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16 October 2019

Drainage Services Department

**Environmental Impact Assessment (EIA) Ordinance, Cap. 499**  
**Application for EIA Study Brief**

**Project Title: Upgrading of Tai Po Sewage Treatment Works**  
**(Application No. ESB-321/2019)**

I refer to your above application received on 5 September 2019 for an EIA Study Brief under Section 5(1)(a) of the EIA Ordinance.

In accordance with Section 5(7)(a) of the EIA Ordinance and after public inspection of the project profile, I issue the attached EIA Study Brief (No. ESB-321/2019) for your preparation of an EIA report.

Under Section 15 of the EIA Ordinance, the EIA Study Brief will be placed on the EIA Ordinance Register. It will also be placed on the EIA Ordinance website (<http://www.epd.gov.hk/eia/>).

You may submit an application for approval of the EIA report in accordance with Section 6(2) of the EIA Ordinance after its completion. Upon receipt of your application, this department will decide under Section 6(3) of the EIA Ordinance whether the EIA report meets the requirements of the EIA Study Brief and Technical Memorandum on EIA Process, and accordingly advise you under Section 6(4) of the EIA Ordinance whether a submission to the Advisory Council on the Environment (ACE) or its subcommittee is required. In this connection, you are required to provide sufficient copies of the Executive Summary of the EIA report to the Secretariat of the EIA Subcommittee of ACE for selection for submission when you submit the EIA report to this department for approval. Please liaise with Ms. Becky LAM (Tel: 2594 6323) of the ACE Secretariat regarding the details in due course.

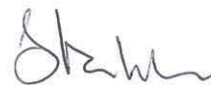
If the EIA report is selected by ACE for submission and presentation, you are expected to provide ACE with an account of the environmental issues arising from the project,

major conclusions and recommendations of the EIA study. In particular, the main environmental concerns of the general public and interest groups who may be affected by the Project should be identified and addressed in the EIA study. As such, you are strongly advised to engage the public and interest groups during the course of the EIA study. Please find attached a copy of the "*Modus Operandi of the EIA Subcommittee of the Advisory Council on the Environment*" for your reference.

Please note that if you are aggrieved by any of the content of this EIA Study Brief, you may appeal under Section 17 of the EIA Ordinance within 30 days of receipt of this EIA Study Brief.

Should you have any queries on the above application, please contact my colleague Mr. Steve LI at 2835 1142.

Yours sincerely,



( Stanley C. F. LAU )

Acting Principal Environmental Protection Officer  
for Director of Environmental Protection

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

**ENVIRONMENTAL IMPACT ASSESSMENT STUDY BRIEF NO. ESB-321/2019**

**PROJECT TITLE:** **UPGRADING OF TAI PO SEWAGE TREATMENT WORKS**  
(hereinafter known as the “Project”)

**NAME OF APPLICANT:** **DRAINAGE SERVICES DEPARTMENT**  
(hereinafter known as the “Applicant”)

**1. BACKGROUND**

- 1.1 An application (No. ESB-321/2019) 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 5 September 2019 with a project profile (No. PP-587/2019) (the Project Profile).
- 1.2 The Project is to upgrade the existing Tai Po Sewage Treatment Works (TPSTW) to provide secondary treatment for a maximum design capacity of average dry weather flow (ADWF) of 160,000 m<sup>3</sup>/day. The key elements of the Project comprise:
- (i) Construction and operation of new treatment facilities, modification/ demolition of the existing treatment facilities of TPSTW;
  - (ii) Providing effluent reuse facilities; and
  - (iii) Providing co-digestion facilities for imported sewage sludge and organic waste/ pre-treated food waste.

The location of the Project is shown in Appendix A.

- 1.3 The Project is a designated project by virtue of Item F.1 of Schedule 2, Part I of the EIAO, which specifies “*Sewage treatment works with an installed capacity of more than 15 000 m<sup>3</sup> per day*”, Item F.4 of Schedule 2, Part I of the EIAO, which specifies “*An activity for the reuse of treated sewage effluent from a treatment plant*”, and Item G.4 of Schedule 2, Part I of the EIAO, which specifies “*A waste disposal facility ... or waste disposal activity, for refuse...*”.
- 1.4 Based on the information provided in the Project Profile, there may be potential for the Project to supply surplus gas and electricity generated from co-digestion of sewage sludge and organic waste/pre-treated food waste to the Hong Kong and China Gas Company Limited and CLP Power Hong Kong Limited respectively. Hence, the Project is also a potential designated project under Item D.2 of Schedule 2, Part I of the EIAO which specifies “*Public utility gas generation plant*”, and

under Item D.1 of Schedule 2, Part I of the EIAO, which specifies “*Public utility electricity power plant*”.

