

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

Environmental Impact Assessment Study Brief No. ESB-252/2012

**Project Title: Alternative Ground Decontamination Works at the Proposed Kennedy Town Comprehensive Development Area Site
(hereinafter known as the "Project")**

**Name of Applicant: Civil Engineering and Development Department
(hereafter known as the "Applicant")**

1. BACKGROUND

- 1.1 An application (No. ESB-252/2012) for an Environmental Impact Assessment (EIA) study brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 19 July 2012 with a project profile (No. PP-471/2012) (the Project Profile).
- 1.2 The Project is to carry out construction and land decontamination work at the proposed Kennedy Town Comprehensive Development Area (KTCDA) site (the Project site). According to the Project Profile, land decontamination methods will be determined during the EIA study. The environmental impacts identified in the Project Profile are based on the possible on-site land decontamination methods, such as biopiling and cement solidification etc. within the Project site. The Project site mainly consists of the ex-Kennedy Town Incineration Plant (KTIP), ex-Kennedy Town Abattoir (KTA), Cadogan Street temporary garden, a public car park, a refuse collection point (RCP), Highways Department's maintenance depot and a bus depot. The boundary of the Project is shown in the Project Profile and reproduced in Figure 1 of this EIA study brief.
- 1.3 The Applicant had previously conducted an Environmental Impact Assessment (EIA) for the "*Demolition of Buildings and Structures in the Proposed Kennedy Town Comprehensive Development Area Site*" (the Decommissioning Project). The EIA report (EIA Register No. AEIAR-058/2002, hereafter called "original EIA report") was approved with conditions in 2002 and an Environmental Permit was subsequently issued. The Decommissioning Project is currently covered by Environmental Permit No. EP-136/2002/D (the EP). Since some areas of the Project site were not accessible for land contamination assessment during the EIA study of the Decommissioning Project, a Contamination Confirmatory Investigation (CCI) was subsequently conducted to ascertain the extent of the land contamination in accordance with the EP. The CCI indicated that the amount of soil requiring remediation would be significantly larger than the quantity as predicted in the original EIA report. As such, the recommended land decontamination methods and related mitigation measures in the original EIA report are no longer applicable. Therefore, this EIA is required to explore alternative methods for the land decontamination work and to assess the nature and extent of environmental impacts arising from the selected land decontamination method(s) and associated works. This EIA report, subject to its approval, is for supporting the future application of variation to the EP.
- 1.4 The Decommissioning Project is a designated project by virtue of Item 3, Part II of Schedule 2 of the EIAO, which specifies "*Decommissioning of a municipal, chemical or chemical*

waste incinerator". This Project forms part of the Decommissioning Project.

- 1.5 Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection (the Director) issues this EIA study brief to the Applicant to carry out an EIA study.
- 1.6 The purpose of this EIA study is to provide information on the environmental impacts arising from the carrying out of the Project and associated works that will take place concurrently. This information will contribute to decisions by the Director on:
 - (i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project and associated works, and their staged implementation;
 - (ii) the conditions and requirements for the detailed design of construction and land decontamination work to mitigate against adverse environmental consequences; and
 - (iii) the acceptability of residual impacts, if any, after the proposed mitigation measures are implemented.

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

- (i) to describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project;
- (ii) to identify and describe the elements of the community and environment likely to be affected by the Project, and/or likely to cause adverse impacts to the Project, including both the natural and man-made environment and the associated environmental constraints;
- (iii) to identify and quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
- (iv) to identify and quantify any potential losses or damage to flora, fauna and natural habitats;
- (v) to propose the provision of infrastructure or mitigation measures to minimize pollution, environmental disturbance and nuisance during the carrying out of the Project;
- (vi) to investigate the feasibility, effectiveness and implications of the proposed mitigation measures;
- (vii) to identify, predict and evaluate the residual (i.e. after practicable mitigation) environmental impacts and the cumulative effects expected to arise during the carrying out of 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 detailed design and the carrying out of the Project which are necessary to mitigate these residual environmental impacts and cumulative effects and reduce them to acceptable levels;

- (ix) to design and specify the environmental monitoring and audit requirements; and
- (x) to identify any additional studies necessary to implement the mitigation measures or monitoring and proposals recommended in the EIA report.

3. DETAILED REQUIREMENTS OF THE EIA STUDY

3.1 The Purpose

The purpose of this EIA study brief is to set out the purposes and objectives of the EIA study, the scope of environmental issues which shall be addressed, the requirements that the EIA study shall need to fulfil, and the necessary procedural and reporting requirements. The Applicant shall demonstrate in the EIA report whether the criteria in the relevant sections of the Technical Memorandum on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance (hereinafter referred to as “the TM”) are complied with.

3.2 The Scope

3.2.1 The scope of this EIA study shall cover the Project and associated works mentioned in sub-sections 1.2-1.4 above. For the purpose of assessing whether the environmental impacts shall comply with the criteria of the TM, the EIA study shall address the likely key issues described below, together with any other key issues identified during the course of the EIA study:

- (i) potential air quality impact and the associated health risks on sensitive receivers due to the Project and associated works, including construction dust emissions, odour, gaseous emissions as well as released contaminated vapour and particulates etc.;
- (ii) potential noise impact on sensitive receivers due to the Project and associated works, including impact from the use of powered mechanical equipment (PME), land decontamination process (such as biopiling and cement solidification etc.) and rock crushing (if required);
- (iii) potential water quality impact and the associated risks of discharge of potentially contaminated wastewater resulting from the land decontamination process and surface runoff, if any, due to the Project and associated works, including construction site runoff, drainage diversion, sewage effluent from the workforce and accidental spillage of chemicals/wastes;
- (iv) potential waste management implications arising from the Project;
- (v) land contamination within the Project site and the associated health and safety risks to on-site personnel during the construction and land decontamination, monitoring and measurements activities;
- (vi) potential impact on ecological sensitive areas due to the Project;
- (vii) potential fisheries impact due to the Project;
- (viii) potential landscape impact, including the impacts on existing trees within the Project site and Cadogan Street Temporary Garden, due to the Project; and
- (ix) potential cumulative environmental impacts of the Project and associated works, through interaction or in combination with other existing, committed and planned projects in the vicinity of the Project, and that the impacts of these projects may have a bearing on the environmental acceptability of the Project.

