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Date:

Dear Member

KENT FLOOD RISK MANAGEMENT COMMITTEE - MONDAY, 6 MARCH 2017

I am now able to enclose, three presentations for the Monday, 6 March 2017 meeting of the Kent Flood Risk Management Committee that were unavailable when the agenda was printed.

Agenda Item No

4 **Rewilding and Natural Flood Management - Presentation by Professor Alastair Driver FCIEEM, Director England and Wales Rewilding Britain (Pages 3 - 22)**

5 **Thames Estuary Asset Management 2100 (Pages 23 - 36)**

Yours sincerely

John Lynch
Head of Democratic Services

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Rewilding and Natural Flood Management

Presentation to Kent Flood Risk Management Committee

Prof Alastair Driver

Director - England and Wales, Rewilding Britain

What is rewilding?

Ennerdale, West Cumbria

What is rewilding?

Great Fen after 2 years

Sutcliffe Park FSA after 15 years

Welsh hillside after 20 years

Welsh mountainside after 30 years

NFM - upland restoration

Bare and restored peat on Kinder Scout

August 2016: Newsletter Issue 9

Exmoor mires Partnership

"On the Bog" in a sea of cotton grass at Bogtastic, July 2016

A SUMMER OF OUTREACH

BOGTASTIC DAY 2016

On Tuesday the 26th of July Simonsbath became a hub of activity as 450 people visited Bogtastic Day! Held during National Park's week this event co-hosted by the Exmoor Mires Partnership and Exmoor National Park Authority aims to raise awareness and enjoyment of bogs, wildlife and heritage on Exmoor. The day was a huge success and feedback has been unanimously good! One family who had been previously even said they planned their holiday to Exmoor specifically to coincide with Bogtastic Day!

There were many different activities on the bog:

- The infamous Bogstacle Course and Bogtastic Challenge;
- Bog pool dipping with the Environment Agency where they found lots of young newt lava and an abundance of dragonfly nymphs, including one massive Common Hawker specimen;
- The archaeology tent where they were doing peat coring and pollen analysis, making clay coil pots in the style of bronze age beakers and pin your birthday to the tree ring;

Other activities included the bog plant treasure hunt, bog bouncing and having a go at practical conservation by building a peat block.

In the shelter of the meadow at Simonsbath there was a lovely fete atmosphere. The activities were equally diverse: bats, meadows, face painting, stream dipping and crafts. Catering was provided on site by Exford Community Youth Club who did a fantastic BBQ!

The event was sponsored by South West Water and we were kindly given a grant from the Exmoor Trust to go towards travel bursaries for community groups from Exeter and Barnstaple.

Many many thanks to the land manager for allowing Bogtastic to take place and being so helpful in the preparation. Thanks also to the minibus drivers and all the volunteers who gave up their time to ensure the success of the day. We couldn't do it without you all!

Exmoor Mires community events

Evidence from Moors for the Future: Restoration by re-vegetation and gully blocking on Kinder Scout has reduced peak flows from the restored areas by up to 37% and increased storm flow lag times by up to 267%

