

**HALCROW**

Consulting Engineers

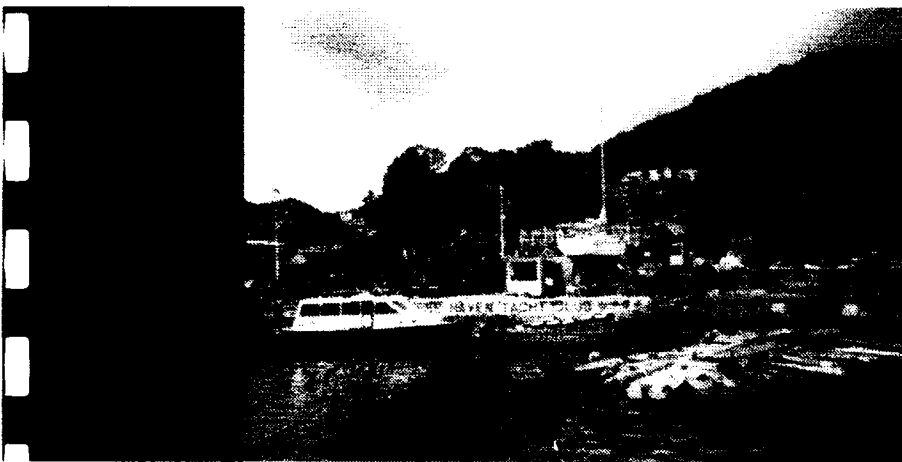
合樂 工程顧問集團

# Hebe Haven Yacht Club Development - Phase 2 Environmental Impact Assessment Study

---

Final Report

October 1999



**Hyder** 

Consulting



EIA-028.1/1999  
copy 2.1

125 Years of Pedigree as Freeman Fox & John Taylor

**HEBE HAVEN YACHT CLUB DEVELOPMENT - PHASE 2**  
**ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**OCTOBER 1999**

**TABLE OF CONTENTS**

**1. INTRODUCTION**

- 1.1 Background
- 1.2 Approach and Objectives
- 1.3 Study Area
- 1.4 Report Structure

**2. PROJECT DESCRIPTION**

- 2.1 Site Location and History
- 2.2 Current Conditions
- 2.3 Design of the Project
- 2.4 Phasing and Programme of the Project
- 2.5 Construction Requirement

**3. ASSESSMENT CRITERIA**

- 3.1 General Legislation

**4. EXISTING MARINE ENVIRONMENT**

- 4.1 Introduction
- 4.2 Sensitive Receivers (SRs)
- 4.3 Sediment quality
- 4.4 Tributyl Tin (TBT)
- 4.5 Marine Water Quality

**5. MARINE IMPACTS**

- 5.1 Introduction
- 5.2 Sediment Release Rates
- 5.3 Impact of Tributyl Tin
- 5.4 Hydrodynamic Model

- 5.5 Water quality Impacts during Construction
- 5.6 Impacts on TBT Concentrations
- 5.7 Dissolved Oxygen Concentrations
- 5.8 Nutrient Concentrations
- 5.9 Conclusions

## **6. ECOLOGICAL IMPACT**

- 6.1 Introduction
- 6.2 Relevant Legislation
- 6.3 Baseline Conditions
- 6.4 Impact Identification
- 6.5 Assessment Methodology
- 6.6 Evaluation
- 6.7 Operational Impacts
- 6.8 Conclusions

## **7. FISHERIES IMPACT**

- 7.1 Introduction
- 7.2 Legislation and Assessment Criteria
- 7.3 Baseline Conditions
- 7.4 Impact Assessment
- 7.5 Mitigation and Monitoring

## **8. OTHER ENVIRONMENTAL ISSUES**

- 8.1 Noise Impact Assessment
- 8.2 Air Quality Impacts
- 8.3 Construction Waste Management

## **9. LANDSCAPE AND VISUAL IMPACT ASSESSMENT**

- 9.1 Introduction
- 9.2 Methodology
- 9.3 Baseline Study
- 9.4 Landscape Impact Assessment
- 9.5 Visual Impact Assessment

