Environmental Impact Assessment Ordinance (Cap. 499), Section 5 (7)

Environmental Impact Assessment Study Brief No. ESB-152/2006

Project Title : Kai Tak Development
(hereinafter referred as "the Project")

Name of Applicant : Civil Engineering and Development Department
(hereinafter referred as "the Applicant")

1. BACKGROUND

1.1 An application (No. ESB-152/2006) for an Environmental Impact Assessment (EIA) study brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 10 July 2006 with a project profile (No. PP-294/2006) (hereinafter referred as "the Project Profile").

1.2 The application is for a feasibility study for the redevelopment of the former Kai Tak Airport site and its adjoining waterfront areas at To Kwa Wan, Ma Tau Kok, Kowloon Bay and Kwun Tong. The boundary of the Project is shown in Figure 1.

1.3 The Project is a designated project in accordance with item 1 of Schedule 3 of the EIAO, which specifies an "Engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100 000". In accordance with section 5(1)(a), a person who is planning a designated project shall apply to the Director for an environmental impact assessment study brief to proceed with an environmental impact assessment study for the project. The Project also includes various individual designated projects defined under Schedule 2 of the EIAO, including at least the following (i) to (iv) identified for early stages of development:-

(i) decommissioning of the former Kai Tak Airport other than the North Apron areas (Item 1, Part II of Schedule 2 of the EIAO;

(ii) new distributor roads (Item A.1 of Part I of Schedule 2 of EIAO) serving the Tourism and Leisure Hub at Runway South;

(iii) sewage Pumping Stations serving the Tourism and Leisure Hub at Runway South (Item F.3 of Part I of Schedule 2 of EIAO);

(iv) dredging works as part of the site formation for the proposed cruise terminal (Item C.12 of Part I of Schedule 2 of EIAO); and

any individual project(s) that fall under Schedule 2 of the EIAO to be identified under section 2.1(xiii) below.

1.4 Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection (hereinafter referred as "the Director") issues this 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 developments proposed under the Project and related works 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 and associated works, and their related staged implementation;

(ii) the conditions and requirements for mitigating environmental nuisances associated with introducing the Project as a new urban development in the existing environs close to an embayed area with known pollution problems;

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

(iv) the acceptability of residual impacts after the staged as well as the full implementation of the Project, the associated works and the related proposed mitigation measures.

1.6 The Project is formerly known as the South East Kowloon Development (SEKD). There have been previous EIAO submissions, either associated with projects within the Project boundary or with previous or current development schemes for the Project or South East Kowloon Development. A list of relevant Project Profiles, EIA study briefs, approved EIA reports, approved application to apply directly for an environmental projects is included as Appendix A. These documents are available in the EIAO Register Office.

1.7 Projects listed in Appendix A may assist to identify, screen and scope potential Schedule 2 designated projects and their constituent environmental issues.

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

(i) to describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project and associated works;

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

(iii) to provide information on the consideration of alternatives to avoid or minimize the potential adverse environmental impacts on the sensitive uses at the Project and adjacent areas that may be subject to the adverse environmental impacts of the Project and associated works; to provide justifications and constraints for selecting the preferred option(s) and to describe the part environmental factors played in the selection;

(iv) to identify and quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;

(v) to identify, describe and quantify any potential landscape and visual impacts, evaluate the significance of such impacts on sensitive receivers and propose measures to avoid or mitigate these impacts;

(vi) to identify and quantify any potential losses or damage to flora, fauna and

natural habitats and to propose measures to avoid or mitigate these impacts;

(vii) to identify any negative impacts on site of cultural heritage and to propose measures to avoid or mitigate these impacts;

(viii) to identify the negative impacts and propose measures to avoid or provision of mitigation measures to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;

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

(x) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable avoidance or mitigation measures) and the cumulative effects expected to arise during the construction and operation of the Project and associated works (including associated decommissioning works, e.g., decommissioning of the former Kai Tak Airport) in relation to the sensitive receivers and potential affected uses;

(xi) to identify, assess and specify methods, measures and standards to be included in the detailed design, construction and operation of the Project and associated works (including any associated decommissioning works, e.g., decommissioning of the former Kai Tak Airport) which are necessary to mitigate these environmental impacts and cumulative effects and reduce them to the acceptable levels;

(xii) 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 provision of any necessary modification;

(xiii) to identify, within the scope of the EIA study as defined in section 3.2.1 below, any individual project(s) that fall under Schedule 2 of the EIAO; to ascertain whether the EIA study has adequately addressed the environmental impacts of those projects; and, where necessary, to identify the outstanding issues that need to be addressed in any further detailed EIA study; and

(xiv) to design and specify environmental monitoring and audit requirements to ensure 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 Environmental Impact Assessment Process (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 all the developments proposed within the boundary of the Project as shown in Figure 1, including the relevant and

representative land use plan(s) (to include any draft/final Preliminary Outline Development Plan or draft/final Recommended Outline Development Plan), and representative alternative development proposal(s) that may be recommended in the course of the EIA study, as well as other works associated with the Project. The EIA study shall cover the combined impacts of the Project and associated works, and the cumulative impacts of the existing, committed and planned developments in the vicinity of the Project in accordance with section 3.4 of the TM.

3.2.2 The EIA study shall address the likely key issues described below together with any other key issues identified during the course of the EIA study:

(i) the objective comparison of the environmental benefits and dis-benefits of different development scenarios with or without the Project, with a view to deriving the preferred options that would avoid the adverse environmental impact to the maximum extent practicable. Particular attention shall be given to the acceptability of the overall environmental condition at different stages of the Project implementation;

(ii) the potential impacts and nuisances (to include at least the poor water quality and odour from the Kai Tak Approach Channel and the Kwun Tong Typhoon Shelter) associated with introducing a large new urban development in the vicinity of an existing embayed area with known pollution problems, with the view to assess and recommend sound engineered mitigation proposal(s) to avoid or minimise such impacts and nuisances to the maximum extent practicable.

(iii) the air quality impact, including impact from the construction and operation of the Project and associated works and the air quality impacts on the Project, from the air pollutant emission sources identified according to section 3.4.5.3(iii);

(iv) the noise impact, including construction and operational noise impacts, from fixed noise sources, road traffic, railways, helicopter and heliport and marine traffic;

(v) the water quality impact caused by the Project and associated works, in particular:

- construction and operation of immersed tunnels including the proposed Trunk Road T2 at Kwun Tong Typhoon Shelter and the proposed Central Kowloon Route at Kowloon Bay;
- dredging works associated with the construction and operation (e.g. future maintenance dredging) of the proposed cruise terminal;
- works associated with construction/re-construction of seawalls and other marine structures;
- drainage diversion works;
- stormwater and sewerage works;
- overflow bypass of sewage pumping stations;
- spent cooling water discharges;
- re-alignment of submarine gas mains (if applicable);
- decommissioning of any marine structures (such as the former Kai Tak Airport fuel dolphin and associated submerged fuel pipes);
- proposed works associated with mitigation proposals for tackling odour/water/sediment quality problems at the Kai Tak Approach

Channel (KTAC), including possible opening of a gap at the former runway adjacent to the KTAC, possible sediment treatment works which may involve application of chemicals to marine sediments and/or disturbance of the marine sediments; and alternative mitigation proposals that have water quality implications (including possible use of reclamation[1] of the KTAC, interception and diversion and/or treatment of the pollution in the tidal downstream sections of the Kai Tai Development area);

- suitability of the predicted water quality for any proposed recreational use(s); and
- any other water quality key and related issues identified during the course of the EIA study.

(vi) the sewerage and sewage treatment implications, taking into account the staged implementation of planned developments, within and outside the proposed Project, which will be connected to the Kwun Tong Preliminary Treatment Works, and other Works;

(vii) the potential impacts of various types of wastes arisings, including the excavated materials from construction works, the dredged sediments and any other construction and demolition waste and chemical waste to be generated from the construction and operation of the Project and associated works;

(viii) the extent of residual land contamination associated with the historical operation of the former Kai Tak Airport, in areas to be identified and assessed within the Project boundary, with a view to recommend soil remediation measures if necessary. The assessment shall investigate and identify, amongst others, possible burn pits from historical fire training exercises, if any, and to propose remediation; the possibility of land contamination at other sites within the study area but outside the airport boundary should similarly be assessed;

(ix) the hazard to life of existing potentially hazardous sites including the Ma Tau Kok (MTK) gas works and all associated gas facilities[2], chlorine dock and other dangerous goods (DGs) facilities including the Kwun Tong DG Vehicular Ferry Pier, the Kerry DG Godown, Petrol cum LPG filling stations and dedicated LPG stations; in particular the implication that any one or combination(s) of these facilities may have on early stages of the Project development such as the Tourism and Leisure Hub at Runway South;

(x) the potential landscape and visual impacts caused by the construction and operation of the proposed development, which involves the introduction of a new urban development at a prominent location of the Victoria Harbour. The glare impacts of the proposed multi-purpose sports stadium complex and cruise terminal would also need to be addressed;

[1] Assessment of the feasibility of reclamation as part of a mitigation package should be considered in the context of the Protection of the Harbour Ordinance, giving due consideration to the "overriding public need test" that a need should only be regarded as overriding if it is compelling and present and if there is no reasonable alternative to reclamation.

[2] Associated facilities of the MTK Gas Works include the gas pigging station, naphtha unloading jetty, pressure regulating station, landing point for the two 400mm diameter submarine gas pipelines and other operational related facilities situated at a seafront site just next to the Kowloon City Ferry Pier.

(xi) the cultural and heritage impacts on historic structures and monuments such as the Kowloon City Execution Ground, the Kowloon City Public Pier, Hong Kong Flying School and Aviation Club Building, Fish Tail Rock, Sung Wong Toi Inscription Rock, Kowloon Rock together with the post, as well as historical items within the former Kai Tak Airport including two windpoles, airport pier, runway, seawall, fire station A, fire station B, fire station C and the adjacent pole and known archaeological sites which fall within the boundary of the Project;

(xii) the potential impact on ecological sensitive areas, if any, the assessment of which shall be based on a field survey of at least 4 months;

(xiii) the potential fisheries impacts, if any;

(xiv) the potential cumulative environmental impacts of the Project and associated works, through interaction or in combination with other concurrent existing, committed and planned developments in the vicinity of the Project. Particular attention shall focus on those impacts identified to have a direct bearing on the environmental acceptability of the Project.

3.3 Consideration of Alternative Options and Construction Methods

The Need of Project

3.3.1 The Applicant shall report on or provide information related to the need and justification for the Project as described in the Project Profile and outlined in section 1.2 above. The Applicant shall explain clearly the purpose and objectives of the Project and describe the scenarios with and without the Project.

Consideration of Different Development Options

3.3.2 The Applicant shall consider and present information on identified feasible alternatives other than the proposed development option(s) as presented in the Project Profile, taking into account the relevant findings of those options addressed in previous studies as well as any studies conducted to reflect the latest changes and developments identified during the course of the EIA study. A comparison of the environmental benefits and dis-benefits of possible development options, in respect of the alignments of roads or rail, built form, design, construction methods and phased or staged implementation, shall be made on the sensitive areas within the study boundary[3]. The comparison shall assist informed-decisions to be made on the recommended preferred options, which shall in principle, avoid or minimize adverse environmental impacts to the maximum practicable extent. The EIA report shall focus on and describe adequately the part that environmental factors played in arriving at the preferred development option(s) for the Project.

3.4 Technical Requirements

3.4.1 The Applicant shall conduct the EIA study to address all environmental aspects of the Project and associated works as described in sections 3.1, 3.2 and 3.3 above.

[3] The study boundary refers to the assessment area specified for various media.

The assessment shall be based on the best and latest information available during the course of the EIA study.

3.4.2 The Applicant shall include in the EIA report details of the construction programme and methodologies. The Applicant shall clearly state in the EIA report the time frame and work programmes of the Project and associated works and other concurrent projects, and assess the cumulative environmental impacts from the Project and associated works with all interacting projects, including staged implementation of the Project and associated works.

Use of Relevant Findings of Approved EIA Reports and Relevant Studies

3.4.3 The Applicant shall review all previously approved studies and EIA reports which are relevant to the Project and extract relevant information for the purpose of this EIA Study, including at least the following:

(i) Comprehensive Feasibility Study for The Revised Scheme of South East Kowloon Development (EIAO Register No. AEIAR-044/2001);

(ii) Kai Tak Airport North Apron Decommissioning EIA Report (EIAO Register No. AEIAR –002/1998)

(iii) Tseung Kwan O Development – Contract F : Grade Separated Interchange T1/P1/P2, EIA Report (EIAO Register No. AEIAR-017/1999);

(iv) Feasibility Study on the Alternative Alignment for the Western Coast Road, Tseung Kwan O, EIA Report (EIAO Register No. AEIAR-016/1999);

(v) Further Development of Tseung Kwan O Feasibility Study (EIAO Register No. AEIAR-092/2005)

3.4.4 The EIA study shall include the following technical requirements on specific impacts.

3.4.5 Air Quality Impact

3.4.5.1 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.

