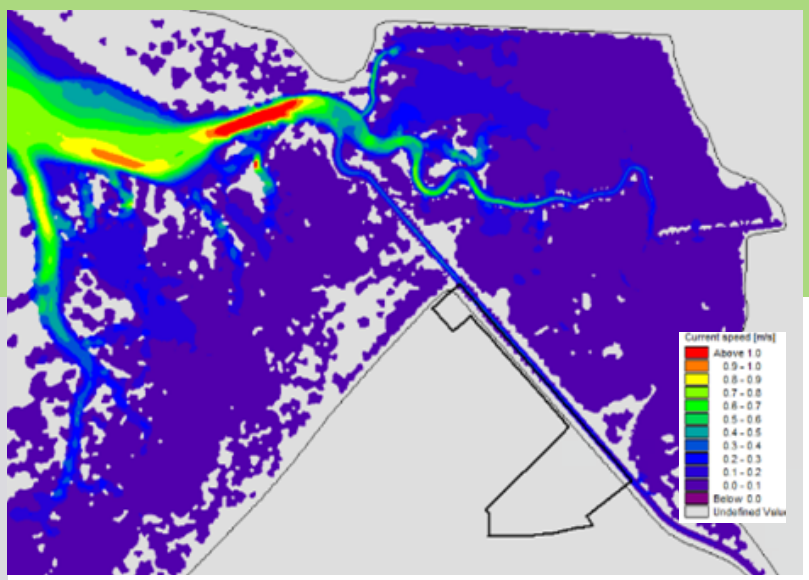
Cocker Tidal Channel & Cockerham Marsh SSSI Restoration Investigation



Task 2b Modelling: Summary

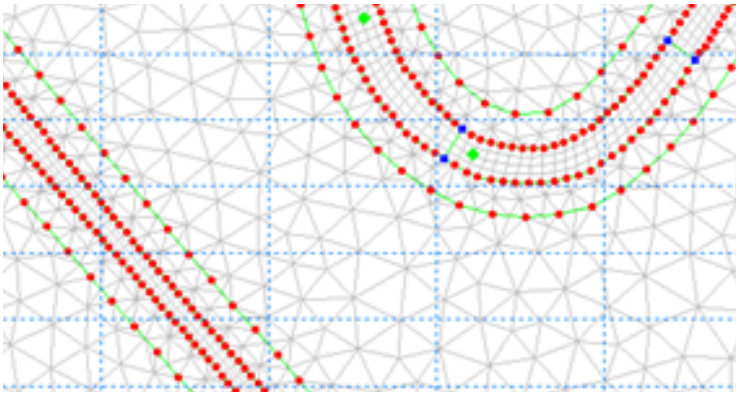
The Cocker Tidal Channel and Cockerham Marsh SSSI Restoration Investigation, led by Natural England, Lancashire Wildlife Trust and the Environment Agency, forms part of the wider Our Future Coast programme in North West England.

In 'Task 2b – Modelling', hydrodynamic modelling was used to understand how tides, river flows and channel configurations influence water levels, currents and inundation patterns across the Cocker Tidal Channel, Cockerham Sands and Cockerham Marsh SSSI. A nested MIKE21 hydrodynamic model was developed, using a regional Irish Sea model to drive a fine resolution local model covering the tidal Cocker Channel, Bank End Farm and Cockerham Marsh SSSI. Model inputs were built from 2023 LiDAR, UKHO/C Map bathymetry, and available long section channel surveys.

Verification against observed and predicted tides at Heysham and Fleetwood demonstrated excellent model performance. The model was then run for a full 14 day spring–neap cycle in September 2024 for six scenarios: (i) Baseline; (ii) and (iii) Baseline Sensitivity (two river-flow cases); (iv) Historic Baseline; (v) one Tidal Cocker Channel restoration option; and (vi) one Cockerham Marsh SSSI restoration option.

