



Welcome to the Severn Estuary Forum 2022!



Housekeeping



Go to www.menti.com and use the code 5793 0989



Session 1 – Adaptation and Resilience:

John Buttivant
Coastal Engineer/Severn Estuary Coastal Group Chair
Environment Agency



PARTNERIAETH MOR HAFFREN SEVERN ESTUARY PARTNERSHIP

Severn Estuary Partnership Forum 2022



Bristol Avon Flood Strategy

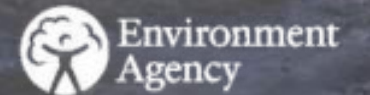
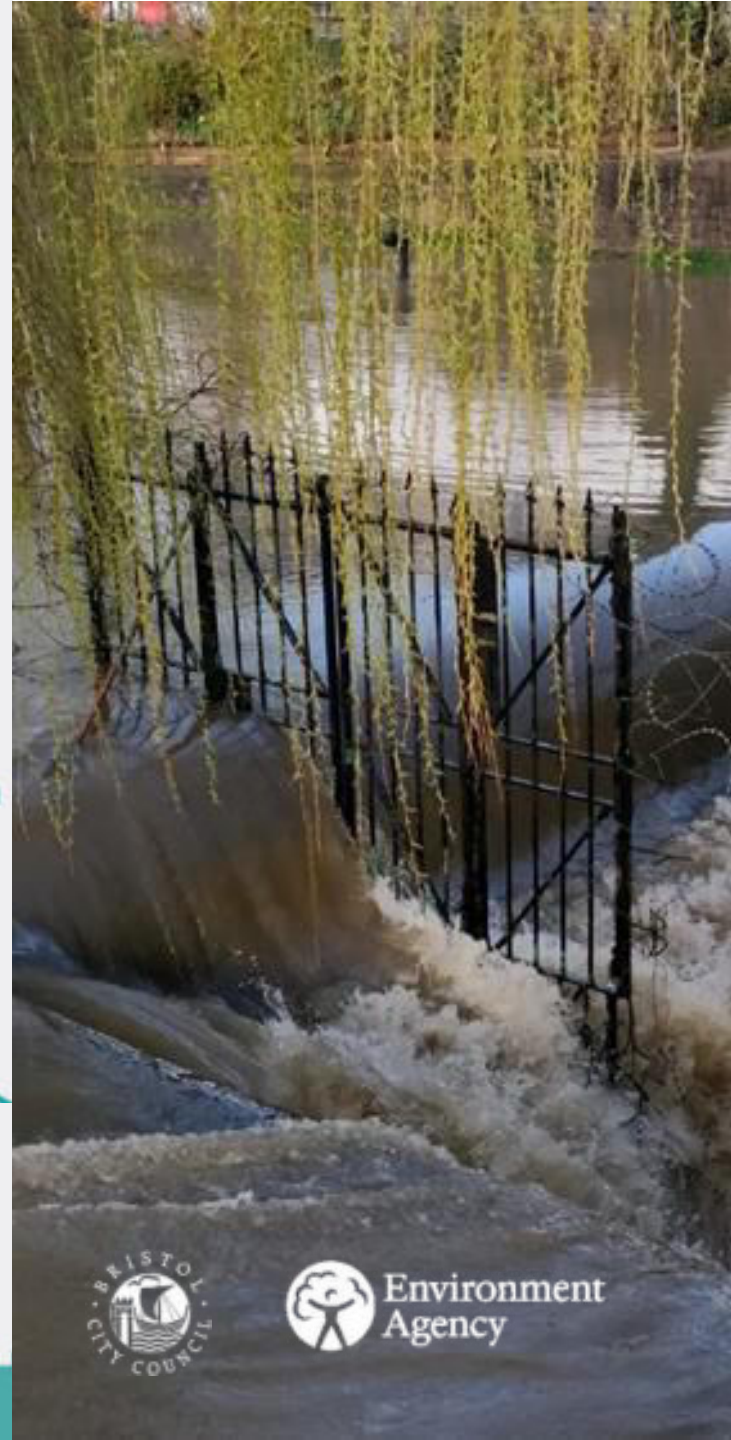
Shaun Hartley, Project Director for Bristol City Council

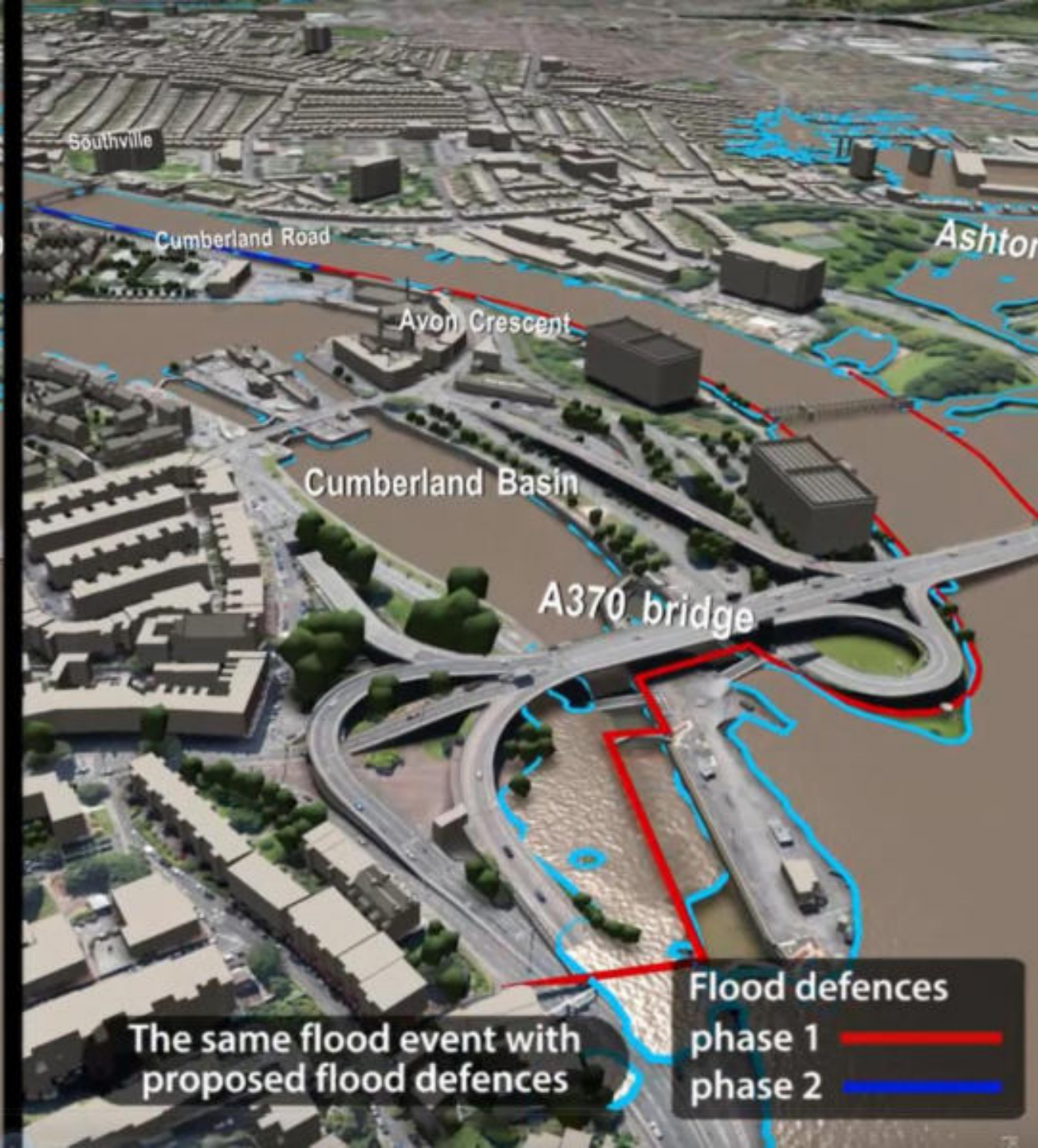
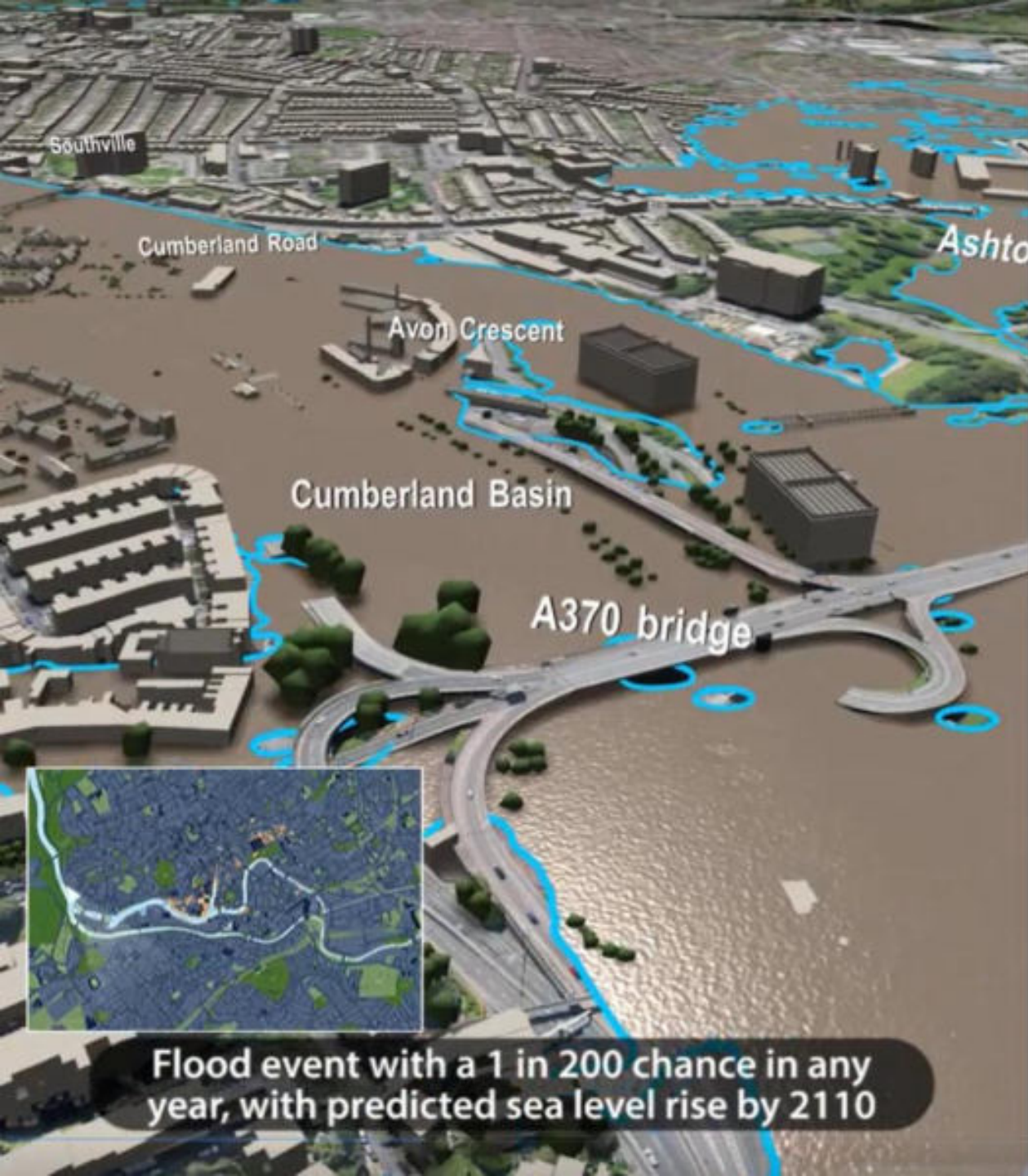
Better protecting people and property from flooding

Future-proofing Bristol and neighbouring communities; enabling a greener, more active city; and unlocking our city's potential.



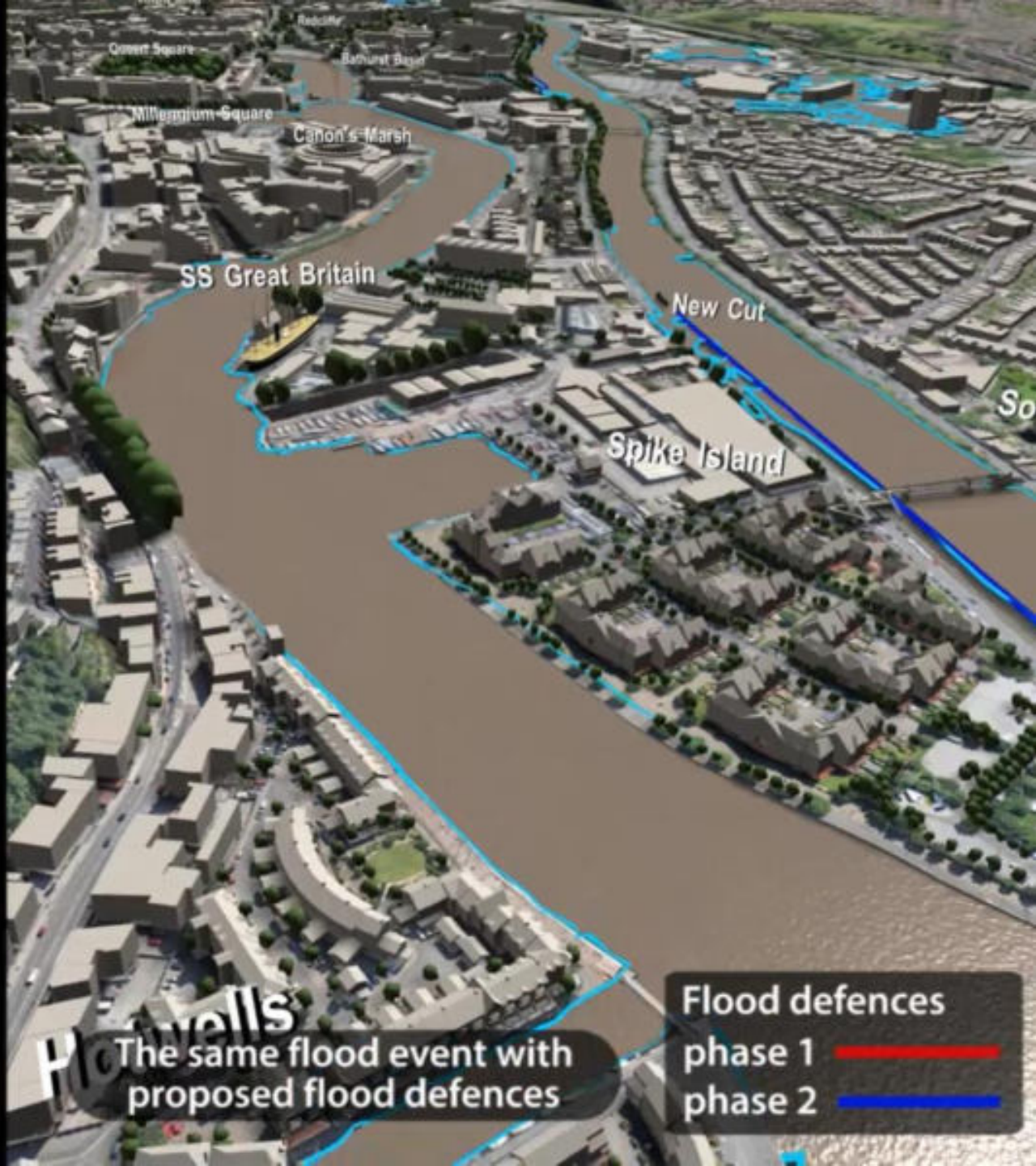
www.bristol.gov.uk/bristolavonflood









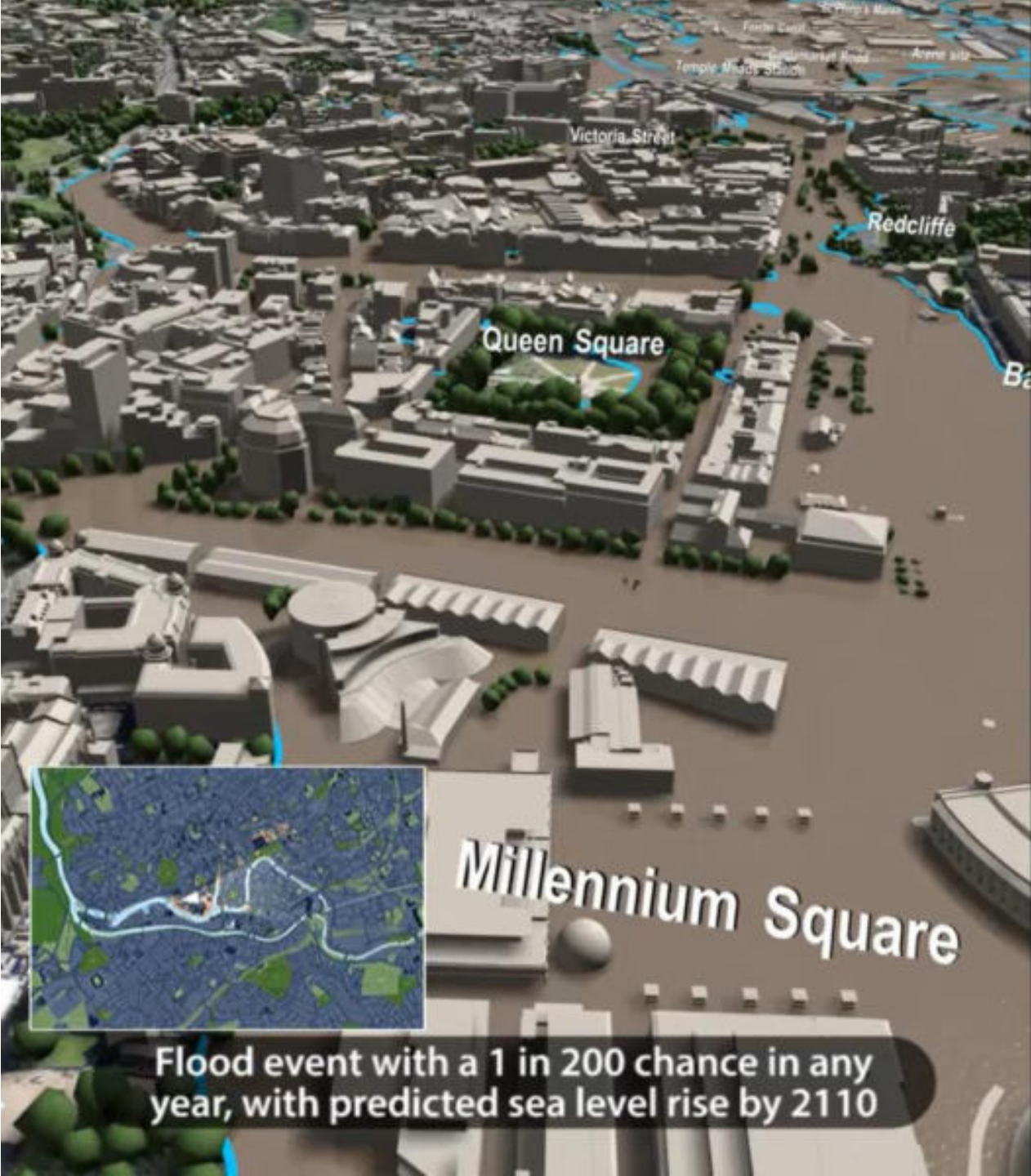
Hoo Valley
Flood event with a 1 in 200 chance in any year, with predicted sea level rise by 2110