3.4.5.2 The Applicant shall identify and assess air pollutants to include at least existing odour sources and the prevailing odour strength that may threaten the proposed new developments of the Project, in addition to dust and any air pollutant emissions that shall arise from the construction and operation of the Project and associated works, including their staged implementation. The Applicant shall assess air pollutants concentrations with reference to the relevant sections of the guidelines in Appendices B-1 to B-3 in this EIA study brief, or other methodology to be agreed by the Director (with reference to section 4.4.2(c) of the TM) prior to commencement of the assessment(s).

3.4.5.3 The air quality impact assessment shall include the following:

(i) Determination of Assessment Area

The area for air quality impact assessment shall generally be defined by a distance of 500 metres expanded from the boundary of the scope of the EIA study as defined in sections 1.2 and 3.2. Subject to the agreement of the Director, the assessment area could be extended to include major emission sources that may have bearing on determining the environmental acceptability of the Project.

(ii) Background and Analysis of Activities

(a) Provide background information relating to air quality issues relevant to the Project, including the existing odour sources leading to the prevailing odour strength that has the potential to adversely affect the proposed new developments of the Project and associated works, description of the types of activities of the Project and associated works that may affect air quality during the construction and operation stages,

(b) Give an account, where appropriate, of the works/measures that have been considered during the course of planning the Project to abate the air pollution impact including the odour nuisance. The Applicant shall consider alternative odour abatement measures other than the "no reclamation scenario" using bioremediation of the sediment, alternative construction methods, alternative development programmes and alternative modes of operation to minimize the odour, construction and operation air quality impacts on the staged implementation of development proposals including the cruise terminal within the Tourism and Leisure Hub at the Runway South.

(c) Present the background air quality (including odour levels) in the assessment area for the purpose of evaluating the residual odour strength and any cumulative constructional and operational air quality impacts due to the new Project and associated works

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

(a) Identify and describe the representative existing, planned and committed ASRs likely be affected by the potential adverse environmental impacts caused by emission sources identified in section 3.4.5.3(iii)(b) below as arising from the Project and associated works within the assessment area (section 3.4.5.3(i)), both on-site and off-site, including those earmarked on the relevant Preliminary Outline Development Plans, Outline Zoning Plans, Outline Development Plans, Recommended Outline Development Plan, Layout Plans and other relevant published land use plans and any alternative development proposal(s) identified or recommended in the course of this EIA study. The Applicant shall select assessment points of the identified ASRs that would represent the worst impact point of these ASRs. A map clearly showing the locations and descriptions, such as names of buildings, uses and heights of the selected assessment points shall be included. The separation distances of these ASRs from the nearest emission sources shall also be given. For staged implementation of development or associated works, the Applicant

should review the development programme, and where appropriate, to avoid or reduce adverse air quality impacting on existing occupiers and occupiers of early implementation packages to the maximum extent practicable.

(b) Identify and present a list of air pollutant emission sources, including any emission sources likely to impact on the Project and the associated works, based on results of the analysis conducted under section 3.4.5.3(ii)(a) above. Activities that shall give rise to construction stage emission sources (dust) will at least include stock piling, blasting, concrete batching, and vehicle movements on unpaved haul roads within the Project area. Potential operational stage emission sources shall take into account at least the following:

- odour sources including culverts, nullahs, the "Kai Tak Approach Channel" where nullah discharges mixed with seawater, polluting discharges, and polluted sediments identified within the EIA study area and in the vicinity of and traversing the Project;
- emission sources from the San Po Kong and Kwun Tong industrial areas;
- vehicular emissions from open roads, tunnel portal and ventilation shafts;
- chimney emissions, if any, from cruise vessels mooring at the proposed cruise terminal[4]; and
- emissions from operation of the proposed heliport.

Confirmation regarding the validity of the assumptions adopted and the magnitude of the activities (e.g. volume of construction material handled, traffic mix and volume on a road etc.) shall be obtained from the relevant government departments/authorities and documented.

(c) The emissions from any associated works of the Project, and from any concurrent projects, identified as relevant during the course of the EIA study, shall be taken into account as contributing towards the overall cumulative air quality impact. The impacts as affecting the existing, planned and committed air sensitive receivers within the assessment area (section 3.4.5.3(i)) shall be assessed, based on the best information available at the time of assessment

(iv) Construction 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 Applicant anticipates that the Project will give rise to significant

[4] Assessment of chimney emission impact from cruise vessels during mooring will depend on availability of shoreside power.

construction dust impacts likely to exceed the recommended limits in the TM at the ASRs despite the incorporation of the dust control measures proposed in accordance with section 3.4.5.3(iv)(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 section 3.4.5.3(vi) below when carrying out the quantitative assessment.

(v) Operational Air Quality Impact

(a) The Applicant shall calculate the expected air pollutant concentrations at the identified ASRs based on an assumed reasonable worst-case scenario under normal operating conditions. The evaluation shall be based on the strength of the emission sources identified in section 3.4.5.3(iii)(b) above. The Applicant shall follow section 3.4.5.3(vi) below when carrying out the quantitative assessment.

(b) The air pollution impacts of future road traffic shall be calculated based on the highest emission strength from road vehicles within the next 15 years upon commencement of operation of the proposed road. The Applicant shall demonstrate that the selected year of assessment represents the highest emission scenario given the combination of vehicular emission factors and traffic flow for the selected year. The Fleet Average Emission Factors used in the assessment shall be agreed with the Director. If necessary, the Fleet Average Emission Factors shall be determined by a motor vehicle emission model such as EMFAC-HK model to be agreed with the Director prior to the commencement of the assessment (reference section 4.4.2(c) of the TM). All the traffic flow data and assumptions that used in the assessment shall be clearly and properly documented in the EIA report.

(c) If vehicular tunnels and/or full enclosures are to be proposed, it is the responsibility of the Applicant to ensure that the air quality inside these proposed structures shall comply with EPD's “Practice Note on Control of Air Pollution in Vehicle Tunnels”. When assessing air quality impact due to emissions from tunnels/full enclosures, the Applicant shall ensure prior agreement with the relevant tunnel ventilation design engineer over the amount and the types/kinds of pollutants emitted from these tunnel/full enclosures; and such assumptions shall be clearly and properly documented in the EIA report.

(d) For odour impact assessment at the Kai Tak Approach Channel and the Kai Tak Nullah, the Applicant shall specify clearly the assumptions used for determining the reasonable worst case scenario and justify the assumptions adopted in the assessment. The Applicant shall also include an assessment on the odour generation mechanism with a view to reasonably determine the existing and future emission strength of the odour source(s). The assessment methodology of the odour assessment shall be agreed by the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment..

(vi) Quantitative Assessment Methodology

(a) The Applicant shall apply the general principles enunciated in the modelling guidelines in Appendices B-1 to B-3 while making allowance for the specific characteristics of the Project. This specific methodology should 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 and a map showing all the emission sources for input to the modelling shall be presented in the EIA report. The Applicant should 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 pollutant parameters (types of pollutants and the averaging time concentrations) to be evaluated and provide explanation for selecting such parameters for assessing the impact from the Project and associated works.

(c) The Applicant shall calculate the overall cumulative air quality impact at the ASRs identified under section 3.4.5.3 (iii) 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 implications they may have on the land use. Plans of a suitable scale should be used to present pollution contours to allow buffer distance requirements to be determined accurately.

(e) If any direct noise mitigation measures would be recommended under the Project, the associated air quality implication of these measures shall be assessed. For instance, if barriers are recommended to mitigate excessive traffic noise, they may affect dispersion of air pollutants, then the implications of such traffic noise remedies on air quality impact shall be assessed. If tunnel or noise enclosures are proposed, then portal emissions of the tunnel/enclosed road sections and air quality inside the tunnel/enclosed road sections shall also be addressed. The Applicant shall highlight clearly the locations and types of agreed noise mitigating measures (where applicable), be they barriers, tunnel/road enclosure and their portals, and affected ASRs, on the contour maps for easy reference.

(vii) 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 other associated constraints on future land use planning shall be agreed with the relevant government departments/authorities and be clearly documented in the EIA report. The Applicant shall demonstrate quantitatively that the resultant impacts after incorporation of the proposed mitigating measures will comply with the criteria stipulated in section 1 of Annex 4 in the TM. The Applicant shall also justify the

assumptions adopted in the assessment for effectiveness of the proposed mitigation measures, in particular for odour assessment; address any uncertainty of the residual odour impact after mitigation by appropriate sensitivity test or scenario study; and initiate contingency methods and action plan under environmental monitoring and audit provisions for follow-up. The methodology of the sensitivity test or scenario study for odour assessment shall be agreed by the Director (with reference to section 4.4.2(c) of the TM).

(vii) Submission of Model Files

All input and output file(s) of the model run(s) shall be submitted to the Director in electronic format together with submission of the EIA report.

3.4.6 Noise Impact

3.4.6.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing both the construction and operational noise impacts arising from the Project and associated works, including their staged implementation, as stated in Annexes 5 and 13 of the TM respectively.

3.4.6.2 The noise impact assessment shall include the following :

(i) Determination of Assessment Area

The area for noise impact assessment shall generally include all areas within 300m from the boundary of the scope of the EIA study as defined in sections 1.2 and 3.2. Subject to the agreement of the Director, the assessment area could be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the boundary of the Project, provides acoustic shielding to those receivers at further distance behind. Similarly, subject to the agreement of the Director, the assessment area shall be expanded to include NSRs at distance greater than 300m from the boundaries of Project which are noise sensitive if they may be affected by the construction and operation of the Project.

(ii) Provision of Background Information and Existing Noise Levels

(a) The Applicant shall provide all background information relevant to the Project and associated works, including 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 required except as set out below.

(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 Preliminary Outline Development Plans, Outline Zoning Plans, Outline Development Plans, Recommended Outline Development Plan, Layout Plans and other relevant published land use plans, including any alternative development proposal(s) identified or recommended in the course of the EIA study. The photographs of all existing NSRs shall be

appended to the EIA report.

(b) The Applicant shall select assessment points to represent all identified NSRs for carrying out quantitative noise assessment described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment. A map showing the location and description such as name of building, use, and floor of each and every selected assessment point shall be given. For planned noise sensitive land uses without committed site layouts, the Applicant can use the relevant planning parameters to work out representative site layouts for operational noise assessment purpose. However, such assumptions together with any constraints identified, such as setback of building, building orientation, extended podium, shall be agreed with the relevant responsible parties including Planning Department and Lands Department in accordance with section 6.3 of Annex 13 of the TM.

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

(a) The Applicant shall provide an inventory of noise sources, including representative construction equipment for construction noise assessment such as for tunneling and other construction works, and traffic flow/fixed plant equipment, as appropriate, for operational noise assessment. Confirmation on the validity of the inventory shall be obtained from the relevant government departments/authorities and documented.

(v) Construction Noise Assessment

(a) The assessment shall cover the cumulative noise impacts due to the construction works of the Project and any other relevant 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 sections 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) To minimize the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable. In case blasting works will be involved, it should be carried out, as far as practicable, outside the sensitive hours of 7 p.m. to 7 a.m. on Monday to Saturday and any time on a general holiday, including Sunday. For blasting that must be carried out during the above-mentioned sensitive hours, the noise impact associated with the removal of debris and rocks should be fully assessed and adequate mitigation measures should be recommended to reduce the noise impact as appropriate.

(d) If tunneling works will be involved, noise impact (including air-borne noise and ground-borne noise) associated with the operation of powered mechanical equipment, in particular tunnel boring machine or equivalent, shall be assessed. If tunnel boring machine is used and it is likely that

ground-borne noise will affect NSRs, the criteria and assessment methodology shall be agreed with the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

(e) If the unmitigated construction noise levels are found exceeding the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including movable barriers, enclosures, quieter alternative methods, re-scheduling and restricting hours of operation of noisy task) to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance shall be given.

(f) The Applicant shall formulate a reasonable 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 in 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 the construction noise impact assessment for restricted hours, the Noise Control Authority will process the Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary conditions/situations. This aspect should be explicitly stated in the noise chapter and the conclusions and recommendations chapter in the EIA report.