3.3 Consideration of Alternatives

3.3.1 Need of the Project

The Applicant shall provide information on the need of the Project, including changes to relevant findings in the original EIA report, purpose, objectives and environmental benefits of the Project, and describe the scenarios with and without the Project.

3.3.2 Consideration of Alternative Land Decontamination Methods and Sequences of Work

Taking into consideration the combined effect with respect to the severity and duration of the impacts resulting from the construction and land decontamination work to the affected sensitive receivers, the EIA study shall explore alternative land decontamination methods and sequences of work for the Project, with a view to avoiding or minimising prolonged adverse environmental impacts. A comparison of the environmental benefits and dis-benefits of applying different land decontamination methods and sequence of work shall be made.

3.3.3 Selection of Preferred Scenario

The Applicant shall, taking into consideration of the findings as required in sub-section 3.3.2 above, recommend and justify the adoption of the preferred scenario and describe the part that environmental factors played in arriving at the final selection.

3.4 Technical Requirements

3.4.1 The Applicant shall conduct the EIA study to address the environmental aspects of the activities as described in section 3.2 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The EIA report shall include the construction and land decontamination programme as well as approaches and methodologies for assessing environmental impacts of the Project. The EIA report shall provide the time frame, stage implementation programme, and work programme of the Project and other concurrent projects, for assessing the cumulative environmental impacts from the Project and the interacting projects identified in the EIA study.

3.4.2 The EIA study shall follow the technical requirements specified below and in the Appendices of this EIA study brief.

3.4.3 Air Quality Impact

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

3.4.3.2 The study area for air quality impact assessment shall generally be defined by a distance of 500 meters from the boundary of the Project site, yet it shall be extended to include major existing and planned/committed air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. The assessment shall include the existing and planned/committed air sensitive receivers within the study area as well as areas where the air quality may be significantly affected by the project. The assessment shall be based on the best available information at the time of the assessment. The assessment shall also take into account the impacts of emission sources from concurrent projects in the vicinity, if

any.

3.4.3.3 The air quality impact assessment shall follow the detailed technical requirements given in Appendix A.

3.4.4 **Noise Impact**

3.4.4.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing noise impact as stated in Annexes 5 and 13 of the TM.

3.4.4.2 The study area for the noise impact assessment shall generally include areas within 300 meters from the boundary of the Project site. Subject to the agreement of the Director, the study area could be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300 meters from the outer Project limit, provides acoustic shielding to those receivers at distances further away from the Project. The study area shall be expanded to include NSRs at distances over 300 meters from the Project and associated works if those NSRs are also affected by the carrying out of the Project.

3.4.4.3 The noise impact assessment shall follow the detailed technical requirements given in Appendix B.

3.4.5 **Water Quality Impact**

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

3.4.5.2 The study area for the water quality impact assessment shall include all areas within 500 meters from the boundary of the Project site and shall cover the Victoria Harbour (Phase Three) Water Control Zone as designated under Water Pollution Control Ordinance (Cap. 358) and the water sensitive receivers in the vicinity of the Project, such as seawater intake of WSD's Kennedy Town Salt Water Pumping Station (PS027). The study area could be extended to include other areas such as stream courses, existing and new drainage system; and the associated water system(s) in the vicinity if they are found also being affected by the Project during the EIA study and have a bearing on the environmental acceptability of the Project.

3.4.5.3 The water quality impact assessment shall follow the detailed technical requirements given in Appendix C.

3.4.6 **Waste Management Implication**

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

3.4.6.2 The assessment of the waste management implication shall follow the detailed technical requirements given in Appendix D1.

3.4.7 **Land Contamination**

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

3.4.7.2 The study area for the land contamination assessment shall include the whole Project site as delineated in Figure 1 of this EIA study brief and, if any, the boundaries of all associated areas (e.g. work areas). If the land contamination and associated health and safety risks of a certain part of the Project site has been investigated in any Contamination Assessment Plan (CAP) or assessed in any Contamination Assessment Report (CAR) and/or Remediation Action Plan (RAP) approved by the Director or any document(s) deposited in the EIA Ordinance Register, the Applicant shall make reference to such document(s) and confirm with the Director whether the information including criteria, assessment methodology and findings of such document(s) is still relevant and valid for the EIA study. If the reviewing of the above relevant document(s) indicates any information gaps, the Applicant shall carry out additional land contamination assessment, including site investigation, to determine the nature and extent of land contamination.

3.4.7.3 The Applicant shall explore different methods for land decontamination and determine suitable works sequence and programme for the selected land decontamination method(s), taking into account the site conditions and the types of contaminants requiring remediation with a view to avoiding and minimizing potential environmental impacts to environmentally sensitive areas and sensitive uses. The Applicant shall also identify health and safety risks for the selected land decontamination method(s) during different stages of the Project and recommend control measures required during the construction, land decontamination, monitoring and measurements activities.

3.4.7.4 The assessment of the potential land contamination issues shall follow the detailed requirements given in Appendix D2.

3.4.8 **Ecological Impact**

3.4.8.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing ecological impact as stated in Annexes 8 and 16 of the TM to confirm whether there are adverse ecological impacts resulting from the Project and, if affirmative, to conduct the ecological impact assessment.

3.4.8.2 In the event that adverse ecological impacts are identified, the Applicant shall approach the Director for additional specific requirements on the assessment of ecological impacts.

3.4.9 **Fisheries Impact**

3.4.9.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing fisheries impact as stated in Annexes 9 and 17 of the TM to confirm whether there are adverse fisheries impacts resulting from the Project and, if affirmative, to conduct the fisheries impact assessment.

3.4.9.2 In the event that adverse fisheries impacts are identified, the Applicant shall approach the Director for additional specific requirements on the assessment of fisheries impacts.

3.4.10 **Landscape Impacts**

3.4.10.1 The Applicant shall follow the criteria and guidelines as stated in Annexes 10 and 18 of the TM, the EIAO Guidance Note No. 8/2010 on "Preparation of Landscape and Visual Impact

Assessment under the Environmental Impact Assessment Ordinance” and the report of “Landscape Value Mapping of Hong Kong” for evaluating and assessing the landscape impact.

