ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE (CAP. 499)
SECTION 5(7)

ENVIRONMENTAL IMPACT ASSESSMENT STUDY BRIEF NO. ESB-259/2013

PROJECT TITLE: PYROLYSIS PLANT AT ECOPARK
(hereinafter known as the "Project")

NAME OF APPLICANT: HONG KONG TELFORD ENVIROTECH GROUP LIMITED
(hereinafter known as the "Applicant")

1. BACKGROUND

1.1 An application (No. ESB-259/2013) 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 28 February 2013 with a Project Profile (No. PP-484/2013) (hereinafter referred as the "Project Profile").

1.2 The Project is to construct and operate a pyrolysis plant with 4 pyrolysis furnaces of 5-tonnes processing capacity each for waste plastics. The Project is expected to handle approximately 20 tonnes of waste plastics per day for a daily production of approximately 12 tonnes of fuel oil products. The site area is about 5000 square metres in Phase 1 of EcoPark, Area 38, Tuen Mun. The proposed location of the Project as shown in Figure 1.1 of the Project Profile is reproduced in Appendix A of this EIA Study Brief. The Project mainly comprises the following:

(i) collection, sorting and mechanical preparation of waste plastics for feeding into Main Reactor; and
(ii) pyrolysis of waste plastics through Main Reactor; Second Combustion Chamber (Catalytic Tank), Cooling Water System and
(iii) auxiliary plant systems such as flue gas furnace system, waste gas treatment system (including gas detection and warning system and its chimney with 20m in height), ash collection and disposal system, combustion fuel storage system ; and
(iv) generated fuel oil storage and its transport.

1.3 The Project consists of the following designated projects under Part I, Schedule 2 of the EIAO:

(i) Item K.7 – " An oil refinery" ; and
(ii) Other designated projects that may be identified during the course of the EIA study.

1.4 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.

1.5 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from construction and operation of 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;
(ii) the conditions and requirements for the design, construction and operation of the Project to mitigate against adverse environmental consequences; and
(iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

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

(ii) to identify and describe elements of community and environment likely to be affected by the Project and/or likely to cause adverse impacts to the Project, including 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 propose the provision of infrastructure or mitigation measures to minimise pollution, environmental disturbance and nuisance during the construction and operation of the Project;

(v) to investigate the feasibility, effectiveness and implications of the proposed mitigation measures;

(vi) to identify, predict and evaluate the residual (i.e. after practicable mitigation) environmental impacts and the cumulative effects expected to arise during the construction and operation of the Project in relation to the sensitive receivers and potentially affected uses;

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

(viii) to design and specify environmental monitoring and audit requirements; and.

(ix) 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

3.1.1 The purpose of this EIA 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 of the EIAO (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 and associated works proposed in the Project Profile (No. PP-484/2013) and mentioned in section 1.2 of this EIA Study Brief. The EIA study shall address the likely key issues described below, together with any other key issues identified during the course of the EIA study:

(i) the potential air quality impact on the air sensitive receivers during the construction and operation of the Project, including dust, gaseous emissions, toxic air pollutants including dioxins and odour (if applicable) from the construction and operation of the facilities and associated works;

(ii) the potential hazard to human life due to the construction and operation of the Project, including the emission of waste gases and Dangerous Goods under the Dangerous Goods Ordinance (Cap. 295);

(iii) the potential water quality impact on the water system(s) during the construction and operation of the Project,

(iv) the potential waste management issues and impacts due to the construction and operation of the Project, including impacts arising from by-product(s) during operation of the Project;

(v) the potential land contamination arising from the construction and operation of the Project;

(vi) the potential landfill gas hazard on site during the construction and operation of the Project if the Project site falls within the 250-metre consultation zone of the restored Siu Lang Shui Landfill;

(vii) the potential noise impact during the construction and operation of the Project;

(viii) the potential landscape and visual impacts during the construction and operation of the Project;

(ix) the potential health impacts on human due to the operation of the Project; and

(x) the potential cumulative environmental impacts of the Project and associated works, through interaction or in combination with other existing, committed and planned projects in their vicinity, and that those impacts 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, including the purpose and objectives of the Project. The Applicant shall provide information on the source(s), classification and composition of wastes to be re-cycled; the intended uses of the generated fuel oil being produced; the quality of generated fuel oil, the amount of generated fuel oil and ash storage and re-use on site; previous experience in pyrolysis operation and consultation being carried out.

