**Environmental Impact Assessment Ordinance (Cap. 499), Section 5(7)**
**Environmental Impact Assessment Study Brief No. ESB-192/2008**

**Project Title : Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom)**
**(hereinafter known as the "Project")**

**Name of Applicant : MTR Corporation Limited (MTRCL)**
**(hereinafter known as the "Applicant")**

## 1. BACKGROUND

1.1 An application (No. ESB-192/2008) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 18 June 2008 with a Project Profile (No. PP-357/2008) (the Project Profile).

1.2 There are two sections in the Shatin to Central Link (SCL), i.e. the Cross Harbour Section and the Tai Wai to Hung Hom Section. The Cross Harbour Section consists of two phases. The Phase I of the Cross Harbour Section is from Mong Kok East to the Hung Hom. The Phase II of the Cross Harbour Section is from Hung Hom to Admiralty.

1.3 This study brief covers only the Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom) (hereinafter known as the "Project"). The Phase II of the Cross Harbour Section from Hung Hom to Admiralty is covered by a separate study brief issued under the EIAO. The indicative alignment of the Project is shown in the Project Profile and is reproduced in Figure 1 in this study brief. An enlarged figure of the Project alignment is reproduced in Figure 2 of this study brief. The development and operation of the Project will comprise the following:

(i) Realignment and modification of the railway section from Mong Kok to Hung Hom as shown in Figure 1 and Figure 2 of this study brief;

(ii) Associated station-related works at Hung Hom with new underground platforms

The Project consists of designated project element including Item A. 2, Part I under

Schedule 2 of the EIAO.

1.4 Pursuant to section 5(7)(a) of the Environmental Impact Assessment Ordinance, the Director of Environmental Protection (the Director) issues this Environmental Impact Assessment (EIA) study brief to the Applicant to carry out an EIA study.

1.5 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently. This information will contribute to decisions by the Director on:

(i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;

(ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and

(iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

## 2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

(i) to describe the Project, associated works, and any option(s) of alignment together with the requirements and environmental benefits for carrying out the Project;

(ii) to identify any individual designated project element(s) under Schedule 2 of the EIAO to be covered in the Project; to ascertain whether the findings of this EIA study have adequately addressed the environmental impacts of these projects;

(iii) to identify and describe the elements of the community and environment likely to be affected by the Project and / or likely to cause adverse impacts to the Project, including both the natural and man made environment and the associated environmental constraints;

(iv) to present the considerations of alternative(s) with regard to avoiding and minimizing the potential environmental impacts on the sensitive receivers; to compare the environmental benefits and dis-benefits of the option(s) (including Project alignment, location(s) and size(s) of station / platform(s), train system, locations and size of works areas / works sites and construction method(s)); to provide reasons for selecting the preferred option(s) and to describe the part that environmental factors played in the selection;

(v) to identify and assess noise impacts, air quality impacts, water quality impacts, waste management implications, potential land contamination issue, landscape and visual impacts, and determine the significance of impacts on sensitive receivers and potential affected uses;

(vi) to propose provision of mitigation measures so as to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;

(vii) to investigate the feasibility, practicability, effectiveness and implications of the proposed avoidance or mitigation measures;

(viii) to identify, predict and evaluate the environmental impacts expected to arise from railway realignment and modification works to the existing railway section from Mong Kok to Hung Hom during the construction and operational phases in relation to the sensitive receivers and potential affected uses; and to consider, if applicable, any potential / consequential operational environmental performance implication on the existing railway in relation to the reduction of 12-car to 9-car train configuration and other associated change(s);

(ix) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise during the construction and operational phases in relation to the sensitive receivers and potential affected uses;

(x) to identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operational stages of the Project which are necessary to avoid or mitigate these environmental impacts and cumulative effects and reduce them to acceptable levels;

(xi) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and

(xii) to design and specify the environmental monitoring and audit requirements to ensure the effective implementation of the recommended environmental protection and pollution control measures.

## 3. DETAILED REQUIREMENTS OF THE EIA STUDY

### 3.1 The Purpose

3.1.1 The purpose of this study brief is to scope the key issues of the EIA study and to specify the environmental issues that are required to be reviewed and assessed in the EIA report. The Applicant has to demonstrate in the EIA report that the criteria in the relevant sections of the Technical Memorandum on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance (hereinafter referred to as "the TM") are fully complied with.

### 3.2 The Scope

3.2.1 The scope of this EIA study shall cover the Project proposed in the Project Profile and shall include the major elements mentioned in Section 1.3 above. The Applicant shall clearly present the scope of the Project, including at least the scope of the realignment and modification works to the railway and the scope of the associated station-related works under the Project.

3.2.2. The EIA study shall address the key issues and provide information as described below, together with any other key issues identified during the course of the EIA study and the cumulative environmental impacts of the Project through interaction or in combination with any Essential Public Infrastructure Works supporting the Project and other existing development in the vicinity of the Project, including at least the existing Hung Hom Station, the existing East Rail and the East Rail Extension – Hung Hom to Tsim Sha Tsui, and committed, planned and known potential development in the vicinity of the Project, including at least the Central Kowloon Route, the Widening of Gascoigne Road Flyover, the Shatin to Central Link (Tai Wai to Hung Hom Section), the Shatin to Central Link (Cross Harbour

Section Phase II – Hung Hom to Admiralty) that interface with the Project at the Hung Hom Station, and the Kwun Tong Line Extension that will interface with the SCL at the Ho Man Tin Station :

(i) the potential noise impacts including ground-borne noise, if applicable, on the existing and planned sensitive receivers, including at least residential buildings and educational institutions along Wylie Road, Princess Margaret Road and Hong Chong Road during the construction and operation of the Project;

(ii) the potential cumulative operation noise impact of the Project through interaction with the existing East Rail and East Rail Extension – Hung Hom to Tsim Sha Tsui, and the potential railway development of the Shatin to Central Link (Tai Wai to Hung Hom Section), the Shatin to Central Link (Cross Harbour Section Phase II – Hung Hom to Admiralty) that interface with the Project at Hung Hom Station, and the Kwun Tong Line Extension that will interface with the SCL at the Ho Man Tin Station;

(iii) the potential air quality impacts on sensitive receivers, including at least residential buildings and educational institutions along Wylie Road, Princess Margaret Road and Hong Chong Road during the construction stage and operation stage of the Project, taking into account the cumulative impact from the construction and operation of existing and planned / committed project in the vicinity of the Project; and

(iv) the potential water quality impacts arising from the construction and operation of the Project, including the impact to the underground water table due to the construction and operation of the Project, discharge during the construction stage, effluent treatment and discharge at facilities and discharge from air conditioning system during the operation stage;

(v) the potential impacts of various types of waste arising, including at least excavated materials from constructing the underground section of the Project between Mong Kok and Hung Hom, excavated materials from constructing the station / underground platforms of the Project and any other construction waste to be generated from the construction and operation of the Project;

(vi) the potential land contamination issue, taking into account relevant land use history and / or present land use / operation of the existing railway;

(vii) the potential landscape and visual impacts on existing and planned sensitive receivers within the assessment area during the construction and operation of the Project

## 3.3 Consideration of Alternative Alignment Option(s) and Construction Method(s)

3.3.1 The Background Information of the Project

The Applicant shall provide information on the background for the construction and operation of this Project and provide plan(s) of a scale of at least 1:5000 to clearly present the scope of the Project, the Project boundary and associated works areas / works sites locations. The Applicant shall explain clearly the purpose and objectives of the Project, and shall include a description of the potential environmental benefits of the Project.

3.3.2 Consideration of Alternative Alignment(s), Station / Platform(s) and Train System

In addition to the proposed alignment and station / platform(s) option mentioned in the Project Profile and Section 1.3 above, the Applicant shall describe the considerations given, when exploring various feasible alternative option(s) for alignment, station / platform(s) and train system (including number of cars in a train), to avoid and minimize adverse environmental impacts, taking into account previous studies and any lessons learned from other similar projects. A comparison of the environmental benefits and dis-benefits of feasible alternative option(s) shall be presented to support the selection of the preferred option.

Operational consideration(s) or other constraint(s) affecting the selection of the preferred option shall also be stated. The consideration(s) given in the design and location of the station and tunnel ventilation exhausts and smoke extraction facilities and / or other station-related structure(s) of the Project shall also be provided to justify the selection of the preferred option.

3.3.3 Consideration of Alternative Construction Method(s), Sequences of Works, Works Areas / Works Sites Requirements and Locations

Taking into consideration the potential cumulative effects during the construction period and the degree of the construction impacts on affected sensitive receivers, the EIA study shall describe the considerations given, when exploring various

feasible alternative construction method(s) including at least tunnel boring machine, cut and cover, mined tunneling and sequence of work(s), works areas / works sites size requirements and works areas / works sites locations for the Project, to avoid exposing sensitive receivers to adverse environmental impacts.

A comparison of the environmental benefits and dis-benefits of applying different construction method(s), sequences of works, works areas / works sites locations and size shall be made.

3.3.4 Selection of Preferred Option

Taking into consideration of the findings resulting from Sections 3.3.2 and 3.3.3 above, the Applicant shall provide the recommendation(s) and justification(s) for the preferred option that will avoid or minimize adverse environmental effect(s) arising from the construction and operation of the Project, and shall adequately describe the part that environmental factor(s) played in arriving at the final selection.

3.3.5 Description of the Project

The Applicant shall describe the Project in details, including at least the Project alignment and train system to be adopted (including number of cars in a train), the station / platforms location(s), the construction programme, the works areas / works sites size requirements and their locations, the form of construction and construction method(s) for various structure(s) of the Project, and the operation of the Project in conjunction with the existing East Rail, the existing East Rail Extension – Hung Hom to Tsim Sha Tsui, and the potential railway development of Shatin to Central Link (Tai Wai to Hung Hom Section), the Shatin to Central Link (Cross Harbour Section Phase II – Hung Hom to Admiralty) that interface with the Project at Hung Hom Station, and the Kwun Tong Line Extension that will interface with the SCL at the Ho Man Tin Station.