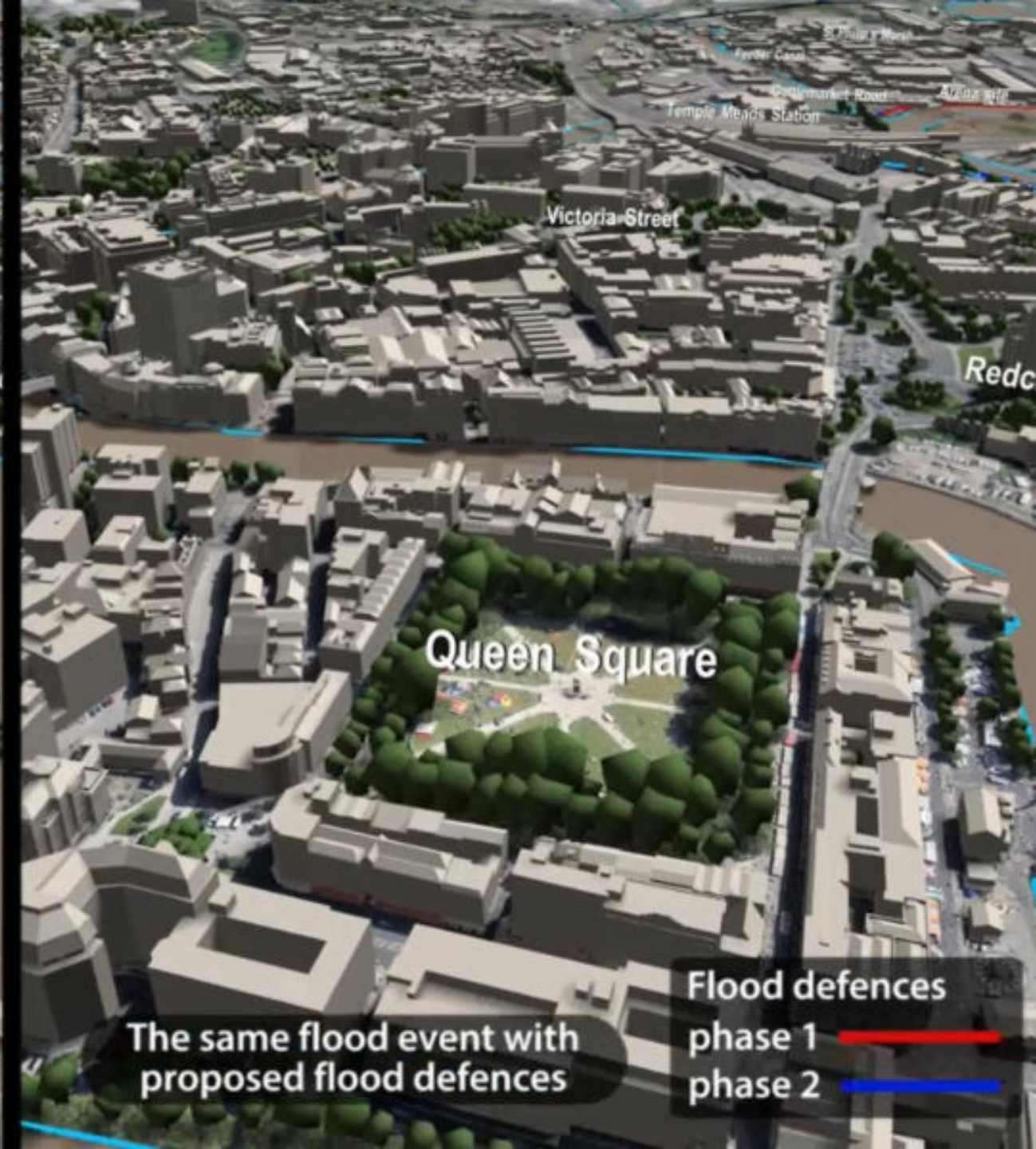


Hoo Valley
The same flood event with proposed flood defences

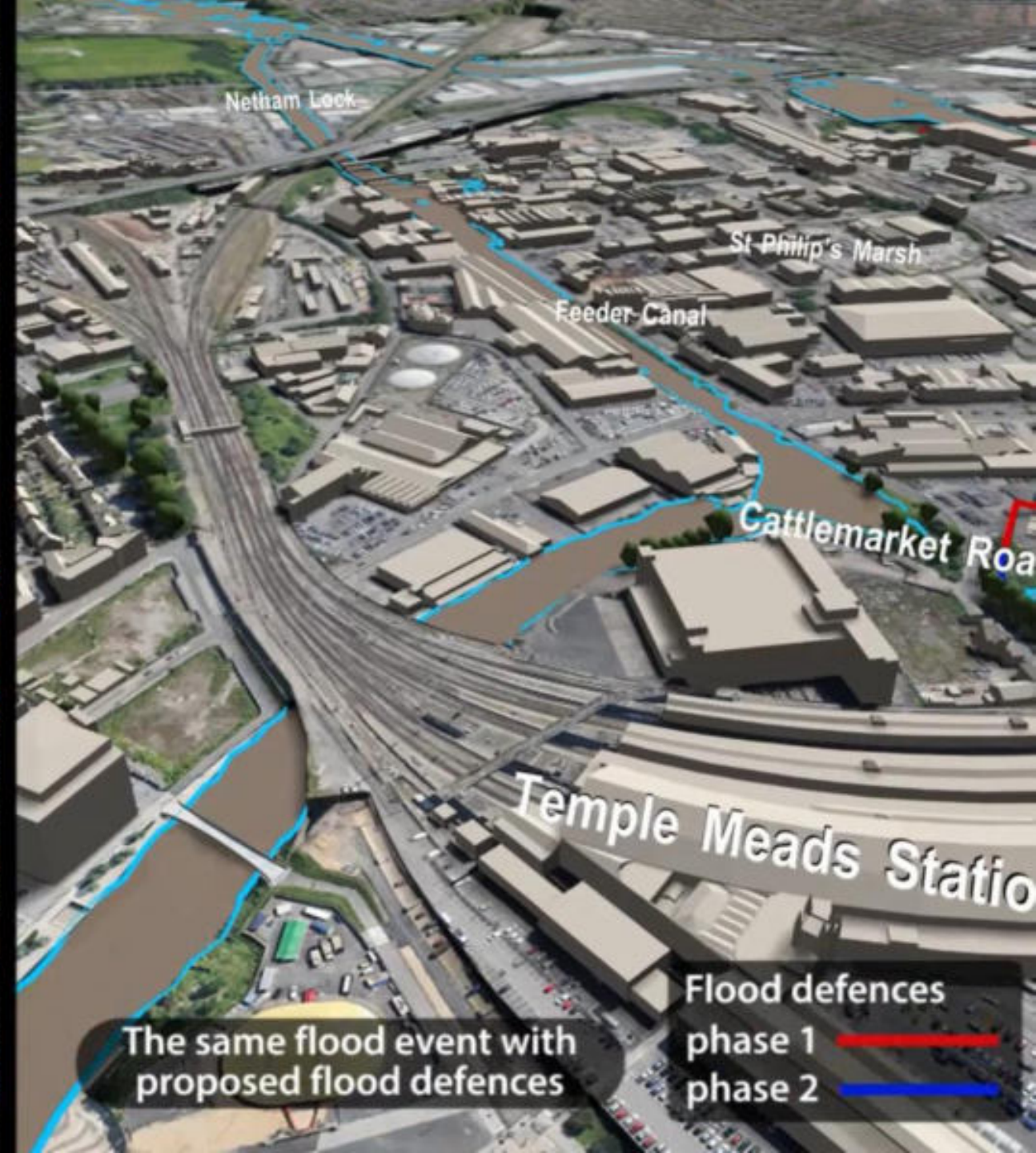
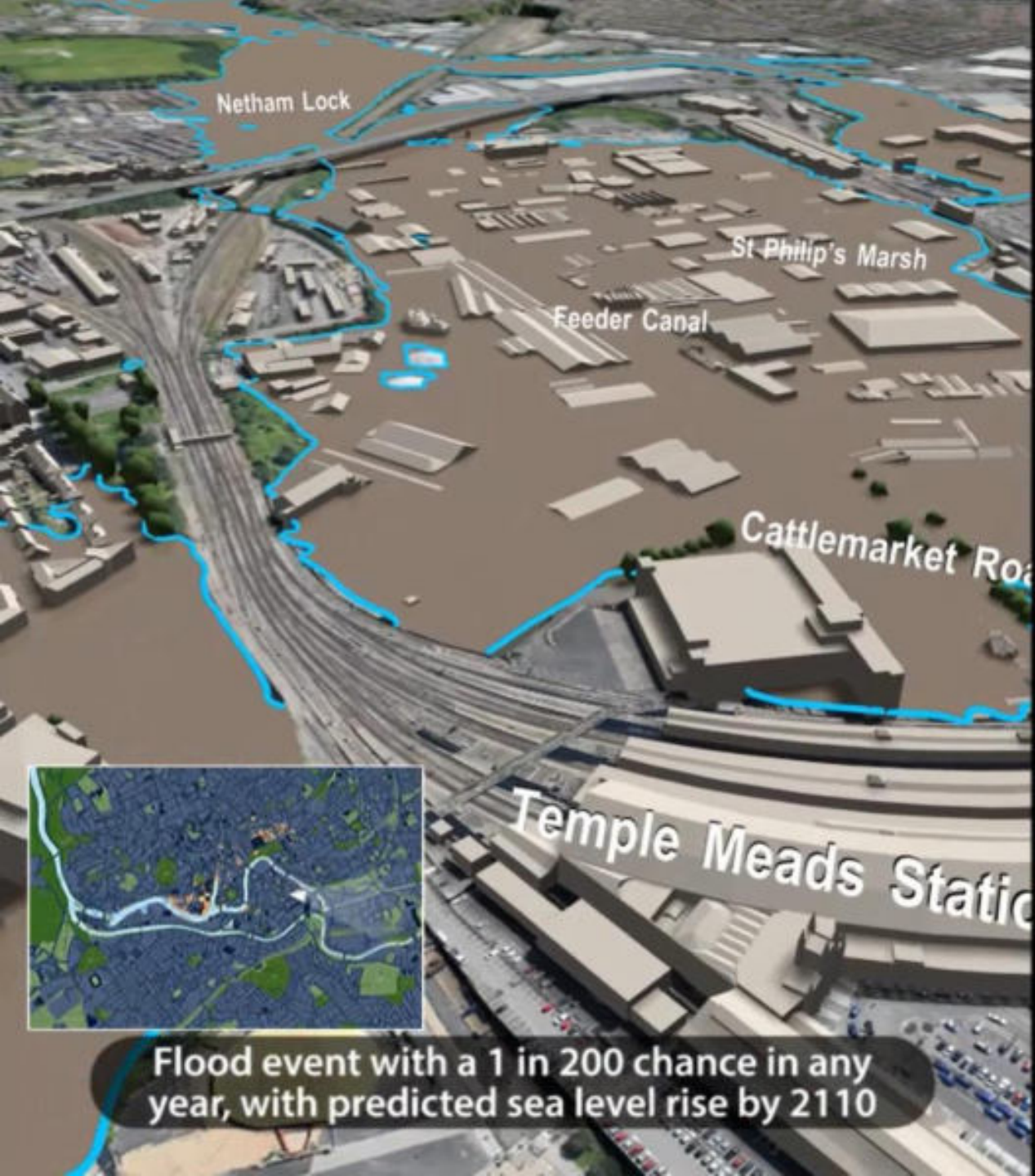
Flood defences
phase 1 
phase 2 













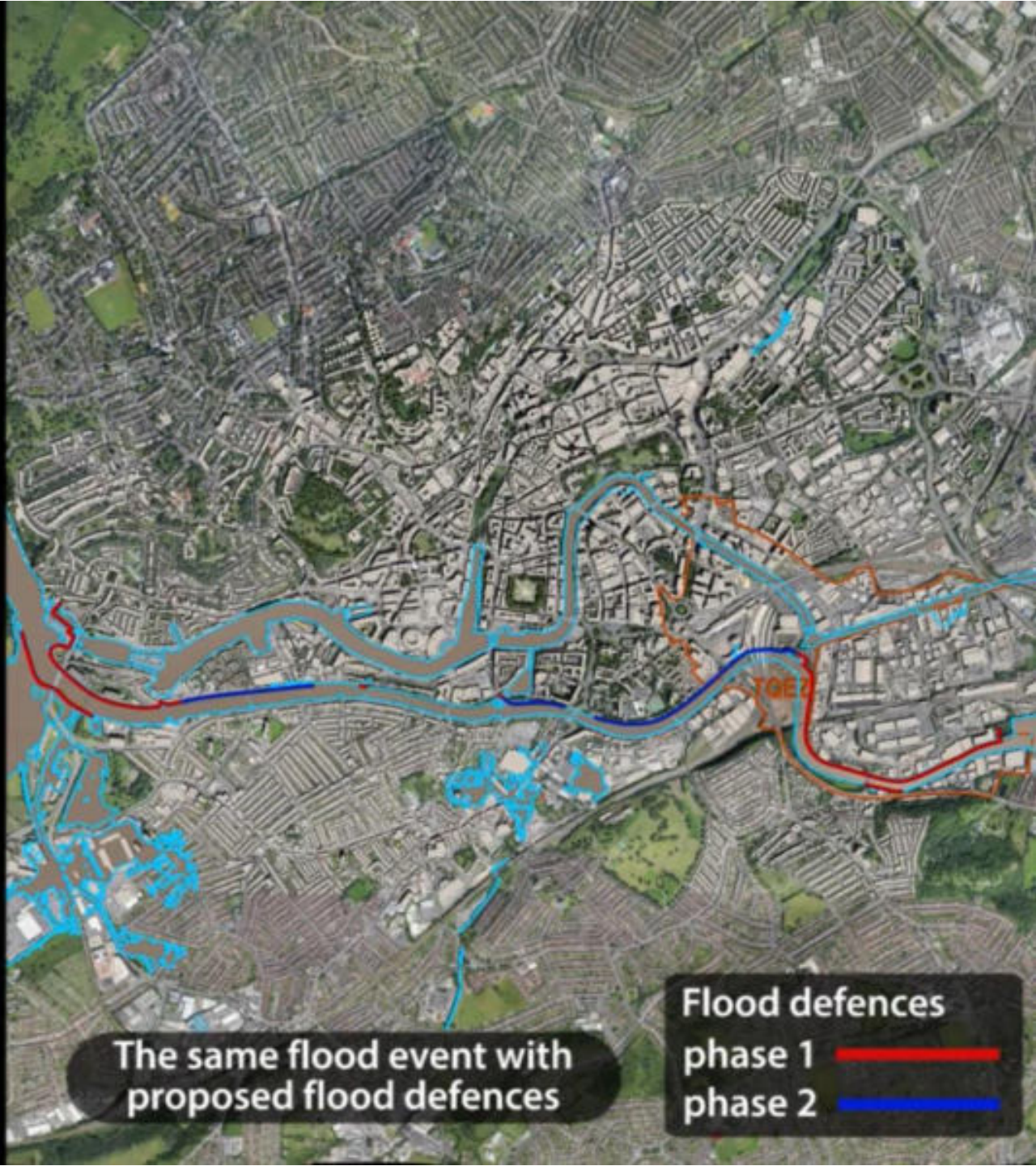


Flood event with a 1 in 200 chance in any year, with predicted sea level rise by 2110