(vi) Operational Noise Assessment

(a) Rail Noise

(a1) The Applicant shall assess the impacts due to the operation of the proposed Shatin-to-Central Link and the associated facilities within the "Assessment Area" in the course of the EIA study, with respect to the acceptable levels contained in Table 1A in Annex 5 in the TM. The assessment methodology shall be agreed with the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

(a2) In assessing the noise level, the Applicant shall take into consideration railway traffic data, railway design, type of rolling stock, and allow for deterioration in rail and rolling stock condition from brand new to an operating level, the reasonable worst case scenario and any other planned noise sources. Quantitative assessment at the identified NSRs for different alignment of the rail shall be compared against the relevant criteria or limits.

(a3) Based on the above noise assessment result, the Applicant shall define the constraints including assumed configuration of the railway (e.g. underground, viaduct or at grade), and make recommendations for noise amelioration/direct mitigation measures for any existing or planned NSR which would be subject to predicted cumulative noise level in excess of the relevant planning criteria and statutory limits in the appropriate design year.

(b) Fixed Noise Sources

(b1) Assessment of Fixed Noise Levels

The Applicant shall identify any fixed noise sources within the "Assessment Area", including at least any permanent and temporary industrial noise sources, pumping stations, electrical substation, bus terminus, railway station, railway depot, sewage treatment plant, open car/lorry park, refuse transfer station, public filling barging point, public cargo working area, concrete batching plants, construction material handling facilities, fire station, ambulance depot, stadium(s), cruise terminal and heliport facilities, and calculate the expected noise using standard acoustics principles. Calculations for the expected noise shall be based on assumed plant inventories and utilization schedule for the reasonable worst case scenario. The Applicant shall calculate the noise levels taking into account correction of tonality, impulsiveness and intermittence in accordance with the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites issued under the Noise Control Ordinance.

(b2) Presentation of Noise Levels

The Applicant shall present the noise levels in Leq (30 min) at the NSRs at various representative floor levels (in m P.D.) on tables and plans of suitable scale.

A quantitative assessment at the NSRs for the fixed noise source(s) shall be carried out and compared against the criteria set out in Table 1A of Annex 5 of the TM. For noise matters not fully listed in Table 1A of Annex 5 of the TM, the criteria and assessment methodology shall be agreed with the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

(b3) Proposals for Noise Mitigation Measures

The Applicant shall propose direct mitigation measures within the Project limits in all situations where predicted noise level exceeds criteria set out in Table 1A of Annex 5 of the TM to protect affected NSRs.

(c) Road Traffic Noise

(c1) Calculation of Noise Levels

The Applicant shall analyze the scope of the proposed road alignment(s) to identify appropriate new and existing road sections for the purpose of traffic noise impact assessment. In determining whether the traffic noise impact due to a road improvement project/work is considered significant, detailed information with respect to factors including at least the change of nature of road, change of alignment and change of traffic capacity or traffic composition, shall be assessed. The traffic noise impact shall be considered significant if the traffic noise level with all of the road projects is greater than that without all of the road projects at the design year by 1.0 dB(A) or more. Figures showing extents of new

roads and existing roads shall be provided in the EIA report.

The Applicant shall calculate the expected road traffic noise using methods described in the U.K. Department of Transport's "Calculation of Road Traffic Noise" (1988). Calculations of future road traffic noise shall be based on the peak hour traffic flow in respect of the maximum traffic projection within a 15 years period upon commencement of operation of the proposed road works. The Applicant shall calculate traffic noise levels in respect of each road section and the overall noise levels from combined road sections (both new and existing) at NSRs.

The EIA report shall contain sample calculations and input parameters for 10 assessment points as requested by the Director. Furthermore, the Applicant shall provide the input data set of the traffic noise model in the format of electronic files in the EIA study. The Applicant shall prepare and provide drawings (i.e. road-plots of the traffic noise model) of appropriate scale to show the road segments, topographic barriers, and assessment points of sensitive receivers input into the traffic noise model.

The Applicant shall provide input data sets of traffic noise prediction model adopted in the EIA study as requested by the Director for the following scenarios :

(1) unmitigated scenario at the assessment year;

(2) mitigated scenario at the assessment year; and

(3) prevailing scenario for indirect technical remedies eligibility assessment.

The data shall be in electronic text file (ASCII format) containing information on road segments, barriers and noise sensitive receivers. The data structure of the above file shall be agreed with the Director. CD-ROM(s) containing the above data shall be attached to the EIA report.

(c2) Presentation of Noise Levels

The Applicant shall present the prevailing and future traffic noise levels in L_{10} (1hour) at the NSRs at various representative floor levels in (m P.D.) on tables and plans of suitable scale.

A quantitative assessment at the NSRs for the proposed road alignments shall be carried out and compared against the criteria set out in Table 1A of Annex 5 of the TM. The potential noise impact of the Project shall be quantified by estimating the total number of dwellings, classrooms and other noise sensitive elements that will be exposed to noise levels exceeding the criteria set in Table 1A of Annex 5 of the TM.

(c3) Proposals for Noise Mitigation Measures

After rounding of the predicted noise levels according to the U.K.

Department of Transport's "Calculation of Road Traffic Noise" (1988), the Applicant shall propose direct mitigation measures in all situations where the predicted traffic noise level exceeds the criteria set in Table 1A of Annex 5 in the TM by 1 dB(A) or more. The direct mitigation measures listed under Section 6.1 of Annex 13 of the TM, including the option of alternative land use arrangement, shall be thoroughly explored and evaluated with a view to reducing the noise level at the NSRs concerned to the level meeting the relevant noise criteria. The feasibility, practicability, programming and effectiveness of the recommended mitigation measures shall be assessed in accordance with section 4.4.2(k) of the TM. Specific reasons for not adopting certain direct mitigation measures in the design to reduce the traffic noise to a level meeting the criteria in the TM or to maximize the protection for the NSRs as far as possible should be clearly and specifically quantified and laid down.

Following the guiding principles set out in the Legislative Council Paper (LC Paper no. CB(1)755/02-03(01), copy in Appendix C) prepared by ETWB in January 2003, sections of barriers proposed to protect existing NSRs shall be differentiated clearly from those proposed for the protection of future or planned NSRs as the latter is only required to be constructed before the occupation of the planned NSRs. To facilitate the phased implementation of the barriers under this principle, a barrier inventory showing intended NSRs (i.e. existing NSRs as distinct from planned NSRs) to be protected by different barrier sections to achieve different extent of noise reduction (to be quantified in terms of how many dB(A)) should be provided.

The total number of dwellings, classrooms and other noise sensitive element that will benefit from and be protected by the provision of direct mitigation measures should be provided. In order to clearly present the extents/locations of the recommended noise mitigation measures, plans prepared from 1:1,000 or 1:2,000 survey maps showing the mitigation measures (e.g. enclosures/barriers, low noise road surfacing) shall be included in the EIA report.

The total number of dwellings, classrooms and other noise sensitive elements that will still be exposed to noise above the criteria with the implementation of all recommended direct mitigation measures shall be quantified. The Applicant shall provide in the EIA report the information of the recommended noise mitigation measures (such as barrier types, nominal dimensions at different cross-sections, extents/locations, lengths, mPD levels of barriers) in electronic format as agreed by the Director.

In case where a number of the NSRs cannot be protected by the recommended direct mitigation measures, the Applicant shall identify and estimate the total number of existing dwellings, classrooms and other noise sensitive elements which may qualify for indirect technical remedies under the Executive Council directive "Equitable Redress for Persons Exposed to Increased Noise Resulting from the Use of New Roads", the associated costs and any implications for such implementation. For the purpose of determining the eligibility of the

affected premises for indirect technical remedies, reference shall be made to the following set of three criteria :

(1) the predicted overall noise level at the NSR from the new road together with other traffic noise in the vicinity must be above a specified noise level (e.g. 70 dB(A) for domestic premises and 65 dB(A) for education institutions, all in L_{10}(1hr));

(2) the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, i.e. the total traffic noise level existing before the works to construct the road were commenced; and

(3) the contribution from the new road to the increase in the predicted overall noise level must be at least 1.0 dB(A).

(d) Helicopter Noise Impacts

(d1) The Applicant shall carry out assessment of the noise impacts arising from the operation of the proposed heliport and related off site facilities with respect to the criteria set in Table 1A of Annex 5 of the TM. The impact shall cover helicopter operation at the heliport and during its approach and departure from the heliport. Where applicable, noise contours should be provided to facilitate appreciation of the extent of the potential noise impacts. The Applicant shall evaluate the reasonable worst-case scenarios in terms of flight types, flight paths, flight frequency and flight hours. For noise matters not fully listed in Table 1A of Annex 5 of the TM, the criteria and assessment methodology shall be agreed with the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

(d2) The Applicant shall propose direct mitigation measures in all situations where the noise level exceedances are predicted following the principle of Section 6 of Annex 13 of the TM such as alternative land use arrangement, alternative siting or treatment at source. The total number of noise sensitive receivers that will benefit from and be protected by the provision of direct mitigation measures should be provided. The total number of other noise sensitive receivers that will still be exposed to noise above the criteria with the implementation of all recommended direct mitigation measures shall be quantified.

(e) Marine Traffic Noise Impacts (include noise from typhoon shelters)

(e1) The Applicant shall assess marine traffic noise impacts including at least noise from operation activities on the moored vessels in typhoon shelters and manoeuvring of vessels including cruise vessels during operational phase of the proposed development. For noise matters not fully listed in Table 1A of Annex 5 of the TM, the criteria and assessment methodology shall be agreed with the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

(e2) The Applicant shall make recommendations for direct mitigation measures for an existing or planned NSR which would be subject to predicted noise impacts from marine traffic and typhoon shelters.

(vii) Assessment of Side Effects and Constraints

The Applicant shall identify, assess and propose means to minimize any side effects and to resolve any potential constraints due to the inclusion of any recommended direct mitigation measures.

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

For planned noise sensitive uses which will still be affected even with all practicable direct mitigation measures in place, the Applicant shall propose, evaluate and confirm the practicality of additional measures including building setback within the planned noise sensitive uses and shall make recommendations on how these noise sensitive uses will be designed for the information of relevant parties.

The Applicant shall take into account agreed environmental requirements/ constraints identified by the study to assess the development potential of concerned sites which shall be made known to the relevant parties.

(ix) Consideration of Mitigation Measures

In accordance with section 6 of Annex 13 of the TM, where the predicted noise impacts exceed the applicable noise criteria, direct mitigation measures as shown below shall be considered and evaluated in an appropriate manner:

(a) alternative land use arrangement
(b) alternative siting
(c) screening by noise tolerant buildings
(d) setback of buildings
(e) decking over
(f) extended podium
(g) building orientation
(h) treatment of source
(i) alternative alignment
(j) noise barrier/enclosure
(k) special building design
(l) architectural features/balcony
(m) open-textured road surfacing

3.4.7 Water Quality Impact

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

3.4.7.2 The "assessment area" for the water quality assessment shall include all areas within and 300m beyond the boundary of the scope of EIA study as described in section 3.2.1 above, plus the Victoria Harbour Water Control Zone (WCZ), the Eastern

Buffer WCZ and the Western Buffer WCZ as declared under the Water Pollution Control Ordinance. This assessment area shall include existing and new drainage system and any associated water system(s) affected by the construction and operation of the Project and associated works.

3.4.7.3 The water quality impact assessment shall include the following major areas of concern:

(a) The water quality impacts on Victoria Harbour and sensitive receivers affected by the construction and operation of the proposed developments and associated works. These impacts shall include at least elevation in suspended solids; release of organic and inorganic contaminants and nutrients resulting from activities to include:

- dredging of marine sediment;
- filling or dumping activities;
- the immersed tunnel and the associated works;
- re-alignment of submarine gas mains;
- construction site run-off;
- non-point source discharge;
- sediment treatment;
- drainage diversion works;
- opening a gap at the former runway;
- stormwater and sewerage works;
- overflow of sewage pumping stations;
- spent cooling water discharges.

(b) The possible nuisance to existing and planned future activities and beneficial uses on introducing developments in an existing embayed area with poor water and sediment quality.

(c) The influence of changes in shoreline configurations to hydrodynamic regime and water quality in Victoria Harbour due to change of land form (e.g., opening a gap at the former runway) and seabed levels arising from construction and operation of the Trunk Road T2 and Central Kowloon Route, and any other Project and placement of bridge structures, cruise terminal and any works associated with construction/re-construction of seawalls and other marine structures.

3.4.7.4 The Applicant shall identify and analyse physical, chemical and biological disruptions of marine water, coastal water, and drainage system arising from the construction and operation of the proposed developments and associated works.