3.4.10.2 The study area for landscape impact assessment shall include all areas within the Project site.

3.4.10.3 The landscape impact assessments shall follow the detailed technical requirements given in Appendix E.

3.4.11 **Environmental Monitoring and Audit (EM&A) Requirements**

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

3.4.11.2 Subject to the confirmation of the EIA study findings on the need for EM&A, the Applicant shall comply with the requirements as stipulated in Annex 21 of the TM.

3.4.11.3 The Applicant shall prepare a Project Implementation Schedule (in the form of a checklist as shown in Appendix F) containing the EIA study recommendations and mitigation measures with reference to the implementation programme.

3.5 **Presentation of Summary Information**

3.5.1 Summary of Environmental Outcomes

The EIA report shall contain a summary of key environmental outcomes arising from the EIA study, including estimated population protected from various environmental impacts, environmentally sensitive areas protected, environmentally friendly options considered and incorporated in the preferred option, environmental designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of environmental protection measures recommended.

3.5.2 Summary of Environmental Impacts

To facilitate effective retrieval of pertinent key information, the EIA report shall contain a summary table of environmental impacts showing the assessment points, results of impact predictions, relevant standards or criteria, extents of exceedances predicted, impact avoidance measures considered, mitigation measures proposed and residual impacts (after mitigation). This summary shall cover each individual impact and shall also form an essential part of the executive summary of the EIA report.

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

The EIA report shall contain a summary including the assessment methodologies and key assessment assumptions adopted in the EIA study, the limitations of these assessment(s) methodologies/assumptions, if any, plus all relevant prior agreement(s) with the Director or other Authorities on individual environmental media assessment components. The proposed use of any alternative assessment tool(s) or assumption(s) have to be justified by the

Applicant, with supporting documents based on cogent, scientific and objectively derived reason(s) before seeking the Director's agreement. The supporting documents shall be provided in the EIA report.

4. DURATION OF VALIDITY

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

5. REPORTING 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 accompany with the submission of the EIA report a summary, pointing out where in the EIA report the respective requirements of this EIA study have been addressed and fulfilled.
- 5.2 The Applicant shall supply the Director with hard and electronic copies of the EIA report and the executive summary in accordance with the requirements given in Appendix G of this EIA study brief. 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.

6. OTHER PROCEDURAL REQUIREMENTS

- 6.1 If there is any change in the name of Applicant for this EIA study brief during the course of the EIA study, the Applicant must notify the Director immediately.
- 6.2 If there is any key change in the scope of the Project mentioned in sub-sections 1.2 to 1.4 of this EIA study brief and in Project Profile (No. PP-471/2012), the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover the key changes, and the additional issues, if any, that the EIA study must also address. If the changes to the Project fundamentally alter the key scope of the EIA study brief, the Applicant shall apply to the Director for a fresh EIA study brief.