The same flood event with proposed flood defences

Flood defences
phase 1 
phase 2 



Overview

Threat

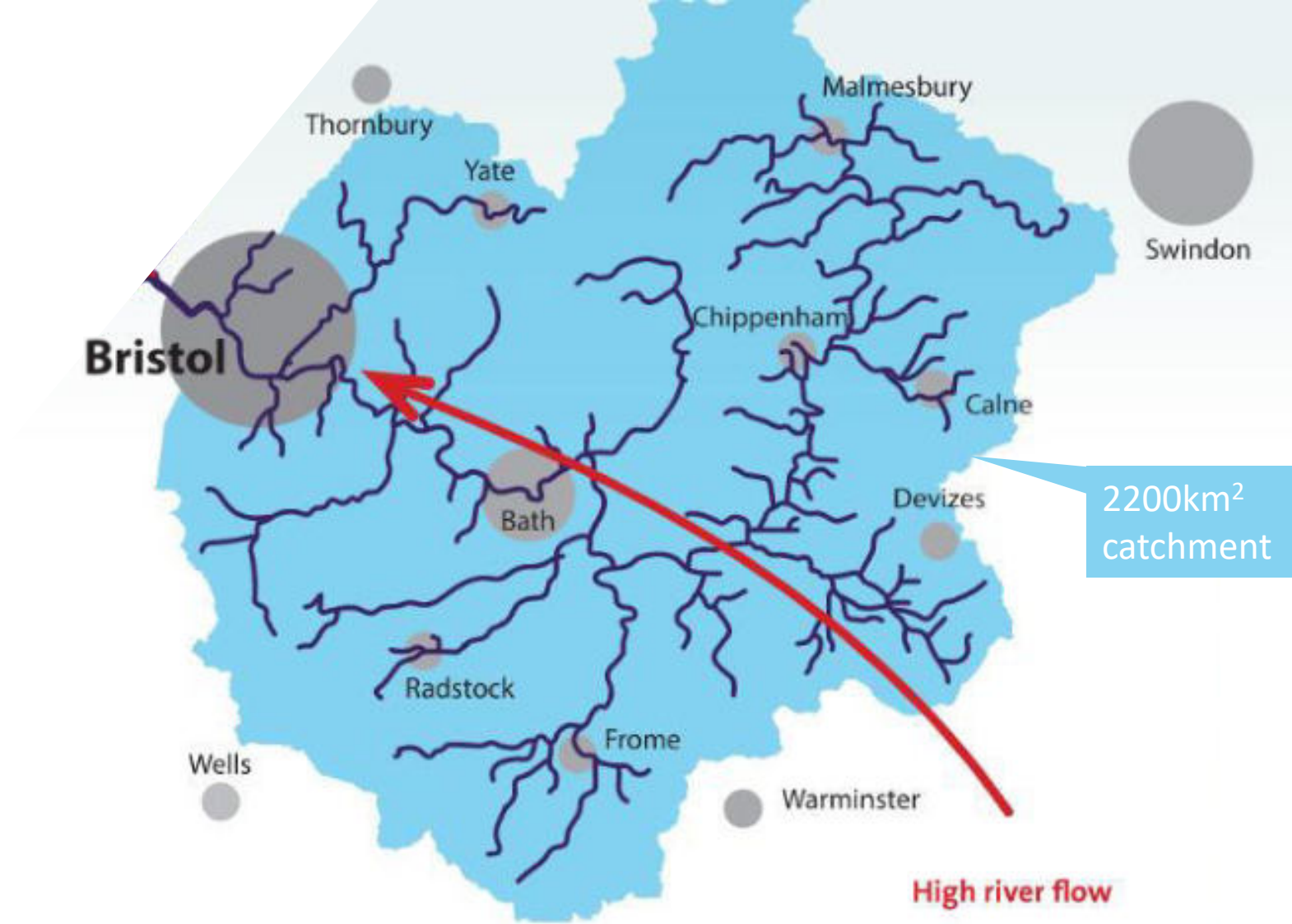


Opportunity



Delivery



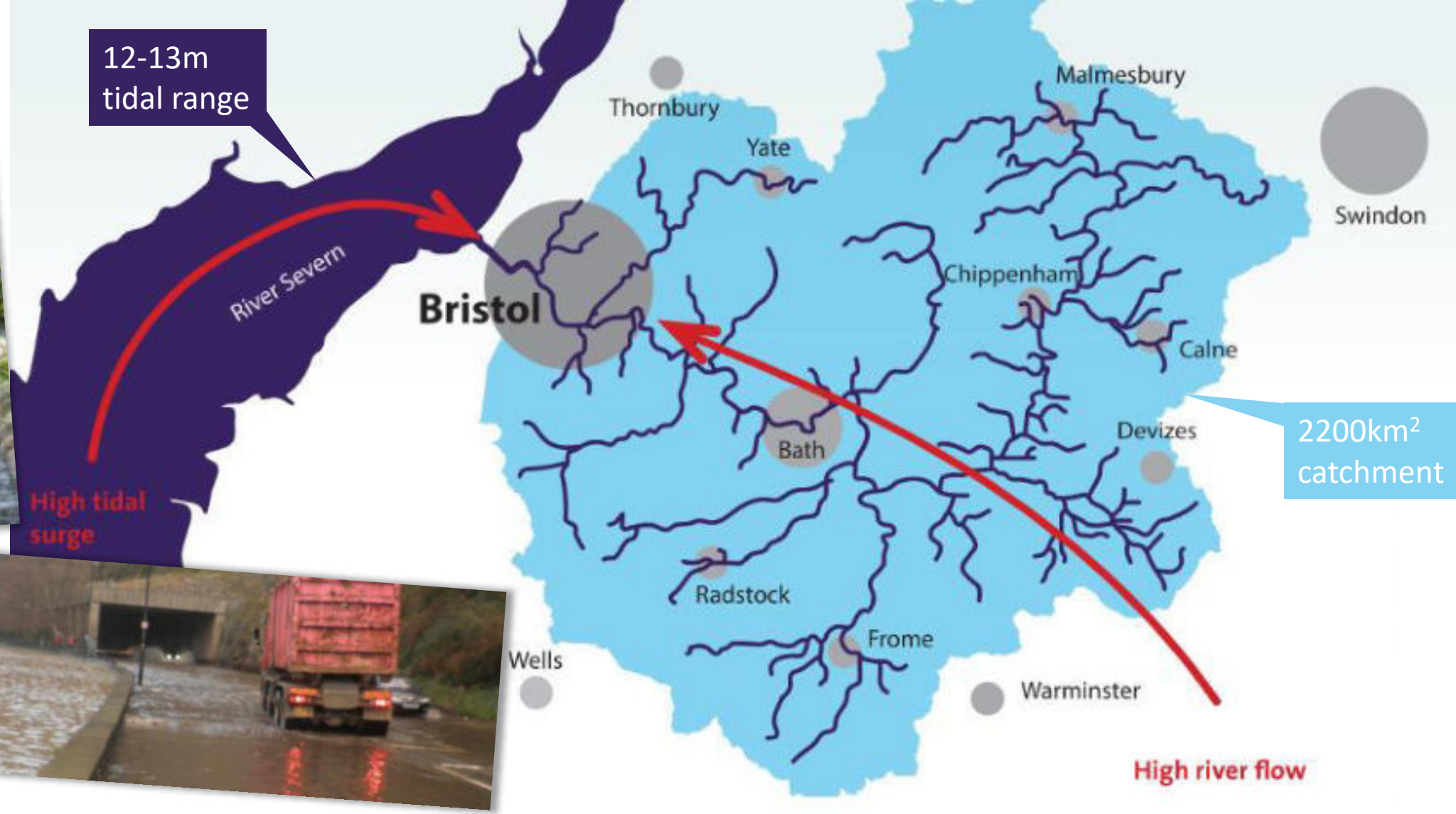






12-13m tidal range

High tidal surge





No flooding



Severe flood today



Severe flood by end of century





No flooding



Severe flood today



Severe flood by end of century



A Broader Vision



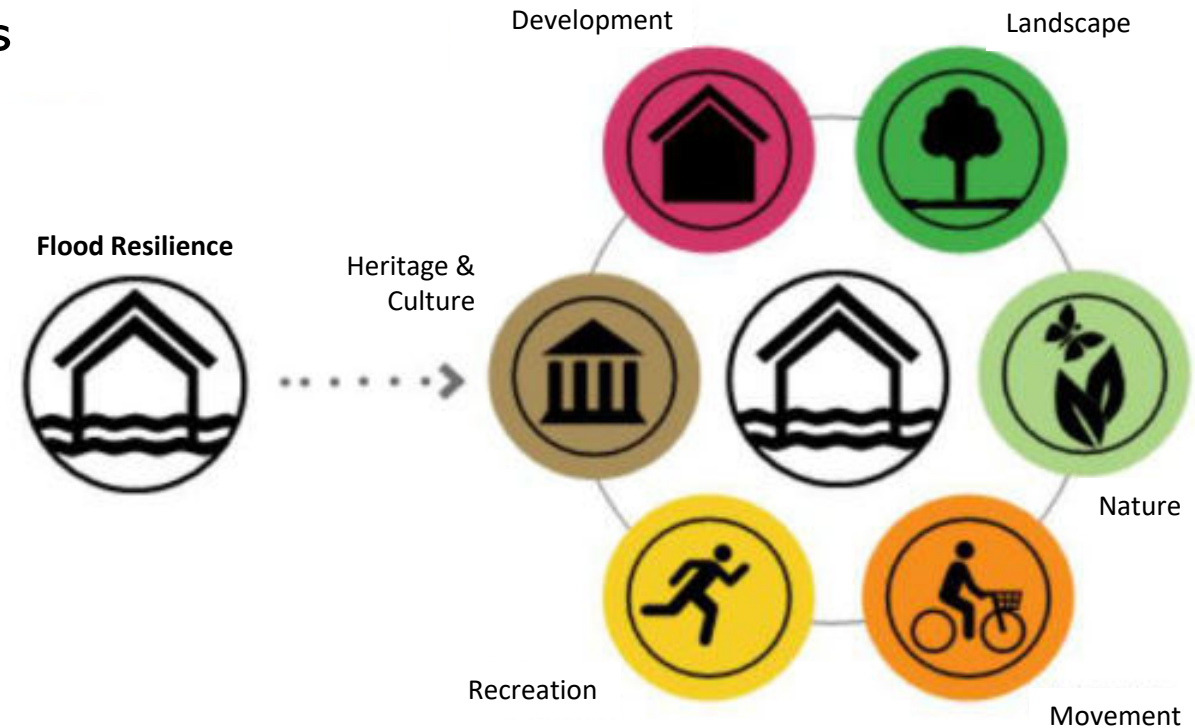
A Broader Vision

Unique opportunity for city by designing for year-round benefit

Future-proofing city and neighbouring communities

Enabling a greener, more active city

Unlocking Bristol's potential



A Strategic Approach



Adaptable ...designed to be enhanced in the future as climate change impacts worsen

Integrated ...embracing a placemaking-led approach to enhance the city

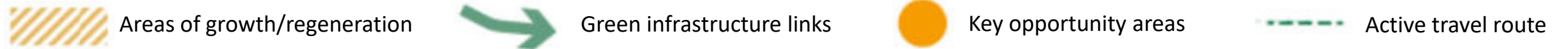
Cohesive ...connected spaces rather than insular

A Strategic Approach

Adaptable ...designed to be enhanced in the future as climate change impacts worsen

Integrated ...embracing a placemaking-led approach to enhance the city

Cohesive ...connected spaces rather than insular



Bringing to Life

How could it look?



© Environment Agency

Submergible paths and parks



© Davis Landscape Architecture

Terracing

Creating opportunity through placemaking



© Environment Agency

Integrated with developments



© Race Street Pier, J. Kennedy for Visit Philadelphia™

Linear green spaces



© Environment Agency

Glazed future extensions

Economic Case Headlines

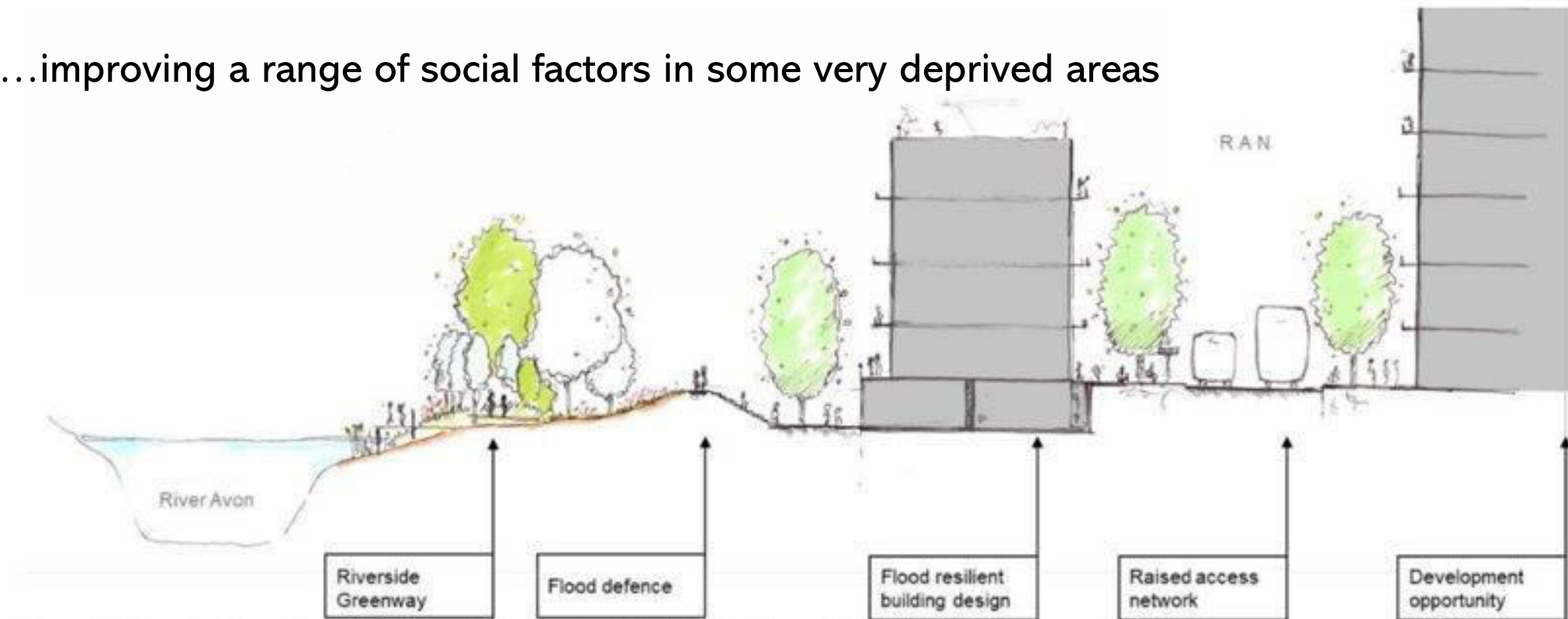


Cost ...£216m based on SOC work (phase 1)

Benefit ...est. £7.7bn to local region's economy through growth and avoiding disruption

Homes ...releasing 13,000 potential dwellings on brownfield sites

Social ...improving a range of social factors in some very deprived areas



Delivery Timeline



Strategic Outline Case

...complete and endorsed March 2021



Delivery Timeline



Strategic Outline Case

...complete and endorsed March 2021

Phase 1 of project split into two stages for delivery

Entrance & Netham Lock flood gates
Detriment mitigation works
St Anne's
Bower Ashton

Cumberland Road
St Philips
Western Harbour
Remainder of Phase 1 defences



Delivery Timeline



Strategic Outline Case ...complete and endorsed March 2021

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Outline Business Case Stage 1 ...underway, completion Autumn 2023

Outline Business Case Stage 2 ...imminent, completion Autumn 2023



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Final Business Case Stage 1 ...2024-25
Construction Stage 1 ...2026-28

Entrance & Netham Lock flood gates
Detriment mitigation works
St Anne's
Bower Ashton

Final Business Case Stage 2 ...2025-27
Construction Stage 2 ...2028-31

Cumberland Road
St Philips
Western Harbour
Remainder of Phase 1 defences



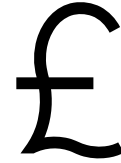
Current Work



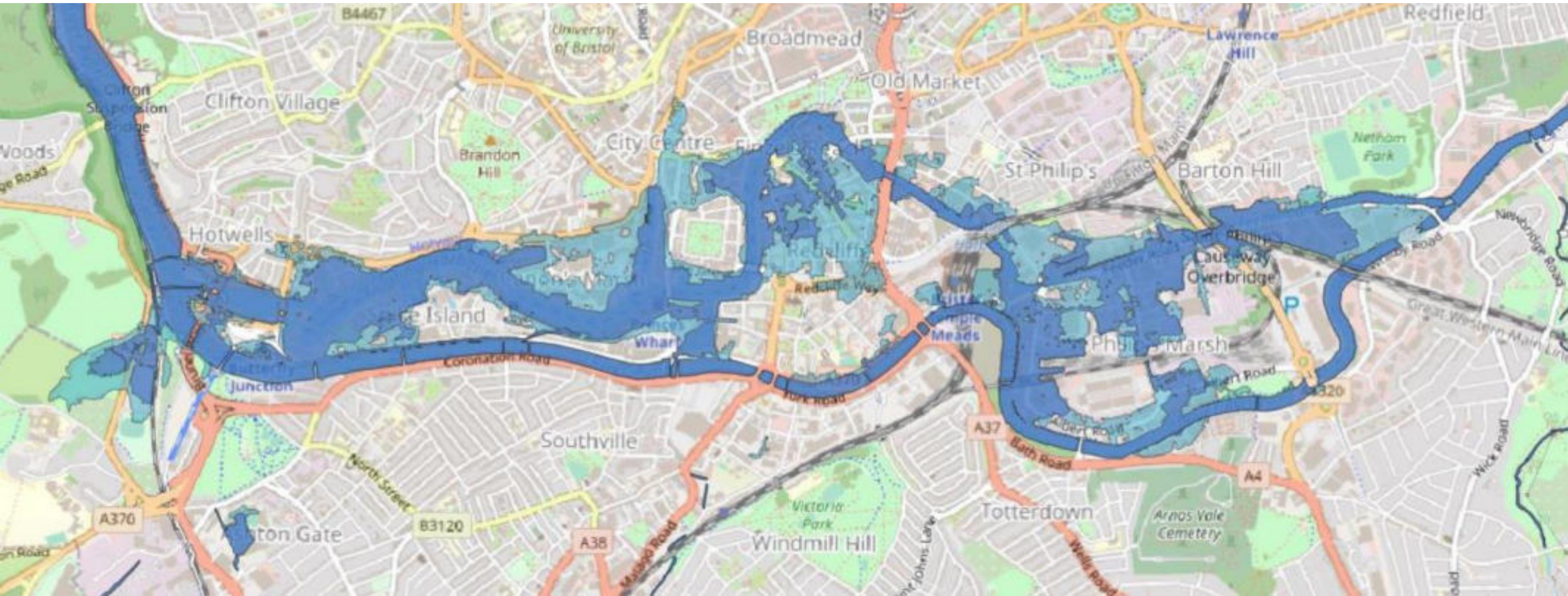
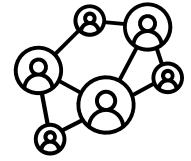
Flood modelling



