APPENDIX A

Fens 2100+

Developing wise investment for the future

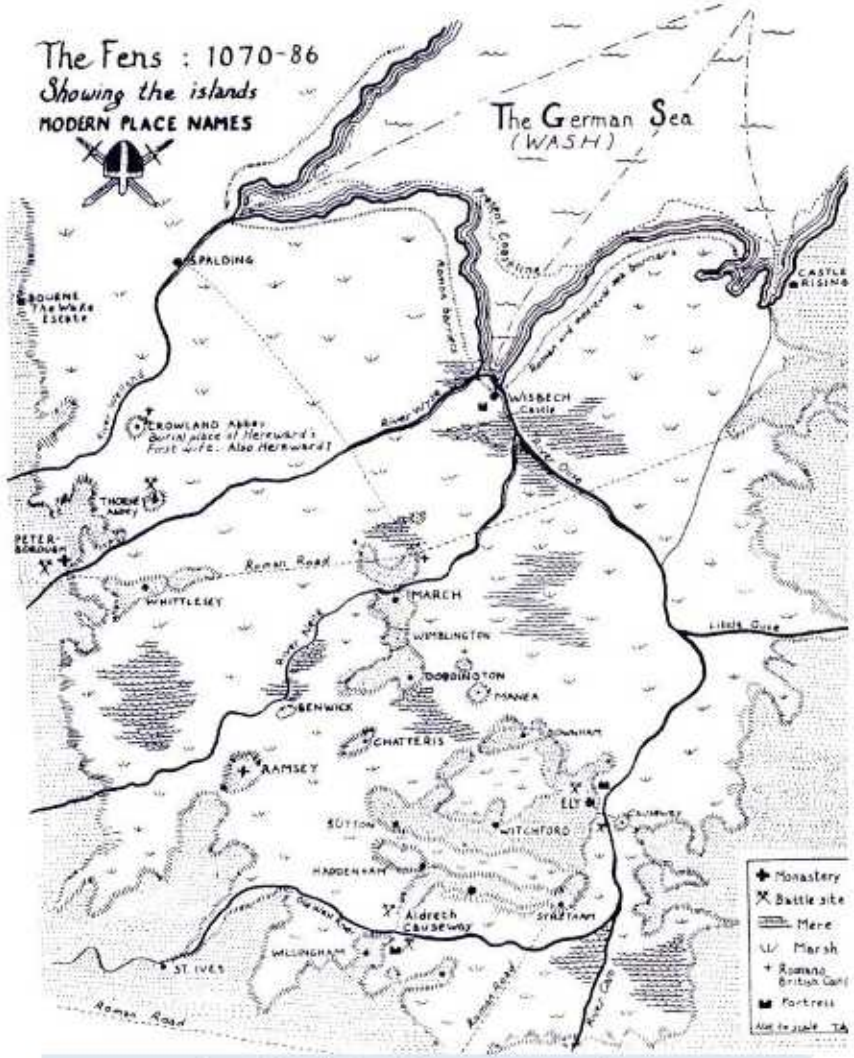
East Lindsey District Council Planning Committee 16.10.25

Environment Agency

ARUP

RIVELIN BRIDGE
water | people | places

A manmade landscape....



https://pocketbookuk.wordpress.com/wp-content/uploads/2016/03/fens1070map.jpg

https://www.wellandantiquemaps.co.uk/product/regiones-inundatae-map-of-the-fens-by-joan-blaeu-c-1664/

Timeline

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Pre 10,000 BC
The area which was to become the Fens was forested. Even today the remains of ancient oak trees are occasionally dug out of the peat.

8000 BC
After the Ice Age, rising sea levels separated Britain from mainland Europe. Marine and estuarine silts were deposited which became the 'Silt Fens' of Lincolnshire. Further south, deposition of marine sediments slowed the flow of rivers, causing them to flood and create the freshwater bogs where peat formation could occur.

43-410 AD
The arrival of the Romans in Britain coincided with falling sea levels. They constructed the artificial channel known as Car Dyke and the raised Fen Causeway between Peterborough and Denver.

600-1000 AD
Monastic foundations were created on some of the raised 'islands' on the Fens such as Crowland, Ely, Thorney, and Ramsey. They were built on the wealth of the eels, reeds, peat, wildfowl and fish that the fens provided.

1287
A disastrous tidal surge affected Boston and South Holland, killing hundreds of people. Spalding monastery and many other churches were destroyed.

