7. PRIORITY PROJECT FOR CHANNEL IMPROVEMENT

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7.1 General

In this chapter, feasibility of the priority program for channel and dredging improvements recommended in the master plan study is examined in the viewpoints of technical, institutional, environmental and economic/financial considerations.

7.2 Priority Reaches for Structural Measure

At the apex of the Orinoco delta, discharge of the Orinoco river starts to spread as a consequent of flat elevation of the delta (Fig. 7-2-1). The sediment transported from the upstream deposits due to low flow velocity and sand bars/islands are developed which form several irregular and distributed channels illustrating complicated river configurations. In the Guaruapo section, river branches off mainly to Rio Grande, Tortola and Piacoa channels and again at Barrancas, Rio Grande further subdivides to form Macareo channel that flows northward to the Boca Macareo. Further downstream, Rio Grande and Piacoa channels meet at the Portuguesa section and flows eastward to the Boca Grande. However, flow characteristics remain almost unchanged over the last few decades as evident from the unchanged dredging areas, except for some minor channel configuration changes, especially in Chivera island and island in front of Barrancas town.

As a result of shallow channel depth in some of the reaches, river navigation especially for Panamax size carriers encounter difficulties as mentioned in the master plan. Moreover, in the Barrancas section, exposed rocks on the navigation channel bed results in the navigable depth of 10.2m only. The annual maintenance dredging volume is huge. In the Guaruapo – Barrancas – Ya-Ya reach alone it amounts to 3.8 million m^3 in average.

In the master plan study, results of 1 dimensional numerical study explain the prominent depth-width inverse relationship of the channels in the delta owing to the mild slope, uniform fine sand in the channel bed and simple annual discharge pattern etc. The structural improvement measures to increase the navigable depth should be envisaged considering this peculiar phenomenon of the river flow regime. Moreover, as Orinoco river is one of the largest rivers in terms of scale and discharge, large scale improvement measures along the longitudinal direction of the channel would not be economically feasible. Hence, appropriate improvement measures should be considered as point measures targeting specific places. Therefore, alternative B2, to regulate the flow in Tortola channel by a dike, is selected as a possible structural measure to deepen the Barrancas section. However, in other sections, structural measures are not proposed due to high construction and maintenance cost. Accordingly it is required to continue with the maintenance dredging efficiently with effective methods to optimize the quantity of dredging works.

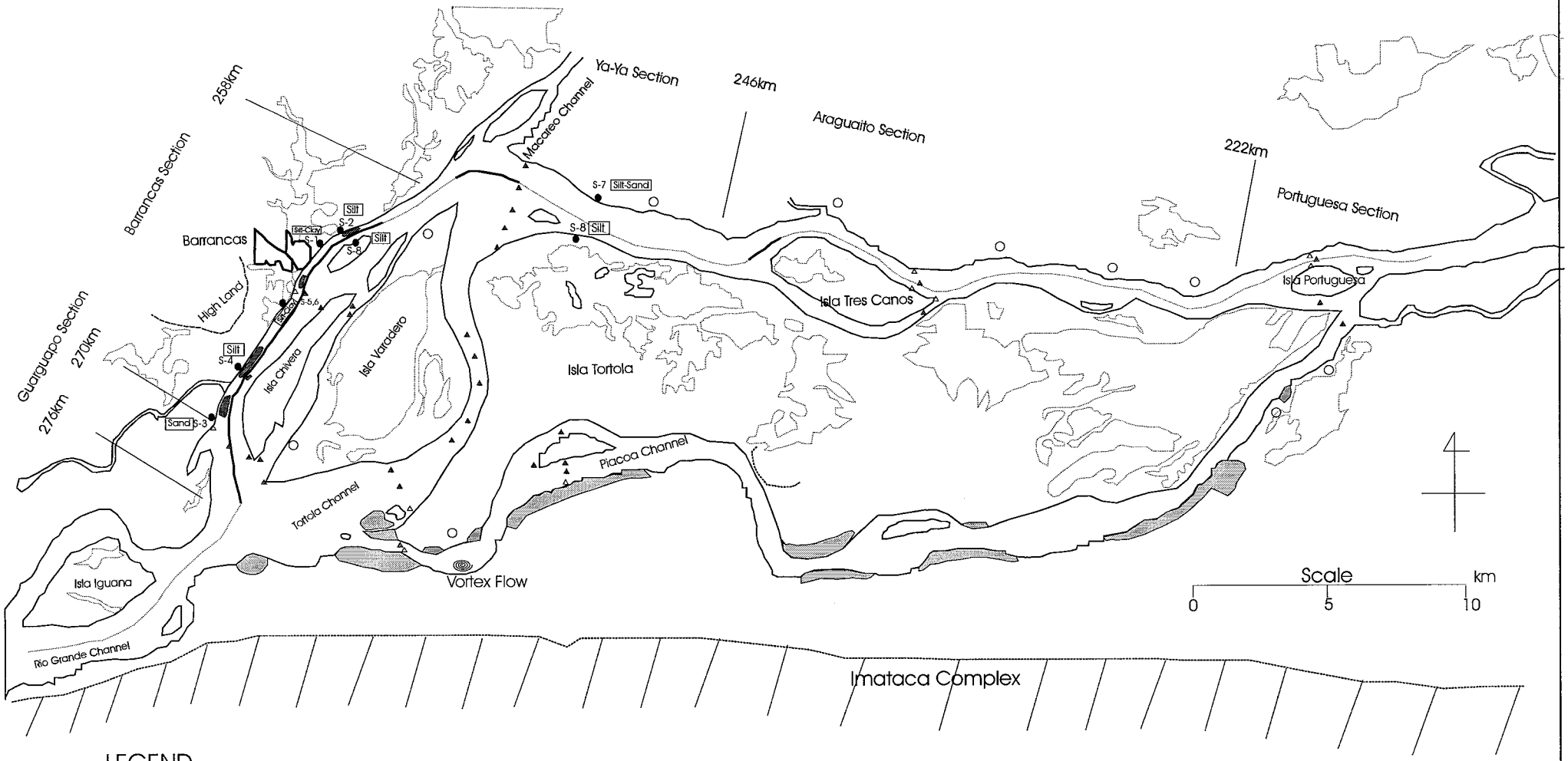

Fig.7-2-1 **CHANNEL CHARACTERISTICS IN THE APEX OF THE ORINOCO DELTA**

THE STUDY ON INTEGRATED RIVER IMPROVEMENT OF THE ORINOCO RIVER IN THE REPUBLIC OF VENEZUELA