strengthen	harden coast	harden coast
overtopping	manageable	minor improvement	raise defence	new sea wall	raise sea wall
direct flooding	manageable	minor improvement	increase embankment	raise defence	new embankment?
fluvial	low	maintain	maintain	maintain	maintain
ground water	manageable	pumping?	pumping	continuous pumping	continuous pumping
risk	medium residual risk	high residual risk	high residual risk	unacceptable residual risk	unacceptable residual risk

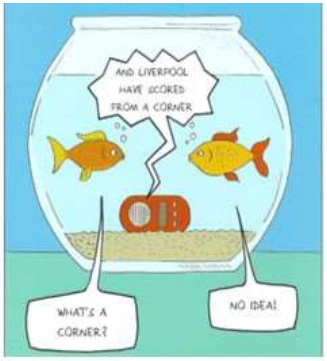






Fairbourne


• SMP 2013 – adopted (hold the line short term,
managed realignment enabling No Active Intervention)
• Fairbourne: moving forward (multi agency project)
Setting the objectives and principles – Planning Horizon of 40 years
Property values fell to zero!
• Three years dealing with the concept of change, perceptions and consequences.
130 FAQs!
Technical - risk
Social
Legal
Infrastructure
BBC week in week out 2014 – "abandon village in 10 years"
• Master Plan 2018
Fairbourne Facing Change - community



- Clear honest communication.
- Involve all

- Going down dead ends is part of the process!

"adaptation cannot be solved through a single action, but is rather a process to be managed over time."

Eating jelly with your fingers
Get the flavour
But difficult to gasp the substance

Who makes decisions – on what basis?
- National
- Regional
- Local

Long term / short term - vison – financial – economic – political pressures

Delivery and responsibilities

Changing attitudes and perceptions

Scottish Government
Riaghaltas na h-Alba
gov.scot

Dynamic Coast

Scotland's National Coastal Change Assessment

Alistair Rennie, Jim Hansom & James Fitton

Scottish Government
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crew
Scotland's centre of expertise for waters

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HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

SEPA

Ordnance Survey

ST ANDREWS LINKS
the home of golf

SCOTTISH GOLF

National Library of Scotland
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Adaptation Scotland
supporting climate change resilience

SCAPE

Crown Estate Scotland
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Dynamic Coast

National Coastal Change Assessment

Special thanks to our funder:

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Dynamic Coast @ FRM2018

Dynamic Coast has shown:

Climate change is very likely affecting Scotland's coastline.

National trends: ↑ erosion, ↓ accretion

erosion rates doubling

Regional trends: differing patterns

Compared with the projected near future rates, recent changes to driving processes are modest.

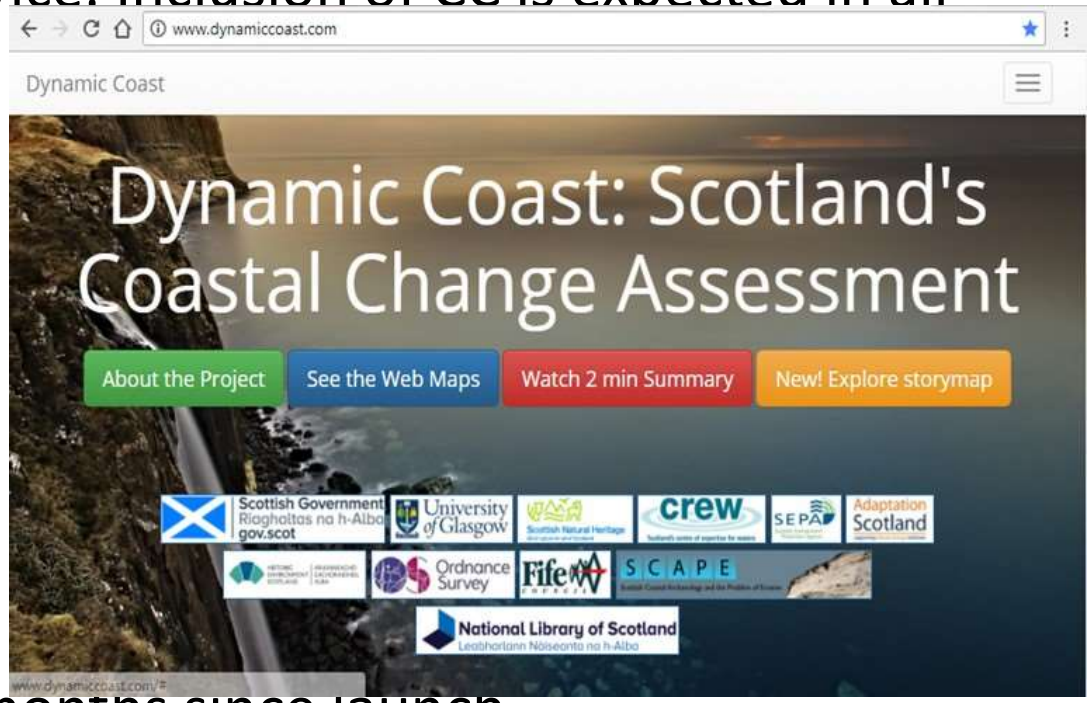
'Business as usual' plans will fail.

Dynamic Coast launch, 4 Aug 17

James Fitton, GIS
Jim Hansom, PI Science
Roseanna Cunningham, Cab Sec
Alistair Rennie, Project manager

Dynamic Coast @ FRM2018

Evidence is available via DynamicCoast.com and should be used to support public sector statutory advice. Inclusion of CC is expected in all sectors.



- Maps
- Reports
- Videos
- Presentations
- Blogs & articles
- Storymap

Website has had over 3k hits in 6 months since launch

Dynamic Coast Method

Method:

1. Over 1m data points to analyse the changes in MHWS on all of Scotland's soft coast, between 1890, 1970 & modern.
2. Projected **recent** rate landward to 2050, and intersected this with all coastal asset database (NFRA).

Whole Coast Assessment Results

e.g. 156km of roads lie within 10m of MHWS, 53km on soft

Asset / Receptor	Unit	Within 10m of MHWS					Within 50m of MHWS				
			Coastal Type					Coastal Type			
		All	Hard & Mixed	Soft	Artificial	Erodable (UPSM 40+)	All	Hard & Mixed	Soft	Artificial	Erodable (UPSM 40+)
Community Services	#	1	1	0	0	0	78	48	20	10	45
Non Residential Property	#	463	197	103	163	245	9,045	4,393	2,309	2,343	5,101
Residential Prop	#	458	107	109	242	332	24,449	9,966	7,194	7,289	15,276
Septic Water Tanks	#	367	219	139	9	181	1,656	954	677	25	769
Utilities	#	25	10	7	8	14	312	137	80	95	184
Rail	km	15	2	9	3	9	104	27	58	18	61
Roads	km	156	87	53	16	68	1,336	733	497	107	590
Clean Water Network	km	87	50	22	16	41	931	507	304	120	452
Cultural Heritage	ha	135	63	55	17	74	1,029	471	438	120	529
Environment	ha	4,204	2,575	1,586	43	1,790	23,430	14,873	8,424	133	8,615
Runway	ha	0	0	0	0	0	3	2	0	1	2

Results available via webmaps on www.DynamicCoast.com

Dynamic Coast Method

Method:

1. Over 1m data points to analyse the changes in MHWS on all of Scotland's soft coast, between 1890, 1970 & modern.
2. Projected **recent** rate landward to 2050, and intersected this with all coastal asset database (NFRA).

Total number of assets within 50m of MHWS

	Anticipated (2050) recent rate	Anticipated (2050+) double rate	All	Hard & Mixed	Soft	% in soft coast	Artificial	
	52	150	33,494	14,359	9,503	27%	9,632	Buildings
	5	10	1,336	733	497	37%	107	Roads (km)
	2	2	104	27	58	56%	18	Rail (km)
	1	4	3	2	0	11%	1	Runways (ha)
	26	27	1,029	471	438	43%	120	Cultural (ha)
	447	670	23,430	14,873	8,424	36%	133	Natural (ha)

Results available via webmaps on www.DynamicCoast.com

Dynamic Coast key results

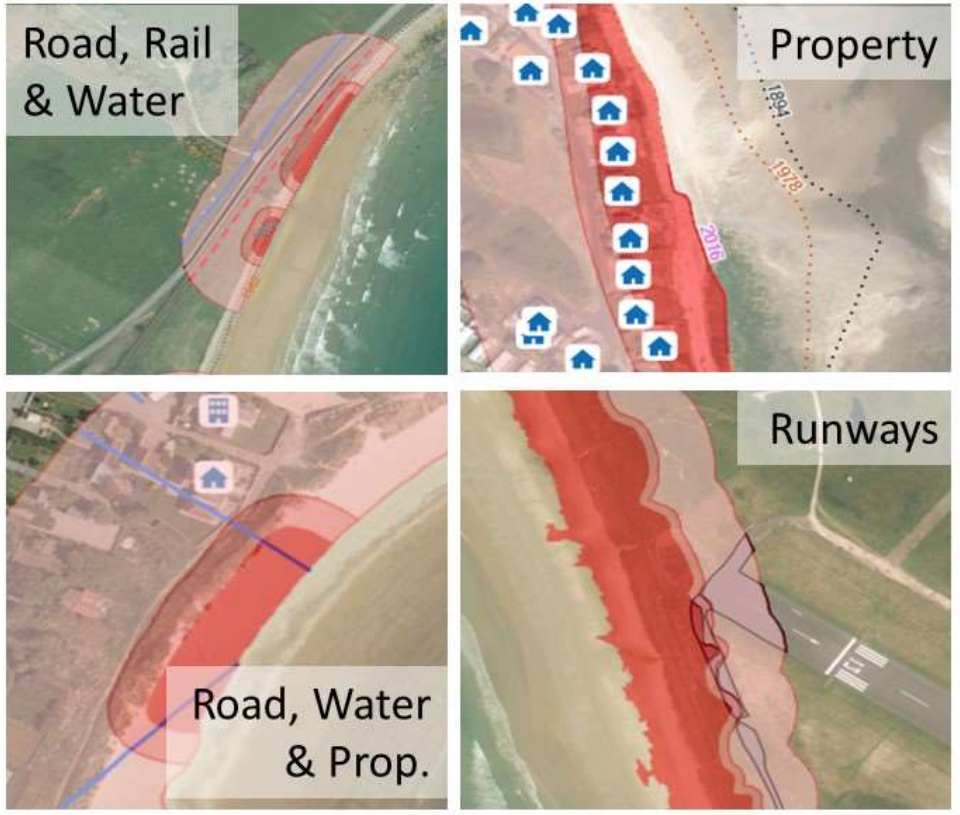
19% of the Scottish coast is soft or ‘erodible’ (3,802 km).

Between ½ and ⅓ of all coastal buildings, roads, rail and water network lie in these erodible sections.

A large proportion of our coastal assets are at risk from erosion and erosion-exacerbated flooding.

£13bn protected by natural defences, whilst £5bn by sea walls.

Nature is protecting more valuable assets than we are.



Dynamic Coast key results

NCCA Results

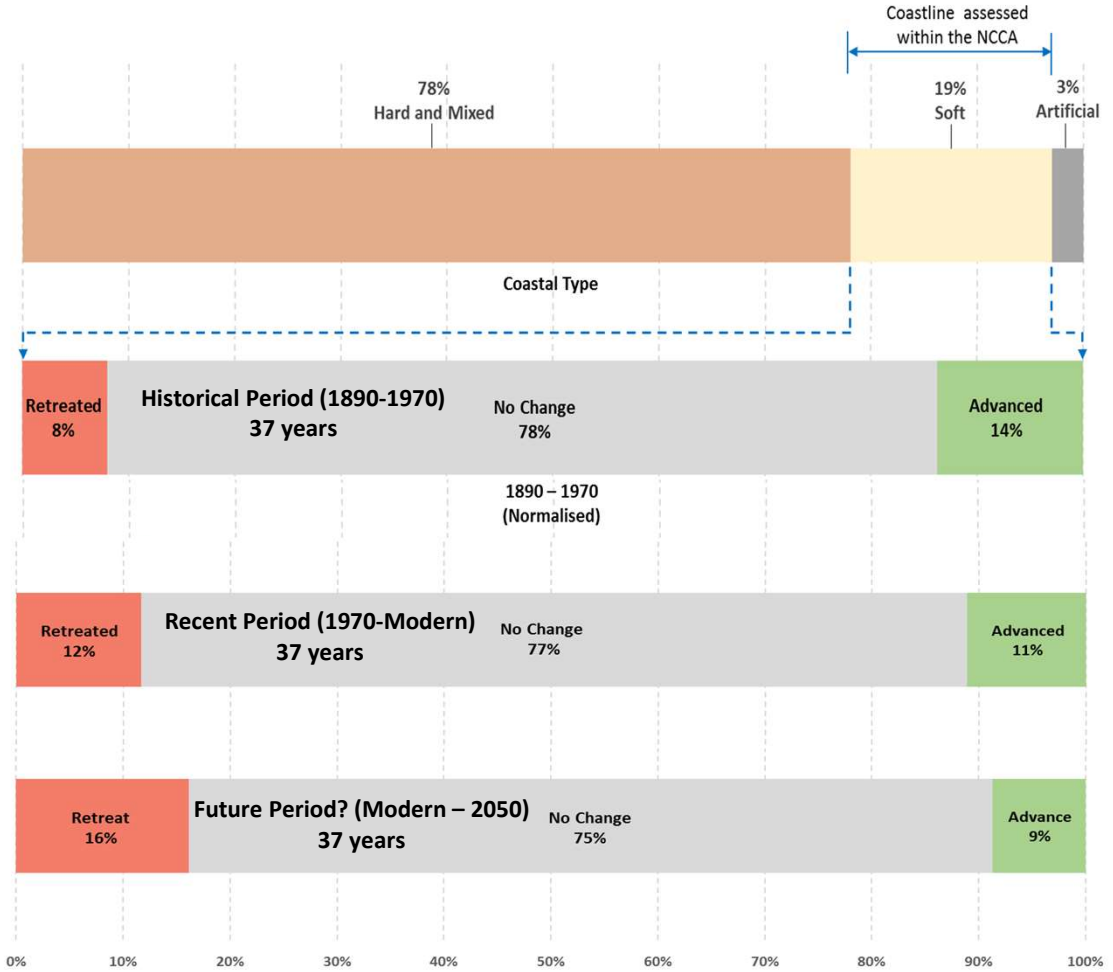
Generally:
75% soft coast dynamic stability
25% directional changes

Before the 1970s:
(normalised for time period)
8% extent of erosion
14% extent of accretion

Since the 1970s:
39% ↑ in extent of erosion
22% ↓ in extent of accretion

+ Doubling of erosion rates to 1m/yr

National picture dilutes more significant changes and regional patterns.



Climate change is a likely driver: (sea level, increasing wave impact & exacerbating storms; added to human

Dynamic Coast key results

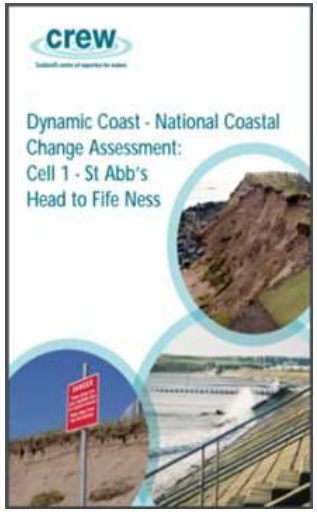
Regional results show geographic bias.

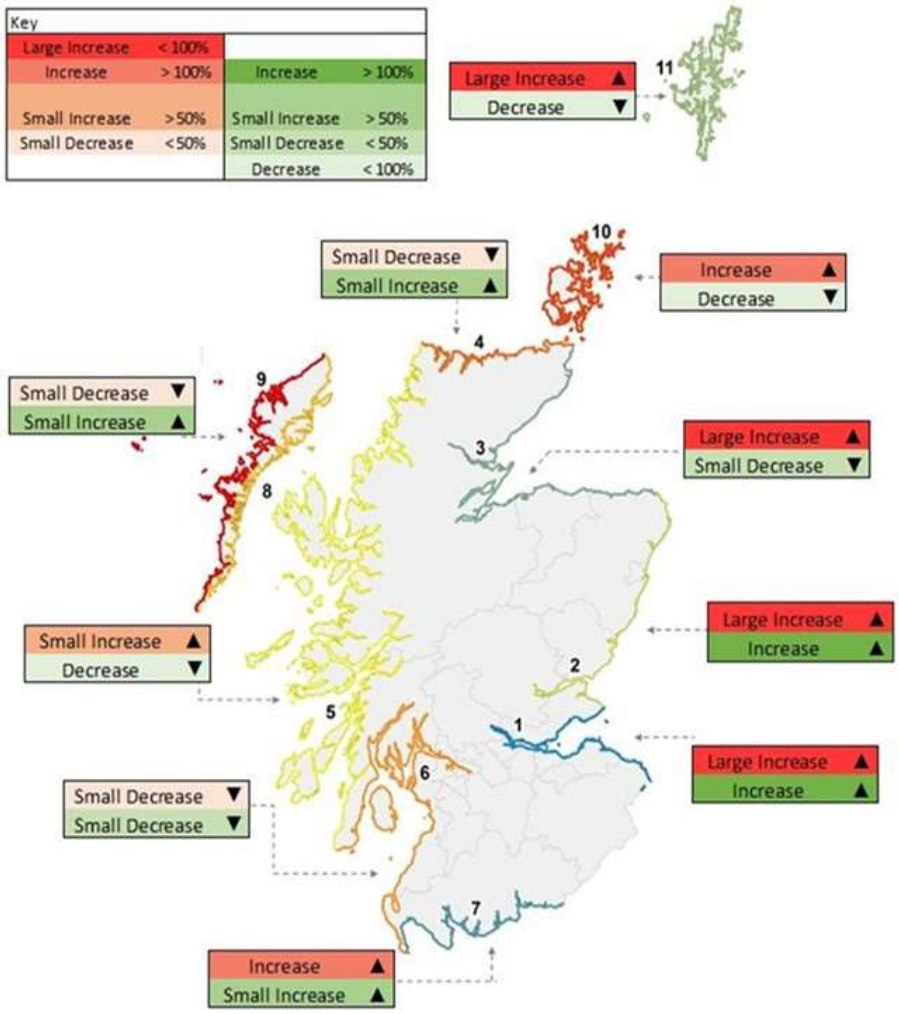
East coast:

- is more susceptible to erosion,
- has seen greatest increase in erosion
- has a large % of assets.

North, West & South coast:

- less susceptible,
- less change from baseline
- has a lower % of assets.





Dynamic Coast key results

What's at risk if this trend continues to 2050? next 32 years

- at least 50 residential and non-residential buildings,
- 1.6 km of railtrack,
- 5.2 km of roadway,
- 2.4 km of clean water network
- as well as significant areas of runways, cultural and natural heritage sites

… all expected to be affected by coastal erosion.

These span all Coastal Cells, all Local Authorities and all asset types.

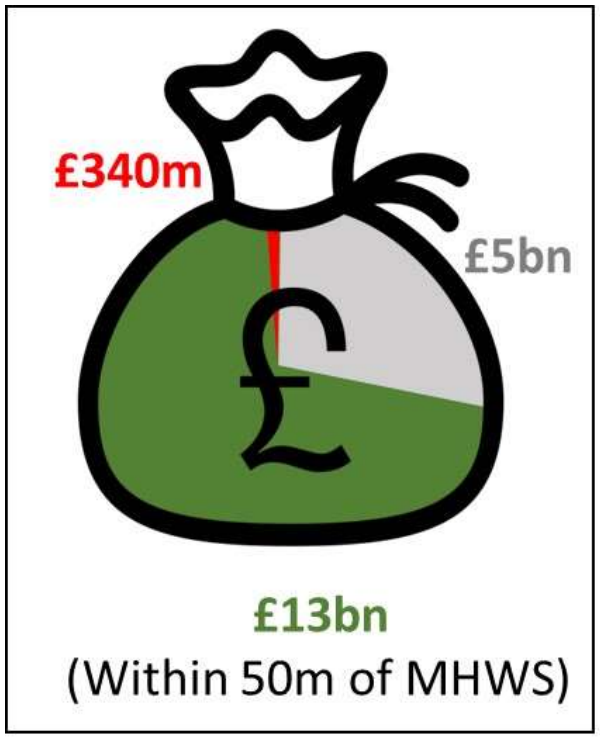
Dynamic Coast key results

Of the **£13bn** of coastal assets protected by natural defences, **£340m** are at risk in the next 30 years if recent erosion continues.