3.4.7.5 The Applicant shall predict, quantify and assess any water quality impacts arising from the proposed developments and associated works on the water system(s) and the sensitive receivers Possible impacts shall include but not be limited to changes in hydrology, flow regime, sediment erosion and deposition pattern; change in water and sediment quality due to any proposed works associated with opening a gap at the former runway, the proposed immersed tunnel, the proposed Cruise Terminal and works associated with construction/re-construction of seawalls and other marine structures, dredging of marine sediment, filling activities, sediment treatment, drainage diversion works, stormwater and sewerage works, overflow of sewage pumping stations, spent cooling water discharges, and the consequential effects on

flora and fauna due to such changes in the affected water bodies.

3.4.7.6 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 pollutant and sediment loading. Essentially, the assessment shall address the following :

(a) Collection and review of background information on the affected existing and planned water systems their respective catchments and sensitive receivers which might be affected by the Project and associated works during construction and operation.

(b) Characterization of water and sediment quality of the water systems and sensitive receivers which might be affected by the Project and associated works during construction and operation based on existing information or site survey and tests as appropriate. If sediment treatment by application of chemicals will be adopted, seawater samples shall be collected to establish baseline water quality;

(c) Identification and analysis of relevant existing and planned future activities and beneficial uses related to the affected water system(s) and identification of all water sensitive receivers within the assessment area, including typhoon shelters and seawater intakes. The Applicant shall refer to, *inter alia*, those developments and uses earmarked on the relevant Preliminary Outline Development Plans, Outline Zoning Plans, Recommended Outline Development Plan and Layout Plans; and land uses and implementation programmes to be recommended under the Project.

(d) Identification of pertinent water and sediment quality objectives and establishment of other appropriate water and sediment quality criteria or standards for the water system(s) and all the sensitive receivers identified in (a), (b) and (c) above, including ecological and fisheries sensitive receivers for the assessments covered in sections 3.4.14 and 3.4.15. The Applicant shall make reference to Water Quality Objectives (for Recreation and Related Uses) in Victoria Harbour Water Control Zone as set out in Appendix F.

(e) Identification of any alteration of water courses, drainage systems, change in shoreline (e.g., change of land form due to opening a gap at the former runway) or bathymetry (e.g., change of seabed level due to the Trunk Road T2, Central Kowloon Route and cruise terminal), change of hydrodynamic regimes, change of catchment types or areas.

(f) Identification and quantification of existing and likely future water and sediment pollution sources, including at least pollution flow and load in existing storm drains, outfalls and nullahs discharged into Kai Tak Nullah, Kai Tak Approach Channel, Kwun Tong Typhoon Shelter or Victoria Harbour within the assessment area, secondary treated effluent discharged from Sha Tin Sewage Treatment Works and Tai Po Sewage Treatment Works into Kai Tak Nullah, former Kai Tak Airport fuelling system 'dolphin' and related submarine pipelines, point discharges and non-point sources within the assessment area to surface water runoff, sewage discharge generated from the Project. An emission inventory on the quantities and characteristics of all

these existing and likely future pollution sources in the assessment area shall also be provided. Field investigation and laboratory tests, as appropriate, shall be conducted to fill any information gaps.

Impact Prediction

(g) Prediction and quantification by mathematical modelling or other technique approved by the Director, of the impacts on the water system and the sensitive receivers due to those alterations and changes identified in (e) and the pollution sources identified in (f). Existing and likely future pollution reduction due to drainage/sewerage improvement, drainage/sewerage mis-connection rectification, enhancement of treated effluent discharges, and dry weather flow interception to be agreed by the Director shall be estimated and taken into account in the impact prediction. The mathematical modelling requirements are set out in Appendix D of this Study Brief. The prediction shall take into account and include likely different construction stages or sequences, and different operational stages.

(h) Assessment of the cumulative impacts due to other related concurrent and planned projects, activities or pollution sources within a boundary around the study area to be agreed by the Director prior to commence of the assessment, that may have a bearing on the environmental acceptability of the Project. This shall include the potential cumulative construction and operational water quality impact arising from, *inter alia*, the associated works of the Project, the activities and planned projects to be approved by the Director when the programme of the Project and associated works can be confirmed by the Applicant.

Stormwater Pollution

(i) Analysis on the provision and adequacy of the existing and planned future facilities to reduce pollution arising from the polluted stormwater drainage system and surface water run-off identified in (f) above. Analysis on the water quality impact should also be addressed

Sediment Pollution

(j) Analysis on the adequacy of the sediment treatment in Kai Tak Nullah, Kai Tak Approach Channel and Kwun Tong Typhoon Shelter to reduce odour impact on the existing and planned future activities and beneficial uses in the adjacent areas. The relationship amongst odour emission, water quality (in particular dissolved oxygen level), and sediment quality shall be established. The Applicant shall justify that the established odour/water/sediment relationship is suitable and applicable to the Kai Tak situation making reference to past studies that have been carried out.

Dredging, Filling and Dumping

(k) Identification and quantification of dredging, filling, sediment/mud transportation and, disposal activities and requirements. Potential fill source and dumping ground to be involved shall also be identified. Field investigation, sampling and chemical laboratory tests to characterize the sediment/mud concerned shall be conducted as appropriate. The potential for

the release of contaminants during dredging shall be addressed using the chemical testing results derived from sediment and marine water samples collected on site and relevant historic data. Appropriate laboratory tests such as elutriate tests in accordance with the United States of Army Corps of Engineers (USACE) method and sediment pore water (interstitial water) analyses shall be performed on the sediment samples to simulate and quantify the degree of mobilization of various contaminants such as metals, oxygen demands, ammonia, nutrients, trace organic contaminants (including Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Tributyltin (TBT) and chlorinated pesticides) into the water column during dredging. The ranges of parameters to be analyzed; the number, location, depth of sediment, type and methods of sampling; sample preservation; and chemical laboratory test methods to be used shall be subject to the approval of the Director. The Applicant shall also assess the pattern of the sediment deposition and the potential increase in turbidity and suspended solid levels in the water column and at the sensitive receivers due to the disturbance of sediments during dredging, filling and dumping.

(l) Prediction, quantification and assessment of impacts on the hydrodynamic regime, water and sediment quality of the water system(s) and the sensitive receivers due to the activities identified above. The prediction and quantification of impacts caused by, among others, sediment re-suspension and contaminant release shall be carried out by mathematical modelling (see modelling requirements set out in Appendix D of this Study Brief) or other techniques to be approved by the Director.

(m) Recommendation of appropriate mitigation measures to avoid or minimize the impacts identified above, in particular suitable mud dredging and filling methods shall be recommended to mitigate any adverse impacts. The residual impacts on the water system(s) and the sensitive receivers with regard to the relevant water and sediment quality objectives, criteria, standards or guidelines shall be assessed and quantified by mathematical models as set out in Appendix D of this Study Brief or other techniques to be approved by the Director.

(n) Identification and evaluation of the best practicable dredging and filling methods to minimize marine mud disturbance and dumping requirements and demand for fill sources based on the criterion that the existing marine mud shall be left in place and not to be disturbed as far as possible.

(o) Evaluation of the impacts due to release of the interstitial water and associated contaminants to the water column and ground water if wick drain installation is used to speed up consolidation of mud.

(p) Predication and quantification of cumulative impacts due to other dredging, filling or dumping activities within a boundary around the Study Area to be agreed by the Director prior to commence of the assessment.

Mitigation

(q) The Applicant shall devise mitigation measures to avoid or minimize the impacts identified. The residual impacts on the water system(s) and the

sensitive receivers with regard to the appropriate water and sediment quality criteria, standards and guidelines shall be assessed and quantified.

(r) 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 (Professional Persons Environmental Consultative Committee) Practice Notes No. 1/94 on construction site drainage.

3.4.8 Sewerage and Sewage Treatment Implications

3.4.8.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing impacts of the Project and associated works on the public sewerage, sewage treatment and disposal facilities as stated in section 6.5 in Annex 14 of the TM.

3.4.8.2 The Applicant shall study and assess the impacts of the sewage discharge from the Project and associated works on the sewerage system of the South East Kowloon. The assessment shall include the following :

(i) investigate and review the existing, committed and planned sewerage networks and sewage treatment and disposal facilities of the Project;

(ii) assess the sewerage system of the Project, including sewage treatment and disposal facilities, taking into account the projected flows from the South East Kowloon area;

(iii) assess the impact of the Project on the existing, committed and planned South East Kowloon sewerage system and sewage treatment and disposal facilities;

(iv) prepare a Sewerage Master Plan for the Project using the latest version of the computerized analysis technique “INFOWORKS” or equivalent computer software agreed by the Director;

(v) identify sewerage upgrading works required for the South East Kowloon sewerage network, sewage treatment and disposal facilities;

(vi) recommend interim upgrading of sewage treatment and disposal facilities and sewerage network as appropriate and prepare programme and cost estimate for such interim works;

(vii) recommend permanent upgrading to the sewage treatment and disposal facilities and sewerage network, and develop a prioritized programme for implementation and prepare cost estimates;

(viii) take note of the findings and recommendations of “The Review of Central and East Kowloon Sewerage Master Plans Study”.

(ix) take note and agree with the Director any relevant development arising from the Action Plan for Tackling Water-Related Pollution Problems at the Kai Tak Approach Channel by relevant department(s) [Sewerage Infrastructure Related] during the course of the EIA study.

3.4.9 Waste Management Implications

3.4.9.1 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.

3.4.9.2 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 and associated works, based on the sequence and duration of these activities.

(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 which 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 all 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 options for each type of waste shall be described in detail. The disposal method recommended for each type of waste shall take into account the result of the assessment in (c) below.

(c) The impact caused by handling (including labeling, packaging and storage), collection, and reuse/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) Dredging, Filling and Dumping

Identification and quantification of all dredging, fill extraction, filling, reclamation, mud/sediment transportation and disposal activities and requirements. Potential fill source and 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 sediments 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 seriously contaminated sediment which requires special treatment/disposal is confirmed, the Applicant shall identify the most appropriate treatment and/or disposal arrangement and demonstrate its feasibility.

3.4.10 Land Contamination Impact

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

3.4.10.2 The "Assessment Area" for land contamination impact shall include all areas within the boundary of the former Kai Tak International Airport as described in section 3.2.1. If the land contamination impact of a certain part of the development area has been adequately assessed in any approved environmental impact assessment reports in the EIA Ordinance Register or any contamination assessment reports/remediation action plans approved by the Director in accordance with the relevant Practice Note for Professional Persons or guidelines issued by the EPD, the Applicant shall make reference to such reports and confirm with the Director whether the information and findings of such reports are still relevant and valid for the EIA study.

3.4.10.3 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, change of land use(s) and the like).

3.4.10.4 During the course of the EIA study, the Applicant shall submit a contamination assessment plan (CAP) to the Director for agreement prior to conducting the contamination impact assessment of the relevant land or site(s) suspected to contain land contaminant(s) that shall require remediation. The CAP shall include proposals 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).

3.4.10.5 Based on the CAP agreed with the Director, the Applicant shall conduct a land contamination impact assessment. If land contamination is confirmed, a remedial action plan (RAP) shall be prepared to formulate necessary remedial measures.

3.4.11 Hazard to Life

3.4.11.1 The Applicant shall follow the criteria for evaluating hazard to life as stated in Annex 4 of the TM. The methodology of hazard assessment shall be agreed and approved by the Director (with reference to section 4.4.2(c) of the TM) prior to the commencement of the assessment.

Potentially Hazardous Installation sites (i.e. Ma Tau Kok Gas Works North Plant (MTKGWNP) and its associated facilities[5])

3.4.11.2 The Applicant shall carry out hazard assessment to evaluate the risk associated to construction and operation of the Project due to operations of the MTKGWNP and its associated facilities. The hazard assessment shall include the following:

(i) Identify hazardous scenarios associated with the MTKGWNP and its associated facilities and then determine a set of relevant scenarios to be included in a QRA;

(ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;

(iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and

(iv) Identify and assess practicable and cost-effective risk mitigation measures, including feasibility of adopting alternative land uses within the boundary of the Project for risk reduction purpose.

(v) Identify and assess practicable and cost-effective risk mitigation measures or alternative measures to be carried out for the construction and operational stage of the Project in case the alignment of the two existing 400mm submarine gas pipelines are required to be changed and the landing points at both pipe ends are required to be relocated.

Chlorine Dock

3.4.11.3 This study shall confirm whether the existing chlorine dock near the Kwun Tong Typhoon Shelter will be decommissioned and relocated outside the scope of the EIA study as defined in section 3.2.1 above without any interim reprovisioning within the proposed development. If co-existence of the chlorine dock and future land uses of the Project is anticipated, the Applicant shall carry out hazard assessment to evaluate the risk to future occupants due to operations of the chlorine dock. The hazard assessment shall include the following:

(i) Identify hazardous scenarios associated with the chlorine dock and then determine a set of relevant scenarios to be included in a QRA;

(ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;

(iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and

(iv) Identify and assess practicable and cost-effective risk mitigation measures.

