

Storm Surge Barrier conference

Thames Barrier

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Thames Tidal Defences Operations Manager

May 2019

Environment Agency

- roles & responsibilities

Within England, we're responsible for:

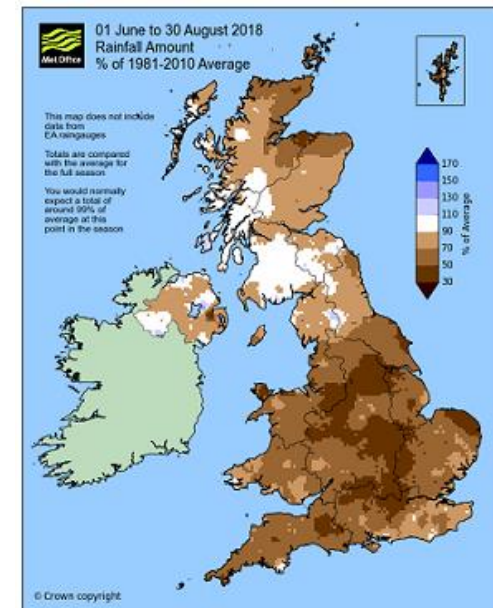
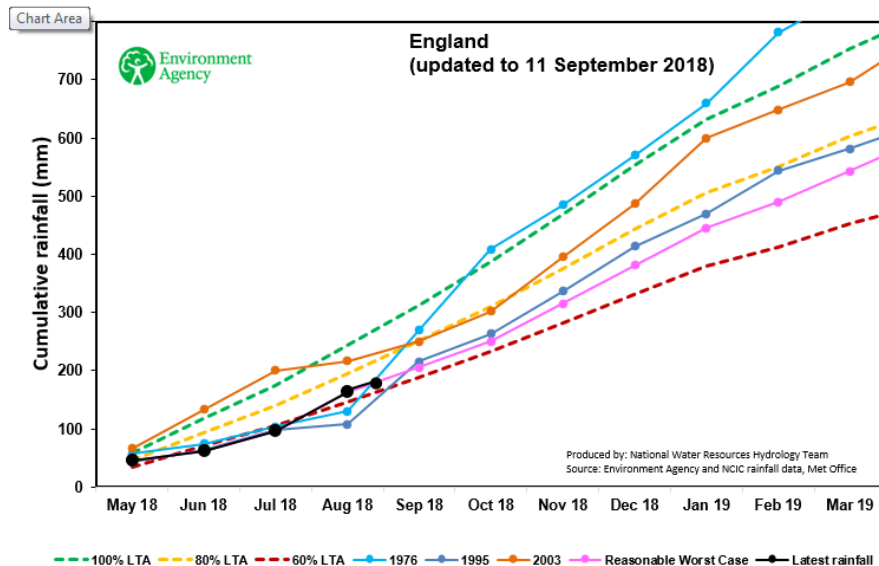
- water quality and resources
- fisheries
- inland river, estuary and harbour navigations
- treatment of contaminated land
- conservation and ecology
- regulating industry

We are also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

Lead local flood authorities (LLFAs) are responsible for managing the risk of flooding from surface water, groundwater and ordinary watercourses and lead on community recovery.

Summer 2018: Rainfall – It's been an unusual year

- Low reservoirs
- Low groundwater levels



Summer 2018: England's warmest on record

- Low reservoirs
- Actions taken to reduce fish kills



Bewl reservoir



Whilst in previous years...

East coast surge: homes fall into sea, waves rip at pier, wildlife struggles

Norfolk residents tell of evacuations, close shaves, a flooded nature reserve and seals with pups missing



▲ A home hit by the high tides along the crumbling coastline at Hemsby, Norfolk. Photograph: Jeremy Durkin/www.photo-features.co.uk

The telephone probably saved Ray Mooney's life. His brother called just as he was rushing to the back door of his home. Mooney, 55, took the call, and the back of his immaculate wooden chalet fell into the tumultuous sea below.

UK weather: flooding crisis set to deepen

Fourteen new severe warnings are issued along Thames Valley, indicating threat to life



By Nick Collins
10:00PM GMT 09 Feb 2014

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Storm Desmond: Thousands of people flooded out of homes

7 December 2015



Aerial footage filmed on Monday morning shows the flood levels in Carlisle

Thousands of people have been flooded out of their homes or left without power after Storm Desmond wreaked havoc in parts of the UK.

In Cumbria and Lancashire more than 43,000 homes are suffering from power cuts, while an estimated 5,200 homes have been affected by flooding.

Despite this... we are committed to better protecting 300,000 homes against flooding by 2021

Flood and coastal erosion risk management in England

Investment programme 2015 to 2021



Total additional benefits to society from capital investment of **£29.4 billion**

£600 million in benefits through improved biodiversity and local environments



£5.0 billion in long term benefits to transport, infrastructure, commerce and industry



£1.5 billion in benefits to the agriculture sector through flood risk reduction



£22.3 billion in benefits through damages avoided from **300,000** households being better protected

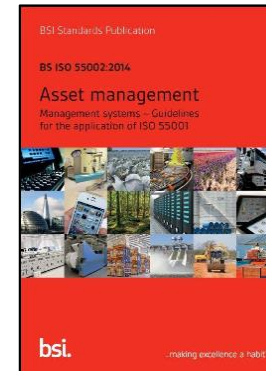
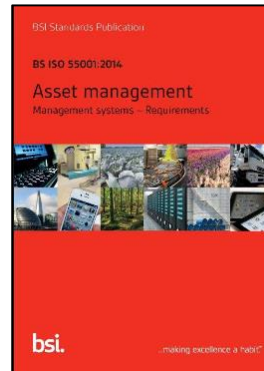
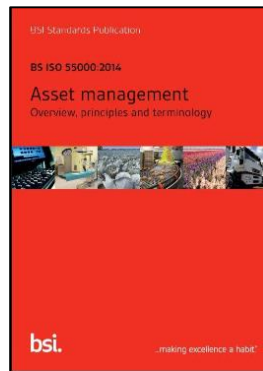
Visit gov.uk/government/publications/programme-of-flood-and-coastal-erosion-risk-management-schemes to find out what is happening in your area

LIT 10060



We are also committed to ISO55000

- International Standard for Asset Management
- Demonstrate our ambition to be industry leading