1531
King Henry VIII passed the Act of Sewers, creating Commissioners and Courts of Sewers to oversee drainage activities and the maintenance of sea defences. The Act was in operation until 1930 when it was replaced by the Land Drainage Act.

1530s
Water from the marshy East and West Fens (which had previously flowed into the Steeping River) was diverted towards the River Witham by cutting new drains.

1600
Dutch Engines (windmills) started to be used to drain the Fens.

1630
The Dutch engineer Cornelius Vermuyden was asked by King Charles I to design a plan to turn the wetlands of the Fens into productive farmland which could be enclosed.

1799
John Rennie published a report with recommendations for draining the East and West Fens.

1810
The 'Great Tide' of 1810 rose more than 1.4m above an ordinary spring tide and overwhelmed the tidal defences near Friskney, Leverton, Boston, Wyberton, and Fosdyke.

1820s
Steam powered engines began to replace windmills. One steam engine could pump as much water as eight wind-powered pumps, and could work even when there was little wind.

1851
Whittlesey Mere finally vanished due to ongoing drainage. It had formed in 5,000 BC and had once been the largest lowland lake in England, stretching six miles between Ramsey and Peterborough.

1899
Wicken Fen was purchased by the National Trust and became their first nature reserve.

1930
The Land Drainage Act created Internal Drainage Boards, and Catchment Boards for the Witham and Steeping River, Welland, Nene and Great Ouse. This enabled one authority to oversee main channels and work with IDBs to manage smaller watercourses.

1940s
Demand for greater food production during and after WWII intensified the drainage of the Fens for agriculture.

1947
Heavy rain caused a breach of the embankments of the Crowland and Cowbit Washes, flooding a large area to the south. In the same year, the River Welland Major Improvement Scheme was initiated.

1953
A severe North Sea storm caused a tidal surge, where sea levels rose 3m higher than expected. It killed many people across the Fens, even in areas far inland.

1960s
Major scheme of pumping station construction across the South Forty Foot catchment, resulting in the pumping of an additional 280km^2 of land into the drain.

2001
Great Fen Steering Group was set up to begin an ambitious 50-100 year habitat restoration project between Peterborough and Ramsey.

2007
Widespread flooding across the country affected the Fens, and a review of the event led directly to the Flood and Water Management Act 2010.

2013
A tidal surge breached embanked defences at Wrangle and Boston, and damaged the rare freshwater dune slack habitat at Gibraltar Point when it was suddenly inundated by saltwater. It also damaged three of the five pumps at Black Sluice Pumping Station in Boston, which has since remained inoperable.

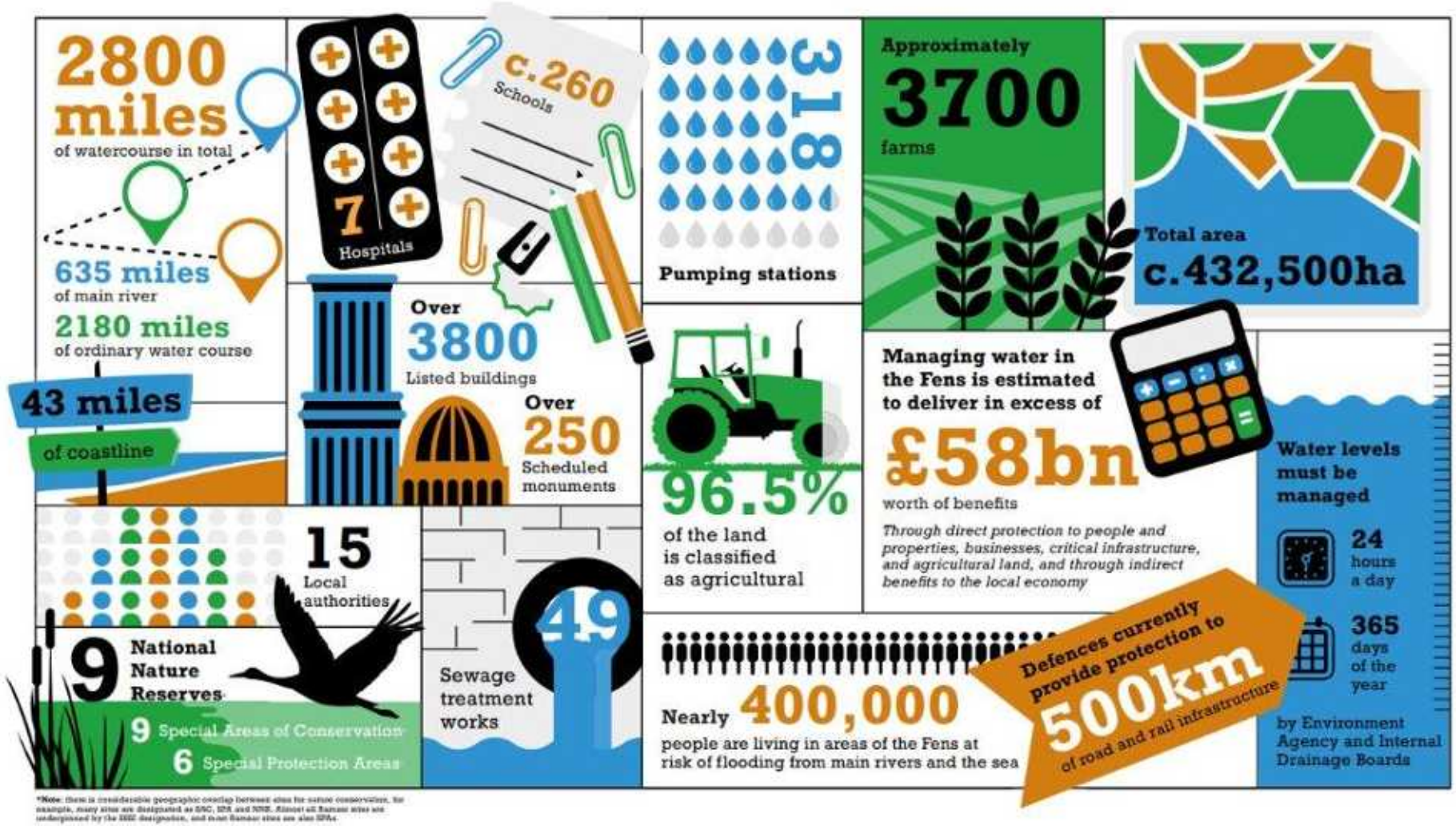
2020
Construction of Boston Barrier completed.