.. alongside the **£5bn** behind coastal defences.

Scotland's society and assets are not immune from erosion.

This is not just about golf courses!

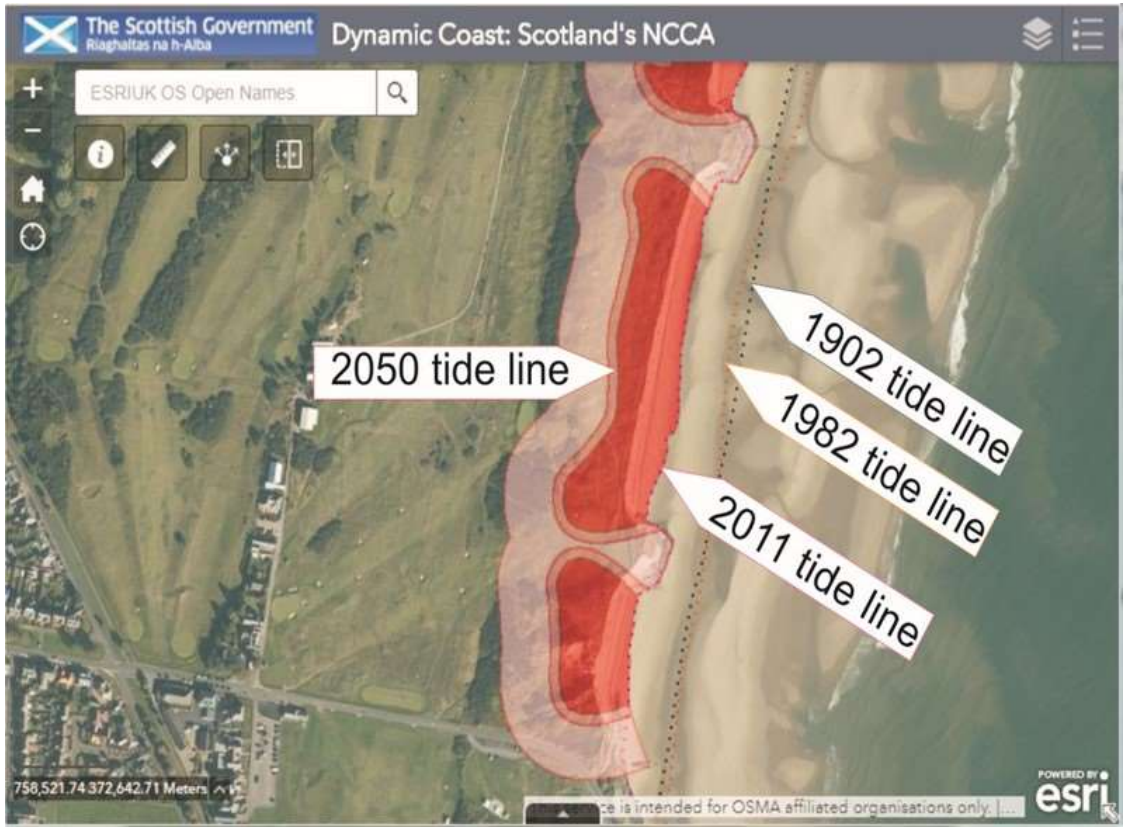


Dynamic Coast key results

Results show an increase in extent and rate of erosion, so anticipated losses are underestimated. We've used recent rates not future rates nor values.

So Dynamic Coast displays

the minimum likely impacts. Business, communities and statutory advisors should plan now.



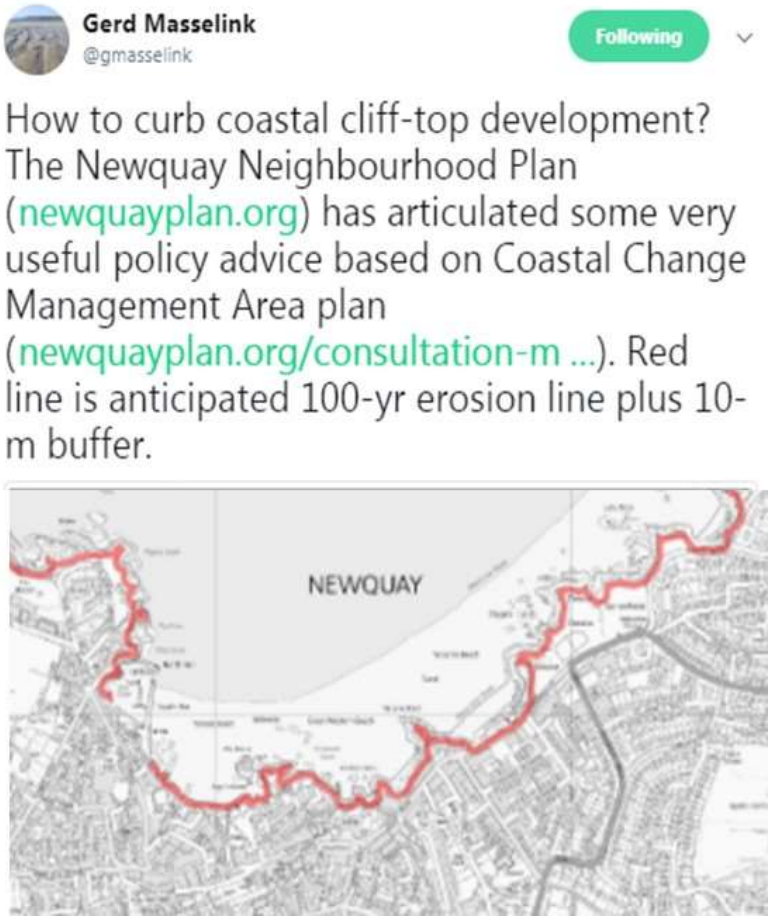
Dynamic Coast key results

Sea level rise estimates are being uplifted by 20-30% (Met Office)

…. See UKCP18 (this session)

Accelerating erosion rates
need to be part of routine planning.
E.g. Fife SMP2 or
Newquay Neighborhood Plan

Considered further in next phase of Dynamic Coast research.



Dynamic Coast key results

Anticipated SLR will have significant impact on flood frequency.

M.E.S. Leith +0.3 m of sea level by 2090 = 1:100 yr event → 1:8 yr.

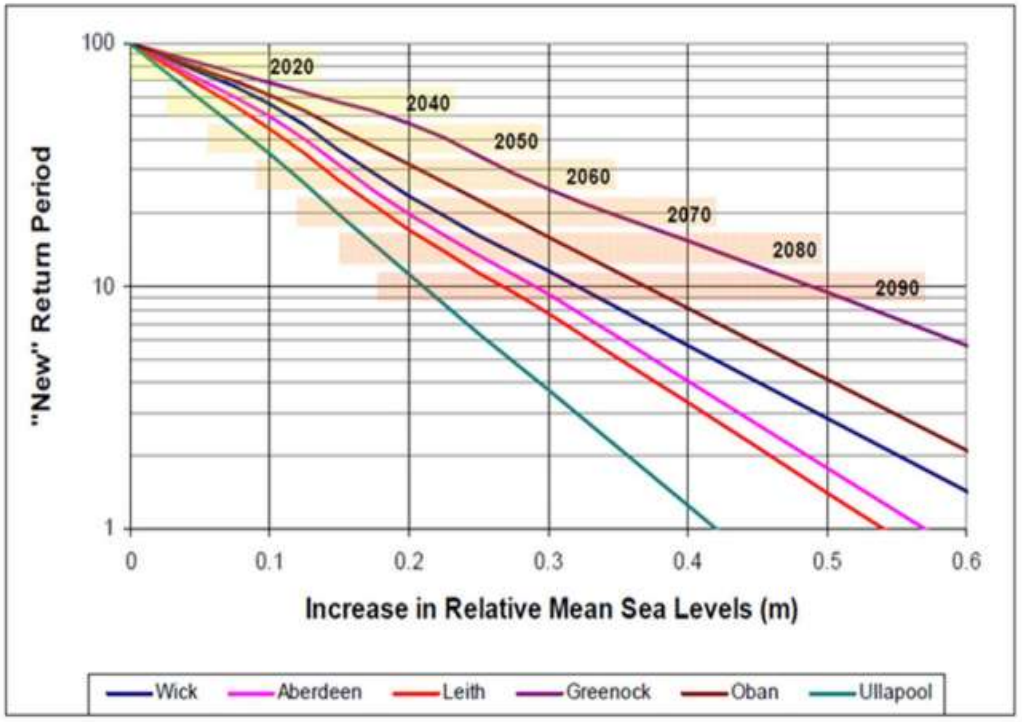


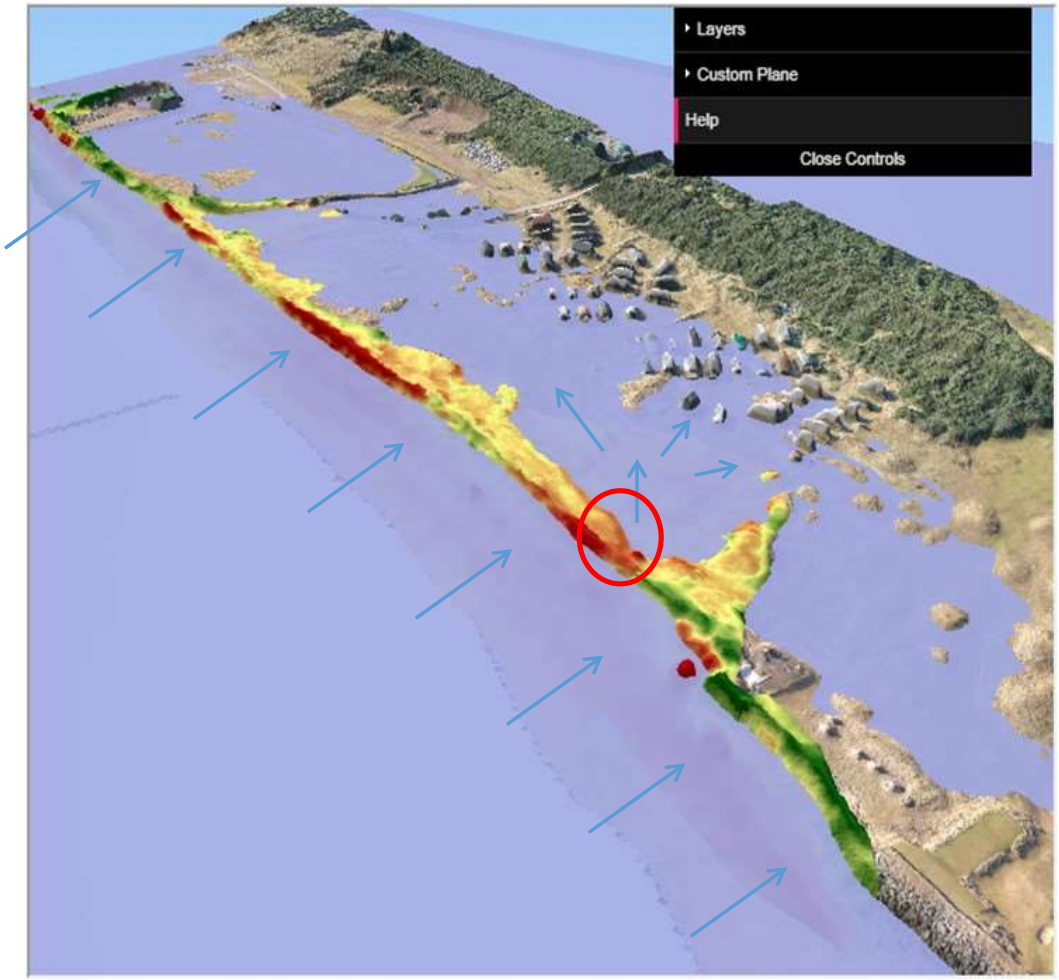
Figure 4.6: Reduction in flood return period given increases in mean sea level (Defra (2012) UKCCRA for Scotland – Technical Report. Fig3.5 p43, based on the central estimate of the Medium Emissions Scenario, locations are approximate)

In Scotland we now have a Window of Opportunity, and the Policies in place, to choose to adapt, mitigate or defend according to the local, regional and national contexts.

Dynamic Coast phase 2

Dynamic Coast 2 is about to start, using 3-D modelling to:

- Appraise resilience of soft natural defences,
- ID the breach-points for erosion enhanced flooding (this is how cc will impact people),
- consider impact of acceleration in future erosion extents and rates.



Dynamic Coast phase 2

2nd phase will also:

- Encourage adaptation (super sites)

Dynamic Coast phase 2

2nd phase will also:

- Encourage adaptation (super sites)
- Incorporate latest smart phone GPS+tech to ID coastal change.. vegetation edge etc
- Use UAV drones for coastal position updates at key sites
- Produce a coastal erosion disadvantage mapping

Dynamic Coast

And a final word…

"Dynamic Coast gives Scotland it's most advanced nationally consistent and locally informed understanding of the causes and consequences of coastal change that it has ever had so we have to use it and build on it now."

Environment Secretary Roseanna Cunningham

(August 2018)

Scottish Government
Riaghaltas na h-Alba
gov.scot

More info: www.DynamicCoast.com

Dynamic Coast phase 2 … continues!

Funder:

Proj. Manager:

Research team:

crew
Scotland's centre of expertise for waters

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UKCIP18: The UK's next generation climate change projections

"A Scottish FRM perspective"

Fiona McLay – Strategic Flood Risk SEPA

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Introduction

- Why do we need climate change projections?
- If we already have climate projections why do we need new ones?
- Who's producing them?
- What information will be available?
- When will the new projections be available?
- What are the implications for my project?
- What is SEPA going to do with the new information?

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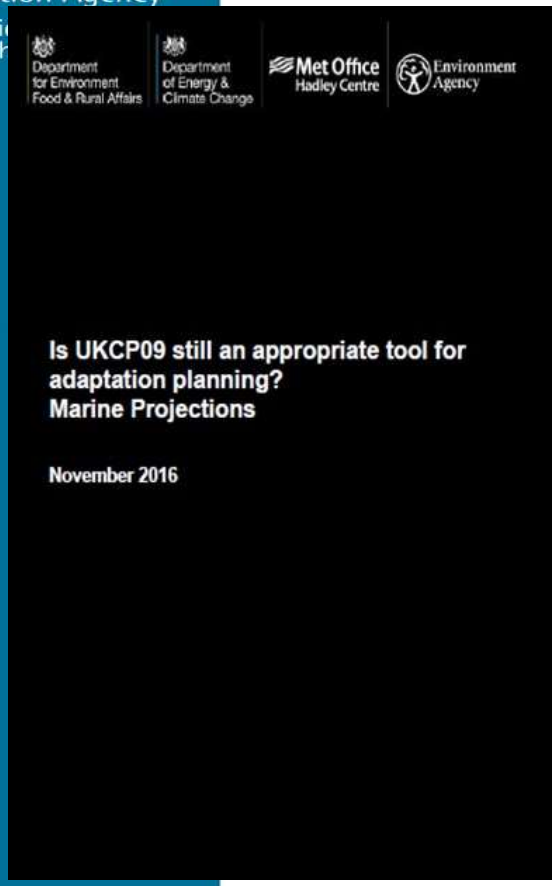
Why do we need climate change projections?

Why do we need new climate projections?



- Improved models, new observations, faster supercomputers.
  - Information relevant to surface water flooding now possible.
  - IPCC AR5 projections for global sea level rise greater than in AR5.

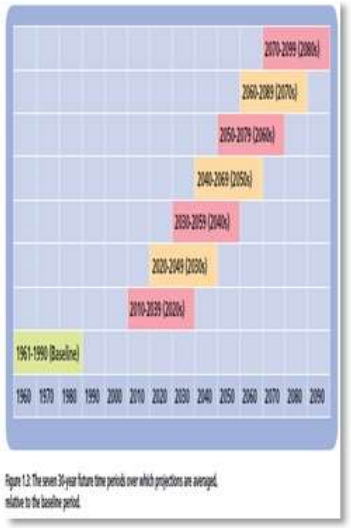
Q. Is UKCP09 still an appropriate tool for adaptation planning?

A. Not if you are interested in sea level rise or summer rainfall extremes.

Department for Environment Food & Rural Affairs | Department for Business, Energy & Industrial Strategy | Met Office Hadley Centre | Environment Agency

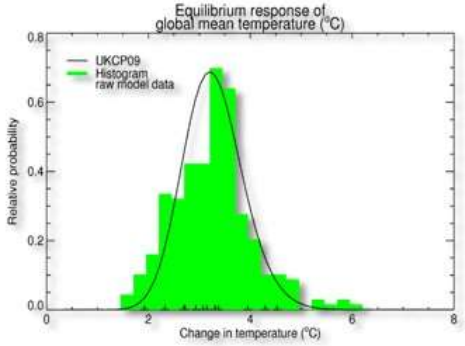
Working together on
UK Climate Projections

UKCIP98



Global model projections with HadCM2

UKCIP02



HadCM3 + downscaling with RCM

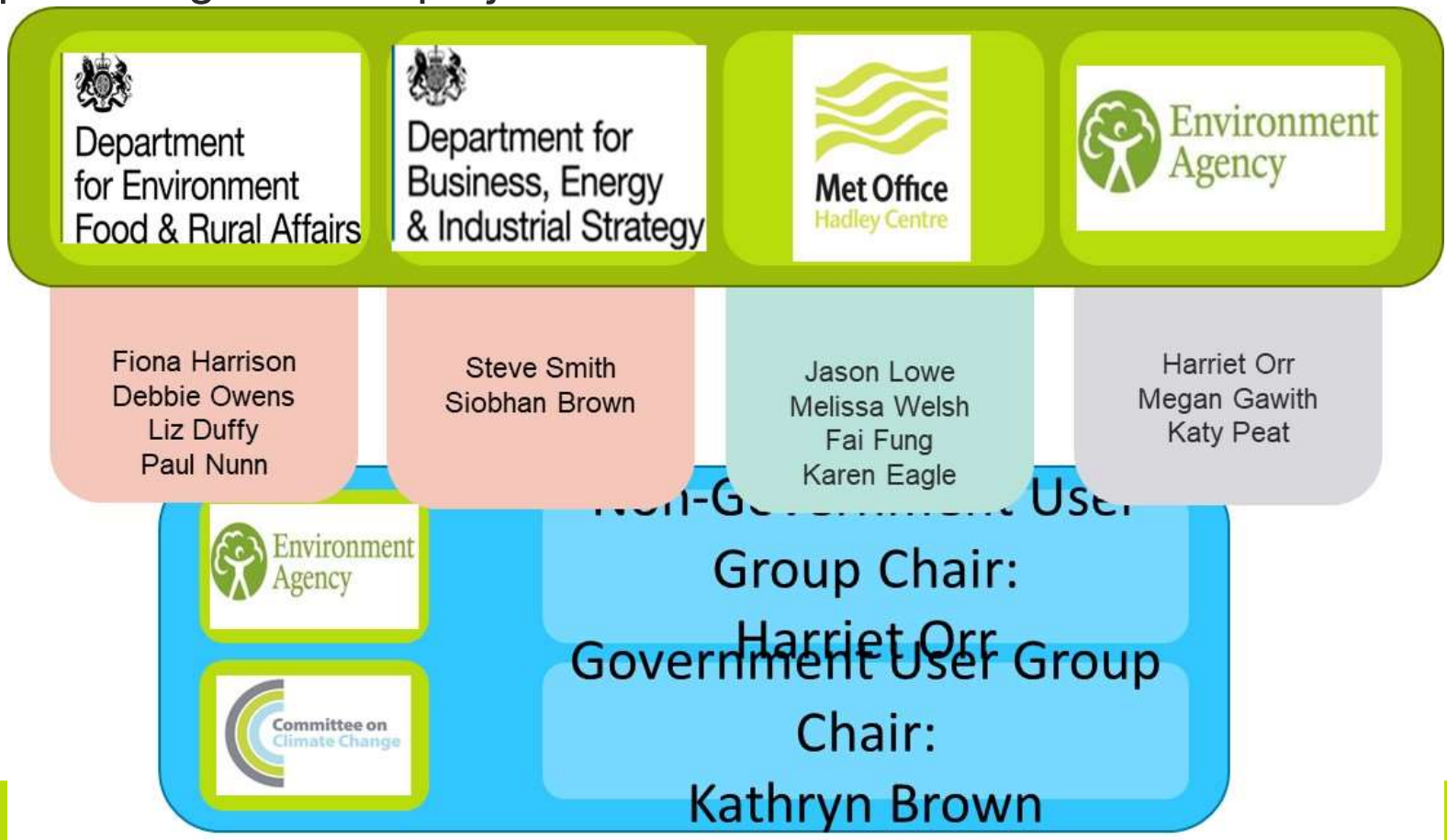
UKCP09

- Treatment of
- uncertainty and risk
- 11 Spatial realisations

UKCP18

- Treatment of uncertainty and risk
- Approx. 20 spatially coherent realisations
- Better treatment of global and local scale physics

Who's producing the new projections?