- Align our FCRM Activities to ISO Standard

Storm surge barriers

Environment Agency Storm Surge Barriers

Boston Barrier



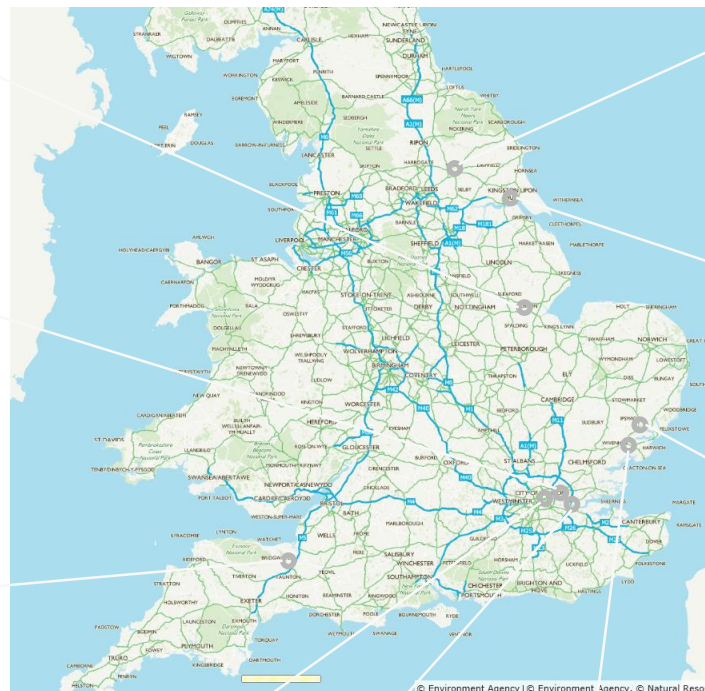
Barking Barrier



Bridgwater Barrier



Thames Barrier



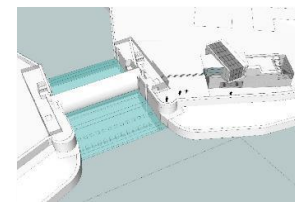
Foss Barrier



Hull Barrier



Ipswich Barrier



Colne Barrier



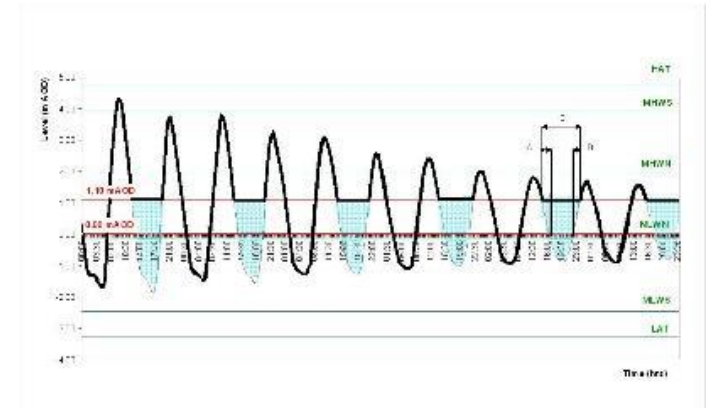
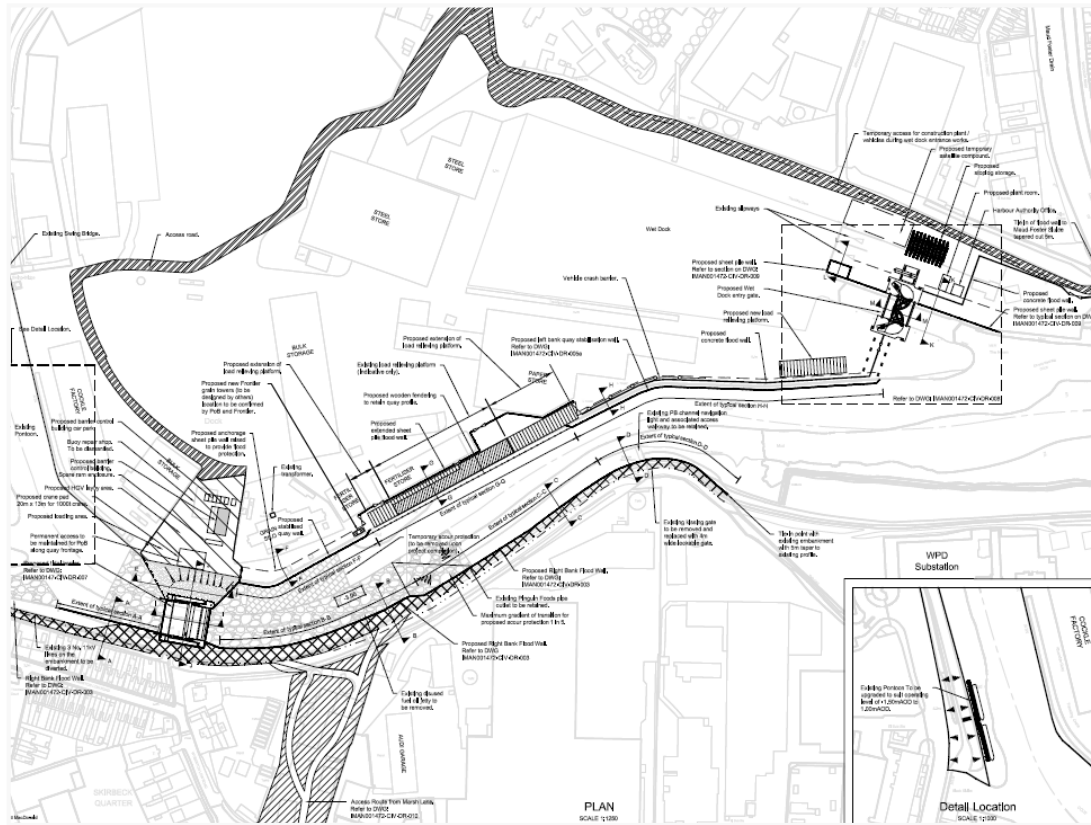
Dartford Barrier



Bridgwater Barrier – in design



Boston Barrier – under construction



Ipswich Barrier – just completed



Foss Barrier – major refurbishment



Hull Barrier - existing



Case study



Thames Tidal Defences

History of Tidal Flooding



- Anglo Saxon Chronicle 1099:
"...on the Festival of St Martin the sea flood sprang up to such a height and did so much harm as no man remembered that it did before and this was the first day of the new moon..."
- Another flood recorded on the same day in 1236: *"...which caused the marshes about Woolwich to be all at sea wherein boats and other vessels were carried in the stream. In the great Palace of Westminster men did row in wherries in the midst of the hall..."*

1928 - Most Recent Tidal Flood in Central London



1953 Floods



3,000 AWAIT RESCUE BOATS

The caravans float like matchboxes

By NOEL WHITCOMB

LOOKING down from an aeroplane on the watery tragedy that hit England yesterday, it was not so much the appalling pictures of Mablethorp, Canvey Island and Great Yarmouth that struck home the full terror wrought by the cruel sea.

It was sights like the farmer standing on his roof, surveying the sandy beach that had been his field; the bottles of painted boats at Skegness which turned out to be no bottles at all, but Butlin's cups.

It was the sight of a farmer with two of his horses standing on the cart of two bodies, which might have been animals but didn't look like it.

work and hope and saving, suddenly washed out by the sea and the wind.

We looked down to look at a lighthouse—and found it was a windmill.

It wasn't possible to follow the old, familiar coastline, for it has disappeared. This storm has changed the map.

Just Twisted Metal

Playgrounds, putting greens and fanfairs are not where they used to be. They are, in many places, just struts of twisted metal.

Caravans float like matchboxes. Red, white and green holiday villas are in the sea. In what must have been the front garden of one such villa, saw a stretch like that.

"DAILY MIRROR" REPORTERS

THREE thousand people in Plaistow and West Ham, in the worst-hit flood areas of London, were waiting last night for rescue by a fleet of small craft rounded up by the Thames Police.

For hours, strings of boats sailed up the streets to houses and blocks of flats where whole families were at the upper windows.

"Children first" was the order. They were ferried to high ground, where convoys of trucks took over and ran a shuttle service to improvised refugee centres.

Drowned in Air Raid Shelter

A man aged seventy was drowned in an air-raid shelter when a stream feeding the Thames at Barnes overflowed, and a raging torrent swept along Rectory-road. For ten years Herbert Haines had slept in the shelter in a garden of one of the houses there—to be away from the noise. In the darkness he was trapped before the alarm could be raised.

A watchman at a factory on the Belvedere Marshes, near the Thames Estuary, was drowned when he, too, was caught by the sudden torrent which roared through a breach in the river bank.

A police launch saved people marooned in their houses as the water spread over an area of 700 acres of the marshes.

For hours, in the early morning, police radio cars toured river-side areas of London, warning sleeping families to get up—and in some cases to flee from their threatened homes.

USELESS EUSTACE



"Naturally I haven't spoken to you all the evening—I didn't like to interrupt!"

THE ISLAND OF NO NEWS

"DAILY MIRROR" REPORTER

WHAT has happened to can't tell how many people, the 200 men, women if any, are dead, and children on foot. —Maiden on the River

Daily Mirror

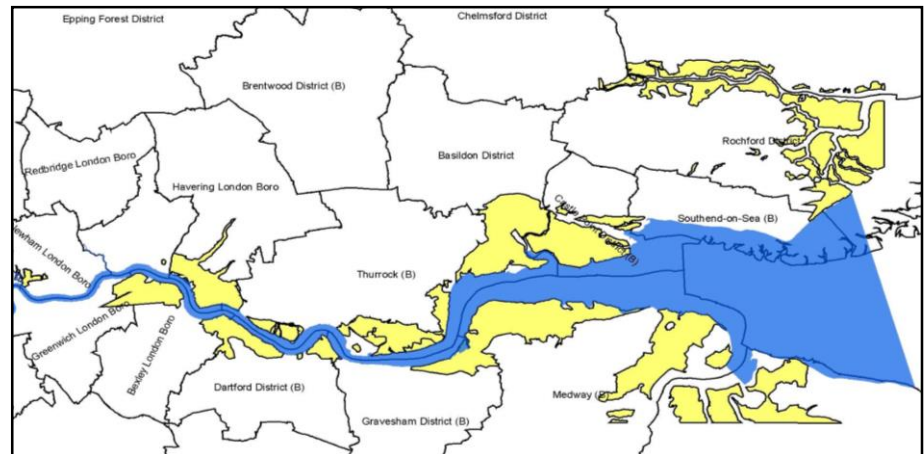
FROM FEB. 2 1953

FORWARD WITH THE PEOPLE

No. 115,346

200 DEATH-ROLL IS FEARED AS SEA-FLOOD HORROR STRIKES BRITAIN

Two to whom death came in a night of terror...

