

Environmental Impact Assessment Ordinance (Cap. 499), Section 5 (7)**Environmental Impact Assessment Study Brief No. ESB-160/2006**

Project Title : Decommissioning of the Former Kai Tak Airport Other than the North Apron
(hereinafter referred as “the Project”)

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

1. BACKGROUNDThe Application

- 1.1 An application (No. ESB-160/2006) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 22 November 2006 with a project profile (No.PP-305/2006) (hereinafter referred as “the Project Profile”).
- 1.2 The Applicant proposes to decommission the remaining structures and buildings and abandoned facilities associated with the disused Kai Tak Airport and to clean up any contaminated areas within the Project boundary identified during the EIA. The boundary of the Project is shown in the Project Profile and reproduced in Figure 1 of this Study Brief. The objectives of the Project are to:
- (i) demolish remaining existing structures / buildings and remove abandoned facilities of the former Kai Tak Airport within the Project boundary including the off-shore disused fuel dolphin and the associated connecting abandoned fuel pipelines;
 - (ii) identify and clean up contaminated areas associated with the previous airport operation within the Project boundary identified during the EIA; and
 - (iii) implement appropriate mitigation measures as recommended in the EIA to ensure the site would be safe and free of hazards for the planned future use.
- 1.3 The former Kai Tak Airport ceased operation in 1998. Most of the original buildings and structures within the airport site have been cleared and the ground contamination identified at the north apron has been decontaminated under the Kai Tak Airport North Apron Decommissioning Project (No. AEIAR-002/1998).
- 1.4 The Project is a designated project under Item 1 of Part II Schedule 2 of the EIAO: “*Decommissioning of airports, including fueling and fuel storage, the aircraft maintenance and repair facilities*”.
- 1.5 Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection (the Director) issues this Environmental Impact Assessment (EIA) study brief to the Applicant to carry out an EIA study.

Purpose of the EIA

- 1.6 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the Project and related activities taking place concurrently. This information will contribute to decisions by the Director on:
- (i) the acceptability of adverse environmental consequences that are likely to arise as a result of the Project and associated works;
 - (ii) the conditions and requirements for the Project to mitigate against adverse environmental consequences wherever practicable; and
 - iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

Related Projects

- 1.7 For the purpose of this EIA Study, the Applicant shall ensure the consistency of information relevant and related to the Project to be included in the EIA for this Project and in the future Kai Tak Development (KTD) Schedule 3 EIA (No. ESB-152/2006).
- 1.8 Section 1.2.1 of the Project Profile stated that all the remaining facilities, structures and buildings within the disused Kai Tak Airport other than the north apron will be decommissioned. However, the project boundary as shown in Drawing no. KZ 450 at Appendix of the Project Profile has excluded the area where the ex-Government Flying Service Building and the CAD's ASDE Station situated (which also form of the former Kai Tak Airport). The Applicant shall state clearly whether or not the decommissioning of these facilities are also covered under this EIA Study and whether or not these facilities would be decommissioned / demolished in the future prior to any redevelopment of the sites as part of the KTD.
- 1.9 If the Applicant confirms that decommissioning and demolition of these facilities is covered in this Project, the Applicant shall also address in the EIA the environmental issues related to their decommissioning / demolition.
- 1.10 If the Applicant confirms that the decommissioning and demolition of these facilities is not covered in this Project, the Applicant shall carry out separate EIA for their decommissioning or ensure they are covered / addressed under the future KTD Schedule 3 EIA before the redevelopment of the site(s).

