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**圖例**  
LEGEND

- 建議之香港西排水隧道  
Proposed tunnel alignment
- ▨ 截流之區域  
Area to be intercepted
- 保護之區域  
Area to be protected

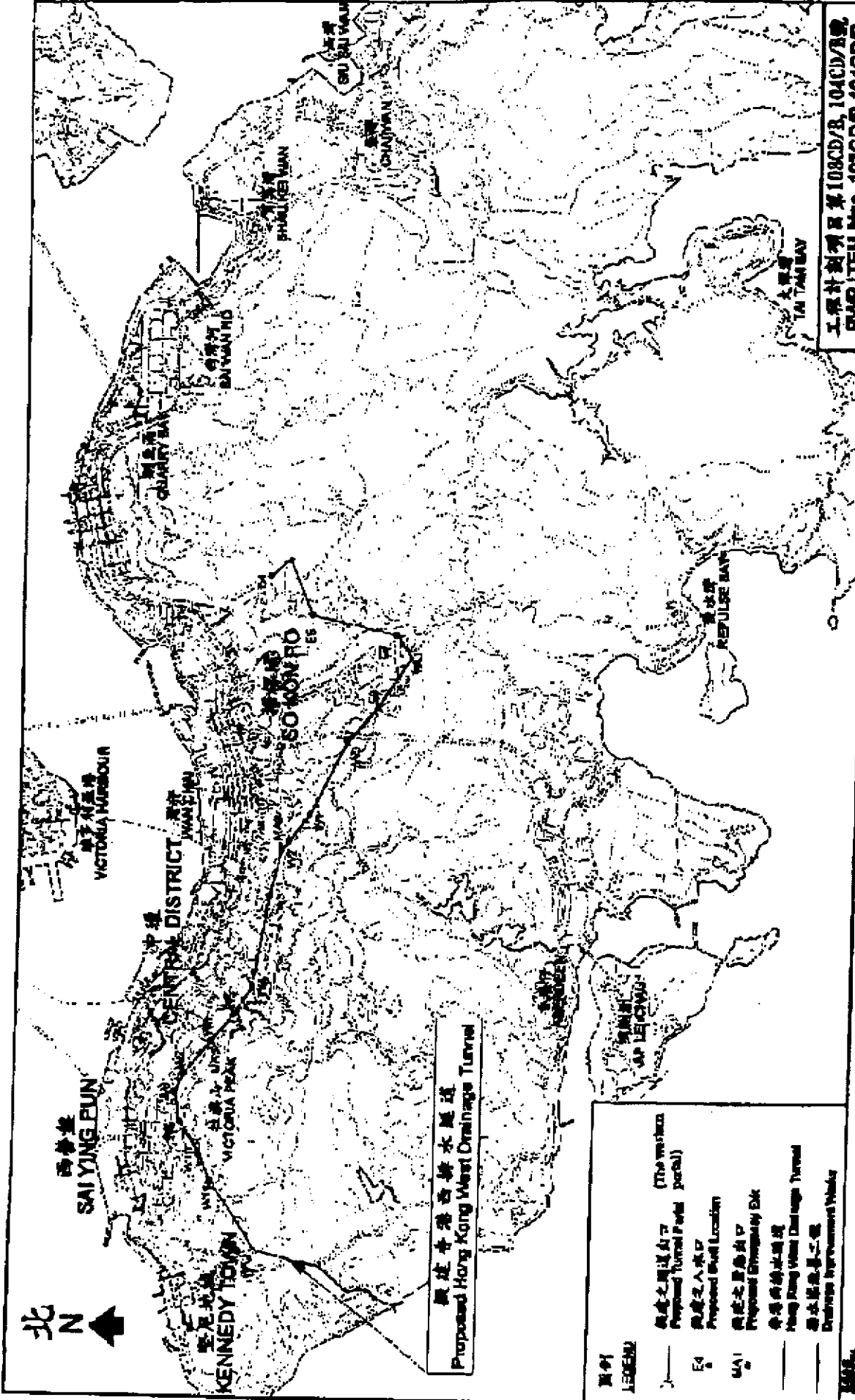
港島北港水新發展統改善工程-香港西排水隧道和下游集水區改善工程  
DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND -  
HONG KONG WEST DRAINAGE TUNNEL AND LOWER CATCHMENT IMPROVEMENT  
- AREA TO BE INTERCEPTED AND PROTECTED BY DRAINAGE TUNNEL

