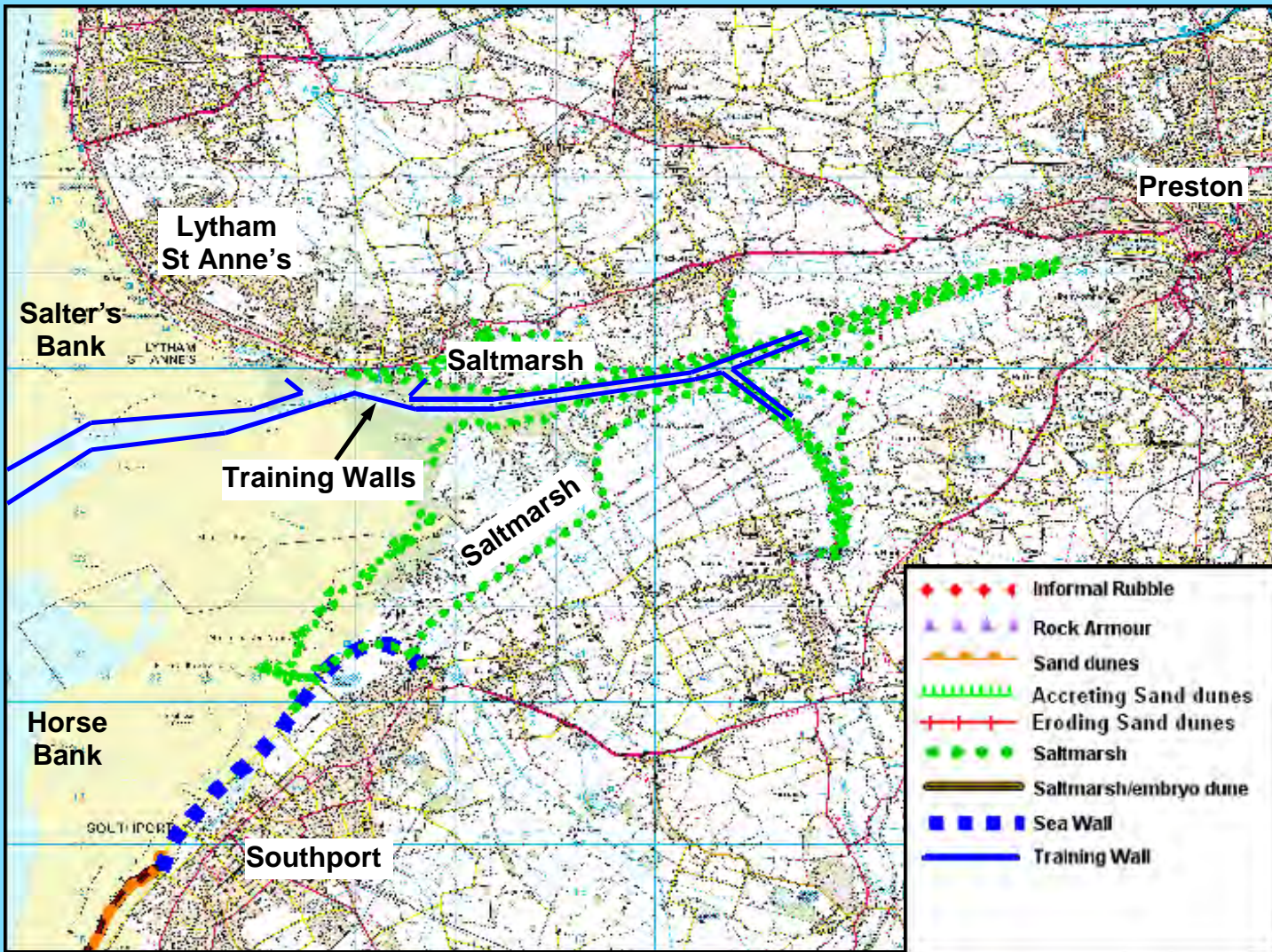


Ribble Estuary Summary



Introduction

This report summarises the history and evolution of the river Ribble and details the significant influence it has had on the northern half of the Sefton Coast.

Physical characteristics of the Ribble Estuary

The Ribble Estuary is funnel-shaped, 15km wide at its mouth between Southport and Lytham St Annes. Its shape was formed by the historic excursions of river channels between banks of easily eroded sediments. The channel length between Preston Dock and the open sea is 28km. The total area of the estuary is 21,700 hectares, of which 12,000 hectares is inter-tidal. The bed consists of sandstone, covered by glacial boulder-clay deposits up to 50 metres thick. The surface deposits consist mainly of sand, with mud deposits limited to the higher tidal flats.

Conservation Importance

The Ribble Estuary is an internationally designated nature conservation site on account of its sand flats, mud flats and salt marshes that support one of the largest breeding wildfowl and migrating bird populations in Britain.

Tidal Range

At the mouth of the estuary the Mean Spring Tidal Range is 8.0m, whilst at Preston this is 3.6m. The flood-tide (tide coming in) duration is shorter than the ebb-tide (tide going out) and average flood-tide velocities are higher than average ebb-tide velocities. Tidal inflow on a spring tide averages 12,000 cubic metres per second.