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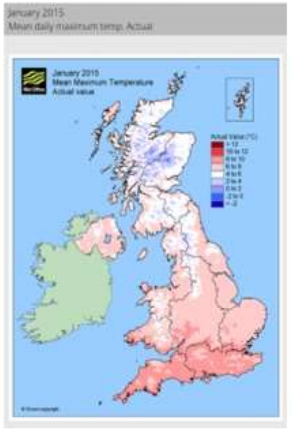
What will be available?

New projections over UK land areas

Updated projections of sea-level



Observational data and trends

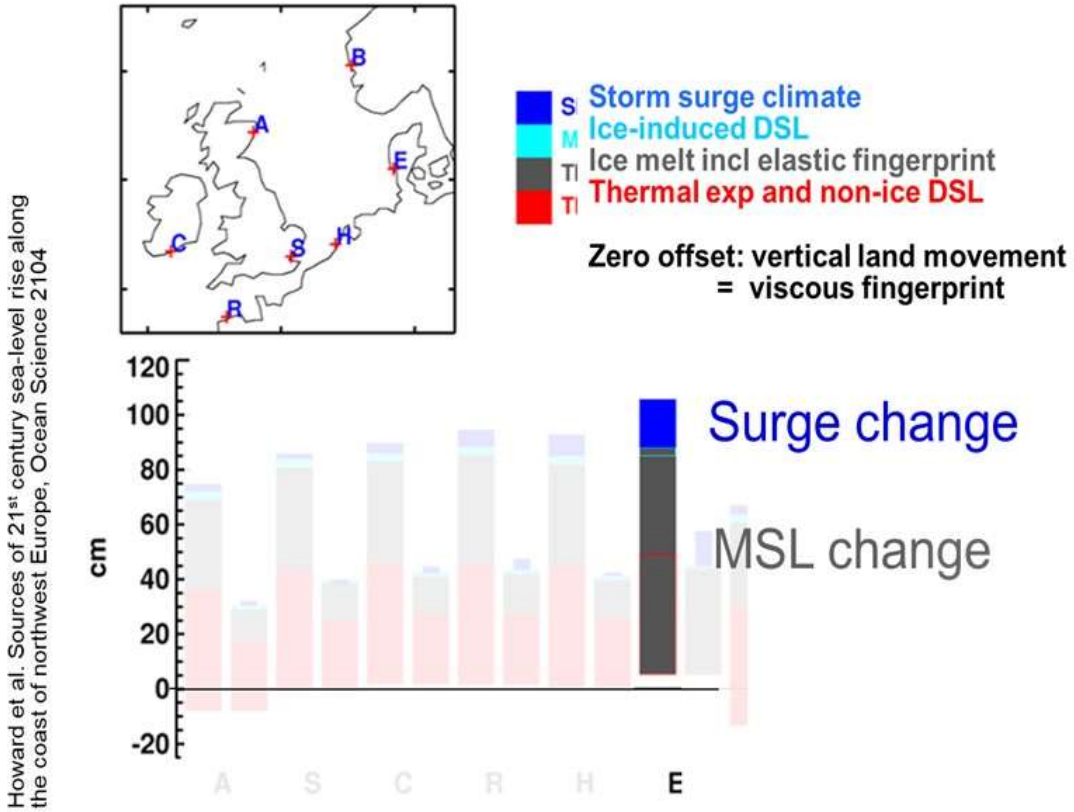
A climate service to help involve the user in development

Marine Projections

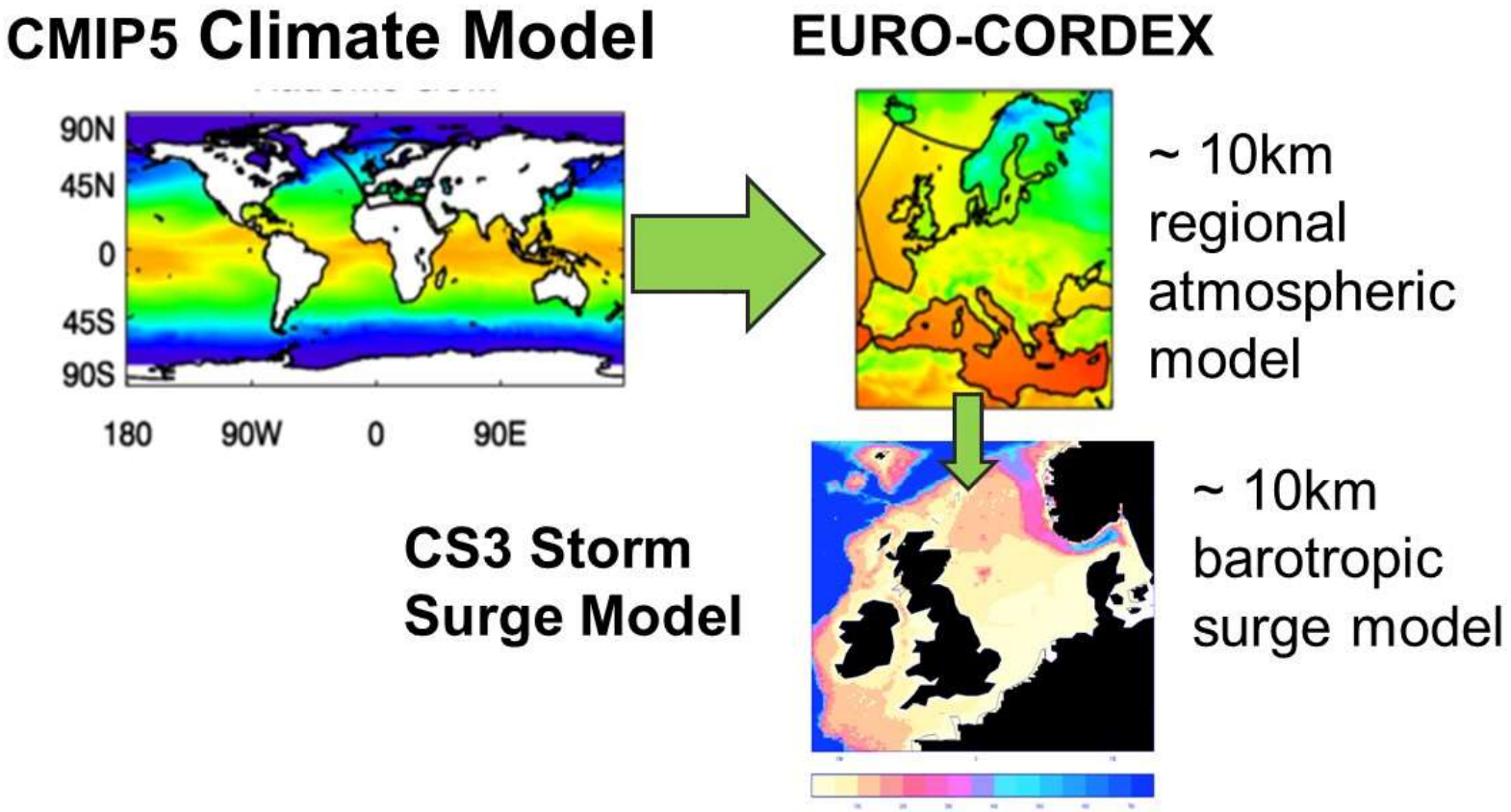
- Projections extending to 2100
- Year to year changes in sea level rise and plausible H++ scenarios
- Updated storm surge projections
- Historical case studies placing actual historical storm events in future sea levels.
- **Metrics**: Sea level rise, storm surge

Storm surge

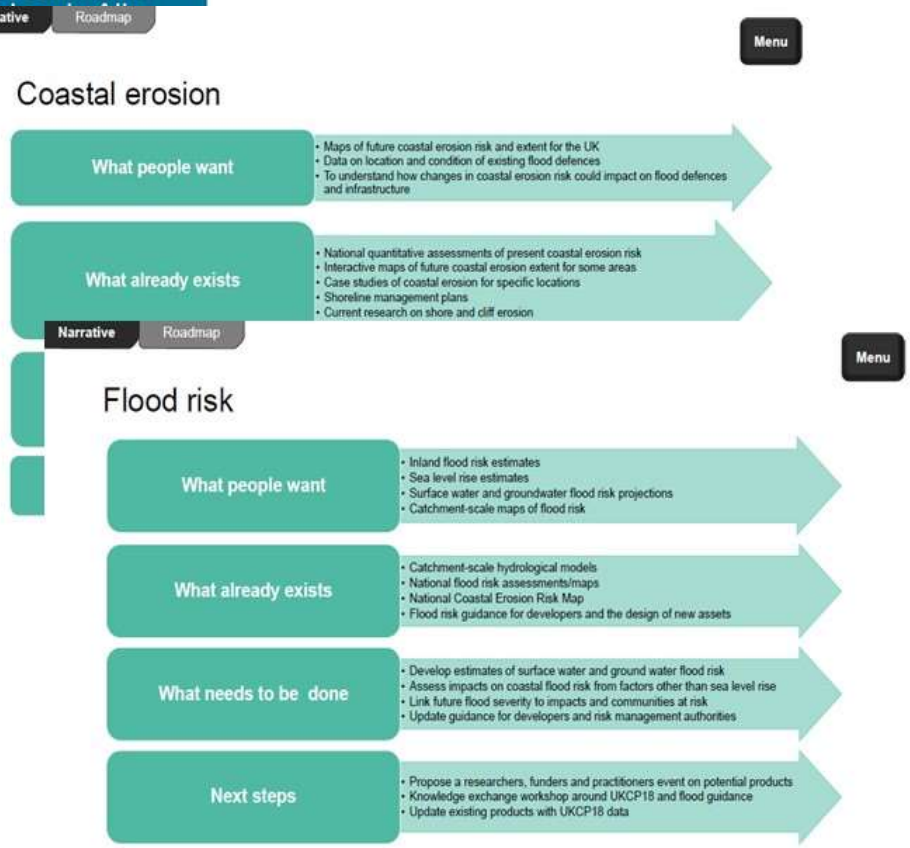
Some studies have suggested significant changes in surge climate at some locations, for example at Esbjerg under a climate model which simulates an increase in westerlies



Projected changes in storm surge activity



What won't be produced?



- Information on changes in wave climate.
- Impact information including;
  - change in flood risk
  - coastal erosion
  - flood defence asset deterioration
- Environment Agency gap analysis and road maps

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When will the new projections be available?

- Data – May 2018
- Guidance and headline messages – Nov 2018
- Publication embargo until – Nov 2018
- High resolution rainfall projections ~ Nov 2018.
- Revised flood flow projections based on UKCP18~ Nov 2018.

What will be the implications for my work?

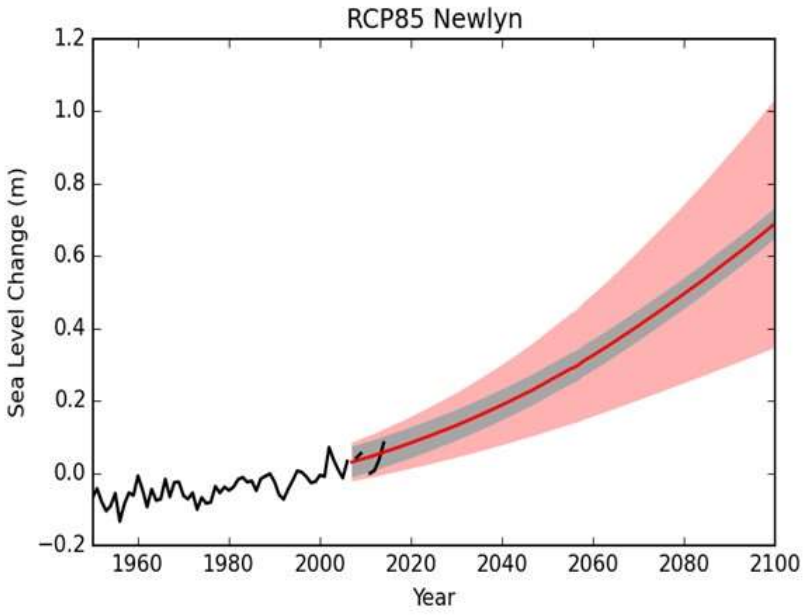

Figure from Met Office

- Use UKCP18 for studies publishing after Nov 2018.
- Data use likely to be similar to UKCP09.
- No single allowance for flood schemes.
  - Managed adaptive rather than precautionary approach.
  - May need to consider a range of time horizons, emissions scenarios and probabilities.

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What will SEPA do with the data?

- Updated guidance.
  - Land Use Planning
  - Flood prevention schemes?
- Flood hazard maps
- Future NFRAs and FRM Strategies.

Coastal Flood Boundary Updates 2017

Jennifer Hornsby, JBA Consulting

5 February 2018

Introduction

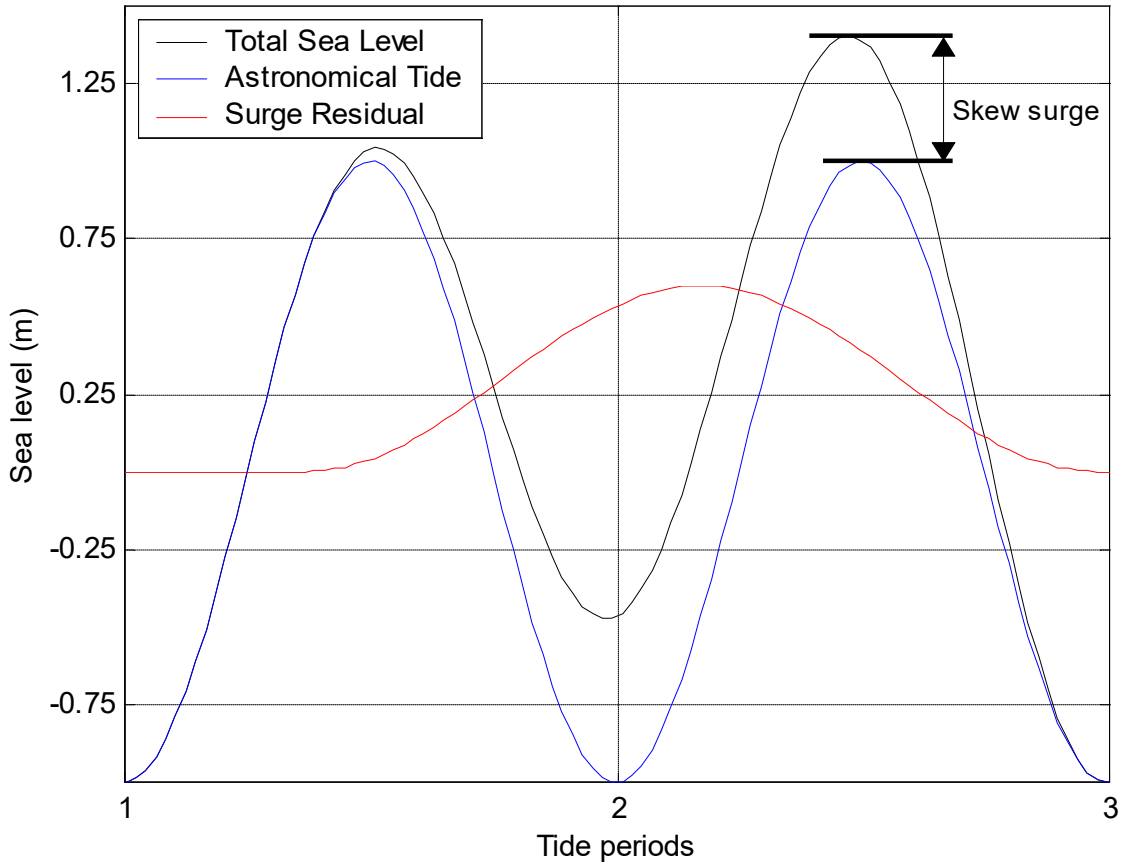
- What are the Coastal Flood Boundaries (CFB)?
- What has been undertaken for the 2017 update?
- What can we expect from the new dataset?

- **Key partners** are the EA, SEPA in Scotland, NRW in Wales. All work together under the UK Coastal Flood Forecasting (UKCFF) group

Extreme sea-levels

Sea-level = tide + surge

- **Used for** understanding and modelling flood risk for flood risk management and coastal projection work
- **Used by** engineering consultants, coastal analysts, hydrologists, climatologists and academics.



What are the Coastal Flood Boundaries (CFB)?

- A robust and consistently derived evidence base to support flood risk management and coastal protection work

- The current CFB data includes:
  - a continuous and spatially consistent set of extreme sea levels, uncertainty data and design surge profiles
  - a spatially consistent set of extreme swell wave conditions
  - practical guidance how to use these datasets

CFB dataset (2011) - Spatial Coverage

What will the new CFB dataset include?