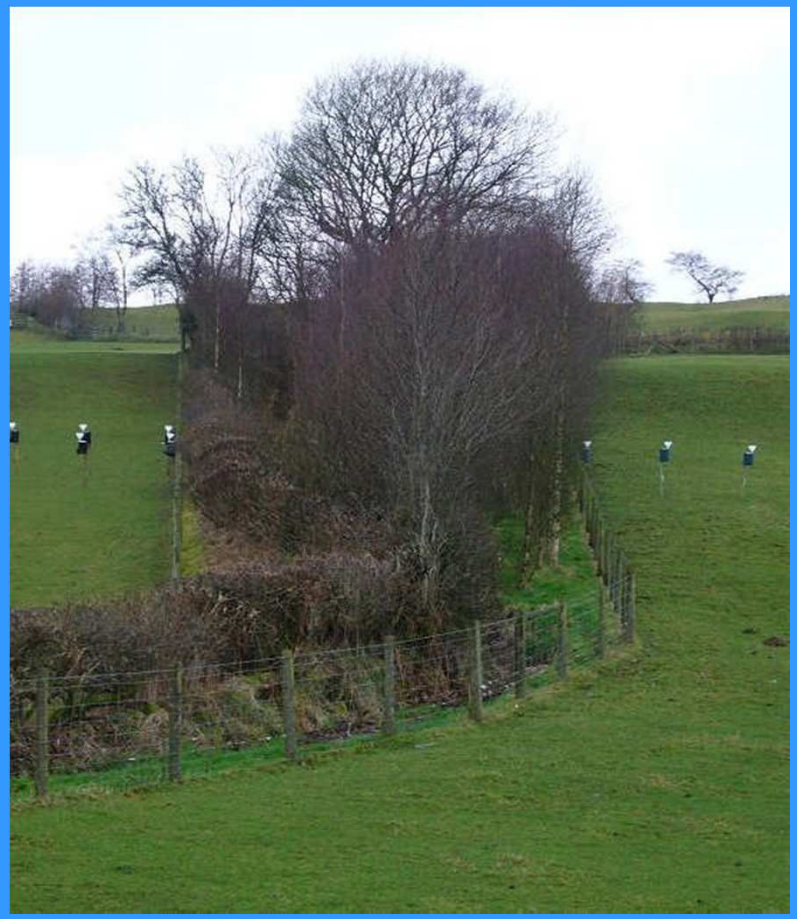
NFM – pond creation

Belford Burn, Northumberland

Evidence from Belford Burn: a "leaky" pond holding 800 m3 of water takes roughly 8-12 hrs to drain completely and delays the peak flow 1 km downstream by app. 15 mins

NFM – tree planting

Woodland planting on the Belford Burn



Woodland shelterbelt at Pont Bren

Evidence from Pont Bren: infiltration rates are up to 60x higher under young native woodland shelterbelts compared to adjacent heavily grazed pasture

NFM – woody debris

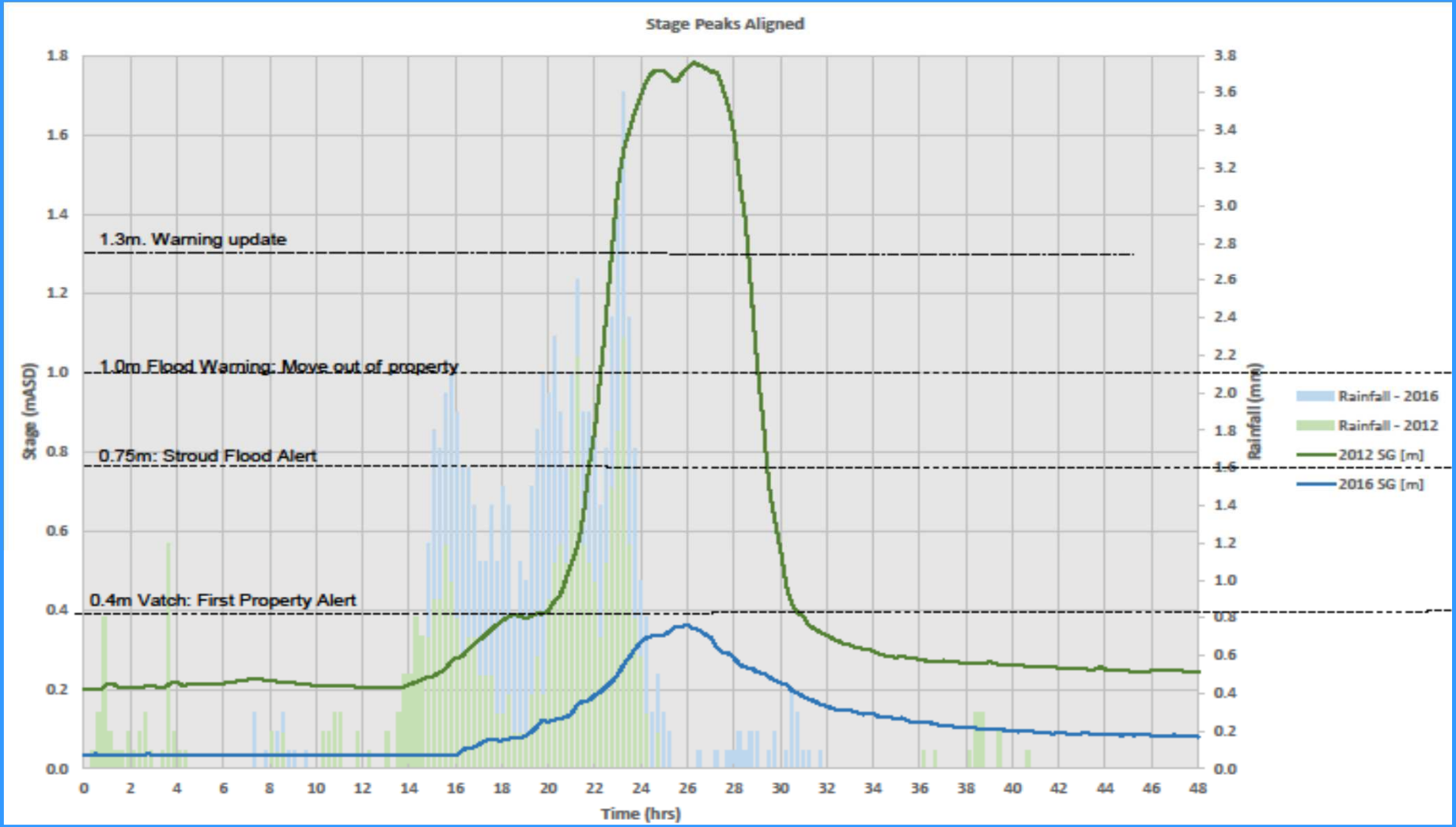
High flow woody debris dam,
Slad Valley, Glos