## 3.4 Technical Requirements

The Applicant shall conduct the EIA study to address the environmental aspects as described in Section 3.2 above. The assessment shall be based on the best and latest information available during the course of the EIA study.

### 3.4.1 **Noise Impact**

3.4.1.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing both the construction and operation noise impacts arising from the Project as stated in Annexes 5 and 13 of the TM respectively. In response to Section 4.4.2(h) of the TM, the Applicant shall review and consider any lessons learnt from other similar projects for incorporation in the current proposal to avoid in the first instance or minimize potential noise impacts.

3.4.1.2 The Applicant shall address the potential noise impacts, including at least (1) the potential air-borne and ground-borne construction noise impacts; (2) the potential operational rail noise impacts; and (3) the potential fixed noise impacts during the operation stage, such as tunnel ventilation exhausts and smoke extraction facilities and fixed plant at station.

3.4.1.3 The noise impact assessment shall include the following:

(i) Determination of Assessment Area

The assessment area shall include all areas within a distance of 300m from the Project alignment and of all works sites, including works areas away from the Project alignment, proposed under the Project. The assessment area may be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the outer project limit, provides acoustic shielding to those receivers located further away. In this case, the assessment area shall be agreed with the Director. Subject to the agreement of the Director, the assessment area shall be expanded to include NSRs at greater distance which would be affected by the construction and operation of the project.

(ii) Provision of Background Information and Existing Noise Levels

The Applicant shall provide background information relevant to the Project, e.g. relevant previous or current studies. Unless required for determining the planning standards, such as those for planning of fixed noise sources, no existing noise levels are particularly required.

(iii) Identification of Noise Sensitive Receivers

(a) The Applicant shall refer to Annex 13 of the TM when identifying the NSRs. The NSRs shall include all existing NSRs and all planned / committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Outline Development Plans and Layout Plans, and other relevant published land use plans.

(b) The Applicant shall select assessment points to represent all identified NSRs for carrying out quantitative noise assessment as described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment and may be varied subject to the best and latest information available during the course of the EIA study. A map shall be given showing the location and description such as name of building, use, and floors of each and every selected assessment points. For planned noise sensitive land uses without committed site layouts, the Applicant should use the relevant planning parameters to work out representative site layouts for operational noise assessment purpose.

(iv) Provision of an Emission Inventory of the Noise Sources

The Applicant shall provide inventory of noise sources including representative construction equipment assumed for assessing construction noise associated with, for example tunnelling and other construction works, and plant / equipment / railway / rolling stock for operation noise assessment. The inventory shall assume appropriate railway traffic data for the purpose of assessment.

(v) Construction Noise Assessment

(a) The assessment shall cover the cumulative noise impacts due to the construction works of the Project and other likely concurrent projects identified during the course of the EIA study.

(b) The Applicant shall carry out assessment of noise impact from construction (excluding percussive piling) of the Project during day time, i.e. 7 a.m. to 7 p.m., on weekdays other than general holidays in accordance with the methodology stipulated in paragraphs 5.3 and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of the TM shall be adopted in the assessment.

(c) If tunneling by a mechanized tunnel boring machine is used, the criteria and assessment methodology for construction ground-borne noise impacts shall be agreed with the Director (with reference to Section 4.4.2(c) of the TM). Site measurements at appropriate locations may be required in order to obtain the empirical input parameters required in the ground-borne noise model.

(d) To minimize the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable.

(e) For tunnelling, noise impact associated with the operation of powered mechanical equipment or equivalent shall be assessed. If the equipment, such as a tunnel boring machine and associated facilities, is used, the methodology / model for assessing ground-borne noise impact from these equipments / facilities shall be agreed with the Director prior to obtaining the empirical parameters required in the ground-borne noise model. Cumulative impacts with other projects shall be covered if appropriate.

(f) If the unmitigated construction noise levels are found to exceed the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including at least movable barriers, enclosures, quieter alternative methods, re-scheduling and restricting hours of operation of noisy tasks), particularly at open-cut area(s), to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance and population being affected shall be given.

(g) The Applicant shall formulate a construction programme as far as practicable such that no work will be required in the restricted hours as defined under the Noise Control Ordinance (NCO). In case the Applicant needs to evaluate whether construction works during restricted hours as defined under the NCO are feasible or not in the context of programming construction works, reference should be made to the relevant technical memoranda issued under the NCO. Regardless of the results of construction noise impact assessment for restricted hours, the Noise Control Authority will process Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary condition / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. This should be explicitly stated in the noise chapter and the conclusions and

recommendations chapter in the EIA report.

(vi) Operational Rail Noise Assessment

(a) The Applicant shall assess the noise impacts during the operational phase of the proposed Project, including worst case scenario, normal, abnormal, transient and emergency operations, if applicable, with respect to the acceptable levels contained in Table 1A in Annex 5 in the TM. The assessment methodology including the railway / train design noise level shall be agreed with the Director prior to the commencement of the assessment.

(b) For operation ground-borne noise impact, the criteria and assessment methodology shall be agreed with the Director with special reference to Section 4.4.2(c) of the TM. The assessment shall also cover the cumulative ground-borne noise impact due to the Project and the railways in the vicinity (such as the Shatin to Central Link (Tai Wai to Hung Hom Section), the Shatin to Central Link (Cross Harbour Section Phase II – Hung Hom to Admiralty) that interface with the Project at Hung Hom, and the Kwun Tong Line Extension that will interface with the SCL at the Ho Man Tin Station, if appropriate). Site measurements at appropriate locations on a "like-to-like" basis (e.g. under similar situations) may be required in order to obtain the empirical input parameters required in the ground-borne noise model.

(c) In assessing the noise level, the Applicant shall allow for a deterioration in rail and rolling stock condition from brand new to an operating level, and if applicable, with consideration to freight train / maintenance train / through train; and shall address the reasonable and worst case scenarios, taking into account any other planned noise sources. The Applicant shall present the noise levels in Leq(30min), Leq(24 hr) and Lmax during the day and at night at the NSRs at various representative floor levels (in mPD) on tables and plans of suitable scale. Quantitative assessment at the identified NSRs for different alignment of the rail shall be compared against the relevant criteria or limits. The potential noise impact of each proposed alignment on the existing and planned NSRs shall be quantified by estimating the total number of dwellings and / or classrooms and other sensitive elements that will be exposed to levels above the relevant planning criteria and statutory limits.

(d) The Applicant shall make recommendations for noise amelioration / direct

technical remedies for any existing or planned NSR which would be subject to predicted cumulative noise level in excess of the relevant planning criteria or statutory limits in the appropriate design year. A manual detailing the schedule of maintaining / capping the wheel / rail noise to suit the design specification shall be provided, if relevant.

(e) In case where a number of the NSRs cannot be protected by the recommended noise amelioration / direct technical remedies, the Applicant shall consider alternatives to reduce the impact.

(vii) Fixed Noise Source Assessment

For fixed noise sources, such as tunnel ventilation exhausts and smoke extraction facilities and fixed plant at station, the following assessment shall be followed:

(a) Assessment of Fixed Source Noise Levels – The Applicant shall calculate the expected noise using standard acoustic principles. Calculations for the expected noise shall be based on the assumed plant inventories and utilization schedule for the reasonable and worst case scenarios. The Applicant shall calculate the noise levels taking into account the correction of tonality, impulsiveness and intermittency in accordance with the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites. The cumulative impacts due to the fixed noise sources proposed for the Project (such as tunnel ventilation exhausts and smoke extraction facilities and fixed plant at station) and other existing and planned noise sources shall also be assessed.

(b) Presentation of Noise Levels – The Applicant shall present the existing and future noise levels in Leq(30min) at the NSRs at various representative floor levels (mPD) on tables and plans of suitable scale. A quantitative assessment at the NSRs for the proposed fixed noise sources shall be carried out and compared against the criteria set out in Table 1A of Annex 5 of the TM.

(c) Proposal for Noise Mitigation Measures – To protect the affected NSRs, the Applicant shall propose direct technical remedies within the project limits in all situations where the predicted noise levels exceed the criteria set out in Table 1A of Annex 5 of the TM.

(viii) Assessment of Side Effects and Constraints

The Applicant shall identify, assess and propose means to avoid or minimize any consequential adverse impacts from the construction of noise impact mitigation measures and to resolve any potential constraints due to the inclusion of the recommended direct technical remedies.

(ix) Evaluation of Constraints on Planned Noise Sensitive Developments / Land Uses

(a) For planned noise sensitive uses which will still be affected even with all practicable direct technical remedies in place, the Applicant shall propose, evaluate and confirm the practicality of additional measures within the planned noise sensitive uses boundary and shall make recommendations on how these noise sensitive uses should be designed for the information of relevant parties.

(b) The Applicant shall take into account the agreed environmental requirements / constraints identified by the study to assess the development potential of the concerned sites, and shall make such information known to the relevant parties.

### 3.4.2 Air Quality Impact

3.4.2.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing air quality impact as stated in Section 1 of Annex 4 and Annex 12 of the TM, respectively.

3.4.2.2 The study area for air quality impact assessment shall generally be defined by a distance of 500 meters from the Project alignment and of all works sites, including works areas away from the Project alignment, with consideration to be given to extend the area to include major emission sources that may have a bearing on the environmental acceptability of the Project. The emissions from associated works of the Project shall also be included in determining the cumulative impacts. Besides, if any other concurrent projects are identified relevant during the course of the EIA study, their possible emissions shall also be taken into account in the air quality assessment. The assessment shall include at least the existing, planned and committed sensitive receivers within the study area. Such assessment shall be based on the best available information at the time of the assessment.