[5] Associated gas facilites for the MTKGW include the gas pigging station, naphtha unloading jetty, pressure regulating station, landing point for the two 400mm diameter submarine gas pipelines and other operational related facilities situation at a seafront site just next to the Kowloon City Ferry Pier

Other dangerous goods (DGs) facilities including the Kwun Tong DG Vehicular Ferry Pier, the Kerry DG Godown, petrol cum LPG stations[6] and dedicated LPG filling stations[7]

3.4.11.4 The Applicant shall carry out hazard assessment to evaluate the risk to future occupants due to operations the Kwun Tong DG Vehicular Ferry Pier, the Kerry DG Godown, petrol cum LPG stations and dedicated LPG stations. As part of the assessment, the Applicant shall also confirm whether the Kerry DG Godown will be decommissioned or relocated outside the scope of the EIA study as defined in section 3.2.1 above without any interim reprovisioning within the proposed development. The hazard assessment shall include the following for each DG facility:

(i) Identify hazardous scenarios associated with the above DG facilities and then determine a set of relevant scenarios to be included in a QRA;

(ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;

(iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and

(iv) Identify and assess practicable and cost-effective risk mitigation measures.

Explosives

3.4.11.5 The Applicant shall investigate alternative construction method to avoid the use of explosives. If there is use of explosives for the construction activities and the storage or blasting location is in close proximity to populated areas and/or Potentially Hazardous Installation sites (i.e. MTKGW and its associated facilites) and/or other dangerous good (DG) facilites (i.e., the Kwun Tong DG Vehicular Ferry Pier (KTDGVFP), the Kerry DG Godown and petrol cum LPG stations [at 4 Kai Fuk Road, Kowloon Bay (West Bound) and 8 Kai Fuk Road, Kowloon Bay (West Bound) and the chlorine dock], the Applicant shall carry out hazard assessment as follows:

(i) Identify hazardous scenarios associated with the transport, storage and use of explosives and then determine a set of relevant scenarios to be included in a QRA;

(ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;

(iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and

(iv) Identify and assess practicable and cost-effective risk mitigation measures.

[6] These include 5 petrol cum LPG stations within boundary or in close vicinity of the Project (3 within the boundary of the Project and 2 outside). The addresses of the 3 stations located within the boundary of the Project are (a)Wang Chin Street, Kowloon Bay, (b) 4 Kai Fuk Road, Kowloon Bay (West Bound) and (c) 8 Kai Fuk Road, Kowloon Bay (West Bound). The addresses of the 2 stations located outside the boundary of the Project are (a) 7 Kai Fuk Road, Kowloon Bay (East Bound) and (b) 5 Kai Fuk Road, Kowloon Bay (East Bound).

[7] These include 2 dedicated LPG stations within vicinity of the Project. Their addresses are (a) Wai Lok Street, Kwun Tong and (b) Cheung Yip Street, Kowloon Bay

3.4.12 Impact on Cultural Heritage

3.4.12.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing the cultural heritage impacts as stated in Annexes 10 and 19 of the TM respectively, Criteria for Cultural Heritage Impact Assessment in Appendix E1, Guidelines for Handling of Archaeological Finds and Archives in Appendix E2 and Guidelines for Marine Archaeological Investigation (MAI) at Appendix E3.

3.4.12.2 The cultural heritage impact assessment shall include archaeological impact assessment and built heritage impact assessment.

3.4.12.3

(i) Archaeological Impact Assessment

The Applicant shall engage qualified archaeologist(s) to review the archaeological potential (both terrestrial and marine) of the Project Area taking the results of previous archaeological investigations and other background of the site into account. In case the existing information is inadequate or where the Project or associated works has not been adequately studied before, the archaeologist(s) shall conduct the investigations (both terrestrial and marine) to assemble data.

The archaeologists shall obtain licences from the Antiquities Authority prior to commence of archaeological field investigations. Details of the archaeological impact assessment shall be agreed with the Antiquities Authority or the Director prior to the commencement of the assessment (with reference to Section 4.4.2(c) of the TM) .

Based on existing and collected data, the Applicant shall evaluate whether the proposed development(s) associated with the Project and associated works is(are) acceptable from archaeological preservation point of view. In case adverse impact on archaeological resources cannot be avoided, appropriate mitigation measures should be designed.

The Applicant shall draw necessary reference to relevant sections of the Criteria for Cultural Heritage Assessment at Appendix E1, Guidelines for Handling of Archaeological Finds and Archives at Appendix E2 and Guidelines for Marine Archaeological Investigation (MAI) at Appendix E3.

(ii) Built Heritage Impact Assessment

The Applicant shall conduct a built heritage impact assessment (BHIA), taking the results of previous BHIA and other background of the site into account, to identify known and unknown heritage items within the assessment area (as described in section 1.2 and 3.2) that may be affected by the Project and its associated works to assess the direct and indirect impacts on heritage items. Appropriate mitigation measures should be recommended in the BHIA.

The Applicant shall draw necessary reference to relevant sections of the Criteria for Cultural Heritage Assessment at Appendix E1.

3.4.13 Landscape and Visual Impact

3.4.13.1 The Applicant shall follow the criteria and guidelines as stated in Annexes 10 and 18 of the TM and EIAO Guidance Note No. 8/2002 on "Preparation of Landscape and Visual Impact Assessment under the Environmental Impact Assessment Ordinance" for evaluating and assessing landscape and visual impacts of the Project and associated infrastructure and works, such as noise barriers and above ground structures (e.g., ventilation buildings, tunnel portals, etc.), during both construction and operational stages. The assessment shall take into account all existing and planned land uses and sensitive receivers.

3.4.13.2 The area for the landscape impact assessment shall include all areas within 500 metres from the boundary of the scope of the EIA study as described in section 1.2 and 3.2 above. The area for the visual impact assessment shall be defined by the visual envelope from the Project and associated works. The defined visual envelope must be shown on a plan.

3.4.13.3 In the landscape impact assessment, the Applicant shall describe, appraise, analyze and evaluate the existing and planned landscape resources and character of the assessment area. Annotated oblique aerial photographs and plans of suitable scale showing the baseline landscape character areas and landscape resources and mapping of impact assessment shall be extensively used to present the findings of impact assessment. Tree survey information should be included. The assessment shall be particularly focused on the sensitivity of the landscape framework and its ability to accommodate change. The Applicant shall identify the degree of compatibility of the Project and associated works with the existing and planned landscape settings. The landscape impact assessment shall quantify the potential landscape impacts as far as possible, so as to illustrate the significance of such impacts arising from the Project and associated works. Clear mapping of all landscape impact is required.

3.4.13.4 The Applicant shall assess the visual impacts of the Project and associated works. Clear illustrations including mapping of visual impact is required. The assessment shall include the following:

(i) Identification and plotting of visual envelope of the Project and associated works;

(ii) Identification of the key groups of sensitive receivers within the visual envelope with regard to views from ground level, sea level and elevated vantage points;

(iii) Description of the visual compatibility of the Project and associated works with the surrounding and the planned setting, and its obstruction and interference with the key views of the adjacent areas;

(iv) Description of the severity of visual impacts in terms of nature, distance and number of sensitive receivers. The visual impact of the Project and associated works with and without mitigation measures shall be assessed.

3.4.13.5 The Applicant shall review relevant Preliminary Outline Development Plans, Outline Zoning Plans, Outline Development Plans, Recommended Outline Development Plan, Layout Plans, other relevant published land use plans, planning

briefs and studies which may identify areas of high landscape value, open space, amenity area and green belt designations. Any guidelines on landscape strategies, landscape frameworks, urban design concepts, building height profiles, special design areas, landmarks, designated view corridors, open space networks, landscape links that may affect the appreciation of the Project and associated works shall also be reviewed. The aim is to gain an insight to the future outlook of the area so as to assess whether the Project and associated works can fit into the surrounding setting. Any conflict with statutory town plan(s) and any published land use plans should be highlighted and appropriate follow-up action should be recommended.

3.4.13.6 The Applicant shall evaluate the merits of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area. In addition, alternative alignment(s), design(s) and construction methods that would avoid or reduce the identified landscape and visual impacts shall 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 existing landscape and visual quality. The Applicant shall recommend mitigation measures to minimize the adverse effects identified above, including provision of a landscape design.

3.4.13.7 The mitigation measures shall include consideration of at least the following: preservation of vegetation and existing coastline, transplanting, provision of screen planting, re-vegetation of disturbed land, compensatory planting, provisioning/ reprovisioning of amenity areas and open spaces, avoidance or minimization of noise barriers, design of structures, provision of finishes to structures, colour scheme and texture of material used, any measures to mitigate the impact on existing and planned land uses, creation of view corridors, and ridgeline preservations. The relevant responsible 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 and associated works. A practical programme and funding proposal for the implementation of the recommended measures shall be provided.

3.4.13.8 Annotated illustration materials such as colour perspective drawings, plans and section/elevation diagrams, oblique aerial photographs, photographs taken at vantage points, and computer-generated photomontages shall be adopted to fully illustrate the landscape and visual impacts of the Project and associated works to the satisfaction of the Director. In particular, the landscape and visual impacts of the Project with and without mitigation measures shall also be properly illustrated in existing and planned setting by computer-generated photomontage so as to demonstrate the effectiveness of the proposed mitigation measures. All computer graphics shall be compatible with Microstation DGN file format. The Applicant shall record the technical details such as system set-up, software, data files and function in preparing the illustration, which may need to be submitted for verification of the accuracy of the illustrations.

3.4.14 Ecological Impact (Terrestrial and Aquatic)

3.4.14.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing ecological impact as stated in Annexes 8 and 16 of the TM respectively.

3.4.14.2 The assessment area for the purpose of terrestrial ecological assessment shall include all areas within 500 metres from the site boundaries of the proposed land based works areas or the area likely to be impacted by the Project and associated works. For aquatic ecology, the assessment area shall be the same as the water quality impact assessment or the area likely to be impacted by the Project and associated works.

3.4.14.3 In the ecological impact assessment, the Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area, including those highlighted in section 1.2 and 3.2 above. The aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the Project and associated works shall avoid impacts on recognized sites of conservation importance and other ecological sensitive areas. The assessment shall identify and quantify as far as possible the potential ecological impacts arising from the construction and operation of the Project and associated works.

3.4.14.4 The assessment shall include the following:

(i) review the findings of relevant studies/surveys and collate all available information on the ecological characters of the assessment area;

(ii) evaluate the information collected and identify any information gap relating to the assessment of potential ecological impacts to the aquatic and terrestrial environment;

(iii) carry out necessary field surveys, the duration of which shall be at least 4 months and investigations to verify the information collected, fill the information gaps identified and fulfill the objectives of the EIA study;

(iv) establish an ecological profile of the assessment area based on data of relevant previous studies/surveys and results of additional ecological field surveys, and describe the characteristics of each habitat found. Major information to be provided shall include :

(a) description of the physical environment;

(b) habitats maps of suitable scale (1:1000 to 1:5000) showing the types and locations of habitats in the assessment area;

(c) ecological characteristics of each habitat type such as size, vegetation type, species present, dominant species found, species diversity and abundance, community structure, seasonal patterns, inter-dependence of the habitats and species, and presence of any features of ecological importance ;

(d) representative colour photographs of each habitat type and any important ecological features identified; and

(e) species found that are rare, endangered and/or listed under local legislation, international conventions for conservation of wildlife/ habitats or Red Data Books;

(v) investigate and describe the existing wildlife uses of the various habitats with special attention to those wildlife groups and habitats with conservation interests, including birds, soft-bottom benthic habitat and and any other habitats and wildlife groups identified as having special conservation interests by this EIA study;

(vi) Describe all recognized sites of conservation importance in the proposed development site and its vicinity and assess whether these sites will be affected by the Project and associated works;

(vii) using suitable methodology to identify and quantify as far as possible any direct, indirect (e.g. changes in water qualities, sediment, hydrodynamics properties, sedimentation rates and patterns, hydrology), on-site, off-site, primary, secondary and cumulative ecological impacts on the wildlife groups and habitats, reduction of species abundance/diversity, loss of feeding grounds, reduction of ecological carrying capacity, habitat fragmentation; and in particular the following :

(a) habitat loss and disturbance to wildlife during construction stage; and

(b) deterioration of environmental quality (e.g. water quality) and the subsequent impacts to the biological communities during operation stage;

(viii) demonstrate that the ecological impacts due to the construction and operation of the Project and associated works are avoided by design to the maximum practicable extent;

(ix) evaluate the significance and acceptability of the ecological impacts identified using well-defined criteria;

(x) recommend all practicable alternatives (such as modification of layout, different alignment, built-form and/or using other construction methods) and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified:

(xi) evaluate the feasibility and effectiveness of the recommended mitigation measures and define the scope, type, location, implementation arrangement, subsequent management and maintenance of such measures;

(xii) determine and quantify as far as possible the residual ecological impacts after implementation of the proposed mitigation measures;

(xiii) evaluate the severity and acceptability of the residual ecological impacts using well-defined criteria; and

(xiv) review the need for and recommend any ecological monitoring programme required.