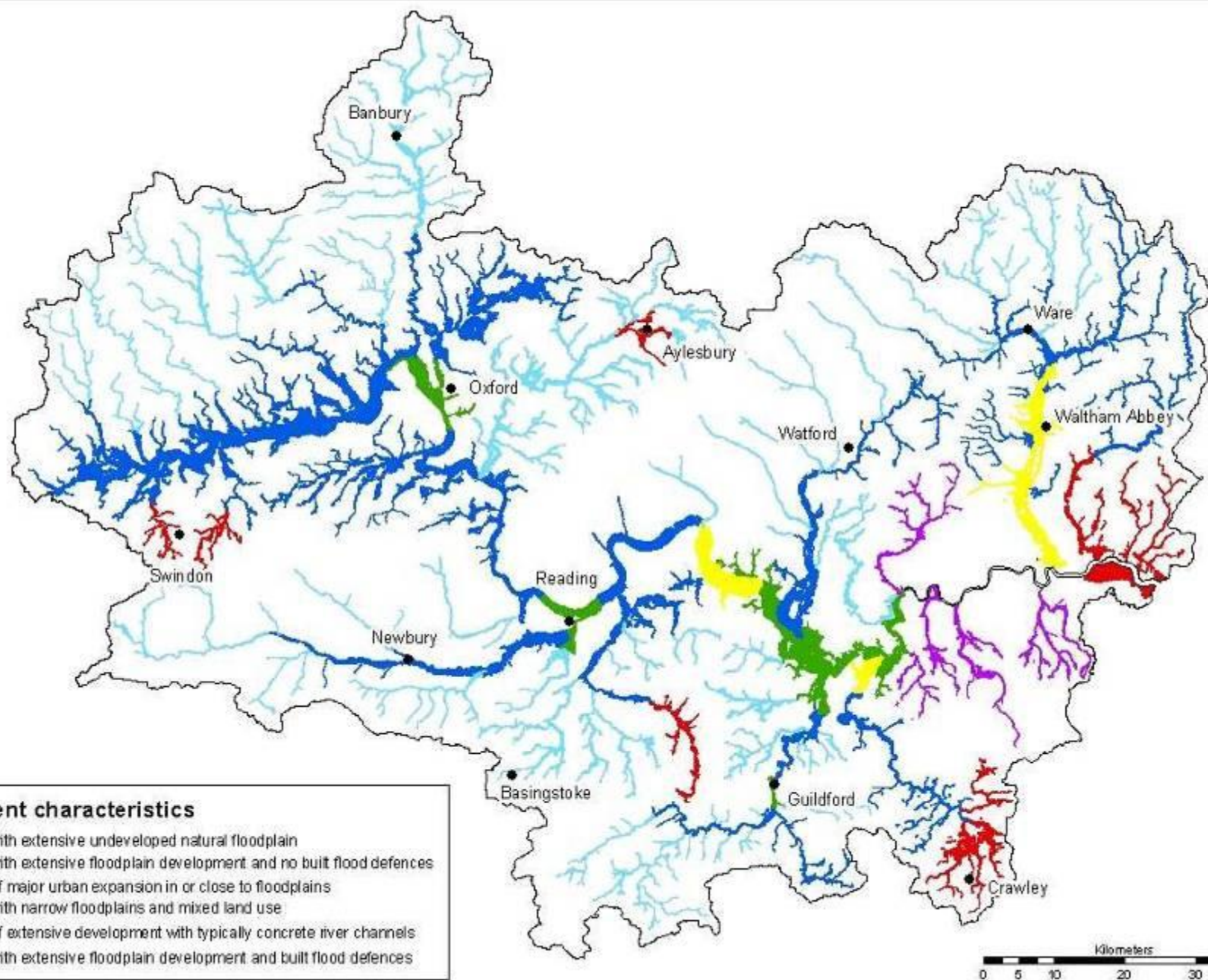


The 1953 Flood Event

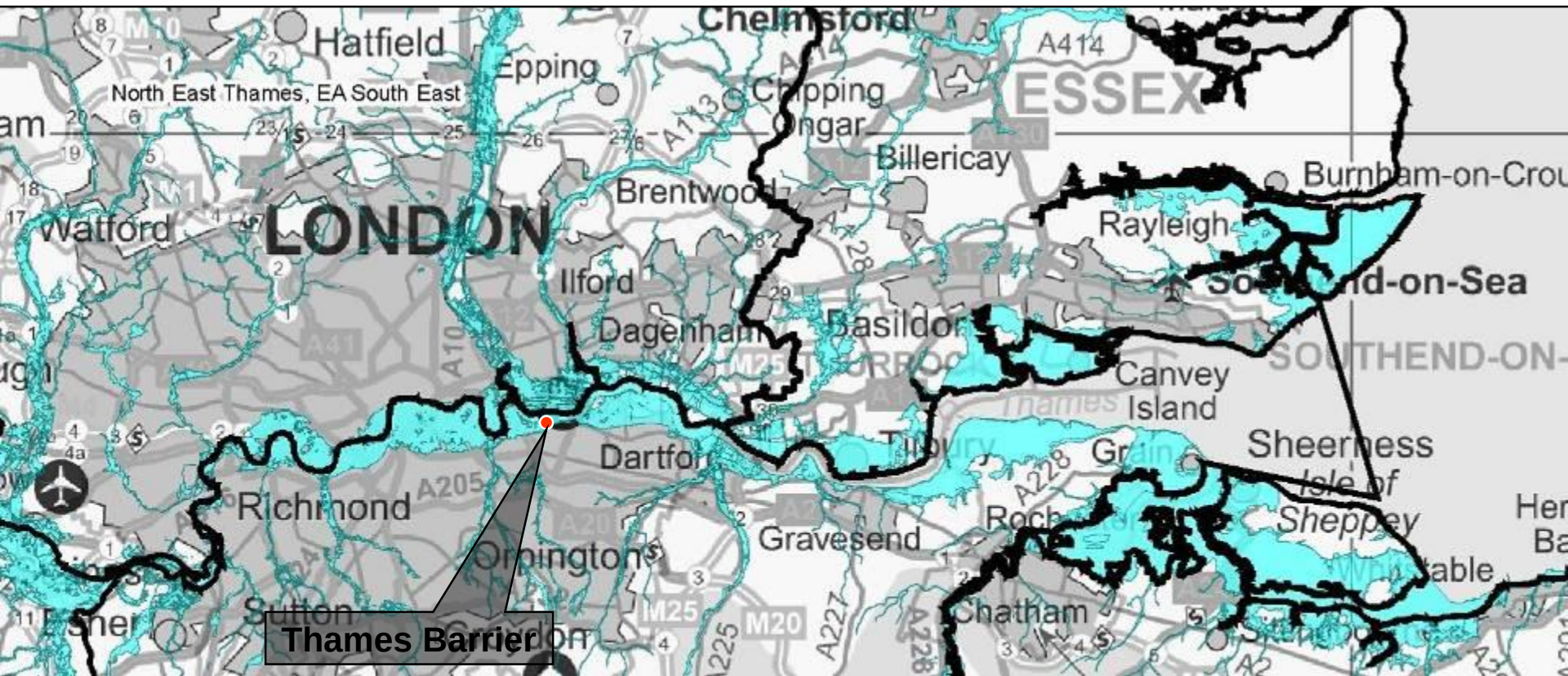
- 1953 saw disastrous flooding on the east coast
- 100 of the 300 people who died lived in the Thames Estuary
- Over 25,000 properties were damaged
- 30,000 people evacuated
- 100,000 acres of land was flooded along the coast



Flood Risk



Flood risk area



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Tidal Flood Risk Area

- ➡ 115 sq Km of London
- ➡ Over 375,000 properties at risk
- ➡ Over £300 billion capital values of assets
- ➡ 25 mainline & 54 Underground / DLR stations
- ➡ 226 schools, 13 hospitals, 15 fire & 15 police stations
- ➡ 1.3 million people live/work below average high tide
- ➡ City Airport
- ➡ Internationally important cultural heritage and environmental sites

Flood Defences

**Interim Defences during Thames Barrier construction →
1928 Flood and subsequent 1930 Flood Act →**

Late C19 update to Flood Act →

1879 Flood Act →



What were the options ?

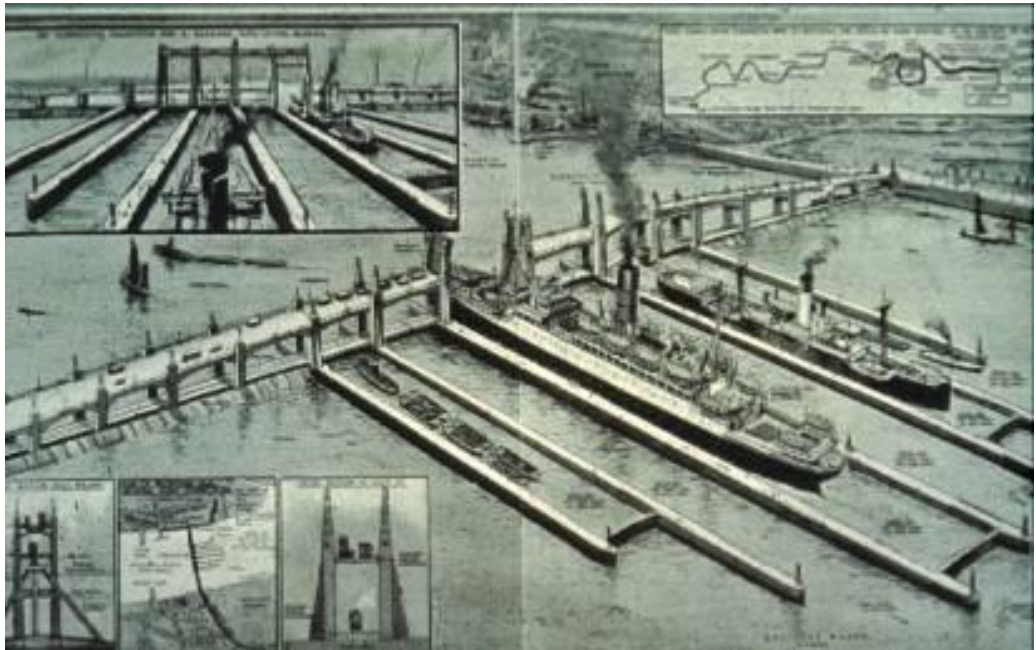
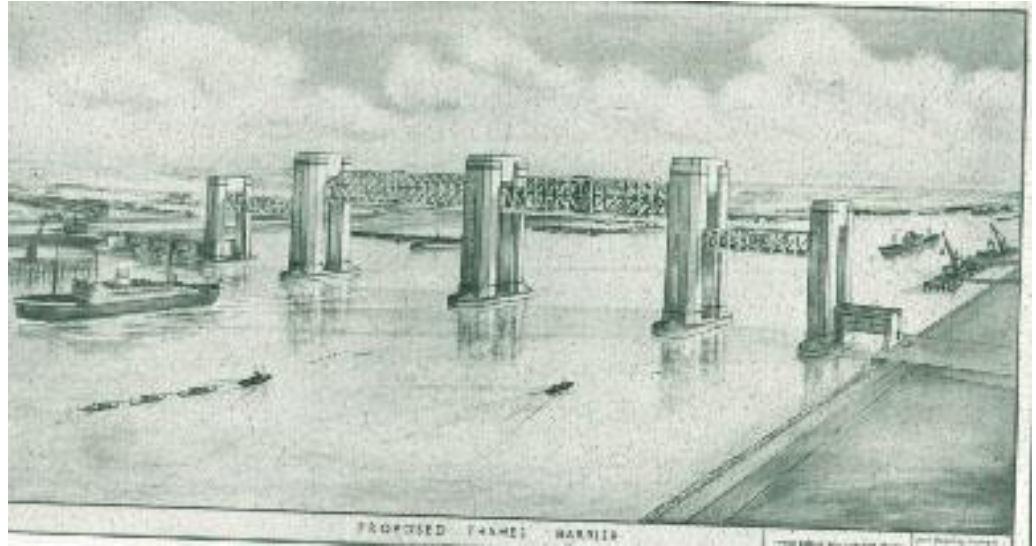
- Do nothing
- Relocate London to a safer site
- Raise the height of walls both sides of the Thames
- Build barriers to keep dangerously high tides from the city