3.4.2.3 The air quality impact assessment shall include the following:

(i) Background and Analysis of Activities

(a) Provide background information relating to air quality issues relevant to the Project, e.g. description of the types of activities of the Project that may affect air quality during the construction and operation stages.

(b) Give an account, where appropriate, of the consideration / measures that had been taken into consideration in the planning of the Project to abate the air pollution impact. That is, the Applicant shall consider alternative construction methods / phasing programmes to minimize the constructional air quality impact and / or alternative mode of operation to minimize operation air quality impact.

(c) Present background air quality levels in the assessment area for the purpose of evaluating cumulative constructional and operational air quality impacts.

(ii) Identification of Air Sensitive Receivers (ASRs) and Examination of Emission / Dispersion Characteristics

(a) Identify and describe existing and planned / committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning Plans, Outline Development Plans and Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development application approved by the Town Planning Board. The Applicant shall select the assessment points of the identified ASRs that represent the worst impact point of these ASRs. A map clearly showing the location and description such as name of buildings, uses and height of the selected assessment points shall be given. The separation distances of these ASRs from the nearest emission sources shall also be given.

(b) Provide a list of air pollution emission sources, including any nearby emission sources which are likely to have impact related to the Project based on the analysis of the constructional and operation activities in Sub-section 3.4.2.3(i)(a) above. Examples of construction stage emission sources include stock piling, construction plant, concrete batching plant and vehicular movements on unpaved haul roads on site, etc. Confirmation of the validity of

the assumptions and the magnitude of the activities (e.g. volume of construction materials handled and traffic volume on a haul road etc.) shall be obtained from the relevant government department / authorities and documented.

(iii) Construction Phase Air Quality Impact

(a) The Applicant shall follow the requirements stipulated under the Air Pollution Control (Construction Dust) Regulation to ensure that construction dust impacts are controlled within the relevant standards as stipulated in Section 1 of Annex 4 of the TM. A monitoring and audit programme for the construction phase shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper construction dust control.

(b) If the Project will give rise to significant construction dust impacts likely to exceed recommended limits in the TM at the ASRs despite the incorporation of the dust control measures proposed in accordance with Sub-section 3.4.2.3(iii)(a) above, a quantitative assessment should be carried out to evaluate the construction dust impact at the identified ASRs. The Applicant shall follow the methodology set out in Sub-section 3.4.2.3(v) below when carrying out the quantitative assessment.

(iv) Operational Phase Air Quality Impact

The Applicant shall assess the expected air pollutant impacts at the identified ASRs based on an assumed reasonable worst-case scenario under normal operating conditions and if applicable, with consideration of freight train / maintenance train / emission from diesel-powered through train. If the Applicant anticipates an air quality impact that will likely cause exceedance of the recommended limits in the TM at the ASRs despite the incorporation of control / mitigation measures, a quantitative assessment by following the methodology set out in Section 3.4.2.3(v) below shall be carried out to evaluate the operational air quality impact at the identified ASRs.

(v) Quantitative Assessment Methodology

(a) If quantitative assessment is to be carried out following Section 3.4.2.3 (iii)(b) or 3.4.2.3(iv), the Applicant shall apply the relevant general principles

enunciated in the modelling guidelines in Appendices A1 to A3 while making allowance for the specific characteristic of the Project. This specific methodology must be documented in such level of details, preferably assisted with tables and diagrams, to allow the readers of the EIA report to grasp how the model has been set up to simulate the situation under study without referring to the model input files. Detailed calculations of air pollutants emission rates for input to the modelling and a map showing the emission sources shall be presented in the EIA report. The Applicant must ensure consistency between the text description and the model files at every stage of submissions for review. In case of doubt, prior agreement between the Applicant and the Director on the specific modelling details should be sought.

(b) The Applicant shall identify the key / representative air pollution parameters (types of pollutants and averaging time concentrations) to be evaluated and provide explanation for selecting such parameters for assessing the impact from the Project.

(c) The Applicant shall calculate the cumulative air quality impact at the ASRs identified under Sub-section 3.4.2.3 (ii)(a) above and compare these results against the criteria set out in section 1 of Annex 4 in the TM. The predicted air quality impacts (both unmitigated and mitigated) shall be presented in the form of summary table(s) and pollution contours, to be evaluated against the relevant air quality standards and on any effect they may have on the land use implications. Plans of a suitable scale should be used to present pollution contours to allow buffer distance requirements to be determined properly.

(vi) Mitigation Measures for Non-compliance

The Applicant shall propose remedies and mitigating measures where the predicted air quality impact exceeds the criteria set in Section 1 of Annex 4 in the TM. These measures and any constraints on future land use planning shall be agreed with the relevant government departments / authorities and documented. The Applicant shall demonstrate quantitatively that the residual impacts after incorporation of the proposed mitigating measures will comply with the criteria stipulated in Section 1 of Annex 4 in the TM.

(vii) Submission of Model Files

All input and output file(s) of the model run(s) shall be submitted to EPD in electronic format.

### 3.4.3 Water Quality Impacts

3.4.3.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing water pollution as stated in Annexes 6 and 14 of the TM respectively.

3.4.3.2 The water quality impact shall cover the following major areas of concern:

(i) Construction site-runoff including the effluents generated from dewatering associated with piling activities, grouting, concrete washing and if applicable, dewatering of spoil from the tunnel boring operations;
(ii) Potential impacts on stream courses (if any) and drainages around the work sites;
(iii) The track runoff containing oil / grease and suspended solids during the operational stage;
(iv) Spent cooling water discharge (if applicable) from air-conditioning systems of the station;
(v) Sewage and pumped groundwater derived from both the construction and operational stages of the Project; and
(vi) The loss of water due to tunnelling works at close proximity to existing water tunnels

3.4.3.3 The study area for the water quality impact assessment shall include the Victoria Harbour (Phase 2) Water Control Zone stipulated under the Water Pollution Control Ordinance (WPCO, Cap. 358), and all areas within a distance of 300m from the Project alignment and boundaries of all associated areas under the Project. This assessment area shall be extended to include other areas such as stream courses, water gathering ground, existing and new drainage system; and the associated water system(s) in the vicinity which may be affected by the Project.

3.4.3.4 The Applicant shall identify and analyze physical, chemical and biological disruptions of inland water or groundwater system(s), drainage system, catchment area(s), stormwater channel(s) and coastal water arising from the construction and operation of the Project.

3.4.3.5 The Applicant shall predict, quantify and assess the water quality impacts arising from the Project on the water system(s) and sensitive receivers by appropriate techniques. These techniques shall be considered in accordance with Section 4.4.2(c) of the TM.

3.4.3.6 The Applicant shall take into account and include likely different construction stages or sequences, and different operational stages of the Project in the assessment. The assessment shall have regard to the frequency, duration, volume and flow rate of discharges and their pollution loading. The assessment shall address the following:

General

(i) Collection and review of background information on the existing and planned water system(s) and their respective catchments and sensitive receivers which might be affected by the Project.

(ii) Characterization of water quality of the water system(s) and respective catchments and sensitive receivers which might be affected by the Project based on existing best available information or through site surveys and tests as appropriate.

(iii) Identification and analysis of relevant existing and planned activities, beneficial uses and water sensitive receivers related to the affected water system(s). The Applicant shall refer to, *inter alia*, those developments and uses earmarked on the relevant outline zoning plans, outline development plans, layout plans and other published land use plans.

(iv) Identification of pertinent water quality objectives and establishment of other appropriate water quality criteria or standards for the water system(s) and the sensitive receivers as mentioned in (i), (ii) and (iii) above.

(v) Review of specific design, construction method(s) and configuration(s) of the tunnel, station and ventilation shaft as well as other ancillary facilities of the railway systems; and operation of the Project. Identification of any alteration of water course, drainage system, change of hydrodynamic regimes, change of ground water levels, change of catchment types or areas.

(vi) Identification, analysis and quantification of existing, likely future water

pollution sources including point discharges and non-point sources to surface water runoff, sewage and polluted discharge generated from the Project and spent cooling water discharge.

(vii) Establishment and provision of a pollution load inventory on the quantities and characteristics of existing and likely future water pollution sources identified in (vi) above. Field investigation and laboratory test(s) shall be conducted as appropriate to fill in any major information gaps.

Impact Prediction

(viii) Prediction and quantification of the impacts on the water system(s) and the sensitive receivers due to those alterations and changes identified in (v) above and the pollution sources identified in (vi) above. Possible impacts include changes in hydrology, flow regime, groundwater level and water quality shall be assessed. The prediction shall take into account and include likely different construction stages or sequences, and different operation stages.

(ix) If contaminated groundwater is identified in the land contamination assessment covered in this study brief, the potential impacts during construction stage shall be evaluated and properly addressed.

(x) If seawater will be used in cooling systems and spent coolant effluent shall be discharged into marine water, prediction and quantification by mathematical modelling shall be required to assess the impacts on the water system and sensitive receivers, in respect of thermal and chemical discharge. The water quality modeling specifications in Appendix B of this study brief could be used as a guideline subject to amendment in respect of the model calibration area and the fine grid model area. If the spent cooling water discharge will not be significant in terms of discharge rate and impact on sensitive waters or sensitive receivers, the Applicant may propose alternative assessment methodology, subject to agreement with EPD.

(xi) Assessment of the cumulative impacts due to other related concurrent and planned projects, activities or pollution sources within a boundary around the study area that may have a bearing on the environmental acceptability of the Project.

(xii) Assessment and evaluation of any potential impacts on the identified water system(s), respective catchments and sensitive receivers due to sewage, wastewater and pumped groundwater arising from the Project. Any effluent generated will require appropriate collection, treatment and disposal to within standards and objectives and criteria established in (iv) above.

(xiii) Assessment and evaluation of any potential impacts arising from tunnel/seepage drainage and track runoff. Appropriate measures shall be recommended to reduce the identified impacts arising during operation. The assessment should include the volume of anticipated wastewater / water seepage to be discharged from the station / tunnel so as to facilitate assessment in accordance with Section 6.5 in Annex 14 of the TM.