## **10. CONCLUSIONS & RECOMMENDATIONS**

- 10.1 Introduction
- 10.2 Marine Water & Dredging Impact

- 10.3 Ecological Impact
- 10.4 Construction Noise Impact
- 10.5 Air Quality Impact
- 10.6 Construction Waste
- 10.7 Landscape & Visual Impact
- 10.8 Fisheries
- 10.9 Conclusion

## **11. ENVIRONMENTAL MONITORING & AUDIT**

- 11.1 Requirements
- 11.2 Purpose of the Environmental Monitoring and Audit Manual
- 11.3 Environmental Monitoring and Audit Requirements

## **LIST OF FIGURES**

- Figure 1.1 Location for marine boreholes and land boreholes at HH
- Figure 2.1 Proposed site location and layout
- Figure 2.2 Surroundings of subject site
- Figure 2.3 Layout of the Club's facilities
- Figure 2.4 Proposed reclamation
- Figure 2.5 Dredging Layout
- Figure 5.1 Hebe Haven, proposed dredging areas and potentially sensitive locations
- Figure 5.2 Upper and lower estimates for adsorbed TBT concentrations over 12 hour dredging cycle
- Figure 5.3 Average TBT desorbed concentration over 12 hour dredging cycle using representative TBT parameters
- Figure 5.4 Peak concentrations experienced over 12 hour dredging period
- Figure 5.5 Mean concentrations experienced over 12 hour dredging period
- Figure 5.6 Envelope of peak suspended sediment concentrations experienced over 3 month dredging period
- Figure 5.7 DO depletion over 12 hour dredging cycle
- Figure 5.8 Nutrient concentration over 12 hour dredging cycle
- Figure 6.1 Study Area - Ecological Baseline

## LIST OF TABLES

Table 2.1	Estimated Phase 2 development inventory for HHYC
Table 4.1	Classification of dredged sediments for marine disposal
Table 4.2	Analytical results of sediment samples
Table 4.3	Mean TBT concentration found in sediments in Hong Kong
Table 4.4	Levels of TBT and its degradation products in the sample area of Pak Sha Wan Shipyard
Table 4.5	Concentrations of TBT measured in marine sediments November 1998
Table 4.6	Depth-averaged DO concentrations for 1993-97
Table 4.7	Depth-average SS concentrations for 1993-97
Table 4.8	Depth-averaged total N concentrations for 1993-97
Table 4.9	Depth-averaged ortho-P concentrations for 1993-97
Table 4.10	Depth-average total P concentrations for 1993-97
Table 4.11	Water quality objectives for Port Shelter water control zone
Table 5.1	Estimated dredging rates of production
Table 5.2	Comparative sediment losses. per cubic meter dredged at grab dredging
Table 5.3	Estimated releases rates based on Table 5.1 and Table 5.2
Table 5.4	Sediment release rates for grab dredgers based on USA and Dutch observations
Table 5.5	Concentration of TBT which is toxic to marine organisms
Table 11.1	Environmental Mitigation Implementation Schedule (EMIS)

## LIST OF APPENDICES

- Appendix A EIA Brief of the project
- Appendix B Works Branch Technical Circular No. 22/92
- Appendix C EPD Technical Circular No (TC) NO 1-1-92.
- Appendix D Hebe Haven Yacht Club Development - Sediment Quality Report (September 1997)
- Appendix E Bathymetry Data for Hydrodynamic Model Setup
  - E1 - Result Output Points
  - E2 - Model Mesh - Whole Model Area
  - E3 - Model Mesh - Baseline
  - E4 - Model Mesh - Post Development
  - E5 - Model Bathymetry
  - E6 - Model Bathymetry - Post Development
  - E7 - Imposed Tidal Elevation Boundary Conditions
  - E8-E8.3 - Currents in Hebe Haven - Dry Season, Neap Tide Baseline
  - E9-E9.3 - Currents in Hebe Haven - Dry Season, Neap Tide Post Development
  - E10 - Depth-mean Tidal Currents Baseline - Dry Season, Neap Tide
  - E11 - Depth-mean Tidal Currents Post Development - Dry Season, Neap Tide
- Appendix F Water Quality Monitoring