工總	T.C. CHAN	16-09-2001	16-09-2001	DPM 0006	1:40 000
工總	Y.F. KAN	16-03-2001	16-03-2001		
工總	PROJECT MANAGEMENT DIVISION				

工總計劃項目第 103CD/B, 104CD/B 號  
FWP ITEM Nos. 103CD/B, 104CD/B



香港特別行政區政府  
工務管理處  
PROJECT MANAGEMENT DIVISION



擬建香港西排水隧道  
Proposed Hong Kong West Drainage Tunnel

**圖例**  
**LEGEND**

- (Tunnel portals)  
E4  
—— (Proposed Tunnel Portal)
- (Proposed Shaft Location)  
UA1  
● (Proposed Shaft)
- (Proposed Drainage Basin)  
—— (Proposed Drainage Tunnel)  
—— (Drainage Improvement Works)

工程計劃編號 108CD/B, 104CD/B 號 PWP ITEM Nos. 103CD/B, 104CD/B		比例尺 DPM 0007 1 : 50 000
核准日期 19-03-2001	核准人 T.C. CHAN	核准日期 06-03-2001
核准日期 06-03-2001	核准人 Y.F. KAM	核准日期 06-03-2001
工程項目 PROJECT MANAGEMENT/MEQ		

港島北面排水系統改善工程-香港西排水隧道和下游集水區改善工程  
 DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND  
 - HONG KONG WEST DRAINAGE TUNNEL AND LOWER CATCHMENT IMPROVEMENT

## Annex A

### Modeling Requirements Environmental Impact Assessment Study for Drainage Improvement in Northern Hong Kong Island Hong Kong West Drainage Tunnel

#### Modelling software general

1. The modelling software shall be fully 3-dimensional capable of accurately simulating the stratified condition, salinity transport, and effect of wind and tide within the model area.
2. The modelling software shall consist of hydrodynamic, water quality and particle dispersion modules. The hydrodynamic and water quality modules shall have been proven with successful applications locally and overseas.
3. The hydrodynamic and water quality modules shall be strictly mass conserved at all levels.

#### Model details – Calibration & Validation

1. No field data collection is required for model calibration for this study. However, the models shall be properly calibrated and validated before its use in this study in the marine waters in the area including North Western, Victoria Harbour, Western Buffer, and Southern Water Control Zones, defined under the WPCO, with the field data collected by:
  - Hydraulic and Water Quality Studies in Victoria Harbour (1987)
  - Port and Airport Development Strategy - Enhancement of WAHMO Mathematical Models (1990)
  - Strategic Sewage Disposal Scheme Stage II - Oceanic Outfall, Oceanographic Surveys and Modelling (1992)
  - Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (1998)
  - EPD's routine monitoring data
  - Tidal data from HK Observatory, Macau and relevant Mainland Authorities.
2. Tidal data shall be calibrated and validated in both frequency and time domain manner.
3. For the purpose of calibration and validation, the model shall run for not less than 15 days of real sequence of tide (excluding model spin up) in both dry and wet seasons with due consideration of the time required to establish initial conditions.
4. In general the hydrodynamic models shall be calibrated to the following criteria:

<u>Criteria</u>	<u>Level of fitness with field data</u>
• tidal elevation (rms)	< 8 %

- maxi. phase error at HW and LW < 20 minutes
- maxi. current speed deviation < 30 %
- maximum phase error at peak speed < 20 minutes
- maximum direction error at peak speed < 15 degrees
- maximum salinity deviation < 2.5 ppt