2023
In October, Storm Babet caused flooding in all the catchments from high river flows.

2024
Storm Henk caused severe river flooding across the Fens, as rain fell on already saturated ground.

2025
In January 2025, the highest ever recorded levels were reached in the South Forty Foot Drain after heavy rainfall.

A valuable landscape



Flood events timeline

1947
The winter of 1946/1947 saw extremely low temperatures and heavy snowfall, followed by a rapid thaw that led to significant flooding across the UK.

1953
The greatest storm surge on record for the North Sea caused extensive tidal flooding across the Fens study area.

1998
Heavy rainfall fell on already saturated land causing extensive flooding across the Fens.

2007
Flooding across the Fens study area occurred as a result of the highest recorded rainfall since the records began in 1766.

2013
A storm surge caused significant flooding across the Fens.

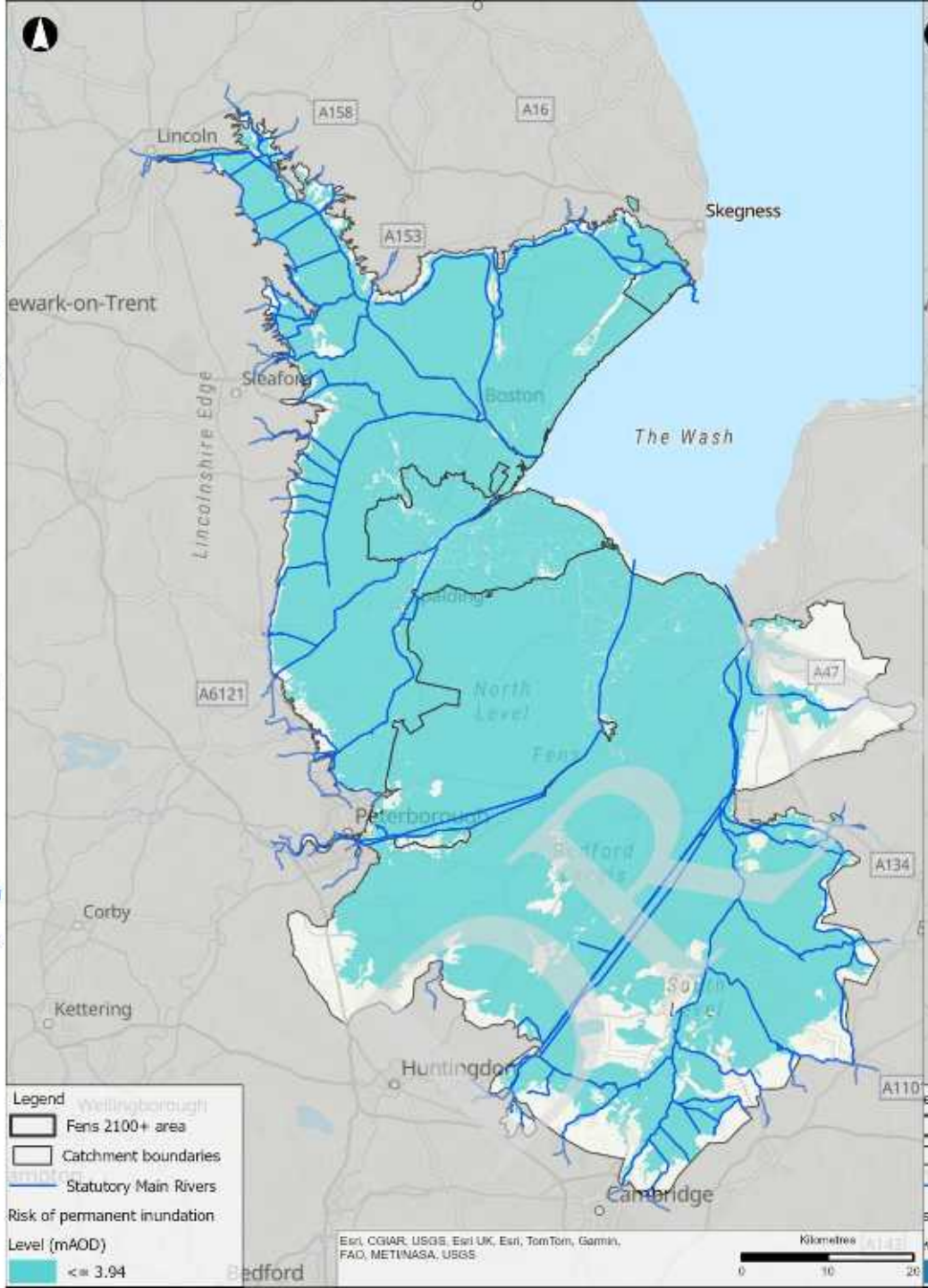
2019
A breach of the River Steeping caused 88 properties to be internally flooded.

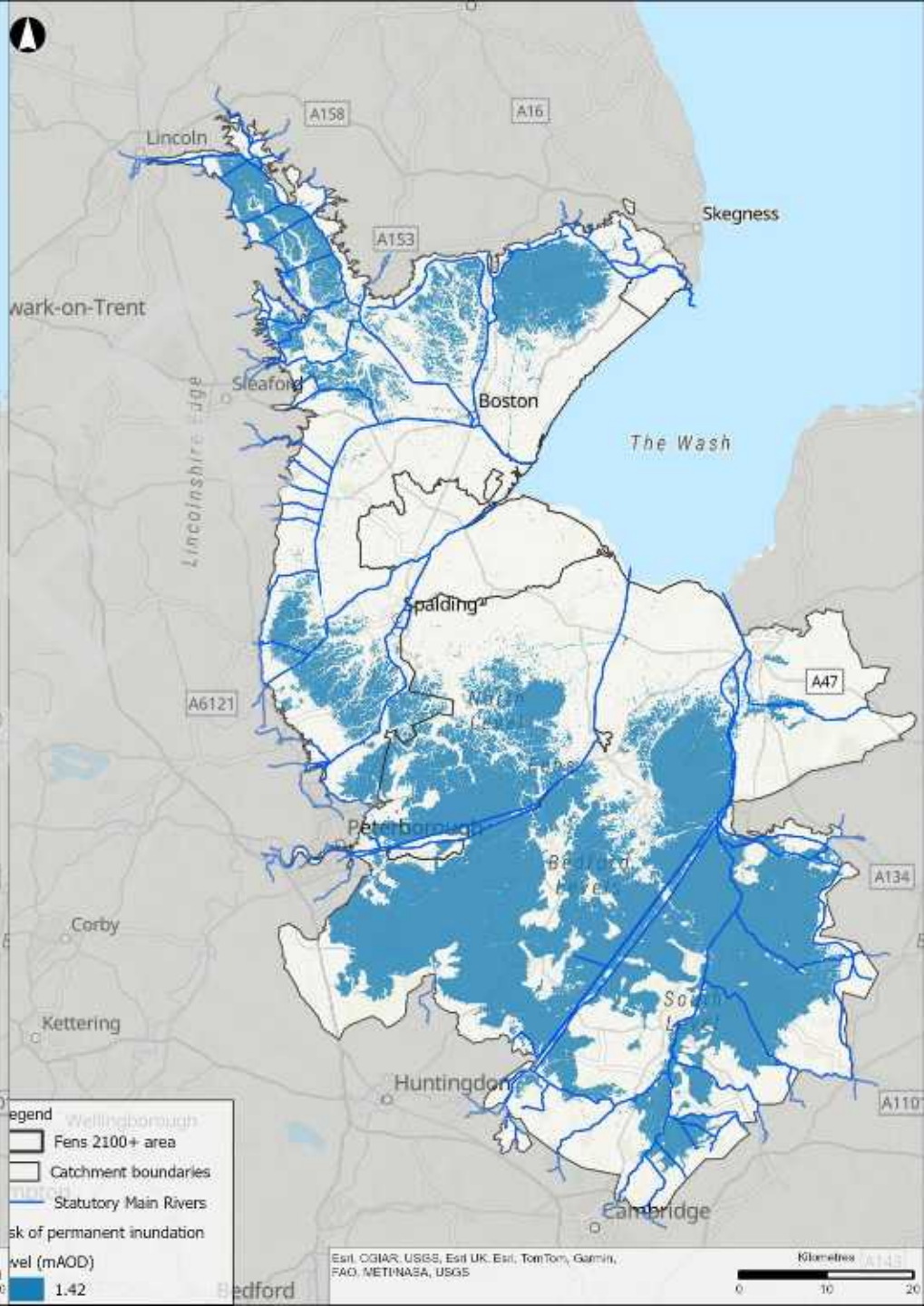
2020
Heavy rainfall fell on saturated ground causing several homes to be flooded in March, Wisbech and Doddington.