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;
 - (ii) to identify and describe elements of the community and environment likely to be affected by the Project and/or likely to cause adverse impacts to the Project, including both the natural and man-made environment;
 - (iii) to identify and quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;

- (iv) to identify any negative impact on the marine ecology and to propose measures to avoid or mitigate these impacts;
- (v) identify any negative impacts on sites of cultural heritage and to propose measures to avoid or mitigate these impacts;
- (vi) to investigate the feasibility, practicability, effectiveness and implications of the proposed impact avoidance or mitigation measures;
- (vii) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable avoidance or mitigation measures) and the cumulative effects expected to arise from the Project in relation to the sensitive receivers and potential affected uses;
- (viii) to identify, assess and specify methods, measures and standards to be included in the Project which are necessary to mitigate these environmental impacts and cumulative effects and reduce them to the acceptable levels;
- (ix) 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; and
- (x) 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 the Project proposed in the Project Profile (No. PP-305/2006) and mentioned in Section 1.2 above. The EIA study shall address the key issues described below, together with any other key issues identified during the course of the EIA study :
- (i) the extent of residual land and groundwater contamination associated with the previous operation of the former Kai Tak Airport including at least the jet fuel storage area near ex-Government Flying Service Building, dangerous good stores at the former fire stations, any underground fuel pipeline for fuel transfer and aircraft fueling, and any past aircraft accidents within the Project boundary with a view to recommend soil and groundwater remediation measures if necessary;
 - (ii) the potential release of dust and gaseous emissions through decommissioning, demolition and soil and groundwater remediation works

- and impact to nearby sensitive receivers including the occupants of the ex-GFS building (if it is not decommissioned during the project duration);
- (iii) the potential release of contaminants through contaminated groundwater treatment and disposal, surface runoff, groundwater seepage and effluent generated during the Project and the water quality impact caused by the removal of the off-shore disused fuel dolphin and the associated connecting abandoned fuel pipeline;
 - (iv) the waste management (including handling, storage, collection, transport, treatment and final disposal) of building debris generated from the decommissioning and demolition works, contaminated soil and various types of chemical wastes/ hazardous materials to be cleaned up and generated from decontamination and site clearance;
 - (v) the potential noise impact from the Project;
 - (vi) the potential marine ecology impact arising from the removal of the off-shore disused fuel dolphin and the associated connecting fuel pipeline;
 - (vii) the potential cultural and heritage impacts on the heritage items including two windpoles, airport pier, runway, seawall, fire stations B & C and the adjacent pole within the Project boundary; and
 - (viii) the potential cumulative environmental impacts of the Project, through interaction or in combination with other existing, committed and planned developments in the vicinity of the Project if any. Consideration shall be given on the likely concurrent projects in the vicinity such as dredging for the cruise terminal at Kai Tak and potential submarine gas mains diversion for the Kai Tak Development.

3.3 Consideration of Alternative Decommissioning / Decontamination Methods

- 3.3.1 Having regard to the affected sensitive receivers, decommissioning duration and the severity of the environmental impacts, the EIA study shall explore alternative decommissioning methods (including demolition and decontamination methods) for the Project. A comparison of the environmental benefits and dis-benefits of applying different methods for different types of contamination shall be made. Taking into the comparison, the Applicant shall recommend/justify the adoption of a set of decommissioning approaches that will avoid or minimize adverse environmental effects to the maximum practicable extent. In particular, consideration shall be given to avoidance or minimization of impacts and disturbances on the various heritage items within the Project Area and salvage and reuse as far a possible the affected heritage items in the future KTD development.

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. 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 decommissioning programme and methodologies. The Applicant shall clearly state in the EIA report the time frame and work programmes of the Project and other potential concurrent

projects, and assess the cumulative environmental impacts from the Project with all interacting projects.

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)

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

3.4.5 Land Contamination Impact

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

3.4.5.2 The "Assessment Area" for land contamination impact shall include all areas within the Project boundary as shown in Figure 1 of this Study Brief, in particular for areas with the previous operation of the former Kai Tak Airport as mentioned in Section 3.2.1(i). If the land contamination impact of a certain part of the Project 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.

3.4.5.3 The Applicant shall provide a clear and detailed account of the former airport 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).

3.4.5.4 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).

3.4.5.5 Based on the endorsed CAP, the Applicant shall conduct a land contamination impact assessment and submit a Contamination Assessment Report (CAR) as part of this EIA report to the Director for endorsement. If land contamination is confirmed,

a Remedial Action Plan (RAP) shall also be submitted as part of this EIA report to the Director for endorsement to formulate necessary remedial measures.