Stages in the decision to build the Barrier . . .

1953	Waverley Committee
1966	Sir Herman Bondi Report
1972	Legislation Provided (Thames Barrier and Flood Prevention Act)
1971-2	Interim Defences built
1974	Construction of Thames Barrier & Associated Gates commences

Designing the Barrier

- Many designs submitted
- Charlton chosen because of the straight, deep, wide stretch of river
- Not too wide to be cost prohibitive

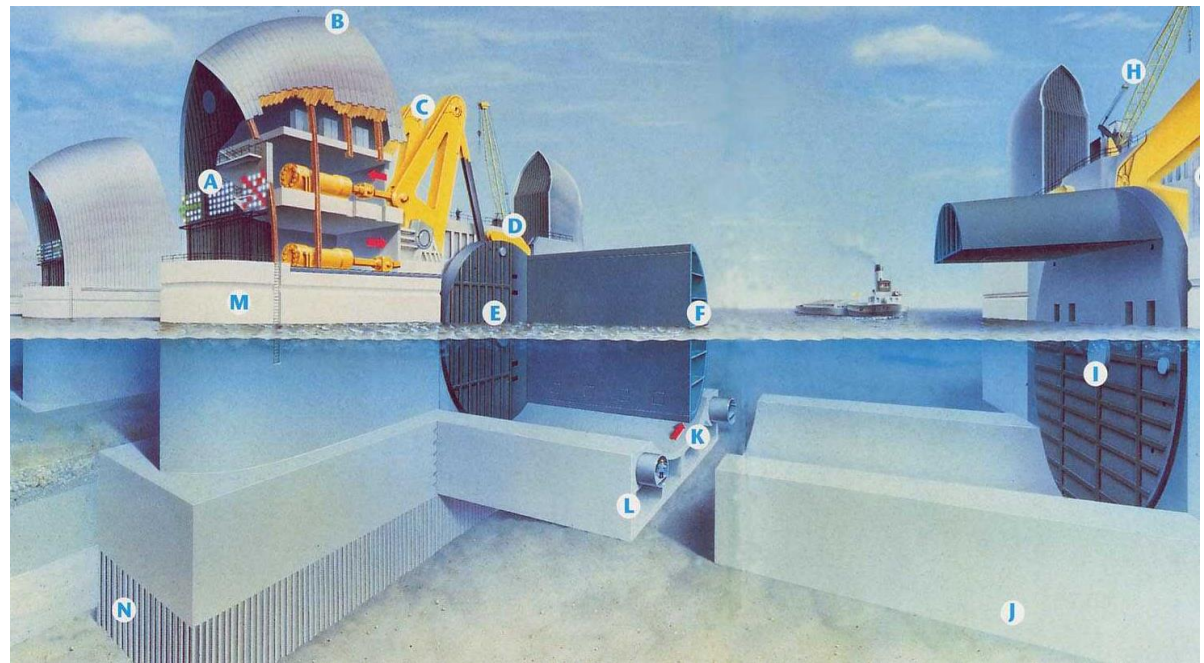


Constructing the Thames Barrier

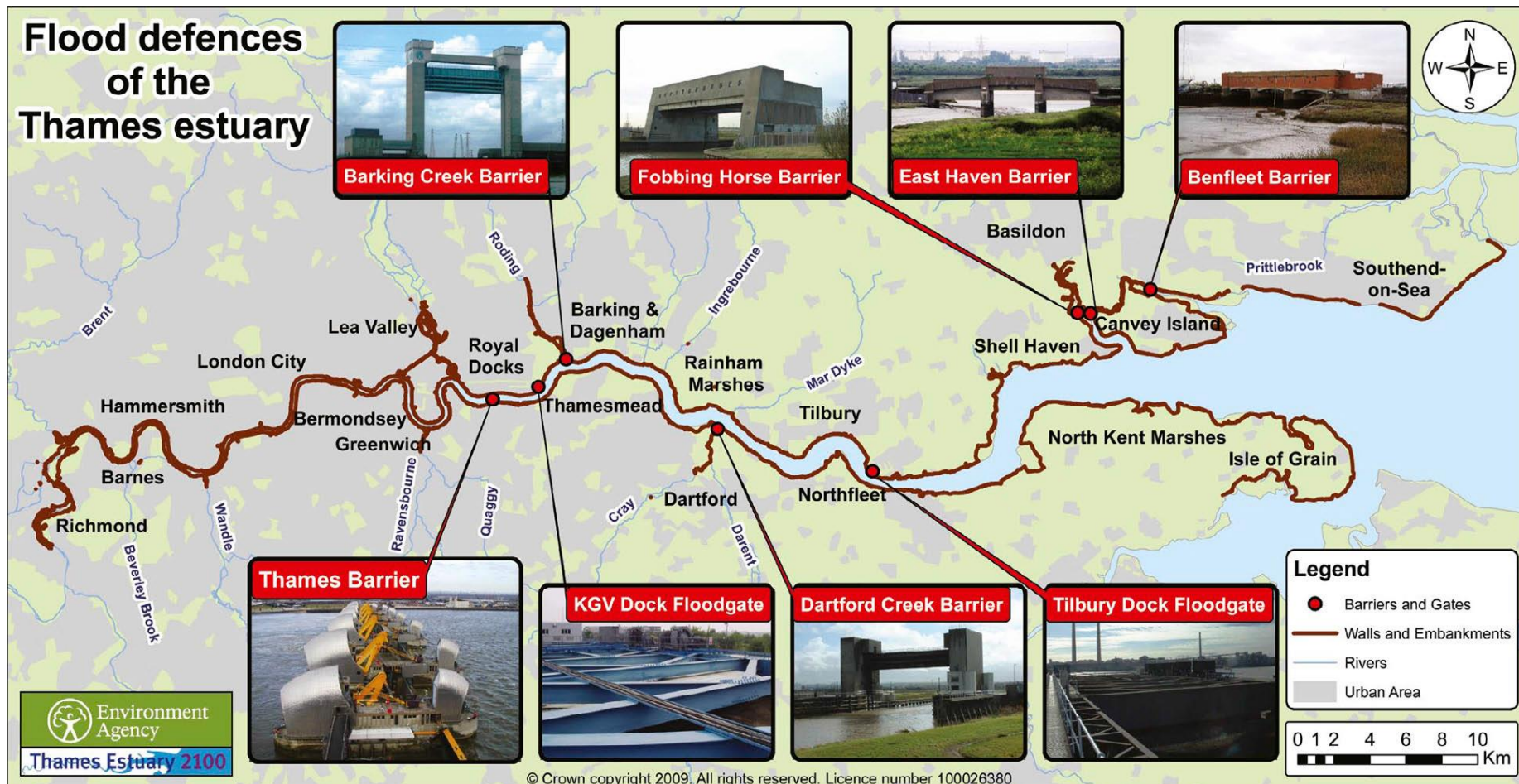


One of the six concrete gate cills, that were formed on the North Bank, before being floated out and sunk between two of the Piers





Flood defences of the Thames estuary



Thames Tidal Defences

Dartford Creek Barrier



Barking Barrier



Thames Tidal Defences



Earth embankments



Steel sheet



Stone revetments



Flood gates



Masonry gravity walls



Concrete gravity walls



Wooden piles

Stages in the decision to build the Barrier . . .