2023
Storm Babet brought persistent frontal rain to large parts of the UK in October 2023 and this caused significant flooding across the Fens.

2024
Storm Henk brought heavy rainfall, causing agricultural flooding across the Fens. 56 properties were flooded in the South Forty Foot Drain catchment.

2025
On the 6th January 2025, heavy rainfall coincided by a high tide causing internal flooding of 30-40 residential properties in Wyberton.





Flood management system

1. **Hobhole Pumping Station** is formed of two separate pump houses, on each branch of a split channel. It lifts water up to 7m from the Hobhole Drain into the Boston Haven and is responsible for draining the majority of the East and West Fens catchment.

2. **Tydd Pumping Station** is the largest pumping station in the Lower Nene catchment. It removes water from the North Level district by pumping it into the tidal River Nene.

3. **St German's Pumping Station** is the largest pumping station in Britain. It is the primary outlet for water from an area of 700km² in the Middle Level.

4. **Bevill's Leam Pumping Station** was constructed to boost the flow from the south-west of the Great Ouse catchment, which is the lowest lying area in Britain, and therefore very vulnerable to flooding.

5. **Black Sluice** consists of two tidal sluices, one of which operates as a navigational lock. It releases water in the South Forty Foot Drain into the Boston Haven when tides allow.

6. **Boston Barrier** was completed in 2020. It can be deployed in just 20 minutes to increase the protection offered to Boston and areas upstream against tidal surges.

7. **Grand Sluice** sits across the River Witham to prevent saltwater travelling upstream at high tides. It controls water levels for the 21 miles upstream to Bardney Lock, and an adjoining lock gate allows navigation.

8. **Marsh Road Sluice** sets the tidal limit on the Coronation Channel, and together with the nearby Fulney Lock sets the tidal limit of the Lower Welland catchment.

9. **Dog-in-a-Doublet Sluice** marks the tidal limit of the River Nene, and controls river levels upstream in Peterborough.

10. **Denver Sluice** is part of a complex of assets, which together are vitally important for managing water levels in the Great Ouse catchment. Denver Sluice controls the flow from the non-tidal branch of the Great Ouse River system (known as the Ely Ouse) into the tidal reach of the Great Ouse River.

11. **Crowland and Cowbit Washes**
Constructed in 1664 adjacent to the River Welland, the Crowland and Cowbit Washes can protect Spalding from river flooding by temporarily storing excess water.

12. **Whittlesey (Nene) Washes**
Located to the south of the River Nene along a 20km stretch, these washes can store as much water as 14,000 Olympic swimming pools.