- Updated extreme sea-levels at the same point locations BUT with:
  - Additional extreme sea-levels along estuaries and around islands
  - Incorporating new science and new recorded sea-level data
  - New practical guidance on how to use the datasets
  - **No waves**

CFB dataset (2011) - Spatial Coverage

Project objectives – consult with users

- Task 1: Identify users and agree wider consultation pool
- **Task 2: Consultation with key users**
- Task 3: Data/Models collection
- Task 4: Data/Models quality review
- Task 5: Finalise scope
- Task 6: Science/method improvements
- Task 7: Modelling phase including **calibration/verification** with
- **Task 8: Consultation on draft results**
- Task 9: Address issues from consultation and review
- Task 10: Project team sign off
- Task 11: Final reporting and deliverables

Project objectives – improve confidence in CFB data

- Task 1: Identify users and agree wider consultation pool
- Task 2: Consultation with key users
- Task 3: **Data/Models collection**
- Task 4: Data/Models quality review
- Task 5: Finalise scope
- Task 6: **Science/method improvements**
- Task 7: Modelling phase including calibration/verification with
- Task 8: Consultation on draft results
- Task 9: Address issues from consultation and review
- Task 10: Project team sign off
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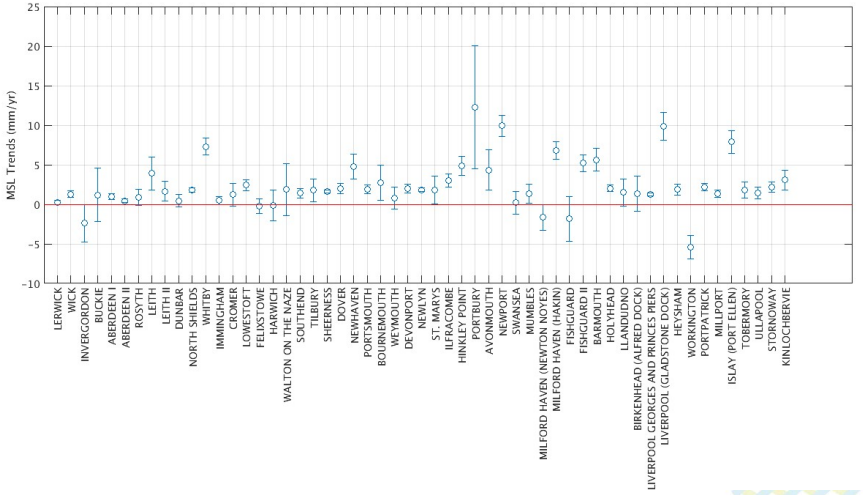
Updates included – additional data

- % increase in record after extending the record to include data to 2016 (left) and secondary channel data (right)

Updates included – science updates

With the National Oceanographic Centre and Professor Jonathan Tawn

- Re examine the code/methods used for the skew surge joint probability method
  - Choice of threshold
  - Smoothing
  - Extremal Index
  - Tidal analysis / peak tides over nod cycle calculation
  - Mean Sea Level trends



Project outcomes

- Due March 2018
- Draft results currently being reviewed
- Extended dataset
- Small changes in general
- Most significant change at Lerwick
- Confidence intervals have changed
- Still have lower confidence where we have no tidal gauges or modelling

Coastal Flood Risk Mapping Phase 1

Douglas Pender, JBA Consulting

5 February 2018

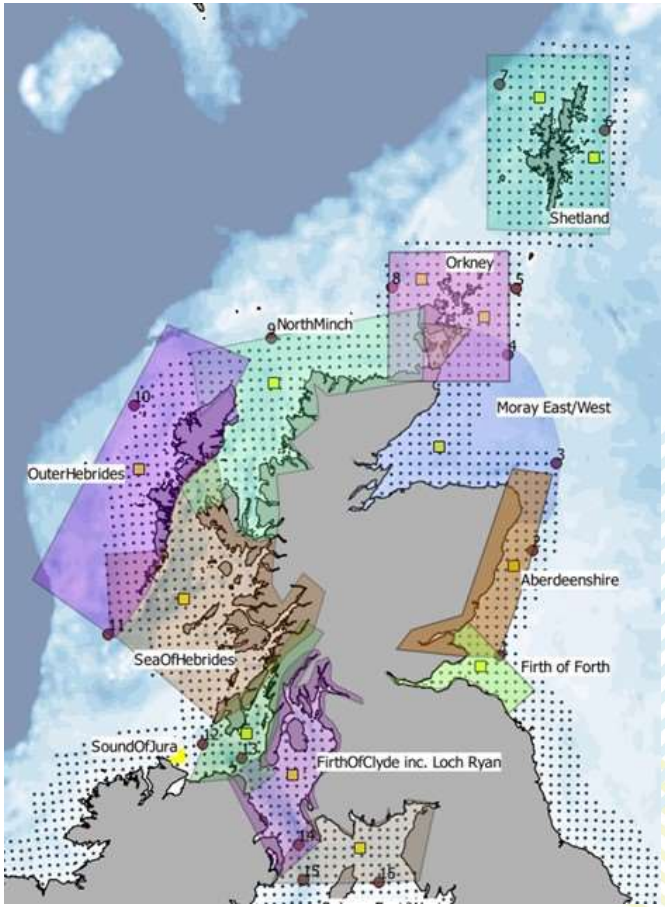
Introduction

Phase 1 update to SEPA's Coastal Flood Risk Maps

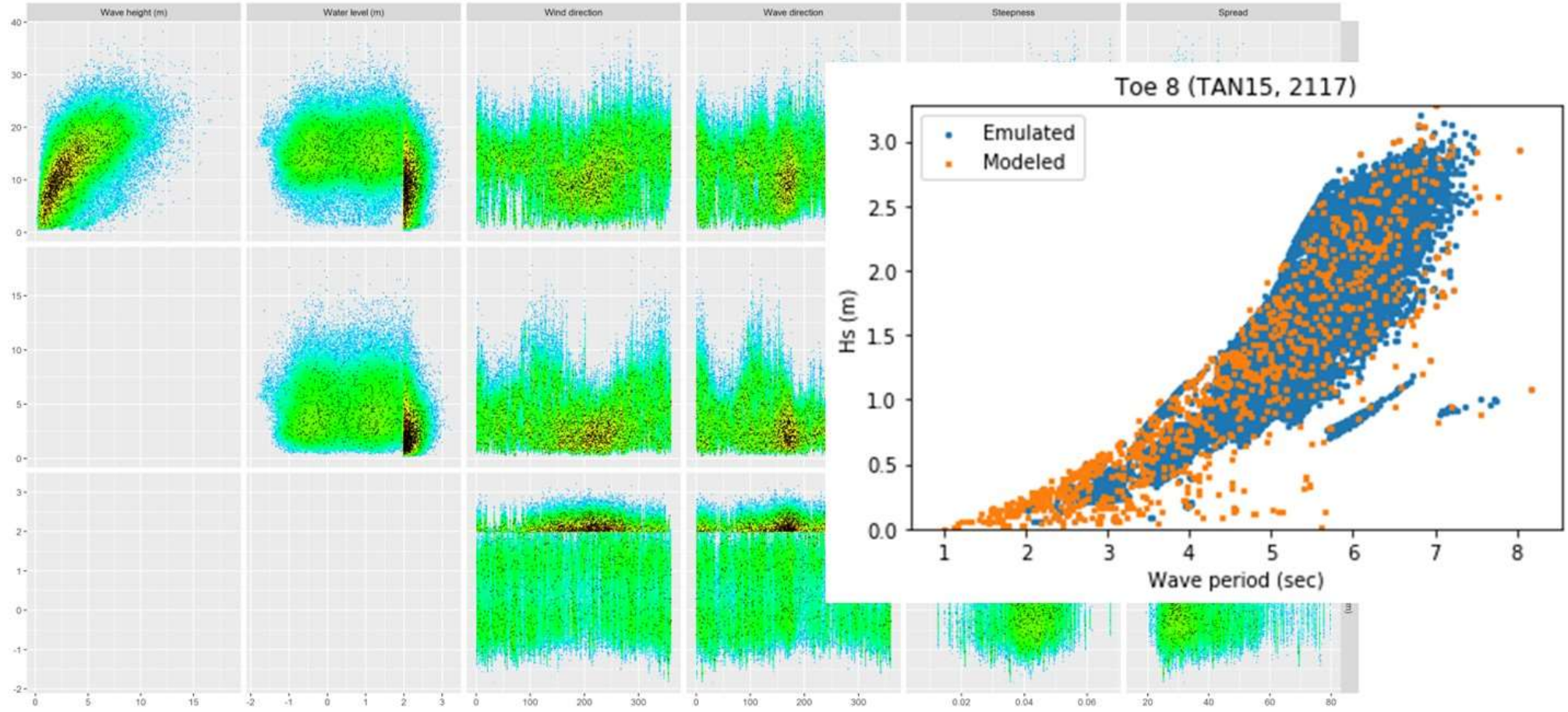
- Northeast Scotland and Orkney
- Multiple components
  - Extreme sea levels
  - Wave overtopping
  - Wave runup
- Updated method
  - Simplified mapping
  - Detailed modelling
- Use of new datasets
  - Multivariate offshore wave and wind data
  - Updated CFBD data
  - UKCP18 climate change projections

Offshore multivariate datasets

- Developed by RHDHV and HR Wallingford
- 16 points around the Scottish coastline
- Joint probability modelling of overtopping drivers
- 10,000-year synthetic event dataset
- Supersedes Defra Simplified JP Method
- Used to quantify extreme overtopping rates and wave runup heights
- Used in FFS and flood studies



Offshore multivariate datasets

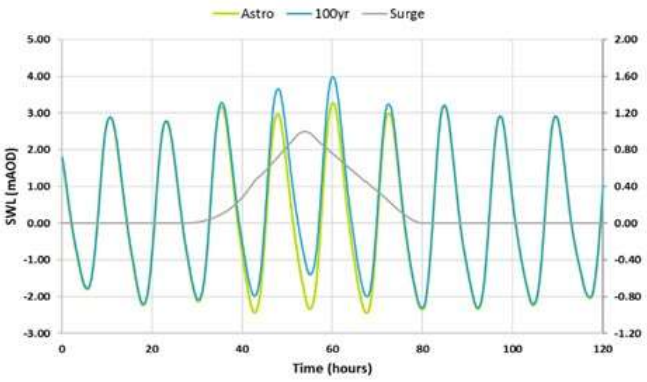


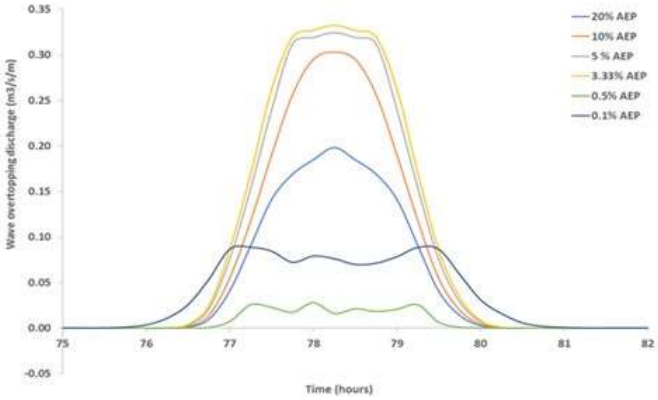
Simplified mapping

- GIS projection of ESL at rocky coasts
- GIS projection of ESL + wave runup on beaches
- Approx. 50 locations that include runup
- Sand and gravel beaches
- Wave conditions from multivariate dataset to estimate extremes

Detailed mapping

- TUFLOW inundation models at 5m resolution
- ESL boundary from CFDB
- Overtopping boundaries from multivariate dataset and EurOtop
- Defended and undefended runs

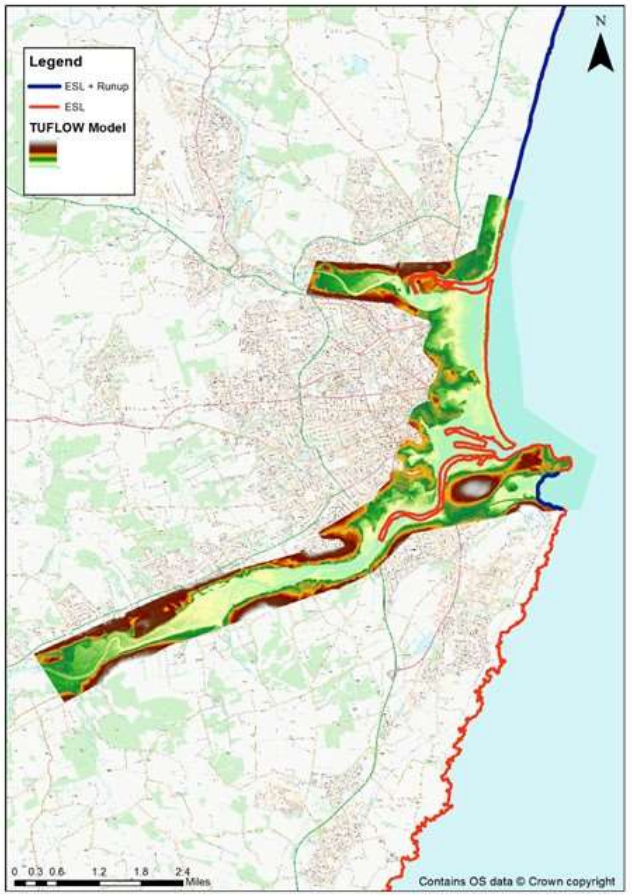




Final product

- Seamless maps merging simplified and detailed extents
- Replacement of current web maps
- Present day, 2050, 2100 and 2300
- Defended and undefended

- **RELEASED EARLY 2019**



Working together to manage flood risk

Flood Risk Management Conference 2018

5 – 6 February 2018

Follow the conversation on Twitter at #FRM2018
Wifi network: WiFi Guest

sniffer
knowledge brokers
for a resilient Scotland

Working together to manage flood risk

Jeremy Jones, CIWEM

Chair session 3 Surface Water Management

5 – 6 February 2018

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Wifi network: WiFi Guest

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The Metropolitan Glasgow Strategic Drainage Partnership

Partnership Working and Innovation Delivers Regeneration – Case Study

David Hay, Group Manager, Glasgow City Council

SNIFFER - 6 February 2018

The Metropolitan Glasgow Strategic Drainage Partnership

Overview

- Funding
- Canal and North Gateway
- North Glasgow Integrated Water Management System (NGIWMS)
- Sighthill Regeneration
- Challenges for Partnership Working
- Lessons Learnt

The Metropolitan Glasgow Strategic Drainage Partnership

Funding

- Complex funding package with multiple funders

Scottish Canals

European Union

gov.scot

EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

Green Infrastructure
making places for people
a' cruthachadh àitichean do dhaoine

GLASGOW CITY REGION
City Deal

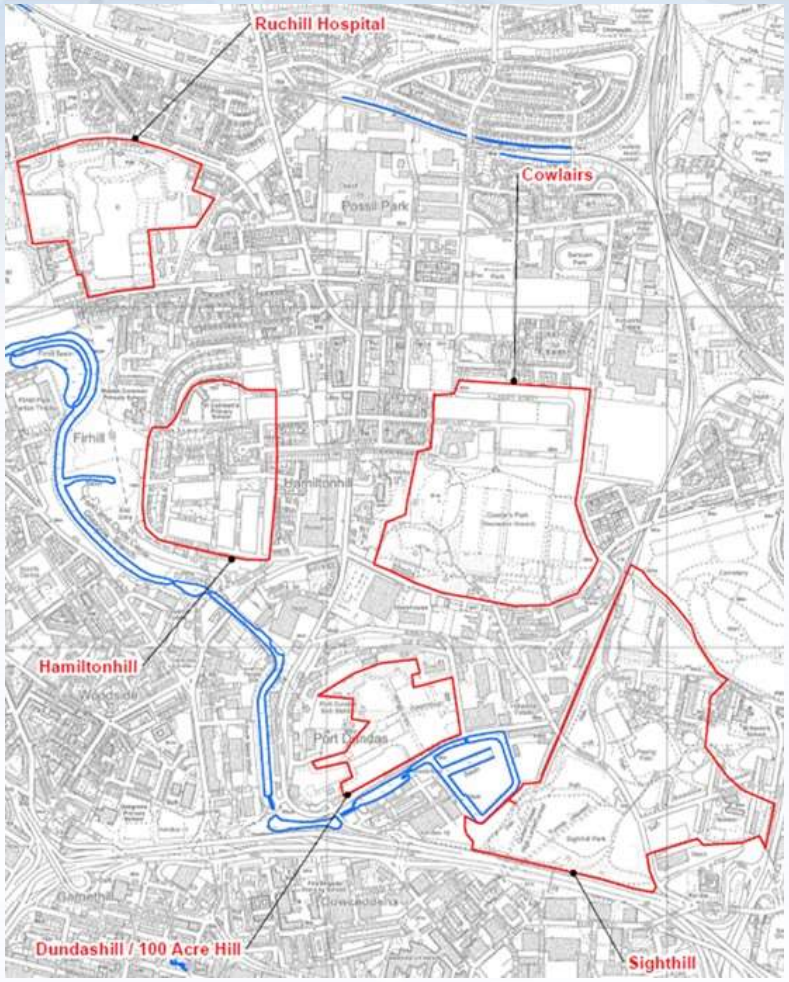
Glasgow CITY COUNCIL

Scottish Water
Trusted to serve Scotland

smart cities scotland

The Metropolitan Glasgow Strategic Drainage Partnership

Canal and North Gateway

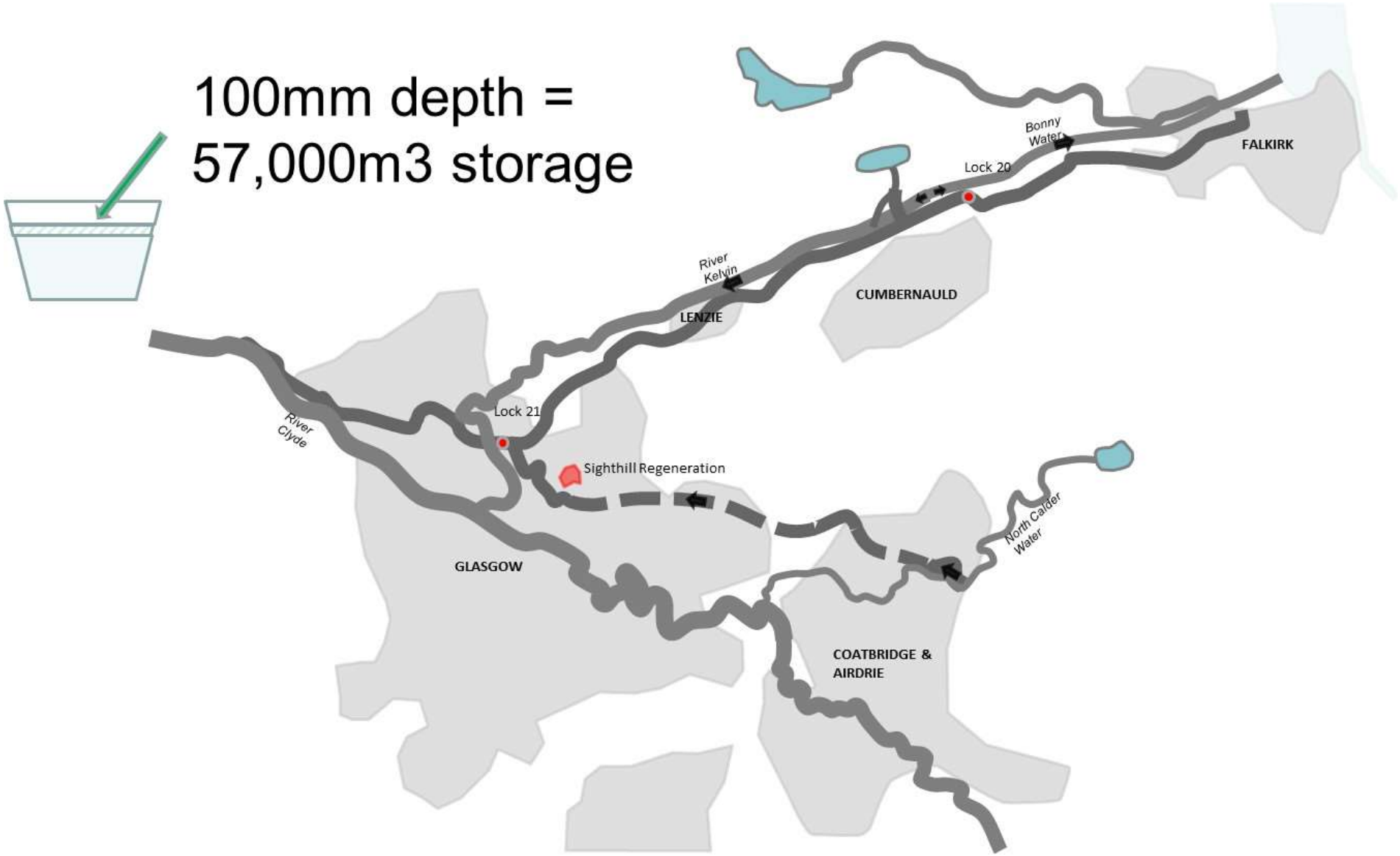


- Unlocks 2,500+ homes

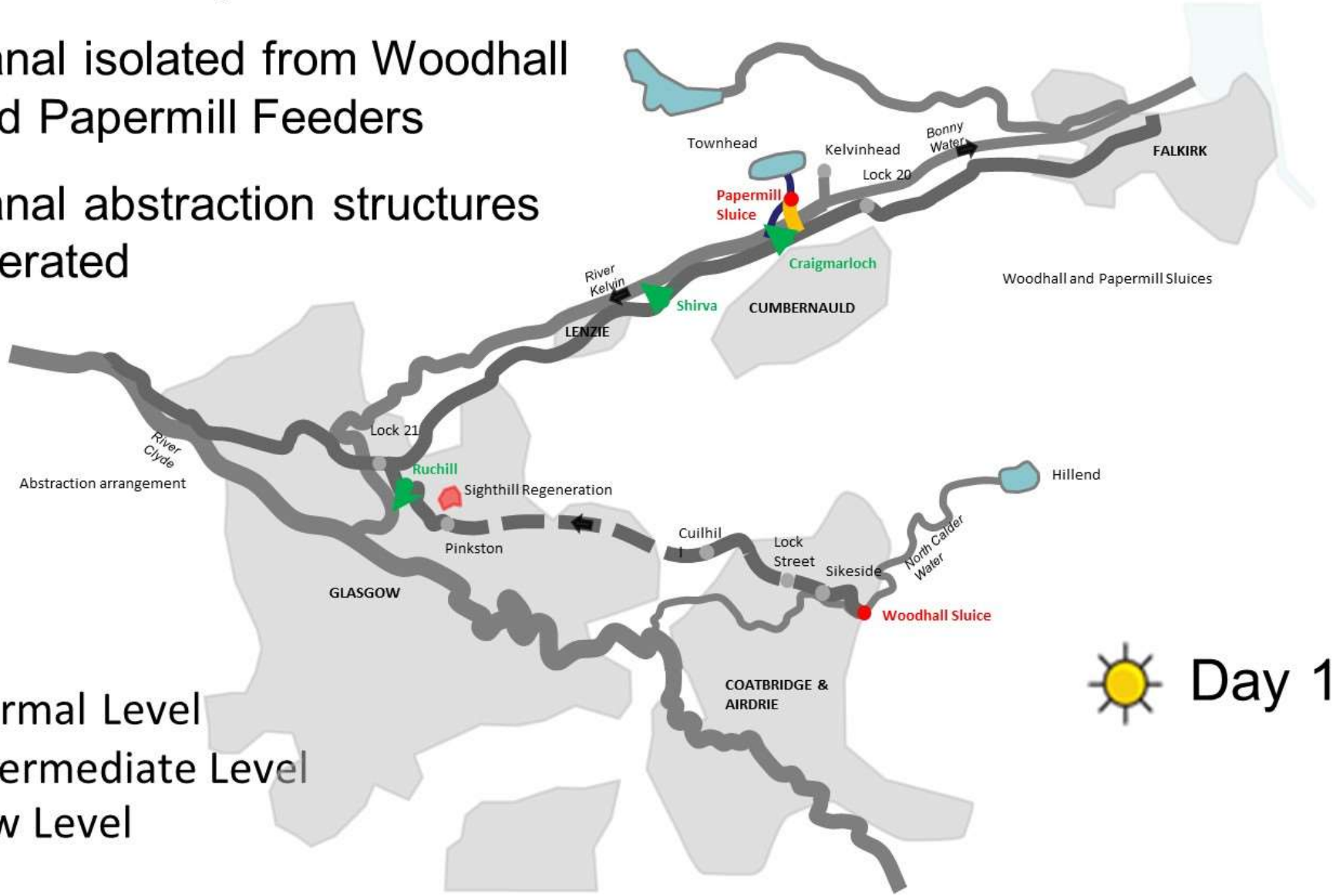
The Metropolitan Glasgow Strategic Drainage Partnership