3.4.15 Fisheries Impact

3.4.15.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing

fisheries impact as stated in Annexes 9 and 17 of the TM.

3.4.15.2 The area for fisheries impact assessment shall include all areas within 500m from the boundary of the study area and any areas likely to be impacted by the Project and associated works. Special attention shall be given to the potential impacts on the mariculture activities at Tung Lung Chau fish culture zone and the loss of fishing ground.

3.4.15.3 The assessment shall cover any potential impact on both capture and culture fisheries, during the construction and operation of the Project and associated works.

3.4.15.4 Existing information regarding the assessment area shall be reviewed. Based on the review results, the study shall identify data gap and determine if there is any need for field surveys. If field surveys are considered necessary, the study shall recommend appropriate methodology, duration and timing for the field surveys. ***The proposed field survey shall be agreed with the Director of Agriculture and Fishers or the Director prior to the commencement of the survey.***

3.4.15.5 The fisheries impact assessment shall include the following :

(i) description of the physical environmental background;

(ii) description and quantification of existing capture and culture fisheries activities;

(iii) description and quantification as far as possible the existing fisheries resource;

(iv) identification of parameters (e.g. water quality parameters) and areas that are important to fisheries and will be affected;

(v) identification and quantification any direct/indirect and on-site/off-site impacts to fisheries;

(vi) evaluation of impacts and make proposals for any practical alternatives or mitigation measures with details on justification, description of scope and programme, feasibility as well as manpower and financial implications including those related to subsequent management and maintenance requirements of the proposals; and

(vii) review the need for monitoring during the construction and operation phases of the Project and associated works and, if necessary, propose a monitoring and audit programme.

3.4.16 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. The proposed use of any alternative assessment tool(s) or assumption(s) 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.

3.4.17 Impacts Summary

3.4.17.1 To facilitate effective retrieval of pertinent key information, a summary of environmental impacts in the form of a table (or in any other form approved by 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.

3.4.18 Summary of Environmental Outcomes

3.4.18.1 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.

3.4.19 Environmental Monitoring and Audit (EM&A) Requirements

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

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

3.4.19.3 The Applicant shall prepare an implementation schedule, in the form of a checklist containing all the EIA study recommendations and mitigation measures with reference to the Project and associated works implementation programme. A stand-alone implementation schedule shall be prepared for each of the individual Schedule 2 projects as described in section 1.3 and 2.1(xiii) of this EIA study brief.

4. DURATION OF VALIDITY

4.1 This EIA study brief is valid for 36 months counting from the date of its issuance. If the EIA study does not commence within this period, the Applicant shall apply to the Director for a fresh EIA study brief before commencement of the EIA study. The Applicant shall advise the Director the date of 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 review of an EIA report.

5.2 A stand-alone EIA report or a separate stand-alone section of the EIA report shall be prepared for each of the individual Schedule 2 EIA projects identified in section 1.3 and 2.1(xiii) of this EIA study brief. Each report or section shall aim to be self-sufficient in information documentation for the Director to make decision on whether the content meets requirements of this EIA study brief and relevant provisions in the Technical Memorandum of the EIAO Process for that particular individual Schedule 2 EIA project.

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

(i) 50 copies of the EIA report in English and 80 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.

(ii) when necessary, addendum to the EIA report and the executive summary submitted under sub-section 5.3 (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 50 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.

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

5.5 In addition, to facilitate the 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 4.0 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.

5.6 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.

5.7 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.

5.8 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 Applicant (as representing his or her organisaton) for this EIA study brief during the course of the EIA study, the Applicant must notify the Director immediately.

6.2 If there are any key changes in the scope of the Project mentioned in sub-section 1.2 of this EIA study brief and in the Project Profile, the Applicant must seek confirmation in writing from the Director on whether or not the scope of this EIA study brief is still applicable to cover the key changes identified, and what additional issues, if any, that the EIA study must also cover to address these key changes. 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 ---

August 2006
Environmental Assessment Division,
Environmental Protection Department

Appendix A

List of Project Profiles, EIA study briefs, approved EIA reports, approved application to apply directly for an environmental projects relevant to Kai Tak Development (South East Kowloon Development)

Project Profiles submitted for application of EIA study brief:-

(i) South East Kowloon Development Kai Tak Airport - Early Development Package Phase 1 (EIAO Register No. PP–009/1998)
(ii) Comprehesive Feasibility Study for the Revised Scheme of South East Kowloon Development (EIAO Register No. PP–058/1999)
(iii) Central Kowloon Route (EIAO Register No. PP–158/2002)
(iv) South East Kowloon Development - Kai Tak Approach Channel Reclamation (EIAO Register No. PP–162/2002)
(v) Sewage Pumping Stations under Agreement No. CE 42/2000 South East Kowloon Development, Infrastructure at North Apron Area of Kai Tak Airport, Design and Construction (This application was withdrawn by the applicant on 25 April 2002)
(vi) Distributor Roads under Agreement No. CE 42/2000 South East Kowloon Development, Infrastructure at North Apron Area of Kai Tak Airport, Design and Construction (EIAO Register No. PP–164/2002)
(vii) Further Development of Tseung Kwan O Feasibility Study (EIAO Register No. PP–208/2004)
(viii) Shatin to Central Link
(ix) Optimized Shatin to Central Link Conforming Scheme (East West Railway Corridor) (EIAO Register No. PP–212/2004)
(x) Optimized Shatin to Central Link Conforming Scheme (North South Railway Corridor) (EIAO Register No. PP–213/2004)

EIA study briefs issued:-

(i) Kai Tak Airport Early Development Package Phase 1 - Design and Construction (EIAO Register No. ESB–007/1998)
(ii) Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (EIAO Register No. ESB–039/1999)
(iii) Central Kowloon Route (EIAO Register No. ESB–096/2002)
(iv) South East Kowloon Development - Kai Tak Approach Channel Reclamation (EIAO Register No. ESB–098/2002)
(v) Distributor Roads under Agreement No. CE 42/2000 South East Kowloon Development, Infrastructure at North Apron Area of Kai Tak Airport, Design and Construction (EIAO Register No. ESB–100/2002)
(xi) Further Development of Tseung Kwan O Feasibility Study (EIAO Register No. ESB–111/2004)
(vi) Shatin to Central Link (EIAO Register No. ESB–115/2004)
(vii) Optimized Shatin to Central Link Conforming Scheme (East West Railway Corridor) (EIAO Register No. ESB–115/2004)
(viii) Optimized Shatin to Central Link Conforming Scheme (North South Railway Corridor) (EIAO Register No. ESB–116/2004)

Approved EIA reports:-

(i) Kai Tak Airport North Apron Decommissioning EIA Report (EIAO Register No. AEIAR –002/1998)

(ii) Tseung Kwan O Development – Contract F : Grade Separated Interchange T1/P1/P2, EIA Report (EIAO Register No. AEIAR-017/1999);
(iii) Feasibility Study on the Alternative Alignment for the Western Coast Road, Tseung Kwan O, EIA Report (EIAO Register No. AEIAR-016/1999);
(iv) Further Development of Tseung Kwan O Feasibility Study (EIAO Register No. AEIAR-092/2005)
(v) Comprehensive Feasibility Study for The Revised Scheme of South East Kowloon Development (EIAO Register No. AEIAR-044/2001);

Decisions of the Director on applications for permission to apply directly for an environmental permit

(i) Karting Mall at Kai Tak (EIAO Register No. DIR-044/2000)
(ii) Sewage Pumping Stations under Agreement No. CE 42/2000 (CE) South East Kowloon Development Infrastructure at North Apron Area of Kai Tak Airport Design and Construction (EIAO Register No. DIR-068/2002)
(iii) Proposed Temporary Golf Facility at Kai Tak Runway (EIAO Register No. DIR-097/2004)
(iv) Maintenance of Yamen of Kowloon Walled City Park (EIAO Register No. DIR-114/2005)

Note: the above list is provided to facilitate retrieval of information. The above list is indicative in nature and is not intended to be exhaustive. It remains the onus of the Applicant to ensure accuracy of information in the EIA report.

Appendix B-1

Guidelines on Choice of Models and Model Parameters 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. 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.

Model	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 (20 m 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 B-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 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 10o) 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, σ_θ, needs to be provided as input to the CALINE4 model. Typical values of σ_θ range from 12^o for rural areas to 24^o for highly urbanised areas under 'D' class stability. For semi-rural such as new development areas, 18^o 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 classified 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 classified 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 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' in Appendix B-2).

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
E & F	8

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 the Director (with reference to Section 4.4.2(c) of the TM). The EPD's 'Guidelines on the Use of Alternative Computer Models in Air Quality Assessment' should also be referred to in Appendix B-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 B-2 for further information.

3.11 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 the Director's reference.

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 B-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: (Background contributions)	pollution not accounted for by the previous two

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**
NO_2	59	57	39
SO_2	21	26	13
O_3	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:

$$(1.0 - E_{\text{Secondary contributions}}/E_{\text{Territory}})$$

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 B-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 modelled 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 the Director on a case-by-case basis. In such cases, the proponent will have to provide the followings for the Director's review:

(i) Technical details of the proposed model; and
(ii) Performance evaluation of the proposed model

Based on the above information, the Director 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).

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.

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 the Director 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 the Director 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 the Director to avoid sending in duplicate information.

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

Appendix C

LC Paper No. CB(1)755/02-03(01)

For discussion
on 23 January 2003

LEGISLATVE COUNCIL

PANEL ON ENVIRONMENTAL AFFAIRS
PANEL ON TRANSPORT

Policy on Mitigating Road Traffic Noise

PURPOSE

At the meeting of the Panel on Transport on 22 November 2002 when the project to widen Tolo Highway was discussed, Members asked that the Administration's policies on installation of noise barriers and the principles guiding the implementation of the policies be discussed at a joint meeting with the Panel on Environmental Affairs. This paper summarizes our existing policies on mitigating road traffic noise and sets out the guiding principles for implementation of the policies.

THE POLICIES

2. The Government's objective is to mitigate road traffic noise to protect the public from excessive noise. We have adopted separate policies to mitigate road traffic noise for new roads and existing roads.

Statutory Requirement for New Roads

3. When planning new roads, or projects involving substantial widening of existing roads, the relevant government department or developer must ensure that traffic noise at sensitive receivers will stay within the noise limits. If through a defined vigorous assessment procedure the predicted traffic noise is found to exceed the noise limits, the project proponent must adopt all practicable direct measures, including adjusting the alignment, using low noise material

for surfacing and erecting barriers or enclosures to reduce the impact on users of noise sensitive buildings in the neighbourhood. The noise limits of 65dB(A)L_{10}(1 hour)[1] for schools and 70 dB(A)L_{10}(1 hour) for residential premises have been prescribed in the Hong Kong Planning Standards and Guidelines since mid-1980s and have become statutory limits for designated projects under the Environmental Impact Assessment (EIA) Ordinance since April 1998 when they were included in the Technical Memorandum of the Ordinance.

Policy for Existing Roads

4. In November 2000, we introduced the following administrative measures to address the noise impact of existing roads on residents in their neighbourhood –

(a) engineering solutions, by way of retrofitting of barriers and enclosures, and resurfacing with low noise material, should be implemented where practicable at existing excessively noisy roads (i.e. roads generating traffic noise in excess of the noise limits mentioned in paragraph 3 above); and

(b) traffic management solutions, such as speed control, traffic diversion and restricting use by heavy vehicles, should be fully explored and implemented where practicable on a case by case basis where engineering solutions are impracticable or where engineering solutions alone are inadequate in reducing the noise to a level below the noise limits.

This policy is implemented through administrative arrangements.

THE GUIDING PRINCIPLES

5. In implementing the above statutory requirements and administrative measures, we follow five key guiding principles –

[1] L_{10}(1 hour) is the noise level exceeded for 10% of an one-hour period, generally used for road noise at peak traffic flow.