Leaving woody debris in situ at Holnicote

Hebden Bridge volunteers learning from Stroud

Evidence from Belford Burn, Northumberland: Installation of 6 large woody debris structures in a headstream near Belford, more than doubled the travel time for the peak of the flood 1 km downstream

NFM – woody debris



Evidence from Stroud Rural SuDS project: Similar rainfall events in Nov 2012 (before NFM) and Mar 2016 (after NFM) had strongly contrasting impacts. Before NFM the flood peak was app. 1.8M at the Slad Rd flow gauge and after NFM it was 0.4M

NFM – beavers

Beaver reintroduction on the R. Otter in Devon

Monitoring equipment at Boldventure

Beaver canal at Boldventure

Beaver pond at Boldventure

Evidence from Boldventure beaver enclosure, Devon: In 5 years, the beaver family have constructed 13 dams holding up to 1M litres of water in ponds on the site, reducing peak flows by 30% and increasing lag times by 1 hr app. 200 metres downstream

NFM – river restoration

Hammer Stream, Kent

R.Adur, Knepp, Sussex

R.Cole, Oxon/Wilts

Whit Beck, Cumbria

Evidence from a range of projects: A 21% increase in channel length combined with a 142% increase in the frequency of large woody debris across a range of river restoration projects, resulted in a 21% reduction in flood peak magnitude on average

NFM – floodplain reconnection

River Quaggy Flood Storage Area at Sutcliffe Park, South London,

River Leith, Cumbria

Evidence from the R. Quaggy: creation of wetlands through Sutcliffe Park in South London created 85,000 cubic metres of flood storage and significantly reduced the flood risk to 600 properties

NFM - SuDS

Surface water collection pond, Dunfermline

Green roof, London

Cheltenham Rain Gardens

Evidence from Environment Agency Introduction to SUDS: On average, urbanisation without SUDS trebles the rate of run-off during storm events

NFM - SuDS

Hollickwood Primary

Susie Earnshaw Theatre School

Queen Elizabeth Girls' School, Pymmes Brook catchment, North London

Evidence from Lamb Drove SuDS project: Maintenance costs associated with the Lamb Drove SuDS were 4% lower than those for equivalent pipe drainage systems

NFM – coastal realignment

Medmerry, Sussex

Steart Peninsula, Severn Estuary

Alkborough Flats, Humber Estuary

Evidence from EA Ecosystem Services Case Studies report: 400 ha Alkborough Flats managed realignment scheme cost app. £10M and provided £12M of storm protection to land and property. Other ecosystems services benefits = app. £1M p.a.