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

- (i) a review of the available information;
- (ii) an initial contamination evaluation of this/these site(s) and possible remediation methods;
- (iii) confirmation of whether the contamination problem at this/these site(s) would be surmountable;
- (iv) a sampling and analysis proposal which shall aim at determining the nature and the extent of the contamination of this/these site(s) ; and
- (v) a schedule of submission of revised CAP (if necessary), CAR and RAP upon this/these site(s) is/are accessible.

3.4.5.7 The Applicant shall complete land contamination assessment and remediation (if necessary) at the potential contaminated site(s) prior to the commencement of any construction works for the planned future Kai Tak developments at the respective site(s). If off-site treatment of contaminated soil from the Project is proposed, the applicant shall provide a definitive, committed programme for the off-site treatment. Any proposed off-site treatment site(s) shall on completion of the treatment process be decontaminated and confirmed clean to ensure the site(s) suitable for future development.

3.4.5.8 The Applicant shall make it clear how the contaminated wastes from the Project would be disposed of and determine the environmental acceptability of the associated impacts. Every effort should be made to reduce the amount of materials that require off-site disposal. If there are contaminated materials to be transported to other sites for treatment prior to proper disposal, the Applicant shall investigate the potential risks of pollution from the contaminated materials on the way to the treatment site(s) and recommended adequate mitigation measures against with any potential pollution accidents.

3.4.6 Waste Management Implications

3.4.6.1 The Applicant shall follow the relevant criteria and guidelines for evaluating and assessing waste management implications as stated in the main text, Annex 7 and Annex 15 of the TM respectively.

3.4.6.2 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 Project, 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 decommissioning process 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.

3.4.6.3 The Applicant shall confirm if the Project will generate dredged mud / sediment which require off-site disposal e.g. through the removal of the disused fuel dolphin and the associated connecting abandoned pipeline. If positive, the waste management assessment shall also address the followings:

- (a) Identification and quantification as far as practicable of all dredging, fill extraction, filling, mud/sediment transportation and disposal activities and requirements shall be conducted. 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.
- (b) Identification and evaluation of the best practical dredging methods to minimize dredging and dumping requirements and demand for fill sources based on the criterion that existing marine mud shall be left in place and not to be disturbed as far as possible.

3.4.7 Water Quality Impact

- 3.4.7.1 The Applicant shall follow the relevant criteria and guidelines for evaluating and assessing water pollution as set out in the main text, Annex 6 and Annex 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 Project boundary as shown in Figure 1 of this Study Brief, plus the Victoria Harbour Water Control Zone (WCZ) as declared under the Water Pollution Control Ordinance.
- 3.4.7.3 The Applicant shall identify and analyse physical, chemical and biological disruptions of groundwater and marine water arising from the Project.
- 3.4.7.4 The Applicant shall predict, quantify and assess any water quality impacts arising from the Project on the water system(s) and the sensitive receivers. Possible impacts shall include but not be limited to elevation in suspended solids; release of organic and inorganic contaminants resulting from the removal of the disused fuel dolphin; construction site runoff; and contaminated groundwater discharge / seepage if any and the consequential effects on aquatic organisms due to such changes in the affected water bodies.
- 3.4.7.5 The Applicant shall take into account and include likely different work stages or sequences, 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 which might be affected by the Project.
 - (b) Characterization of water quality of the water systems and sensitive receivers which might be affected by the Project based on existing information or site survey and tests as appropriate.
 - (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.
 - (d) Identification of pertinent water quality objectives and establishment of other appropriate water quality criteria or standards for the water system(s) and all the sensitive receivers identified in (a), (b) and (c) above.
 - (e) Identification of any alteration of water courses, change of flow regimes, change of groundwater quality and level and catchment types or areas.
 - (f) Identification of any site formation activities such as demolition, excavation or

stockpiling which will lead to increase in overland erosion potential.