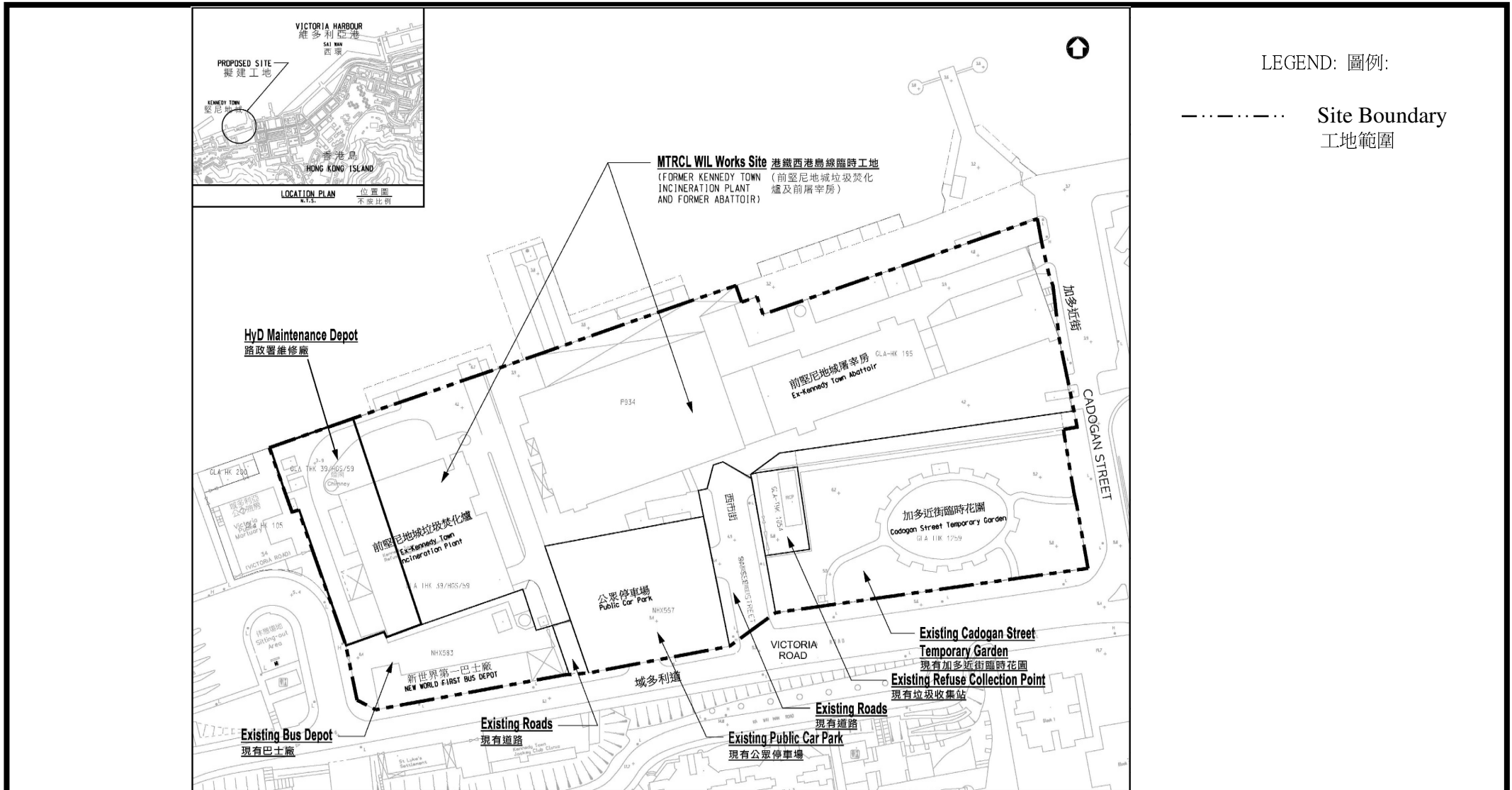
7. LIST OF FIGURE AND APPENDICES

7.1 This EIA study brief includes the following figure and appendices:

- Figure 1 – Project Location Plan
- Appendix A – Requirements for Air Quality Impact Assessment
- Appendix B – Requirements for Noise Impact Assessment
- Appendix C – Requirements for Water Quality Impact Assessment
- Appendix D1 – Requirements for Assessment of Waste Management Implications
- Appendix D2 – Requirements for Land Contamination Assessment
- Appendix E – Requirements for Landscape Impact Assessment
- Appendix F – Implementation Schedule
- Appendix G – Requirements for EIA Documents

--- END OF EIA STUDY BRIEF ---

August 2012
Environmental Assessment Division
Environmental Protection Department



Alternative Ground Decontamination Works at the Proposed Kennedy Town

Comprehensive Development Area Site
堅尼地城綜合發展區替代土地除污工程

Location Plan of the Project
工程項目的位置圖

This figure was prepared based on Figure 1.1 of the Project Profile (No.: PP-471/2012)
本圖是根據工程項目簡介(編號: PP-471/2012) 圖 1.1 編制

Figure 1 附圖 1

EIA Study Brief No.
ESB-252/2012

環評研究概要編號
ESB-252/2012



Appendix A

Requirements for Air Quality Impact Assessment

The air quality impact assessment shall include the following:

1. Background and Analysis of Activities

- (i) Provide background information relating to air quality issues relevant to the Project, e.g. description of the types of activities of the Project that may affect air quality during construction and land decontamination stages of the Project.
- (ii) Provide an account, where appropriate, of the consideration/measures that had been taken into consideration in the planning of the Project to abate the air pollution impact. The Applicant shall consider alternative land decontamination methods/phasing programmes to minimize the air quality impact due to the Project.
- (iii) Present the background air quality levels in the study area for the purpose of evaluating cumulative air quality impacts during construction and land decontamination stages of the Project. The Applicant may establish the existing air quality conditions based on properly collected ambient air quality monitoring data, and in case necessary, augmented with air quality modelling tools. The Pollutants in the Atmosphere and their Transport over Hong Kong (PATH) model may be used to estimate the future background air quality.

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

- (i) Identify and describe existing, planned and committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development applications approved by the Town Planning Board. The Applicant shall select the assessment points of the identified ASRs that represent the reasonable worst impact location of these ASRs. A map clearly showing the location and a table with description such as name of buildings, their uses and height of the selected assessment points shall be given. The separation distances of these ASRs from the nearest emission sources shall also be given.
- (ii) Provide a list of air pollution emission sources, which are related to the Project based on the analysis of the construction and land decontamination activities in section 1 above. Examples of emission sources include land decontamination process (such as biopiling and cement solidification), stock piling, vehicular movements on unpaved haul roads on site, etc. Confirmation regarding the validity of assumptions adopted and the magnitude of the activities (e.g. volume of construction material and contaminated soil handled, etc.) shall be obtained from the relevant government departments / authorities and documented.
- (iii) Identify other sources of emissions which are likely to have an impact related to the Project, such as any concurrent projects identified as relevant during the course of the EIA study for incorporation into the assessment of the overall cumulative air quality

impact. The impact as affecting the existing, committed and planned ASRs within the study area shall be assessed, based on the best information available at the time of assessment.

3. Construction Dust Impact

- (i) The Applicant shall follow the requirements stipulated under the Air Pollution Control (Construction Dust) Regulation to ensure that construction dust impacts (i.e. Total Suspended Particulate) are controlled within the relevant standards as stipulated in section 1 of Annex 4 of the TM.
- (ii) If the Applicant anticipates that the Project will give rise to significant construction dust impacts likely to exceed recommended limits in the TM at ASRs within the study area despite the incorporation of the dust control measures proposed, a quantitative assessment shall be carried out to evaluate the construction dust impact at the identified ASRs. The Applicant shall follow the methodology set out in section 5 below when carrying out the quantitative assessment.

4. Air Quality Impact from the Land Decontamination Process Other than Construction Dust Impact

- (i) The Applicant shall assess the potential air quality impact and the associated health risks due to the Project at identified ASRs including any resultant/related odour, gaseous emission as well as released contaminated vapour and particulates arising from the land decontamination process.
- (ii) If the health risks required under section 4(i) above have been assessed in any document(s) deposited in the EIA Ordinance Register, the Applicant shall make reference to such document(s) and confirm with the Director whether the information including criteria, assessment methodology and findings of such document(s) is still relevant and valid for the EIA study.
- (iii) If previous assessment of health risks as stated in section 4(ii) above is no longer valid, the Applicant shall propose the criteria and assessment methodology for the Director's agreement.

5. Quantitative Assessment Methodology

- (i) The Applicant shall apply the general principles enunciated in the modelling guidelines in Appendices A-1 to A-3 while making allowance for the specific characteristic of the Project.
- (ii) For the purpose of assessing the compliance with the criteria as stated in Annex 4 of the TM, the Applicant shall identify the key/representative air pollution parameters (types of pollutants and averaging time concentrations) to be evaluated and provide explanation for selecting such parameters for assessing the impact of the Project.
- (iii) Calculations of relevant pollutant emission rates for input to the model and a map showing the emission sources shall be presented in the EIA report. A summary table of the emission rates shall be presented in the EIA report. The Applicant shall ensure consistency between the text description and the model files at every stage of

submissions for review.

