

# Mersey Estuary Summary



support a range of bird and other species of international importance. Large parts of the Inner Estuary have been designated as Sites of Special Scientific Interest (SSSIs), as a RAMSAR site, and as Special Protection Areas (SPAs), and there are numerous Local Nature Reserves (LNRs).

The estuary is a major trade route leading to important industrial complexes around Ellesmere Port, Runcorn, Widnes and the outskirts of Manchester (via the Manchester Ship Canal). Liverpool and Birkenhead were formerly important docks and centres of ship building activity. There are large oil refineries at Tranmere and Ellesmere Port in the inner estuary and Royal Seaforth Dock is a major international container terminal.

After decades of industrial effluent and sewage disposal that caused severe pollution, recent initiatives have led to considerable improvements in water quality.

## Introduction

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

## Physical setting and characteristics of the Mersey Estuary

The configuration of the Mersey Estuary is unusual, when compared to the typical open funnel shape of many other estuaries such as the Ribble. The estuary consists of four distinct zones: the Upper Estuary, which extends eastwards from Runcorn to the limit of

tidal influence at Warrington; a bottle-shaped Inner Estuary, which has a maximum width of 5km; the Narrows, where the estuary narrows to a minimum of 1km near Liverpool; and a wide Outer Estuary, which forms part of Liverpool Bay.

The present day estuary occupies a total area of about 11,600 ha, of which 9,700ha is inter-tidal, with a total channel length of about 55km.

The Mersey estuary contains and is fringed by a range of important habitats, including coastal dune systems, inter-tidal sand and mudflats, rocky shores and saltmarsh, which

## Tidal Characteristics

The estuary has a maximum tidal range of 10.2m this is the difference between the highest and lowest tides. The strong tidal currents in the Narrows are slowed upstream as the estuary widens, leading to deposition of sand and mud which form extensive banks at low tide.

## Wave Energy

Due to the constriction of the Narrows, wave energy in the inner estuary is relatively low. Although there has been need on the Wirral frontage to carry out works to reduce this wave energy further.

## Sediment Supply

Prior to the late 19<sup>th</sup> century, the estuary existed in a state of dynamic equilibrium. Sediment exchange occurred between the outer and inner part of the Estuary and there may have been a slow net accretion within the Inner Estuary. Most of the accretion during this period occurred in the outer estuary, with the Formby and Wirral coastlines acting as major sinks (areas of deposition) for sandy sediments.

In recent times the supply of river-borne sediment to the Mersey estuary has been small compared to the supply from offshore sources. Although it was never large, the river-borne supply of sediment to the estuary largely ceased with the construction of the Manchester Ship Channel in 1894.

## Land reclamation

Unlike the nearby estuaries of the Dee and Ribble, the Mersey has undergone relatively little land reclamation. Some areas have experienced human interference due to the expansion of the Port of Liverpool, especially in the Narrows, and around 44 ha were reclaimed for the construction of the docks and container terminal at Seaforth.

## Changes in sea level

During the period 1860 to 1980, relative mean sea level rose by an average of about 1mm/yr at Liverpool, reflecting the combined effects of changes in mean sea level, tidal range, and vertical land movements.

## Channel training and dredging

Due to the importance and development of the Port of Liverpool, and long-standing problems associated with shallow water and sandbanks, the approaches to the River Mersey have been dredged since 1833. By 1894 annual dredging rates reached 5 million tons, and although the depth of the channel could be maintained at -13.4 m OD, the alignment of the channels could not be stabilised.

In 1909, a training wall of 3.6 km in length was constructed from limestone blocks on the outside of the Crosby Channel bend. The intention was to prevent the continued northward movement of the channel, and also to prevent a channel from breaking through Taylor's Bank. Between 1910 and 1957, the training walls were extended westwards, and new training walls were built to either side of Crosby Channel. The walls succeeded in reducing the need for dredging, which reduced from a peak of some 25 million tons in 1924, to between 5 and 9 million tons after the Second World War.

The volume of maintenance dredging has declined in recent years to around 1.5 to 3 million tonnes of sediment per year. The spoil from the various dredging operations in the Mersey Estuary has been deposited at various sites in Liverpool Bay.

The channel can be identified from land by the red marker buoys.

## Effects of Dredging and Training

The construction of the training walls, combined with intense dredging and spoil disposal practices, has produced a redistribution of sediment within the Mersey Estuary which appears to be the most important factor in the physical development of the estuary in the last 100 years. Firstly, dredging failed to stop, and may actually have enhanced, sand encroachment in the navigation channels. This prompted the building and extension of the training walls. In turn, construction of the training walls concentrated the ebb flow (tide going out) in the main navigation channel. Consequently, the Rock Channel and Formby Channel filled in at an accelerated rate. This infilling was further assisted by dredge spoil drifting into the channels from dump sites on Taylor's Bank and Great Burbo Bank.

In addition to affecting sediment volumes, dredging and deposition of dredge spoil also had the effect of altering water depth, which affects wave activity. The increased water depths at the Mersey Bar (west of Jordan's Spit) and Crosby Channel, due to dredging, combined with decreased water depths at Jordan's Spit due to spoil dumping, and the infilling of Formby Channel, contributed to substantial changes in wave patterns which were probably the main factor responsible for the onset of beach and dune erosion after 1900. While some of the sand eroded from Formby Point has found its way southwards into the Mersey Estuary, a high proportion has moved northwards and added to accretion in the Ribble 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](http://www.sefton.gov.uk)

[www.seftoncoast.org.uk](http://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](mailto:graham.lymbery@technical.sefton.gov.uk)

Report published December 2004  
Technical Services Department

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