- (g) Identification and quantification of past, existing and likely future water pollution sources including point discharge and non-point sources to surface water runoff. An emission inventory on the quantities and characteristics of all these past, 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.
- (h) Investigation of the risk of groundwater contamination during the decommissioning and decontamination processes. The potential impacts from the contaminated groundwater to the coastal zone should be evaluated and properly addressed.
- (i) Prediction and quantification of the impacts on the water system and the sensitive receivers due to those alterations and changes identified in (e) and the polluting activities and pollution sources identified in (f) and (g). The prediction shall take into account and include likely different decommissioning stages or sequences.
- (j) Assessment of the cumulative impacts due to other related concurrent and planned projects, activities or pollution sources within a boundary around the assessment 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.

Decommissioning of the Off-shore Disused Fuel Dolphin

- (k) The Applicant shall review the methods for the removal of the off-shore disused fuel dolphin and the associated connecting abandoned fuel pipeline and confirm if the Project will involve major dredging, filling and sediment mud / disposal activities.
- (l) Should dredging be required, the Applicant shall evaluate and quantify the possible impacts arising from the dredging works. The Applicant shall identify clearly the nature, extent and rate of the dredging works, and the volume of sediment disturbed. Appropriate prediction or laboratory tests such as elutriate tests (USACE) shall be performed on the sediment samples to simulate and quantify the degree of mobilization of various contaminants such as metals, ammonia, trace organic contaminants such as PCBs, PAHs, TBT and chlorinated pesticides into the water column during dredging. Suitable mud dredging disposal methods shall be recommended to reduce any adverse effects found.
- (m) Should the decommissioning works of the off-shore disused fuel dolphin involve disturbance of contaminated sediment, the Applicant shall assess with methodology agree by the Director, the potential increase in turbidity and suspended solids levels in the water column due to disturbance of marine sediments, and the potential for release of contaminants during decommissioning works using the chemical testing results derived from sediment samples collected on site and relevant historic data.

Waste Water and Non-point Source Pollution

- (n) Proposal of effective and practicable water pollution prevention and mitigation measures to be implemented during the decommissioning works stages so as to reduce the water quality impacts to within acceptable levels of standards. Requirements to be incorporated in the project contract document shall also be proposed.
- (o) Best management practices to reduce stormwater and non-point source pollution shall be investigated and proposed as appropriate. Attention shall be made to the water quality control and mitigation measures recommended in the ProPECC (Professional Persons Environmental Consultative Committee) Practice Notes No. 1/94 on construction site drainage.
- (p) Evaluation and quantification of residual impacts on the water system(s) and the sensitive receivers with regard to the appropriate water quality criteria, standards or guidelines.

3.4.8 Air Quality Impact

3.4.8.1 The Applicant shall follow the relevant criteria and guidelines for evaluating and assessing air quality impact as stated in the main text, Annex 4 and Annex 12 of the TM respectively.

3.4.8.2 The Applicant shall identify and assess dust and any air pollutant emissions that shall arise from the demolition and decontamination works under the Project. The Applicant shall assess air pollutants concentrations with reference to the relevant sections of the guidelines in Appendices A1 to A3 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).

3.4.8.3 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 Project boundary as shown in Figure 1 of this study brief. 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 description of the types of activities of the Project.
- (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.
- (c) Present the background air quality in the assessment area for the purpose of evaluating any cumulative air quality impacts due to the Project.

(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 sub-section 3.4.8.3(iii)(b) below as arising from the Project within the assessment area (sub-section 3.4.8.3(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. 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.
- (b) Identify and present a list of air pollutant emission sources, including any emission sources from the decommissioning and decontamination processes, based on results of the analysis conducted under sub-section 3.4.8.3(ii)(a) above. Examples of emission sources include odour, soil gas, volatile organic compounds, dust arising from vehicular movements on unpaved haul roads on site and soil excavation.

Confirmation regarding the validity of the assumptions adopted and the magnitude of the activities (e.g. volume of excavated material handled) shall be obtained from the relevant government departments/authorities and documented.

