MARITIME SCHELDT

Map IV.5 shows the section of the Scheldt subject to the effect of tides. Besides ground relief, we describe the navigation routes and give an outline of the principal tidal characteristics. The map has been based on the most recent Belgian and Dutch soundings.

Different names are given to the river reaches as follows: "Western Scheldt" to that part of the Scheldt in Dutch territory, "Maritime Scheldt" to that part of the Scheldt in Belgian territory affected by tides.

NAVIGATION

The Western and the Maritime Scheldt form the sea access route to the ports of Antwerp and Brussels, the Western Scheldt to the port of Ghent. The port of Antwerp is linked to the Maritime Scheldt by means of several large locks: the lock at Zandvliet, the Baudouin lock, the lock at Kruisschans and the Royers lock are on the right bank, and the lock at Kallo is on the left bank. The lock at Berendrecht, situated beside that at Zandvliet, is under construction and also could be in use before 1990. The port of Ghent is linked to the Western Scheldt by the Ghent-Terneuzen canal and the complex of locks at Terneuzen. As to the port of Brussels it is linked with the Maritime Scheldt by the Rupel, the lock at Wintham and the sea canal from Brussels to the Rupel. A new lock is under construction at Hingene: it will ensure a direct link between the sea canal and the Maritime Scheldt.

As will be seen from the map the navigation channel has a sinuous course between the right and left banks of the Western Scheldt. Here and there these sinuosities oppose and rejoin each other and result in shoals, or "sills". Besides the main navigation channel there are several secondary channels accessible to small vessels. The depth of the Western Scheldt is actually some 12 metres on the shoals between Flushing (Vlissingen) and the lock at Zandvliet, from 9 to 10 metres between that lock and Antwerp and from 3 to 5 metres between Antwerp and the lock at Wintham on the Rupel. The depths of the canals from Ghent to Terneuzen and from Brussels to the Rupel are 13,5 and 6,5 metres respectively. The depths in the Scheldt and the Rupel are expressed in decimetres by reference to the datum level of the map: lowest mean sea level of spring tides, and this signifies that at high tide there is a supplementary depth available of about 5 metres. The depths in the canals are shown by reference to the water surface level, which is only subject to very slow oscillations.

PHYSICAL CHARACTERISTICS

Just as the tides in the North Sea are derived from those of the Atlantic, the tide in the Scheldt is controlled by the extent of penetration of the tidal stream in that river. During a tidal cycle about 1 milliard cubic metres of water flow, at the time of flood, from the sea into the river and then, several hours later at ebb tide, drain freshly back to the sea. The flood tidal current has a tendency to flow in a straight line under the influence of waves; it thus gives birth to flood channels with deep entrances and silted extremities. Ebb tides by contrast, obeying the rules of flow under the influence of gravity (Fargue's Law), have a tendency to form meanders: from whence comes the sinuous appearance of the principal navigation channels.

The horizontal tide is characterised in the river by an alternating water movement: drainage upstream at the time of flood, in the opposite direction at the time of ebb. This is contrary to that seen in the open sea where the currents form a "tidal rose".

As it thus appears from the map, the tide suffers different modifications in the river. In the first place, the volume of the tide diminishes as a function of distance from the mouth. Therefore, starting from the mouth at Flushing, high water levels rise to a maximum in the neighbourhood of the mouth of the Durme before steadily diminishing further upstream. Low water levels reveal an opposite aspect with a minimum more or less constant between Bath and the mouth of the Rupel and a higher level in the upper reaches caused above all by the decrease in depth. The tidal range, that is to say the difference between high and low water levels, increases from about 4 metres at the mouth of the Scheldt to more than 5 metres at the mouth of the Rupel; it then decreases quite rapidly to about 2 metres in the region of Ghent, where the tide is stopped by a certain number of weirs. The duration of flood tide also varies and regresses from $\pm$ 5 hours 55 minutes at Flushing to 3 hours 30 minutes at Ghent. The duration of the ebb tide similarly changes, given that the total time length of the tidal movement remains constant.

Besides in the upper reaches of the Maritime Scheldt, the tide is influenced by the contribution of the upper Scheldt and its tributaries. Above all during the winter months this contribution can cause an important inflation to low water levels. The mean annual flow of the Scheldt, calculated immediately downstream from the mouth of the Rupel, is around 100 m^3/s. Yet during the year, the flow may vary from a few m^3/s to hundreds of m^3/s. It is nevertheless certain that further dowstream from the mouth of the Rupel the supply of fresh water is insignifiant compared to the volume of tidal water.

A quite different aspect of the tidal river is the mixture of saline water from the sea and the surface run-off fresh water. The mean annual chloride content diminishes gradually from about 17 g Cl^- per litre at Flushing to less than 1 g Cl^- per litre at the height of the mouth of the Rupel and to 6,5 g Cl^- per litre in passing by the Dutch-Belgian frontier. Locally there are big variations in the level of chloride present, partly a function of tide - at a maximum at the crest of high tide and minimum at the turn of low tide - and partly a function of surface water run-off.

Finally it is right to mention storm tidal surges: depressions coming from the Atlantic Ocean and across the North Sea can produce fierce storms accompanied by strong winds from the north-west. The winds force back the water in the southern part of the North Sea, which can result in sea levels much higher than normal. It goes without saying that there are very grave consequences when this happens at times of spring high tides more than at tides of slack water. In extreme cases such storms give rise to extensive flooding.