Putting it all together

Grip-blocking and tree planting

High level timber dams

Timber barriers across floodplain

Flood storage area

Evidence from Pickering Beck, East Yorks: NFM measures reduced peak flows by 15-20% in Dec 15, prevented flooding that would otherwise have occurred to a small number of properties in Pickering

Putting it all together

Re-wetting upstream bog

Leaving woody debris in situ

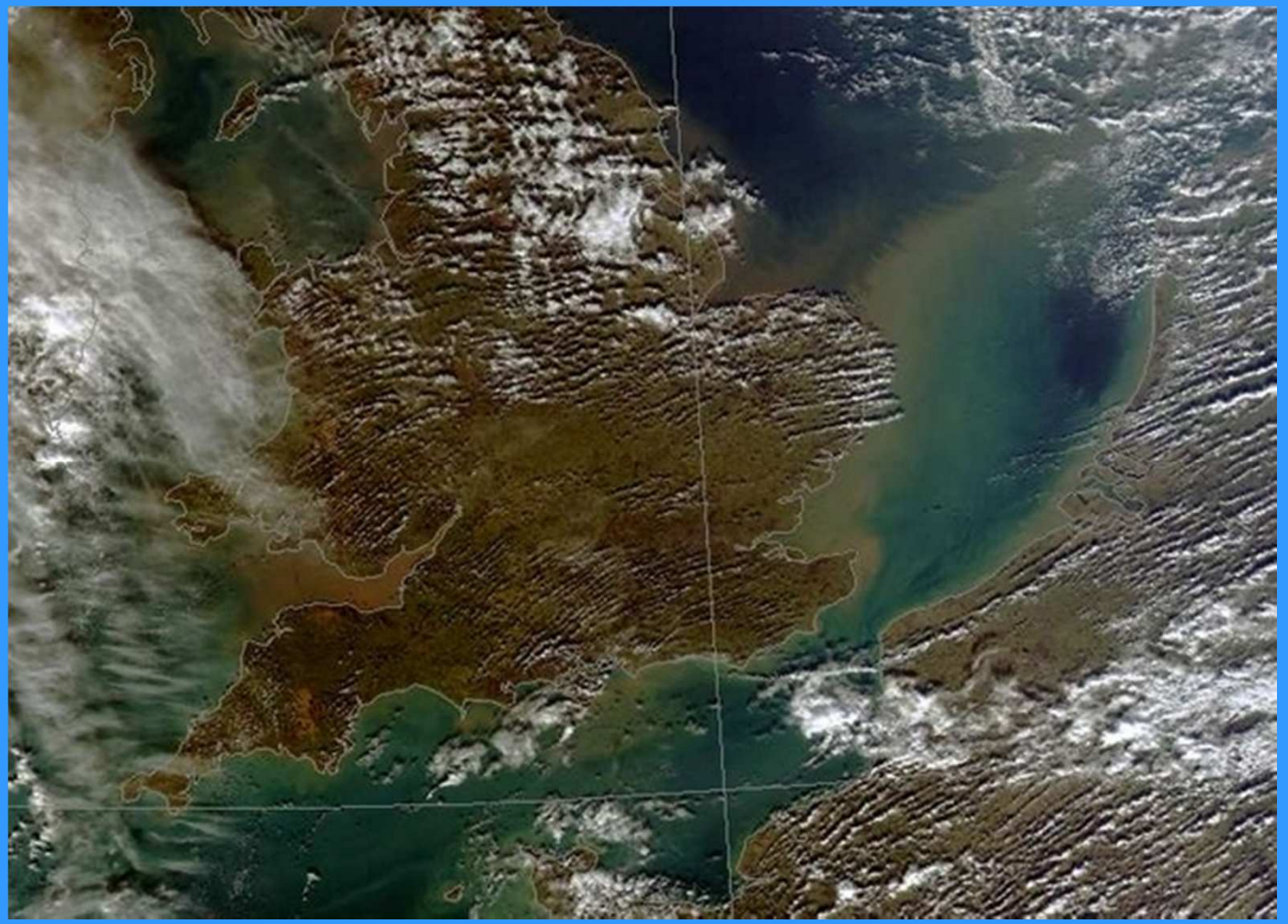
Downstream woody debris combined with floodplain attenuation

Evidence from Holnicote estate – Somerset: £160K NFM work reduced flood peak by 10% and prevented £30M of assets (90 properties) from flooding during a 1 in 25+ year flood event on Xmas Eve 2013.