3.3.2 Consideration of Alternative Project Layout

The Applicant shall consider alternative layout for the Project and provide justifications regarding the layout in relation to the nearby oil farms in terms of hazard issues. The applicant shall describe the environmental factors considered in the selection and compare the environmental benefits and dis-benefits of alternative layout, and to avoid and/or minimize adverse environmental impacts.

3.4 Technical Requirements

The Applicant shall conduct the EIA study to address the environmental aspects of the Project as described in sections 3.1 to 3.3 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The Applicant shall include in the EIA report details of the construction and operational programme and the methodologies for the Project. The Applicant shall clearly state in the EIA report the time frame and works programmes of the Project and other concurrent projects, and assess the cumulative environmental impacts from the Project and the interacting projects as identified in the EIA study.

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

3.4.1 Air Quality Impact

3.4.1.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing air quality impact as stated in Annexes 4 and 12 of the TM.

3.4.1.2 The study area for air quality impact assessment shall be defined by a distance of 500 metres from the boundary of the Project site or other project locations as identified in the EIA, which shall be extended to include major existing, planned and committed air pollutant emission sources, including the EcoPark in Area 38, Tuen Mun, that may have a bearing on the environmental acceptability of the Project. The assessment shall include the existing, planned and committed sensitive receivers within the study area as well as areas where air quality may be potentially affected by the Project. The assessment shall be based on the best available information at the time of the assessment.

3.4.1.3 The assessment of the air quality impact arising from the construction and operation of the Project shall follow the detailed technical requirements given in Appendix B of this EIA Study Brief.

3.4.1.4 The Applicant shall assess the air pollutant concentrations with reference to the relevant sections of the guidelines in Appendices B-1 to B-3 attached to this EIA Study Brief, or

other methodology as agreed by the Director. The Applicant shall also note that the PATH model may be used for estimating the cumulative background concentrations by taking into account the major air pollutant emission sources in Hong Kong and nearby regions.

3.4.2 Hazard to Life

3.4.2.1 The Applicant shall follow the criteria for evaluating hazard to life as stated in Annex 4 of the TM.

3.4.2.2 The hazard assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix C of this EIA Study Brief.

3.4.3 Water Quality Impact

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

3.4.3.2 The study area for this water quality impact assessment shall include areas within 500 metres from the site boundary of the Project and shall cover the North Western Water Control Zone as designated under the Water Pollution Control Ordinance (Cap. 358) and the water sensitive receivers in the vicinity of the Project. The study area shall be extended to include other areas if they are found also being impacted during the course of the EIA study and have a bearing on the environmental acceptability of the Project.

3.4.3.3 The water quality impact assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix D of this EIA Study Brief.

3.4.4 Waste Management

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

3.4.4.2 The assessment of the waste management implications arising from the construction and operation of the Project shall follow the detailed technical requirements given in Appendix E of this EIA Study Brief.

3.4.5 Land Contamination Impact

3.4.5.1 The Applicant shall carry out land use review of the Project site and prevent potential land contamination during operation of the Project.

3.4.5.2 If any contaminated land uses as stated in Sections 3.1 of Annex 19 in the TM is identified, the Applicant shall follow the guidelines for evaluating and assessing potential land contamination issues as stated in Sections 3.1 of Annex 19 of the TM.

3.4.5.3 The land contamination assessment for the Project shall follow the detailed technical requirements given in Appendix F of this EIA Study Brief.

3.4.6 Landfill Gas Hazard

3.4.6.1 If the Project site falls within the 250-metre consultation zone of the restored Siu Lang Shui Landfill, the Applicant shall follow the guidelines for evaluating and assessing landfill gas hazard as stated respectively in Annexes 7 and 19 of the TM and the Landfill Gas Hazard Assessment Guidance Note issued by the Director.