- (c) The emissions from 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 (sub-section 3.4.8.3(i)) shall be assessed, based on the best information available at the time of assessment

(iv) Dust 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 decommissioning and decontamination processes shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper dust control.
- (b) If the Applicant anticipates that the Project will give rise to significant 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 sub-section 3.4.8.3(iv)(a) above, a quantitative

assessment should be carried out to evaluate the dust impact at the identified ASRs. The Applicant shall follow the methodology set out in sub-section 3.4.8.3(vi) below when carrying out the quantitative assessment.

(v) Air Quality Impacts from Decommissioning Other Than Dust Impact

The Applicant shall calculate the expected air pollutant concentrations and the associated health risk from the Project at the identified ASRs including possible impacts of at least, any resultant/related odour, soil gas, volatile organic compounds. Calculations for the expected impacts shall be based on an assumed reasonably worst case scenario. The Applicant shall follow the methodology as described in sub-section 3.4.8.3(vi) below when carrying out the quantitative assessment.

(vi) Quantitative Assessment Methodology

- (a) The Applicant shall apply the general principles enunciated in the modelling guidelines in Appendices A1 to A3 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.
- (c) 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.
- (d) The Applicant shall calculate the overall cumulative air quality impact at the ASRs identified under sub-section 3.4.8.3(iii) above and evaluate these results against the relevant criteria and guidelines set out in the main text and Annex 4 of 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.

(vii) Mitigation Measures for Non-compliance

The Applicant shall propose remedies and mitigating measures where significant air quality impacts are identified and predicted. 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 relevant criteria and guidelines set out in the main text and Annex 4 of the TM. The Applicant shall also justify the assumptions adopted in the assessment for effectiveness of the proposed mitigation measures.

(viii) 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.

3.4.9 Noise Impact

3.4.9.1 The Applicant shall follow the relevant criteria and guidelines for evaluating and assessing the construction noise impacts arising from the Project as stated in the main text, Annex 5 and Annex 13 of the TM respectively.

3.4.9.2 The noise impact assessment shall include the following :

(i) Determination of Assessment Area

The area for construction noise impact assessment shall generally include all areas within 300m from the Project boundary as shown in Figure 1 of this Study Brief. 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 boundary of Project if they may be affected by the Project.

(ii) Provision of Background Information and Existing Noise Levels

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.

(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 Plans, Layout Plans and other relevant published land use plans. 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.

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

The Applicant shall provide an inventory of noise sources, including representative power mechanical equipment, e.g. demolition and land decontamination equipment as appropriate, for 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 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 the construction (including decommissioning and demolition process but 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) 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 construction 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 at the affected NSRs shall be given.
- (d) The Applicant shall formulate a reasonable work 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.

3.4.10 Impact on Cultural Heritage

3.4.10.1 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.

3.4.10.2 The Applicant shall conduct a built heritage impact assessment (BHIA), taking the results of previous BHIA and other earlier cultural heritage studies of the site into account, including the relevant EIA reports / studies mentioned in Section 3.4.3, to identify known and unknown heritage items within the assessment area (as described in Sections 1.2 and 3.2) that may be affected by the Project 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 B1.

3.4.11 Marine Ecology Impact

3.4.11.1 Subject to the final scope and scale of the marine works, the Applicant shall carry out a desktop review of the relevant available marine ecological information within the Project area.

3.4.11.2 The Applicant shall follow the criteria and guidelines for evaluating and assessing ecological impacts as set out on Annexes 8 and 16 of the TM respectively.

3.4.11.3 The assessment area shall be the same as the water quality impact assessment or the area likely to be impacted by the Project.

3.4.11.4 Based on the review results, the Applicant shall identify data gap and determine if there is any need for field dive surveys. If the desktop review identifies the need, field dive surveys of short duration¹ shall be conducted to collect additional information.

3.4.11.5 Based on the desktop review and any additional information gathered from the field surveys considered necessary, the Applicant shall evaluate any potential loss of or disturbance to important marine habitats / species, such as corals within the vicinity of the Project area, as affected by the Project's marine work, such as removal of the off-shore disused fuel dolphin and the associated connecting abandoned fuel pipeline. If adverse marine ecology impacts are anticipated to result from Project activities, practical mitigation measures shall be recommended.