(xiv) Assessment and evaluation of any potential stormwater and surface runoff impacts on the water systems(s), respective catchments and sensitive receivers during both construction and operation stages so as to reduce the water quality impacts to within standards, objectives and criteria established in (iv) above. Best management practices shall be recommended to reduce any potential impacts arising from stormwater drainage system and surface runoff.

Mitigation

(xv) Proposal of effective and practicable infrastructure upgrading or provision, water pollution prevention and mitigation measures including those for contaminated groundwater to be implemented during the construction and operation stages so as to reduce the water quality impacts to within acceptable levels of standards. Requirements to be incorporated in the Project contract document shall also be proposed.

(xvi) Evaluation and quantification of residual impacts (if any) on the affected water system(s) and sensitive receivers with regard to the appropriate water quality criteria, standards or guidelines.

(xvii) Best management practices to reduce storm water and non-point source pollution shall be investigated and proposed as appropriate. Attention shall be made to the water pollution control and mitigation measures recommended in ProPECC Note 1/94 on construction site drainage.

### 3.4.4 **Waste Management Implications**

3.4.4.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing waste management implications as stated in Annexes 7 and 15 of the TM respectively.

3.4.4.2 The Applicant shall address the potential waste management implications due to the construction and operation phases of the Project, including at least excavation for the underground section of the Project between Mong Kok and Hung Hom and the excavation for the new station / underground platforms and modification to the existing station of the Project. The assessment of waste management implications shall cover the following:

(i) Analysis of Activities and Waste Generation

The Applicant shall identify the quantity, quality and timing of the waste arising as a result of the construction and operation activities of the Project, based on the sequence and duration of these activities including any dredged / excavated sediment / mud which would be generated during construction stage. The Applicant shall adopt design, general layout, construction methods and programme to minimize the generation of public fill / inert construction and demolition material (C&DM) and maximize the use of public fill / inert C&DM for other construction works.

(ii) Proposal for Waste Management

(a) Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation, on-site or off-site re-use and recycling shall be fully evaluated. Measures that can be taken in the planning and design stages e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered;

(b) After considering the opportunities for reducing waste generation and maximizing re-use, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal methods/options for each type of the wastes shall be described in detail. The disposal methods/options recommended for each type of wastes shall take into

account the result of the assessment in item (c) below; and

(c) The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use/disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas:

- potential hazard;
- air and odour emissions;
- noise;
- wastewater discharge; and
- public transport.

(iii) Management of Dredged/Excavated Sediment/Mud

(a) Identification and quantification as far as practicable of relevant dredging/excavation, sediment/mud transportation and disposal activities and requirements shall be conducted. Potential dumping ground to be involved shall also be identified. Field investigation, sampling and chemical and biological laboratory tests to characterize the sediment/mud concerned shall be conducted as appropriate. The ranges of parameters to be analyzed; the number, type and methods of sampling; sample preservation; chemical and biological laboratory test methods to be used shall be agreed with the Director (with reference to Section 4.4.2(c) of the TM) prior to the commencement of the tests. The categories of sediment/mud which are to be disposed of in accordance with a permit granted under the Dumping at Sea Ordinance (DASO) shall be identified by both chemical and biological tests and their quantities shall be estimated. If the presence of any serious contamination of sediment / mud which requires special treatment / disposal is confirmed, the Applicant shall identify the most appropriate treatment and / or disposal arrangement and demonstrate its feasibility; and

(b) Identification and evaluation of the best practical dredging / excavation methods to minimize dredging / excavation and dumping requirements based on the criterion that existing sediment / mud shall be left in place and not to be disturbed as far as possible.

### 3.4.5 Land Contamination Assessment

3.4.5.1 The Applicant shall follow the guidelines for evaluating and assessing potential land contamination issues as stated in Sections 3.1 and 3.2 of Annex 19 of the TM.

3.4.5.2 The "Assessment Area" for the land contamination shall include any potential land contamination site(s) within the Project area, in particular area used for the Hung Hom Freight Yard, and other potential contaminated site(s) identified in this EIA study.

3.4.5.3 The Applicant shall provide a clear and detailed account of the present land use (including description of the activities, chemicals and hazardous substances handled, with clear indication of their storage and location, by reference to a site map) and the relevant land use history in relation to possible land contamination (including accident records and change of land use(s) and the like and if applicable, with consideration to oil and grease-containing runoff from existing tracks / existing railway maintenance and operation).

3.4.5.4 During the course of the EIA study, the Applicant shall submit a Contamination Assessment Plan (CAP) to the Director for endorsement prior to conducting the contamination impact assessment of the relevant land or site(s). The CAP shall include proposal with details on representative sampling and analysis required to determine the nature and the extent of the contamination of the relevant land or site(s).

3.4.5.5 Based on the endorsed CAP, the Applicant shall conduct a land contamination impact assessment and submit a Contamination Assessment Report (CAR) to the Director for endorsement. If land contamination is confirmed, a Remedial Action Plan (RAP) shall also be submitted to the Director for endorsement to formulate necessary remedial measures.

3.4.5.6 If there is / are potential contaminated site(s) that is / are inaccessible for preparing sampling and analysis during the course of the EIA study, e.g. due to site access problem, the Applicant's CAP shall include :

(i) A review of the available information;

(ii) An initial contamination evaluation of this/these site(s) and possible

remediation methods;

(iii) A confirmation of whether the contamination problem at this/these site(s) would be surmountable;

(iv) A sampling and analysis proposal which shall aim at determining the nature and the extent of the contamination of this/these site(s); and

(v) A schedule of submission of revised CAP (if necessary), CAR and RAP upon this/these site(s) is / are accessible.

3.4.5.7 The Applicant shall complete land contamination assessment and remediation (if necessary) at the potential contaminated site(s) prior to the commencement of the construction works at the respective site(s).

### 3.4.6 Landscape and Visual Impacts

3.4.6.1 The Applicant shall follow the criteria and guidelines as stated in Annexes 10 and 18 of the TM and the EIAO Guidance Note No.8/2002 on "Preparation of Landscape and Visual Impact Assessment under the Environmental Impact Assessment Ordinance".

3.4.6.2 The Applicant shall address the potential landscape and visual impacts during the construction and operation stages.

3.4.6.3 The assessment area for landscape impact assessment shall include all areas within a 100m distance from the Project alignment and of all works sites, including works areas away from the Project alignment. The assessment area for the visual impact assessment shall be defined by the visual envelope of the Project.

3.4.6.4 The Applicant shall review relevant outline development plan(s), outline zoning plan(s), layout plan(s) or planning briefs and studies which may identify areas of high landscape value and visually sensitive areas. The aim is to gain an insight to the future outlook of the area affected so as to assess whether the Project can fit into the surrounding setting. Any conflict with statutory town plan(s) shall be highlighted and appropriate follow-up action shall be recommended.

3.4.6.5 The Applicant shall describe, appraise, analyze and evaluate the existing landscape

resources and character of the assessment area within the assessment area. A system shall be derived for judging landscape impact significance as required under the TM. The sensitivity of the landscape framework and its ability to accommodate change shall be particularly focused on. The Applicant shall identify the degree of compatibility of the Project with the existing and planned landscape setting. The landscape impact assessment shall evaluate the potential landscape impact as far as possible so as to illustrate the significance of such impacts arising from the proposed Project. Clear mapping of the baseline landscape resources, landscape character areas and the landscape impact is required if area(s) of high landscape value is (are) identified in Section 3.4.6.4 above.

3.4.6.6 The Applicant shall assess the visual impacts of the proposed Project. For above ground ancillary structures of the Project, clear illustration including mapping of visual impact is required. The assessment shall adopt a systematic methodology and include the following:

(i) Identification and plotting of visual envelope of the proposed Project within the study area;

(ii) Identification of the key groups of sensitive receivers within the visibility envelope and their views at both ground level and elevated vantage points;

(iii) Description of the visual compatibility of the Project with the surrounding and the planned setting, and its obstruction and interference with the key views of the adjacent areas. Among other receivers, sensitive receivers shall include nearby residents;

(iv) Description of the severity of visual impacts in terms of distance, nature and number of sensitive receivers. The visual impacts of the Project with and without mitigation measures shall also be included so as to demonstrate the effectiveness of the proposed mitigation measures; and

(v) Clear evaluations and explanation with supportive arguments of all relevant factors considered in arriving the significance thresholds of visual impact.

3.4.6.7 The Applicant shall evaluate the merit of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area. Alternative construction methods and / or Project-related works / structure(s)

that would avoid or reduce the identified landscape and visual impacts shall first be considered and be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The mitigation measures proposed shall not only be concerned with damage reduction but shall also include consideration of potential enhancement of the existing landscape and visual quality. The Applicant shall recommend mitigation measures to minimize the adverse effects identified above, including provision of a landscape design.

3.4.6.8 The mitigation measures shall also include the preservation of vegetation, transplanting of trees of good amenity value, provision of screen planting, re-vegetation of disturbed lands, compensatory planting, re-provisioning of amenity areas and open spaces, design of structure, provision of finishes to structure, colour scheme and texture of material used, integration of new station works with existing station and minimization of additional land intake, sensitive station design appropriate for the harbourfront setting and any measures to mitigate the disturbance of the existing land use. Parties shall be identified for the on-going management and maintenance of the proposed mitigation works to ensure their effectiveness throughout the operation phase of the Project. A practical programme and funding proposal for the implementation of the recommended measures shall be provided.

3.4.6.9 Annotated illustration such as coloured perspective drawings, plans and section/elevation diagrams, oblique aerial photographs, photographs taken at vantage points and computer-generated photomontage shall be adopted to illustrate the significance of the landscape and visual impacts of the above ground ancillary structures of the Project.

