



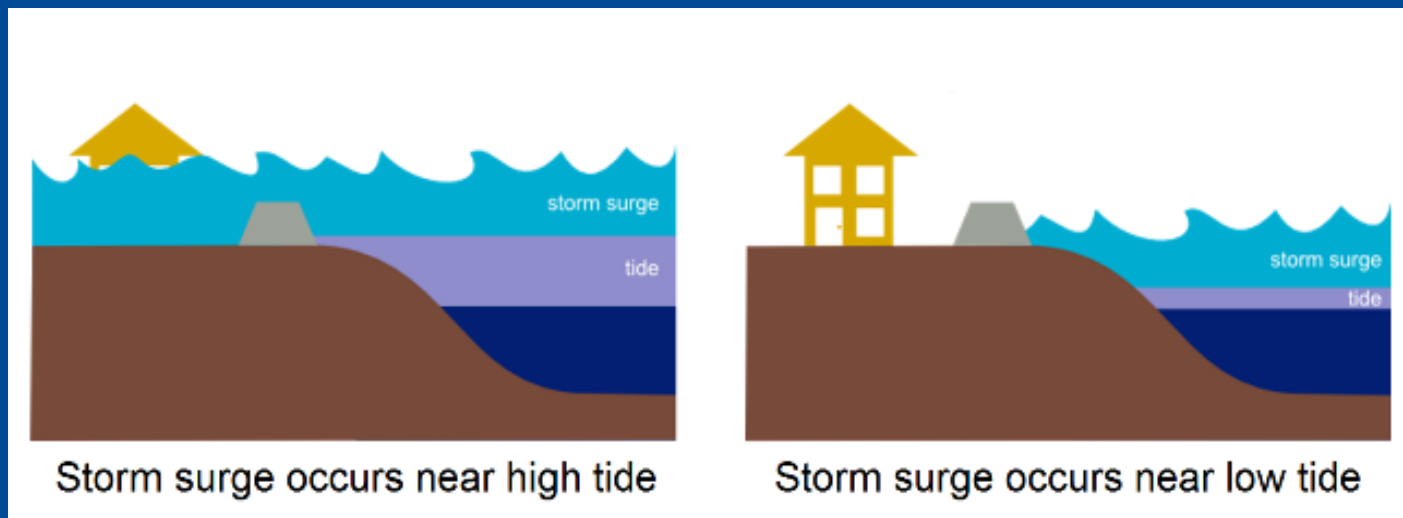
# Humber Surge Recovery and Flood Resilience

Sue Manson  
Humber PSO  
March 2015

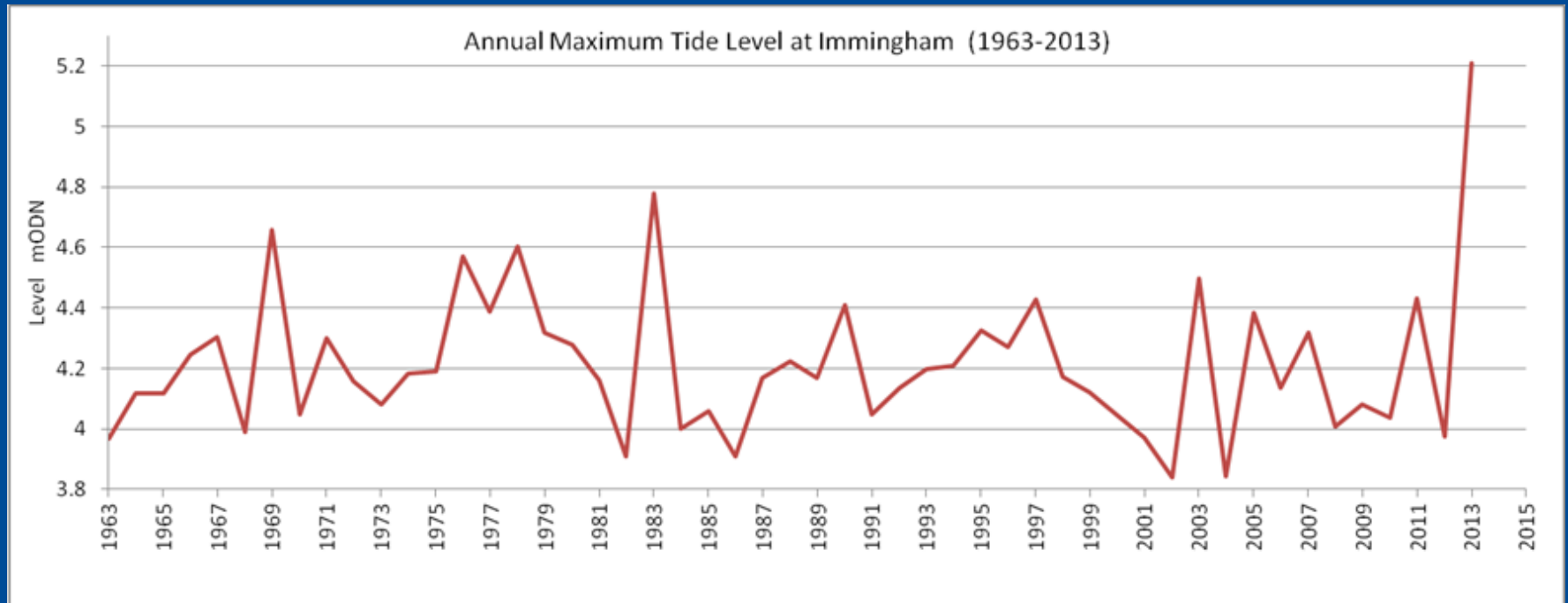
- ➔ On the 5th of December a serious tidal surge moved around the UK coastline.
- ➔ Widespread flooding was experienced by a number of coastal communities, but the most serious impact was felt along England's East Coast between the Humber and the Wash.
- ➔ Conditions changed throughout the day of the 5<sup>th</sup>, with high winds throughout the morning and an area of low pressure deepening during the day.
- ➔ Since the 5<sup>th</sup> December the UK has experienced a long period of extreme weather, though the impacts of this have been mainly felt in other parts of the country.