- (iv) The Applicant shall calculate the cumulative air quality impact at the ASRs identified under section 2 above and compare these results against the criteria set out in section 1 of Annex 4 in the TM. The predicted air quality impacts (both unmitigated and mitigated) shall be presented in the form of summary table(s) and pollution contours, to be evaluated against the relevant air quality standards and on any effect they may have on the land use implications. Plans of a suitable scale should be used to present pollution contours to allow buffer distance requirements to be determined properly.

6. Mitigation Measures for Non-compliance

Consideration for Mitigation Measures

- (i) Where the predicted air quality impact exceeds the criteria set in section 1 of Annex 4 in the TM, the Applicant shall consider mitigation measures to reduce the air quality impact on the identified ASRs. The feasibility, practicability, programming and effectiveness of the recommended mitigation measures shall be assessed and documented in the EIA report. Specific reasons for not adopting certain workable mitigation measures to reduce the air quality to a level meeting the criteria in the TM or to maximise the protection of the ASRs as far as possible should be clearly substantiated and documented in the EIA report.
- (ii) A monitoring and audit programme for the construction and land decontamination stages of the Project shall be devised to verify the effectiveness of the recommended mitigation measures to ensure proper control of construction dust, odour, gaseous emission as well as released contaminated vapour and particulates.

Evaluation of Residual Air Quality Impact

- (iii) Upon consideration of mitigation measures, if the mitigated air quality impact still exceeds the relevant criteria in Annex 4 of TM, the Applicant shall identify, predict, evaluate the residual air quality impact in accordance with section 4.4.3 of the TM and estimate the total number of existing dwellings, classrooms and other air sensitive elements that will be exposed to residual air quality impacts exceeding the criteria set in Annex 4 in the TM.

7. Submission of Emission Calculation Details and Model Files

- (i) Input and output file(s) of model run(s) including those files for generating the pollution contours shall be submitted to the Director in electronic format together with the submission of the EIA report.

Appendix A-1

Guidelines on Choice of Models and Model Parameters

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

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 exercises 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'.

2.3 The models can be used to estimate both short-term (hourly and daily average) and long-term (annual average) ambient concentrations of air pollutants. The model results, obtained using appropriate model parameters (refer to section 3) and assumptions, allow direct comparison with the relevant air quality standards such as the Air Quality Objectives (AQOs) for the relevant pollutant and time averaging period.

3. Model input requirements

3.1 Meteorological Data

3.1.1 At least 1 year of recent meteorological data (including wind speed, wind direction, stability class, ambient temperature and mixing height) from a weather station either closest to or

having similar characteristics as the study site should be used to determine the highest short-term (hourly, daily) and long-term (annual) impacts at identified air sensitive receivers in that period. The amount of valid data for the period should be no less than 90 percent.

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

Day time: stability class D; wind speed 1 m/s (at 10m height); worst-case wind angle; mixing height 500 m

Night time: stability class F; wind speed 1 m/s (at 10m height); worst case wind angle; mixing height 500 m

This is a common practice with using the CALINE4 model due to its inability to handle lengthy data set.

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

- (i) perform a frequency occurrence analysis of one year of meteorological data to determine the actual wind speed (to the nearest unit of m/s), wind direction (to the nearest 10°) and stability (classes A to F) combinations and their frequency of occurrence;
- (ii) determine the short term hourly impact under all of the identified wind speed, wind direction and stability combinations; and
- (iii) apply the frequency data with the short term results to determine the long term (daily / annual) impacts.

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

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

3.1.5 An additional parameter, namely, the standard deviation of wind direction, 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 classed as either rural or urban so as to reflect the enhanced mixing that occurs over urban areas due to the presence of buildings and urban heat effects. The selection of either rural or urban dispersion coefficients in a specific application should follow a land use classification procedure. If the land use types including industrial, commercial and residential uses account for 50% or more of an area within 3 km radius from the source, the site is classified as urban; otherwise, it is classed as rural.

3.4 Surface Roughness Height

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

3.5 Receptors

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

3.6 Particle Size Classes

In evaluating the impacts of dust-emitting activities, suitable dust size categories relevant to the dust sources concerned with reasonable breakdown in TSP (< 30 µgm) and RSP (< 10 µgm) 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 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 µg/m³ depending on the land use type (see also EPD reference paper 'Guidelines on Assessing the 'TOTAL' Air Quality Impacts').

3.8 Odour Impact

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

<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 EPD. The EPD's '*Guidelines on the Use of Alternative Computer Models in Air Quality Assessment*' should also be referred to.

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. Refer to EPD reference paper 'Guidelines on Assessing the 'TOTAL' Air Quality Impacts' for further information.

3.12 Output

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

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

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 (USEPA)

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 USEPA.

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

Appendix A-2

Guidelines on Assessing the “Total” Air Quality Impacts

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

1. Total Impacts - 3 Major Contributions

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

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

2. Nature of Emissions

2.1 Primary contributions

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

2.2 Secondary contributions

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

2.3 Background contributions

The above two types of emission contributions should account for, to a great extent, the air quality impacts upon local air sensitive receivers, which are often amenable to estimation by the 'Gaussian Dispersion' type of models. However, a background air quality level should be prescribed to indicate the baseline air quality in the region of the project site, which would account for any pollution not covered by the two preceding contributions. The emission sources contributing to the background air quality would be located further afield and not easy to identify. In addition, the transport mechanism by which pollutants are carried over long distances (ranging from 1km up to tens or hundreds of kms) is rather complex and cannot be adequately estimated by the 'Gaussian' type of models.

3. Background Air Quality - Estimation Approach

3.1 The approach

In view of the difficulties in estimating background air quality using the air quality models currently available, an alternative approach based on monitored data is suggested. The essence of this approach is to adopt the long-term (5-year) averages of the most recent monitored air quality data obtained by EPD. These background data would be reviewed yearly or biennially depending on the availability of the monitored data. The approach is a first attempt to provide a

reasonable estimate of the background air quality level for use in conjunction with EIA air quality assessment to address the cumulative impacts upon a locality. This approach may be replaced or supplemented by superior modelling efforts such as that entailed in PATH (Pollutants in the Atmosphere and their Transport over Hong Kong), a comprehensive territory-wide air quality modelling system currently being developed for Hong Kong. Notwithstanding this, the present approach is based on measured data and their long term regional averages; the background values so derived should therefore be indicative of the present background air quality. In the absence of any other meaningful way to estimate a background air quality for the future, this present background estimate should also be applied to future projects as a first attempt at a comprehensive estimate until a better approach is formulated.