### 3.4.7 Documentation of Key Assessment Assumptions, Limitation of Assessment Methodologies and related Prior Agreement(s) with the Director

To facilitate efficient retrieval, a summary to include the assessment methodologies and key assessment assumptions adopted in this EIA study, the limitations of these assessment(s) methodologies / assumptions, if any, plus all relevant prior agreement(s) with the Director or other Authorities on individual environmental media assessment components shall be provided in the EIA report. The proposed use of any alternative assessment tool(s) or assumption(s) of all environmental issues / media to be assessed have to be justified by the Applicant, with supporting documents based on cogent, scientific and objectively derived reason(s) before

seeking the Director's agreement. This summary and all related supporting documents shall be provided in the form of an Appendix to the EIA study report.

### 3.4.8 Impacts Summary

3.4.8.1 To facilitate effective retrieval of pertinent key information, a summary of environmental impacts in the form of a table (or in any other form agreed with the Director) showing the assessment points (such as ASRs, NSRs), results of impact predictions, relevant standards or criteria, extents of exceedances predicted, impact avoidance measures considered, mitigation measures proposed and residual impacts (after mitigation) shall be provided to cover each individual impact in the EIA report. This impact summary shall form an essential part of the Executive Summary.

### 3.4.9 Summary of Environmental Outcomes

3.4.9.1 The EIA report shall contain a summary of the key environmental outcomes arising from the EIA study, including the population and environmentally sensitive areas protected, environmentally friendly designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of environmental protection measures recommended.

### 3.4.10 Environmental Monitoring and Audit (EM&A) Requirements

3.4.10.1 The Applicant shall identify and justify in the EIA study whether there is any need for EM&A activities during construction and operation phases of the Project and, if affirmative, to define the scope of EM&A requirements for the Project.

3.4.10.2 Subject to confirmation of EIA findings, the Applicant shall comply with requirements as stipulated in Annex 21 of the TM. The Applicant shall also propose real-time reporting of monitoring data for the Project through a dedicated internet website.

3.4.10.3 The Applicant shall prepare a project implementation schedule (in the form of a checklist as shown in Appendix C to this EIA study brief) containing the EIA study recommendations and mitigation measures with reference to the implementation programme.

## 4. DURATION OF VALIDITY

4.1 The Applicant shall notify the Director of the commencement of the EIA study. If the EIA study does not commence within 36 months after the date of issue of this EIA study brief, the Applicant shall apply to the Director for a fresh EIA study brief before commencement of the EIA study.

## 5. REPORT REQUIREMENTS

5.1 In preparing the EIA report, the Applicant shall refer to Annex 11 of the TM for the contents of an EIA report. The Applicant shall also refer to Annex 20 of the TM, which stipulates the guidelines for the review of an EIA report.

5.2 The Applicant shall supply the Director with the following number of copies of the EIA report and the executive summary:

(i) 40 copies of the EIA report in English and 40 copies of the executive summary (each bilingual in both English and Chinese) as required under section 6(2) of the EIAO to be supplied at the time of application for approval of the EIA report. Addition copies of the EIA report and the executive summary shall be supplied upon advice by the Director.

(ii) when necessary, addendum to the EIA report and the executive summary submitted in 5.2 (i) above as required under section 7(1) of the EIAO, to be supplied upon advice by the Director for public inspection.

(iii) 20 copies of the EIA report in English and 20 copies of the executive summary (each bilingual in both English and Chinese) with or without Addendum as required under section 7(5) of the EIAO, to be supplied upon advice by the Director for consultation with the Advisory Council on the Environment.

5.3 The Applicant shall, upon request, make additional copies of above documents available to the public, subject to payment by the interested parties of full costs of printing.

5.4 In addition, to facilitate public inspection of the EIA report via the EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA report and the executive summary prepared in HyperText Markup Language (HTML) (version

4.0 or later) and in Portable Document Format (PDF version 1.3 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EIA report and the executive summary shall be included in the beginning of the document. Hyperlinks to all figures, drawings and tables in the EIA report and executive summary shall be provided in the main text from where the respective references are made. All graphics in the report shall be in interlaced GIF format unless otherwise agreed by the Director.

5.5 The electronic copies of the EIA report and the executive summary shall be submitted to the Director at the time of application for approval of the EIA report.

5.6 When the EIA report and the executive summary are made available for public inspection under section 7(1) of the EIAO, the content of the electronic copies of the EIA report and the executive summary must be the same as the hard copies and the Director shall be provided with the most updated electronic copies.

5.7 To promote environmentally friendly and efficient dissemination of information, both hardcopies and electronic copies of future EM&A reports recommended by the EIA study shall be required and their format shall be agreed by the Director.

## 6. OTHER PROCEDURAL REQUIREMENTS

6.1 If there is any change in the name of Applicant for this EIA study brief during the course of the EIA study, the Applicant must notify the Director immediately.

6.2 If there is any key change in the scope of the Project mentioned in Section 1.2 of this EIA study brief and in Project Profile (No. PP-357/2008), the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover the key changes, and the additional issues, if any, that the EIA study must also address. If the changes to the Project fundamentally alter the key scope of the EIA study brief, the Applicant shall apply to the Director for a fresh EIA study brief.

--- END OF EIA STUDY BRIEF ---
July 2008
Environmental Assessment Division,
Environmental Protection Department

**Appendix A-1**

## Guidelines on Choice of Models and Model Parameters

***[The information contained in this Appendix is only meant to assist the Applicant in performing the air quality assessment. The Applicant must exercise professional judgment in applying this general information for the Project.]***

## 1. Introduction

1.1 To expedite the review process by the Authority and to assist project proponents or environmental consultants with the conduct of air quality modelling exercise which are frequently called for as part of environmental impact assessment studies, this paper describes the usage and requirements of a few commonly used air quality models.

## 2. Choice of Models

2.1 The models which have been most commonly used in air quality impact assessments, due partly to their ease of use and partly to the quick turn-around time for results, are of Gaussian type and designed for use in simple terrain under uniform wind flow. There are circumstances when these models are not suitable for ambient concentration estimates and other types of models such as physical, numerical or mesoscale models will have to be used. In situations where topographic, terrain or obstruction effects are minimal between source and receptor, the following Gaussian models can be used to estimate the near-field impacts of a number of source types including dust, traffic and industrial emissions.

| Models | Applications |
|---|---|
| FDM | for evaluating fugitive and open dust source impacts (point, line and area sources) |
| CALINE4 | for evaluating mobile traffic emission impacts (line sources) |
| ISCST3 | for evaluating industrial chimney releases as well as area and volumetric sources (point, area and volume sources); line sources can be approximated by a number of volume sources. |

These frequently used models are also referred to as Schedule 1 models (see attached list).

2.2 Note that both FDM and CALINE4 have a height limit on elevated sources (20m and 10m, respectively). Source of elevation above these limits will have to be modelled using the ISCST3 model or suitable alternative models. In using the latter, reference should be made to the 'Guidelines on the Use of Alternative Computer Models in Air Quality Assessment' in Appendix A-3.

2.3 The models can be used to estimate both short-term (hourly and daily average) and long-term (annual average) ambient concentrations of air pollutants. The model

results, obtained using appropriate model parameters (refer to Section 3) and assumptions, allow direct comparison with the relevant air quality standards such as the Air Quality Objectives (AQOs) for the relevant pollutant and time averaging period.

## 3. Model Input Requirements

### 3.1 Meteorological Data

3.1.1 At least 1 year of recent meteorological data (including wind speed, wind direction, stability class, ambient temperature and mixing height) from a weather station either closest to or having similar characteristics as the study site should be used to determine the highest short-term (hourly, daily) and long-term (annual) impacts at identified air sensitive receivers in that period. The amount of valid data for the period should be no less than 90 percent.

3.1.2 Alternatively, the meteorological conditions as listed below can be used to examine the worst case short-term impacts:

- Day time: stability class D; wind speed 1 m/s (at 10m height); worst-case wind angle; mixing height 500 m
- Night time: stability class F; wind speed 1 m/s (at 10m height); worst case wind angle; mixing height 500 m
- This is a common practice with using the CALINE4 model due to its inability to handle lengthy data set.

3.1.3 For situations where, for example, (i) the model (such as CALINE4) does not allow easy handling of one full year of meteorological data; or (ii) model run time is a concern, the followings can be adopted in order to determine the daily and annual average impacts:

(i) perform a frequency occurrence analysis of one year of meteorological data to determine the actual wind speed (to the nearest unit of m/s), wind direction (to the nearest 10°) and stability (classes A to F) combinations and their frequency of occurrence;

(ii) determine the short term hourly impact under all of the identified wind speed, wind direction and stability combinations; and

(iii) apply the frequency data with the short term results to determine the long term (daily / annual) impacts.

Apart from the above, any alternative approach that will capture the worst possible impact values (both short term and long term) may also be considered.

3.1.4 Note that the anemometer height (relative to a datum same for the sources and receptors) at which wind speed measurements were taken at a selected station should be correctly entered in the model. These measuring positions can vary greatly from station to station and the vertical wind profile employed in the model can be grossly distorted from the real case if incorrect anemometer height is used. This will lead to

unreliable concentration estimates.

3.1.5 An additional parameter, namely, the standard deviation of wind direction, $\sigma_\theta$, needs to be provided as input to the CALINE4 model. Typical values of $\sigma_\theta$ range from 12° for rural areas to 24° for highly urbanised areas under 'D' class stability. For semi-rural such as new development areas, 18° is more appropriate under the same stability condition. The following reference can be consulted for typical ranges of standard deviation of wind direction under different stability categories and surface roughness conditions.

*Ref.(1): Guideline On Air Quality Models (Revised), EPA-450/2-78-027R, United States Environmental Protection Agency, July 1986.*

## 3.2 Emission Sources

All the identified sources relevant to a process plant or a study site should be entered in the model and the emission estimated based on emission factors compiled in the AP-42 (Ref. 2) or other suitable references. The relevant sections of AP-42 and any parameters or assumptions used in deriving the emission rates (in units g/s, g/s/m or g/s/m$^2$) as required by the model should be clearly stated for verification. The physical dimensions, location, release height and any other emission characteristics such as efflux conditions and emission pattern of the sources input to the model should also correspond to site data.