3.4.6.2 The landfill gas hazard assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix G of this EIA Study Brief.

3.4.7 Noise Impact

3.4.7.1 The Applicant shall identify and justify in the EIA study the need for a noise impact assessment associated with the construction and operation of the Project including, but not limited to, noise generated from the night-time operation of the facilities and production plants, and the off-site traffic due to the Project.

3.4.7.2 If a noise impact assessment is needed, the Applicant shall follow the criteria and guidelines for evaluating and assessing noise impact as stated in Annexes 5 and 13 of the TM.

3.4.8 Landscape and Visual Impacts

3.4.8.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing landscape and visual impacts as stated in Annexes 10 and 18 of the TM, and the EIAO Guidance Note No. 8/2010 "Preparation of Landscape and Visual Impact Assessment under the EIAO".

3.4.8.2 The study area for the landscape impact assessment shall include areas within a distance of 500 metres from the site boundary of the Project while the study area for the visual impact assessment shall be defined by the visual envelop of the Project.

3.4.8.3 The landscape and visual impact assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix H of this EIA Study Brief.

3.4.9 Health Impacts

3.4.9.1 If a significant increase in levels of air pollutants to human receivers due to the project is predicted, the Applicant shall conduct health impact assessment for the increase in the identified air pollutants. For this purpose, the Applicant shall assess the potential health impact on human in relation to air pollutants (including toxic substances) in the exhaust gases from the operation of the Project in accordance with the technical requirements given in Appendix I.

3.4.9.2 The health impact assessment shall be based on established practices in countries around the world. A literature search shall be carried out to determine the best approach and methodology for the health impact assessment, including any codes of practices, guidelines, etc. applied locally in Hong Kong and elsewhere in the world. The approach and methodology to be adopted shall be agreed by the Director prior to the commencement of assessment.

3.4.10 Summary of Environmental Outcomes

3.4.10.1 The EIA report shall contain a summary of the 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 and environmental benefits of the environmental protection measures recommended.

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 construction and operational phases 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, 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 for the Project through a dedicated internet website.

3.4.11.3 The Applicant shall prepare a project implementation schedule (in the form of a checklist as shown in Appendix J of this EIA Study Brief) containing all the EIA study recommendations and mitigation measures with reference to the implementation programme of the Project.

4. DURATION OF VALIDITY

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

5. 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 also refer to Annex 20 of the TM, which stipulates the guidelines for the review of an EIA report.

5.2 The Applicant shall supply the Director with hard and electronic copies of the EIA report and the executive summary in accordance with the requirements given in Appendix K 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 section 1.2 of this EIA Study Brief and in Project Profile (No. PP-484/2013), 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 this EIA Study Brief, the Applicant shall apply to the Director for a fresh EIA study brief.