Funding strategy

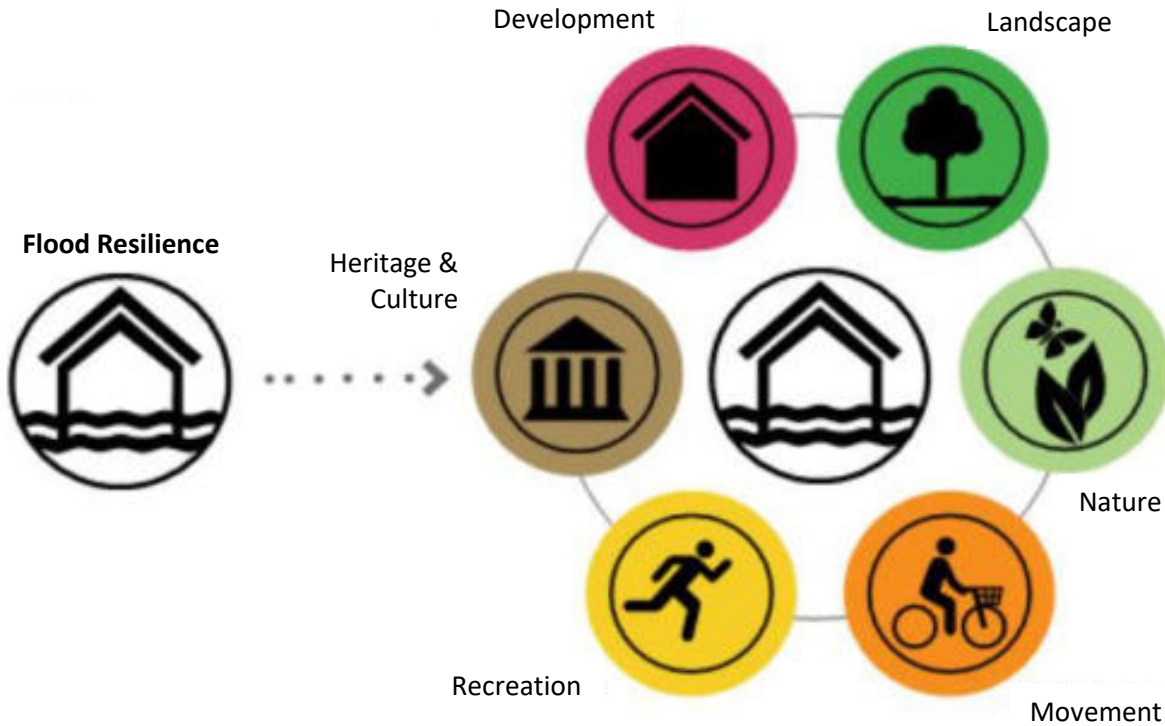


Stakeholder support

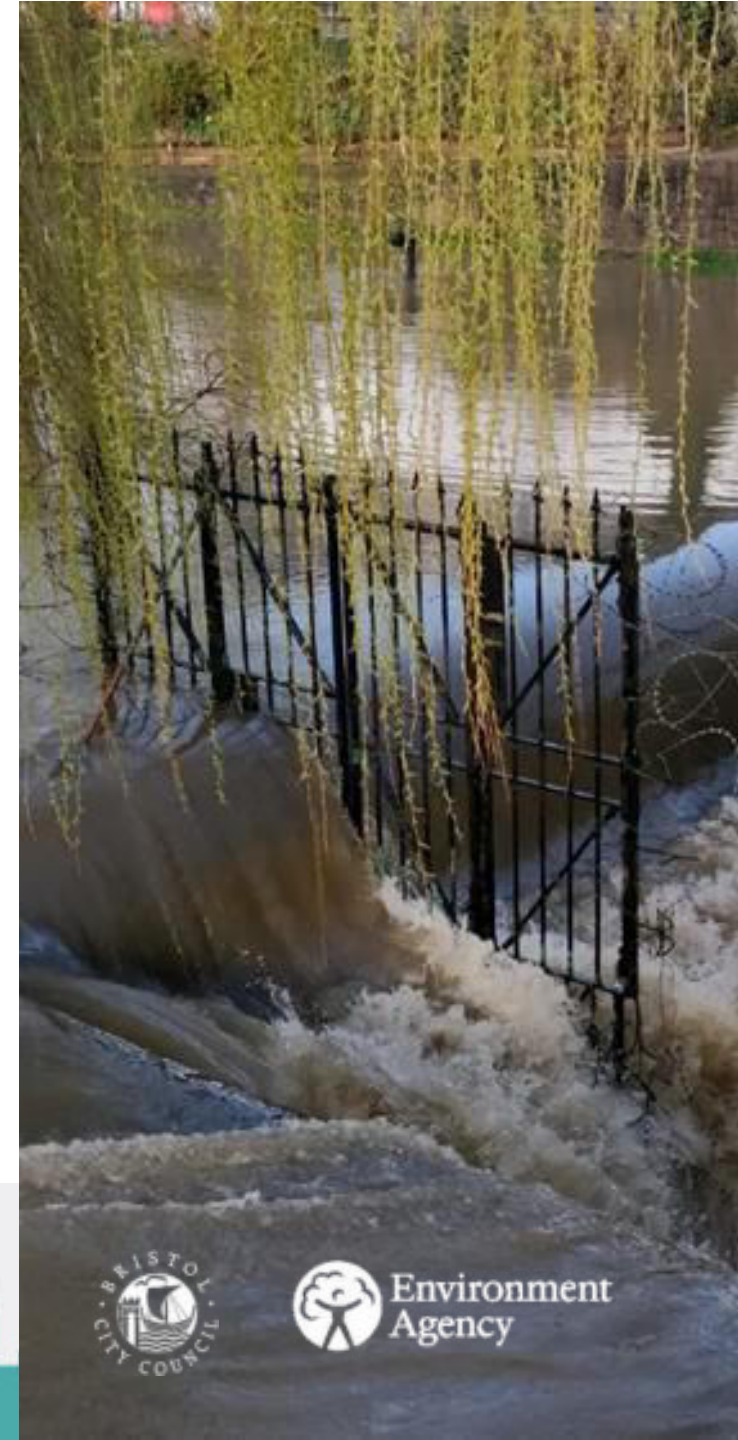


Bristol Avon Flood Strategy

A Broader Vision for Flood Defences



Shaun Hartley, Project Director for Bristol City Council



Restoring meadows, marsh and reef: progress and potential.



Dr Benjamin Green – Environment Agency, Estuaries and Coast Planning

ben.green@environment-agency.gov.uk / @saltmarshben

Severn Estuary Partnership, October 2022

Restoring Meadows, Marsh and Reef (ReMeMaRe)

Vision - Restored estuarine & coastal habitats that benefit people & nature

Mission - Restore or enhance at least **15% of our priority habitats** along the English coast by 2043 in line with the Defra 25 Year Environment Plan timeframe.



Steart Marshes, Somerset (EA)

ReMeMaRe Partnership (so far...)



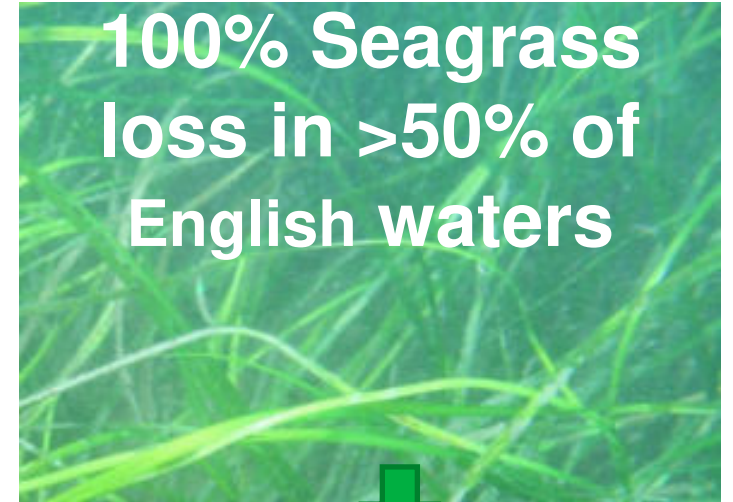
Restore & enhance?



Managed realignments / recharges



Reseeding oyster beds



Replanting seagrass beds

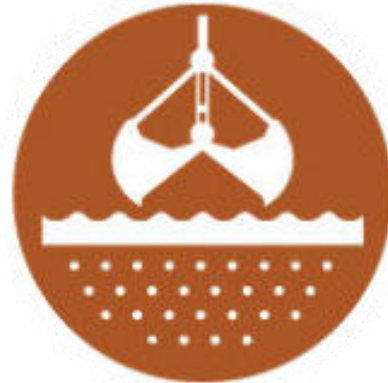


Strategic Goals & Action Plan

Seascape
restoration



Streamlined
project delivery



Regeneration of
coastal communities



Enhanced ocean
awareness



Coordinated research
and development



Investment through
blended finance



Seagrass, Totland Bay (EA)

Funding

- Natural Environment Investment Readiness Fund (NEIRF) – e.g. **Saltmarsh Carbon Code**
- Championing Coastal Coordination (3Cs)
- Strategic Management of Marine Resources (SMMR) – **ReSOW UK**
- Green Recovery Challenge Fund – **Revitalising our Estuaries**
- Flood and Coastal Resilience Innovation Programme – e.g. **Stronger Shores, Tees Tidelands**



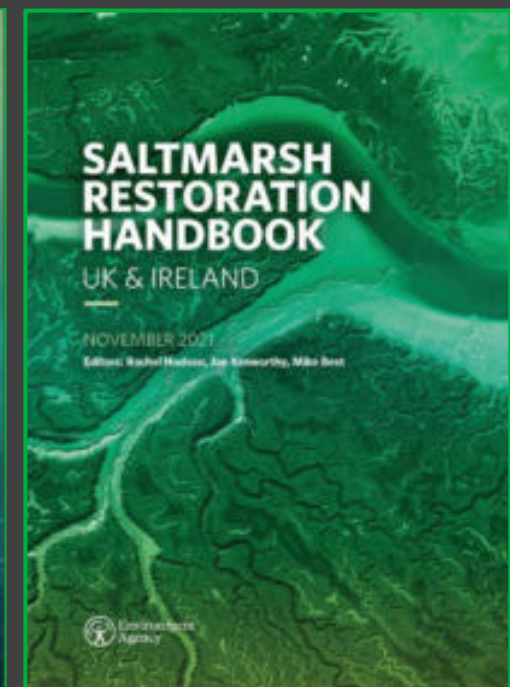
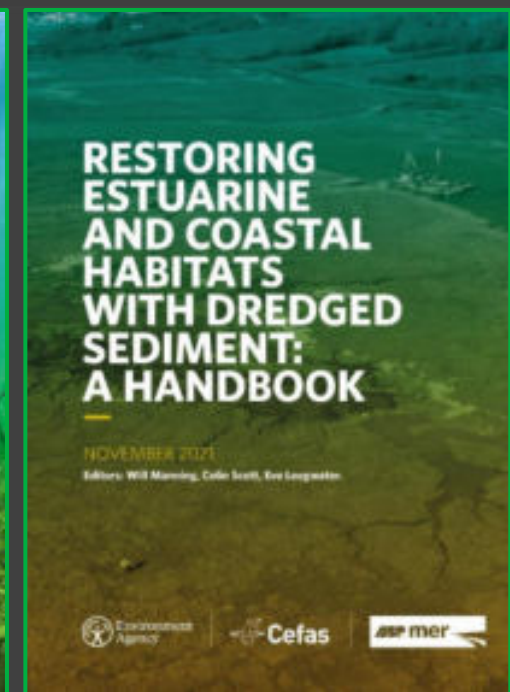
Saltmarsh at the Humber Bridge (EA)

Restoration Tools and Guidance



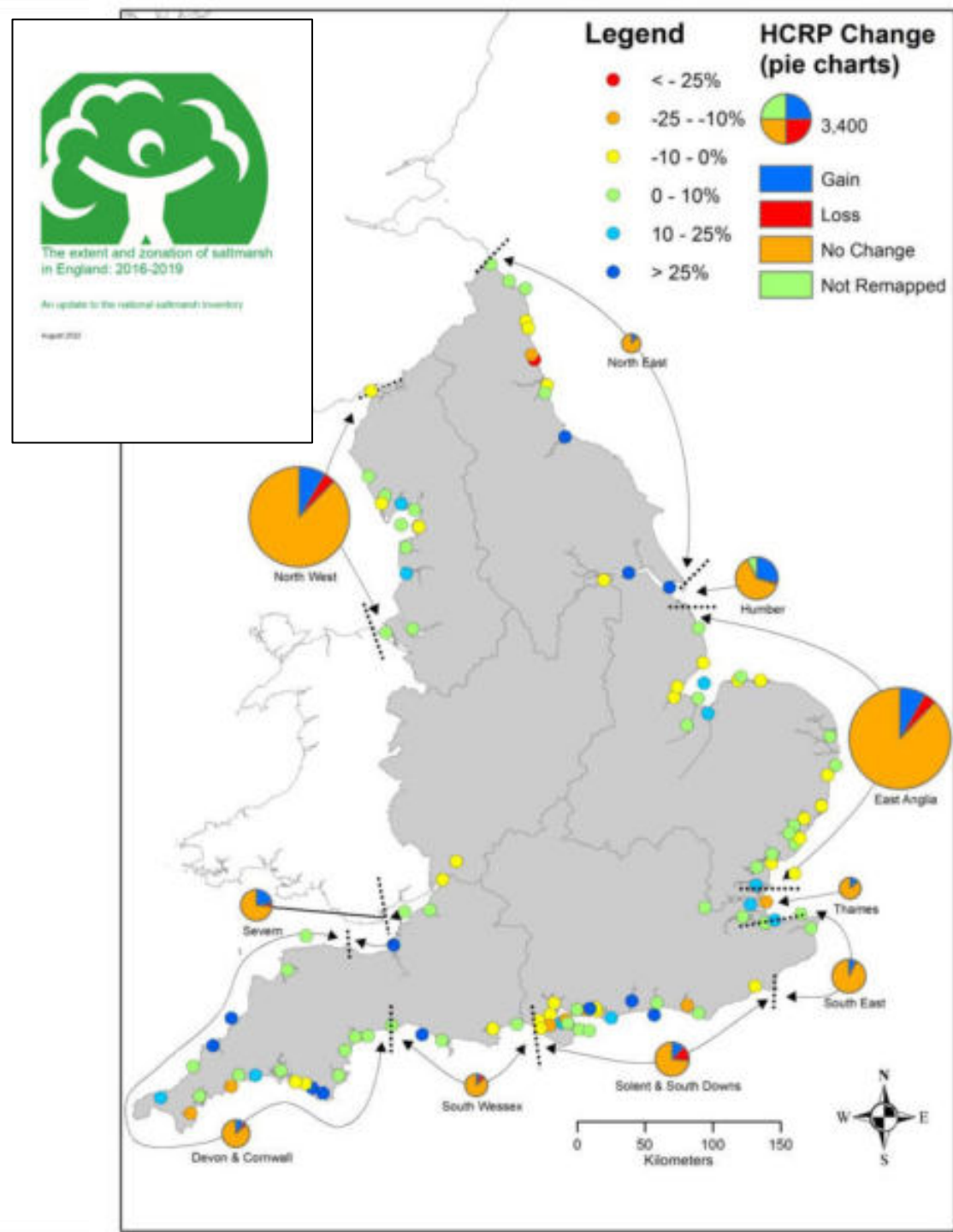
Restoration Handbooks

- Practical guidance on **how** to restore.
- Outline current **best practice**, knowledge gaps and thinking.
- Capture knowledge of top practitioners.
- **Infographics** freely available to use on ReMeMaRe website.



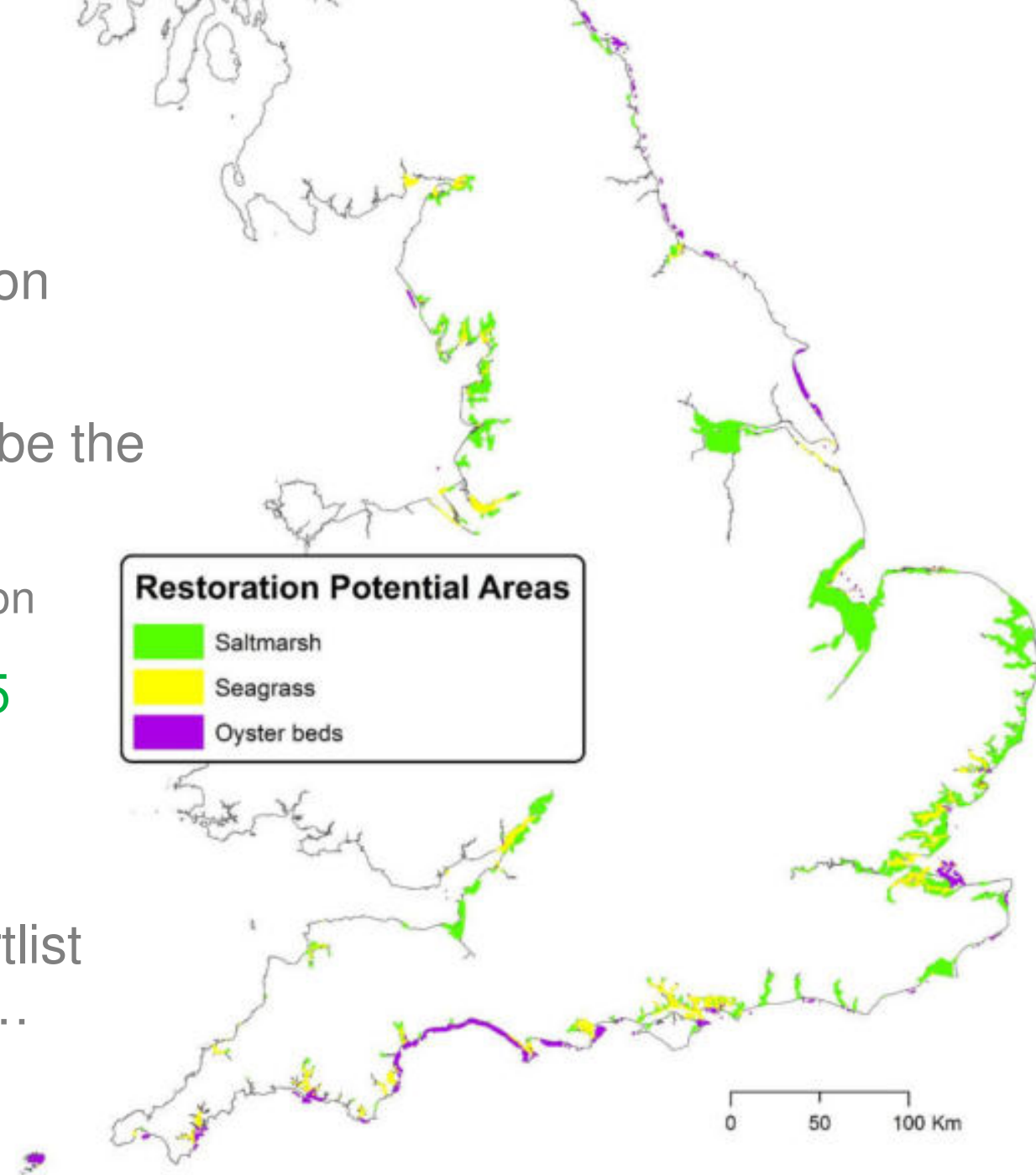
Saltmarsh & Seagrass Inventories

- Updated saltmarsh report and inventory – launched August
 - Maps all managed realignments and saltmarsh restoration to date.
 - Maps zonation and extent change over 10 years
 - Severn region sees overall increase.
- National seagrass inventory – launched Friday!