# What caused the tidal surge?

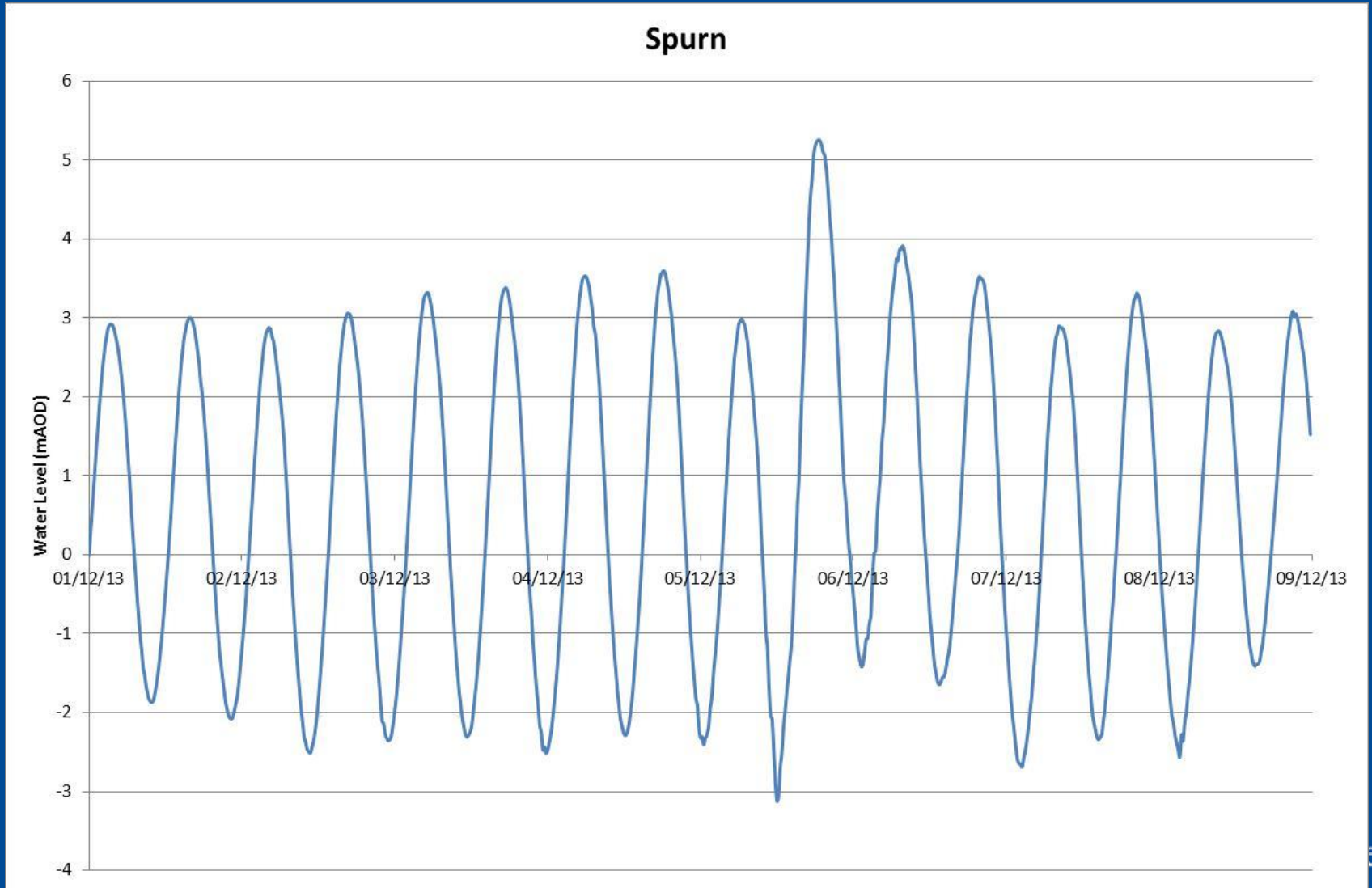
- ➔ Deep low pressure weather system = raised water level
- ➔ ... tracking southwards with strong winds
- ➔ ...combined with high spring astronomical tides
- ➔ ...and timing close to the peak of the high tide.



# Tide Surge Context



# Tide Level

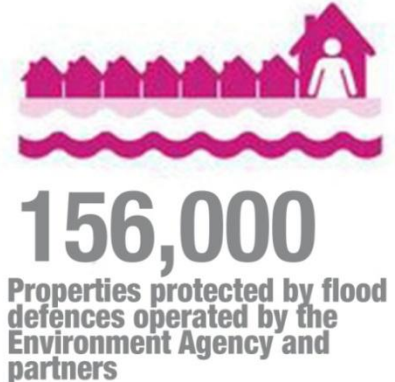


# Tidal surge

December 2013



Issued across The Humber - 05/06 December 2013



\* figure correct as of 17/12/13. \*\* approximate figure provided by EA and partners.