- 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 nature and extent of environmental impacts arising from the construction and operation 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;
  - (ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
  - (iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

## **2. OBJECTIVES OF THE EIA STUDY**

- 2.1 The objectives of the EIA study are as follows :
- (i) to describe the Project 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 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/ evaluate any potential loss or damage and other potential impacts to fisheries, flora, fauna and natural habitats and to propose measures to mitigate these impacts;
  - (v) to identify any potential hazard to life due to generation, storage, utilisation, processing and transmission (if applicable) of biogas within the Project site and due to neighbouring fuel gas dangerous goods (DGs) facilities during the construction and operation of the Project and to propose measures to mitigate these impacts if required;

- (vi) to identify and quantify waste management requirements and to propose measures to mitigate these impacts;
- (vii) to identify and quantify contaminated land within any project area for development works, and to propose measures to avoid disposal of contaminated materials in the first instance;
- (viii) to identify any potential human health impacts associated with reuse of treated sewage effluent during operation of the Project and to propose measures to avoid and mitigate these impacts;
- (ix) to identify and evaluate any potential landscape and visual impacts and to propose measures to mitigate these impacts;
- (x) to propose the provision of infrastructure or mitigation measures so as to minimise pollution, environmental disturbance and nuisance during construction and operation of the Project;
- (xi) to investigate the feasibility, effectiveness and implications of the proposed mitigation measures;
- (xii) 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 phases of the Project in relation to the sensitive receivers and potentially affected uses;
- (xiii) 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;
- (xiv) to design and specify the environmental monitoring and audit requirements;  
and
- (xv) 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 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 fully complied with.

### **3.2 The Scope**

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

- (i) environmental benefits and dis-benefits of different development options, design and construction methods of the Project with a view to deriving the preferred development option(s) that will avoid or minimise adverse environmental impact;
- (ii) potential air quality impacts on air sensitive receivers due to the construction and operation of the Project, in particular arising from odour emissions from the sewage treatment works and the co-digestion facility for sewage sludge and organic waste/ pre-treated food waste, the transportation of sewage sludge and organic waste/ pre-treated food waste during operation of the Project, and construction dust during construction of the Project;
- (iii) potential water quality impacts on water system(s) including the Tolo Harbour and Channel Water Control Zone, Victoria Harbour Water Control Zone, and relevant water sensitive receivers, during construction and operation of the Project;
- (iv) potential terrestrial and aquatic ecological impacts due to the construction and operation of the Project;
- (v) potential fisheries impacts due to the construction and operation of the Project;
- (vi) potential hazard to life due to the generation, storage, utilisation, processing and transmission (if applicable) of biogas within the Project site and due to neighbouring fuel gas DGs facilities during the construction and operation of the Project;
- (vii) potential landfill gas hazard due to the construction and operation of the Project;
- (viii) potential waste management issues and impacts during construction and operation of the Project, in particular arising from handling and disposal of construction & demolition materials, sewage sludge and screenings;
- (ix) potential extent of land contamination within any project area for development

works and relevant mitigation measures;

- (x) measures and actions to avoid or minimise potential human health impacts associated with reuse of treated sewage effluent during operation of the Project; and
- (xi) potential noise impacts on the noise sensitive receivers due to the construction and operation of the Project, in particular arising from the operation of sewage treatment works and the co-digestion facility for sewage sludge and organic waste/ pre-treated food waste, and construction noise during construction of the Project;
- (xii) potential landscape and visual impacts arising from the Project;
- (xiii) potential cumulative impacts of the Project, through interaction or in combination with other existing, committed and planned projects in the vicinity of the Project.

### **3.3 Description of the Project**

#### **3.3.1 Purpose(s) and Objectives of the Project**

- 3.3.1.1 The Applicant shall provide information on the purpose(s) and objectives of the Project, and describe the environmental benefits of the Project and scenarios with and without the Project.

#### **3.3.2 Details of the Project**

- 3.3.2.1 The Applicant shall indicate the nature and status of project decision(s) for which the EIA study is undertaken. The Applicant shall describe the proposed design, construction methods, sequence of construction works and other major activities involved in the Project, using diagrams, plans and/or maps as necessary. The estimated duration of the construction phase and operational phase of the Project together with the programme within these phases, where appropriate, shall be given. The land taken by the Project site(s), construction sites and any associated access arrangements, auxiliary facilities and landscaping areas shall be shown on a scaled map. The uses of the Project shall be described and the different land use areas shall be demarcated as appropriate.

#### **3.3.3 Background and History of the Project**

- 3.3.3.1 The Applicant shall provide information on the site location and site history of the Project, interactions with other projects including those related to the reuse of treated effluents, and the consideration of different development options, taking into account the principles of avoidance, minimising and control of adverse environmental impacts. The options might include layout, design, sewage treatment

technologies, sludge treatment, co-digestion of organic waste/ pre-treated food waste, construction methods and sequence of construction works for the Project. The key reasons for selecting the preferred development option(s) and the part environmental factors played in the selection shall be described. The main environmental impacts of different development options shall be compared with those of the Project and with the likely future environmental conditions in the absence of the Project.

### **3.4 Technical Requirements**

3.4.1 The Applicant shall conduct the EIA study to address all environmental aspects of the activities as described in the scope as set out above. The assessment shall be based on the best and latest information available during the course of the EIA study.

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

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

#### **3.4.4 Air Quality Impact**

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

3.4.4.2 The assessment area for air quality impact assessment shall be defined by a distance of 500 metres from the boundary of the Project Area and the works of the Project as identified in the EIA, which shall be extended to include major existing, committed and planned air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. The assessment shall include the existing, committed and planned sensitive receivers within the assessment 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.