3.2 Categorisation

The monitored air quality data, by 'district-averaging' are further divided into three categories, viz, Urban, Industrial and Rural/New Development. The background pollutant concentrations to be adopted for a project site would depend on the geographical constituency to which the site belongs. The categorisation of these constituencies is given in section 3.4. The monitoring stations suggested for the 'district-averaging' (arithmetic means) to derive averages for the three background air quality categories are listed as follows:

Urban: Kwun Tong, Sham Shui Po, Tsim Sha Tsui and Central/Western Industrial: Kwun Tong, Tsuen Wan and Kwai Chung Rural/New Development: Sha Tin, Tai Po, Junk Bay, Hong Kong South and Yuen Long

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

3.3 Background pollutant values

Based on the above approach, background values for the 3 categories have been obtained for a few major air pollutants as follows:

POLLUTANT	URBAN	INDUSTRIAL	RURAL/NEW DEVELOPMENT
NO ₂	59	57	39
SO ₂	21	26	13
O ₃	62	68	57
TSP	98	96	87

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 realised) 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 A-3

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

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

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) complexity of situation to be modelled far exceeds capability of Schedule 1 models; and
 - (ii) performance of an alternative model is comparable or better than the Schedule 1 models.
- 1.4 This paper outlines the demonstration / submission required in order to support the use of an alternative air quality model for regulatory applications for Hong Kong.

2. Required Demonstration / Submission

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

Based on the above information, EPD will determine the acceptability of the proposed model for a specific or general applications. The onus of providing adequate supporting materials rests entirely with the proponent.
- 2.2 To provide technical details of the proposed model, the proponent should submit documents containing at least the following information:
 - (i) mathematical formulation and data requirements of the model;
 - (ii) any previous performance evaluation of the model; and
 - (iii) a complete set of model input and output file(s) in commonly used electronic format.
- 2.3 On performance evaluation, the required approach and extent of demonstration varies depending on whether a Schedule 1 model is already available and suitable in simulating the situation under consideration. In cases where no Schedule 1 model is found applicable, the proponent must demonstrate that the proposed model passes the screening test as set out in USEPA Document "Protocol for Determining the Best Performing Model"

- 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"
- 2.5 Should EPD find the information on technical details alone sufficient to indicate the acceptability of the proposed model, information on further performance evaluation as specified in sections 2.3 and 2.4 above would not be necessary.
- 2.6 If the proposed model is an older version of one of the Schedule 1 models or was previously included in Schedule 1, the technical documents mentioned in section 2.2 are normally not required. However, a performance demonstration of equivalence as stated in section 2.4 (i) would become necessary.
- 2.7 If EPD is already in possession of some of the documents that describe the technical details of the proposed model, submission of the same by the proponent is not necessary. The proponent may check with EPD to avoid sending in duplicate information.
-

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

Appendix B

Requirements for Noise Impact Assessment

The noise impact assessment shall include the following:

1. Provision of Background Information and Existing Noise Levels

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

2. Identification of Noise Sensitive Receivers

- (i) The Applicant shall refer to Annex 13 of the TM when identifying the NSRs. The NSRs shall include existing NSRs and planned/committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by Lands Department and any land use and development applications approved by the Town Planning Board. Photographs of existing NSRs shall be appended to the EIA report.
- (ii) The Applicant shall select assessment points to represent 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 and may be varied subject to the best and latest information available during the course of the EIA study. 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.

3. Provision of an Emission Inventory of the Noise Sources

The Applicant shall provide an inventory of noise sources including representative construction equipment for construction noise assessment. Confirmation of the validity of the inventory shall be obtained from the relevant government departments/authorities and documented in the EIA report.

4. Construction Noise Assessment

- (i) The assessment shall cover the cumulative noise impacts resulting from the construction and/or land decontamination work of the Project and other concurrent projects identified during the course of the EIA study.
- (ii) The Applicant shall carry out assessment of noise impact due to the Project (including construction and land decontamination work but excluding percussive piling) during daytime, i.e. 7am to 7pm, on weekdays other than general holidays in accordance with methodology in paragraphs 5.3 and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of TM shall be adopted in the assessment.
- (iii) To minimize the construction noise impact, alternative work methods for the construction and land decontamination work shall be proposed as far as practicable.
- (iv) If the unmitigated construction noise levels are found exceeding the relevant criteria, the

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

- (v) The Applicant shall, as far as practicable, formulate a reasonable work programme so that no work will be required in restricted hours as defined under the Noise Control Ordinance (NCO). In case the Applicant needs to evaluate whether construction work in restricted hours as defined under the NCO are feasible or not in the context of programming construction work, reference should be made to relevant technical memoranda issued under the NCO. Regardless of the results of construction noise impact assessment for restricted hours, the Noise Control Authority will process Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary conditions/situations. This aspect should be explicitly stated in the noise chapter and the conclusions and recommendations chapter in EIA report.

5. Assessment of Side Effects and Constraints

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

6. Evaluation of Constraints on Planned Noise Sensitive Developments/Land uses

For planned noise sensitive uses which will still be affected even with practicable direct technical remedies in place, the Applicant shall propose, evaluate and confirm the practicability of additional measures within the planned noise sensitive uses and shall make recommendations on how these noise sensitive uses will be designed for the information of relevant parties. The Applicant shall take into account agreed environmental requirements / constraints identified by the EIA study to assess the development potential of concerned sites which shall be made known to the relevant parties.