East Coast at Kilnsea





**Keadby on Trent**



**Mitre gates, Grimsby – 5 Dec 2013 22:00 GMT**



**Spurn Head, 6<sup>th</sup> Dec 2013**

# Porter Street

## Looking South to North from the A63



5<sup>th</sup> December 2013, 19:31



5<sup>th</sup> December 2013, 19:35

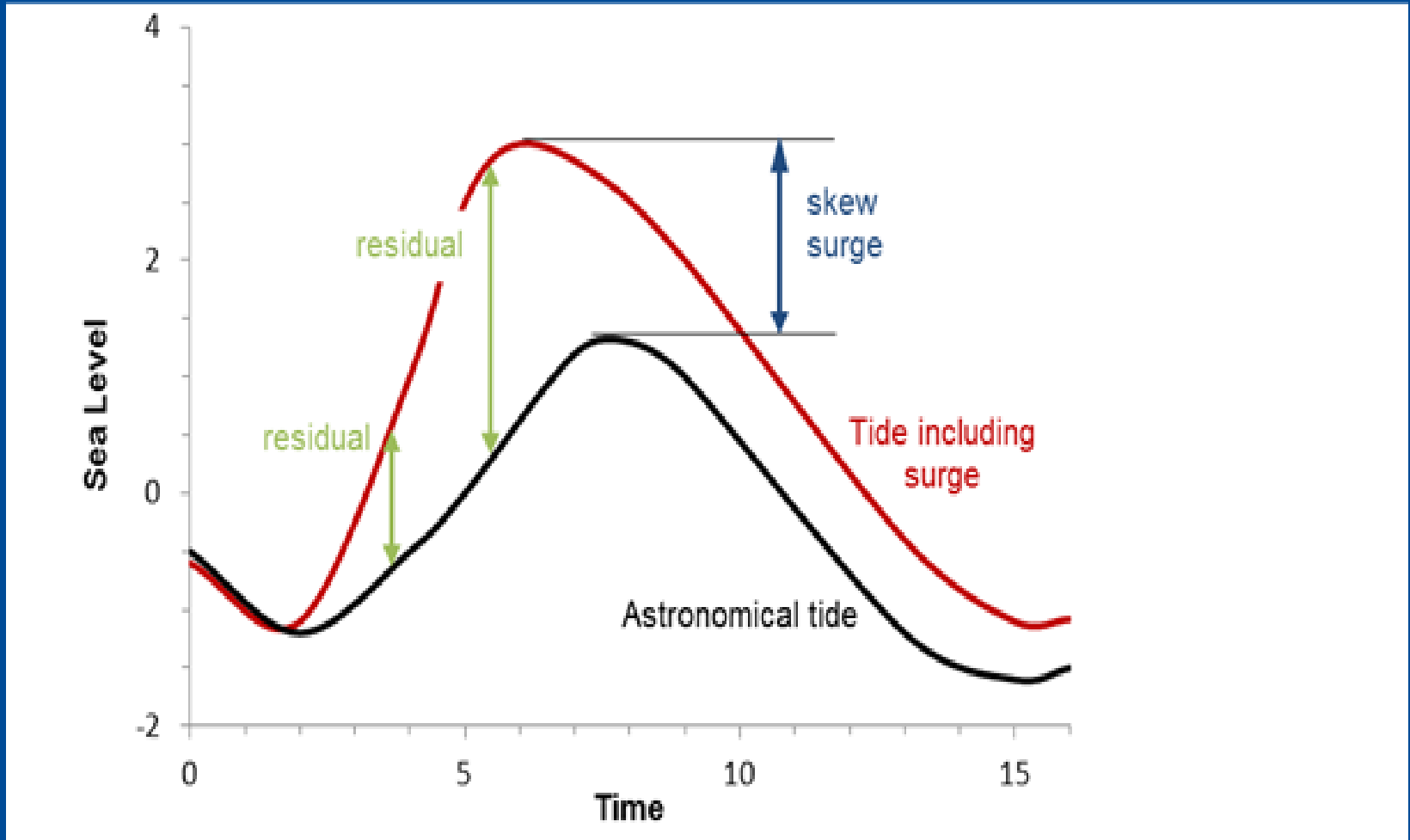


**6<sup>th</sup> December 2013, Port of Immingham**

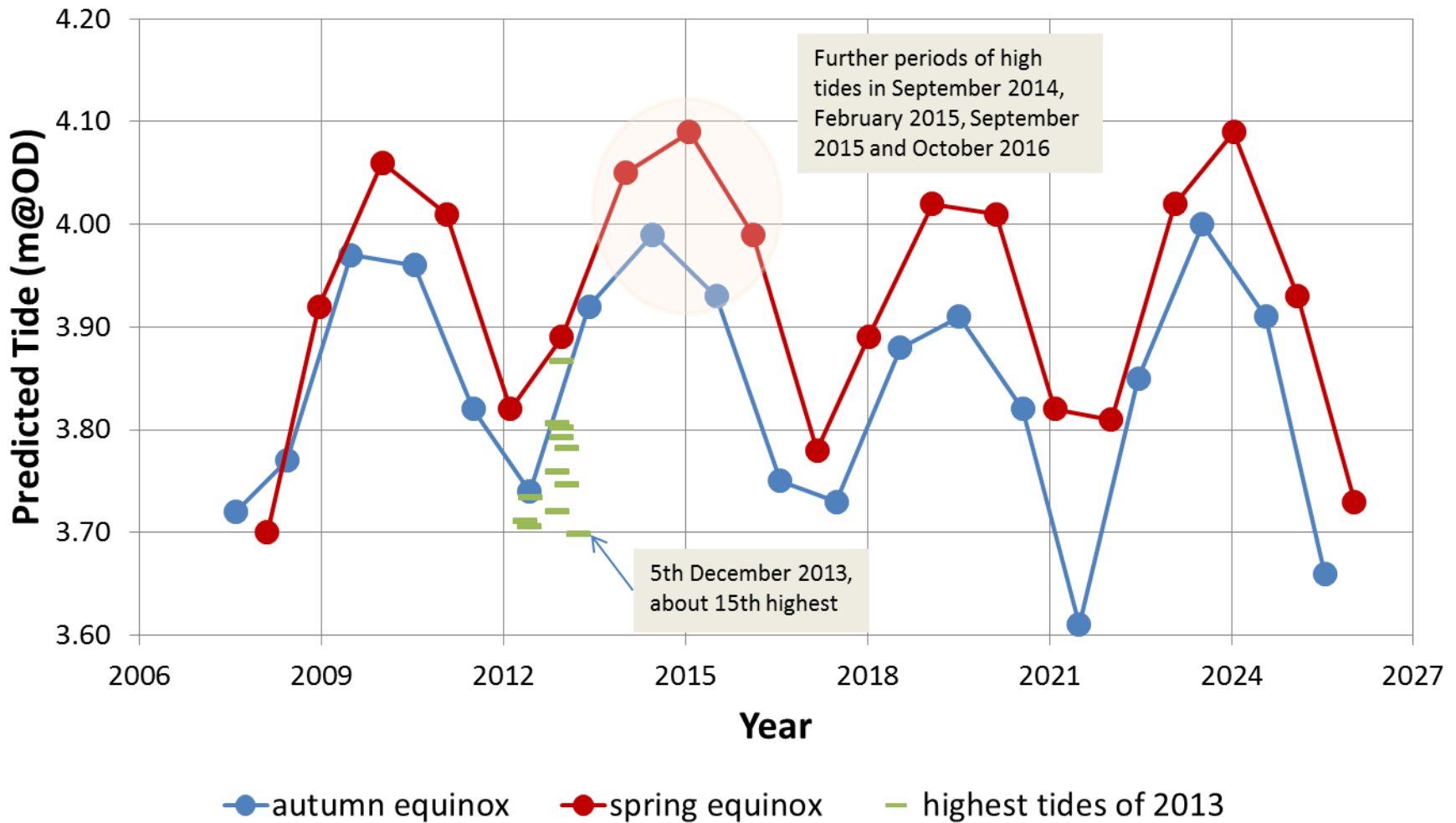
# December 5<sup>th</sup> Tide and Surge Levels

<b>Tide Gauge</b>	<b>Astronomic Tide Predicted Level (mAOD)</b>	<b>Observed Tidal Level (mAOD)</b>	<b>Surge (m)</b>
Aberdeen	2.34	3	0.66
Berwick	2.91	3.67	0.76
Blyth	2.78	3.88	1.1
North Shields	2.79	4.04	1.25
Tees Dock	2.84	4.09	1.25
Whitby	2.85	4.32	1.47
Scarborough	2.88	4.4	1.52
Bridlington	2.8	4.56	1.76
Immingham	3.61	5.31	1.7
Hull Barrier	3.88	5.81	1.93
Blacktoft	4.48	6.01	1.53
Goole	4.67	6.04	1.37