7. LIST OF APPENDICES

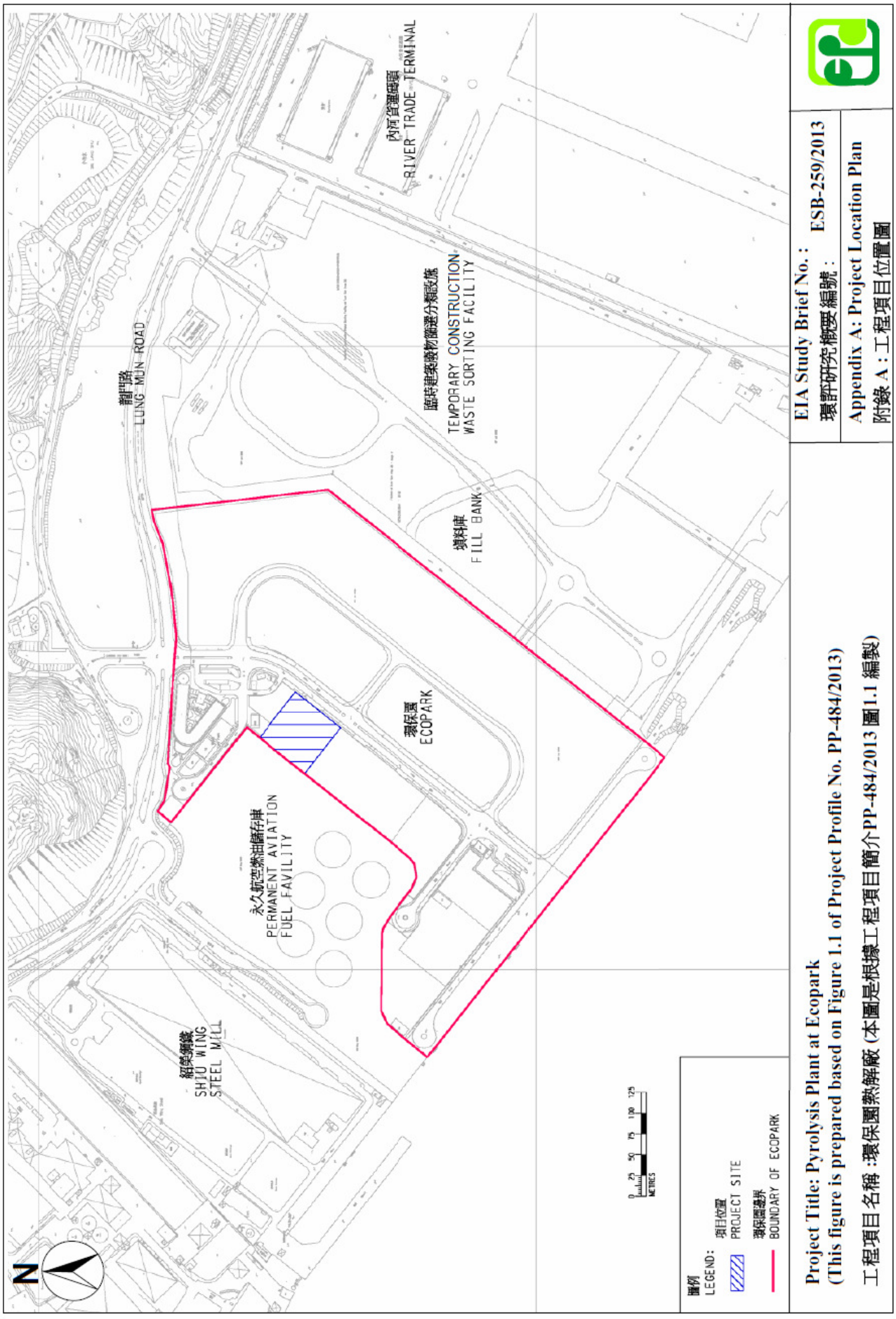
7.1 This EIA Study Brief includes the following appendices:

Appendix A – Project Location Plan
Appendix B – Requirements for Air Quality Impact Assessment
Appendix B-1 – Guidelines on Choice of Models and Model Parameters
Appendix B-2 – Guidelines on Assessing the 'TOTAL' Air Quality Impacts
Appendix B-3 – Guidelines on the Use of Alternative Computer Models in Air Quality Assessment
Appendix C – Requirements for Hazard Assessment
Appendix D – Requirements for Water Quality Impact Assessment
Appendix E – Requirements for Assessment of Waste Management Implications
Appendix F – Requirements for Land Contamination Assessment
Appendix G – Requirements for Landfill Gas Hazard Assessment
Appendix H – Requirements for Landscape and Visual Impact Assessment
Appendix I – Requirements for Health Impact Assessment of Air Pollutants (including toxic substances)
Appendix J – Implementation Schedule of Recommended Mitigation Measures
Appendix K – Requirements for EIA Report Documents