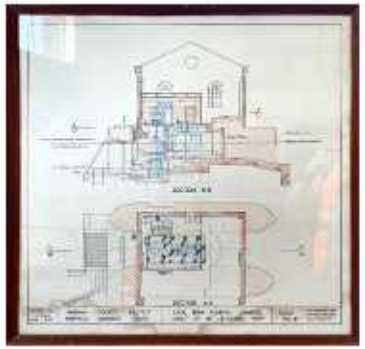
13. **Ouse Washes**
Britain's largest washland, it provides 90 million m³ of flood storage across 25 km².

14. **Tidal defences** consist of earthen embankments which run in sections along the coastline, protecting large areas from tidal flooding.

15. The **Wainfleet Relief Channel** diverts part of the flow of the Steeping River around Wainfleet All Saints. It sits higher than the level of the surrounding land, with raised earthen embankments to contain the channel. Similar relief channels can be found in the Lower Welland and Great Ouse catchments.

16. **Catchwater drains** are present in several of the catchments, running parallel to the Fen edge. They are designed to intercept water running off higher ground before it reaches the low-lying Fens, where the water could only be removed by the difficult and expensive task of pumping.

The challenge



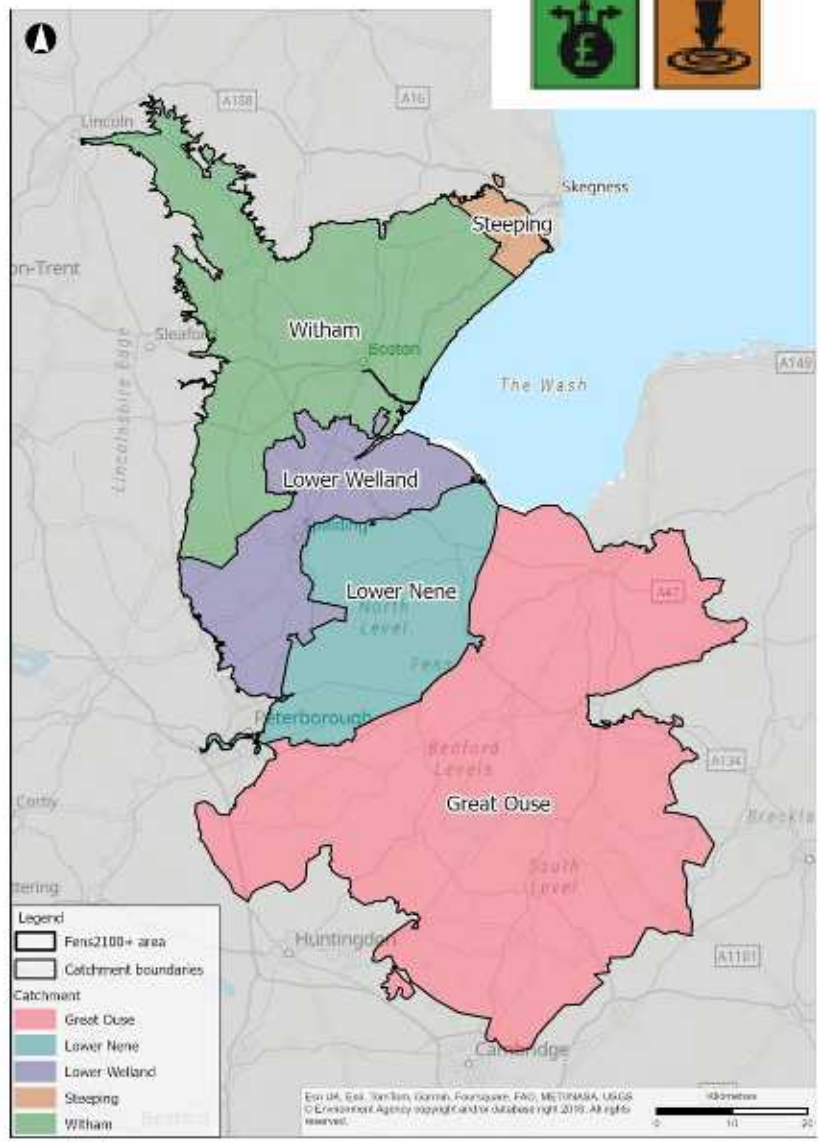
- **For Risk Management Authorities**
  - Aging infrastructure at or nearing the end of its serviceable life
- **For Regional and National Government**
  - An urgent requirement for strategic decisions on future landscape and how flood risk management and growth align beyond the 2040s.
  - Without decisions in the short-term, communities will face an uncertain future and further decline in investment.