- **Principle 1**: Compliance with existing statutory requirements
- **Principle 2**: Timely implementation of mitigation measures, i.e. noise barriers
- **Principle 3**: Setting priority for existing roads in the retrofit programme according to excessive noise levels
- **Principle 4**: For existing roads, cost effectiveness of noise barriers
- **Principle 5**: Paying due attention to aesthetic design of noise barriers

These principles are elaborated below.

Principle 1: Compliance with existing statutory requirements

6. As explained in paragraph 3 above, a proponent of a new road, or a major extension and improvement to an existing road that is a designated project under the EIA Ordinance must comply with the noise limits set out in the Technical Memorandum of the Ordinance where practicable. The Technical Memorandum is a statutory document clearly stating noise criteria and methodology for assessment. If the project proponent finds out during the EIA that the anticipated traffic noise will exceed the noise limits, he must in the first instance consider how the noise impact could be reduced to a level below the limits through choosing a better alignment, liaison with the Planning Authority on planning properly the land uses in the neighbourhood and/or surfacing the road with low noise material. If these measures are infeasible or inadequate, he will have to consider mitigating the noise at source through erection of noise barriers or enclosures which are derived according to the noise criteria and methodology of assessment stated in the Technical Memorandum.

7. The proposed measures for mitigating road traffic noise will be included in the EIA report of his proposed project. The report will be submitted to the Advisory Council on the Environment (ACE) for comments. The Authority under the EIA Ordinance, i.e. the Director of Environmental Protection (DEP), will consider whether to approve the EIA report in accordance with the provisions in the EIA Ordinance and its Technical Memorandum taking into account also

comments from ACE and the public. After an EIA report has been approved by DEP, the project proponent will then have to apply to DEP for an Environmental Permit before construction work can start. The Environmental Permit will set out the requirements that the project proponent has to meet and those will usually include, inter alia, the noise mitigation measures proposed in the EIA report. The project proponent must comply with the requirements in the statutory Environmental Permit.

8. As the project proponent cannot reasonably foresee all possible circumstances when drawing up the EIA report, the EIA Ordinance contains provisions that allow the project proponent to apply for variations to the Environmental Permit to cater for any new and unforeseeable events. For instance, if the plan of a noise sensitive building that he had taken into account in the EIA report has fallen through, the project proponent can apply to DEP for varying the location, length or design of, or even deleting the noise barriers that were included in the EIA report to protect the building. Approval for variation will be granted on the basis of the actual situation on the ground.

Principle 2: Timely implementation of mitigation measures, i.e. noise barriers

9. The EIA Ordinance provides the project proponent with flexibility in terms of the timing of erecting the noise barriers so long as they are in place in time to properly protect the noise sensitive receivers. For instance, in the case of a development that will not take place until a few years after the commission of a new road, the project proponent can defer the noise mitigation measures to a later stage and, if they are no longer required because of a change of plan for the development (for instance, if the plan is cancelled or the noise sensitive development has been changed to a non-noise sensitive development), the project proponent can review with EPD appropriate adjustments to the installation programme to take account of the changes. In the light of the experience in the Tolo Highway widening project, relevant government departments have been

reminded to observe this guiding principle more diligently while also taking into account other implications such as costs and disruption to traffic.

Principle 3: Setting priority for existing roads in the retrofit programme according to excessive noise levels

10. In assessing the noise impact of existing roads, 32 existing roads are identified to cause excessive noise exposure and for which the retrofitting of noise barriers or enclosures might be technically feasible. The retrofit programme is massive. As a general principle, we will accord priority to existing roads with the highest noise exposure and, where practicable, plan the retrofit works having regard to new roads that have already been planned to adjoin them.

11. Similar prioritization system applies to the programme to resurface about 72 existing roads with low noise material.

Principle 4: For existing roads, cost effectiveness of noise barriers

12. In assessing the adverse implications for the community under the policy for existing roads, the criteria shall include the likely size of the community that may be affected: the larger the number of people affected, the greater the importance. The comparative effectiveness can be expressed in terms of money spent per household on retrofitting an existing road with noise barriers.

Principle 5: Paying due attention to aesthetic design of noise barriers

13. To soften the visual impact of noise barriers, works departments are required to pay due attention to their aesthetic design. They will consult the relevant District Councils and explore designs that would enhance the landscape and visual quality or make the noise barriers visually compatible with the vicinity. The Advisory

Committee on the Appearance of Bridges and Associated Structures, which comprises representatives of the Hong Kong Institute of Architects, the Hong Kong Institute of Engineers and various government works departments, is responsible for vetting the aesthetic aspect of noise barriers. We have also published an internal guideline on effective noise shielding materials. The guidelines are updated from time to time to take account of evolving technologies.

14. Insofar as materials used for noise barriers are concerned, clear panels are usually considered less obtrusive but their use is constrained as they do not absorb noise as effective as solid panels. Some have suggested the planting of trees to absorb noise, but we note that one or two rows of trees would have very little effect on reducing noise. Overseas experiences and studies have indicated that about 10-metre depth of densely planted 4-metre tall tree belt could only bring about 1dB(A) reduction. Hence, tree planting as one type of noise barriers may not be viable on most occasions in Hong Kong given the limited space between the roads and the nearby buildings.

TOWARDS A SUSTAINABLE DEVELOPMENT FRAMEWORK FOR ROAD TRAFFIC NOISE MITIGATION

15. The policy and principles described above guide our formulation of strategies and measures to mitigate road traffic noise. In the broader context, they also reflect the Administration's desire and determination to strike the right balance between economic development, environmental protection and social acceptability in Hong Kong's unique high-density city setting. The issues on noise mitigation demand the collaboration of efforts from all relevant government departments and non-government sectors alike. It is only with the concerted effort of all concerned that we can arrive at rational decisions and solutions that are both equitable and affordable.

Environment, Transport and Works Bureau
January 2003

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Appendix D

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. The assessment and modelling tool for spill events should be quantitative with proven applications locally or overseas.

5. An initial dilution model may 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 before its use in this study in the Hong Kong waters, the Pearl Estuary and the Dangan (Lema) Channel, with the field data collected by:

    - South East Kowloon Development Comprehensive Planning and Engineering Review – Stage I: Planning Review, CEDD (2005/2006)
    - Hydraulic and Water Quality Studies in Victoria Harbour (1987)
    - Port and Airport Development Strategy - Enhancement of WAHMO Mathematical Models (1990)
    - Strategic Sewage Disposal Scheme Stage II - Oceanic Outfall, Oceanographic Surveys and Modelling (1992)
    - Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (1998)
    - Environmental Protection Department (EPD)'s routine monitoring data
    - Tidal data from Hong Kong Observatory, Macau and relevant Mainland Authorities

2. Tidal data shall be calibrated and validated in both frequency and time domain manner.

3. For the purpose of calibration and validation, the model shall run for not less than 15 days of real sequence of tide (excluding model spin up) in both dry and wet seasons with due consideration of the time required to establish initial conditions.

4. In general the hydrodynamic models shall be calibrated to the following criteria:

Criteria	Level of fitness with field data
• tidal elevation (rms)	< 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

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 the Director. 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 waterway and the proposed disposal ground. The model coverage area shall be agreed with the Director.

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 Kai Tak Approach Channel shall have at least 4 grids across it to better resolve transverse variations of the Channel. The grid schematization shall be agreed with the Director.

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, 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. Water quality module shall run for a complete year incorporating monthly variations in Pearl River discharges, solar radiation, water temperature and wind velocity in the operational stage. Construction stage impacts may be assessed by simulating typical spring-neap cycles in the dry and wet seasons.

4. If assessment of accidental spillage is required, potential locations, quantities and rates of spill shall be identified and quantified. The spill modelling shall cover combinations of different tides, wind and season conditions. The methodology for modelling spill and scenarios to be covered should be agreed with the Director (with reference to Section 4.4.2(c) of the TM).

5. The results shall be assessed for compliance of Water Quality Objectives. Any changes in hydrodynamic regime shall be assessed. Daily erosion / sedimentation rate shall be computed and its ecological impact shall be assessed.

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

7. Cumulative impacts due to other projects, activities or pollution sources within a boundary to be agreed with the Director shall also be predicted and quantified.

8. All modelling input data and results shall be submitted in digital media to the Director.

- END -

Appendix E1

Criteria for Cultural Heritage Impact Assessment

(1) Baseline Study

1.1 A baseline study shall be conducted:

a. to compile a comprehensive inventory of archaeological sites (including marine archaeological sites), historic buildings and structures within the proposed project area, which include:

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

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

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

1.3. Desk-top Study

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

a. Search of the list of declared monuments protected by the Antiquities and Monuments Ordinance (Chapter 53).
b. Search of the list of deemed monuments through the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department.
c. Search of the list of sites of cultural heritage identified by the AMO.
d. Search of publications on local historical, architectural, anthropological, archaeological and other cultural studies, such as, Journals of the Royal Asiatic Society (Hong Kong Branch), Journals of the Hong Kong Archaeological society, Antiquities and Monuments Office Monograph Series and so forth.
e. Search of other unpublished papers, records, archival and historical documents through public libraries, archives, and the tertiary institutions, such as the Hong Kong Collection and libraries of the Department of Architecture of the University of Hong Kong and the Chinese University of Hong Kong, Public Records Office, photographic library of the Information Services Department and so forth.

f. Search of any other unpublished archaeological investigation and excavation reports kept by the AMO.
g. Search of historical documents in the Public Records Office, the Land Registry, District Lands Office, District Office and the Hong Kong Museum of History and so forth.
h. Search of cartographic and pictorial documents. Maps of the recent past searched in the Maps and Aerial Photo Library of the Lands Department.
i. Study of existing Geotechnical information (for archaeological desk-top research).
j. Discussion with local informants.

1.4 Field Evaluation

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

1.4.2 Historic buildings and structures survey

a. Field scan of all the historic buildings and structures within the project area.
b. Photographic recording of each historic building or structure including the exterior (the elevations of all faces of the building premises, the roof, close up for the special architectural details) and the interior (special architectural details), if possible, as well as the surroundings of each historic building or structure.
c. Interview with local elders and other informants on the local historical, architectural, anthropological and other cultural information related to the historic buildings and structures.
d. Architectural appraisal of the historic buildings and structures.

1.4.3 Archaeological Survey

A licence shall be obtained from the Antiquities Authority for conducting an archaeological survey. It takes at least two months to process the application.

A detailed archaeological survey programme should be designed to assess the archaeological potential of the project area. The programme should clearly elaborate the strategy and methodology adopted, including what particular question(s) can be resolved, how the archaeological data will be collected and recorded, how the evidence will be analyzed and interpreted and how the archaeological finds and results will be organized and made available. Effective field techniques should also be demonstrated in the programme. The programme should be submitted to the Antiquities and Monuments Office for agreement prior to applying for a licence.

The following methods of archaeological survey (but not limited to) should be applied to assess the archaeological potential of the project area:

a. Definition of areas of natural land undisturbed in the recent past.
b. Field scan of the natural land undisturbed in the recent past in detail with

special attention paid to areas of exposed soil which were searched for artifacts.

c. Conduct systematic auger survey and test pitting. The data collected from auger survey and test pitting should be able to establish the horizontal spread of cultural materials deposits.
d. Excavation of test pits to establish the vertical sequence of cultural materials. The hand digging of 1 x 1 m or 1.5 x 1.5 m test pits to determine the presence or absence of deeper archaeological deposits and their cultural history.
e. The exact quantity and location of auger holes and test pits should be agreed with the Antiquities and Monuments Office prior to applying for a licence.
f. A qualified surveyor should be engaged to record reduced levels and coordinates as well as setting base points and reference lines in the course of the field survey.

1.4.4 If the field evaluation identifies any additional sites of cultural heritage within the study area which are of potential historic or archaeological importance and not recorded by AMO, the office should be reported as soon as possible. The historic and archaeological value of the items will be further assessed by the AMO.

1.5 The Report of Baseline Study

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

1.5.2 Historic Buildings and Structures

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

1.5.3 Archaeological Sites

a. A map showing the boundary of each archaeological site as supported and delineated by field walking, augering and test-pitting;
b. Drawing of stratigraphic section of test-pits excavated which shows the cultural sequence of a site.
c. Reduced levels, coordinates, base points and reference lines should be clearly defined and certified by a qualified surveyor.

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

standard.

1.6 Finds and Archives

1.6.1 Archaeological finds and archives should be handled following the *Guidelines for Handling of Archaeological Finds and Archives (Appendix).*

(2) Impact Assessment

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

2.2 Preservation in totality must be taken as the first priority. Please refer to paragraph 4.3.1(c), item 2 of Annex 10, items 2.6 to 2.9 of Annex 19 and other relevant parts of the Technical Memorandum on Environmental Impact Assessment Process for the detailed requirements of the impact assessment.