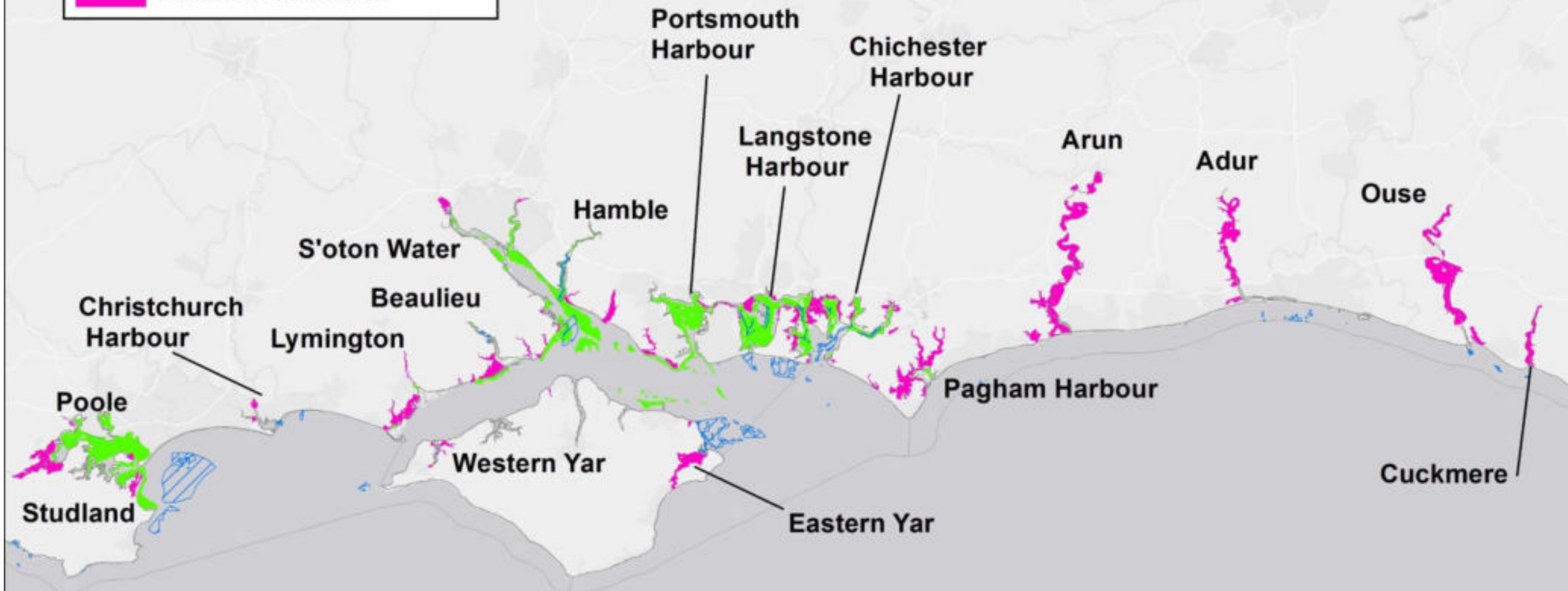
Restoration Prioritisation

- Restoration prioritisation maps available on data.gov.uk & Coastal Data Explorer
- Areas where new habitat **creation** could be the most successful
 - Aim to encourage local discussion on restoration
- **774** saltmarsh, **1,028** seagrass and **1,235** native oyster sites
 - **323,305 ha** in total
- Looking to prioritise these down to a shortlist based on ecosystem services & delivery...



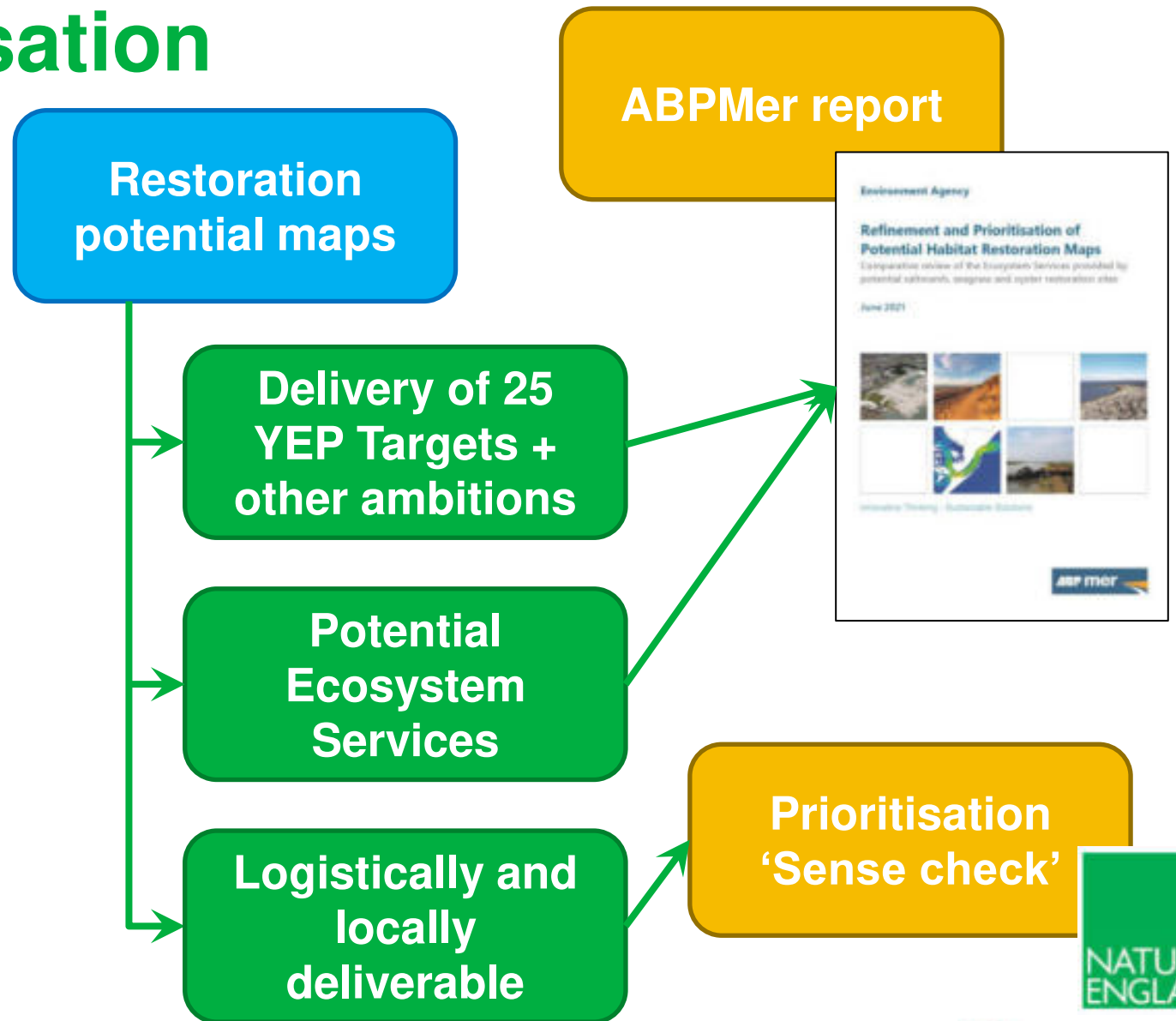
Legend

-  Potential native oyster reef
-  Potential seagrass
-  Potential saltmarsh



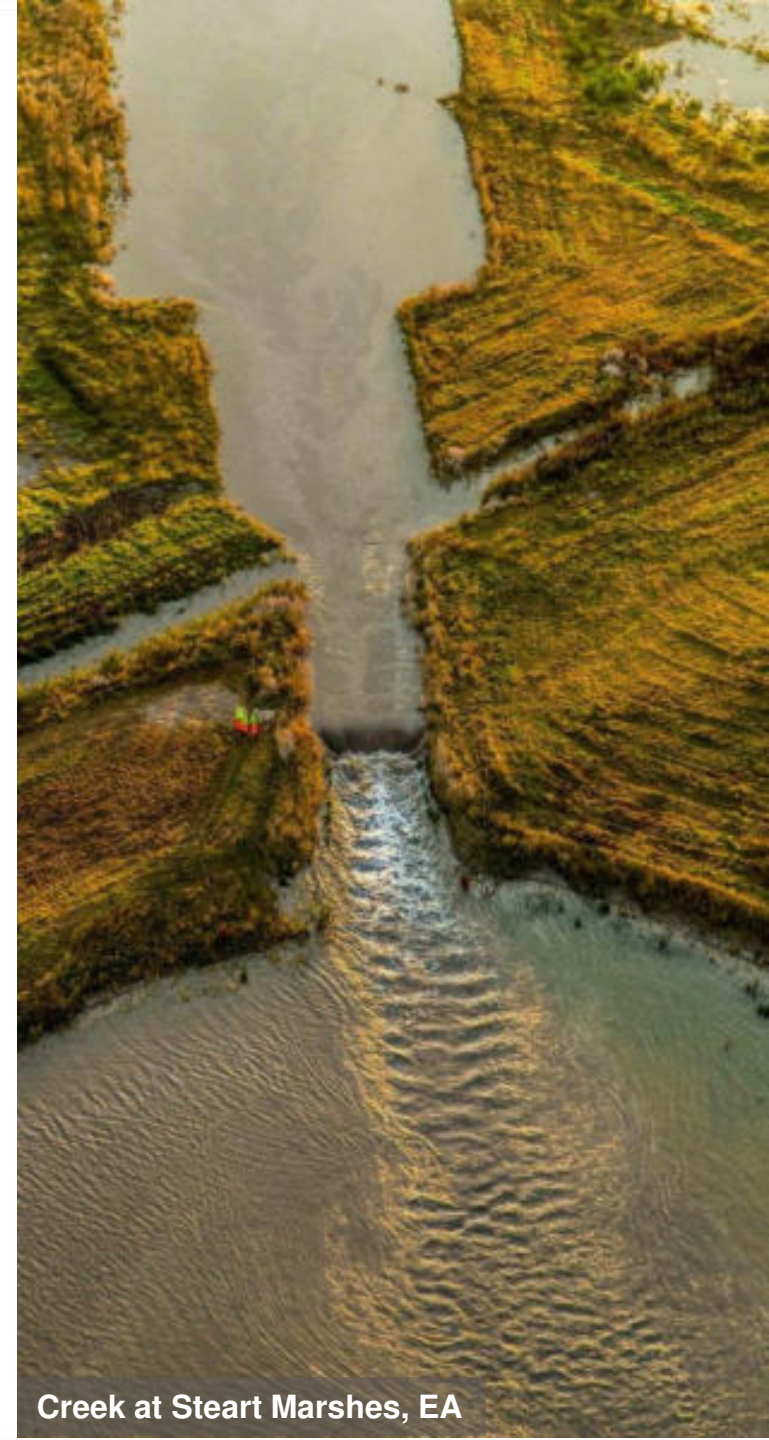
Restoration Prioritisation

- Use restoration potential maps to develop shortlist of key sites.
- Sites with high ecosystem services & support government objectives for restoration.
 - ABP Mer Report
- Sense-check outputs with local teams at EA, NE, MMO & CE
 - 7 habitats + saltmarsh
- Aim to link with spatial prioritisation for Landscape Recovery (ELM) and Net Gain.



New opportunities

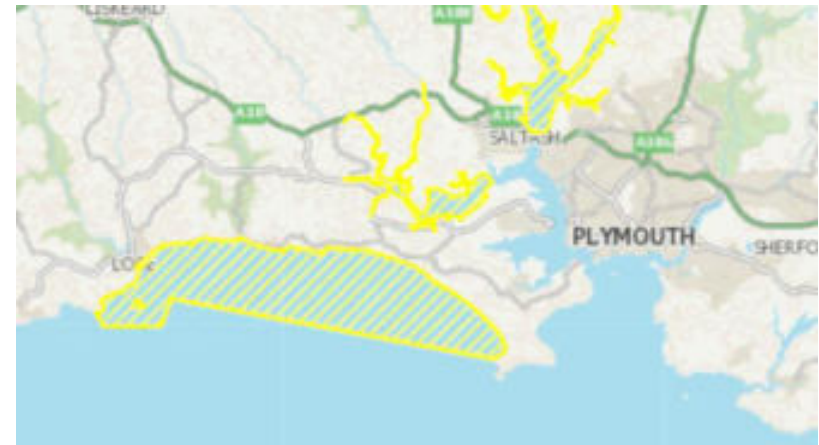
- Environmental Land Management - **Landscape Recovery Scheme**
- Biodiversity Net Gain – **Intertidal opportunities**
- Marine Net Gain – **subtidal opportunities**
- Habitat Compensation and Restoration Programme – **looking to 2050**
- Draft River Basin Management Plans - **Local Estuary and Coast Restoration Action Plans**
- Local Nature Recovery Strategies



Creek at Steart Marshes, EA

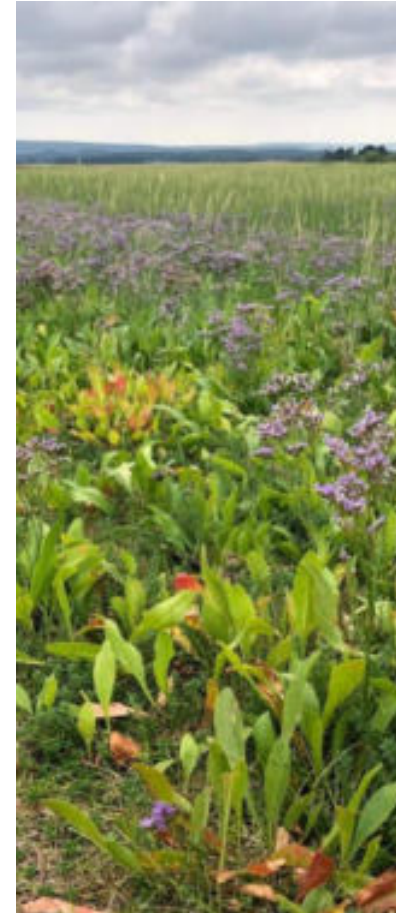
Other ReMeMaRe work in 2022

- **Restoration Principles:** Guidance for what restoration can take place inside and outside of MPAs.
- **Beneficial Use Restoration Potential Map:** Exploring options for mapping sustainable use of sediment resources.
- **Marine Restoration Potential (MaRePo):** Development of offshore habitat restoration potential maps for Marine Net Gain
- **Aquaculture and Nursery Facilities:** Scoping report to support upscaling of restoration projects.



Connectivity in Estuarine, Coastal and Transitional Ecosystem Restoration

- **ConnECTER SIG** – voluntary group
- Connect academic and research organisations to practical estuarine and coastal habitat and ecosystem restoration.
- Research questions that would enable upscaled restoration and understanding of NbS in UK.
- Ecosystem Network and Seascape Restoration
- **ZSL Symposium**: *Ecological connectivity across temperate coastal habitats – moving towards seascape scale restoration (22nd-23rd Nov).*



REACH Conference 2023

- Restoring Estuarine and Coastal Habitats
- Scarborough 11th - 12th July 2023

For more information, please contact:

ben.green@environment-agency.gov.uk

For general information on ReMeMaRe:

rememare@environment-agency.gov.uk



ReMeMaRe Successes



Tools and guidance

- Restoration handbooks

Tools and guidance

- Mapping products



Partnerships

- National Action Plan



Reshaping our Coastline through Blue Carbon



WWT

- WWT is the UK's leading wetland conservation charity
- We create, restore and manage wetlands, save wetland wildlife, and inspire communities to value the amazing things wetlands can do for people and nature
- We have a demonstrable track record of working with communities to deliver urban, rural and coastal wetland creation at scale
- We have the experience and capabilities to develop and pursue projects that deliver multiple societal benefits
- We are pioneering the development of saltmarsh creation through understanding long-term investment opportunities