NFM – soils – “the elephant in the room”

Evidence from Cranfield Univ research report on soil degradation for Defra 2011: The total cost to society of soil degradation in England and Wales is £1.2Bn per annum, of which 19% (£228M) are flood damage and flood risk management costs

NFM – soils – “the elephant in the room”



Evidence from Defra Soil Strategy for England 2009: 2.2 million tonnes of silt is lost from the land each year in the UK.

NFM key messages

- **NFM includes any catchment restoration intervention for which the best available evidence suggests it can make a contribution to reducing flood risk - no matter how small**
- **NFM is not the silver bullet for solving all flooding problems. Usually a mix of NFM and "traditional" civil engineering solutions will be necessary**
- **Successful NFM can be achieved in larger catchments through large numbers of carefully targeted smaller scale interventions**
- **All NFM interventions deliver additional benefits for people and wildlife**
- **The small scale and localised nature of most NFM solutions mean that it is an excellent way to involve local communities and individuals in decision-making and delivery**
- **All NFM interventions contribute in some way to the spectrum of rewilding !**

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TEAM2100

Environment Agency

Kent County Council

Kent Flood Risk Management Committee

TEAM2100 Introduction

6 March 2017

Rebecca Murphy – Environment Agency

Victor Freeney – TEAM2100

TEAM2100

Environment Agency

Agenda

- Introduction to TEAM2100 and background to TE2100
- Flood defence system across the estuary
- Project area and works
- Questions

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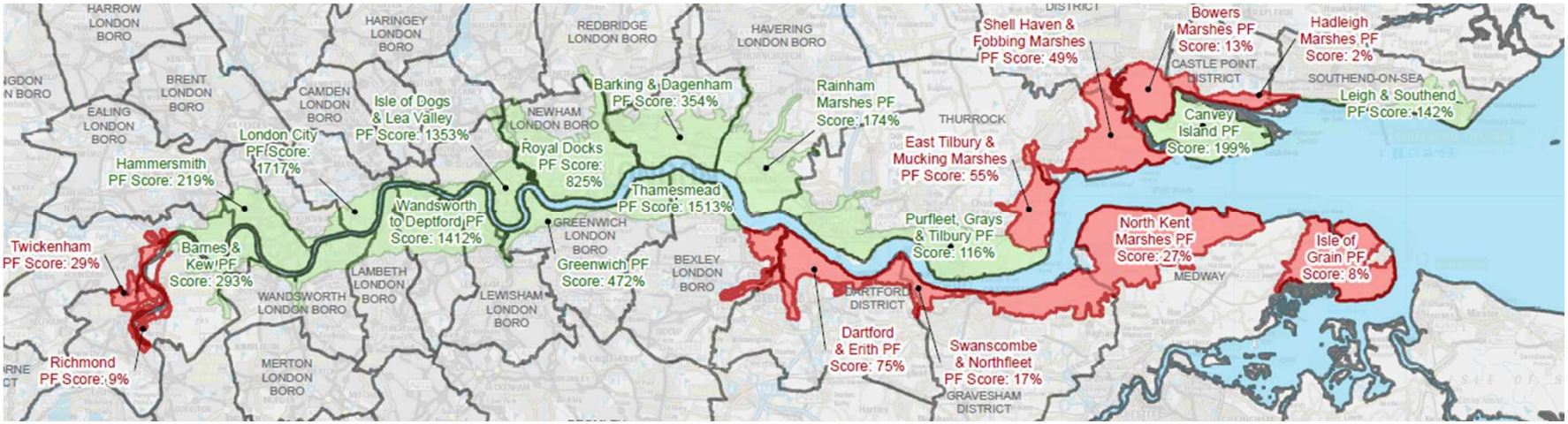
Introduction to TEAM2100 and the flood defence system across the estuary