--- END OF EIA STUDY BRIEF ---

April 2013
Environmental Assessment Division
Environmental Protection Department

Appendix A


龍門路
LUNG MUN ROAD
內河貨運碼頭
RIVER TRADE TERMINAL
臨時建築廢物簡選分類設施
TEMPORARY CONSTRUCTION WASTE SORTING FACILITY
填料庫
FILL BANK
環保園
ECOPARK
永久航空燃油儲存庫
PERMANENT AVIATION FUEL FAVILITY
紹榮鋼鐵
SHIU WING STEEL MILL
N
0 25 50 75 100 125
METRES
圖例
LEGEND:
項目位置
PROJECT SITE
環保園邊界
BOUNDARY OF ECOPARK
Project Title: Pyrolysis Plant at Ecopark
(This figure is prepared based on Figure 1.1 of Project Profile No. PP-484/2013)
工程項目名稱 :環保園熱解廠 (本圖是根據工程項目簡介PP-484/2013 圖1.1 編製)
EIA Study Brief No. : ESB-259/2013
環評研究概要編號 :
Appendix A: Project Location Plan
附錄 A : 工程項目位置圖

Appendix B

Requirements for Air Quality Impact Assessment

The air quality impact assessment shall include the following:

1. Background and Analysis of Activities

   (i) Provision of 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 operational stages of the Project.

   (ii) Provision of an account, where appropriate, of the consideration/measures that have been taken into consideration in the planning of the Project to abate the air pollution impact.

   (iii) Presentation of background air quality levels in the study area for the purpose of evaluating cumulative air quality impacts during construction and operational stages of the Project. If PATH model is used to estimate the background air quality, details for the estimation of all emission sources to be adopted in the model runs should be clearly presented.

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

   (i) Identification and description of existing, planned and committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning 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. The Applicant shall select the assessment points of the identified ASRs that represent the worst impact point of these ASRs. A map clearly showing the location and description such as name of buildings, 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) Provision of a list of air pollution emission sources, including any nearby emission sources which are likely to have impact related to the Project based on the analysis of the construction and operation activities in section 1 above. Examples of operational stage emission sources include emissions of gaseous pollutants such as volatile organic compounds (VOC) and toxic air pollutants from the production processes and facilities, marine vessel emissions from the barges, vehicular emissions from the trucks transporting the feedstocks, reagents and products to and from the Project site, and odour emissions from the production processes and facilities, the transportation, handling and storage of odorous materials at the Project site, and the on-site wastewater treatment plant. Confirmation regarding the validity of the assumptions adopted and the magnitude of the activities (e.g. volume of construction material handled, odour emission strength, etc.) shall be obtained from the relevant government departments/authorities and documented.

(iii) Identification of chimneys and obtainment of relevant chimney emission data in the study area by carrying out a survey for assessing the cumulative air quality impact of air pollutants through chimneys. The Applicant shall ensure and confirm that the chimney emission data used in their assessment have been validated and updated by their own survey. If there are any errors subsequently found in their chimney emission data used, the Applicant shall be fully responsible and the submission may be invalidated.

(iv) The emissions 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 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 Phase Air Quality Impact

(i) 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.

(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 the ASRs 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. A monitoring and audit programme for the construction phase of the Project shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper construction dust control.

4. Operational Phase Air Quality Impact

(i) The Applicant shall calculate the expected air pollutant concentrations, such as dust, gaseous emissions, toxic air pollutants and odour, at the identified ASRs based on an assumed reasonably worst case scenario under normal operating conditions. The evaluation shall be based on the strength of the emission sources identified in section 2 above. The Applicant shall follow the methodology set out in Section 5 below when carrying out the assessment.

(ii) A monitoring and audit programme for the operational phase of the Project shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper control of operational air quality impacts.

5. Quantitative Assessment Methodology

(i) The Applicant shall apply the general principles enunciated in the modelling guidelines in Appendices B-1 to B-3 while making allowance for the specific characteristic of the Project. This specific methodology must be documented in such level of details, preferably assisted with tables and diagrams, to allow the readers of the EIA report to grasp how the model has been set up to simulate the situation under study without referring to the model input files. Detailed

calculations of air pollutants emission rates for input to the model shall be presented in the EIA report. The Applicant must ensure consistency between the text description and the model files at every stage of submissions for review.

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

(iii) 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

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

7. Submission of Model Files

All input and output file(s) of the model run(s) including those files for generating the pollution contours and the calculation of emission rates/factors, shall be submitted to the Director in electronic format together with the submission of the EIA report.