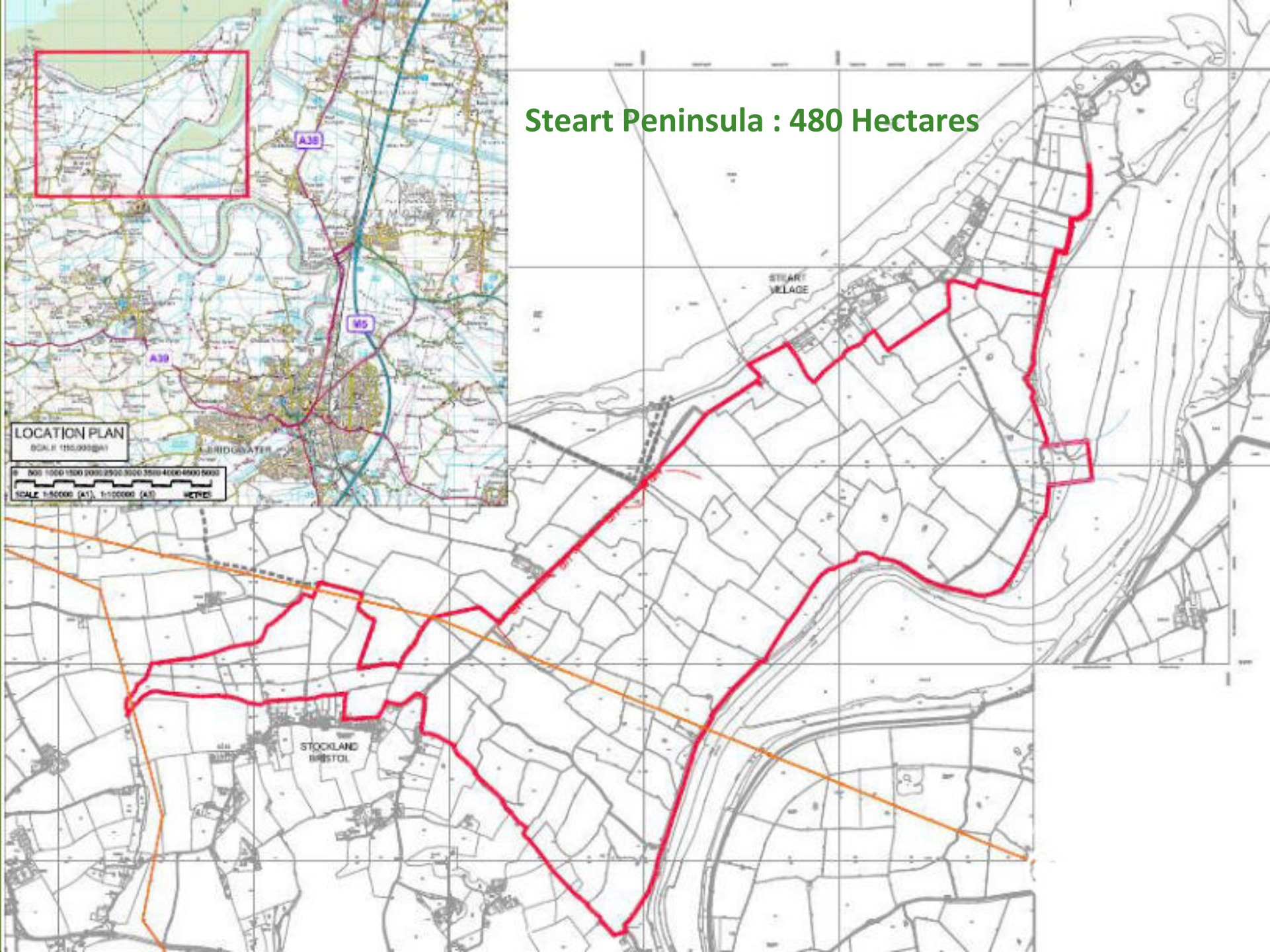
WWT Steart Marshes



working in partnership with



Stear Peninsula : 480 Hectares



WWT Steart Marshes

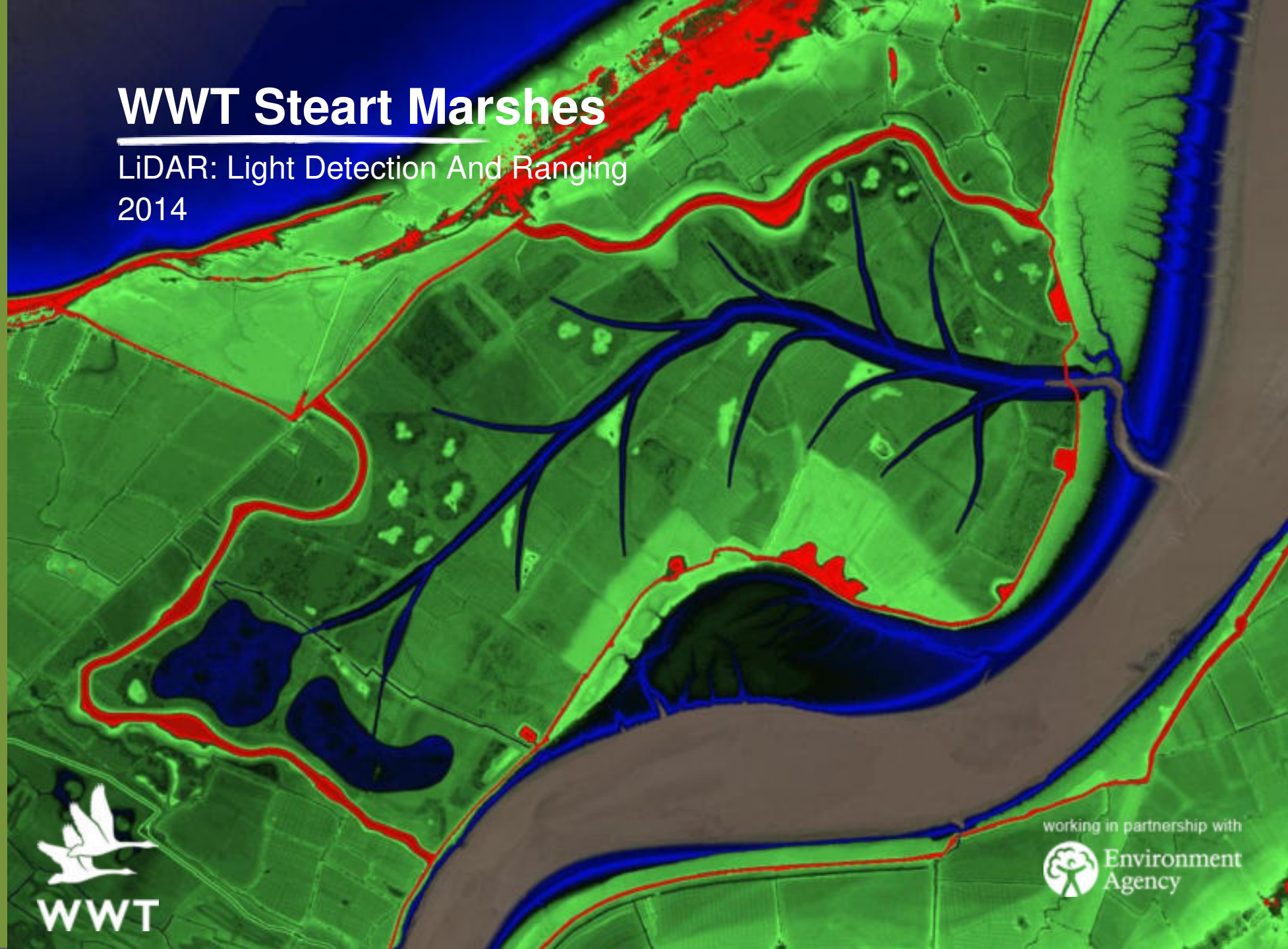
LiDAR: Light Detection And Ranging
2009



working in partnership with
 Environment
Agency

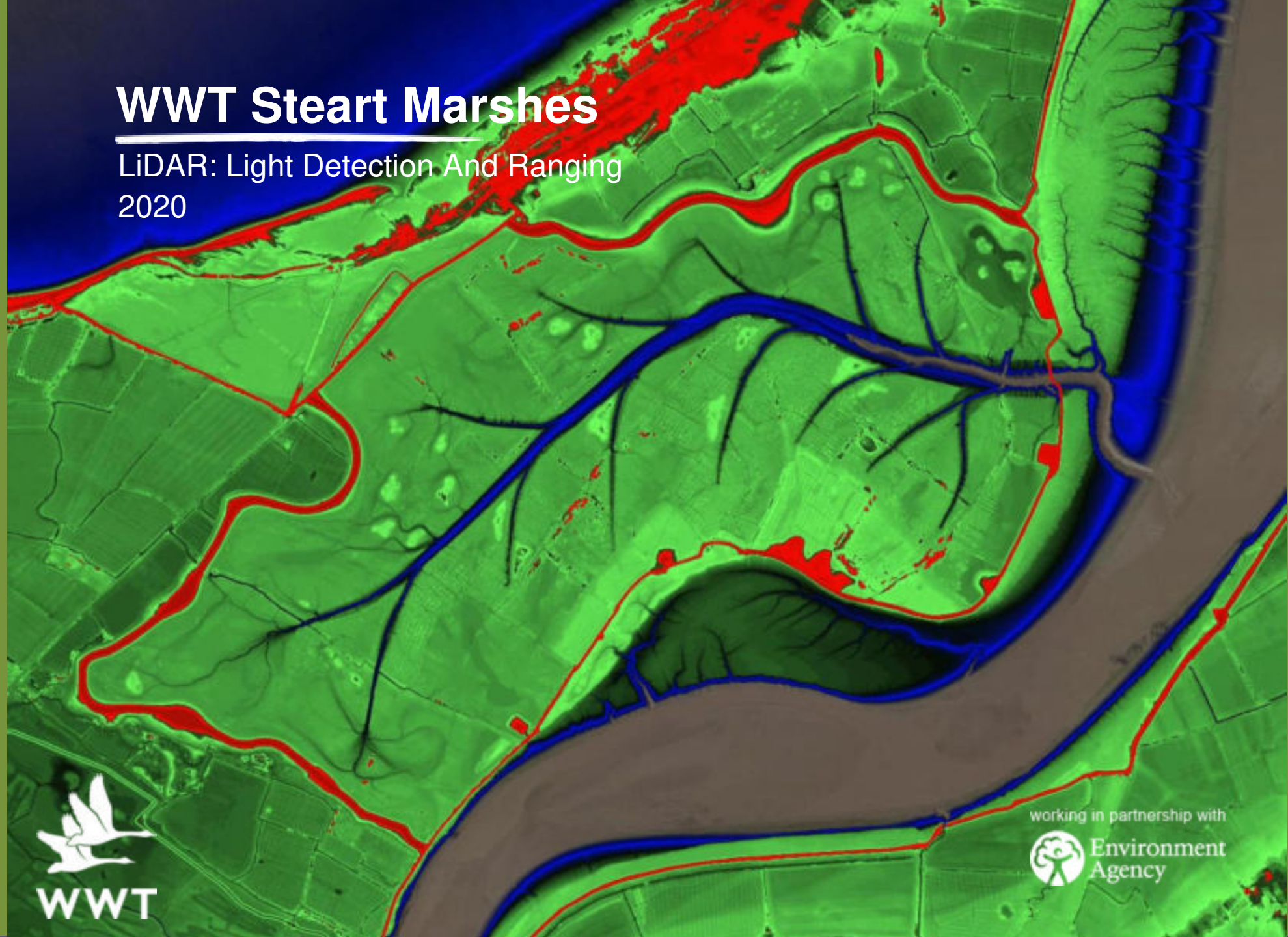
WWT Steart Marshes

LiDAR: Light Detection And Ranging
2014



WWT Steart Marshes

LiDAR: Light Detection And Ranging
2020



WWT Steart Marshes

Why are Saltmarshes so Good at Storing Carbon?



working in partnership with



WWT Steart Marshes

What does blue carbon look like?



WWT



WWT Steart Marshes

Blue Carbon storage results

- total carbon storage: **36tC/ha/yr**
- organic carbon: **19tC/ha/yr** (aprx. 70tCO₂e/ha/yr)
- in-situ vs washed carbon issue: **22tCO₂e/ha/yr**
- Over 250ha is equivalent to **5,500tCO₂/yr**
- 2014 -2018 years of study : approx **22,000tCO₂e**
- value approx. **approx. £1M** over 6 years
- 1ha newly planted native woodland stores **450tCO₂e in 100yrs**










working in partnership with



Natural capital values of saltmarsh creation

Summary of results (benefits) of Natural Capital Assessment of large scale **saltmarsh creation**

Asset values (monetised)	Valuation metric	Constant baseline* (PV60 £m)			
		Value to Businesses	Value to the rest of society	Total	Confidence
 Food provision	Total income from livestock	86		86	H
 Fishing (commercial)	Commercial fish catch value supported by saltmarsh	39		39	L
 Carbon – saltmarsh	Value of CO2e sequestered by saltmarshes		3,794	3,794	M
 Carbon – livestock	Cost of CO2e emitted by livestock		(462)	(462)	L
 Flood risk management	Value of additional coastal wetland area for flood control		1,084	1,084	L
 Recreation + Tourism	Welfare value uplift for created saltmarsh		258	258	M
 Water quality	Value of Nitrogen removal		129	129	M
	Value of Phosphorous removal		93	93	
Total gross asset value	Mix of values			5022	

Produced February 2022

What next?

- Saltmarsh Carbon Code - NEIRF funding with CEH lead partner
- Building confidence in data
 - allochthonous v autochthonous - stable isotope and biomarker study
 - saltmarsh greenhouse gas emission
- Nationally Determined Contributions
- Metrics to forecast potential blue carbon storage
- Which estuary & overlapping objectives?
- UK Blue Carbon Forum & UK Saltmarsh Technical Group – coordinating effort

- Establishing & piloting a blended finance model
- Developing an ethical community legacy fund
- Keeping coastal communities in focus – right conversation at the right time



What next?

Rapid carbon accumulation at a saltmarsh restored by managed realignment far exceeds carbon emitted in site construction

Hannah L. Mossman, Rachel M. Dunk et al (2021) Manchester Metropolitan University

Blue Carbon in Managed Realignments an overview with an comparative analysis and valuation of 10 different UK sites

Colin Scott (2021) ABPmer

Saltmarsh Restoration Handbook

Environment Agency (2021)

Blue Carbon Wetlands are emerging centre stage when it comes to fighting our climate emergency. So why are they still so undervalued?

WWT (2021)

Four Blue Infrastructure Proposals for the UK's Recovery

WWT (2021)



working in partnership with



Thank you



Avonmouth and Severnside Enterprise Area (ASEA)

Ecology Mitigation and Flood Defence Project

Severn Estuary Forum

12th October 2022

Colin Taylor, Senior Flood & Coastal Risk Management Advisor



What we'll cover

- Drivers/Objectives for the project
- Constraints
- New Passage section
- Project progress



ASEA Project Location

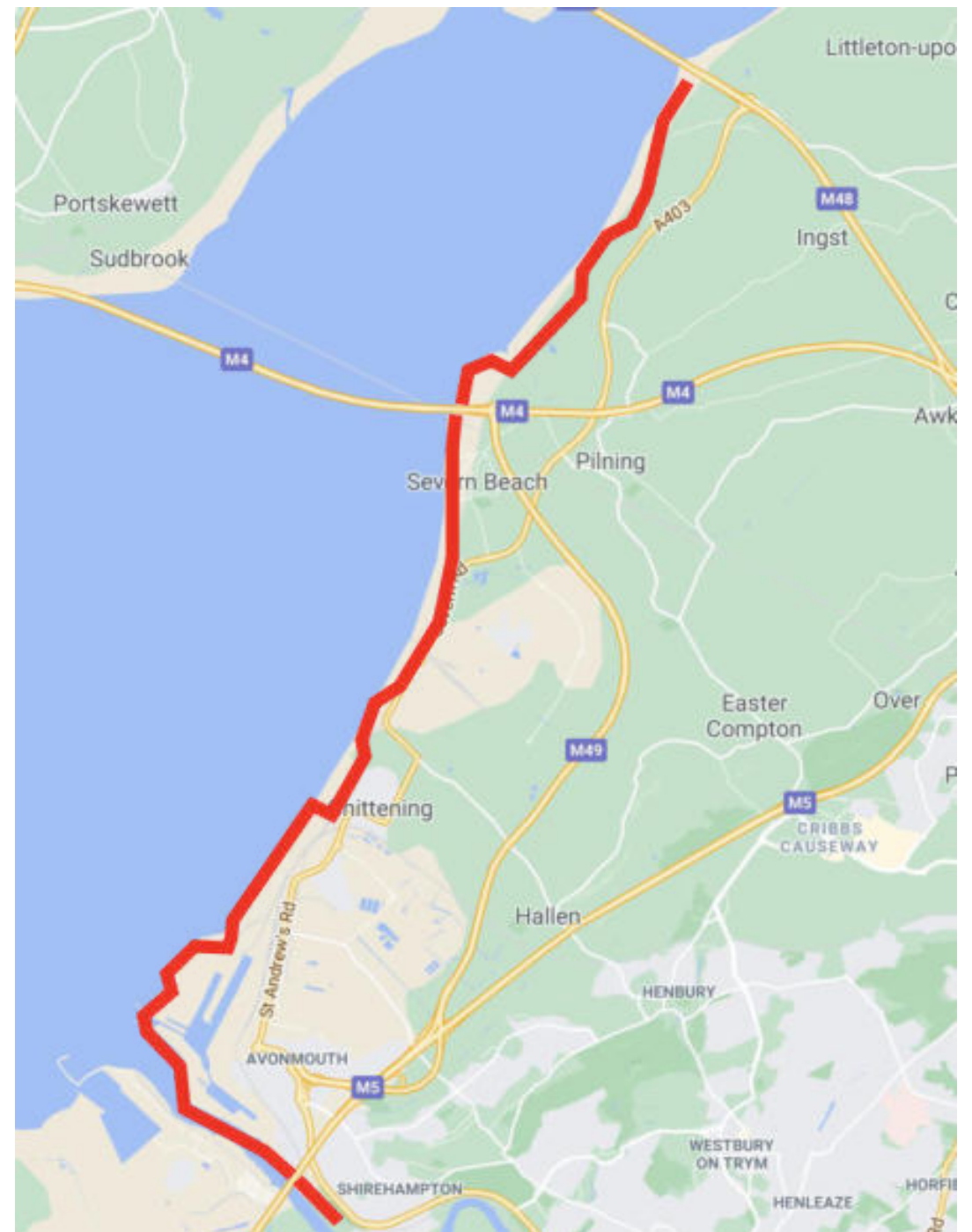
Context



Severn Estuary: a Special Protection Area and Special Area of Conservation, Site of Special Scientific Interest and Ramsar internationally important wetlands site.



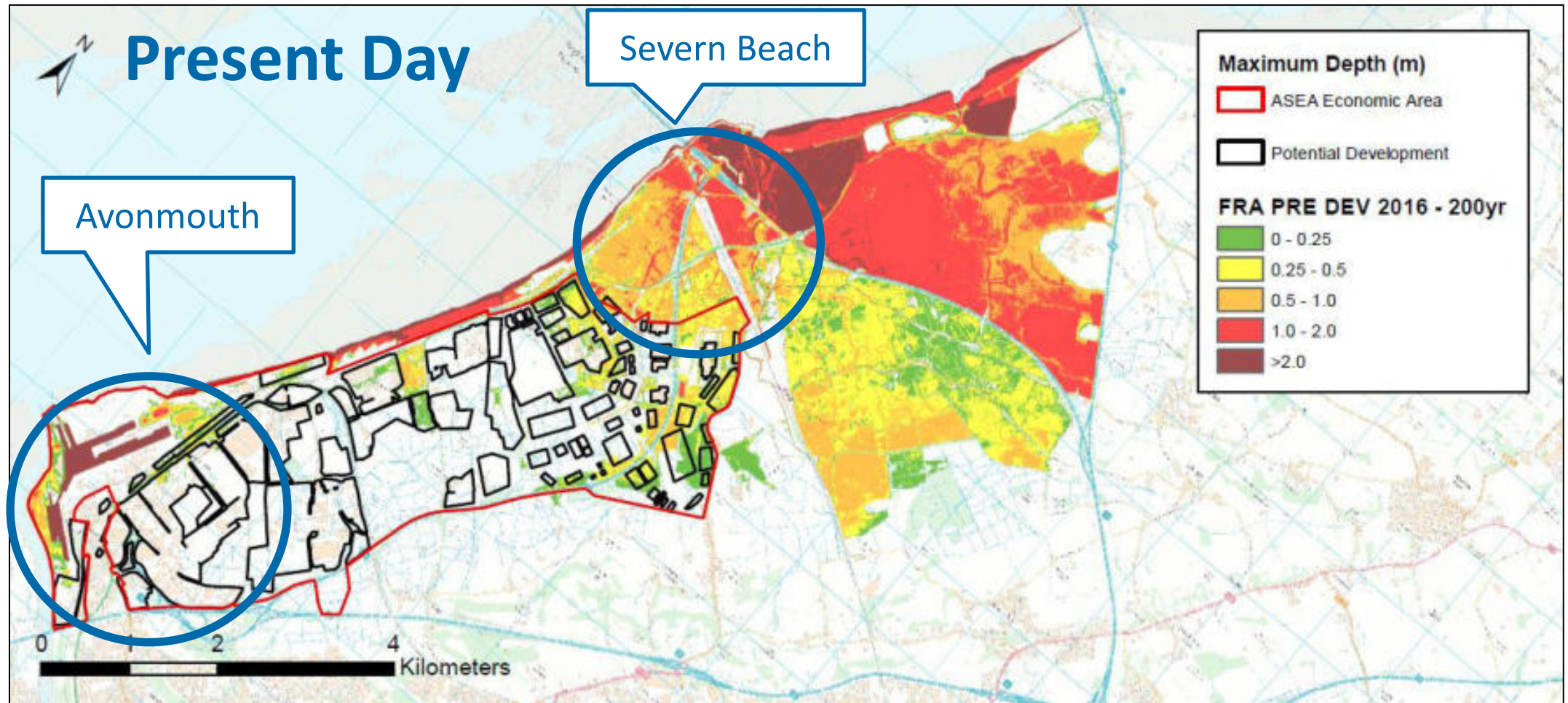
Avonmouth & Severnside Area: a strategically important employment location in the West of England and designated as an Enterprise Area. The largest brownfield site in Europe.