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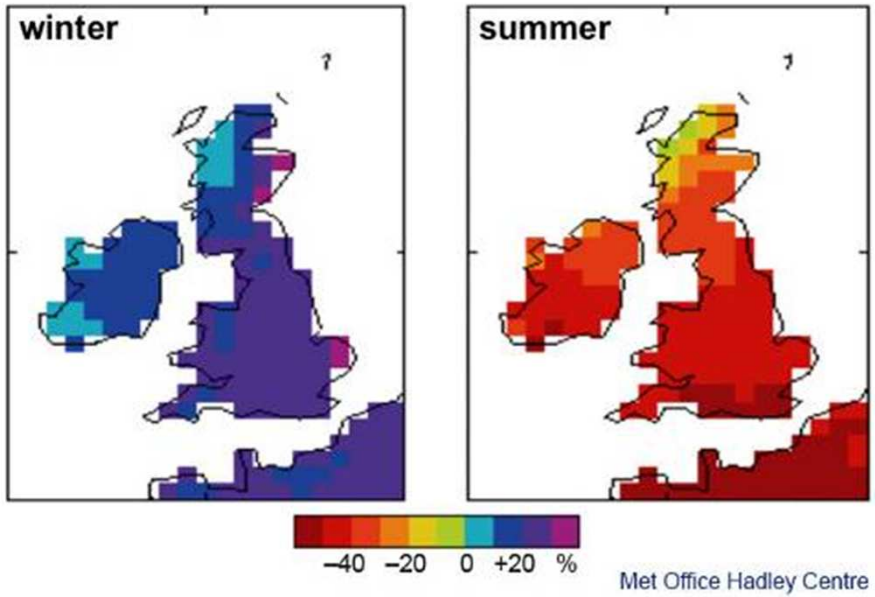
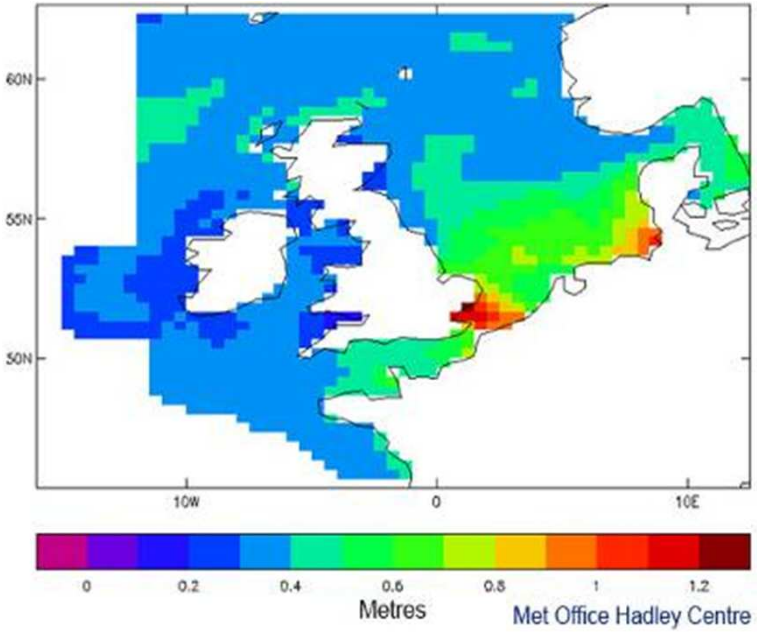
Why is flood risk increasing?

- More intense storm surges and sea level rise
- Increased rainfall





- More people in the floodplain
- Sinking of the southeast
- Flood defences aging