Fens 2100+ Partnership

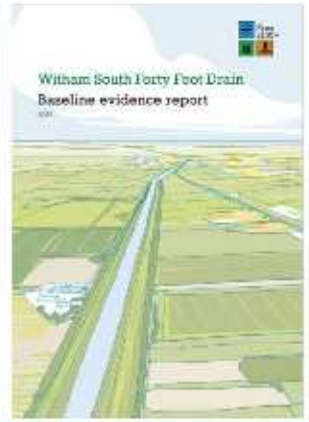
- Lincolnshire County Council
- Norfolk County Council
- Cambridgeshire County Council
- Cambridgeshire & Peterborough Combined Authority
- Anglian Northern & Great Ouse RFCCs
- Environment Agency
- Association of Drainage Authorities (ADA)
- Internal Drainage Boards (IDBs) - represented by MLC, BSIDB, W&D
- NFU
- Natural England
- Anglian Water

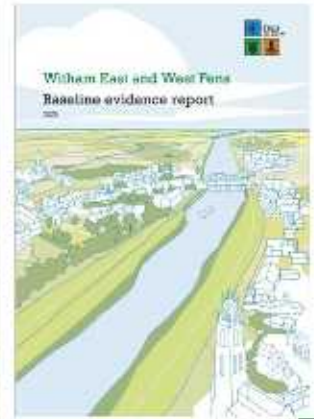
National Flood & Coastal Erosion Risk Management Strategy *Climate Resilient Places measure 1.5.4:*

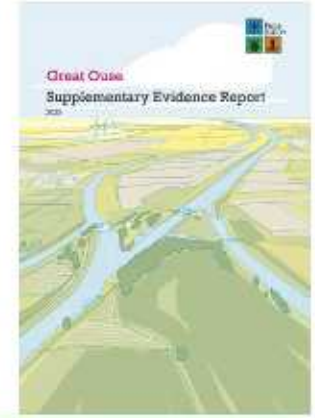
"By 2025 the Environment Agency will work with farmers, land managers, water companies, internal drainage boards and other partners to develop a long-term plan for managing future flood risk in the Fens."

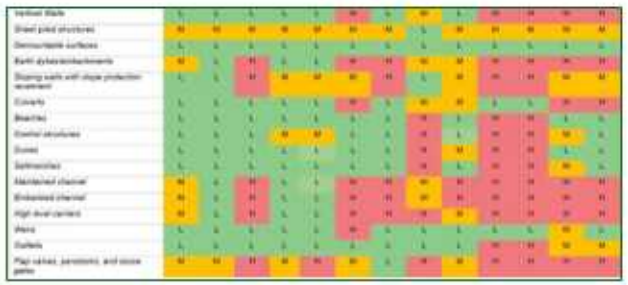


Underpinning Evidence





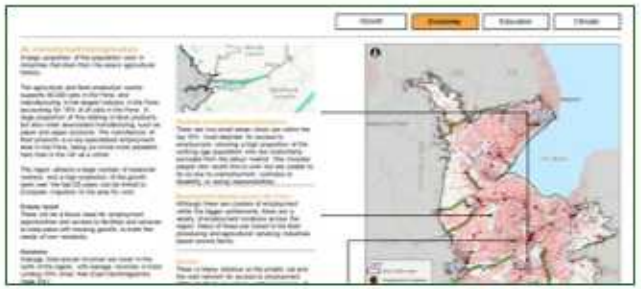




Asset vulnerability

Asset condition

Lived experience



Systems analysis

international learning

Asset maintenance

The Fens Narrative

Transforming our approach to investing in flood and coastal resilience for the future of the UK Fens

Fens 2100+

...The following is not questionable and not negotiable:

- The Fens are a **valuable landscape** both nationally and regionally
- The FCERM assets that underpin the fens **are critical** in securing its value
- But **sustaining them** is getting more and more **challenging**
- There is a need to **act now (urgency)** to ensure we maintain this valuable landscape
- **No single organisation** can solve this challenge alone

"The right **money**, at the right **time**, in the right **places**, on the right **things**, in the hands of the right **people** – that's how we achieve **a vibrant and climate resilient Fens** – *the alternative is failure*"

Our 3 key projects

Case for Change

A publication exploring the value of the Fens, nationally, regionally and locally, and setting out a strategic case for continued and enhanced investment in flood risk management to ensure we have a vibrant and sustainable future fens