Project objectives:

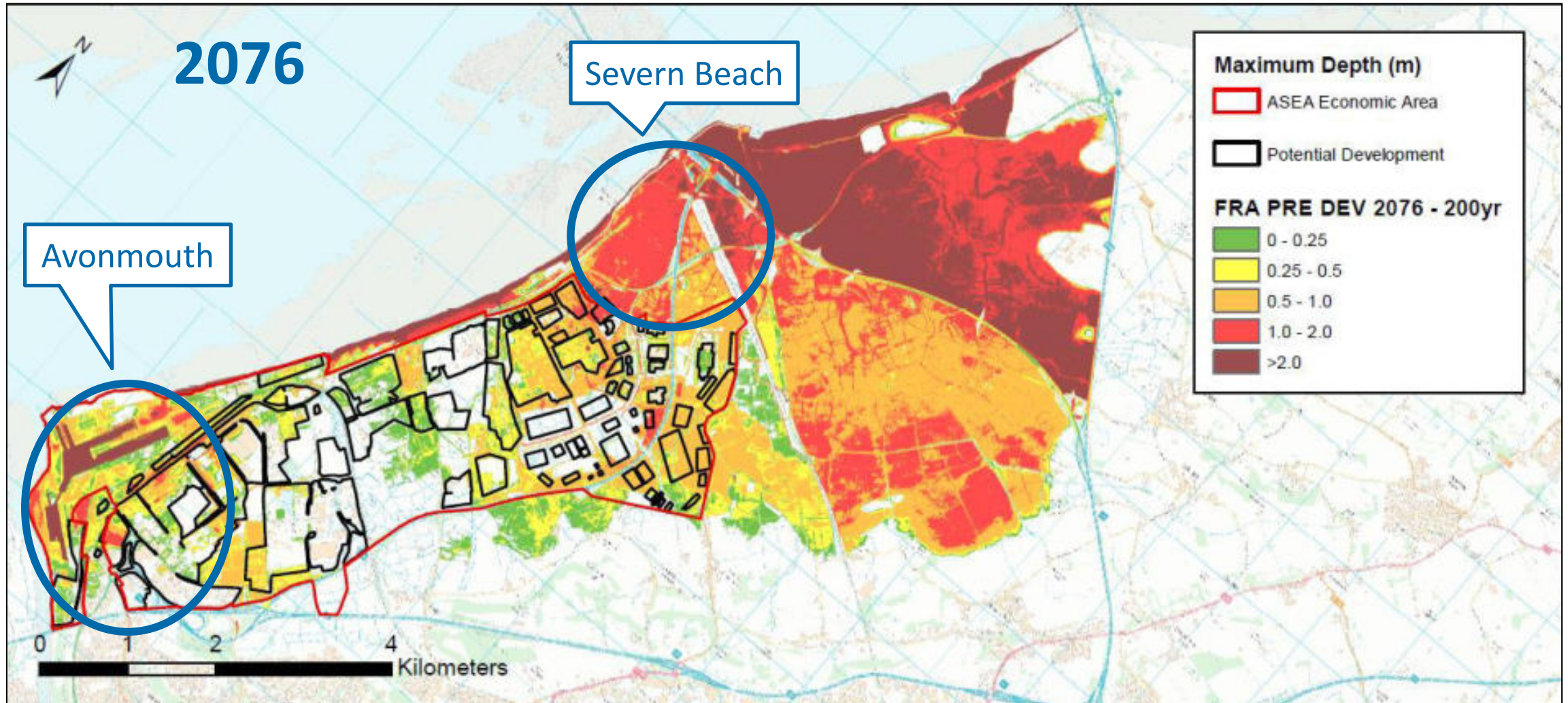
1. Reduce flood risk to existing homes and businesses
2. Help ensure that economic development can continue within the Enterprise Area by:
 - Managing flood risk to keep pace with climate change and sea level rise
 - Ensuring sufficient wetland habitat is created to protect the internationally important habitats and species of the Severn Estuary

Avonmouth and Severnside Enterprise Area (ASEA) Ecology Mitigation and Flood Defence Project



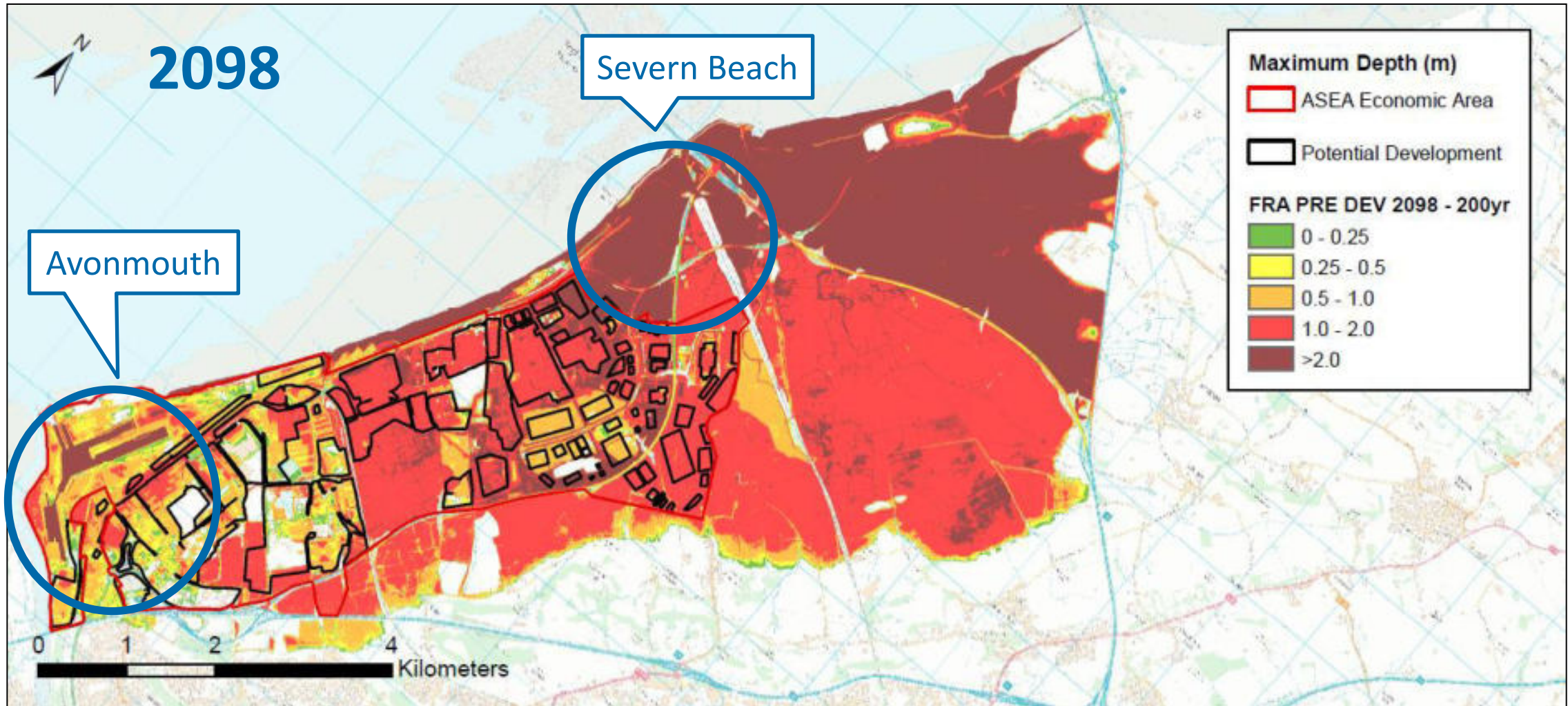
Present Day Flood Risk, taking account of existing flood defences

Avonmouth and Severnside Enterprise Area (ASEA) Ecology Mitigation and Flood Defence Project



Modelled Flood Risk in 2076, taking account of existing flood defences

Avonmouth and Severnside Enterprise Area (ASEA) Ecology Mitigation and Flood Defence Project



Modelled Flood Risk in 2098, taking account of existing flood defences

Habitat creation

73
hectares

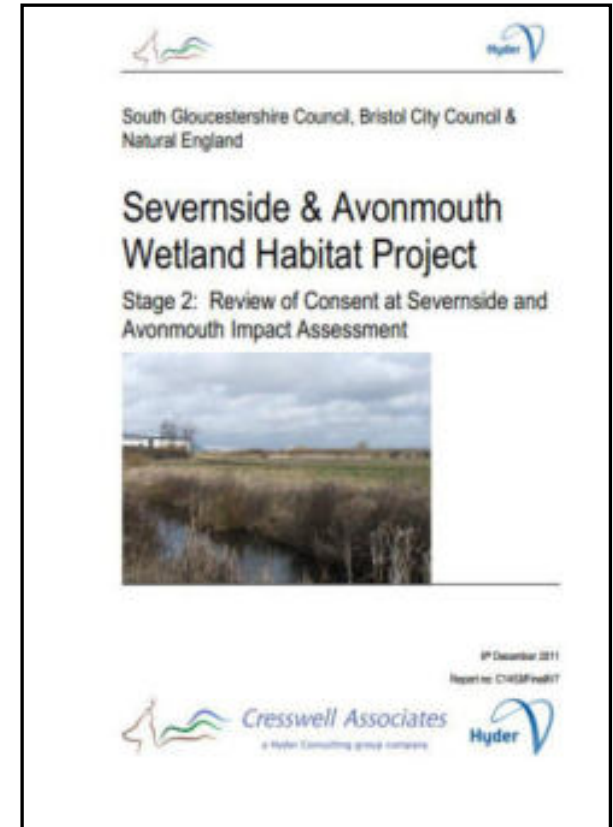


Minimum amount of wet grassland we will create to encourage wading birds such as lapwing, common snipe and curlew.

7
hectares









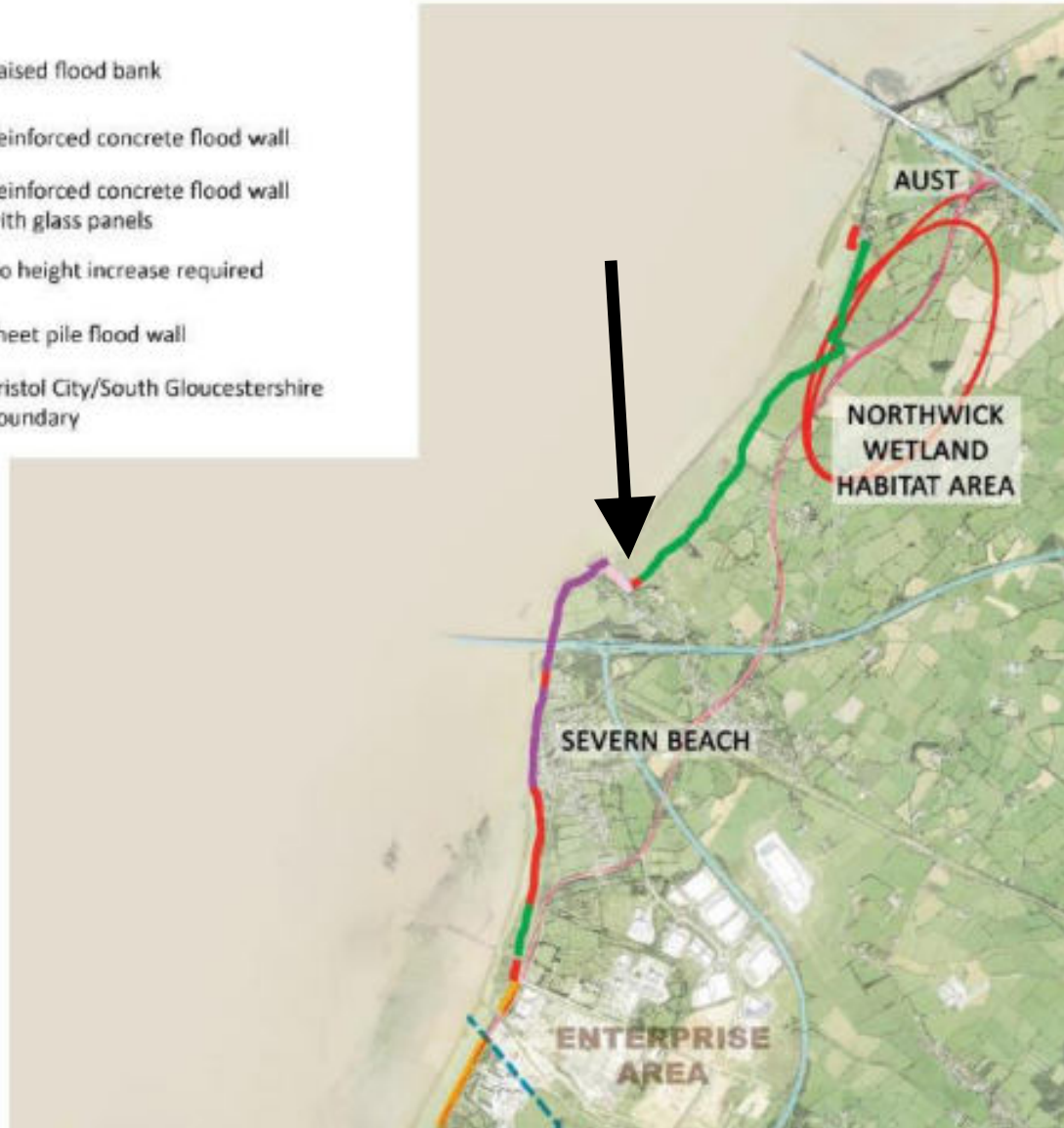
Minimum amount of open water and ponds we will create to encourage wildfowl such as gadwall, teal, mallard, shoveler, pochard and tufted duck.



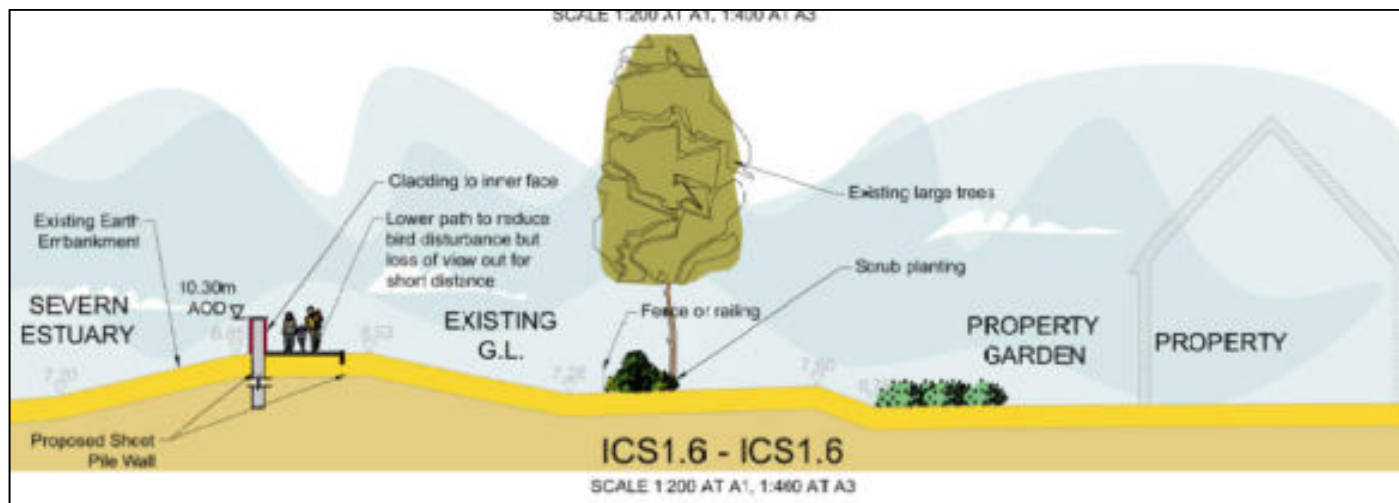
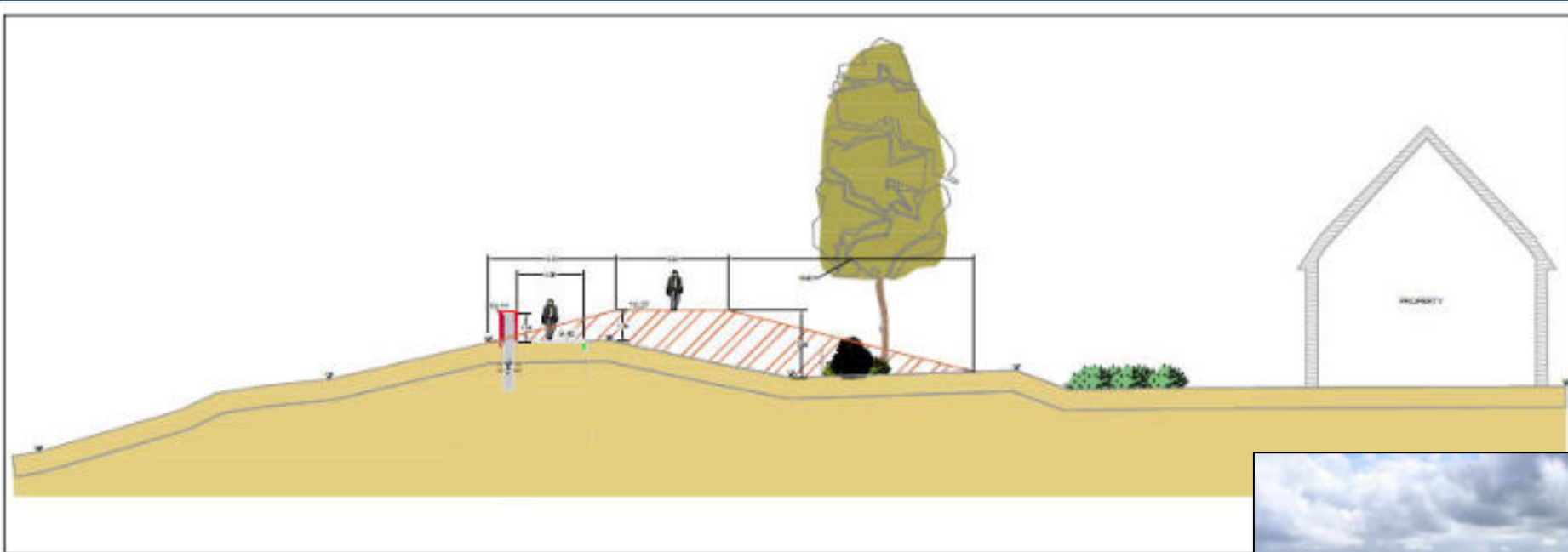
Compensatory habitat for commercial development in the Enterprise Area