If the emission of a source varies with wind speed, the wind speed-dependent factor should be entered.

*Ref.(2): Compilation of Air Pollutant Emission Factors, AP-42, 5th Edition, United States Environmental Protection Agency, January 1995.*

## 3.3 Urban/Rural Classification

Emission sources may be located in a variety of settings. For modelling purposes these are classed as either rural or urban so as to reflect the enhanced mixing that occurs over urban areas due to the presence of buildings and urban heat effects. The selection of either rural or urban dispersion coefficients in a specific application should follow a land use classification procedure. If the land use types including industrial, commercial and residential uses account for 50% or more of an area within 3 km radius from the source, the site is classified as urban; otherwise, it is classed as rural.

## 3.4 Surface Roughness Height

This parameter is closely related to the land use characteristics of a study area and associated with the roughness element height. As a first approximation, the surface roughness can be estimated as 3 to 10 percent of the average height of physical structures. Typical values used for urban and new development areas are 370 cm and 100 cm, respectively.

## 3.5 Receptors

These include discrete receptors representing all the identified air sensitive receivers at their appropriate locations and elevations and any other discrete or grid receptors for supplementary information. A receptor grid, whether Cartesian or Polar, may be used to generate results for contour outputs.

## 3.6 Particle Size Classes

In evaluating the impacts of dust-emitting activities, suitable dust size categories relevant to the dust sources concerned with reasonable breakdown in TSP (< 30 μm) and RSP (< 10 μm) compositions should be used.

## 3.7 $NO_2$ to $NO_x$ Ratio

The conversion of $NO_x$ to $NO_2$ is a result of a series of complex photochemical reactions and has implications on the prediction of near field impacts of traffic emissions. Until further data are available, three approaches are currently acceptable in the determination of $NO_2$:

(a) Ambient Ratio Method (ARM) - assuming 20% of $NO_x$ to be $NO_2$; or

(b) Discrete Parcel Method (DPM, available in the CALINE4 model); or

(c) Ozone Limiting Method (OLM) - assuming the tailpipe $NO_2$ emission to be 7.5% of $NO_x$ and the background ozone concentration to be in the range of 57 to 68 $\mu g/m^3$ depending on the land use type (see also the EPD reference paper 'Guidelines on Assessing the 'TOTAL' Air Quality Impacts').

## 3.8 Odour Impact

In assessing odour impacts, a much shorter time-averaging period of 5 seconds is required due to the shorter exposure period tolerable by human receptors. Conversion of model computed hourly average results to 5-second values is therefore necessary to enable comparison against recommended standard. The hourly concentration is first converted to 3-minute average value according to a power law relationship which is stability dependent (Ref. 3) and a result of the statistical nature of atmospheric turbulence. Another conversion factor (10 for unstable conditions and 5 for neutral to stable conditions) is then applied to convert the 3-minute average to 5-second average (Ref. 4). In summary, to convert the hourly results to 5-second averages, the following factors can be applied:

| Stability Category | 1-hour to 5-sec Conversion Factor |
|---|---|
| A & B | 45 |
| C | 27 |
| D | 9 |

Under 'D' class stability, the 5-second concentration is approximately 10 times the hourly average result. Note, however, that the combined use of such conversion factors together with the ISCST results may not be suitable for assessing the extreme close-up impacts of odour sources.

*Ref.(3): Richard A. Duffee, Martha A. O'Brien and Ned Ostojic, 'Odor Modeling – Why and How', Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Air & Waste Management Association, 1991.*

*Ref.(4): A.W.C. Keddie, 'Dispersion of Odours', Odour Control – A Concise Guide, Warren Spring Laboratory, 1980.*

## 3.9 Plume Rise Options

The ISCST3 model provides by default a list of the U.S. regulatory options for concentration calculations. These are all applicable to the Hong Kong situations except for the 'Final Plume Rise' option. As the distance between sources and receptors are generally fairly close, the non-regulatory option of 'Gradual Plume Rise' should be used instead to give more accurate estimate of near-field impacts due to plume emission. However, the 'Final Plume Rise' option may still be used for assessing the impacts of distant sources.

## 3.10 Portal Emissions

These include traffic emissions from tunnel portals and any other similar openings and are generally modelled as volume sources according to the PIARC 91 (or more up-to-date version) recommendations (Ref. 5, section III.2). For emissions arising from underpasses or any horizontal openings of the like, these are treated as area or point sources depending on the source physical dimensions. In all these situations, the ISCST3 model or more sophisticated models will have to be used instead of the CALINE4 model. In the case of portal emissions with significant horizontal exit velocity which cannot be handled by the ISCST3 model, the impacts may be estimated by the TOP model (Ref. 6) or any other suitable models subject to prior agreement with EPD. The EPD's 'Guidelines on the Use of Alternative Computer Models in Air Quality Assessment' should also be referred to in Appendix A-3.

*Ref.(5): XIXth World Road Congress Report, Permanent International Association of Road Congresses (PIARC), 1991.*

*Ref.(6): N. Ukegunchi, H. Okamoto and Y. Ide "Prediction of vehicular emission pollution around a tunnel mouth", Proceedings 4th International Clean Air Congress, pp. 205-207, Tokyo, 1977.*

## 3.11 Background Concentrations

Background concentrations are required to account for far-field sources which cannot be estimated by the model. These values, to be used in conjunction with model results for assessing the total impacts, should be based on long term average of monitoring data at location representative of the study site. Please make reference to the paper 'Guidelines on Assessing the 'TOTAL' Air Quality Impacts'

in Appendix A-2 for further information.

### 3.12 Output

The highest short-term and long-term averages of pollutant concentrations at prescribed receptor locations are output by the model and to be compared against the relevant air quality standards specified for the relevant pollutant. Contours of pollutant concentration are also required for indicating the general impacts of emissions over a study area.

Copies of model files in electronic format should also be provided for EPD's reference.

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**Schedule 1**

**Air Quality Models Generally Accepted by Hong Kong Environmental Protection Department for Regulatory Applications as at 1 July 1998***

**Industrial Source Complex Dispersion Model - Short Term Version 3 (ISCST3)** or the latest version developed by U.S. Environmental Protection Agency

**California Line Source Dispersion Model Version 4 (CALINE4)** or the latest version developed by Department of Transportation, State of California, U.S.A.

**Fugitive Dust Model (FDM)** or the latest version developed by U.S. Environmental Protection Agency

* EPD is continually reviewing the latest development in air quality models and will update this Schedule accordingly.

**Appendix A-2**

## Guidelines on Assessing the 'TOTAL' Air Quality Impacts

***[The information contained in this Appendix is only meant to assist the Applicant in performing the air quality assessment. The Applicant must exercise professional judgment in applying this general information for the Project.]***

### 1. Total Impacts - 3 Major Contributions

1.1 In evaluating the air quality impacts of a proposed project upon air sensitive receivers, contributions from three classes of emission sources depending on their distance from the site should be considered. These are:

| | |
|---|---|
| Primary contributions: | project induced |
| Secondary contributions: | pollutant-emitting activities in the immediate neighbourhood |
| Other contributions: | pollution not accounted for by the previous two (Background contributions) |

### 2. Nature of Emissions

### 2.1 Primary contributions

In most cases, the project-induced emissions are fairly well defined and quite often (but not necessarily) the major contributor to local air quality impacts. Examples include those due to traffic network, building or road construction projects.

### 2.2 Secondary contributions

Within the immediate neighbourhood of the project site, there are usually pollutant emitting activities contributing further to local air quality impacts. For most local scale projects, any emission sources in an area within 500m radius of the project site with notable impacts should be identified and included in an air quality assessment to cover the short-range contributions. In the exceptional cases where there is one or more significant sources nearby, the study area may have to be extended or alternative estimation approach employed to ensure these impacts are reasonably accounted for.

### 2.3 Background contributions

The above two types of emission contributions should account for, to a great extent, the air quality impacts upon local air sensitive receivers, which are often amenable to estimation by the 'Gaussian Dispersion' type of models. However, a background air quality level should be prescribed to indicate the baseline air quality in the region of the project site, which would account for any pollution not covered by the two preceding contributions. The emission sources contributing to the background air quality would be located further afield and not easy to identify. In addition, the

transport mechanism by which pollutants are carried over long distances (ranging from 1km up to tens or hundreds of kms) is rather complex and cannot be adequately estimated by the 'Gaussian' type of models.

## 3. Background Air Quality - Estimation Approach

### 3.1 The approach

In view of the difficulties in estimating background air quality using the air quality models currently available, an alternative approach based on monitored data is suggested. The essence of this approach is to adopt the long-term (5-year) averages of the most recent monitored air quality data obtained by EPD. These background data would be reviewed yearly or biennially depending on the availability of the monitored data. The approach is a first attempt to provide a reasonable estimate of the background air quality level for use in conjunction with EIA air quality assessment to address the cumulative impacts upon a locality. This approach may be replaced or supplemented by superior modelling efforts such as that entailed in PATH (Pollutants in the Atmosphere and their Transport over Hong Kong), a comprehensive territory-wide air quality modelling system currently being developed for Hong Kong. Notwithstanding this, the present approach is based on measured data and their long term regional averages; the background values so derived should therefore be indicative of the present background air quality. In the absence of any other meaningful way to estimate a background air quality for the future, this present background estimate should also be applied to future projects as a first attempt at a comprehensive estimate until a better approach is formulated.

### 3.2 Categorisation

The monitored air quality data, by 'district-averaging' are further divided into three categories, viz, Urban, Industrial and Rural/New Development. The background pollutant concentrations to be adopted for a project site would depend on the geographical constituency to which the site belongs.

