Yorkshire & Humber Drainage Boards

Reedness & Swinefleet IDB

Lowland Agricultural Peat Water Discovery Pilot

Thorne, Crowle and Goole Moors Peatlands – Connectivity and Hydrological Study

Stakeholder report

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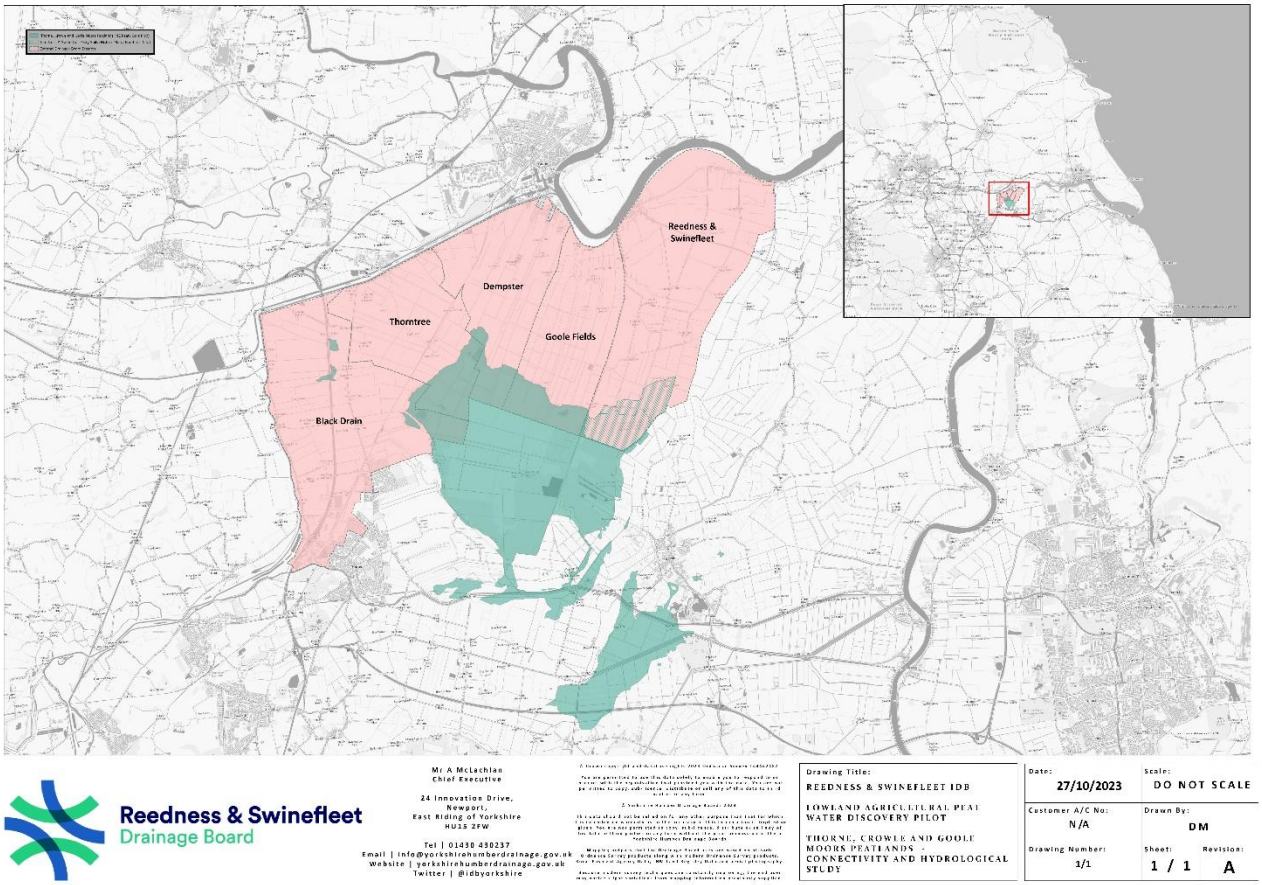
Scheme Summary

Yorkshire & Humber Drainage Boards (YHDB) undertook a modelling exercise supported by funding from Defra's Lowland Agricultural Peat Water Discovery Pilot (LAPWDP). The primary objective was to gain a deeper understanding of the hydraulic connectivity between the Humberhead Peatlands National Nature Reserve, recognised nationally as the UK's largest lowland peat bog, encompassing Hatfield, Thorne, Crowle, and Goole Moors, and the Internal Drainage Board (IDB) areas to the north.

This modelling aims to inform the development of a long-term management strategy that balances the flood risk concerns of agricultural stakeholders within the drainage districts with the ecological goals of peatland restoration across the moors



The northern side of the Moors are bounded by 5 drainage boards (3 of which are part of the YHDB consortium). Reedness and Swinefleet IDB (the scheme sponsor) have a particular interest in the management of the Moors, as one of the board's principal drainage channel (Swinefleet Warping Drain) takes significant flows from the moors.

Natural England, responsible for managing Thorne and Goole Moors, and the Lincolnshire Wildlife Trust (LWT), which oversees Crowle Moors, played an active role in the scheme. Their contributions of data, expertise, and ecological insight were instrumental in supporting the calibration and validation of the model.

Presented below is the summary report from the modelling exercise, prepared for stakeholders. It outlines the key findings and recommendations arising from the study.

For further details about the project, please contact the Asset Management Team at the Yorkshire & Humber Drainage Boards (YHDB) via email: info@yorkshirehumberdrainage.gov.uk.

