

APPENDIX 7C

**Comparison of
Sediment/Erosion Rates
in Deep Bay**

7C. COMPARISON OF SEDIMENTATION/EROSION RATES IN DEEP BAY

This appendix provides a comparison of the predicted sedimentation/erosion rates between the Shenzhen Western Corridor (SWC) Investigation and Planning EIA study and the Shenzhen River Regulation Project (SRRP) EIA study.

The Shenzhen River Regulation Project involved three stages of works to realign, widen and deepen the Shenzhen River. The first two stages of the Project were included in the Shenzhen River Regulation EIA report. The effect on the sediment deposition and erosion rates relative to the existing conditions as a result of the implementation of the Shenzhen River Regulation project was one of the key issues in the EIA study. A sediment transport model covering the key sensitive areas of Mai Po, Futian and the inter-tidal mudflats was used to predict the changes in deposition and erosion rates. The model predicted deposition/erosion rates before, during and after the Project in the sensitive areas. For the assessment of impact during the construction period of the Project, in addition to the sediment yield in the Shenzhen River basins sediment loads introduced by storm events were also included. The storm events might play an important role in increasing the sediment loads in Shenzhen River.

The SWC project is different from the Shenzhen River Regulation Project that it is aimed to assess the effect on sedimentation (or deposition) and erosion rates in Deep Bay due to the reduction in flushing capacity with the presence of bridge piers. The baseline case for the SWC study is compared with the situations before and after the Shenzhen River Regulation project. The predicted results from both the studies should be in a similar order of magnitude especially for the comparison between the predictions from the SWC EIA study and the situation after the Shenzhen River Regulation project.

The water quality model used in the SWC EIA study predicted the average sedimentation rates in unit of $\text{g/m}^2/\text{d}$. The predicted results for the baseline case (Scenario 1) at selected indicator points are shown in **Table 7C.1**. With reference to the report “*Hydraulic and Water Quality Studies in Victoria Harbour. Mathematical Model Report Part II – Sediment Model Validation*” by Binnie & Partners (Hong Kong) (1989), the dry density of deposited sediment at 0.1m below the seabed was about 189kg/m^3 . The unit of sedimentation rate in $\text{g/m}^2/\text{d}$ can then be converted to mm/year by adopting the dry density of 189kg/m^3 . The predicted sedimentation rates in mm/year are also presented in **Table 7C.1**.

Table 7C.2 compares the predicted results from the SWC EIA study and those from the Shenzhen River Regulation Project EIA (before and after the project) at selected indicator points. It is worth noting that the model setup, bathymetry, coastline conditions and discharge conditions for the models adopted in the two projects were not exactly the same. However, the comparison could give an indication of whether the model predictions from the SWC EIA study were in reasonable ranges. As can be seen in **Table 7C.2**, the predicted results from the SWC EIA study at Futian and Ramsar Site North are well compared with those from the SRRP (before the project) and are slightly higher than the conditions after Stage 2 of the SRRP (after 1999). At Ramsar Site South, the prediction from the SWC EIA study matches well with the condition after Stage 2 of the SRRP. Since the locations of the selected indicator points may not exactly the same between the two models, differences in model predictions are expected. In general, the two model predictions at the indicator points near the outlets of Shenzhen River are comparable to each other. All the predicted results for the two models are in similar order of magnitude. This can demonstrate that the sedimentation rates predicted from the SWC EIA study are in reasonable ranges.

The EM&A for *Stage II Phase II Works of Shenzhen River Regulation Project* reported that the annual sedimentation rates on mudflat near the outlet of Shenzhen River was 25.6 mm/yr (from 16 March to 16 June 1999) and on mudflat at Mai Po was 21.6 mm/yr (from 3 March 1997 to 14 July 1999). The predicted results at Ramsar Site North and Mai Po (16.2 – 28.2 mm/yr) from

the SWC EIA study shown in **Table 7C.2** were reasonably close to the actual measured field data in the same region.

One of the objectives of the SWC EIA study is to investigate the effects on sedimentation/erosion rates and the consequent effects on ecological system in Deep Bay after the completion of the SWC project. Impact assessment will therefore focus on the net increases or decreases in sedimentation rates between different scenarios. Since the predicted sedimentation rates from the SWC EIA study are in reasonable ranges, the net increases or decreases in sedimentation rates determined based on the predicted results would be reliable and can provide a basis to assess the impacts on mudflats and other water quality sensitive receivers in Deep Bay.

Table 7C.1 Predicted Sedimentation Rates at Selected Indicator Points (SWC I&P EIA Study)

Indicator Point		Baseline Conditions (Scenario 1)	
		g/m ² /d	mm/yr
G	Mangroves & Mudflat at Futian	8.61	16.6
L1	Ramsar Site (North)	14.61	28.2
L2	Ramsar Site (South)	6.72	13.0

Note:

1. **Figure 7.5** shows the locations of the selected indicator points.

Table 7C.2 Comparison of Sedimentation Rates

Indicator Point		SWC Baseline Conditions (Scenario 1) ^A (mm/yr)	Shenzhen River Regulation Project EIA ^B (Before the Project) (mm/yr)	Shenzhen River Regulation Project EIA ^C (After Stage 2) (mm/yr)
SWC	Shenzhen River Regulation Project			
G (Mangroves & Mudflat at Futian)	D4 (Futian)	16.6	16.4	12.0
L1 (Ramsar Site North)	D2 (Mai Po)	28.2	27.0	21.0
D (Mai Po)		16.2		
L2 (Ramsar Site South)	D3 (Central Mudflats)	13.0	17.0	13.0

Remarks:

- A. The results in mm/yr were calculated from the model predictions (in g/m²/d) for Scenario 1 (baseline case) presented in the SWC Draft EIA report using a dry density of 189kg/m³;
- B. Model predictions “Current with River” presented in Table 7.18 of the Shenzhen River Regulation Project EIA; and
- C. Model predictions “After Stage 2” presented in Table 7.18 of the Shenzhen River Regulation Project EIA.