### Model details - Simulation

1. The water quality modelling results shall be qualitatively explainable, and any identifiable trend and variations in water quality shall be reproduced by the model. The water quality model shall simulate and take account of the interaction of dissolved oxygen, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, temperature, suspended solids, air-water exchange, contaminant release of dredged and disposed material, and benthic processes. It shall also simulate salinity and *E. coli*. Salinity results simulated by hydrodynamic models and water quality models shall be demonstrated to be consistent.
2. The models shall at least cover the Hong Kong waters, the Pearl Estuary and the Lema Channel to incorporate all major influences on hydrodynamic and water quality. A fine grid model shall be used for detailed assessment of this study. It shall cover at least the Western Buffer, Victoria Harbour, Eastern Buffer and Southern Water Control Zones, defined under the WPCO.
3. In general, grid size at the area affected by the project shall be less than 400 m in open waters and less than 75 m around sensitive receivers. The grid schematisation shall be agreed with EPD. All models shall either be dynamically linked to a far field model or form part of a larger model by gradual grid refinement.

### Modelling assessment

1. Scenarios to be assessed shall cover all phases of development being considered, including the baseline condition. Corresponding pollution load, bathymetry and coastline shall be adopted in the model set up. For areas not directly affected by the Project, the pollution load could be obtained from the study "Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (1998)", where appropriate.
2. The hydrodynamic and water quality models shall be able to reproduce (with proper model spin up) at least a real sequence of 15 days spring-neap tidal cycle in both dry season and wet season.
3. The water quality model shall run for a complete year incorporating monthly variations in Pearl River discharges, solar radiation, water temperature and wind velocity in the operation phase. A year with the most severe storm events shall be selected based on past records by the Hong Kong Observatory of rainfall in the Hong Kong Island to produce the discharge from the drainage tunnel. The discharge from the drainage tunnel shall be included in the hydrodynamic model, as appropriate. Construction phase impacts may be assessed by simulating typical spring-neap cycles in the dry and wet seasons.

4. The results shall be assessed for compliance of Water Quality Objectives. Daily sedimentation rate shall be computed and its ecological impact shall be assessed where appropriate.
5. The impact on all sensitive receivers including the application of bacterial dispersion module shall be assessed.
6. All modeling input data and results shall be submitted in digital media to EPD.

- End -

## **Annex B**

### **Requirements of Built Heritage Impact Assessment**

#### **(I) Baseline Study**

##### **1.1 A baseline study shall be conducted :**

a. to compile a comprehensive inventory of historic buildings and structures within the proposed project area, which include:

- (i) all pre-1950 buildings and structures;
- (ii) selected post-1950 buildings and structures of high architectural and historical significance and interest; and
- (iii) landscape features include sites of historical events or providing a significant historical record or a setting for buildings or monuments of architectural or archaeological importance, historic field patterns, tracks and fish ponds and cultural element such as *fung shui* woodlands and clan grave.

b. to identify the direct and indirect impacts on the site of built heritage at the planning stage in order to avoid causing any negative effects. The impacts include the direct loss, destruction or disturbance of an element of cultural heritage, impact in its settings causing impinge on its character through inappropriate sitting or design, potential damage to the physical fabric of archaeological remains, historic buildings or historic landscapes through air pollution, change of water-table, vibration, recreation pressure and ecological damage by the development. The impacts listed are merely to illustrate the range of potential impacts and not intended to be exhaustive.

1.2 The baseline study shall also include a desk-top study and a field survey.

##### **1.3. Desk-top Research**

1.3.1 Desk-top searches should be conducted to analyse, collect and collate extant information. They include :

- a. Search of the list of declared monuments protected by the Antiquities and Monuments Ordinance (Chapter 53).
- b. Search of the list of deemed monuments through the Antiquities and

- b. Search of the list of deemed monuments through the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department.
- c. Search of sites of built heritage identified by the AMO.
- d. Search of publications on local historical, architectural, anthropological and other cultural studies, such as, Journals of the Royal Asiatic Society (Hong Kong Branch), Antiquities and Monuments Office Monograph Series and so forth.
- e. Search of other unpublished papers, records, archival and historical documents through public libraries, archives, and the tertiary institutions, such as the Hong Kong Collection and libraries of the Department of Architecture of the University of Hong Kong and the Chinese University of Hong Kong, Public Records Office, photographic library of the Information Services Department and so forth.
- f. Search of historical documents in the Public Records Office, the Land Registry, District Lands Office, District Office and the Hong Kong Museum of History and so forth.
- g. Search of cartographic and pictorial documents. Maps of the recent past searched in the Maps and Aerial Photo Library of the Lands Department.
- h. Discussion with local informants.