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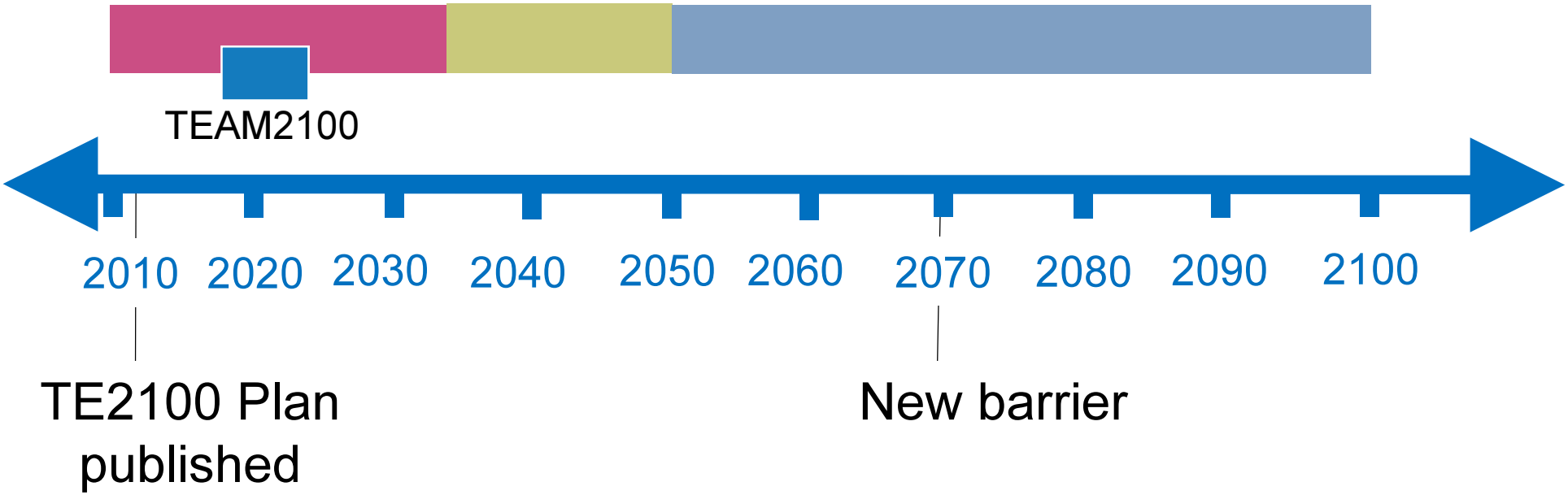
Phase 1
Maintaining confidence and planning together

Phase 2
Renewal and reshaping the riverside

Phase 3
Preparing for and moving into the 22nd century



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Key facts

- **Client** – Environment Agency
- **Contract signature date** – 4 November 2014
- **Value** – Estimated £308m
- **Duration** – 7 + 3 years *(ends 2024)*
- **Integrated Delivery Team:**
    - Environment Agency
    - CH2M
    - Balfour Beatty
    - Qualter Hall
    - Hunton Engineering
    - KGAL
    - Engineering Safety Consultants

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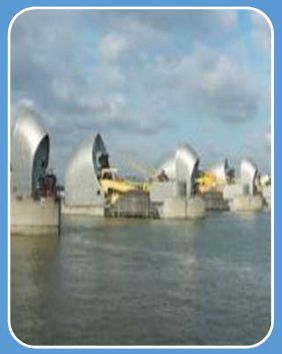
The Physical work



Major maintenance works and asset management for the **Thames Barrier** and other flood gates.

Inspections and repair of existing river flood defences through **central London and the outer Thames estuary**

Initial assessment and appraisal

- Initial assessment
  - Collation of information and desktop review
  - Site walkover and non-intrusive investigations
  - Is work required?
- Appraisal
  - More detailed investigations, where required (including intrusive)
  - Options identification
  - Design development
  - Appraisal and selection of preferred option

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Assets in the programme including Dartford Creek Barrier