# Skew Surge at High Water

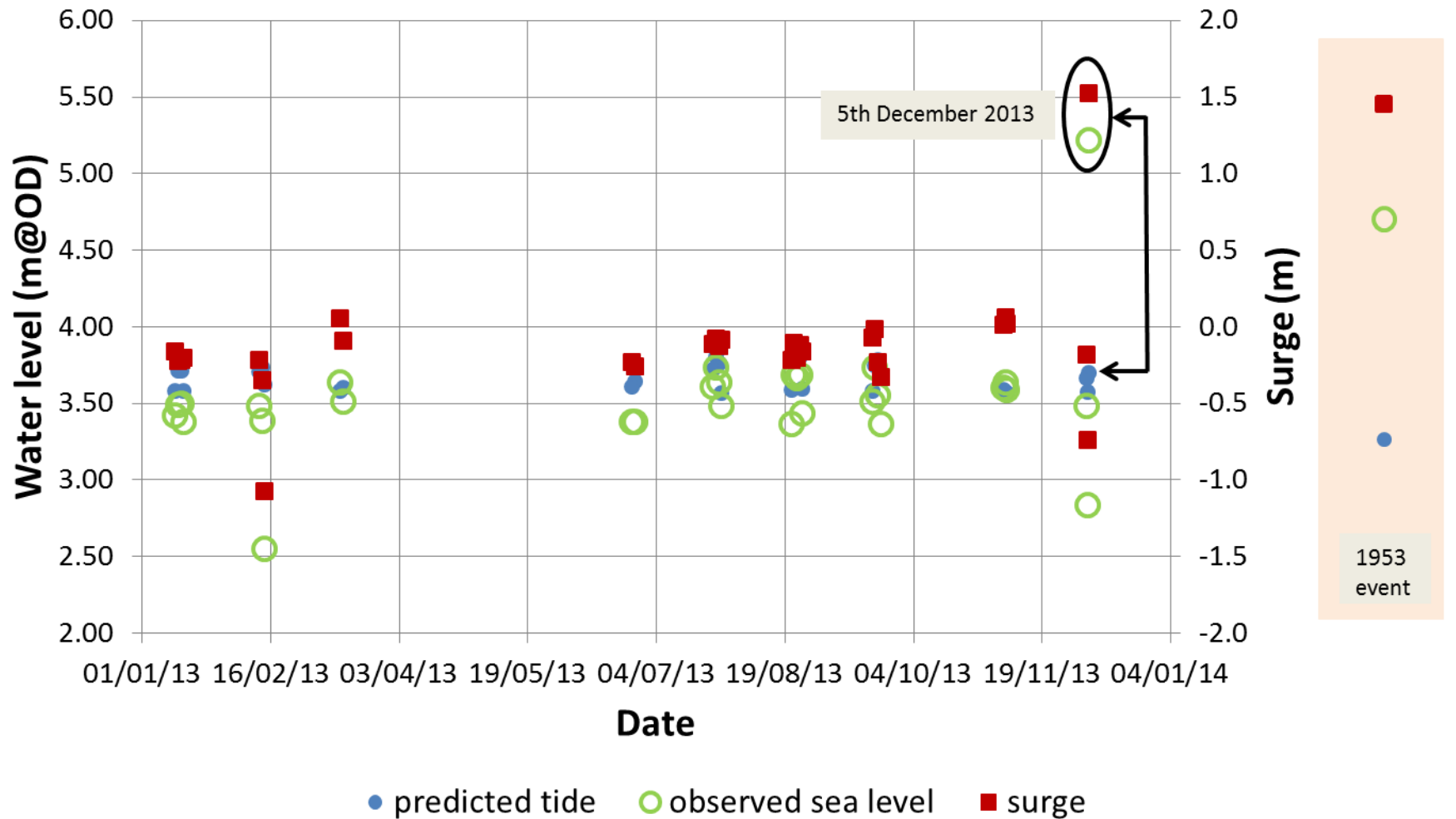


# Predicted Astronomical Tides

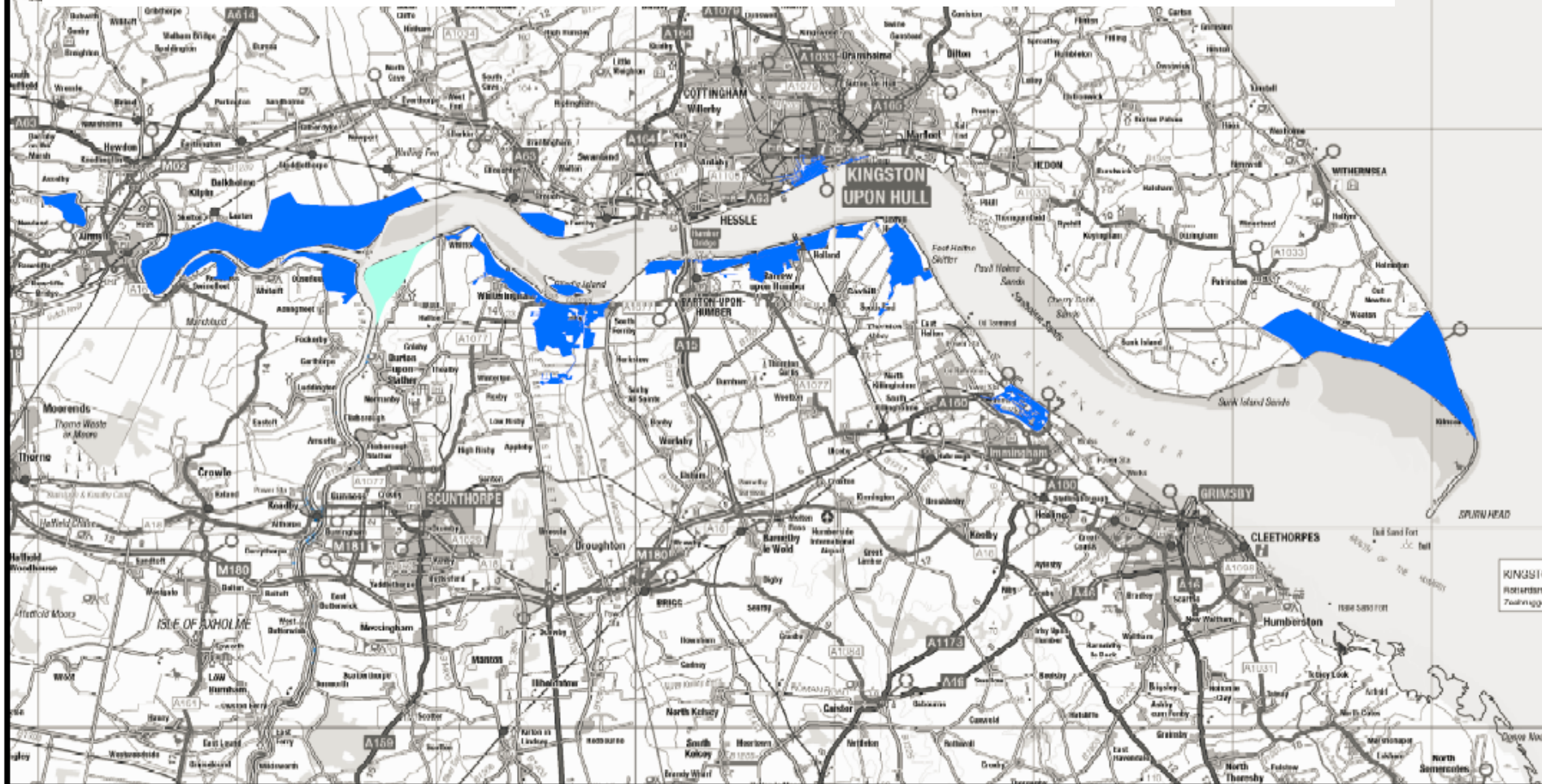




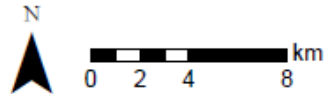
# Predicted Astronomical Tides



# Around 7,000 Hectares of Land Flooded

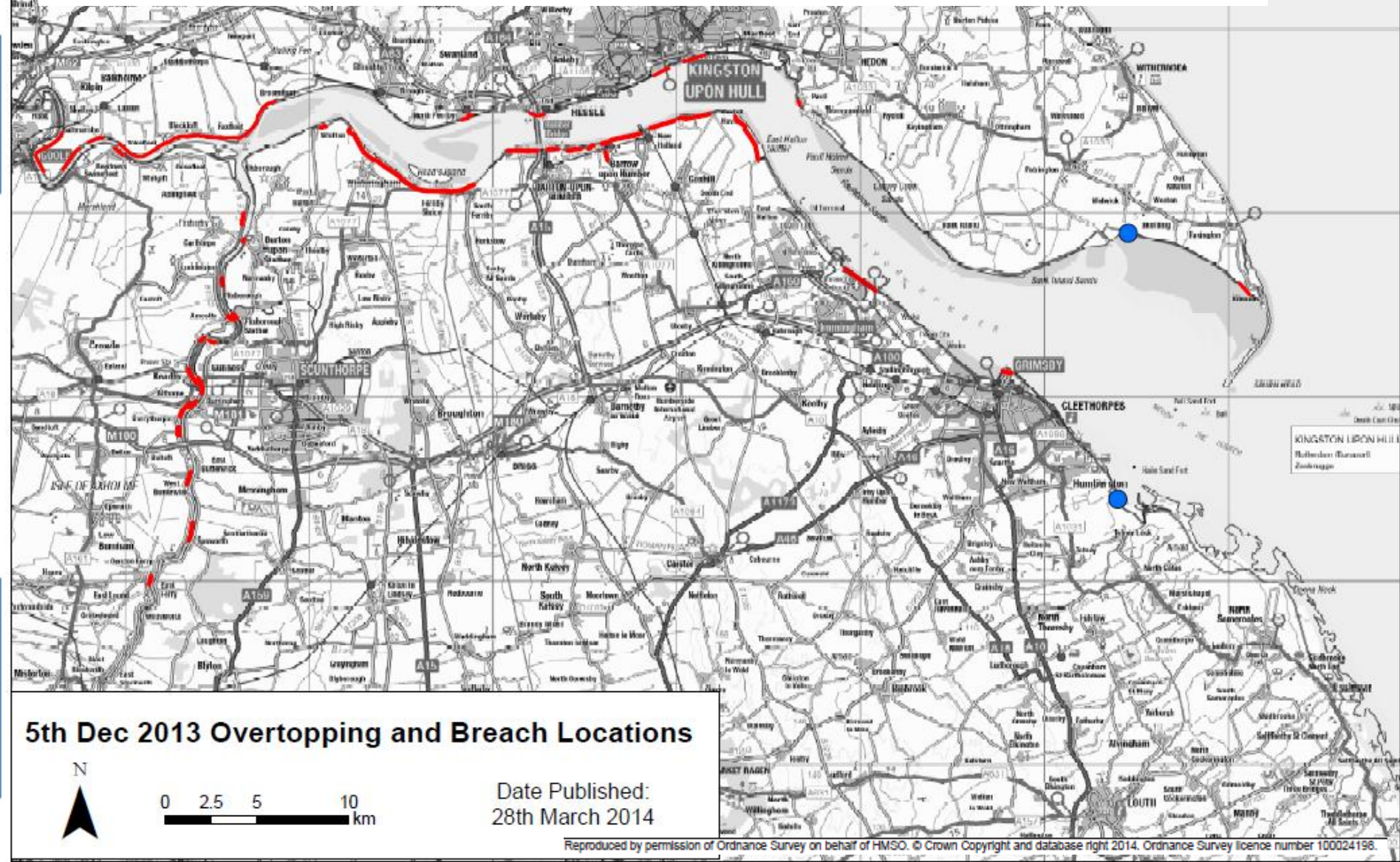


Humber Estuary 5th December 2013 Flood Outline



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# Around 40km of Defences Overtopped



# Repairs and Urgent Schemes

# Damage to the Defences

- ➔ Defences were inspected immediately following the flood.
- ➔ Many defences had suffered damage.
- ➔ Significant breaches of the defences occurred between Tetney and Humberston and at Welwick.
- ➔ Many defences experienced significant scour, most notably to their rear face as a result of overtopping
- ➔ Other defences had sustained some smaller scale damage
- ➔ Impact assessment – risk based approach to repair priority



Breach of the Bank at Welwick

# Tetney Breach and Repair



# Recovery Works

Following the tidal surge in December 2013 a number of schemes were undertaken as part of the repair and recovery programme:

- ➔ Works are currently being delivered to raise a low spot in the defence at Reedness.
- ➔ A temporary solution has been put in place to reduce the risk of flooding through Albert Dock, permanent works are now underway.
- ➔ Works are ongoing at Kilnsea and North Ferriby.
- ➔ Bank repairs at Far Ings are now complete.
- ➔ There are ongoing repairs at Barrow Haven.





## Ongoing Works at Reedness



Environment  
Agency



Works to Deliver Permanent Flood Defences at Albert Dock





North Ferriby showing works completed to date. Further work now underway.