1953	Waverley Committee
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1972	Legislation Provided (Thames Barrier and Flood Prevention Act)
1971-2	Interim Defences built
1974	Construction of Thames Barrier & Associated Gates commences
1982	Thames Barrier becomes operational
1983	In February, first use of Thames Barrier to protect London
1984	Official opening of Thames Barrier by Her Majesty The Queen

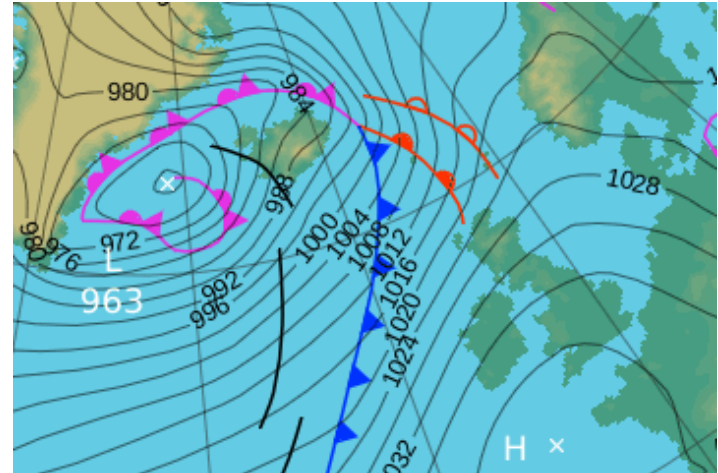
35th Anniversary of the opening

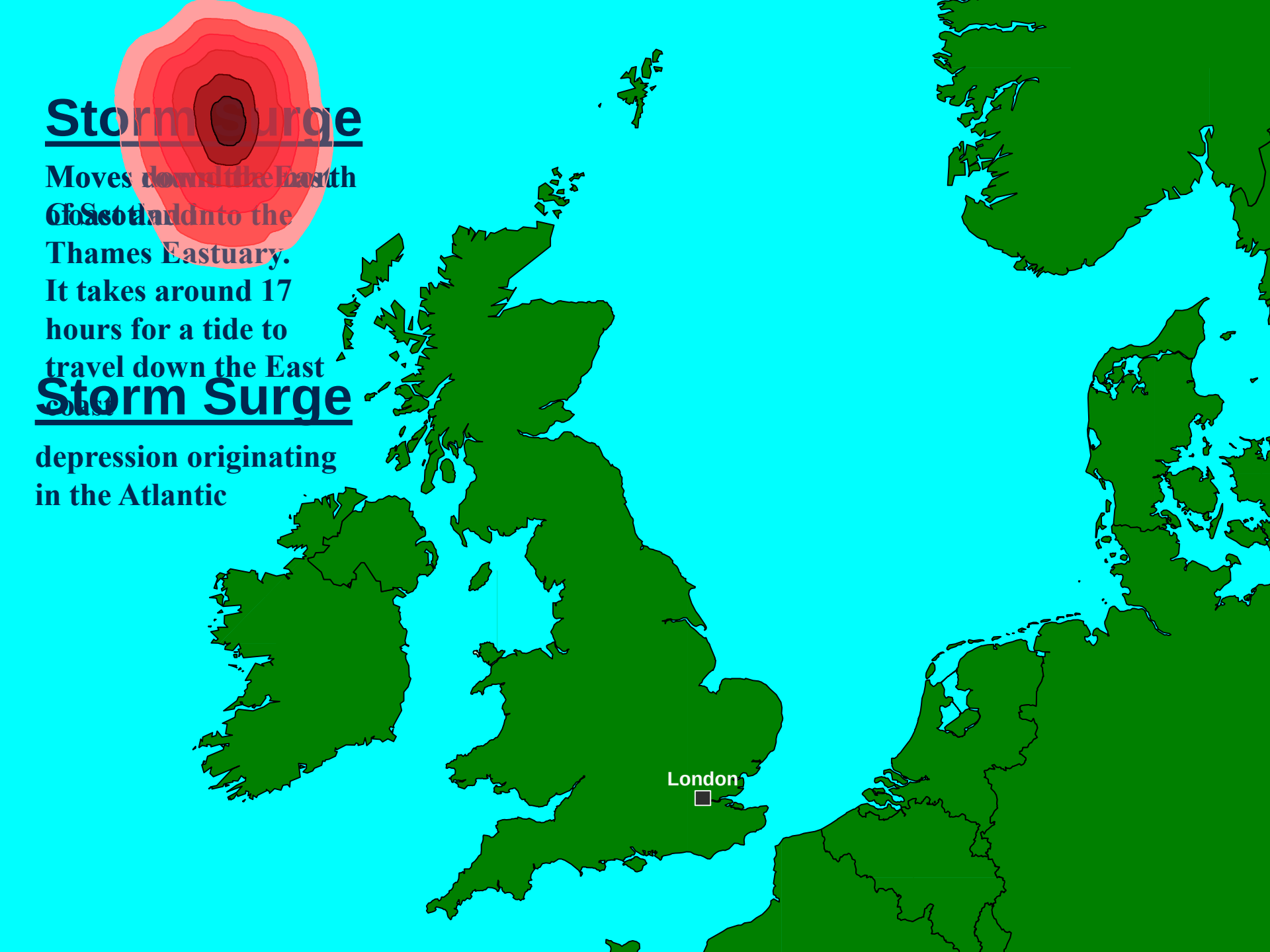


Flood Forecasting

Flood Forecasting

- Astronomical tide
- Surge element
- River flow
- Wind



A map of the British Isles, including Great Britain and Ireland, with a light blue background representing the ocean. A series of concentric, semi-transparent red circles of varying shades (from light pink to dark red) are centered in the Atlantic Ocean west of Ireland, indicating the path and intensity of a storm surge moving southwards. The text 'Storm Surge' is written in a large, bold, black serif font, underlined, and positioned over the red circles. To the right of the text, there is a block of text in a smaller, black serif font. At the bottom right of the map, a small black square marks the location of London, with the word 'London' written in a black serif font above it.

Storm Surge

Moves down the coast
of Scotland into the
Thames Estuary.

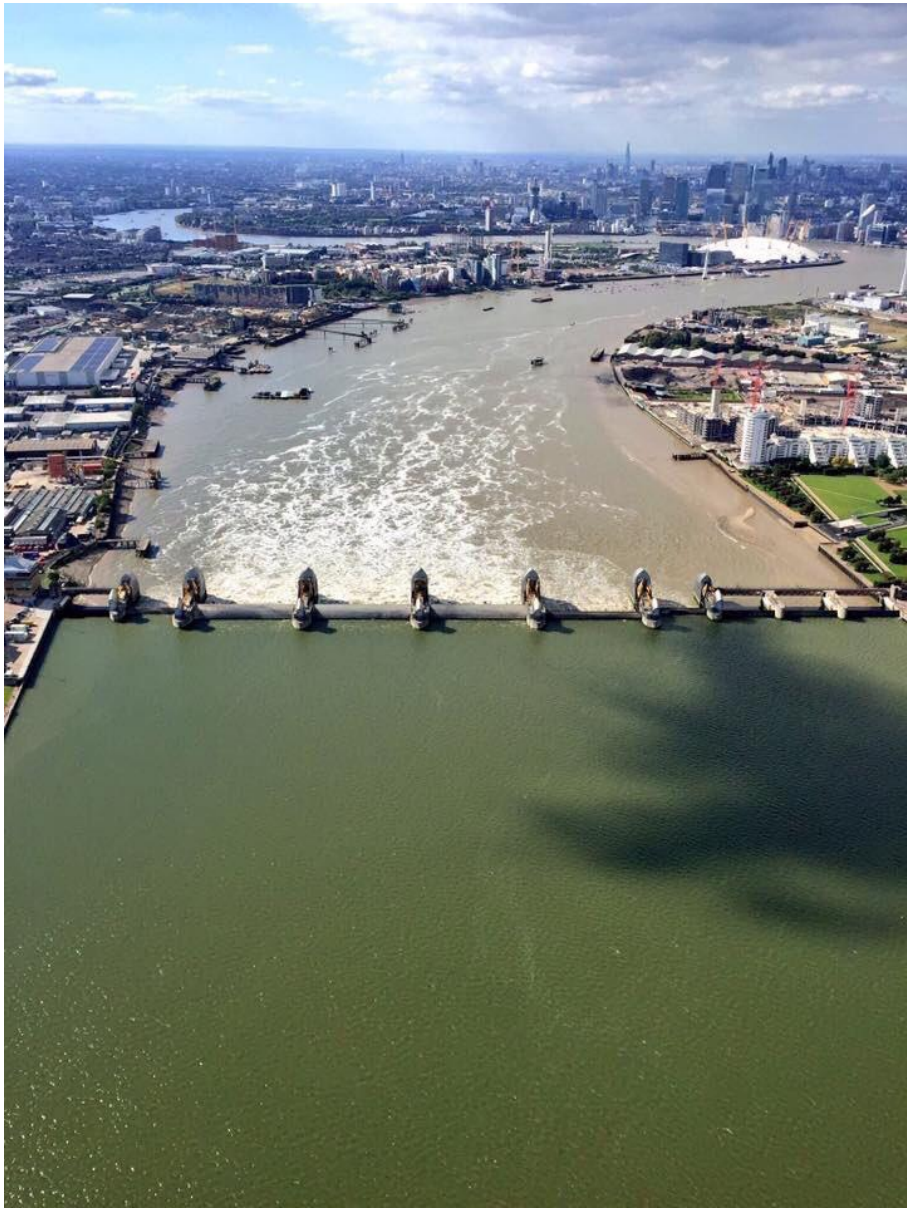
It takes around 17
hours for a tide to
travel down the East