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

3.4.12.1 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

¹ The durations of the field surveys would be a few days and the surveys would unlikely need to cover specific periods of the year.

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.

3.4.13 Impacts Summary

3.4.13.1 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.

3.4.14 Summary of Environmental Outcomes

3.4.14.1 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.

3.4.15 Environmental Monitoring and Audit (EM&A) Requirements

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

3.4.15.2 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 monitoring data, wherever practicable, for the Project and associated works through a dedicated internet website.

3.4.15.3 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.

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 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.
- 5.3 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.
- 5.4 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.
- 5.5 The electronic copies of the EIA report and the executive summary shall be submitted to the Director at the time of application for approval of the EIA report.
- 5.6 When the EIA report and the executive summary are made available for public inspection under section 7(1) of the EIAO, the content of the electronic copies of the EIA report and the executive summary must be the same as the hard copies and the Director shall be provided with the most updated electronic copies.
- 5.7 To promote environmentally friendly and efficient dissemination of information, both hardcopies and electronic copies of future EM&A reports recommended by the EIA study shall be required and their format shall be agreed by the Director.

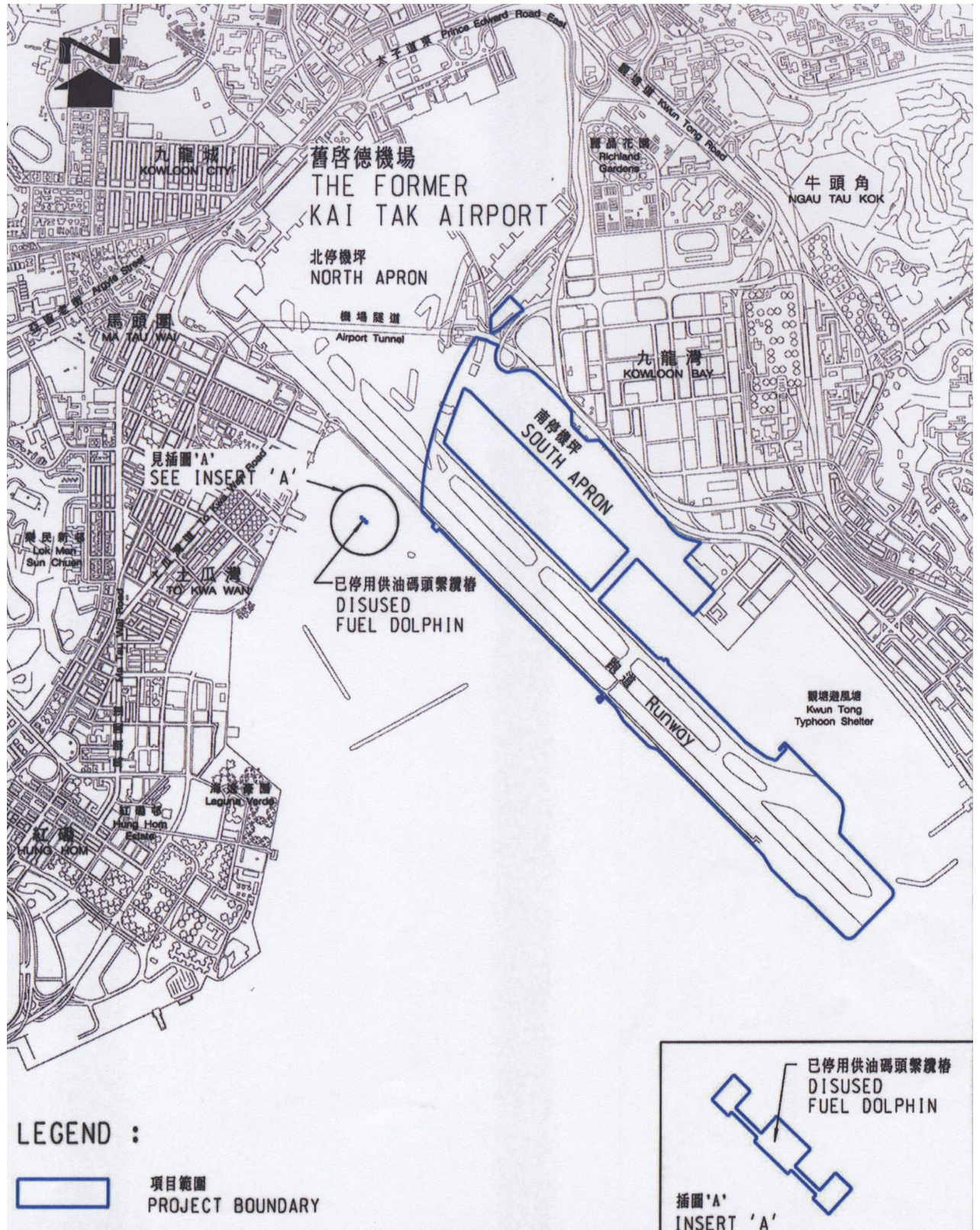
6. OTHER PROCEDURAL REQUIREMENTS

- 6.1 If there is any change in the Applicant (as representing his or her organisation) 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 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 ---

December 2006
Environmental Assessment Division,
Environmental Protection Department



Project Title:
Decommissioning of the Former Kai Tak Airport other than the North Apron
 (EIA Study Brief No.: ESB-160/2006)

Figure 1: Project Location

(prepared based on Drawing No. KZ 450 of Project Profile No. PP-305/2006)

Appendix A1

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.

<u>Model</u>	<u>Applications</u>
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° for rural areas to 24° for highly urbanised areas under 'D' class stability. For semi-rural such as new development areas, 18° is more appropriate under the same stability condition. The following reference can be consulted for typical ranges of standard deviation of wind direction under different stability categories and surface roughness

conditions.

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