NGIWMS

- Partnership between Scottish Canals, Scottish Water and Glasgow City Council
- Utilises Forth & Clyde Canal as a drainage conduit linking regeneration areas to River Kelvin
- Levering value from a Scheduled Ancient Monument
- Dynamic management of water level provides flood storage
- Alternative to £45m+ surface water tunnel


100mm depth =
57,000m3 storage
Bonny Water
FALKIRK
Lock 20
River Kelvin
CUMBERNAULD
LENZIE
River Clyde
Lock 21
Sighthill Regeneration
North Calder Water
GLASGOW
COATBRIDGE &
AIRDRIE

- ❑ Storm event predicted
- ❑ Canal isolated from Woodhall and Papermill Feeders
- ❑ Canal abstraction structures operated

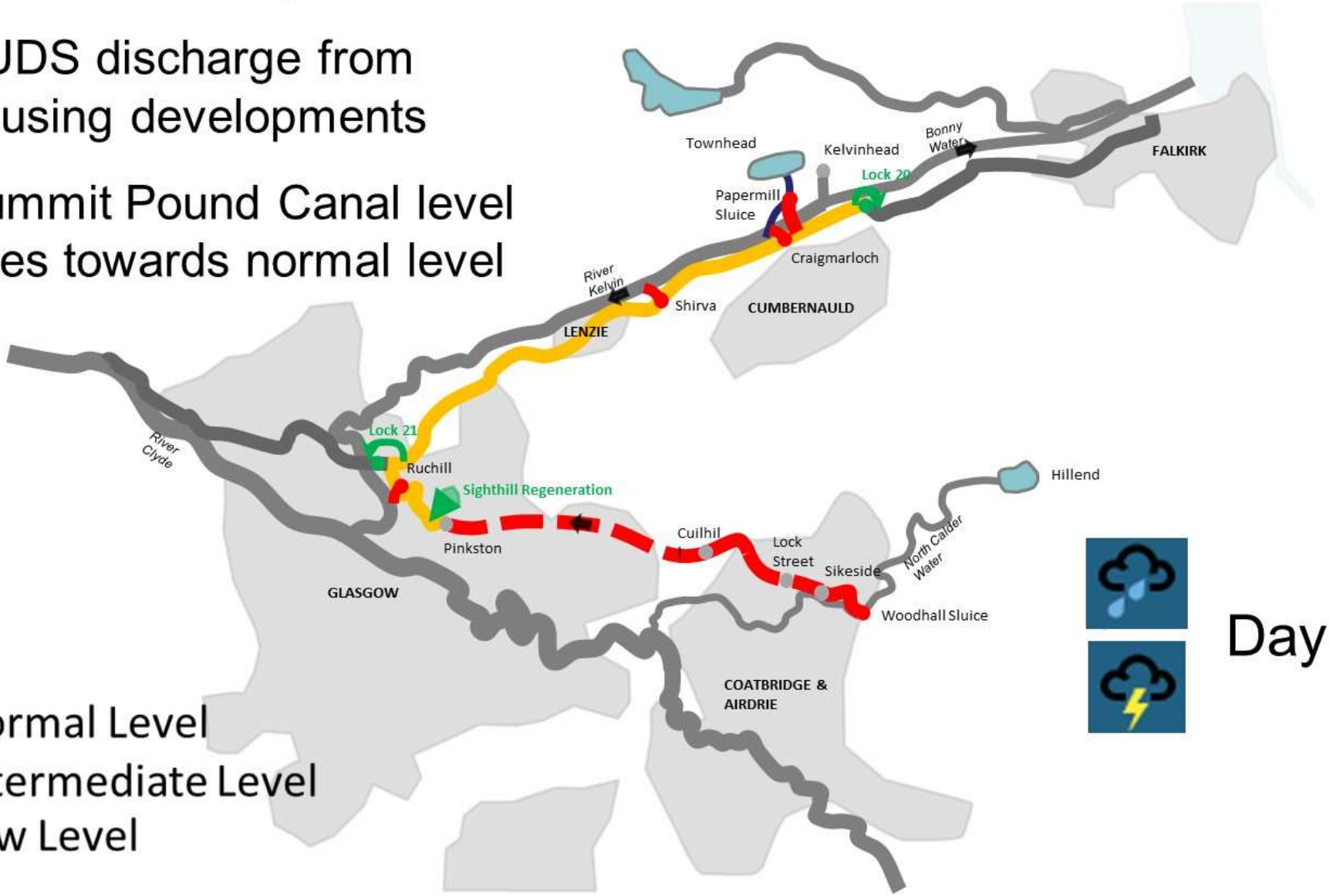


CANAL

- Normal Level
- Intermediate Level
- Low Level

Day 1

- ❑ Storm event begins
- ❑ SUDS discharge from housing developments
- ❑ Summit Pound Canal level rises towards normal level

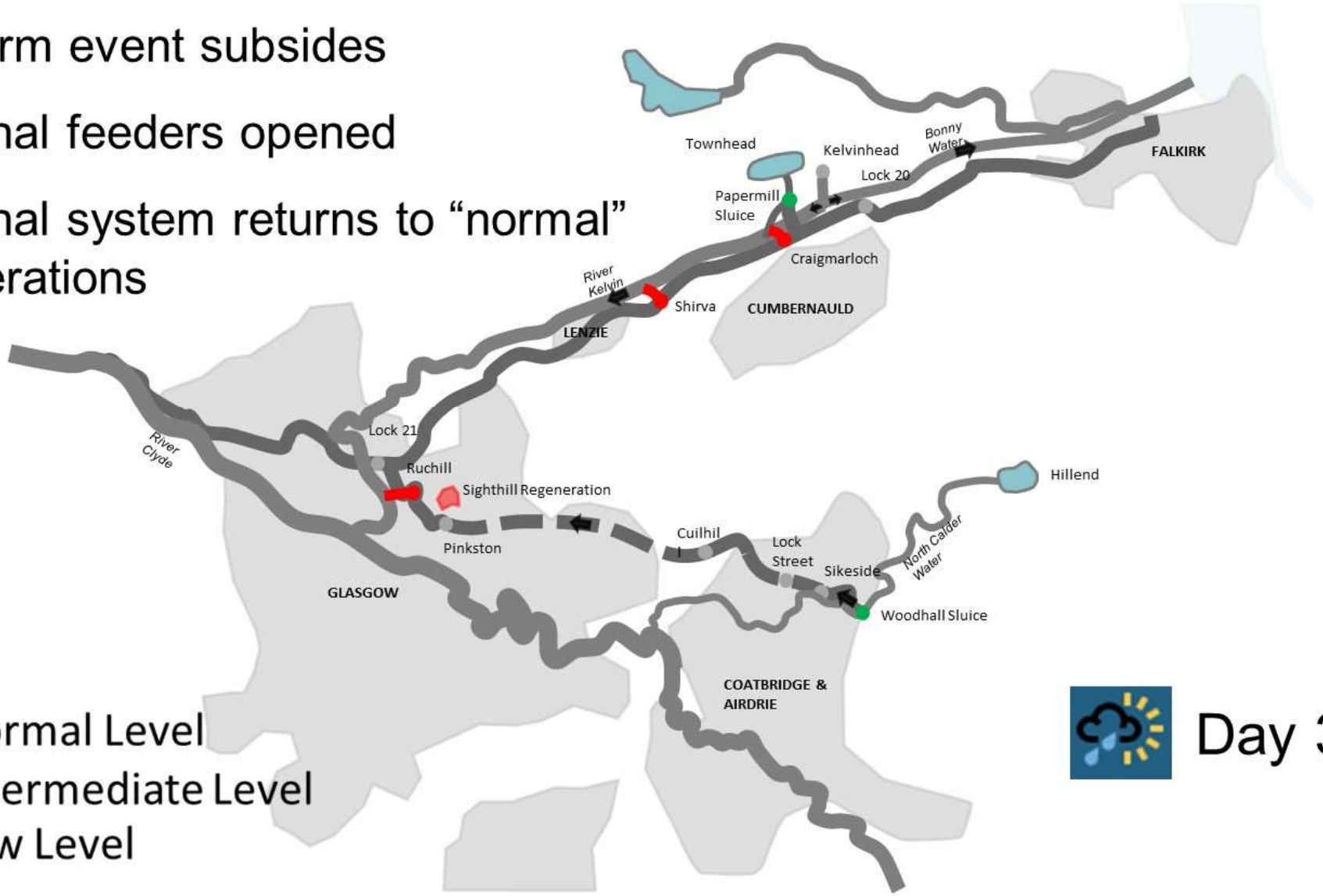


CANAL

- Normal Level
- Intermediate Level
- Low Level

Day 2

- ❑ Watercourses convey storm
- ❑ Storm event subsides
- ❑ Canal feeders opened
- ❑ Canal system returns to “normal” operations



CANAL

- Normal Level
- Intermediate Level
- Low Level

Day 3

The Metropolitan Glasgow Strategic Drainage Partnership

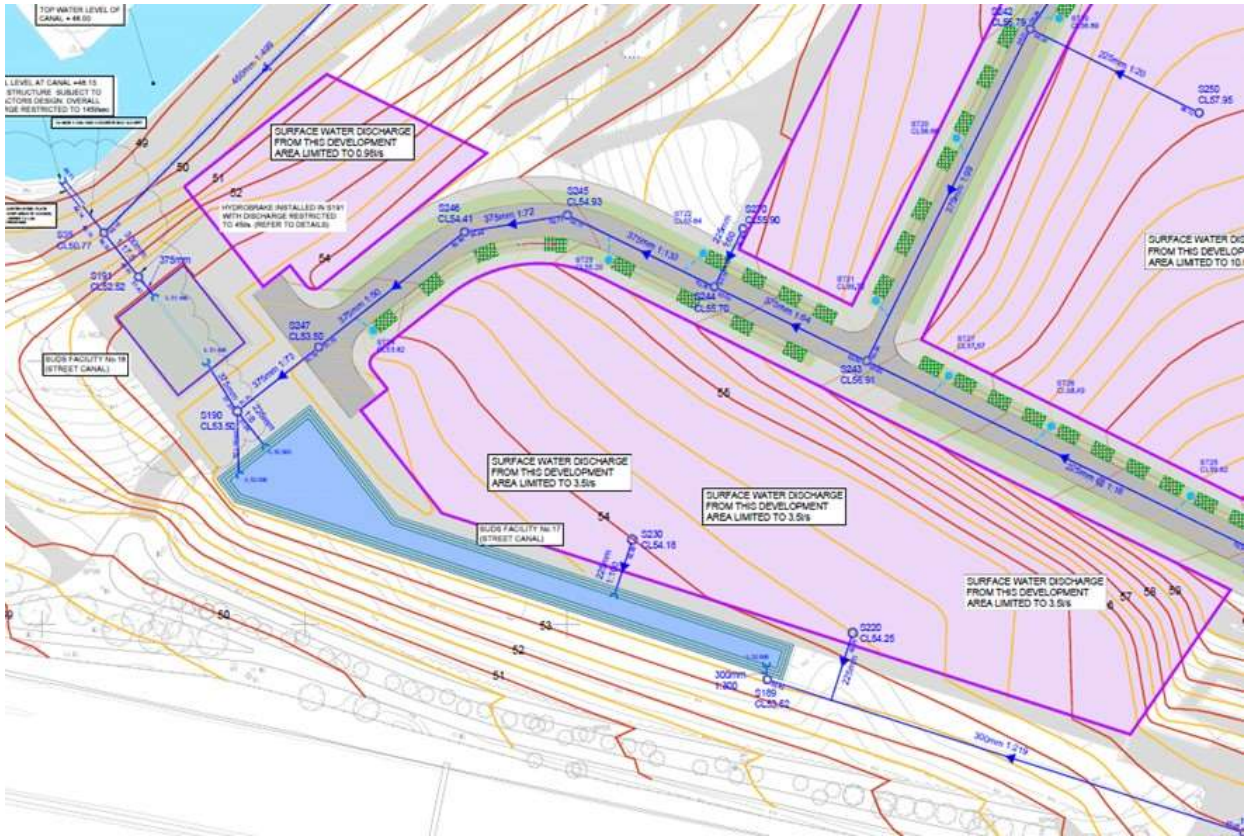
Sighthill TRA Regeneration

- 46ha masterplan led regeneration project
- Contract 1 – Remediation
- Contract 2 – Infrastructure including SuDS
- Keepmoat to deliver 826 new homes
- Community campus and park
- Links City Centre to North Glasgow

The Metropolitan Glasgow Strategic Drainage Partnership

Sighthill Regeneration

Northern SuDS Train



Canal Feature

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Common Theme?

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To Fence or Not to Fence?

For Fencing

- Reduces safety risk
- Delineates working space

Against Fencing

- Integrates with landscape
- Reduces maintenance burden
- Encourages risk learning

The Metropolitan Glasgow Strategic Drainage Partnership

The Challenges

- Drainage Partnership Agreement
- Funding (Capital & Revenue)
- Allocation of Risk
- Proving the Concept
- Masterplan vision vs Sewers for Scotland

The Metropolitan Glasgow Strategic Drainage Partnership

Lessons Learnt

- Seeing beyond the next stage
- Complex, tri-partite legal agreements take a long time
- Partnership working facilitates problem solving
- Cross cutting project has advantages and disadvantages
- Key messages need to reach the right people

The Metropolitan Glasgow Strategic Drainage Partnership

Future Drainage Structure?

The Metropolitan Glasgow Strategic Drainage Partnership

vs

Glasgow City HSCP
Health and Social Care Partnership

The Metropolitan Glasgow Strategic Drainage Partnership

Partnership Working and Innovation is Delivering Regeneration

David Hay, Group Manager, Glasgow City Council

Joint Approach to Optioneering in Merchant Quarter, Aberdeen

Will Burnish
Aberdeen City Council

Dawn Lochhead
Scottish Water

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Collaboration: integrated catchment partners

East Lothian Council

Renfrewshire Council

North Lanarkshire Council

Stirling Council

South Lanarkshire Council

Edinburgh – The City of Edinburgh Council

West Lothian Council

Falkirk Council

Midlothian

The Scottish Government – Riaghaltas na h-Alba

SEPA – Scottish Environment Protection Agency

Angus Council

South Ayrshire Council

Perth & Kinross Council

East Ayrshire Council

Fife Council

Dundee City Council

Aberdeenshire Council

North Ayrshire Council

The Highland Council – Comhairle na Gàidhealtachd

Aberdeen City Council

Inverclyde Council

Aberdeen City Council

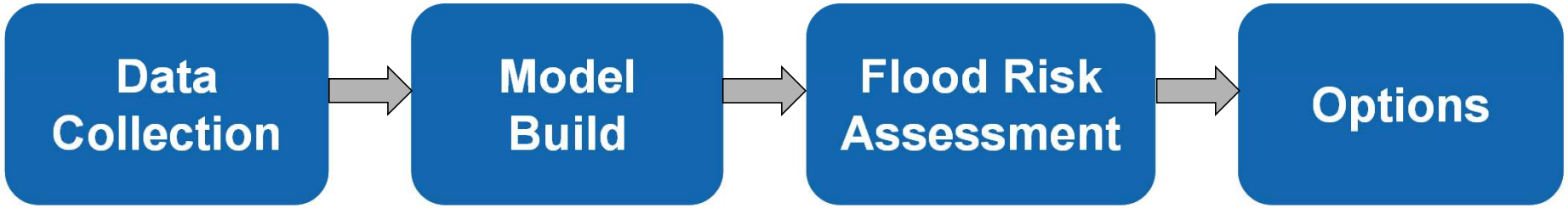
Scottish Water – Trusted to serve Scotland

Aberdeen Integrated Catchment Study

Purpose:

- Improve **knowledge** and understanding of the **urban drainage network**
- Identify **interactions** between **sewers, culverts, rivers** and the **sea**
- Better understand **flood risk** from all of these sources

ICS Process



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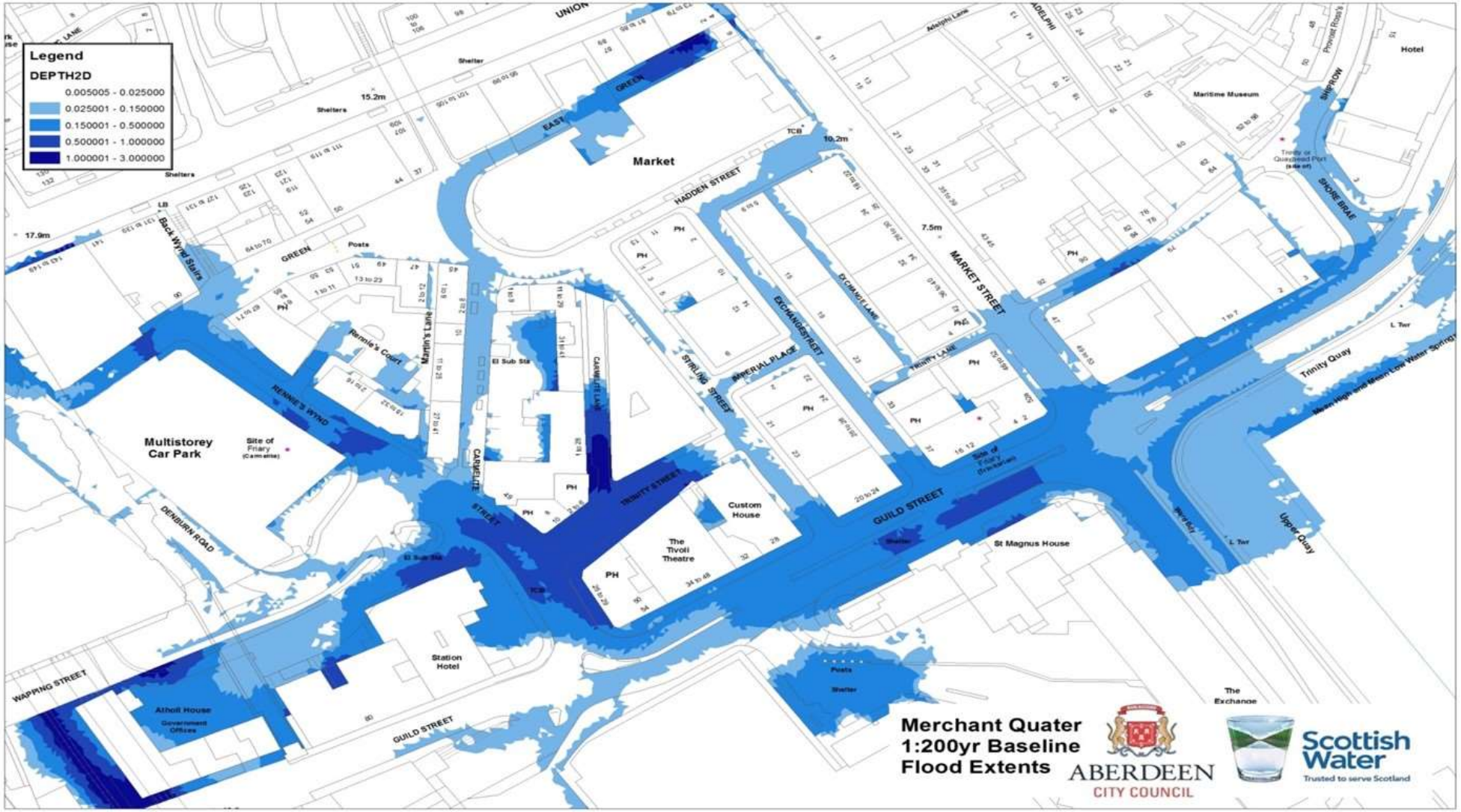
ABERDEEN
CITY COUNCIL