Appendix B-1

Guidelines on Choice of Models and Model Parameters

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

1. Introduction

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

2. Choice of Models

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

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

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

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

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

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

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

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

3.1.5 An additional parameter, namely, the standard deviation of wind direction, σ_θ, needs to be provided as input to the CALINE4 model. Typical values of σ_θ range from 12^o for rural areas to 24^o for highly urbanised areas under 'D' class stability. For semi-rural such

as new development areas, 18^o is more appropriate under the same stability condition. The following reference can be consulted for typical ranges of standard deviation of wind direction under different stability categories and surface roughness conditions.

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

3.2 Emission Sources

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

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

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

3.3 Urban/Rural Classification

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

3.4 Surface Roughness Height

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

3.5 Receptors

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

3.6 Particle Size Classes

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

10 μm) compositions should be used.

3.7 NO_2 to NO_x Ratio

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

(i) Ambient Ratio Method (ARM) - assuming 20% of NO_x to be NO_2; or
(ii) Discrete Parcel Method (DPM, available in the CALINE4 model); or
(iii) Ozone Limiting Method (OLM) - assuming the tailpipe NO_2 emission to be 7.5% of NO_x and the background ozone concentration to be in the range of 57 to 68 μ g/m3 depending on the land use type (see also the Environmental Protection Department (EPD) reference paper "Guidelines on Assessing the 'TOTAL' Air Quality Impacts" in Appendix B-2).

3.8 Odour Impact

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

Stability Category	1-hour to 5-sec Conversion Factor
A & B	45
C	27
D	9
E & F	8

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

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

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

3.9 Plume Rise Options

The ISCST3 model provides by default a list of the U.S. regulatory options for concentration calculations. These are all applicable to the Hong Kong situations except for the 'Final Plume Rise' option. As the distance between sources and receptors are

generally fairly close, the non-regulatory option of 'Gradual Plume Rise' should be used instead to give more accurate estimate of near-field impacts due to plume emission. However, the 'Final Plume Rise' option may still be used for assessing the impacts of distant sources.

3.10 Portal Emissions

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

3.12 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
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Industrial Source Complex Dispersion Model - Short Term Version 3 (ISCST3) or the latest version developed by U.S. Environmental Protection Agency

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

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

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

- END -

Appendix B-2

Guidelines on Assessing the 'TOTAL' Air Quality Impacts

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

1. Total Impacts - 3 Major Contributions

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

Primary contributions:	project induced
Secondary contributions:	pollutant-emitting activities in the immediate neighbourhood
Other contributions:	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 categorization 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
Nitrogen Dioxide (NO_2)	59	57	39
Sulphur Dioxide (SO_2)	21	26	13
Ozone (O_3)	62	68	57
Total Suspended Particulates (TSP)	98	96	87
Respirable Suspended Particulates (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.

- END -

Appendix B-3

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

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

1. Background

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

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

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

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

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

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

2. Required Demonstration / Submission

2.1 Any model that is proposed for air quality applications and not listed amongst the Schedule 1 models will be considered by 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 application. 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 EPD find the information on technical details alone sufficient to indicate the acceptability of the proposed model, information on further performance evaluation as specified in sections 2.3 and 2.4 above would not be necessary.

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

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

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

- END -

Appendix C

Requirements for Hazard Assessment

The hazard assessment shall cover the following:

1. Construction Phase

1.1 The Applicant shall carry out hazard assessment to evaluate the risk to construction workers of the Project due to the neighbouring dangerous goods (DG) processing and storage facilities (e.g. Permanent Aviation Fuel Facility). The hazard assessment shall include:

(i) identification of hazardous scenarios associated with the neighbouring DG processing and storage facilities with a view to determining a set of relevant scenarios to be included in a Quantitative Risk Assessment (QRA);

(ii) execution of a QRA of the set of hazardous scenarios determined in item 1.1(i) above, expressing population risks in both individual and societal terms;

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

(iv) identification and assessment of practicable and cost-effective risk mitigation measures.