THORNE MOORS HYDROLOGICAL STUDY
Stakeholder Summary

Prepared by	Simon Jepps BSc MSc
Reviewed by	John Jepps BA MSc
Prepared for	All Stakeholders
Status	DRAFT
Version	V1-0
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1 STAKEHOLDER SUMMARY – WATER LEVEL MANAGEMENT IMPACTS (ON-SITE AND OFF-SITE)

This hydrological study has investigated how peatland restoration at Thorne Moors interacts with local water levels and surrounding drainage infrastructure. The project was commissioned by Reedness & Swinefleet IDB, supported by Natural England, and carried out by Thomas Mackay Ltd. A key focus of the study was to assess both on-site impacts of restoration measures and the potential knock-on effects to adjacent land managed by Internal Drainage Boards (IDBs), particularly in relation to pumping requirements and flood risk.

A fully integrated 2D hydrological and hydraulic model was developed and calibrated to simulate different restoration and management scenarios under both typical and extreme conditions.

2 SCOPE OF THE ASSESSMENT

The model examined how water moves through and around Thorne, Crowle, and Goole Moors under:

- Existing and historic management practices,
- High rainfall and flood events,
- Modified restoration configurations, including drain blocking and weir adjustments, and
- Scenarios with and without pumping.

The focus was on understanding:

- Water level responses on Thorne Moors,
- Soil store / sub-surface flow interactions with adjacent IDB-managed land, and;
- Flood risk and pumping demand implications for nearby stakeholders.

3 SUPPORTING REPORTS

This stakeholder summary note is based on the following project reports:

Thorne Moors Hydrological Study – Summary Report
Prepared by Thomas Mackay Ltd for Reedness & Swinefleet IDB, January 2025.
This report provides a high-level overview of the study objectives, modelling approach, and key findings, including implications for both on-site restoration and off-site drainage.

Thorne Moors Hydrological Study – Technical Model Report and User Guide
Prepared by Thomas Mackay Ltd for Reedness & Swinefleet IDB, January 2025.

This report presents a full technical account of the model development, including assumptions, calibration, input datasets, and scenario testing. It supports future model use and refinement by project partners.

Copies of both documents are provided alongside this Stakeholder Summary note.

4 KEY FINDINGS

4.1 ON-SITE WATER MANAGEMENT:

- The onsite peatland restoration measures are effective at raising and maintaining higher water levels, supporting habitat conditions for restoration within Natural England's target bounds. Similar impacts can be expected elsewhere on the Moors.
- The site's current water management system, including weirs and pumps, is currently essential to maintaining this restored state.
- Without active pumping, water levels to the west of the Swinefleet Warping Drain rise substantially after rainfall events, particularly after continuous periods of rainfall and in excavated or low areas — similarly confirming that active management is needed to maintain restoration targets.

4.2 OFF-SITE IMPACTS:

- Goole Fields: Under scenarios with higher water retention on Thorne Moors, there was an increase in sub-surface flows towards Goole Fields, with modelled increases in pumping duration and volume required at IDB pumps. This was particularly noticeable in long-duration, non-flood scenarios.

- Reedness and Swinefleet IDB Land: No significant off-site effects were observed under any modelled scenario east of the Warping Drain, though this may reflect current management configurations, selected scenarios and selected reporting points and their calibrations.

- Flood simulations suggested some attenuation benefits: holding more water on-site during short-duration events reduced peak flood levels in Goole Fields — suggesting a potential benefit in certain flood scenarios.

- Other impacts may be evident when the model is calibrated and run for notable flood events (such as storm Babet) where levels in Swinefleet Warping Drain impacted IDB pumping and flood risk.

However, longer events may reverse this benefit if water is not pumped from the site, highlighting a potential tipping point in the effectiveness of site management for flood risk benefit.

4.3 IMPLICATIONS OF ACTIVE MANAGEMENT FOR NATURAL ENGLAND'S RESTORATION PLANS

- Active water level management remains essential — both to meet peatland restoration targets and to manage interactions with adjacent IDB land.

- Without pumping, to the west of Swinefleet Warping Drain off-site sub-surface seepage to the north may increase, potentially leading to greater pumping requirements and operational pressure on IDB infrastructure.

- Conversely, current management may provide some flood attenuation benefit under short-duration storm events by retaining water temporarily on site, mitigated by providing initial drawdown in advance of an event.

- Opportunities exist to coordinate storage and pumping strategies to enhance outcomes for both peat restoration and flood risk management — for example, via pre-event pumping or potential use of Swinefleet Warping Drain as a dynamic part of a wider strategy.

5 RECOMMENDATIONS

To improve confidence in the model and support informed decision-making the following recommendations are made:

- Improve representation of peat condition and soil profiles, especially clay lenses and variable hydraulic conductivity across the site and surrounding area.

- Enhance pump and weir data, including triggers, capacities, and control regimes (especially for Natural England assets) including consolidating historic data where possible.

- Install level gauges in key off-site locations (e.g. Swinefleet Warping Drain and Goole Fields) to verify magnitude of impact of off-site interactions.

- Obtain latest data from dipwell data on Crowle Moors from Lincs Wildlife Trust. Install level gauges in key off site locations .

- Improve dipwell data management and update monitoring to capture current conditions. Ideally a series of test management measures would be undertaken, enabling calibration against specific management scenarios. This should be carried out with in conjunction with the above recommendation.

- Consider future flood event calibration using Storm Babet or similar for model refinement and improved confidence in modelling outputs.