Freshwater Flows

The mean freshwater flow varies throughout the year with the maximum flows occurring between October and March.

Wave Activity

Wave activity is moderate, being limited by the shallow nature of the local seabed.

Spartina planting

Much of the inner and mid estuary have experienced vertical and lateral salt marsh growth. Surveys of the salt marsh edge carried out by the Port of Preston Authority between 1904 and 1980 confirm the expansion of the marsh. Salt marsh growth was aided by the introduction of *Spartina townsendii* in 1932, which was planted in a number of locations. The grass spread rapidly in the 1960s and 1970s, colonising the north bank of the River Ribble, the foreshore of Lytham St. Anne's and the inter-tidal zone north of Southport Pier. The aim and effect of the introduction of *Spartina* was to promote accretion, facilitating subsequent land reclamation.

River Training and Dredging

Until the 19th Century the channels of the River Ribble wandered freely within the estuary. There is a natural tendency of all river channels to meander when passing through level or nearly level terrain. In the outer estuary the channels divided and varied over time, with different combinations of northern, central and southern channels. The earth's rotation sets up a "gyroscope" mechanism that divides the flood and ebb tidal channels, so that in an east-west aligned river estuary such as the River Ribble, the flood tide enters from the south side and the ebb-tide is deflected north.

During the nineteenth century the river was gradually trained into a single central navigation channel by the construction of rubble-stone training walls between Preston and the sea.

The depth of this navigation channel was subsequently maintained by dredging. The purpose of river training was to develop Preston into a major port. There were several phases of training bank construction, mainly between 1840 and 1910, the final 2 kilometres to the open sea was completed between 1932 and 1937.

In the 19th century, Southport considered the South Channel to be very important. It was used by fishermen and also provided a route for the excursion steamers that berthed at the Pier. Southport also recognised that a trained central navigation route would cause siltation of its beaches and fought hard for the adoption of a South Channel navigation route. Preston's preferred choice of the central route was confirmed after Parliamentary enquiries in 1883, 1889, 1896, and 1904.

Albert Edward Dock opened in 1892 - at that time it was the largest single dock in the country. In 1948 the dock was the first to introduce roll-on roll-off traffic. By the 1960s the port held the record for handling the largest amount of container and ferry traffic. As the size of ships increased, fewer could use the dock. At the same time, the import of traditional cargoes decreased, and the cost of dredging silt from the channel increased. The early post-war advantage of being the pioneer in roll on roll off operations was lost to competing ports which could offer faster turn round time. In the 90-year history of the port, it only made a profit in 17 years. In 1979 the decision was made to redevelop the site and the Port closed, by Act of Parliament, in 1980.

The training work and associated dredging suppressed the subsidiary channels in favour of the straightened central channel, although the river still tended to revert to its historic form of divided channels in the outer reaches of the estuary nearest the sea. Following abandonment of the Port of Preston and cessation of dredging in 1980, the navigation channel has been filling in. A more natural channel system is presently trying to establish itself, partly by the development and re-orientation of the South Gut (ebb channel) and the Penfold Channel (flood channel) in the central part of the estuary.

Accretion and Reclamation

Charts and surveys show that the Ribble Estuary has experienced significant accretion over the last 200 years. Sedimentation has been especially apparent in the upper parts of the inter-tidal zone. Infilling, mainly with offshore sediments, has been favoured by the presence of a large tidal range and a weak ebb tide. Other sources of sediment are sand eroded from Formby Point and, in the first half of the 20th century, material dredged from the Mersey and dumped offshore within the Ribble's tidal influence. The triggering factor accelerating sedimentation was embanking and reclamation, commencing in 1810, which progressively reduced the inter-tidal area, tidal capacity and tidal current velocities within the estuary.

Maintenance of the main channel into the Port of Preston also had major consequences for the development of the estuary. Training and dredging of the Navigation Channel led to the concentration of the ebb flow in this over-deepened channel and to a strengthened flood tide in other channels and in shoals, leading to increased sedimentation outside the trained area.

Sand extraction

Sand extraction is presently carried out at two sites in the Ribble Estuary: Salter's Bank and Horse Bank, both of which have been operational since the 1960s. At Salter's Bank, the licence for the extraction of sand at 160,000 cubic metres per year has resulted in the removal of about 2 million cubic metres of sand. At Horse Bank, sand has been extracted since 1966, over an area of 200 ha. Sand winning amounted to an estimated 4.5 million cubic metres in the period between 1966 and 1994 and continues at the time of writing. The sites themselves exhibit net accretion, coupled with a long-term onshore movement of sand at Horse Bank. The volumes of sand extracted are small compared to the volume changes observed in the estuary. Recent expert studies have concluded that sand winning has only had a minor and local impact on the long-term development of the estuary.

Further Information

The full coastal process monitoring report and all the reports in this series as well as other relevant information and a list of references can be found at:

www.sefton.gov.uk

www.seftoncoast.org.uk

These reports will be updated every three years and any interim reporting will be made available online. If information over and above this is required contact Graham Lymbery on 0151 934 2960 or email graham.lymbery@technical.sefton.gov.uk

Report published December 2004
Technical Services Department

Paul Williams B.Sc., D.I.S., C.Eng., M.I.C.E. - Technical Services Director