(3) Mitigation Measures

3.1 It is always a good practice to recognise the site or monument early in the planning stage and site selection process, and to avoid it, i.e. preserve it in-situ, or leaving a buffer zone around the site. Built heritage, sites and landscapes are to be in favour of preservation unless it can be shown that there is a need for a particular development which is of paramount importance and outweighs the significance of the heritage feature.

3.2 If avoidance of the cultural heritage is not possible, amelioration can be achieved by reduction of the potential impacts and the preservation of heritage features, such as physically relocating it. Measures like amendments of the sitting, screening and revision of the detailed design of the development are required to lessen its degree of exposure if it causes visual intrusion to the cultural heritage and affecting its character.

3.3 All the assessments should be conducted by an expert in cultural heritage and further evaluated and endorsed by the Antiquities and Monuments Office and the Antiquities Advisory Board.

3.4 Besides refer to paragraph 4.3.1(d), items 2.10 to 2.14 of Annex 19 and other relevant parts of the Technical Memorandum. Proposals for mitigation measures should be accompanied with a master layout plan together with all detailed treatment, elevations, and landscape plan. A rescue programme, when required, may involve preservation of the historic building or structure together with the relics inside, and its historic environment through relocation, detailed cartographic and photographic survey or preservation of an archaeological site “by record”, i.e. through excavation to extract the maximum data as the very last resort.

3.5 The programme for implementation of agreed mitigation measures should be able to be implemented. It is to be clearly stated in the EIA report, as required in Annex 20 of the Technical Memorandum. In particular, item 6.7 of Annex 20 requires to define and list out clearly the proposed mitigation measures to be implemented, by whom, when, where, to what requirements and the various implementation responsibilities. A comprehensive plan and programme for the protection and conservation of the partially preserved Site of Cultural Heritage, if any, during the planning and design stage of the proposed project must be detailed.

Appendix E2

Guidelines for Handling of Archaeological Finds and Archives

I. General

1. Site Code
   The Licensee should contact the Central Archaeological Repository (CAR) of the Antiquities and Monuments Office (AMO) [Contact Person: Mr. Michael TANG, Tel: 2384 5446; Email: mkstang@lcsd.gov.hk] about the allocation of site code before the commencement of the project to avoid duplicate of site code assignment.

II. *Archaeological* Finds

2. Cleaning
   Every excavated finds should be properly cleaned before handing over to the CAR of the AMO.

3. Marking
   - All the excavated finds should be cleaned before marking object number.
   - "Sandwich" technique should be adopted for marking permanent identification number on an object. *(Please see annex for detail)*
   - Every special finds should be marked with site code, context number and object number, etc.
   - All representative samples collected from general finds should be marked.
   - For the finds which is too small, has unstable surface, or leather, textiles or wood, it should not be marked/labeled directly and should be bagged separately or attached with tags by tying. The tag should contain information about the object number, context number and site code, etc.

4. Labeling and bagging
   - A label should be attached on each bag.
   - Information about the object number, context number, test-pit number, site code and bag number should be stated clearly on the label.
   - Finds excavated within the same context should be bagged together. However, if they have been categorized according to their types, materials or characteristics, separate bagging is required.

5. Conservation
   - To refit and reconstruct pottery vessels by appropriate adhesive. A heat and waterproof adhesive, e.g. product of H. Marcel Guest Ltd., is recommended.
   - Any adhesives which are not reversible or will damage artefacts, e.g. the pottery vessel should not be applied on the finds.

6. Finds register
   A clear finds register with information about the finds description, quantity, form, weight, dimensions and field data should be prepared for handover to the CAR.

III. Field Archives and Laboratory Records

7. Field archives include field dairy, context recording sheet, special finds recording sheet, soil sample/sample recording sheet, map, survey sheet and video/visual records etc. Laboratory records also form part of the archaeological archives, which include finds processing record, conservation record, finds drawings and photos, records of typological analysis and objects card etc.

8. All the aforesaid archives should be handed over to the CAR after the compilation of the excavation report. Attention should be drawn to the followings:

- All the field archives should be submitted together with their indexes.
- The video footage should be submitted together with a detailed script introducing the content of the video record.
- All the slides, colour/black & white negatives and digital photographs should be submitted together with their contact prints and indexes.

IV. *Handover* of Finds

9. Packing
- Every special finds should be protected with tissue paper, bubble sheet or P.E. foam with shock-proofed packing. No packing material other than the aforesaid items should be used.
- All the general finds should be stored in heavy duty plastic container with shock-proofed packing.
- The heavy duty plastic container, e.g. product of the Star Industrial Co., Ltd. (No. 1849 or 1852), is recommended.
- For oversized finds, prior advice on packing method should be sought from the AMO.

10. Handover procedure
- The Licensee should arrange to transport the finds and archives to the CAR upon the completion of the finalized excavation report.
- Separate handover forms for finds and archives should be signed by the representatives of the Licensee and the AMO.

Steps for "Sandwich" technique

1. First of all, the object should be marked in appropriate area and size that does not impact important diagnostic or aesthetic parts of the object.

2. Clean the area to be marked.

3. Apply a thin coat of clear reversible lacquer on the area. Use white lacquer if the object is dark in colour. Let the base coat dry completely.

4. Use a permanent water-based ink to write the object number on top of the base coat. Let ink dry completely.

5. Apply a top coat of clear varnish.

6. Let the marking dry completely before packing.

Appendix E3

Guidelines for Marine Archaeological Investigation (MAI)

The standard practice for MAI should consist of four separate tasks, i.e. (1) Baseline Review, (2) Geophysical Survey, (3) Establishing Archaeological Potential and (4) Remote Operated Vehicle (ROV)/Visual Diver Survey/Watching Brief.

(1) Baseline Review

1.1 A baseline review should be conducted to collate the existing information in order to identify the potential for archaeological resources and, if identified, their likely character, extent, quality and value.

1.2 The baseline review will focus on known sources of archive data. It will include:

a. Geotechnical Engineering Office (GEO) - the Department holds extensive seabed survey data collected from previous geological research.

b. Marine Department, Hydrographic Office - the Department holds a substantial archive of hydrographic data and charts.

c. The Royal Naval Hydrographic Department in the UK - the Department maintains an archive of all survey data collected by naval hydrographers.

1.3 The above data sources will provide historical records and more detailed geological analysis of submarine features which may have been subsequently masked by more recent sediment deposits and accumulated debris.

(2) Geophysical Survey

2.1 Extensive geophysical survey of the study area should deploy high resolution boomer, side scan sonar and an echo sounder. The data received from the survey would be analysed in detail to provide:

a. Exact definition of the areas of greatest archaeological potential.

b. Assessment of the depth and nature of the seabed sediments to define which areas consist of suitable material to bury and preserve archaeological material.

c. Detailed examination of the boomer and side scan sonar records to map anomalies on the seabed which may be archaeological material.

Establishing Archaeological Potential

3.1 The data examined during Task 1 and 2 will be analysed to provide an indication of the likely character and extent of archaeological resources within the study area. This would facilitate formulation of a strategy for investigation.

3.2 The results would be presented as a written report and charts. If there is no indication of archaeological material there would be no need for further work.

(4) Remote Operated Vehicle (ROV)/Visual Diver Survey/Watching Brief

4.1 Subject to the outcome of Task 1, 2 and 3, accepted marine archaeological practice would be to plan a field evaluation programme to acquire more detailed data on areas identified as having archaeological potential. The areas of archaeological interest can be inspected by ROV or divers. ROV or a team of divers with both still and video cameras would be used to record all seabed features of archaeological interest.

4.2 Owing to the heavy marine traffic in Hong Kong, the ROV/visual diver survey may not be feasible to achieve the target. If that is the case, an archaeological watching brief is the most appropriate way to monitor the dredging operations in areas of identified high potential to obtain physical archaeological information.

4.3 A sampling strategy for an archaeological watching brief would be prepared based on the results of Task 1, 2 and 3 to focus work on the areas of greatest archaeological potential. Careful monitoring of the dredging operations would enable immediate identification and salvage of archaeological material. If archaeological material is found, the AMO should be contacted immediately to seek guidance on its significance and appropriate mitigation measures would be prepared.

4.4 If Task 4 is undertaken, the results would be presented in a written report with charts.

Report

Three copies of the final report should be submitted to the AMO for record.

Appendix F

Table 1 : Water Quality Objectives (for Recreation and related Uses) in Victoria Harbour Water Control Zone (WCZ)

There are no bathing beach or secondary contact recreation subzones designated in Victoria Harbour WCZ. Water Quality Objectives (WQOs) applicable to a water body with bathing, secondary contact recreation or amenity use in all three phases of Victoria Harbour WCZ are shown below. The WQOs are assigned by making reference to other water control zones with similar uses.

WQO	Description	WQOs applicable to water body with assigned beneficial use		
		BU 1 : Bathing	BU 2 : Secondary Contact Recreation	BU 3 : General Amenity
Aesthetic Appearance [(a)]	(i) There should be no objectionable odours or discolouration of the water. (ii) Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substance should be absent. (iii) Mineral oil should not be visible on the surface. Surfactants should not give rise to a lasting foam. (iv) There should be no recognizable sewage-derived debris. (v) Floating, submerged or semi-submerged objects of a size likely to interfere with the movement of free vessels, or cause damage to the vessels, should be absent. (vi) The water should not contain substances which settle to form objectionable deposits.	✔	✔	✔
Dissolved Oxygen [(a)]	The level of dissolved oxygen should not fall below 4 mg per liter for 90% of the sampling occasions during the whole year; values should be calculated as the annual water column average [(d)]. In addition, the concentration of dissolved oxygen should not be less than 2 mg per litre within 2 m of the seabed for 90% of the sampling occasions during the whole year.	✔	✔	✔
Temperature [(a)]	Human activity should not cause the daily temperature range to change by more than 2.0 °C.	✔	✔	✔
Salinity [(a)]	Human activity should not cause the salinity level to change by more than 10%.	✔	✔	✔
Suspended Solids [(a)]	Human activity should neither cause the suspended solids concentration to be raised more than 30% nor give rise to accumulation of suspended solids which may adversely affect aquatic communities.	✔	✔	✔
Ammonia [(a)]	The un-ionized ammonical nitrogen level should not be more than 0.021 mg per litre, calculated as the annual average (arithmetic mean).	✔	✔	✔
Nutrients [(a)]	(i) Nutrients should not be present in quantities sufficient to cause excessive or nuisance growth of algae or other aquatic plants.	✔	✔	✔

	(ii) Without limiting the generality of objective (i) above, the level of inorganic nitrogen should not exceed 0.4 mg per litre, expressed as annual water column average [(d)].			
WQO	Description	WQOs applicable to water body with assigned beneficial use		
		BU 1 : Bathing	BU 2 : Secondary Contact Recreation	BU 3 : General Amenity
Toxic substances [(a)]	(i) Toxic substances in the water should not attain such levels as to produce significant toxic, carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to interactions of toxic substances with each other. (ii) Human activity should not cause a risk to any beneficial use of the aquatic environment.	✔	✔	✔
Bacterial (E. coli.) (I) [(b)]	The level of Escherichia coli should not exceed 180 per 100mL, calculated as the geometric mean of all samples collected from March to October inclusive in one calendar year. Samples should be taken at least 3 times in a calendar month at intervals of between 3 and 14 days.	✔		
Bacterial (E. coli.) (II) [(c)]	The level of Escherichia coli should not exceed 610 per 100mL, calculated as the geometric mean of all samples collected in one calendar year.		✔	
pH [(b)]	The pH of the water should be within the range of 6.0 – 9.0 for 95% of samples. In addition, waste discharges shall not cause the natural pH range to be extended by more than 0.5 units.	✔		
Phenol [(b)]	Phenols shall not be present in such quantities as to produce a specific odour, or in concentrations greater than 0.05mg per litre as C_6H_5OH.	✔		
Turbidity [(b)]	No changes in turbidity or other factors arising from waste discharges shall reduce light transmission substantially from the normal level.	✔		

(a) WQOs assigned for general uses of marine water in Victoria Harbour WCZ.
(b) WQOs assigned for bathing use in other WCZs.
(c) WQOs assigned for secondary contact recreation use in other WCZs.
(d) Expressed normally as the arithmetic mean of at least 3 measurements at 1m below surface, mid depth and 1 m above the seabed. However, in water of a depth of 5 m or less the mean shall be that of 2 measurements (1 m below surface and 1 m above seabed), and in water of less than 3 m the 1 m below surface sample shall apply.

Water Policy Group
Aug 5, 2005