2. Operational Phase

2.1 The Applicant shall carry out hazard assessment to evaluate the risk to off-site population due to the operation of the Project, including but not limited to, the DG storage and transfer, biodiesel production process involving DG as input, intermediate and final products. The hazard assessment shall include:

(i) identification of hazardous scenarios associated with the operation of the Project with a view to determining a set of relevant scenarios to be included in a QRA;

(ii) execution of a QRA of the set of hazardous scenarios determined in item 2.1(i), expressing population risks in both individual and societal terms;

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

(iv) identification and assessment of practicable and cost-effective risk mitigation measures.

3. Cumulative Risk Assessment

3.1 The Applicant shall conduct cumulative risk assessment of DG due to the neighbouring DG processing and storage facilities (e.g. Permanent Aviation Fuel Facility) during operation of the Project.

4. Methodology

4.1 The methodology to be used in the hazard assessment shall be consistent with previous studies having similar issues (e.g. EIA studies for the Permanent Aviation Fuel Facility for Hong Kong International Airport and Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate).

Appendix D

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 operation of the Project.

2. The Applicant shall predict and assess any water quality impacts arising from the construction and operation of the Project.

3. The assessment shall include, but not limited to the water quality impacts of the site runoff generated during the construction stage, the effluent and the emergency discharges from the on-site wastewater treatment plant and the spillages of chemicals/feedstocks at site and during marine loading/unloading activities on the water system(s) and the sensitive receivers within the study area.

4. The Applicant shall address water quality impacts due to the construction phase and operational phase of 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 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 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 methods and configurations, and operation 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, wetlands, change of catchment types or areas, erosion or sedimentation due to the Project;

(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 polluted discharge generated from the Project;

(viii) provide an emission inventory on the quantities and characteristics of those 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) report the adequacy of the existing sewerage and sewage treatment facilities for the handling, treatment and disposal of wastewater arising from the Project ;

(x) identify and quantify the water quality impacts based on the findings and recommendations from (ix) above. The water quality concerns shall include, but not limited to, possible sewage overflow or emergency discharge due to capacity constraints of the sewerage system, and emergencies arising from the Project;

(xi) predict and quantify the impacts on the water system(s) and its/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 construction and operation stages of the Project;

(xii) 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;

(xiii) 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;

(xiv) develop effective infrastructure upgrading or provision, contingency plan, water pollution prevention and mitigation measures to be implemented during construction and operation stages, including emergency sewage discharge in the case of sewage treatment works and sewage pumping stations, so as to reduce the water quality impacts to within standards. Requirements to be incorporated in the Project contract document shall also be proposed;

(xv) investigate and develop best management practices to reduce storm water and non-point source pollution as appropriate; and

(xvi) 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.

Appendix E

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 wastes, including chemical wastes and by-products, arising as a result of the construction and operational activities of the Project based on the sequence and duration of these activities, e.g. construction and demolition (C&D) materials and other wastes which will be generated during construction and operational stages. The Applicant shall adopt design, general layout, construction methods and programme to minimise the generation of public fill/inert C&D materials and maximize the use of public fill/inert C&D materials for other construction works.

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 that can be taken in the planning and design stages e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered;

   (ii) After considering the opportunities for reducing waste generation and maximizing re-use, the types and quantities of 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 the result of the assessment in item (iii) below;

   (iii) 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;
   - wastewater discharge; and
   - public transport.

Appendix F

Requirements for Land Contamination Assessment

The land contamination assessment shall cover the following:

1. Land Use Review

The Applicant shall identify land lots and sites within the site boundary of the Project which, due to their past or present land uses, are potential contaminated sites. A detailed account of the present activities and all past land uses history in relation to possible land contamination shall be provided. The list of potential contaminants which are anticipated to be found in these potential contaminated sites shall be provided and the relevant remediation options shall be presented.