Appendix C

Requirements for Water Quality Impact Assessment

1. The Applicant shall identify and analyse physical, chemical and biological disruptions of the water system(s) arising from the construction and land decontamination work of the Project.
2. The Applicant shall predict and assess any water quality impacts and the associated risk of discharge of potentially contaminated wastewater resulting from the construction and land decontamination work and surface runoff, if any, due to the Project including, but not limited to, construction site runoff, drainage diversion, sewage effluent from the workforce and accidental spillage of chemicals/wastes.
3. The assessment shall include, but not limited to the following:
 - (i) the water quality impacts of the site runoff generated during the construction and land decontamination work such as the effluents generated from dewatering associated with excavation and piling activities, grouting and concrete washing and those specified in the ProPECC Practice Note 1/94; and
 - (ii) the water quality impacts on seawater intake points of Water Supplies Department (WSD)'s Kennedy Town Salt Water Pumping Station (PS027) around the work sites.
4. The Applicant shall address water quality impacts due to the Project. Essentially, the assessment shall address the following:
 - (i) collect and review background information on affected existing and planned water systems, their respective catchments and sensitive receivers which might be affected by the Project;
 - (ii) characterize water quality of the water systems and sensitive receivers, which might be affected by the Project based on existing best available information or through appropriate site survey and tests;
 - (iii) identify and analyse relevant existing and planned future activities, beneficial uses and water sensitive receivers including seawater intake(s) of WSD's Kennedy Town Salt Water Pumping Station (PS027) related to the affected water system(s). The Applicant should refer to, *inter alia*, those developments and uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans, and any other relevant published landuse plans;
 - (iv) identify pertinent water quality objectives including WSD seawater quality objectives and establish other appropriate water quality criteria or standards for the water system(s) and the sensitive receivers identified in (i), (ii) & (iii) above;
 - (v) review the specific construction and land decontamination methods and configurations of the Project to identify and predict the likely water quality impacts arising from the Project;

- (vi) identify any alternation of any water courses, natural streams, ponds, change of water holding/flow regimes and change of catchment types or areas in the study area;
- (vii) identify and quantify existing and likely future water pollution sources, including point discharges and non-point sources to surface water runoff, sewage from workforce and potentially contaminated discharge generated from the Project;
- (viii) provide an emission inventory on the quantities and characteristics of these existing and future pollution sources in the study area. Field investigation and laboratory test shall be conducted as appropriate to fill relevant information gaps;
- (ix) if potential discharge of contaminated wastewater resulting from land decontamination process and surface runoff is anticipated, investigate the potential impacts from the contaminated wastewater to the coastal zone. The Applicant shall also evaluate and properly address the consequential effect on aquatic organism;
- (x) predict and quantify the impacts on the water system(s) and their sensitive receivers due to those alternations and changes identified in (vi) above and the pollution sources identified in (vii) above. The prediction shall take into account and include possible different stages of construction and the land decontamination work of the Project;
- (xi) assess the cumulative impacts due to other related concurrent and planned projects, activities or pollution sources within the study area that may have a bearing on the environmental acceptability of the Project;
- (xii) analyze the provision and adequacy of existing and planned future facilities to reduce pollution arising from the point and non-point sources identified in (vii) above;
- (xiii) develop effective infrastructure upgrading or provision, contingency plan, water pollution prevention and mitigation measures to be implemented during the construction and land decontamination work, including emergency sewage discharge, so as to reduce the water quality impacts to within standards. Requirements to be incorporated in the project contract document shall also be proposed;
- (xiv) investigate and develop best management practices to reduce storm water and non-point source pollution as appropriate; and
- (xv) evaluate and quantify residual impacts on water system(s) and the sensitive receivers with regard to the appropriate water quality objectives, criteria, standards or guidelines; if the mitigated water quality impact still exceeds the relevant criteria in Annex 6 of TM, the Applicant shall identify, predict and evaluate the residual water quality impact in accordance with section 4.4.3 of the TM and estimate the significance of the residual impact to the water system(s) and the water sensitive receivers.

Appendix D1

Requirements for Assessment of Waste Management Implications

The assessment of waste management implications shall cover the following:

1. Analysis of Activities and Waste Generation

- (i) The Applicant shall identify the quantity, quality and timing of the waste arising as a result of the construction and land decontamination activities of the Project based on the sequence and duration of these activities, e.g. construction and demolition materials (C&DM) and other wastes which will be generated during the construction and land decontamination stages.
- (ii) The Applicant shall adopt appropriate design, general layout, construction and land decontamination methods and programme to ensure no contaminated wastes from the Project would be disposed of prior to proper decontamination and minimize the generation of public fill/inert C&DM and maximize the use of public fill/inert C&DM for other construction work.

2. Proposal for Waste Management

- (i) 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 planning and design stages, e.g. by modifying the design approach, and in the construction and land decontamination stages for maximizing waste reduction shall be separately considered.
- (ii) After considering the opportunities for reducing waste generation and maximizing re-use, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal methods/options for each type of wastes shall be described in detail. The disposal methods/options recommended for each type of wastes shall take into account of the result of the assessment in (iv) below.
- (iii) The EIA report shall also state clearly the transportation routings and the frequency of the trucks/vessels involved, any barging point or conveyor system to be used, the stockpiling areas and the disposal outlets for the wastes identified.
- (iv) The impact caused by handling (including stockpiling, labelling, packaging and storage), collection, transportation and re-use/disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas :
 - potential hazard;
 - air and odour emissions;
 - noise;
 - wastewater discharge;
 - ecology; and
 - public transport.

3. Excavation, Filling and Dumping

The Applicant shall confirm whether the Project will generate mud/sediment which require off-site disposal. If affirmative, the waste management assessment shall also address the following:

- (i) Identification and quantification as far as practicable of all excavation, fill extraction, filling, sediment/mud 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 and documented in the EIA report for consideration. The categories of sediment/mud which are to be disposed of in accordance with a permit granted under the Dumping at Sea Ordinance (DASO) shall be identified by both chemical and biological tests and their quantities shall be estimated. If the presence of any serious contamination of sediment/mud which requires special treatment/disposal is confirmed, the Applicant shall identify the most appropriate treatment and / or disposal arrangement and demonstrate its feasibility. The Applicant shall provide supporting document, such as agreement by the relevant facilities management authorities, to demonstrate the viability of any treatment/disposal plan.
- (ii) Identification and evaluation of the best practicable excavation methods, treatment methods, reuse/ recycling options and work programme to minimize excavation and dumping requirements and demand for fill sources based on the criterion that existing sediment/mud shall be left in place and not to be disturbed as far as possible.