3.2 Emission Sources

All the identified sources relevant to a process plant or a study site should be entered in the model and the emission estimated based on emission factors compiled in the AP-42 (Ref. 2) or other suitable references. The relevant sections of AP-42 and any parameters or assumptions used in deriving the emission rates (in units g/s, g/s/m or g/s/m²) 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 μ m)

and RSP ($< 10 \mu\text{m}$) compositions should be used.

3.7 NO₂ to NO_x Ratio

The conversion of NO_x to NO₂ 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 NO₂:

- (a) Ambient Ratio Method (ARM) - assuming 20% of NO_x to be NO₂; or
- (b) Discrete Parcel Method (DPM, available in the CALINE4 model); or
- (c) Ozone Limiting Method (OLM) - assuming the tailpipe NO₂ emission to be 7.5% of NO_x and the background ozone concentration to be in the range of 57 to 68 $\mu\text{g}/\text{m}^3$ 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:

<u>Stability Category</u>	<u>1-hour to 5-sec Conversion Factor</u>
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 A2

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 A3**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.

Schedule 1

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

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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 B1**Criteria for Cultural Heritage Impact Assessment**
(As at Oct 2006)**(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. Appropriate methods for pricing and valuation of the archaeological survey, including by means of a Bill of Quantities or a Schedule of Rates should be considered in preparing specifications and relevant documents for calling tenders to carry out the archaeological survey. The specifications and relevant documents should be sent to the Antiquities and Monuments Office for agreement prior to calling tenders to conduct the archaeological survey.
- b. A licence shall be obtained from the Antiquities Authority for conducting an archaeological survey. It takes at least two months to process the application.
- c. 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.

- d. The following methods of archaeological survey (but not limited to) should be applied to assess the archaeological potential of the project area:
 - (i) Definition of areas of natural land undisturbed in the recent past.
 - (ii) 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.
 - (iii) 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.
 - (iv) 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.
 - (v) 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.
 - (vi) 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.
- d. *Guidelines for Archaeological Reports* should be followed (Annex 1).

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 *Guidelines for Handling of Archaeological Finds and Archives* (Annex 2).

(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.