#### 1.4 Field Evaluation

1.4.1 The potential value of the development site with regard to the cultural heritage could be established easily where the site is well-documented. However, it does not mean that the site is devoid of interest if it lacks information. In these instances, a site visit combined with discussions with appropriate individuals or organizations should be conducted by those with expertise in the area of cultural heritage to clarify the position.

#### 1.4.2 Historic buildings and structures survey

- a. Field scan of all the historic buildings and structures within the project area.
- b. Photographic recording of each historic building or structure including the exterior (the elevations of all faces of the building premises, the roof, close up for the special architectural details) and the interior (special architectural details), if possible, as well as the surroundings of each historic building or structure.

- c. Interview with local elders and other informants on the local historical, architectural, anthropological and other cultural information related to the historic buildings and structures.
  - d. Architectural appraisal of the historic buildings and structures.
- 1.4.3 If the field evaluation identifies any additional sites of built heritage within the study area which are of potential historic or architectural importance and not recorded by AMO, the office should be reported as soon as possible. The historic and architectural value of the items will be further assessed by the AMO.

## 1.5 The Report of Baseline Study

1.5.1 The study report should have concrete evidence to show that the process of the above desk-top and field survey has been satisfactorily completed. This should take the form of a detailed inventory of the sites of built heritage supported by full description of their cultural significance. The description should contain detailed geographical, historical, architectural, anthropological, ethnographic and other cultural data supplemented with illustrations below and photographic and cartographic records.

### 1.5.2 Historic Buildings and Structures

- a. A map in 1:1000 scale showing the boundary of each historic building or structure.
- b. Photographic records of each historic building or structure.
- c. Detailed record of each historic building or structure including its construction year, previous and present uses, architectural characteristics, as well as legends, historic persons and events, and cultural activities associated with the structure.

1.5.3 A full bibliography and the source of information consulted should be provided to assist the evaluation of the quality of the evidence. It is expected that the study and result are up to an internationally accepted academic and professional standard.



## **(2) Impact Assessment**

2.1 Built heritage impact assessment must be undertaken to identify the impacts of the historic buildings and structures which will be affected by the proposed development subject to the result of desktop research and field evaluation. The prediction of impacts and an evaluation of their significance must be undertaken by an expert in cultural heritage. During the assessment, both the direct impacts such as loss or damage of important features as well as indirect impacts such as change of water table levels which may affect the preservation of the built heritage *in situ* should be stated. A detailed description and plans should be provided to elaborate to what extent the site of built heritage will be affected.

## **(3) Mitigation Measures**

- 3.1 It is always a good practice to recognize the site or monument early in the planning stage and site selection process, and to avoid it, i.e. preserve it *in situ*, or leaving a buffer zone around the site. Built heritage, sites and landscapes are to be in favour of preservation unless it can be shown that there is a need for a particular development which is of paramount importance and outweighs the significance of the heritage feature.
- 3.2 If avoidance of the cultural heritage is not possible, amelioration can be achieved by reduction of the potential impacts and the preservation of heritage features, such as physically relocating it. Measures like amendments of the siting, screening and revision of the detailed design of the development are required to lessen its degree of exposure if it causes visual intrusion to the cultural heritage and affecting its character.
- 3.3 All the assessments should be conducted by an expert in cultural heritage and further evaluated and endorsed by the Antiquities and Monuments Office and the Antiquities Advisory Board.
- 3.4 Besides refer to paragraph 4.3.1(d), items 2.10 to 2.14 of Annex 19 and other relevant parts of the Technical Memorandum. Proposals for mitigation measures should be accompanied with a master layout plan together with all detailed treatment, elevations, and landscape plan. A rescue programme, when required, may involve preservation of the historic building or structure together with the relics inside, and its historic environment through relocation, detailed cartographic and photographic survey.