2. Prevention of Potential Land Contamination during Operation

To prevent contamination problems arising from the operation of the Project, the Applicant shall:

(i) identify the possible sources of contamination and potential contaminants associated with the operation of the Project including, but not limited to, storage, use, transfer, accidental spillage and leakage of feedstocks, reagents, intermediate products and final products of the facilities and production plants;

(ii) evaluate the level of contamination identified in item (i) above; and

(iii) formulate appropriate operational practices, waste management strategies and precautionary measures for prevention of contamination problems.

Appendix G

Requirements for Landfill Gas Hazard Assessment

1. The landfill gas hazard assessment shall include a qualitative risk assessment and landfill gas precautionary/protection design. Specifically, the assessment shall include the following tasks:

   (i) review of background information and studies related to the restored Siu Lang Shui Landfill;

   (ii) identification of the nature and extent of the sources, including the likely concentrations/amounts of hazardous emissions which might have the potential for causing impacts on the Project;

   (iii) identification of possible pathways through the ground, underground cavities, utilities or groundwater and the nature of these pathways through which hazardous emissions must traverse if they were to reach the facilities within the Project site;

   (iv) identification of the potential targets associated with the proposed facilities which are sensitive to the impacts of the hazardous emissions;

   (v) qualitative assessment on the degrees of risk which the hazardous emissions may pose to the target for each of the source-pathway-target combinations;

   (vi) design of suitable level of precautionary measures, types of protection measures and contingency plan for the construction and operation of the Project; and

   (vii) identification of monitoring requirements for assessing the adequacy and performance of the implemented protection measures.

Appendix H

Requirements for Landscape and Visual Impact Assessment

1. The Applicant shall assess the landscape impact of the Project. The Applicant shall describe, appraise, analyse and evaluate the existing and future landscape resources and character of the study area. A system shall be derived for judging the landscape impact significance as required under the TM and the EIAO Guidance Note No. 8/2010 "Preparation of Landscape and Visual Impact Assessment under the EIAO". Clear illustrations of the landscape impact assessment are required.

2. The Applicant shall assess the visual impact of the Project. A system shall be derived for judging visual impact significance as required under the TM and the EIAO Guidance Note No. 8/2010 "Preparation of Landscape and Visual Impact Assessment under the EIAO". Clear illustrations of visual impact assessment are required. The assessment shall include the following:

   (i) identification and plotting of visibility envelope of the Project within the study area;

   (ii) identification of the key groups of sensitive receivers within the visibility contours and their views at both ground level/sea level and elevated vantage points;

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

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

3. Alternative layout, design, built-form and construction methods that would avoid or reduce the identified landscape and visual impacts shall be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The Applicant shall recommend mitigation measures to minimise the adverse effects identified above. The mitigation measures proposed shall not only be concerned with damage reduction but shall also include consideration of potential enhancement of existing landscape and visual quality.

4. The mitigation measures may include provision of screen planting, sensitive design of structures, colour scheme and texture of materials used and any measures to mitigate the impact on existing land uses.

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

6. All computer graphics shall be compatible with Microstation DGN file format. The Applicant shall record the technical details such as system set-up, software, data files and function in preparing the illustration.

Appendix I

Requirements for Health Impact Assessment of Air Pollutants (including toxic substances)

1. The Applicant shall conduct health impact assessment if a significant increase in levels of air pollutants to human receivers due to the project is predicted. The health impact assessment regarding air pollutants (including toxic substances) in the exhaust gases from the operation of the Project shall include the following key steps:

   (i) identification of key components of air pollutants (including toxic substances) in the exhaust gases from the operation of the Project for health impact assessment;

   (ii) an assessment of the likelihood and consequences of exposure to the identified emissions;

   (iii) an identification of means by which the health impact could be further reduced; and

   (iv) recommendation of reasonably practicable measures, if any, to reduce the health impact during the operation of the Project.

Appendix J

Implementation Schedule of Recommended Mitigation Measures

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

Appendix K

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 and 30 copies of the bilingual (in both English and Chinese) executive summary 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 and 50 copies of the bilingual (in both English and Chinese) executive summary 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. To facilitate public inspection of EIA report via EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA report and the executive summary prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 1.3 or later). 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 figures, drawings and tables in the EIA report and the 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.

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.