Storm Surge

depression originating
in the Atlantic

London

Operations



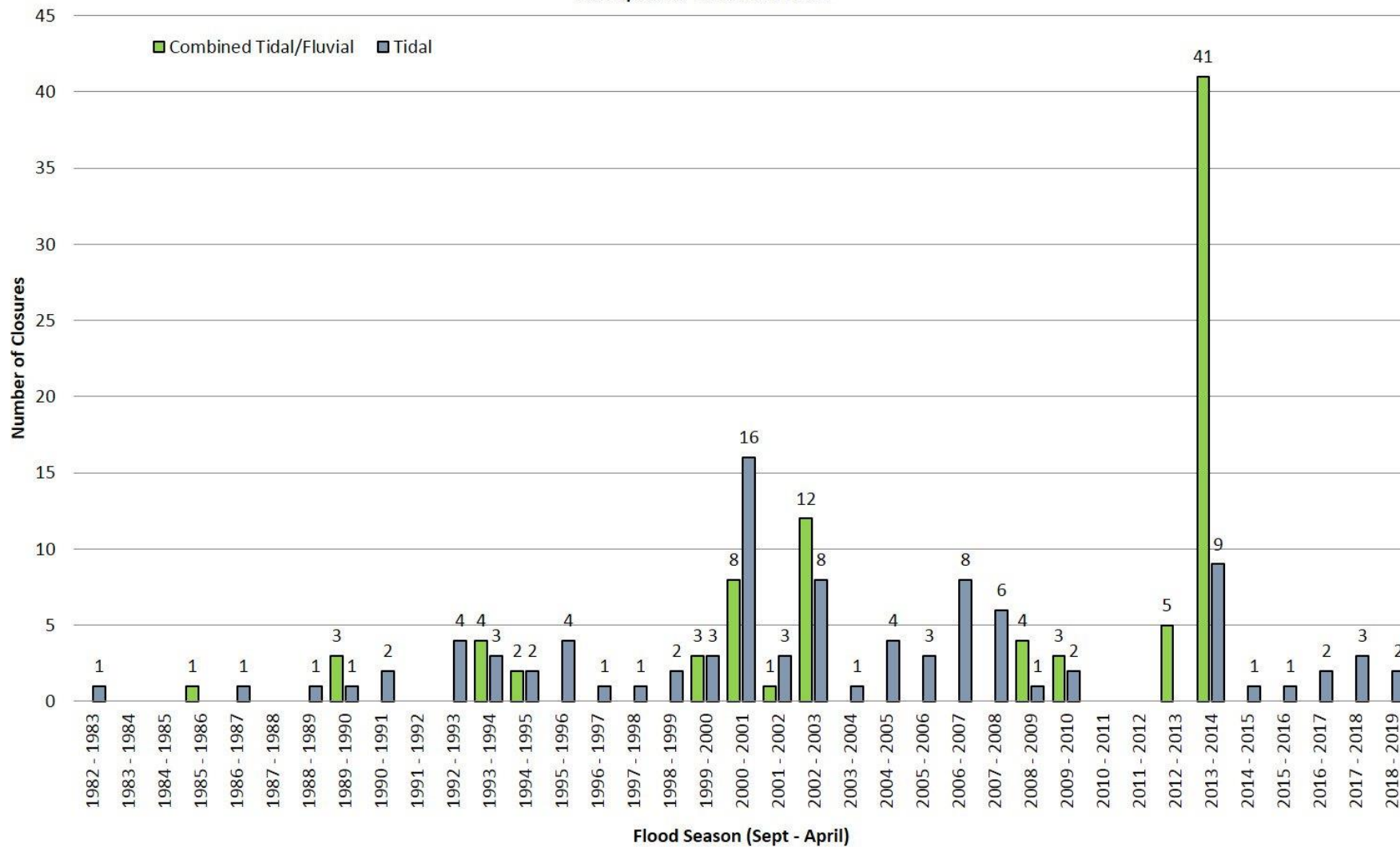
Operations

- 35 years of reliable operations
- 184 operations since 1983
- 24 operations in 2000/2001 season
- 21 operations in 2002/2003 season
- 50 operations in 2013/2014 – including periods of 13 and 20 operations on consecutive tides

Flood Defence Operations

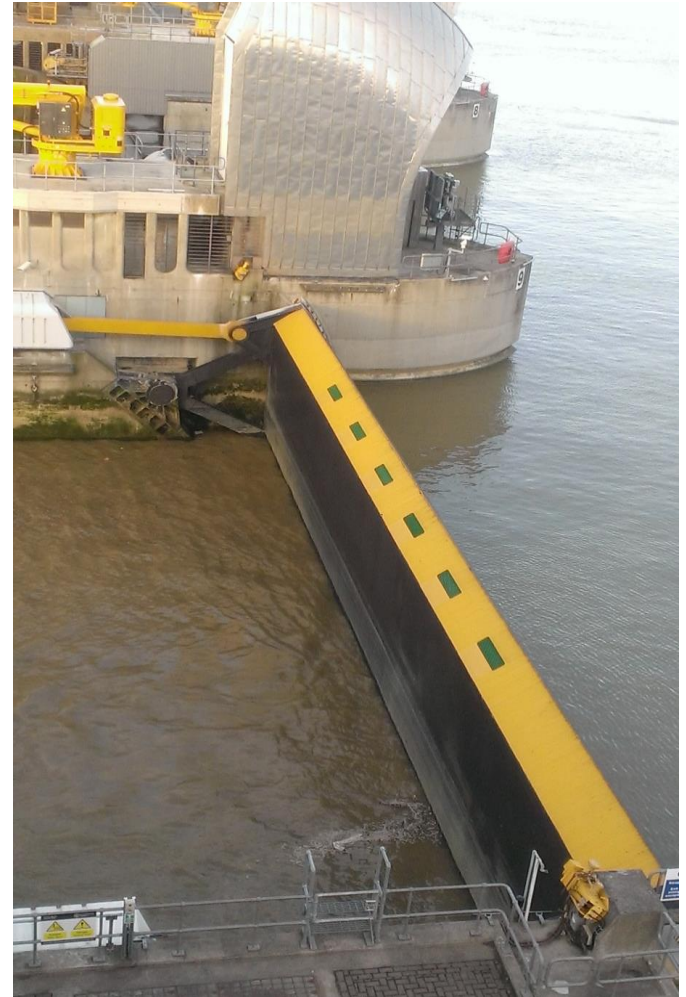
Thames Barrier Flood Defence Closures by Flood Season

Last updated 23rd March 2019



2013/14 – Our busiest Winter

- 50 Closures in 13 weeks
- Closed on 13 and 20 consecutive tides
- Highest tide since construction
- Highest fluvial flow since 1974