A decade of action

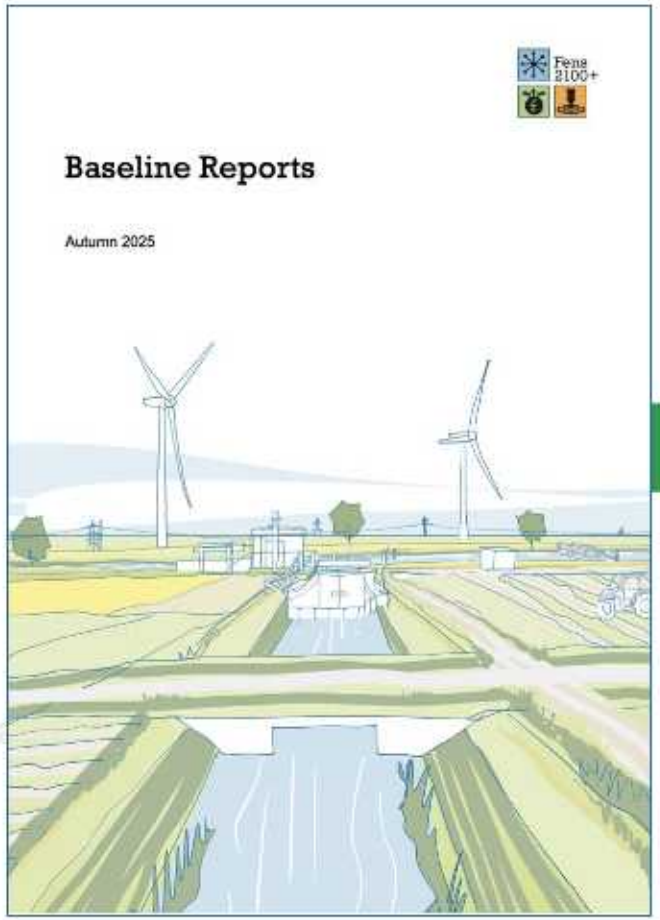
Catchment level asset investment strategies, confirming the immediate asset (and other) investment requirements across each catchment and giving clarity on the medium-term asset investment priorities to underpin a decade of action

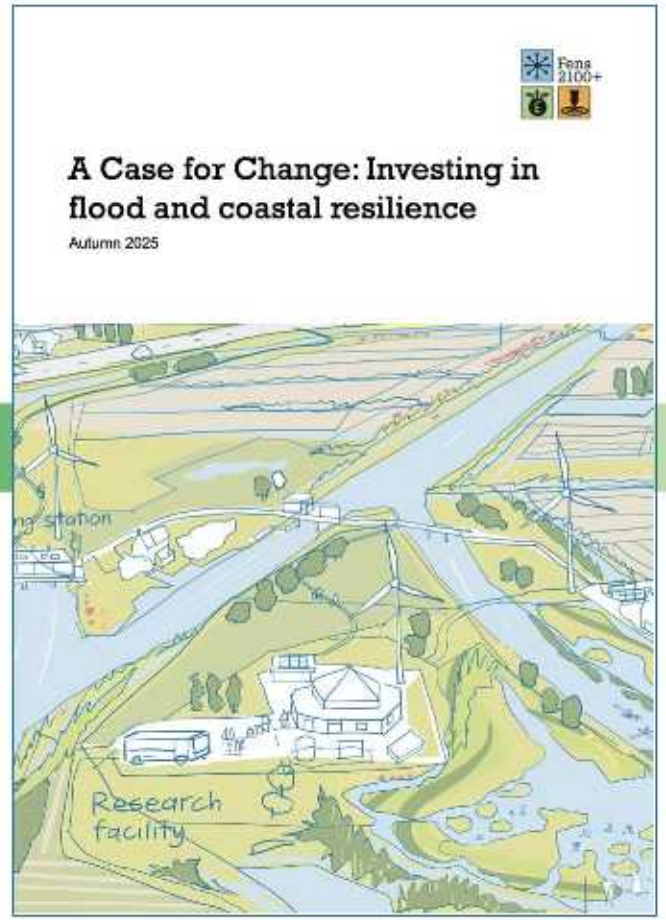
Catchment Baseline Reports

A comprehensive and accessible evidence baseline for each catchment giving a clear picture of what we currently know and don't know, what is working for us, and what we might need to do differently in the future

Transforming our approach to investing in flood and coastal resilience for the future of the UK Fens

2 new publications – due Autumn/Winter 25/26





Delivery

Next Steps

- Launch / Publication
- Political Engagement
- Delivery of Action Plan
- Working with LPAs