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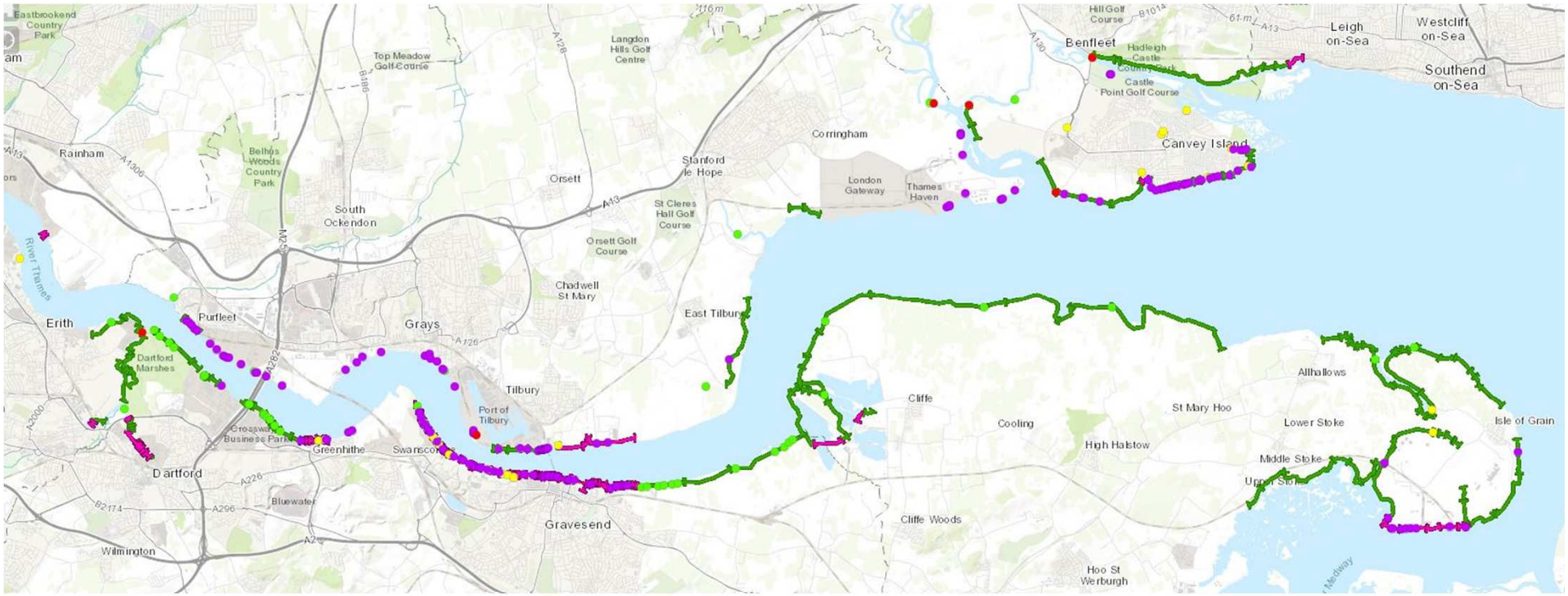

Key

- Barrier
- Gate
- Outfall
- Pump
- Wall
- Embankment

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	End of Stage 1	End of Stage 2	End of Stage 3 / Start of Stage 4
Dartford & Erith (Darent)	Q4 (2017/2018)	Q4 (2019/2020)	Q4 (2020/2021)
Swanscombe & Northfleet (not in 6 year plan)	Q4 (2017/2018)		
North Kent Marshes (Canal Basin)	Q3 (2016/2017)	Q4 (2016/2017)	Q4 (2017/2018)
North Kent Marshes (Denton & Shorne Marshes)	Q2 (2018/2019)	Not yet defined	Q3 (2020/2021)
North Kent Marshes (Cliffe & St. Mary's)	Q2 (2018/2019)	Not yet defined	Q3 (2020/2021)
Isle of Grain (Allhallows & Grain Marshes)	Q2 (2018/2019)	Not yet defined	Q3 (2020/2021)
Isle of Grain (South)	Q2 (2018/2019)	Not yet defined	Q3 (2020/2021)

Key

Stage 1: Initial assessment and appraisal
Stage 2: Develop delivery strategy
Stage 3: Detailed design
Stage 4: Deliver, commission and handover

****All dates indicates end of quarter except stated otherwise****

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Understanding the funding need – draft costs 6 year plan

Policy Unit	Council area	Construction start	Total cost		Partnership Funding		Grant-in-Aid
			Low	High	Low	High	
Dartford & Erith	London (Bexley) & Kent (Dartford)	Q4 20/21	£20.6m	£24.4m	£3.8m	£7.5m	£16.9m
North Kent Marshes	Kent (Gravesham) & Medway	Canal Basin Q4 17/18 remainder Q3 20/21	£8.5m	£14.0m	£5.5m	£10.9m	£3.0m
Isle of Grain	Medway	Q3 20/21	£7.8m	£14.6m	£6.9m	£13.8m	£0.9m

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Questions?

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