Maintenance

Gate paint protection system checking & maintenance

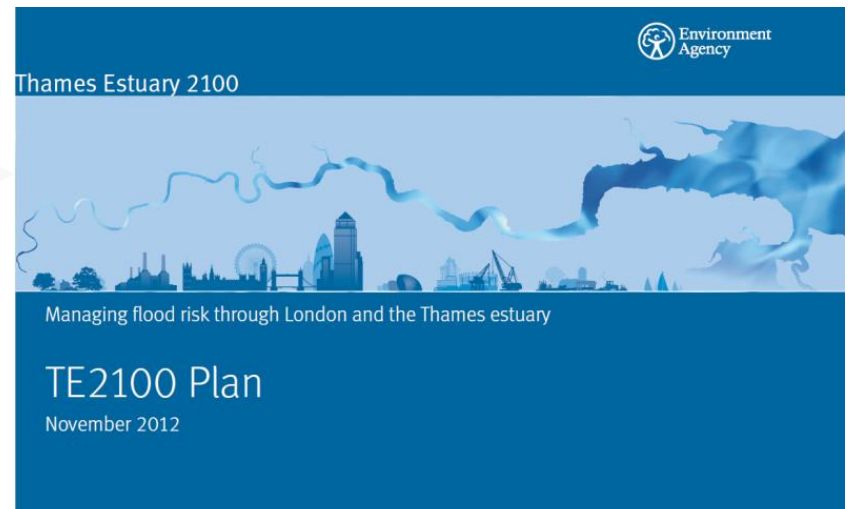


Cylinder inspection & seal replacement



The Future

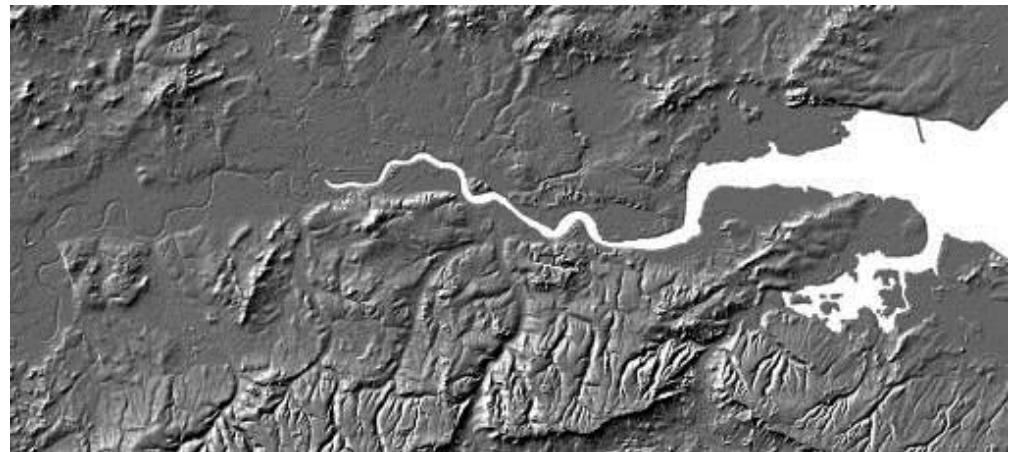
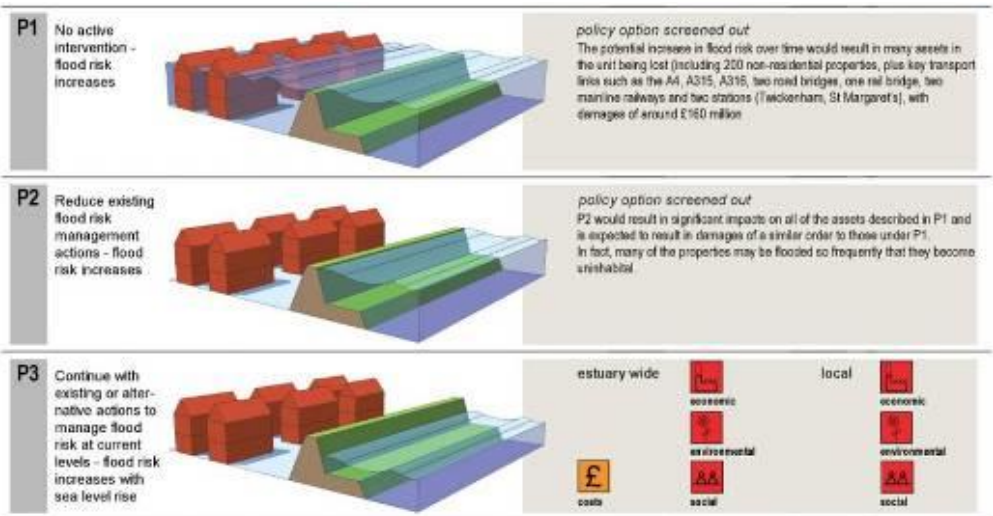
Planning early



Adapting to climate change



Evidence based decision making



Involving others



Thames Estuary 2100: Pre-registration for online consultation - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.227.223/TE2100/pages/WelcomePage.aspx

Environment Agency

Thames Estuary 2100

Home About TE2100 Consultation Contact us [Logout](#)

Introducing the options

- Go to another page
- Return to the policy area
- Finish the consultation and exit

TE2100 Option Zones

West London Central London Thames Estuary Thames Estuary Thames Estuary Thames Estuary

More about the options

The TE2100 options are made up of different actions:

- Managing walls and embankments
- Flood Storage and making space for water
- Damers, barrages and pumping stations
- Floodplain management

Thames Estuary 2100: Managing flood risk through the century - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.227.223/TE2100/pages/Content.aspx?policy

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Thames Estuary 2100

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Managing flood risk through the century

How is flood risk increasing in the Thames Estuary?

- More people are moving into the flood plain as B&S is where people want to live and work.
- Climate change will increase flood risk. We don't know by how much so we are planning for four different [climate change](#) options.
- Our [flood defences](#) are getting older, most parts are over half way through their [full life span](#).

What is an 'Acceptable Level of Flood Risk'?

In order to manage flood risk we must first define the level of risk which is acceptable. This will be different for different areas of the estuary and will be based on the value of what is at risk (this could be cultural, environmental or economic value and risk is likely measured against the cost of managing that level of flood risk. These different levels of flood risk are defined by the [policy](#) which we are recommending for each policy area.

How can we reduce flood risk to an acceptable level?