The categorisation of these constituencies is given in Section 3.4. The monitoring stations suggested for the 'district-averaging' (arithmetic means) to derive averages for the three background air quality categories are listed as follows:

Urban: Kwun Tong, Sham Shui Po, Tsim Sha Tsui and Central/Western

Industrial: Kwun Tong, Tsuen Wan and Kwai Chung

Rural/New Development: Sha Tin, Tai Po, Junk Bay, Hong Kong South and Yuen Long.

The averaging would make use of data from the above stations wherever available. The majority of the monitoring stations are located some 20m above ground.

### 3.3 Background pollutant values

Based on the above approach, background values for the 3 categories have been

obtained for a few major air pollutants as follows:

| POLLUTANT | URBAN | INDUSTRIAL | RURAL/NEW DEVELOPMENT |
|---|---|---|---|
| NO2 | 59 | 57 | 39 |
| SO2 | 21 | 26 | 13 |
| O3 | 62 | 68 | 57 |
| TSP | 98 | 96 | 87 |
| RSP | 60 | 58 | 51 |

All units are in micrograms per cubic metre. The above values are derived from 1992 to 1996 annual averages with the exception of ozone which represent annual average of daily hourly maximum values for year 1996.

In cases where suitable air quality monitoring data representative of the study site such as those obtained from a nearby monitoring station or on-site sampling are not available for the prescription of background air pollution levels, the above tabulated values can be adopted instead. Strictly speaking, the suggested values are only appropriate for long term assessment. However, as an interim measure and until a better approach is formulated, the same values can also be used for short term assessment. This implies that the short term background values will be somewhat under-estimated, which compensates for the fact that some of the monitoring data are inherently influenced by secondary sources because of the monitoring station location.

Indeed, if good quality on-site sampling data which cover at least one year period are available, these can be used to derive both the long term (annual) and short term (daily/hourly) background values, the latter are usually applied on an hour to hour, day to day basis.

## 3.4 Site categories

The categories to which the 19 geographical constituencies belong are listed as follows:

| DISTRICT | AIR QUALITY CATEGORY |
|---|---|
| Islands | Rural / New Development |
| Southern | Rural / New Development |
| Eastern | Urban |
| Wan Chai | Urban |
| Central & Western | Urban |
| Sai Kung | Rural / New Development |
| Kwun Tong | Industrial |
| Wong Tai Sin | Urban |
| Kowloon City | Urban |

| | |
|---|---|
| Yau Tsim | Urban |
| Mong Kok | Urban |
| Sham Shui Po | Urban |
| Kwai Tsing | Industrial |
| Sha Tin | Rural / New Development |
| Tsuen Wan | Industrial |
| Tuen Mun | Rural / New Development |
| Tai Po | Rural / New Development |
| Yuen Long | Rural / New Development |
| Northern | Rural / New Development |

### 3.5 Provisions for 'double-counting'

The current approach is, by no means, a rigorous treatment of background air quality but aims to provide an as-realistic-as-possible approximation based on limited field data. 'Double-counting' of 'secondary contributions' may be apparent through the use of such 'monitoring-based' background data as some of the monitoring stations are of close proximity to existing emission sources. 'Primary contributions' due to a proposed project (which is yet to be realized) will not be double-counted by such an approach. In order to avoid over-estimation of background pollutant concentrations, an adjustment to the values given in Section 3.3 is possible and optional by multiplying the following factor:

(1.0 - ESecondary contributions/ETerritory)

where E stands for emission.

The significance of this factor is to eliminate the fractional contribution to background pollutant level of emissions due to 'secondary contributions' out of those from the entire territory. In most cases, this fractional contribution to background pollutant levels by the secondary contributions is minimal.

## 4. Conclusions

4.1 The above described approach to estimating the total air quality impacts of a proposed project, in particular the background pollutant concentrations for air quality assessment, should be adopted with immediate effect. Use of short term monitoring data to prescribe the background concentrations is no longer acceptable.

**Appendix A-3**

## Guidelines on the Use of Alternative Computer Models in Air Quality Assessment

***[The information contained in this Appendix is only meant to assist the Applicant in performing the air quality assessment. The Applicant must exercise professional judgment in applying this general information for the Project.]***

### 1. Background

1.1 In Hong Kong, a number of Gaussian plume models are commonly employed in regulatory applications such as application for specified process licences and environmental impact assessments (EIAs). These frequently used models (as listed in Schedule 1 attached; hereafter referred to as Schedule 1 models) have no regulatory status but form the basic set of tools for local-scale air quality assessment in Hong Kong.

1.2 However, no single model is sufficient to cover all situations encountered in regulatory applications. In order to ensure that the best model available is used for each regulatory application and that a model is not arbitrarily applied, the project proponent (and/or its environmental consultants) should assess the capabilities of various models available and adopt one that is most suitable for the project concerned.

1.3 Examples of situations where the use of an alternative model is warranted include:

(i) the complexity of the situation to be modeled far exceeds the capability of the Schedule 1 models; and

(ii) the performance of an alternative model is comparable or better than the Schedule 1 models.

1.4 This paper outlines the demonstration/submission required in order to support the use of an alternative air quality model for regulatory applications for Hong Kong.

### 2. Required Demonstration/Submission

2.1 Any model that is proposed for air quality applications and not listed amongst the Schedule 1 models will be considered by EPD on a case-by-case basis. In such cases, the proponent will have to provide the followings for EPD's review:

(i) Technical details of the proposed model; and

(ii) Performance evaluation of the proposed model

Based on the above information, EPD will determine the acceptability of the proposed model for a specific or general applications. The onus of providing adequate supporting materials rests entirely with the proponent.

2.2 To provide technical details of the proposed model, the proponent should submit

documents containing at least the following information:

(i) mathematical formulation and data requirements of the model;

(ii) any previous performance evaluation of the model; and

(iii) a complete set of model input and output file(s) in commonly used electronic format.

2.3 On performance evaluation, the required approach and extent of demonstration varies depending on whether a Schedule 1 model is already available and suitable in simulating the situation under consideration. In cases where no Schedule 1 model is found applicable, the proponent must demonstrate that the proposed model passes the screening test as set out in USEPA Document "Protocol for Determining the Best Performing Model" (Ref. 1).

2.4 For cases where a Schedule 1 model is applicable to the project under consideration but an alternative model is proposed for use instead, the proponent must demonstrate either that

(i) the highest and second highest concentrations predicted by the proposed model are within 2 percent of the estimates obtained from an applicable Schedule 1 model (with appropriate options chosen) for all receptors for the project under consideration; or

(ii) the proposed model has superior performance against an applicable Schedule 1 model based on the evaluation procedure set out in USEPA Document "Protocol for Determining the Best Performing Model" (Ref. 1).

2.5 Should EPD find the information on technical details alone sufficient to indicate the acceptability of the proposed model, information on further performance evaluation as specified in Sections 2.3 and 2.4 above would not be necessary.

2.6 If the proposed model is an older version of one of the Schedule 1 models or was previously included in Schedule 1, the technical documents mentioned in Section 2.2 are normally not required. However, a performance demonstration of equivalence as stated in Section 2.4 (i) would become necessary.

2.7 If EPD is already in possession of some of the documents that describe the technical details of the proposed model, submission of the same by the proponent is not necessary. The proponent may check with EPD to avoid sending in duplicate information.

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**Schedule 1**

**Air Quality Models Generally Accepted by Hong Kong Environmental Protection Department for Regulatory Applications as at 1 July 1998***

**Industrial Source Complex Dispersion Model - Short Term Version 3 (ISCST3)** or the latest version developed by U.S. Environmental Protection Agency

**California Line Source Dispersion Model Version 4 (CALINE4)** or the latest version developed by Department of Transportation, State of California, U.S.A.

**Fugitive Dust Model (FDM)** or the latest version developed by U.S. Environmental Protection Agency

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*Ref. (1): William M. Cox, "Protocol for Determining the Best Performing Model" Publication No.EPA-454/R-92-025; U.S. Environmental Protection Agency, Research Triangle Park, NC.*

* EPD is continually reviewing the latest development in air quality models and will update this Schedule accordingly

**Appendix B**

## Hydrodynamic and Water Quality Modelling Requirements

Modelling software general

1. The modelling software shall be fully 3-dimensional capable of accurately simulating the stratified condition, salinity transport, and effects of wind and tide on the water body within the model area.

2. The modelling software shall consist of hydrodynamic, water quality, sediment transport, thermal and particle dispersion modules. All modules shall have been proven with successful applications locally and overseas.

3. The hydrodynamic, water quality, sediment transport and thermal modules shall be strictly mass conserved at all levels.

4. An initial dilution model shall be used to characterize the initial mixing of the effluent discharge, and to feed the terminal level and size of the plume into the far field water quality modules where necessary. The initial dilution model shall have been proven with successful applications locally and overseas.

Model details – Calibration & Validation

1. The models shall be properly calibrated and validated against applicable existing and/or newly collected field data before their use in this study in the Hong Kong waters, the Pearl Estuary and the Dangan (Lema) Channel. The field data set for calibration and validation shall be agreed with EPD.

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 (@) | < 8 % |
| • maximum phase error at high water and low water | < 20 minutes |
| • maximum 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 |

@ Root mean square of the error including the mean and fluctuating components

shall meet the criteria at no less than 80% of the monitoring stations in the model domain

5. The consultants shall be responsible for acquiring / developing and calibration of the models for use in this study themselves. They might make reference to the models developed under the Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (Agreement No. CE 42/97). They might also propose to use other models subject to agreement with EPD.

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 be able to simulate and take account of the interaction of dissolved oxygen, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, temperature, suspended solids, contaminants release of dredged and disposed material, air-water exchange, *E. coli* and benthic processes. It shall also simulate salinity. Salinity results simulated by hydrodynamic models and water quality models shall be demonstrated to be consistent.