Scottish Water
Trusted to serve Scotland

MQ: Baseline flood risk



MQ: Project Aims

Key Performance Target:
0.5% probability event

Max150mm water on the street

Uninterrupted Business Use

Safe for pedestrians

No sewer flooding in 3.3% event

No water quality detriment

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MQ: Joint Project Governance

MQ Board	• Set project aims and outcomes • Approval technical documents, processes and solutions • Approved budgets
MQ Working Group	• Compliance with project aim and scope • Developed Technical Process and Design • Advice on Project Process

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MQ: Options Appraisal Process

Long list

- Workshop produced ~50 potential actions
- Above and below ground actions

Short list

- Refined long list to short list of possible actions
- Actions were grouped into combinations

Viable option

- 3 proposed options – combination of above/below ground actions
- Modelled to understand reduction in flood risk

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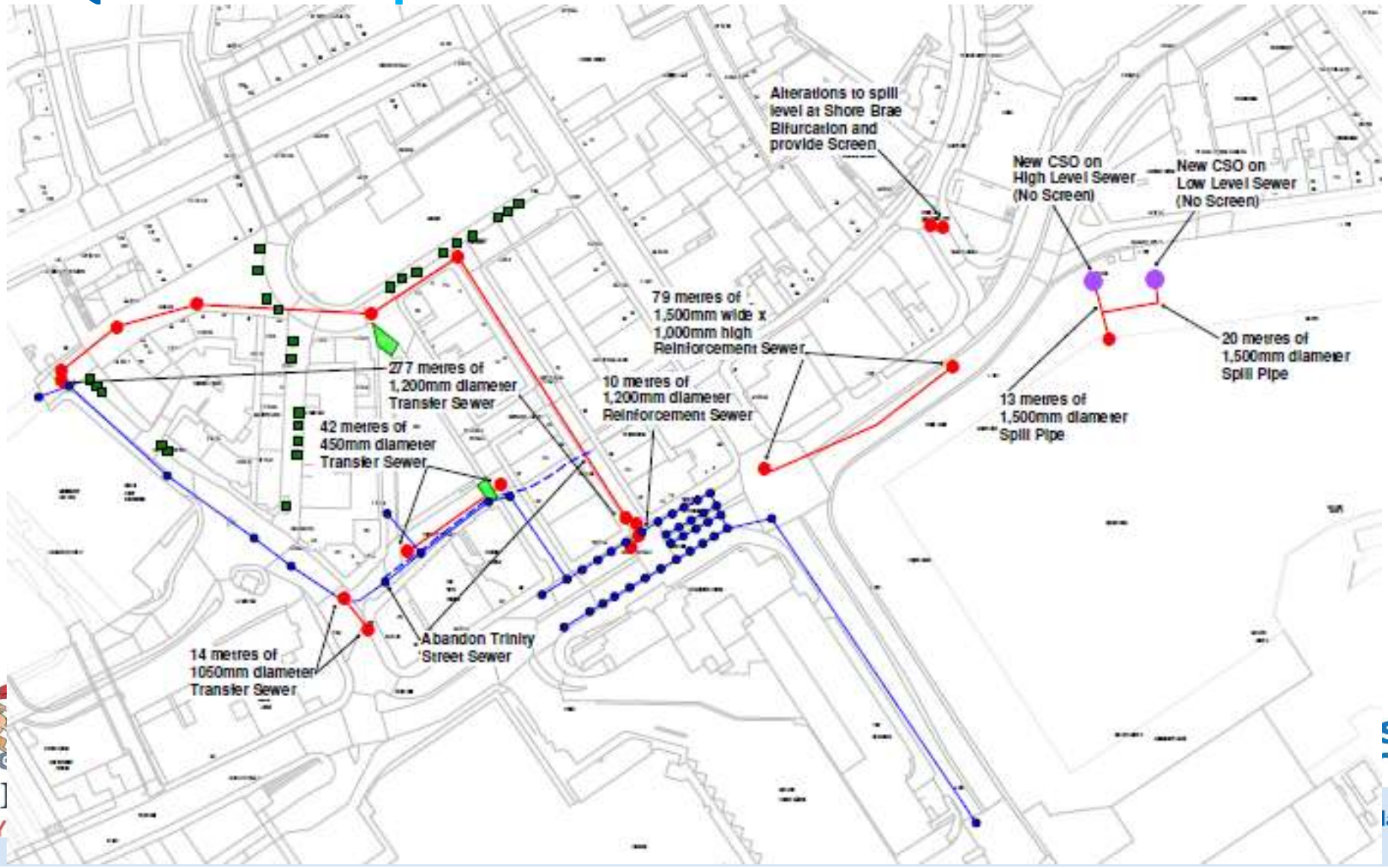
MQ: Options Appraisal Process

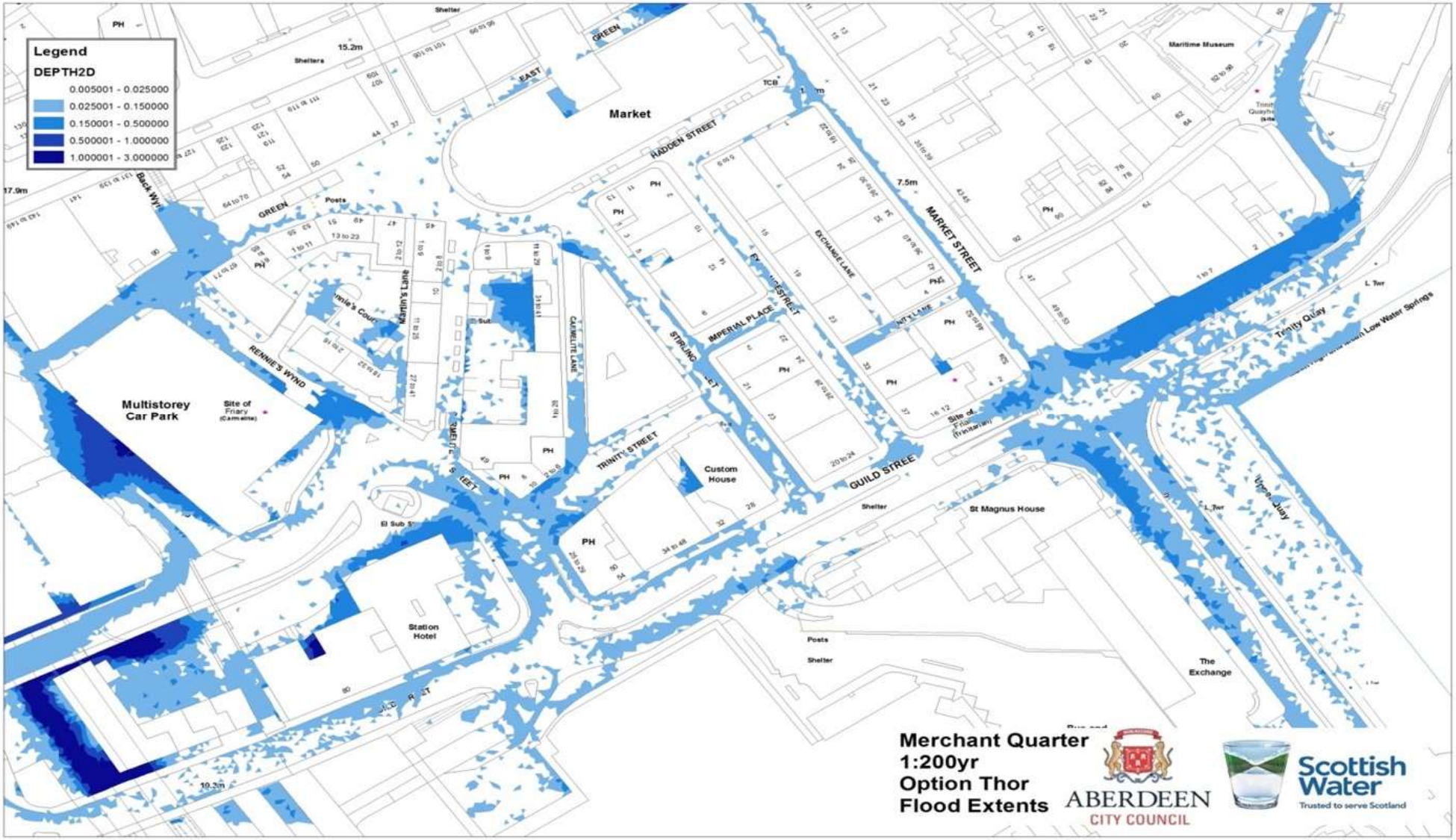
Project Name: Merchant Quarter Delivers Required Project Specific Benefits Are assessed (Low 0 - 5 High)	Baseline	Jupiter	Oden	Thor
uninterrupted business use (200yr)	0	2	4	4
able to access properties safely on foot (200yr)	0	2	4	4
no velocities that take people of their feet (200yr) - no greater than moderate hazard in 200yr, no > Low in 30yr	0			
no standing water in roads or footpaths after the event (200yr)	0	3	3	3
no flooding in the train and bus station and uninterrupted access to them (200yr)	0	3	3	3
hydraulic gradient in the drainage systems below ground level (200yr)	0	2	4	4
no flooding from combined sewers in a 1:30 year probability event.	0	1	4	3
not >150mm surface water in 200yr RP (assessed 10 locations)	0	2	3	3
Screen all CSO discharges up to a 1:5 year probability event (incl. climate change)	0	2	5	5
Meet long term water quality targets in the Den Burn	0	0	0	0
Consider the long term habitat improvements to the Den Burn to meet WFD targets				
Achieve Formula A pass forward flow at all CSOs in the Merchant Quarter catchment area to demonstrate compliance with the UWWTD.	0	1	1	4
Cost				
Estimated Capital Cost	£0.00	£4,040,520.00	£5,006,445.00	£5,370,656.00
Estimated cost of traffic disruption during construction	£0.00	£0.00	£0.00	£0.00
Estimated Annual Opex	£0.00	£2,000.00	£2,000.00	£2,000.00
Estimated Whole Life Cost	£0.00	£4,087,320.00	£5,053,245.00	£5,417,456.00
Expected annual flood damage cost	£176,263.00	£176,263.00	£15,761.00	£16,050.00
Expected annual cost of traffic disruption due to flooding	£162,721.00	£162,721.00	£0.00	£0.00
Estimated whole life damage costs	£7,932,225.60	£7,932,225.60	£368,807.40	£375,570.00
Estimated whole life total costs	£7,932,225.60	£12,019,545.60	£5,422,052.40	£5,793,026.00
Benefit Cost Ratio	**1.00**	**0.66**	**1.46**	**1.37**

MQ: Preferred Option



MQ: Preferred Option

MQ: Preferred Option residual risk



MQ: Ongoing challenges/next steps

Approvals governance: ACC & SW

Align funding opportunities

Early SW intervention effect on CBA

Phase/align delivery

Detailed design of option

Ensure community engagement

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Key messages

Joint working possible: **agreement of scope** of works

Focus on principles of **reducing the risk of flooding** to the public

Governance approach is **key to building trust** between organisations

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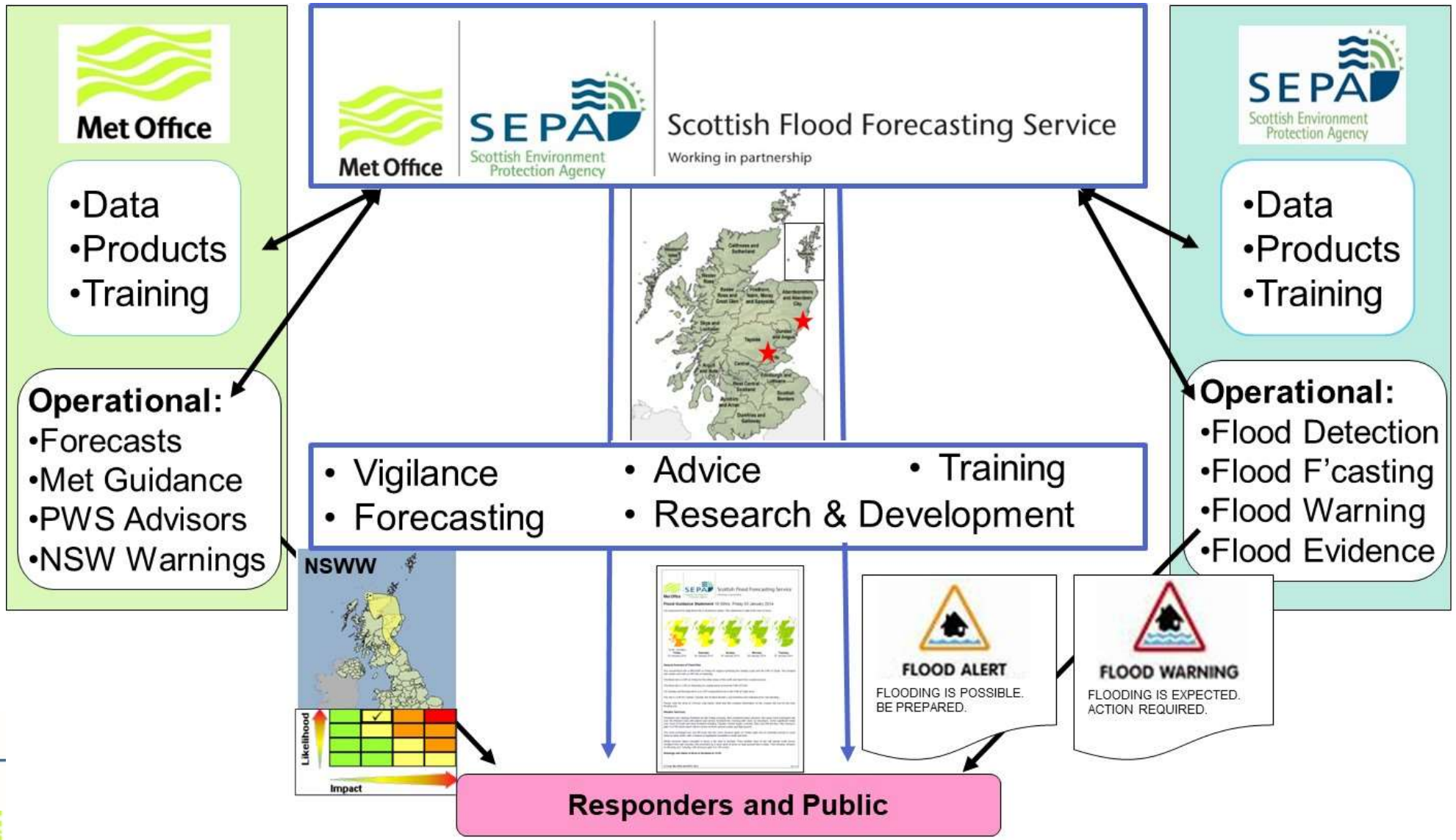
The SFFS Partnership & Surface Water Flood Forecasting In Scotland

Presenters:

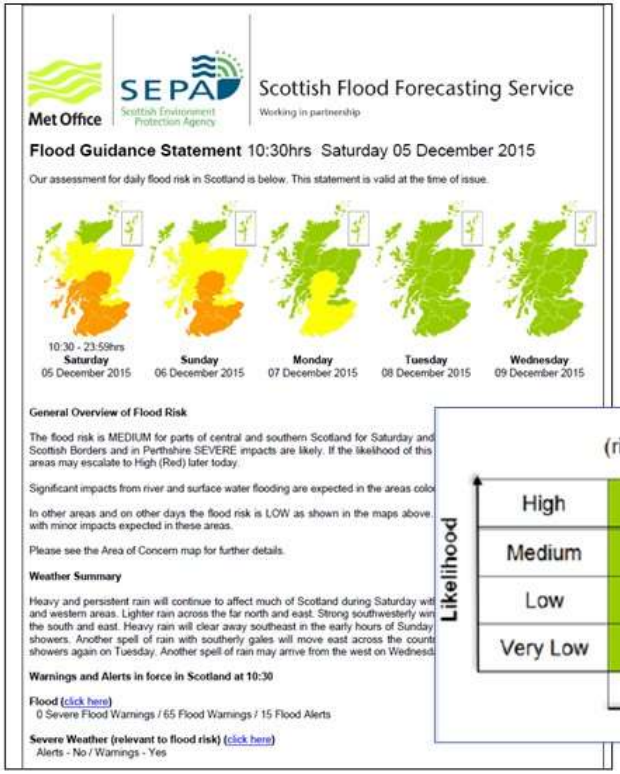
Diane McKain, Met Office

Louise Parry, SEPA

Scotland's Flood Risk Management Conference, 06/02/2018


Met Office
•Data
•Products
•Training
Operational:
•Forecasts
•Met Guidance
•PWS Advisors
•NSW Warnings
Met Office
SEPA
Scottish Environment Protection Agency
Scottish Flood Forecasting Service
Working in partnership
• Vigilance
• Forecasting
• Advice
• Research & Development
• Training
SEPA
Scottish Environment Protection Agency
•Data
•Products
•Training
Operational:
•Flood Detection
•Flood F'casting
•Flood Warning
•Flood Evidence
NSWW
Likelihood
Impact
FLOOD ALERT
FLOODING IS POSSIBLE.
BE PREPARED.
FLOOD WARNING
FLOODING IS EXPECTED.
ACTION REQUIRED.
Responders and Public

The Flood Guidance Statement (FGS)



Met Office | SEPA Scottish Environment Protection Agency | Scottish Flood Forecasting Service
Working in partnership

Flood Guidance Statement 10:30hrs Saturday 05 December 2015

Our assessment for daily flood risk in Scotland is below. This statement is valid at the time of issue.

10:30 - 23:59hrs
Saturday 05 December 2015 | **Sunday** 06 December 2015 | **Monday** 07 December 2015 | **Tuesday** 08 December 2015 | **Wednesday** 09 December 2015

General Overview of Flood Risk

The flood risk is MEDIUM for parts of central and southern Scotland for Saturday and Scottish Borders and in Perthshire SEVERE impacts are likely. If the likelihood of this areas may escalate to High (Red) later today.

Significant impacts from river and surface water flooding are expected in the areas colo

In other areas and on other days the flood risk is LOW as shown in the maps above. with minor impacts expected in these areas.

Please see the Area of Concern map for further details.

