South Forty Foot Drain, Boston and the South Forty Foot Drain Fens

Review of Flooding 6th to 7th January 2025

Executive Summary

What happened

Late December 2024 to early January 2025 brought extreme wet, and wintry weather. Record rainfall occurred on 5th January, exacerbated by saturated and frozen ground, leading to significant flooding. Over 50mm of rain fell in some areas from 4th–6th January, causing extensive flooding in Lincolnshire, with homes, schools, and farmland affected. Boston experienced internal property flooding to 36 homes, with river levels peaking at 3.192m above sea level in the early hours of 7th January 2025. Severe runoff from frozen, saturated ground exceeded river defences, causing overtopping in Dunsby, Quadring, and Wyberton West Road in Boston.

No specific fluvial Flood Warning system exists for this area, with only tidal warnings available, which are not suitable for localised river flooding events. The Environment Agency is reassessing the Flood Warning Service following this incident.

Investigation into main river flooding

An investigation was conducted by the Environment Agency into the possible contributing factors for the flooding. Key areas reviewed include:

- Rainfall, catchment conditions, and river responses.
- Embankment seepage and flood wall performance in Boston.
- Main river defences and operational performance of flood risk assets.
- Impacts of Black Sluice Pumping Station's decommissioning.

Key Findings

- **Rainfall and Catchment Conditions**: High rainfall (43.6mm) fell on saturated and frozen ground, coupled with minimal vegetation interception, resulting in record river levels. These river levels exceed the modelled prediction for a 1 in 1000 (0.1%) chance in any one year plus an allowance for climate change level.
- **Embankment Seepage**: Seepage through the South Forty Foot Drain's right bank, previously reported, worsened due to record-high river levels. A planned repair is set for 2025/26 following surveys.
- **Flood Walls**: Aging flood walls along the South Forty Foot Drain to the rear of Wyberton West Road exhibited settlement and joint failures, allowing water seepage and contributing to overtopping during the flood. Emergency joint repairs have been initiated. The settlement issues will be addressed in the planned repair works.

- **Defence Overtopping**: Evidence of overtopping was observed at multiple locations, including Dunsby, Quadring, and Wyberton West Road in Boston. Peak river levels exceeded wall defence heights at Wyberton West Road by 8–22cm, contributing to the flooding.

This analysis underlines the importance of catchment-specific conditions alongside rainfall totals when assessing flood risks. Ongoing maintenance, asset upgrades and making safe spaces for water that exceeds channel capacities in the catchment will play a critical role in mitigating future risks.

Black Sluice Pumping Station Decommissioning:

The pumping station ceased operation in 2018 due to its minimal impact on flood risk compared to high refurbishment and operational costs. Observations confirm it would not have prevented overtopping during large flood events, as its effects diminished upstream beyond Donington Bridge. The decommissioning of the Black Sluice Pumping Station did not contribute to flooding in areas such as Billingborough during the January 2025 incident, as supported by observed data and historical river level trends. It may have partially reduced levels in Boston.

Actions which mitigated the impacts of the flooding:

- Flood Incident Duty Officers pre-emptively opened the sluices at the Black Sluice complex in Boston, reducing river levels 16 hours before peak flooding.
- Black Sluice IDB implemented its Emergency Response Plan, reducing water pumped into the South Forty Foot Drain while managing ordinary watercourse risks.
- Temporary repairs were in place at damaged embankments in Dunsby and Quadring to prevent breaches.

Key Actions the Environment Agency will be taking forward:

- **Flood warnings:** if feasible, the Environment Agency will introduce a tailored warning for the affected areas.
- **Model review:** the Environment Agency will commission specialist modelling consultants to simulate the January 2025 floods to validate past predictions and inform future decisions.
- **Defence improvements:** the Environment Agency will address embankment seepage and stabilise flood walls at Wyberton West Road.
- **Model update:** the Environment Agency will bid for funding to update the South Forty Foot model to incorporate advanced software, recent data, and climate change projections. This will support strategic, longer term plans for improving flood resilience in the catchment.

Final Considerations

The Environment Agency recognises that while steps can be taken to improve resilience, flood risk cannot be eliminated. Future flooding events may exceed design standards for defences. Any proposals for improving flood protection must meet strict cost-benefit criteria based on predicted damages and frequency of flooding amongst wider issues.