2. The sediment transport module for assessing impacts of sediment loss due to marine works shall include the processes of settling, deposition and re-erosion. The values of the modelling parameters shall be agreed with EPD. Contaminants release and DO depletion during dredging and dumping shall be simulated by the model.

3. The thermal model shall be based on the flow field produced by the hydrodynamic model. It shall incorporate the physical processes of thermal / cooled water discharge and abstraction flow, buoyancy effect of the thermal plume, and surface heat exchange. Dispersion of biocides in the discharge shall also be simulated with appropriate decay rates.

4. The models shall at least cover the Hong Kong waters, the Pearl Estuary and the Dangan Channel to incorporate all major influences on hydrodynamic and water quality. A fine grid model may be used for detailed assessment of this study. It shall either be linked to a far field model or form part of a larger model by gradual grid refinement. The coverage of the fine grid model shall be properly designed such that it is remote enough so that the boundary conditions would not be affected by the project. The model coverage area shall be agreed with EPD.

5. 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 shall also be able to reasonably represent coastal features existing and proposed in the project. The grid schematization shall be agreed with EPD.

Modelling assessment

1. The assessment shall include the construction and operation phases of the project. Where appropriate, the assessment shall also include maintenance dredging. Scenarios to be assessed shall cover the baseline condition and scenarios with various

different options proposed by the Applicant in order to quantify the environmental impacts and improvements that will be brought about by these options. Corresponding pollution load, bathymetry and coastline shall be adopted in the model set up.

2. Hydrodynamic, water quality, sediment transport and thermal modules, 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 the dry season and the wet season.

3. The results shall be assessed for compliance of Water Quality Objectives.

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

5. Cumulative impacts due to other projects, activities or pollution sources within a boundary to the agreement of EPD shall also be predicted and quantified.

**Appendix C**

## Implementation Schedule

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concerns to Address | Who to implement the measures? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve |
|---|---|---|---|---|---|---|---|
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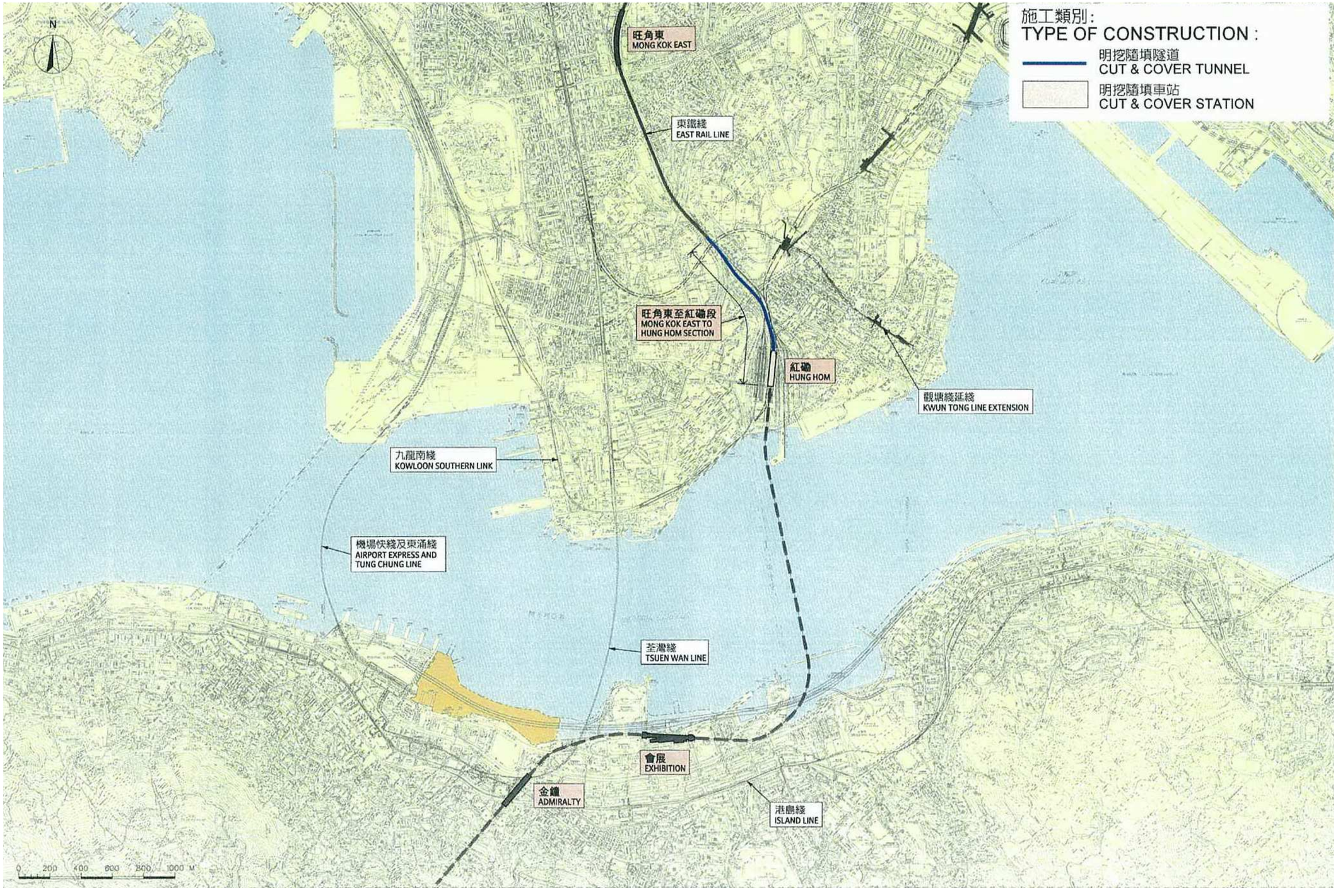


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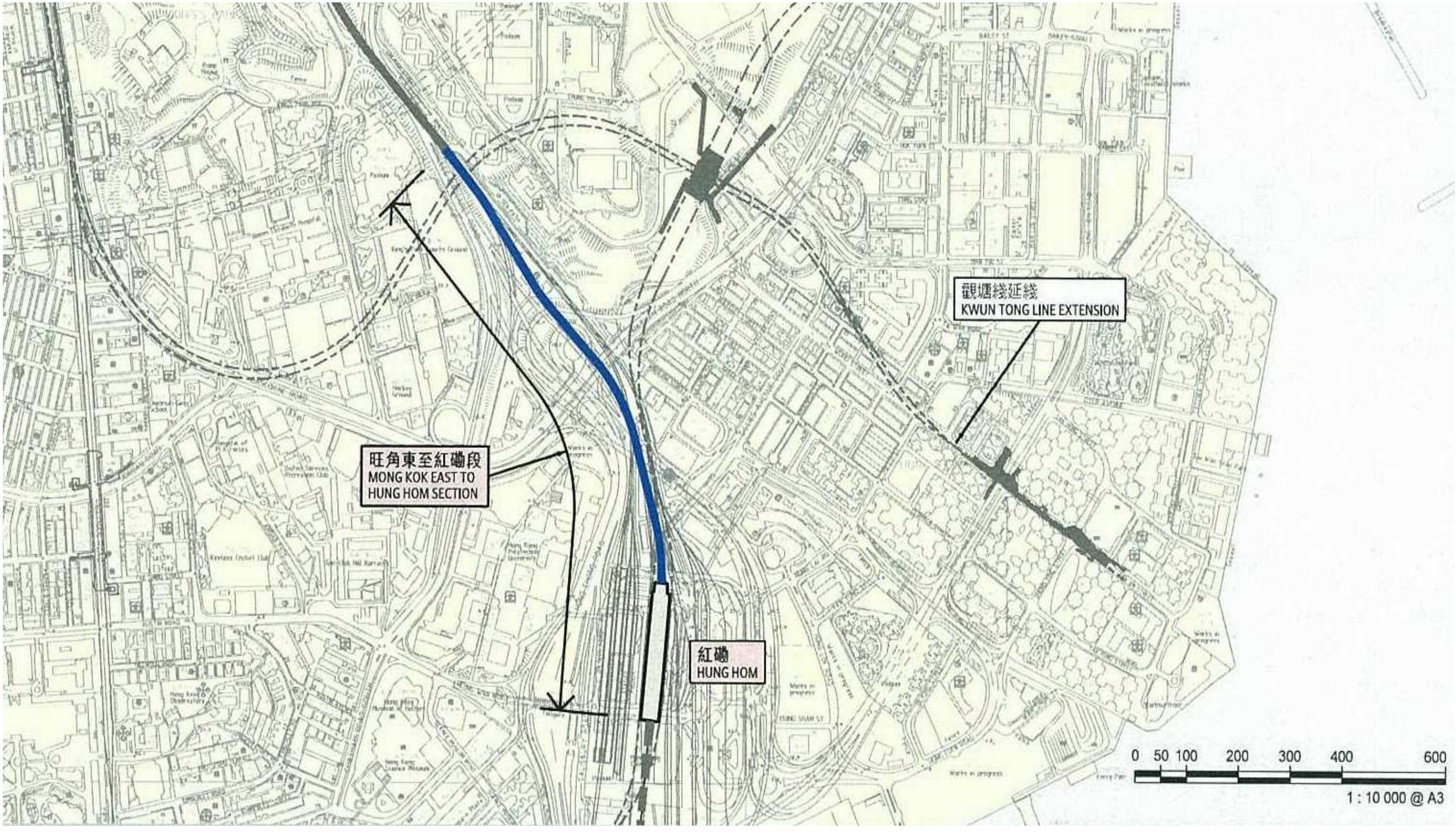
|---|---|
| **Project Title – Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom)** | **EIA Study Brief No.: ESB-192/2008** |

**Figure 1 – Location of Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom)**

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|---|---|
| **Project Title – Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom)** | **EIA Study Brief No.: ESB-192/2008** |

**Figure 2 – Location of Shatin to Central Link – Cross Harbour Section (Phase I – Mong Kok East to Hung Hom)**