Baseline results show that neap tides remain confined to the main channels, while progressively larger tides inundate mudflats and, by the highest spring tide, most of the saltmarsh. A small triangular area of upper saltmarsh near the SSSI remains dry except during the single largest tide in the simulation period, suggesting possible suitability at this location for new natterjack toad habitat pools. Current velocities exceed 1 m/s in the Outer Cocker Channel during spring tides, consistent with known erosion tendencies near Bank End. River inflows (1.3 or 5 m^3/s) have minimal influence on high water levels or tidal timing; tidal processes overwhelmingly dominate.

Historic Baseline modelling, simulating pre 1960s natural-channel conditions, shows that the former meandering channel retains water longer and conveys freshwater less effectively, causing tide locking and poorer drainage upstream. Reinstating the historic alignment would therefore likely worsen flood risk to hinterland areas adjacent to the fluvial Cocker and would not significantly enhance delivery of tidal processes to existing upper saltmarsh areas, and therefore provide no biodiversity enhancement opportunities.



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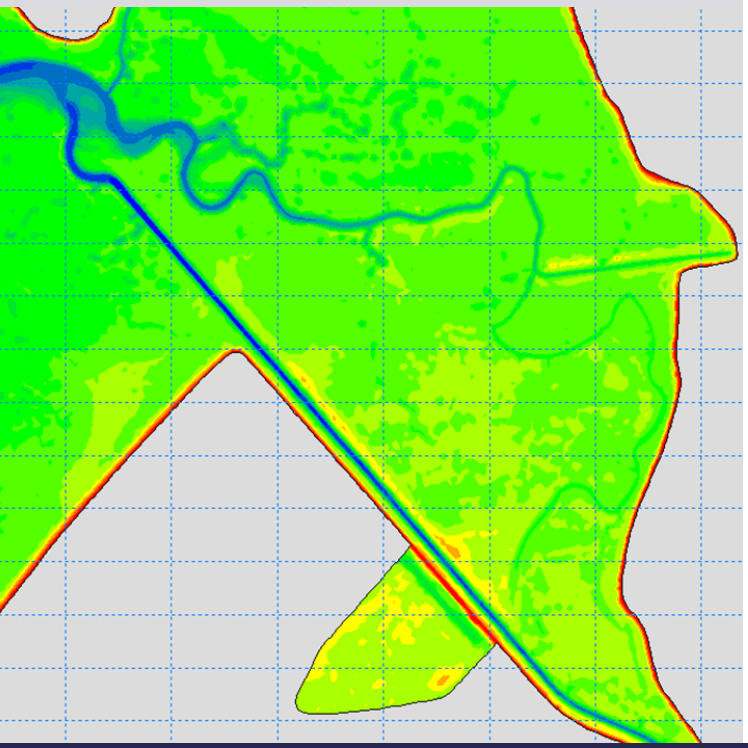
The modelled Cocker Tidal Channel reinstatement option (partial reinstatement of the natural channel while keeping the “new cut” open) produces only minor hydraulic differences from the present day. Small volumes of flow enter the reinstated channel during mid to spring tides, but overall inundation of the saltmarsh still occurs mainly from west to east due to over marsh flooding rather than via creeks.



A slight increase in ebb phase current speeds near Bank End suggests a potential marginal increase in local erosion risk under this option.

The modelled Cockerham Marsh SSSI restoration option (a single 40 m embankment breach) shows that tidal water reaches the SSSI only on mid to spring tides, initially filling the delph ditch immediately behind the flood embankment and then overspilling limited adjacent land areas within the SSSI.

Only the five largest spring tides in the simulation inundate a meaningful portion of the site, and even then some areas remain dry, requiring earthworks to improve hydraulic connectivity between pools/ponds on the SSSI. Engineering measures (namely a perimeter flood embankment) would also be necessary to prevent unwanted flooding of adjacent farmland.

Occasional tidal influence could technically be restored to the SSSI but this alone would not guarantee ecological success without ongoing site management.

Overall, the modelling confirms a strongly tide dominated system where channel modifications would provide limited ecological or flood risk benefits, while potentially creating new hydraulic risks. These findings directly informed the Task 2a Optioneering conclusions.