# Schemes Delivery

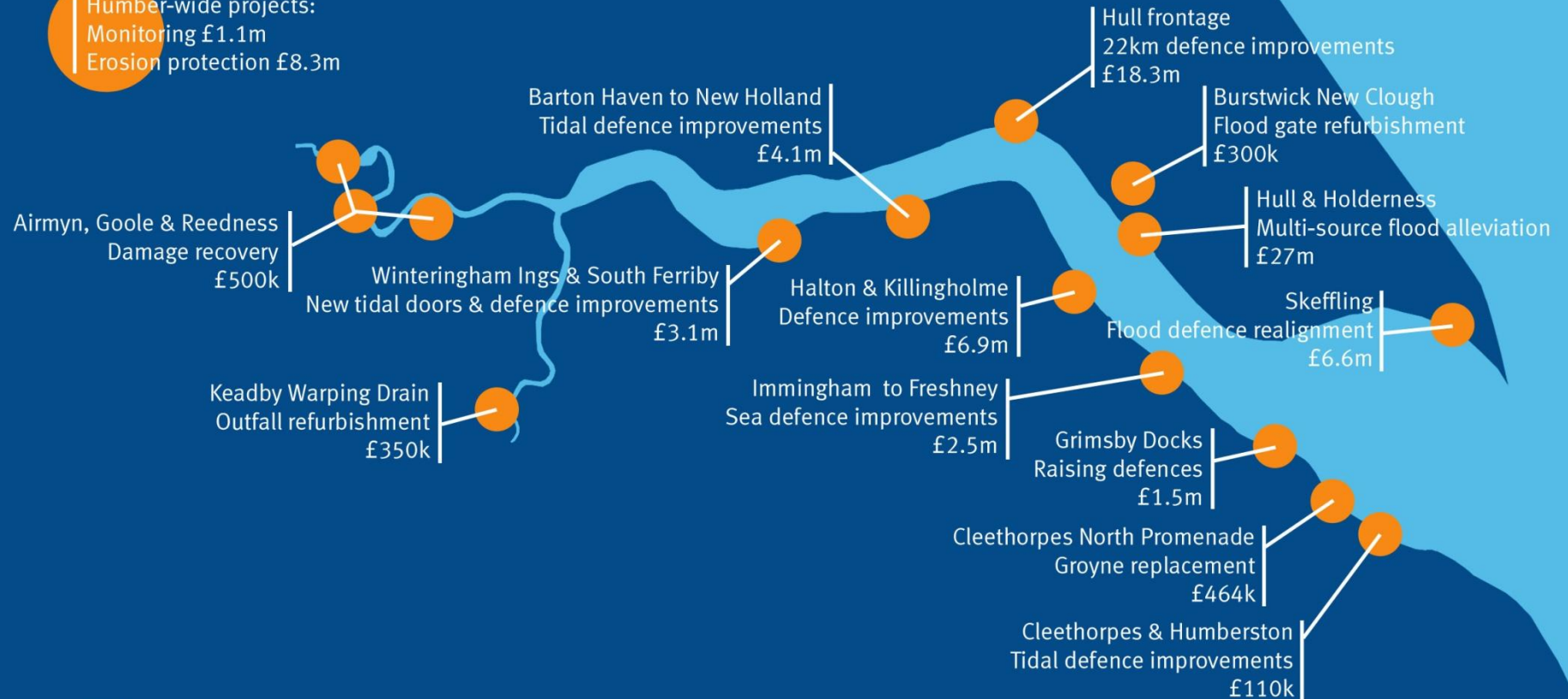
- ➔ We are using information and evidence from the flood to re-prioritise the delivery of schemes in the Strategy update.
- ➔ £80 Million announced in the Autumn Statement for tidal schemes around the Humber



# £81m Humber investment plan

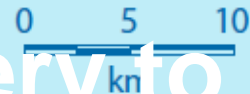
Government flood defence spending 2015 to 2021

Humber-wide projects:  
Monitoring £1.1m  
Erosion protection £8.3m



# Strategy Update

# The 2008 Strategy and delivery to date....



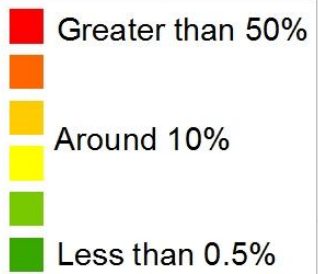
# Strategy Update and Ongoing Work

- ➔ Technical work to understand the flood risk around the estuary still ongoing.
- ➔ Developing a programme of works based on local priorities.
- ➔ Continuing work to ensure the Strategy is legally compliant.
- ➔ Ensuring that the Updated Strategy sets the direction for the next 20 years to deliver a sustainable response to sea level rise. **HUGE CHALLENGE.**





# Likelihood of tidal flooding in any one year for the present day - 2013

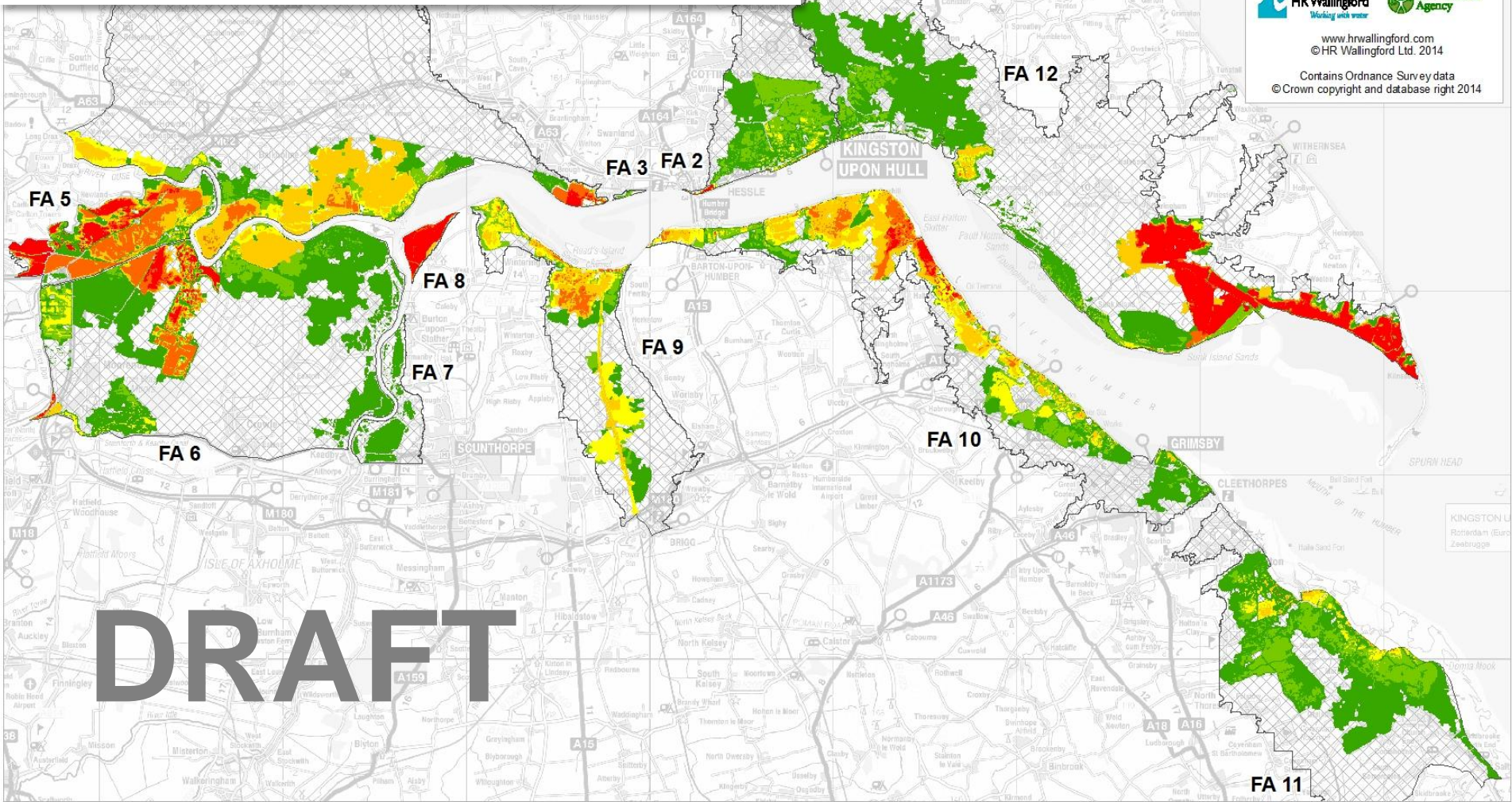


HR Wallingford  
Working with you

Environment Agency

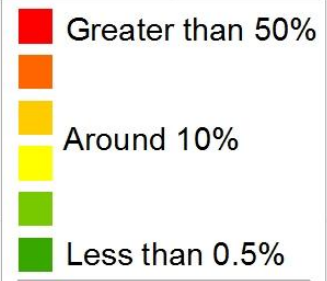
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# DRAFT