The management of risk through the century

- More people & property
- Climate change
- Ageing flood defences

A great legacy





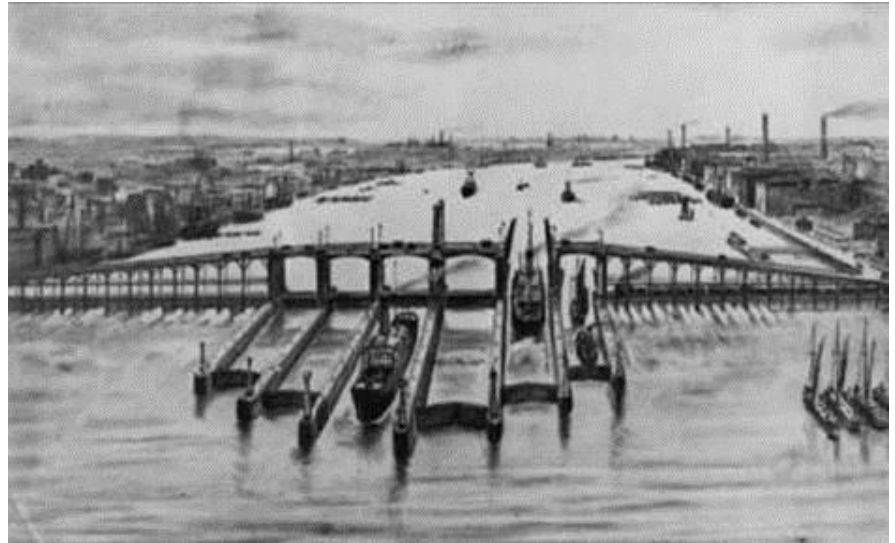
Improve existing defences



Flood Storage



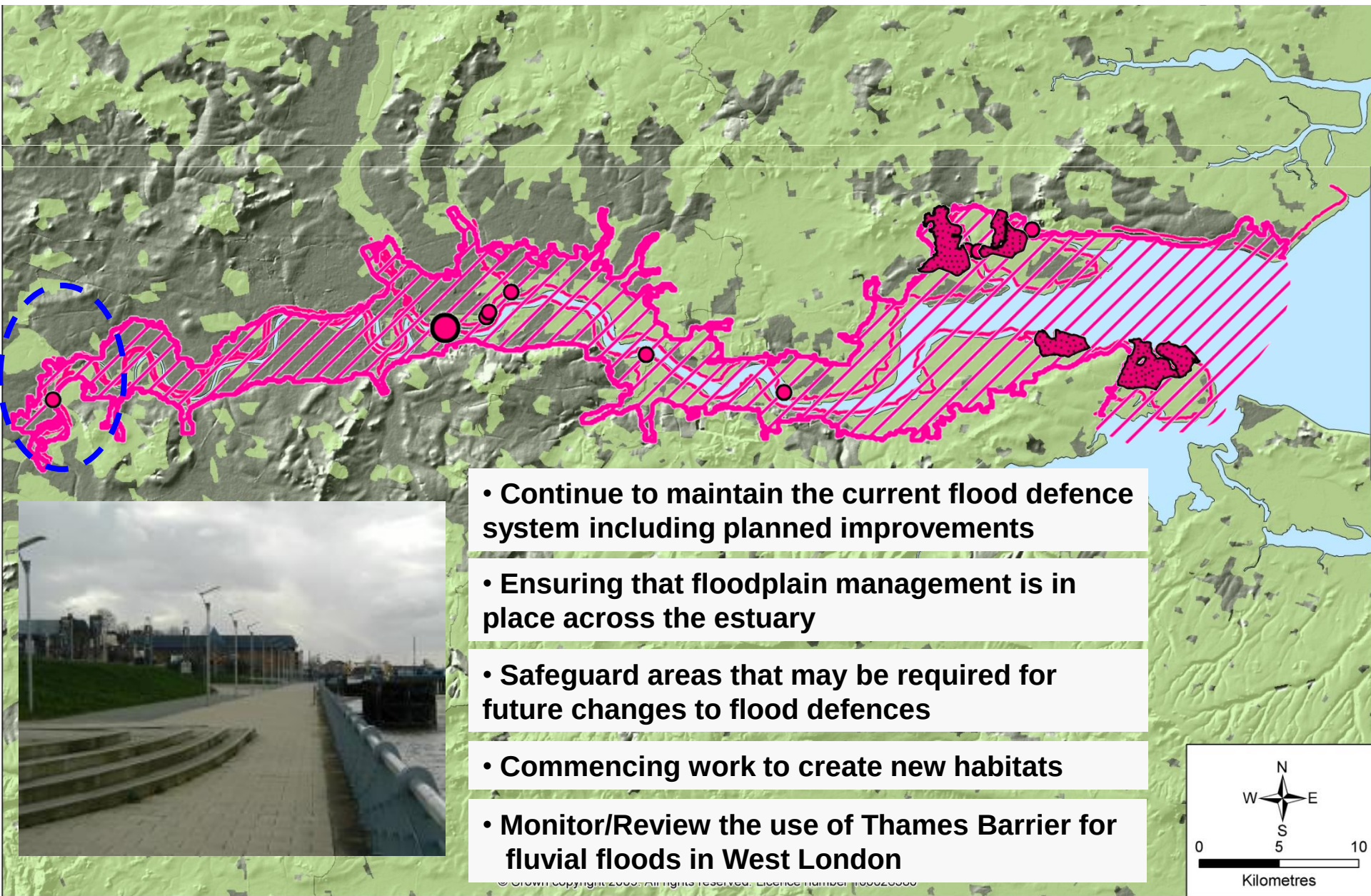
New barrier



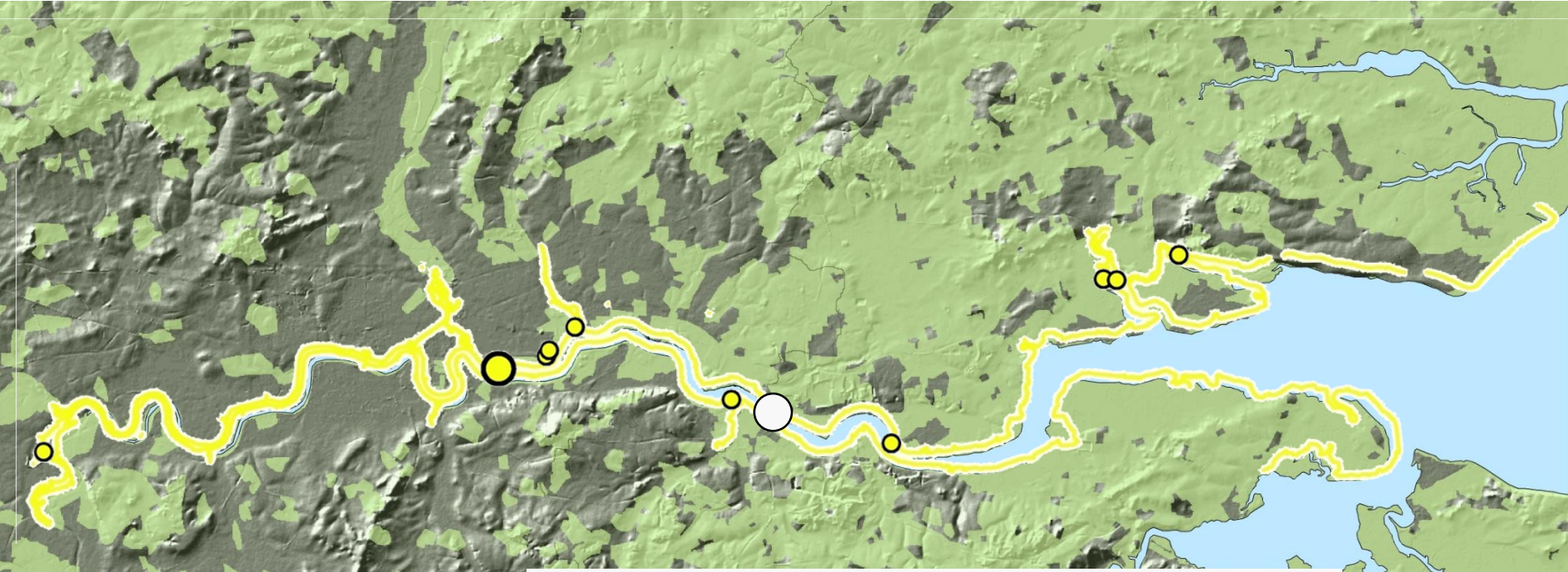
Barrier with locks

Change ahead? Our estuary-wide options

TE2100 - the first 25 years



From 2050 - moving into the 22nd century

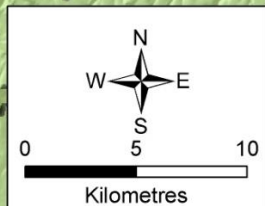


- Replacing and upgrading defences upstream and downstream of the barrier

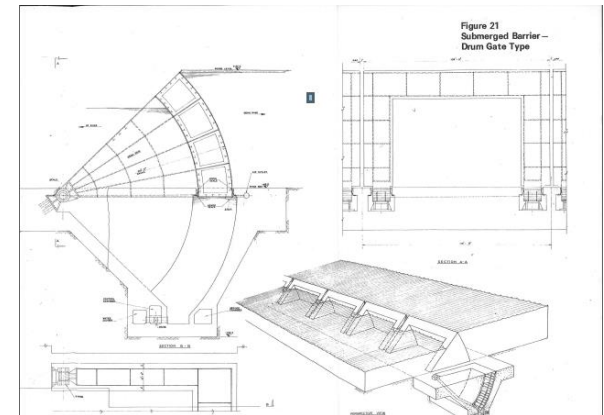
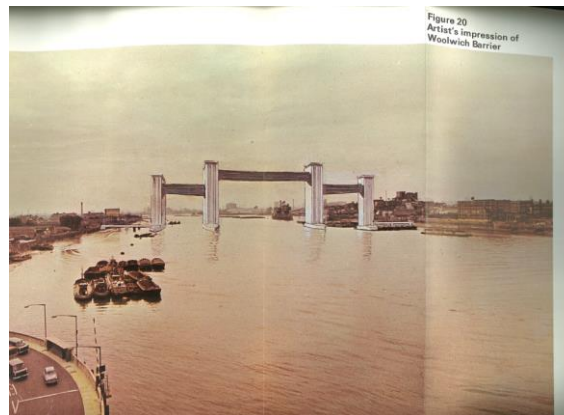
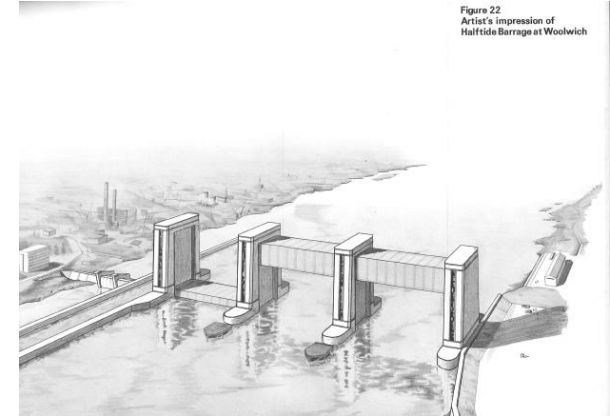
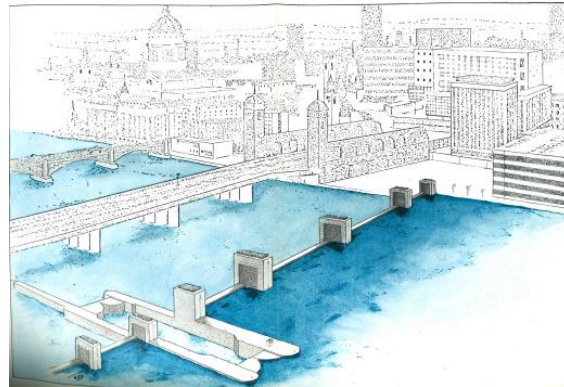
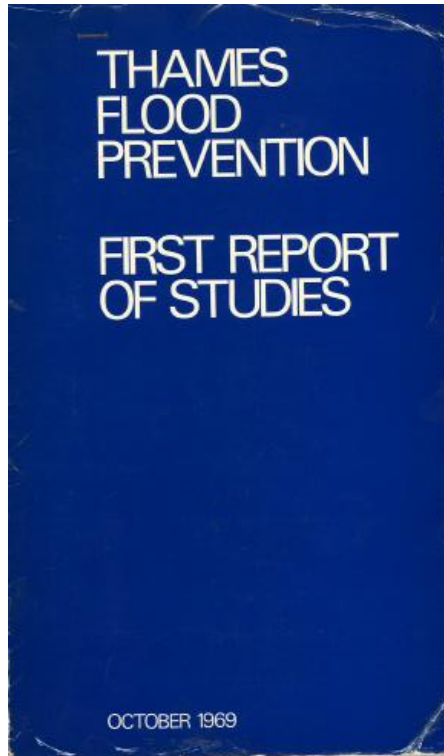
- Working with regional and local planning authorities

- Take informed decision on building a new barrier at Long Reach or other end of the century option

- Construct new barrier by 2070



The pressing need is the design and safeguarding the location of Thames Barrier 2



I-STORM Barriers - could Thames Barrier 2 look like this?





Investment over the century

	The first 25 years “Continuing investment and planning together”
	The middle 15 years from 2035 to 2049 “Renewal and reshaping the riverside”
	To the end of the century from 2050 “moving towards the 22nd century”

- ~ £1.5 bn

- ~ £1.8 bn

- ~ £6bn - £7bn
(Depending on option chosen)

- Current property value protected ~ £300 billion

To Conclude

“Proven tried and tested design with resilience of systems ensures reliability of operation”

- Storm surge barriers can provide a unique solution to flood risk
- They do still rely on a system of defences
- Reliability, resilience, training and testing of all of the barriers systems and team is key
- Operation and maintenance must be first class whilst always keeping an eye looking to the future



**Protecting people,
property and the
environment**