Listening to the community: New Passage

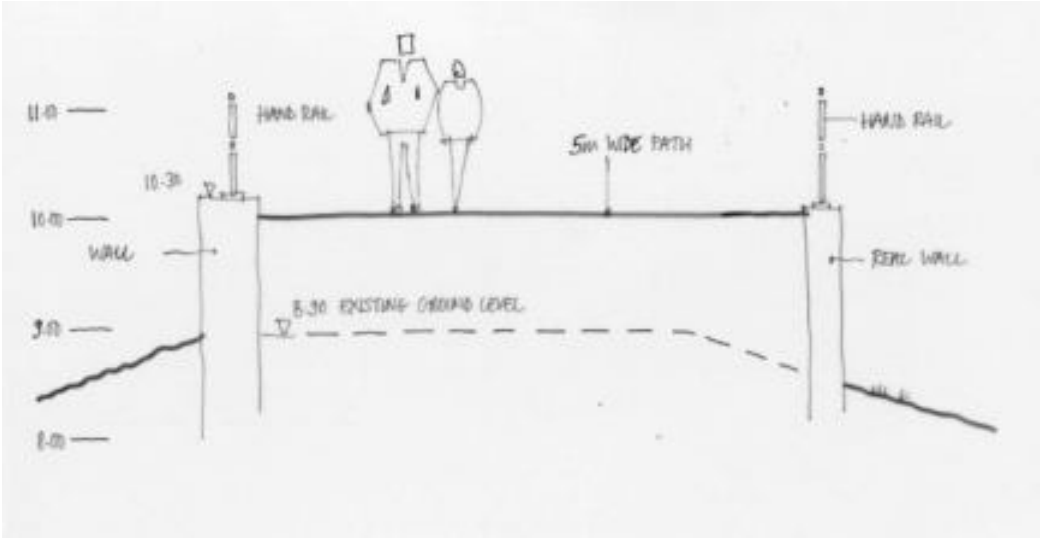
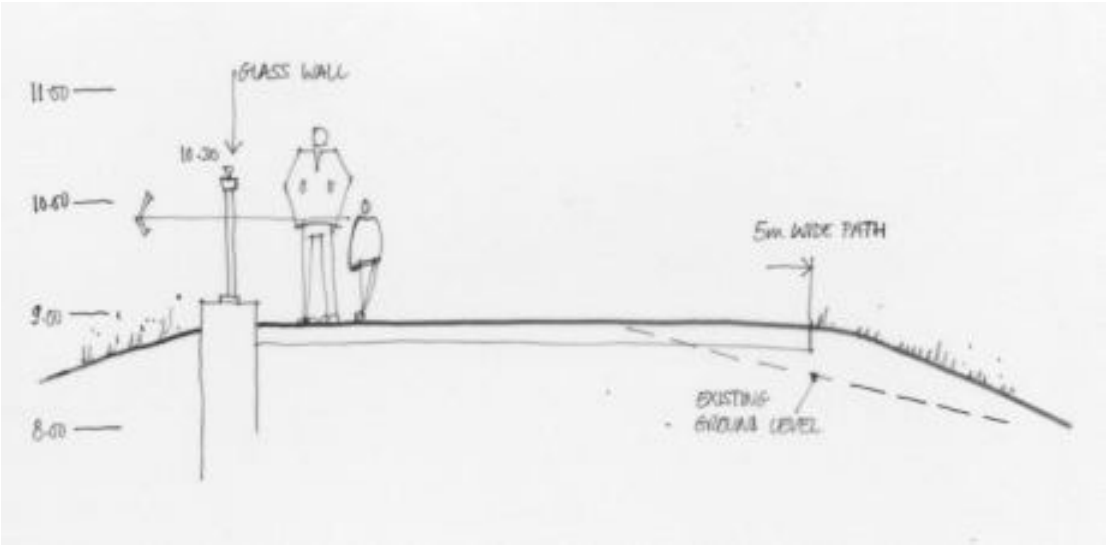
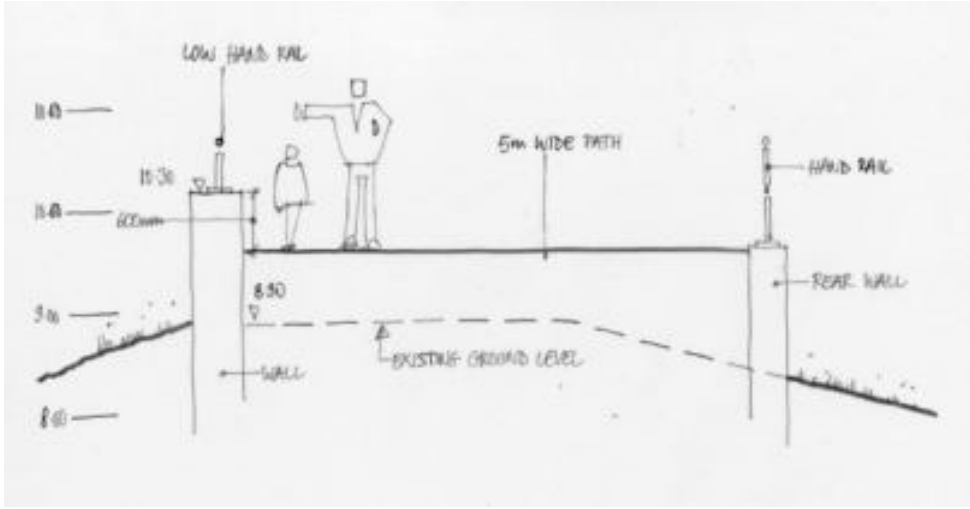
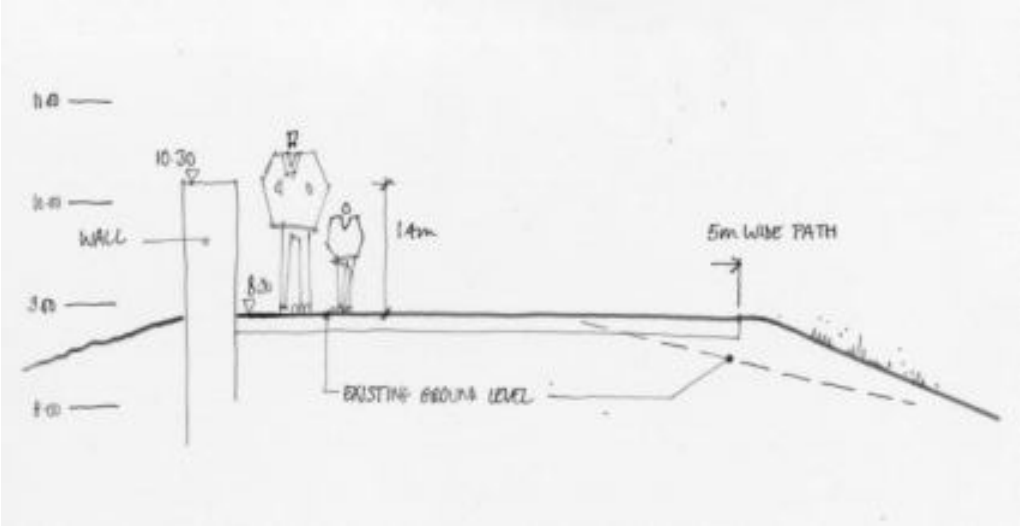
-  Raised flood bank
-  Reinforced concrete flood wall
-  Reinforced concrete flood wall with glass panels
-  No height increase required
-  Sheet pile flood wall
-  Bristol City/South Gloucestershire boundary



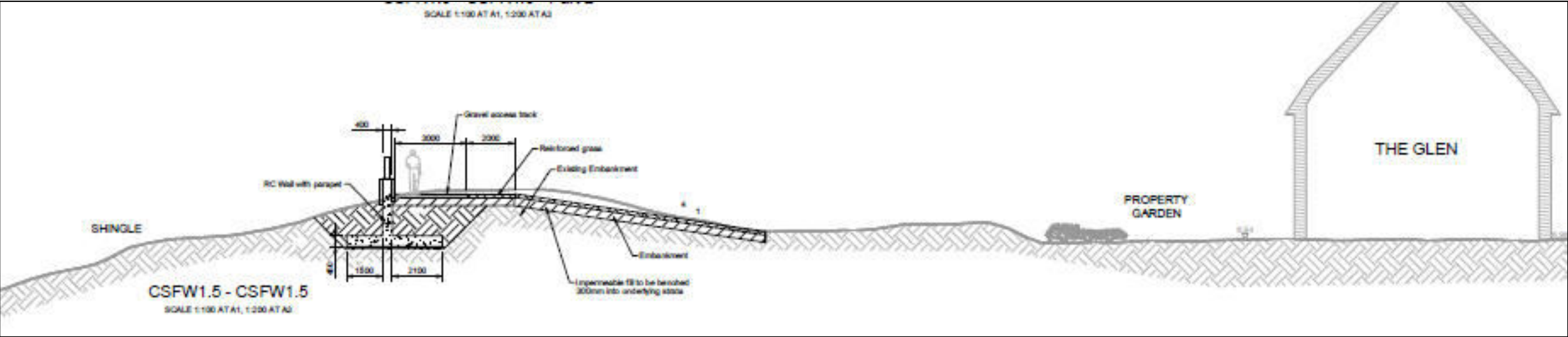
Listening to the community: New Passage flood defence options



Listening to the community: New Passage glass panels



Listening to the community: New Passage glass panels



Listening to the community: New Passage glass panels



New Passage – February 2022



bmmjv

bam **M**
nutall **M**
MOTT
MACDONALD

Listening to the community: New Passage glass panels

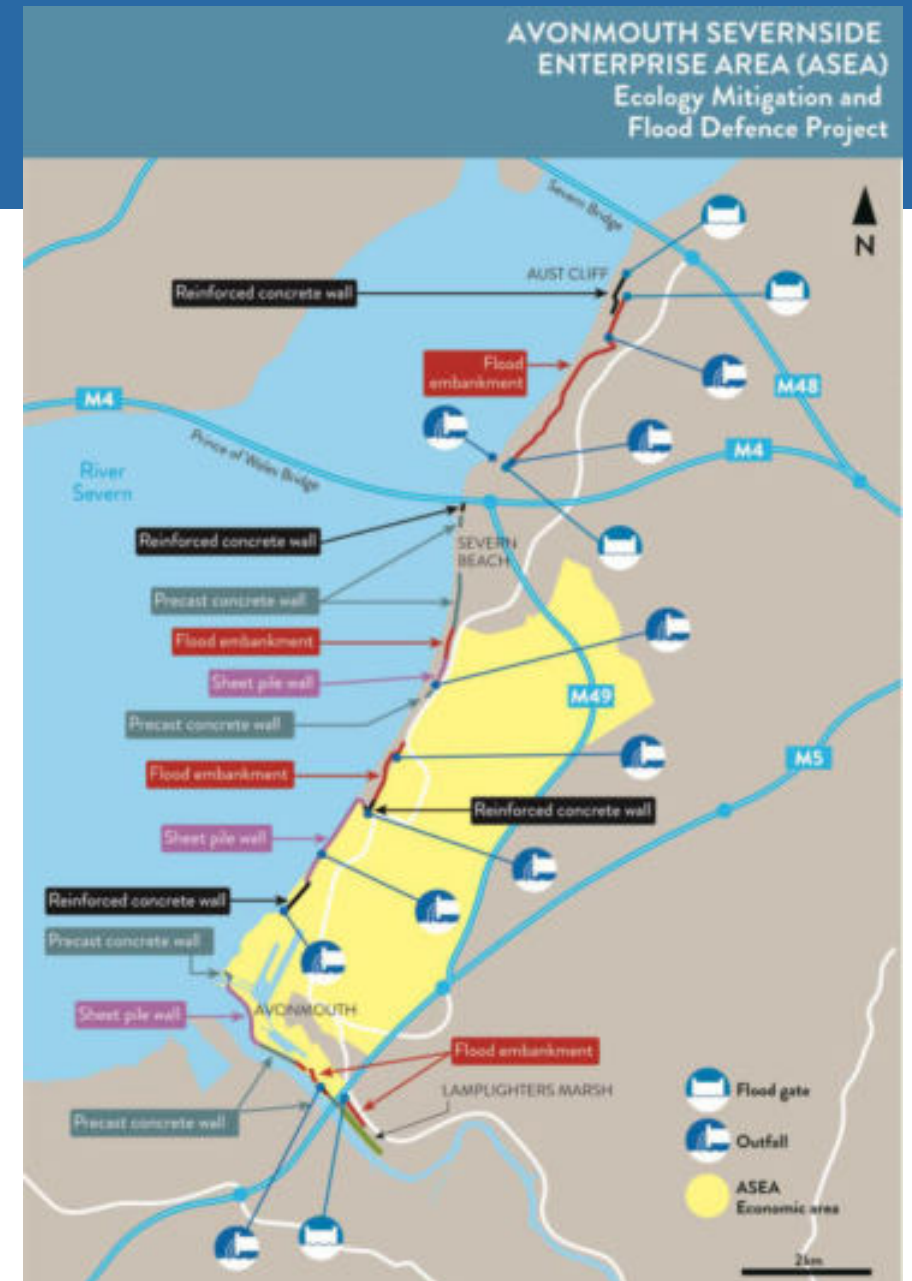


ASEA Scheme: Cake Pill embankment realignment



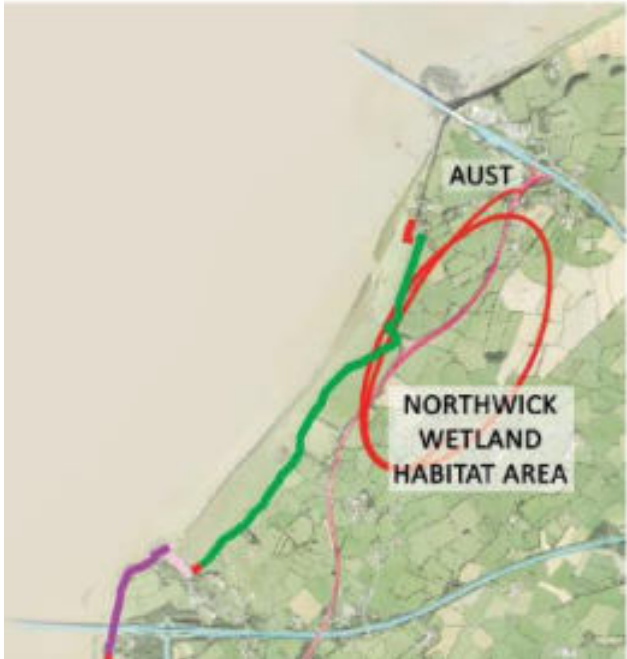
Scheme Overview: ASEA

- The tidal flood defence scheme includes:
 - 5,411m of raised earth embankments, which will make up around half of the total flood defences;
 - 3,055m of sheet piled walls;
 - 1,450m of in-situ reinforced concrete walls;
 - 1,925m of precast reinforced concrete walls.
- Near Severn Beach in-situ reinforced concrete walls with glass panels are being installed to enable views across the Estuary.
- Improvements to 6 existing EA outfall structures;
- 5no. New Flood gates;
- 2 road ramps;
- New Dock gates (to be delivered by Bristol Port Company)



Source: <https://www.newcivilengineer.com/innovative-thinking/precast-units-help-speed-avonmouth-flood-defence-scheme-02-12-2021/>

Progress Update: Wetlands



Stakeholder Engagement

We are engaging as follows:

- E-newsletter Updates [sign-up](#)
- Community Forum - virtual
- Economic Development & Environment Forum - virtual
- Social media Channels:
 - **South Gloucestershire Council:** [Twitter](#)/[Facebook](#)/[YouTube](#).
 - **Environment Agency Wessex:** [Twitter](#)/[Facebook](#)/[YouTube](#)
 - **Bristol City Council:** [Twitter](#)/[Facebook](#)/[YouTube](#)
- ASEA project website with interactive map:
www.asea-flood-ecology.co.uk/



29 September 2022

Progress and news update

Joint message from the lead project partners

We're excited to bring you the latest news from the Avonmouth Severnside Enterprise Area (ASEA) Ecology Mitigation and Flood Defence Project. The summer has been busy and you can read all about the project's extensive progress below.

This summer has also seen several apprentices and graduates join the team, making the most of the wonderful training opportunities the project offers. They share their stories in a short video that you can see below. The project team also thoroughly enjoyed taking part in the Severn Beach centenary celebrations with displays in a local history exhibition.

When completed in 2026-2027, the project will reduce flood risk to 2,500 homes and businesses and help to unlock 12,000 new jobs for the West of England. It will also create a minimum of 80 hectares of new wetland habitat for