# Likelihood of tidal flooding in any one year if we do nothing - 2032

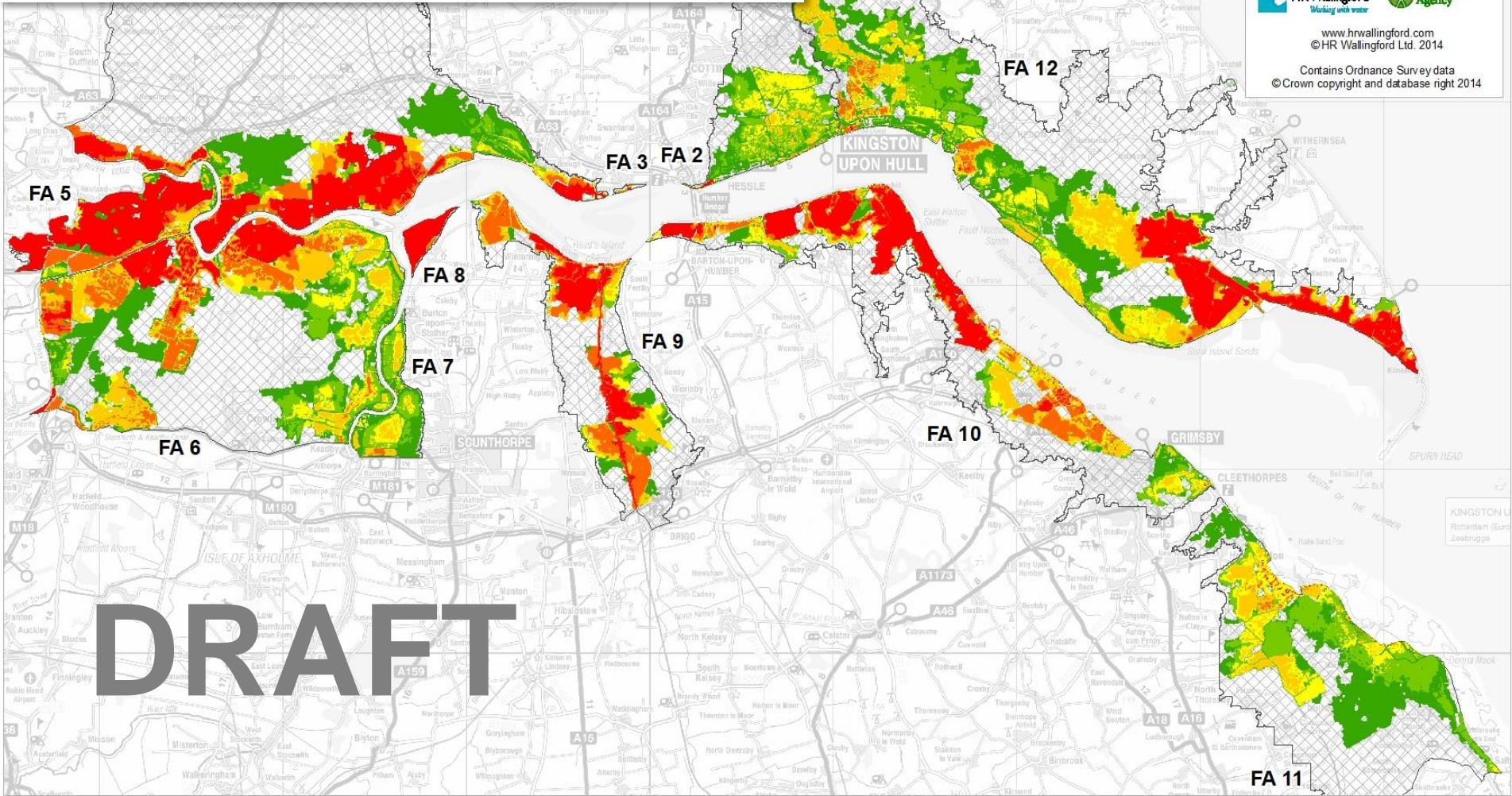


HR Wallingford  
Working with you

Environment Agency

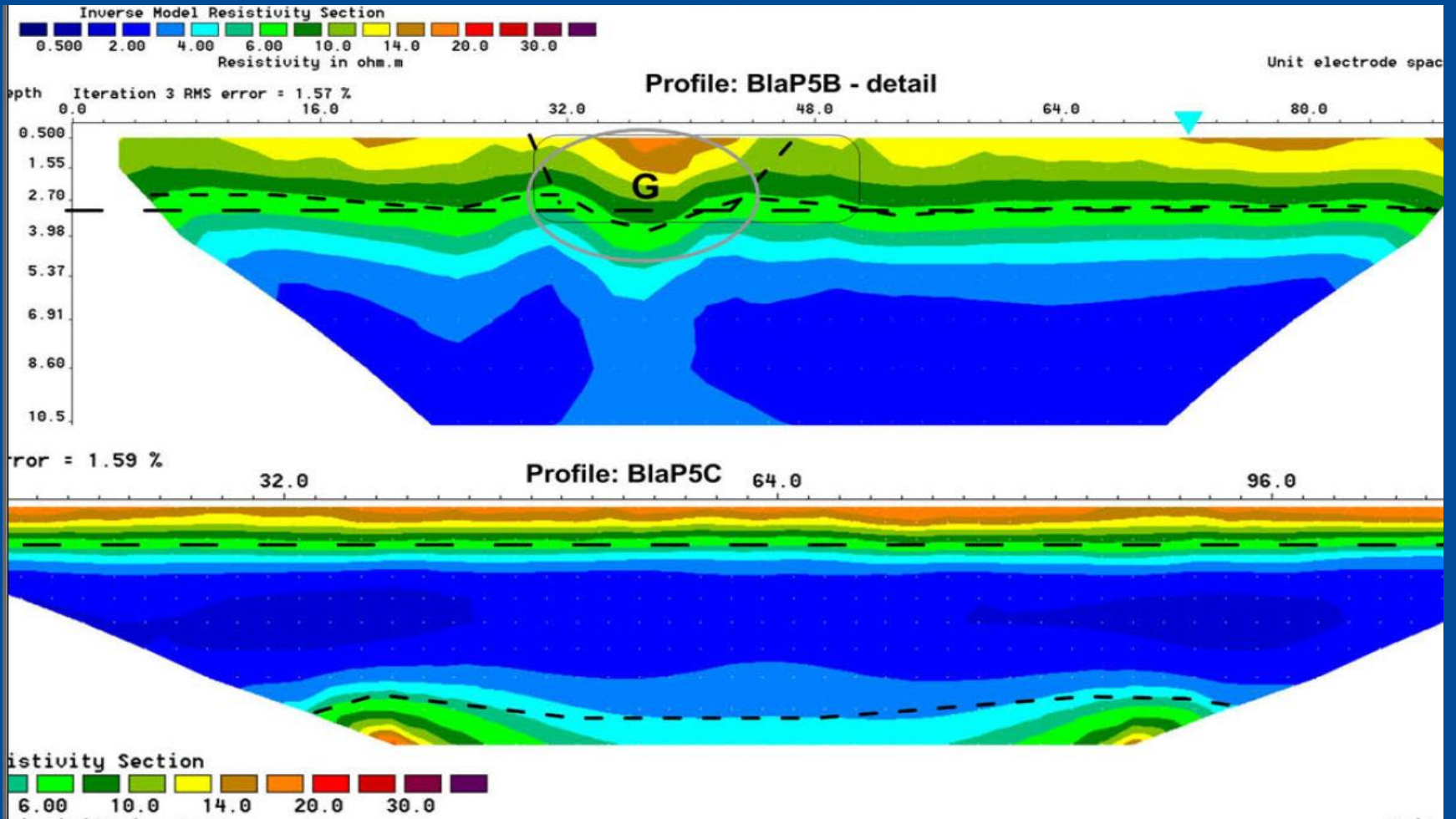
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# Defence Integrity and Fragility