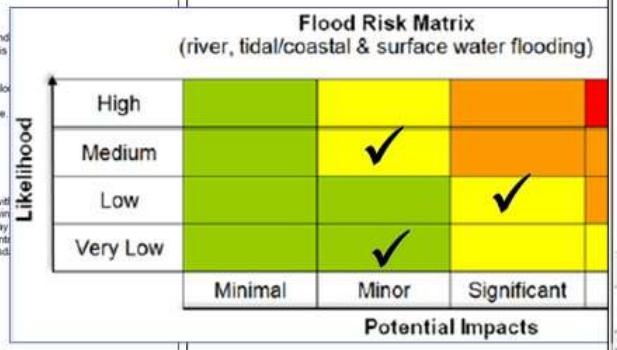
Weather Summary

Heavy and persistent rain will continue to affect much of Scotland during Saturday wit and western areas. Lighter rain across the far north and east. Strong southwesterly win the south and east. Heavy rain will clear away southeast in the early hours of Sunday showers. Another spell of rain with southerly gales will move east across the count showers again on Tuesday. Another spell of rain may arrive from the west on Wednesd

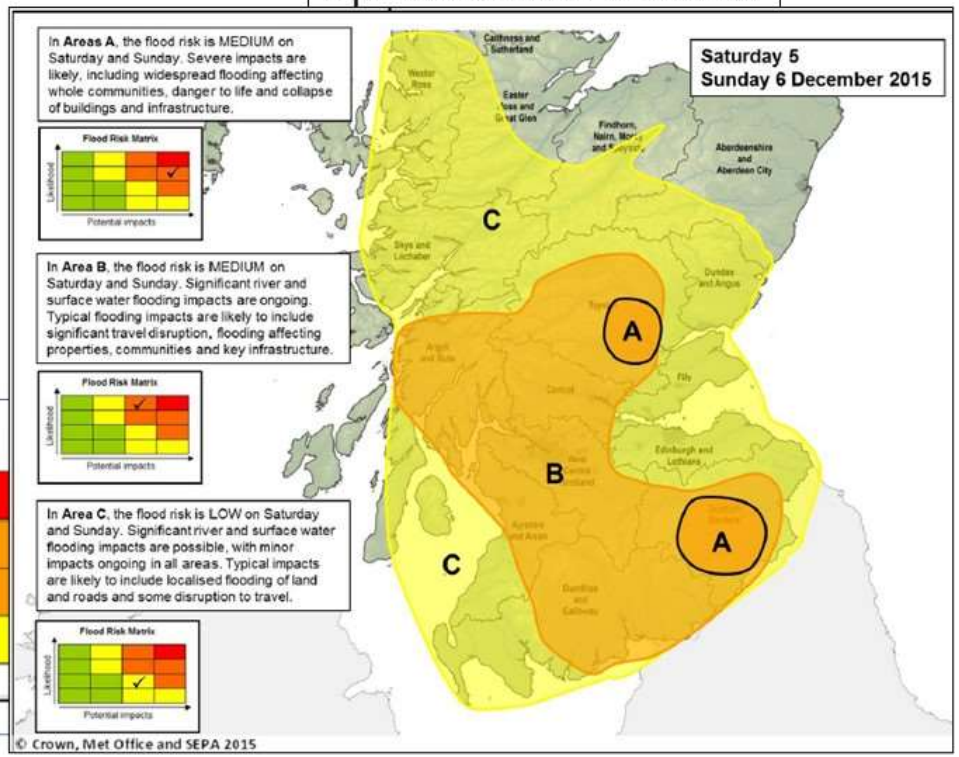
Warnings and Alerts in force in Scotland at 10:30

Flood (click here)
0 Severe Flood Warnings / 65 Flood Warnings / 15 Flood Alerts

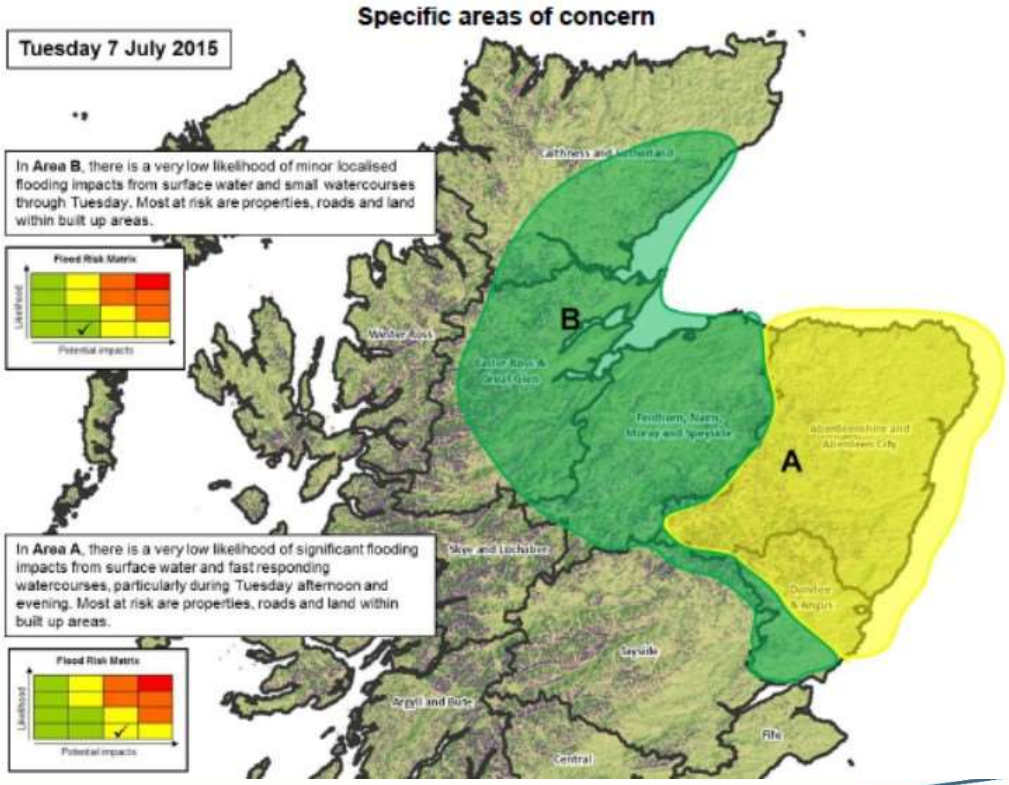
Severe Weather (relevant to flood risk) (click here)
Alerts - No / Warnings - Yes



Specific Area of Concern



The Flood Guidance Statement (FGS) Example- Surface Water

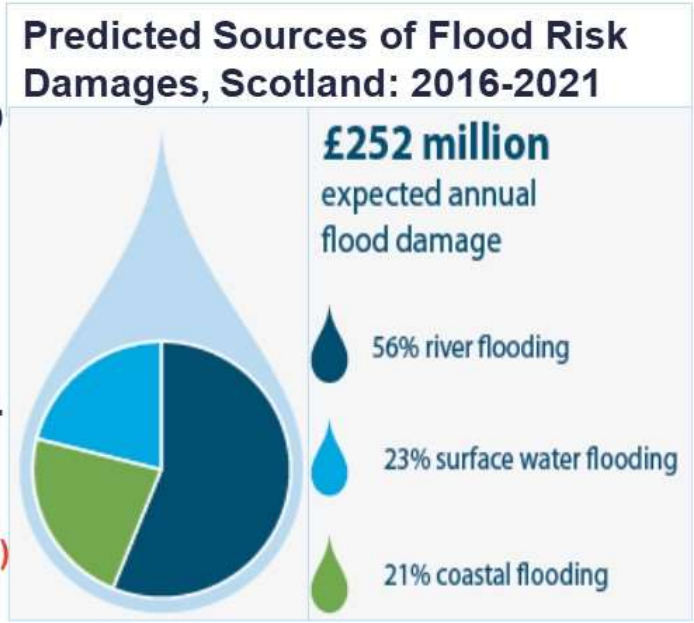


Surface Water Flooding (SWF)

a.k.a. Pluvial Flooding

Definition:
Overland flow or ponding

- Occurs when rainwater does not (cannot) drain away through drainage systems or by soaking into the ground
- Often results from heavy showers and thunderstorms where intense rainfall can overwhelm local drainage: natural and man-made.
- **23% of flood damages estimated to be from SWF in Scotland between 2016-21** (FRM Strategy, 2015)



The Challenges of SWF Forecasting

Difficult to predict or pinpoint, much more so than fluvial or coastal flooding because:

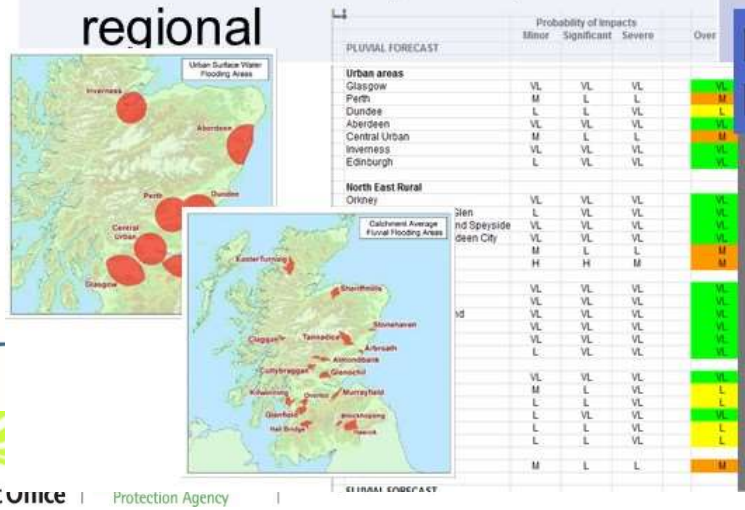
- Local system conditions affect it
  - E.g. level of the river/tidal levels reducing sewer outflows, etc
- Temporal conditions affect it
  - e.g. autumn fallen leaves and tree debris, antecedent rainfall
- Typically driven by convective rainfall events
- Complex modelling requirements to be forecast well in an urban environment

Operational SWF Forecasting: Present

2011 — Present — >2020

Where we were…

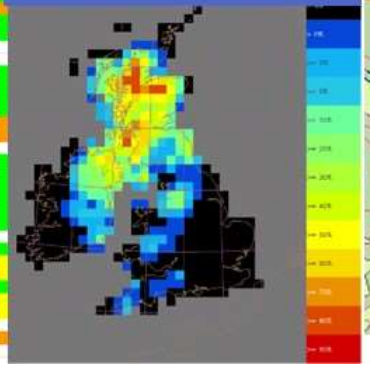
- Guideline rainfall depth-duration thresholds
- Probabilistic Heavy Rainfall Alert (HRA) tool-regional



Where we are…

- HRA tool: regional, cities, rapid response catchments
- MOGREPS-UK forecasts
- FEWS Glasgow

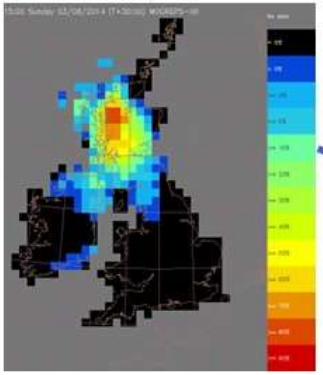
HRA & MOGREPS- UK



FEWS Surface Water Example (17/7/15)
risk to Transport (L); People and Property (R)

Where we're going...

Glasgow Pilot, Summer 2014

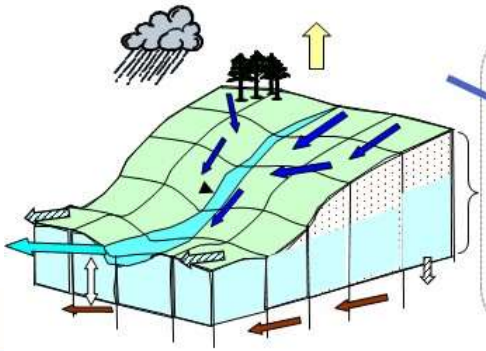


- Built on early work of the Natural Hazards Partnership SWF Hazard Impact Model (HIM) work

Forecast rainfall
Blended ensemble and Nowcast ensemble

Library
SEPA's regional pluvial flood maps and impact assessments

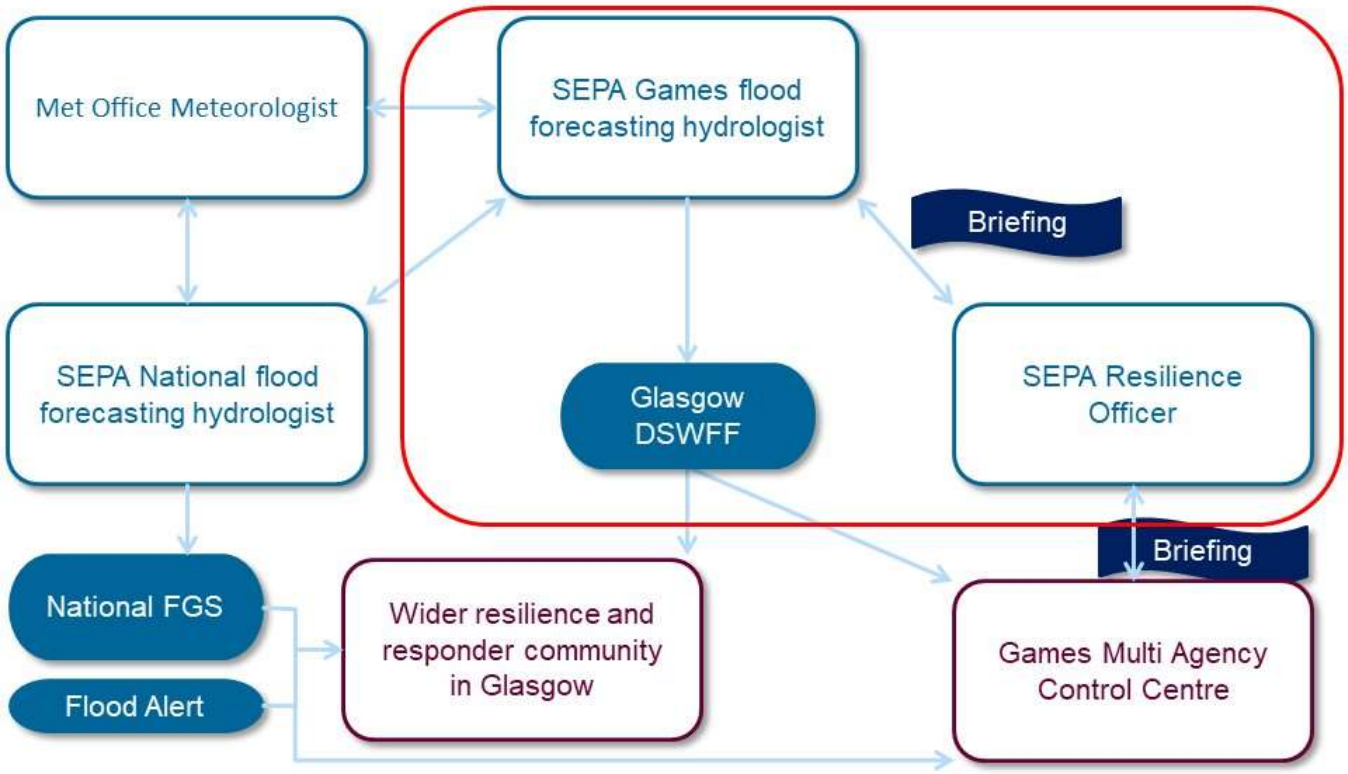
Flood Risk
Assess overall flood risk

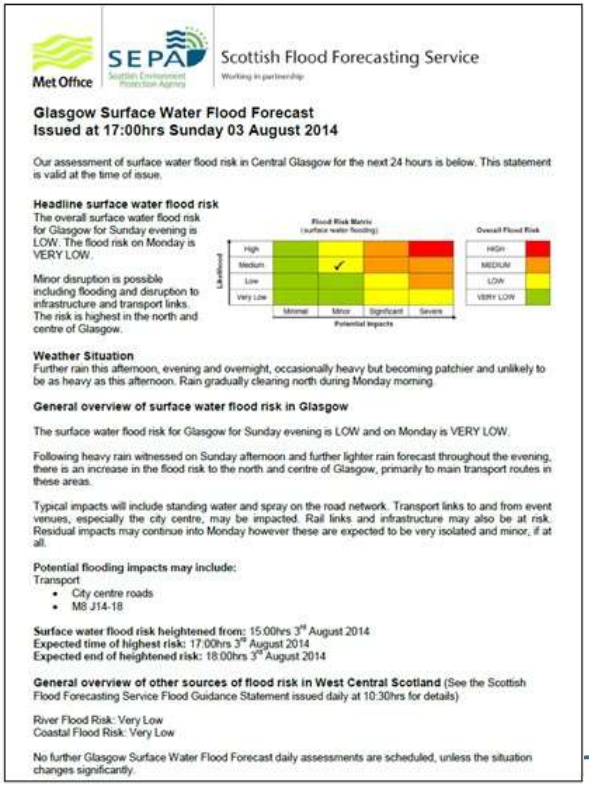


FEWS Surface Water Example (17/7/15)
risk to Transport (L); People and Property (R)

Probability
How many members exceed the thresholds?

SFFS: Glasgow Games Operations





Met Office | SEPA Scottish Environment Protection Agency | Scottish Flood Forecasting Service

Working in partnership

Glasgow Surface Water Flood Forecast
Issued at 17:00hrs Sunday 03 August 2014

Our assessment of surface water flood risk in Central Glasgow for the next 24 hours is below. This statement is valid at the time of issue.

Headline surface water flood risk

The overall surface water flood risk for Glasgow for Sunday evening is LOW. The flood risk on Monday is VERY LOW.

Minor disruption is possible including flooding and disruption to infrastructure and transport links. The risk is highest in the north and centre of Glasgow.

Flood Risk Matrix (surface water flooding)

Likelihood	Minimal	Minor	Significant	Severe
High				
Medium		✓		
Low				
Very Low				

Potential Impacts

Overall Flood Risk: HIGH / MEDIUM / LOW / VERY LOW

Weather Situation

Further rain this afternoon, evening and overnight, occasionally heavy but becoming patchier and unlikely to be as heavy as this afternoon. Rain gradually clearing north during Monday morning.

General overview of surface water flood risk in Glasgow

The surface water flood risk for Glasgow for Sunday evening is LOW and on Monday is VERY LOW.

Following heavy rain witnessed on Sunday afternoon and further lighter rain forecast throughout the evening, there is an increase in the flood risk to the north and centre of Glasgow, primarily to main transport routes in these areas.

Typical impacts will include standing water and spray on the road network. Transport links to and from event venues, especially the city centre, may be impacted. Rail links and infrastructure may also be at risk. Residual impacts may continue into Monday however these are expected to be very isolated and minor, if at all.

Potential flooding impacts may include:

Transport
- City centre roads
- M8 J14-18

Surface water flood risk heightened from: 15:00hrs 3rd August 2014
Expected time of highest risk: 17:00hrs 3rd August 2014
Expected end of heightened risk: 18:00hrs 3rd August 2014

General overview of other sources of flood risk in West Central Scotland (See the Scottish Flood Forecasting Service Flood Guidance Statement issued daily at 10:30hrs for details)

River Flood Risk: Very Low
Coastal Flood Risk: Very Low

No further Glasgow Surface Water Flood Forecast daily assessments are scheduled, unless the situation changes significantly.

