<div align="right">

Appendix B-2
</div>

<div align="center">

Water Quality Modelling Requirements
</div>

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, particle dispersion and thermal modules.   The hydrodynamic and thermal modules shall have been proven with successful applications locally and overseas.

3.   The hydrodynamic and thermal 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 have been properly calibrated and validated before its use in this study in the area including the Western Buffer, Victoria Harbour, Junk Bay and Eastern Buffer Water Control Zones 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 & 1993)
- 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.

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:

Criteria	Level of fitness with field data
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 suspended solids model and thermal model shall be used where appropriate. Details of the models shall be as follows :

(a)   The suspended solids model for assessing impacts of sediment loss due to marine works shall incorporate the processes of settling, deposition and erosion. Contaminant release and DO depletion during dredging and dumping shall be simulated by the model.

(b)   The thermal model shall be based on the flow field produced by the hydrodynamic model. It shall incorporate the physical processes of thermal water discharge and abstraction flow, buoyancy effect of the thermal plume, and surface heat loss. Dispersion of biocide in the discharge shall also be simulated with an appropriate decay rate.

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 can be used for detailed assessment of this study. It shall cover at least the Western Buffer, Victoria Harbour, Junk Bay and Eastern Buffer Water Control Zones as 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. Corresponding pollution load generated from dredging works and/ or spent cooling water discharges as appropriate, bathymetry and coastline shall be adopted in the model set up.

2.   Hydrodynamic, suspended solids and thermal models where appropriate shall be run for (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 results shall be assessed for compliance of Water Quality Objectives. Any changes in hydrodynamic regime shall be assessed. Daily sedimentation rate shall be computed and its ecological impact shall be assessed.

4.   The impacts on all sensitive receivers shall be assessed.

5.   All modelling input data and results shall be submitted in digital media to EPD.