## Blacktoft and Yokefleet



# Flood Resilience

- ➔ Whilst it is not always possible to prevent flooding, planning and preparation can minimise the impact of flooding on an individual or organisation.
- ➔ A first consideration should always be whether a development needs to be situated in the floodplain.
- ➔ Resilience measures include:
  - ➔ Simple design alterations incorporated into new buildings or renovations.
  - ➔ Operational adjustments.
  - ➔ Emergency planning.

# Flood Warnings

# WHAT HAVE YOU GOT TO LOSE?



**FLOODS  
DESTROY  
DESIRE  
BE PREPARED**



Environment  
Agency

Find out now if you're at risk from flooding

[www.gov.uk/floodsdestroy](http://www.gov.uk/floodsdestroy)

Floodline 0345 988 1188 / 0845 988 1188

# Register for Flood Warnings

## ➔ Flood Warnings Direct

➔ <https://fwd.environment-agency.gov.uk/app/olr/register>

## ➔ Floodline

Telephone: 0345 988 1188

## ➔ Social Media

➔ @EnvAgency on Twitter

➔ #floodaware on Twitter

# Flood Warnings



**FLOOD ALERT**

## What it means

Flooding is possible

Be prepared



**FLOOD WARNING**

## What it means

Flooding is expected

Immediate action is required



**SEVERE FLOOD WARNING**

## What it means

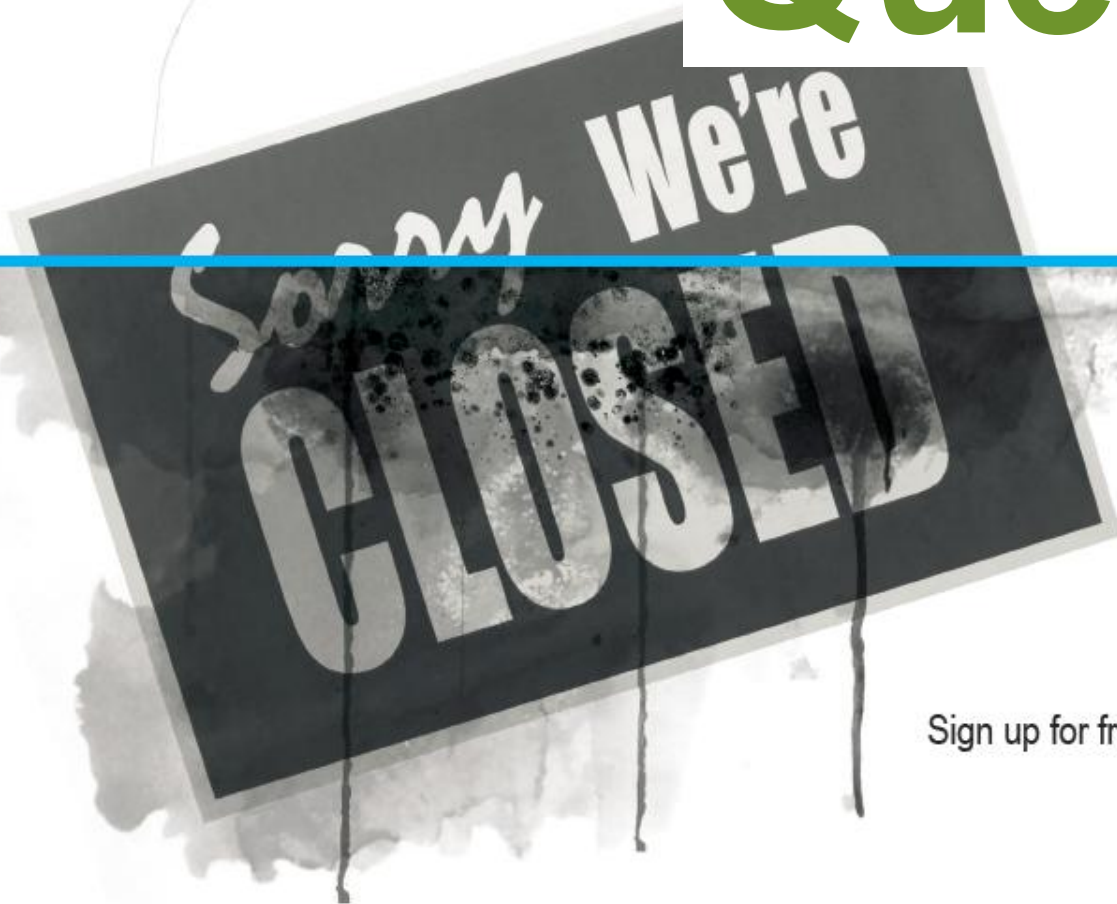
Severe flooding

Danger to life



# OPEN FOR BUSINESS?

# Questions?



**FLOODS  
DESTROY  
DESTROY  
BE PREPARED**



Businesses are counting the costs of flooding.  
Sign up for free flood warnings to help protect your livelihood.

[www.gov.uk/floodsdestroy](http://www.gov.uk/floodsdestroy)  
Floodline 0345 988 1188 / 0845 988 1188