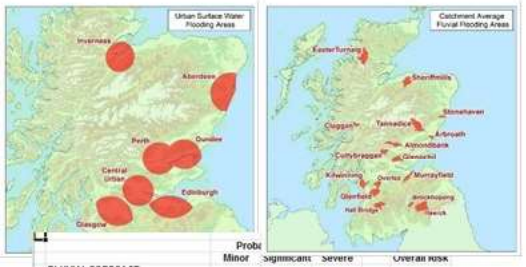
Feedback from Glasgow Pilot

- Review of runoff thresholds required and of the impacts library, including inclusion of additional receptor information
- Extension of forecasting period
- Improvement in graphics to improve interpretation and aid identification of inter-forecast variation
- The level of resource and level of service expected needs to be balanced in a wider roll-out in alignment with the risk

Forecasting SWF: Future

2011 | 2015/16 | >2020

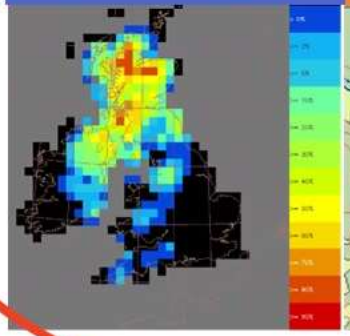
Where we were…



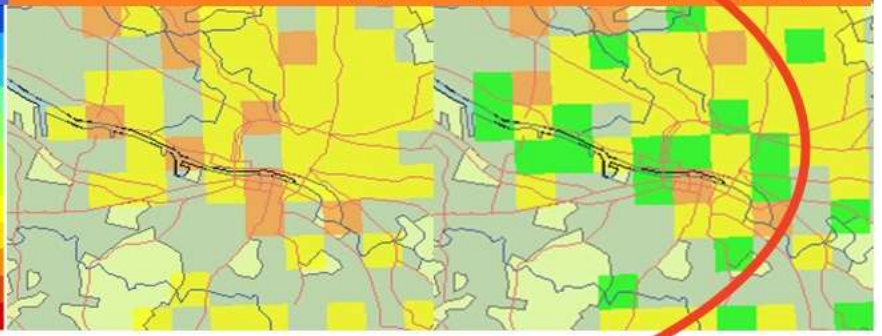
PLUVIAL FORECAST	Minor	Significant	Severe	Overall Risk
Urban areas				
Glasgow	VL	VL	VL	VL
Perth	M	L	L	M
Dundee	L	L	VL	L
Aberdeen	VL	VL	VL	VL
Central Urban	M	L	L	M
Inverness	VL	VL	VL	VL
Edinburgh	L	VL	VL	VL
North East Rural				
Orkney	VL	VL	VL	VL
Easter Ross and Great Glen	L	VL	VL	VL
Findhorn, Nairn, Moray and Speyside	VL	VL	VL	VL
Aberdeenshire and Aberdeen City	VL	VL	VL	VL
Central	M	L	L	M
Tayside	H	H	M	M
North West				
Wester Ross	VL	VL	VL	VL
Argyll and Bute	VL	VL	VL	VL
Caithness and Sutherland	VL	VL	VL	VL
Shetland	VL	VL	VL	VL
Western Isles	VL	VL	VL	VL
Skye and Lochaber	L	VL	VL	VL
Eastern & Central Belt				
Ayrshire and Arran	VL	VL	VL	VL
Fife	M	L	VL	L
West Central Scotland	L	L	VL	L
Scottish Borders	L	VL	VL	VL
Edinburgh and Lothians	L	L	VL	L
Dundee and Angus	L	L	VL	L
South West				
Dumfries and Galloway	M	L	L	M

Where we are…

HRA & MOGREPS- UK



FEWS Surface Water Example (17/7/15)
risk to Transport (L); People and Property (R)



Where we're going?...

a robust, verified and risk appropriate service

meet end-user needs within resource and science capability.

Met Office | Protection Agency

d Warning

To Develop the SWF Forecasting Service We need ….

1. A better idea of the end-user service level requirements
2. Better understanding of the computational, time and monetary costs of the service at a national level
3. To enable better observations and modelling of rainfall and of surface water impacts
4. To improve communication of risk to the end-user, including the public.
5. Better information on the causes and impacts of SWF

1: Service Level Requirements & 2: National Scale Developments

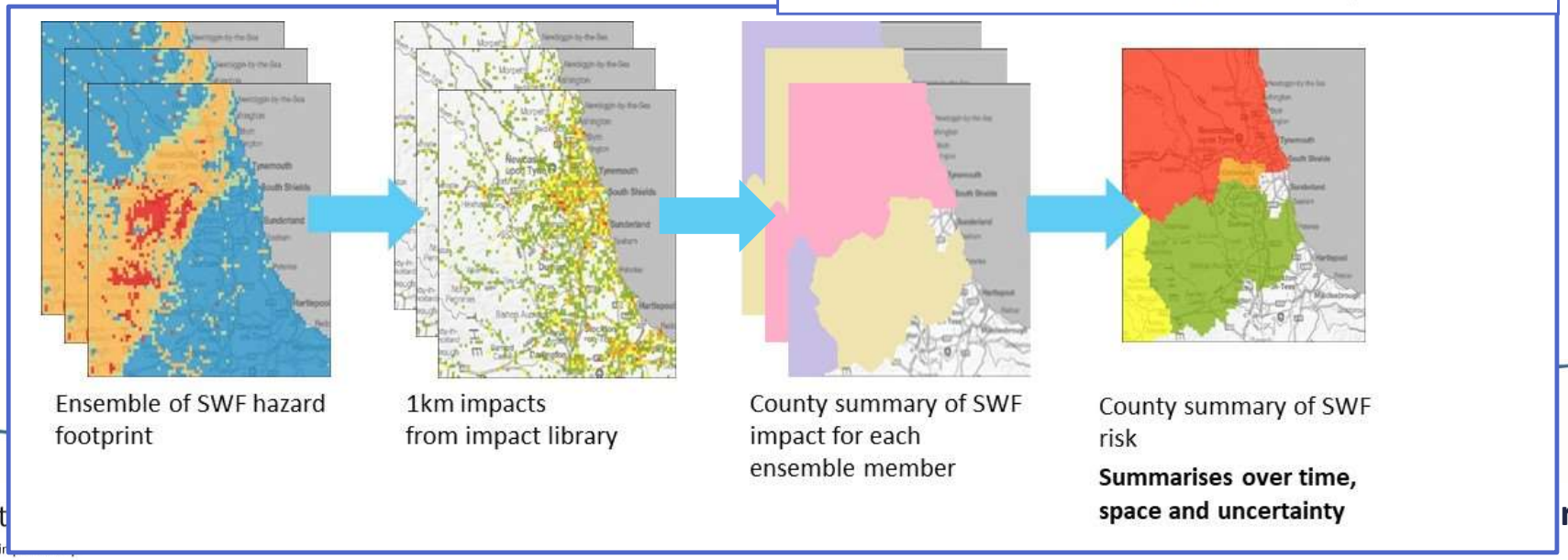
- NFRA update (2018) and Surface Water Hazard Map Updates
- HRA Tool Development
  - Review of thresholds
- Stakeholder Workshops
  - Discussion of options, e.g. focus on cities, transport network etc
  - Requirements of the service for this hazard

2: National SWF HIM Pilot- England & Wales

- Similar approach to Glasgow Pilot, but with developments
- Major changes to how the impacts are evaluated and how results are displayed

FLOODFORECASTINGCENTRE

a working partnership between Environment Agency | Met Office



Met Office | SEPA Scottish Environment Protection Agency | Scott

Working in

rning

3: Improvements to Rainfall Observations & Modelling

15 OPERATIONAL RADARS

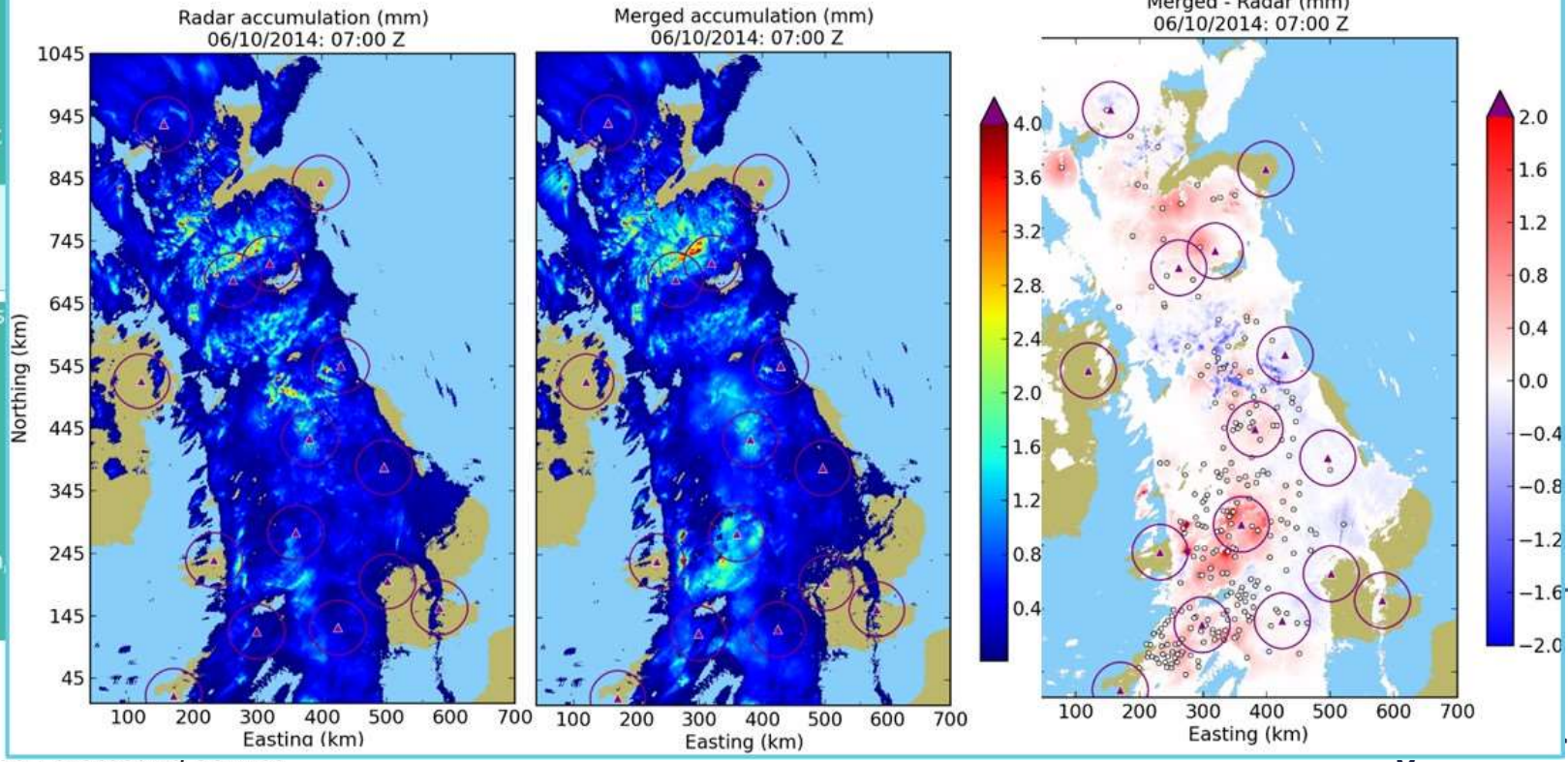
...provide coverage over more than 99% of the UK and detect precipitation in real time.

Radar Developments

Our new dual-polarisation radars

...can discriminate between rain, snow and hail and provide improved rainfall estimates.

Development of a Radar- Rain Gauge Merged Product



Met Office | Scottish Environment Protection Agency | Working in partnership

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4: Effective Communication

- Crew Project: ***Effectiveness of Scotland's public flood warning service.*** Community Flood Alerting Session, 3pm.
  - review of messaging for public
  - feeds into the developments of a future public facing FGS (FW Framework, 2016-2021)
  - **Results:** Local/specific information required
  - **Results:** Clear messaging required
- NSWWS Changes
- Management of public expectations required.

4: Effective Communication

Next Generation NSWWS – March 2018

What to expect:

- ‘Headline’ (140 characters)
- ‘What to expect’
- ‘Further details’
- Focussed local display
- ‘Thunderstorms’ and ‘Lightning’ - new warning elements
- 7 day warning capability

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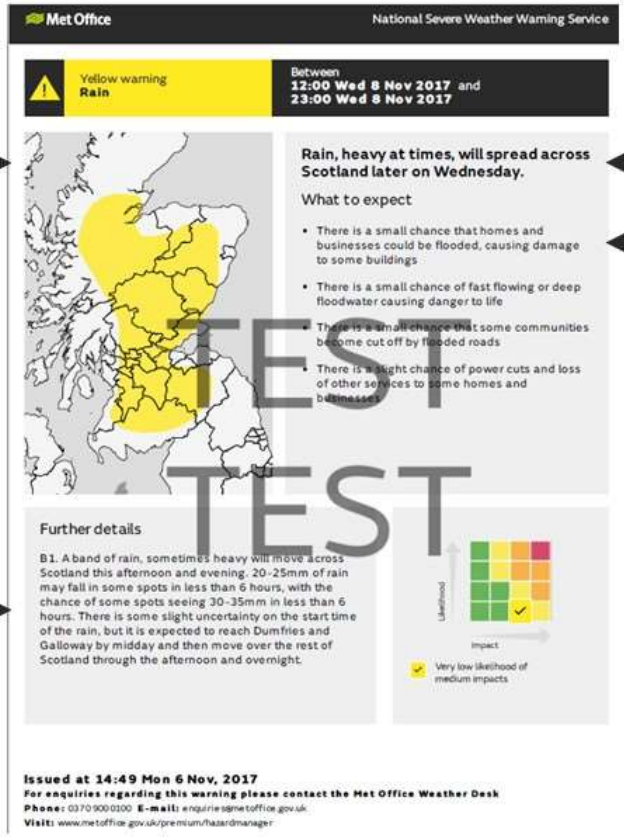
4: Effective Communication

Map scaled to warning area

Next Gen NSWWS – PDF test

Further details



Headline

What to expect

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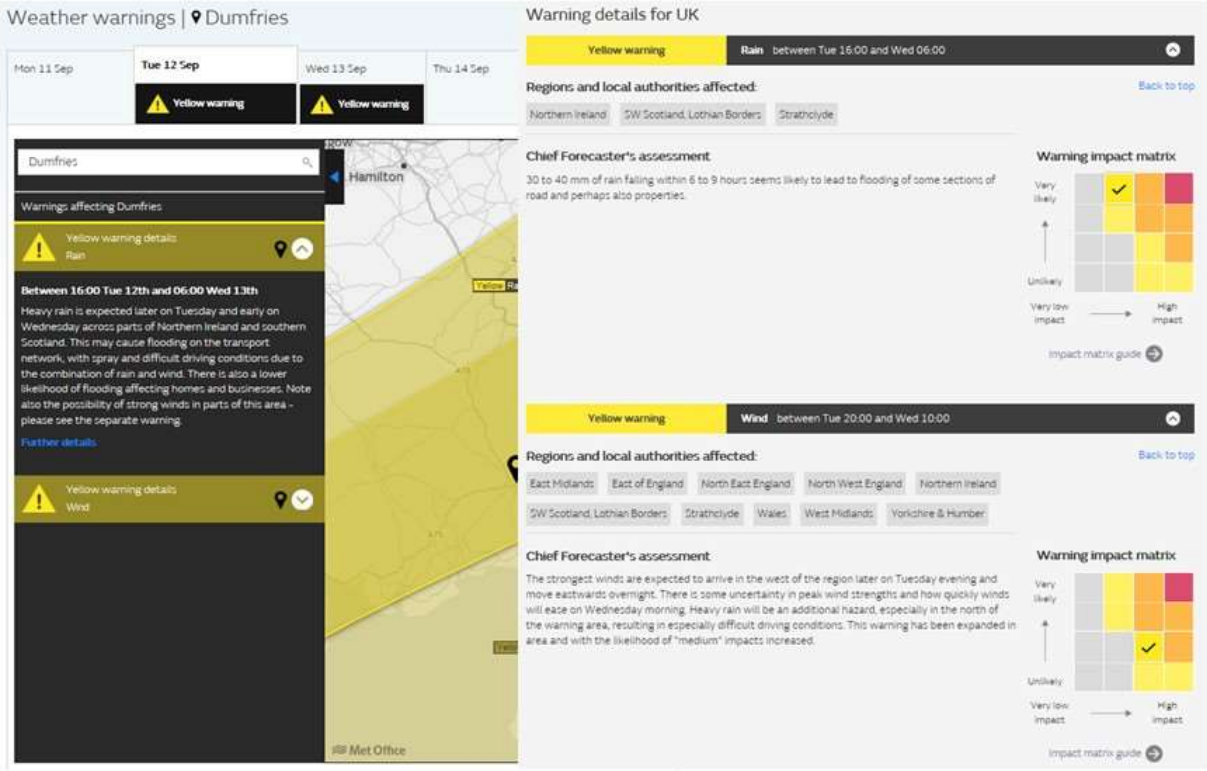
4: Effective Communication

Local Display



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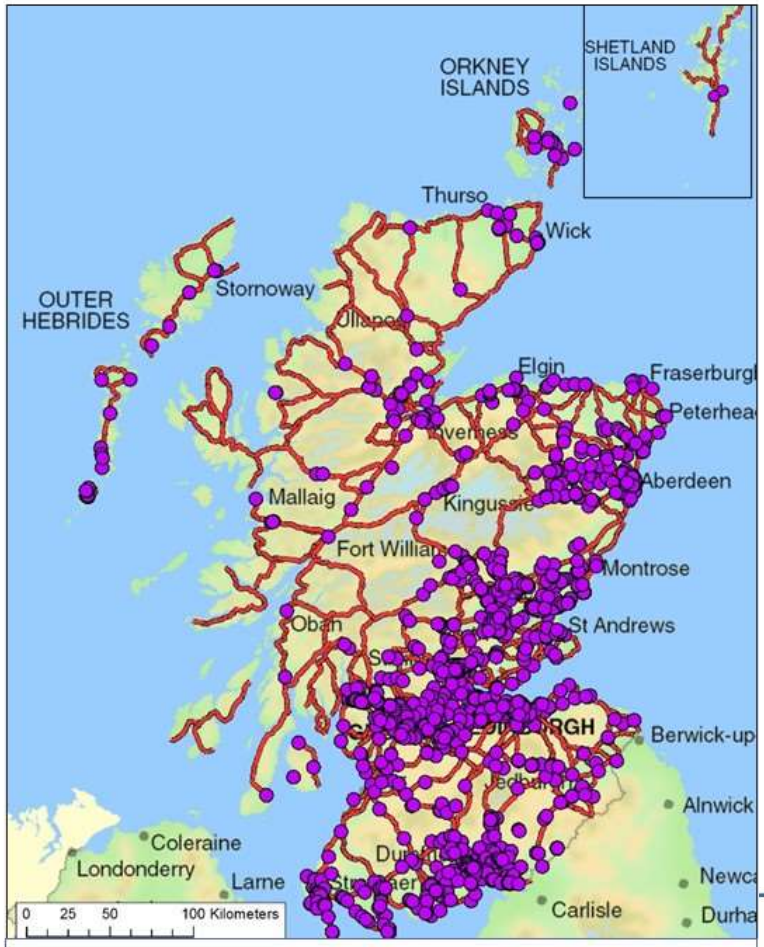
5: Surface Water Flooding Causes & Impacts

- Observed Flood Event Database (OFED)
- Report- A- Flood
- Surface Water Hazard Map Development
- ***What is important to you? What are we forecasting for?***



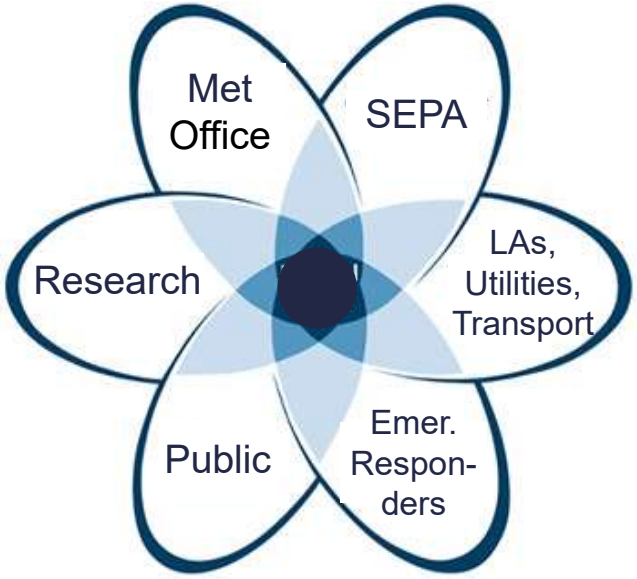
Reported Pluvial Events since 2010 (OFED)

Met Office

Key Messages

- **The success of a SWF forecasting service depends heavily on the engagement of the appropriate stakeholders and end-users**
- It has to meet the needs of end-users within resource and science capability.
- The science is evolving; we need to future proof the service.
- Manage expectations through effective communications
- the sustained investment required to support a robust, verified and risk appropriate operational system should not be underestimated.

Working together



Working together to manage flood risk

Flood Risk Management Conference 2018

5 – 6 February 2018

Follow the conversation on Twitter at #FRM2018
Wifi network: WiFi Guest

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knowledge brokers
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