Appendix D2

Requirements for Land Contamination Assessment

1. The study area for land contamination shall include the whole Project site as delineated in Figure 1 of this EIA study brief and, if any, the boundaries of all associated areas (e.g. work areas) of the Project.
2. The Applicant shall follow the requirements stipulated in *Practice Guide for Investigation and Remediation of Contaminated Land*, *Guidance Note for Contaminated Land Assessment and Remediation*, *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management* and any relevant environmental standards and guidelines issued by the Director and their updated versions to assess the land contamination.
3. The Applicant shall provide a clear and detailed account of the present land use (including description of the activities, chemicals and hazardous substances handled with clear indication of their storage and location by reference to a site map) and a complete past land use history in relation to possible land contamination (including accident records, change of land use(s) and the like).
4. During the course of the EIA study, the Applicant shall submit a Contamination Assessment Plan (CAP) to the Director for endorsement prior to conducting a land contamination assessment for the study area. The Applicant may refer to other previously agreed document(s) which are still relevant and valid, including CAP(s) or any document(s) deposited in the EIA Ordinance Register, to determine the nature and extent of land contamination for certain part of the Project site. If the reviewing of the above relevant document(s) indicates any information gaps, the CAP shall include additional site investigation requirements, including proposal with details on representative sampling and analysis required, to determine the nature and extent of land contamination.
5. 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) a confirmation of whether the contamination problem at this/these site(s) would be surmountable;
 - (iv) a sampling and analysis proposal which shall aim at determining the nature and the extent of the contamination of this/these site(s); and
 - (v) a schedule of submission of revised CAP (if necessary), Contamination Assessment Report (CAR), Remediation Action Plan (RAP) and Remediation Report (RR) upon this/these site(s) is/are accessible.
6. In accordance with the endorsed CAP, the Applicant shall conduct a land contamination assessment including field measurements, sampling, laboratory analysis and results interpretations and compile a CAR based on the standards and guidelines stated in section 2 above for the Director's review.
7. If the extent of land contamination is confirmed, the Applicant shall prepare and submit a

RAP as part of the EIA report to the Director for approval to formulate viable land decontamination methods and remedial measures with supporting documents, such as agreement by the relevant facilities management authorities. The RAP shall follow the requirements stipulated in the standards and guidelines stated in section 2 above, including a health and safety section to identify potential health and safety risks and control measures required for on-site personnel during the construction, land decontamination, monitoring and measurements activities.

8. The RAP shall also include a requirement on the submission of a Remediation Report (RR), which shall be submitted after the completion of land decontamination works and prior to the commencement of any development works within the site to demonstrate that the remedial measures have been carried out and completed according to the RAP.
9. The CAP, CAR, RAP shall be documented in the EIA report.

Appendix E

Requirements for Landscape Impact Assessment

1. The Applicant shall review relevant outline development plan(s), outline zoning plan(s), layout plan(s) or planning briefs and studies which may identify areas of high landscape value, e.g. Cadogan Street Temporary Garden, green belt and woodland areas with sensitive landscape designations. Any guidelines on landscape strategy, landscape framework, urban design concept, building height profiles, designated view corridors, open space network and landscape link that may affect the appreciation of the Project shall also be reviewed.
2. The Applicant shall describe, appraise, analyze and evaluate the existing and planned landscape resources and character of the site area. e.g. vegetation, woodland, streams and topography, etc. A system shall be derived for judging landscape impact significance as required under the TM. Annotated oblique aerial photographs and plans of suitable scale showing the baseline landscape resources and landscape character areas and mapping of impact assessment shall be extensively used to present the findings of impact assessment. Descriptive text shall provide a concise and reasoned judgment from a landscape point of view. The landscape impact assessment shall quantify potential landscape impact as far as possible, so as to illustrate the significance of such impact arising from the Project. Clear mapping of the landscape impact is required. A broad brush tree survey to identify dominant tree species, maturity, rarity and any plant species of conservation interest, etc. should be conducted within the study area to provide baseline information on the landscape resources and landscape character areas and the impacts on existing trees shall be summarized. Cumulative landscape impact of the Project with other existing, committed and planned developments in the study area shall be assessed.
3. The Applicant shall evaluate the merit and demerit of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area. Alternative location, site layout, development options, design and land decontamination method that would avoid or reduce the identified landscape impact shall first be considered and be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The mitigation measures proposed shall not only be concerned with damage reduction but shall also include consideration of potential enhancement of the existing landscape quality. The Applicant shall recommend mitigation measures to minimize the adverse effects identified above, including provision of a master landscape design.
4. The mitigation measures shall also include the preservation of vegetation, transplanting of trees of good amenity value, provision of screen planting, re-vegetation of disturbed lands, compensatory planting and any measures to mitigate the disturbance of the existing land use. A practical programme and funding proposal for the implementation of the recommended measures shall be provided.
5. Annotated illustration such as coloured perspective drawings, plans and section/elevation diagrams, oblique aerial photographs shall be adopted to illustrate the significance of the landscape impact of the Project in three stages i.e. existing conditions, unmitigated impacts and mitigated impacts at Day 1 upon completion of the Project.

Appendix F

IMPLEMENTATION SCHEDULE

EIA* Ref.	EM&A	Environmental Protection Measures*	Location/Duration of Measures/ Timing of Completion of Measures	Implementation Agent	Implementation Stage **				Relevant Legislation & Guidelines
	Log Ref.		Des	C	O	Dec			

* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

** Des=Design; C=Construction & Decontamination; O=Operation; Dec=Decommissioning

Appendix G

Requirements for EIA Report Documents

1. The Applicant shall supply the Director with the following number of copies of the EIA report and the executive summary:
 - (i) 30 copies of the EIA report in English and 30 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 in item (i) above as required under section 7(1) of the EIAO, to be supplied upon advice by the Director for public inspection.
 - (iii) 20 copies of the EIA report in English and 20 copies of the executive summary (each bilingual in both English and Chinese) with or without Addendum as required under section 7(5) of the EIAO, to be supplied upon advice by the Director for consultation with the Advisory Council on the Environment.
2. In addition, to facilitate public inspection of EIA report via EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA report and executive summary prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 1.3 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EIA report and executive summary shall be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EIA report and executive summary shall be provided in the main text from where respective references are made. Graphics in the report shall be in interlaced GIF format unless otherwise agreed by the Director.
3. 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.
4. 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. 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.