Annex 1 to Appendix B1**Guidelines for Archaeological Reports****(As at Oct 2006)****I General**

1. All reports should be written in a clear, concise and logical style.
2. The reports should be submitted in A4 size and accompanying drawings of convenient sizes, but not exceeding A3 size unless otherwise approved by the Antiquities and Monuments Office (AMO).
3. Draft reports should be submitted to AMO for comments within two months after completion of archaeological work unless otherwise approved by AMO.
4. The draft reports should be revised as required by AMO and relevant parties. The revised reports should be submitted to AMO within three weeks after receiving comments from AMO and relevant parties.
5. At least 3 hard copies of the final reports should be submitted to AMO for record purpose.
6. At least 2 digital copies of the final reports in both Microsoft Word format and Acrobat (.PDF) format without loss of data and change of appearance compared with the corresponding hard copy should be submitted to AMO. The digital copies should be saved in a convenient medium, such as compact discs with clear label on the surface and kept in protective pockets.

II Suggested Format of Reports

1. Front page:
 - Project/Site name
 - Nature of the report
e.g. (Draft/Final)
Archaeological Investigation/Survey Report
Archaeological Impact Assessment Report
Watching Brief Report
Rescue Excavation Report
Post-excavation Report
 - Organization
 - Author
 - Date of report
2. Contents list
Page number of each section should be given.
3. Non-technical summary (both in English and in Chinese)
This should outline in plain, non-technical language, the principal reasons for the archaeological work, its aims and main results, and should include reference to authorship and commissioning body.
4. Introduction
This should set out background leading to the commission of the reports. The location, area, scope and date of conducting the archaeological work must be given. The location of archaeological work should be shown on maps in

appropriate scales and with proper legends.

5. Aims of archaeological work
These should reflect the aims set in the project design.
6. Archaeological, historical, geological and topographical background of the site
Supporting aerial photos and maps (both old and present) in appropriate scales, with proper legends and with the site locations clearly marked on should be provided.
7. Methodology
The methods used including any variation to the agreed project design should be set out clearly and explained as appropriate.
8. Result
This should outline the findings, known and potential archaeological interests by period and/or type. Their significance and value with reference/inclusion of supporting evidence should be indicated. For impact assessment, the likely effect of the proposed development on the known or potential archaeological resource should be outlined.
9. Conclusion
This should include summarization and interpretation of the result.
10. Recommendation
Recommendations on further work and the responsible party as well as a brief planning framework should be outlined.
11. Reference and bibliography
A list of all primary and secondary sources used should be given.
12. Supporting illustrations
They should be clearly numbered and easily referenced to the text. They should be scanned and saved in TIFF or JPEG formats.

(i) Maps

Archaeological work locations, such as auger hole and test pit locations (with relevant coordinates certified by a qualified surveyor), should be clearly shown on maps in appropriate scales and with proper legends and captions.

(ii) Drawings of test pits, archaeological features and finds

The below scales should be followed:

Cross section and profile drawings of test pits	1:20
Archaeological feature drawings	1:10
Finds drawings	1:1

If drawings of the above stated scales are not appropriate to be incorporated into the report under certain occasions, reduced copy of the drawings with the same scales are acceptable. Proper captions, legends and indication of reduced size should be given.

(iii) Photos of site and finds

All photos should be at least in 3R size with proper captions and scales. They should be clearly numbered and easily referenced to the text. They should be scanned and saved in TIFF or JPEG formats.

13. Supporting data in appendices

These should consist of essential technical details to support the result. These may include stratigraphy record of test pits and auger holes, record of general and special finds discovered with description, quantity and context number/stratigraphical sequence, index of field archives.

14. Comment and Response

All comments and responses from AMO and relevant parties should be attached.

III Green Measures

1. All reports should be of single line spacing and printed on both sides of the paper.
2. Excessive page margins should be avoided. A top/bottom margin of 2 cm and left/right margin of 2.5 cm are sufficient.
3. Use of blank paper should be avoided as far as possible.
4. Suitable font type of font size 12 should be used generally in balancing legibility and waste reduction objective.

Annex 2 to Appendix B1**Guidelines for Handling of Archaeological Finds and Archives****(As at Oct 2006)****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” technique² should be adopted for marking permanent identification number on an object.
- 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.

² 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.
- 6
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.

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.

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.