3.4.4.3 The assessment of 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.

#### **3.4.5 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 respectively.

3.4.5.2 The assessment area for the water quality impact assessment shall include areas within 500 metres from the boundary of the Project Area and works of the Project, including the discharge point of treated effluent from the Project under the Tolo Harbour Effluent Export Scheme, and shall cover Tolo Harbour and Channel Water Control Zone and Victoria Harbour Water Control Zone as designated under the Water Pollution Control Ordinance (Cap. 358) and water sensitive receivers in the vicinity of the Project. The assessment 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.

3.4.5.3 The water quality impact assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix C of this EIA study brief.

### **3.4.6 Ecological Impact (Terrestrial and Aquatic)**

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

3.4.6.2 The assessment area for the purpose of the terrestrial ecological impact assessment shall include areas within 500 metres distance from the boundary of the Project and any associated works as well as any other areas likely to be impacted by the Project. For aquatic ecological impact assessment, the assessment area shall be the same as the water quality impact assessment described in section 3.4.5 of this EIA study brief.

3.4.6.3 The ecological impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix D of this EIA study brief.

### **3.4.7 Fisheries Impact**

3.4.7.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing fisheries impact as stated in Annexes 9 and 17 of the TM.

3.4.7.2 The fisheries impact assessment area shall be the same as the water quality impact assessment described in section 3.4.5 of this EIA study brief. This assessment area shall be extended to include other areas if they are also found being impacted by the construction or operation of the Project during the course of the EIA study. Special attention should be given to loss or disturbance of fishing ground, water quality deterioration at sensitive receivers such as Fish Culture Zones, nursery ground of commercial fisheries resources in the northeastern waters of Hong Kong, and proposed Fisheries Protection Areas.

3.4.7.3 The fisheries impact assessment for the construction and operation of the Project shall follow the detailed technical requirements given in Appendix E of this EIA study brief.

### **3.4.8 Hazard to Life**

3.4.8.1 The Applicant shall follow the criteria for evaluating hazard to life due to biogas and fuel gas dangerous goods as stated in section 2 of Annex 4 of the TM.

3.4.8.2 The hazard to life assessment shall follow the detailed technical requirements given in Appendix F of this EIA study brief.

### **3.4.9 Landfill Gas Hazard**

3.4.9.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing landfill gas hazard as stated respectively in Annexes 7 and 19 of the TM.

3.4.9.2 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.

### **3.4.10 Waste Management Implication**

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

3.4.10.2 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 H of this EIA study brief.

### **3.4.11 Land Contamination**

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

3.4.11.2 The assessment of the potential land contamination issues shall follow the detailed technical requirements given in Appendix I of this EIA study brief.

### **3.4.12 Noise Impact**

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

3.4.12.2 The Applicant shall provide a general description of any noise control measures during both the construction and operation of the Project. The Applicant shall, based on the best available information at the time of the assessment, identify any existing,

committed and planned noise sensitive receivers (NSRs) 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, within 300 metres from the boundary of the Project Area and the works of the Project as identified in the EIA, including the Staff Quarters of TPSTW as identified in approved EIA Report for Tai Po Sewage Treatment Works Stage V (Register No. AEIAR-081/2004). Unless the Applicant confirms in the EIA report that there is no existing, committed and planned NSR identified within 300 metres from the boundary of the Project Area and works of the Project, construction noise and fixed noise sources impact assessments for the existing, committed and planned NSRs shall be required and shall follow the detailed technical requirements given in Appendix J of this EIA study brief.

### **3.4.13 Landscape and Visual Impacts**

3.4.13.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing the landscape and visual impacts as stated in Annexes 10 and 18 of the TM.

3.4.13.2 The assessment area for the landscape impact assessment shall include all areas within a 500 metres distance from the site boundary of the Project, while the assessment area for the visual impact assessment shall be defined by the visual envelope of the Project. The defined envelope shall be shown on a plan in the EIA report.

3.4.13.3 The landscape and visual impact assessments for construction and operation of the Project shall follow the detailed technical requirements given in Appendix K of this EIA study brief.

### **3.5 Environmental Monitoring and Audit (EM&A) Requirements**

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

3.5.2 Subject to the confirmation of the EIA study findings, the Applicant shall comply with the requirements as stipulated in Annex 21 of the TM.

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

### **3.6 Presentation of Summary Information**

#### **3.6.1 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.

#### **3.6.2 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.

#### **3.6.3 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 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.

#### **3.6.4 Summary of Alternative Mitigation Measures**

The EIA report shall contain a summary of alternative development options and measures considered during the course of EIA study, including size/scale, design, construction methods and sequence of works for the Project, with a view to avoiding or minimising and mitigating adverse environmental impacts. A comparison of the environmental benefits and dis-benefits of applying different development options, and/or mitigation measures shall be made. This summary shall cover the key impacts and shall also form an essential part of the executive summary of the EIA report.

### 3.6.5 Documentation of Public Concern

The EIA report shall contain a summary of the main concerns of the general public, special interest groups and the relevant statutory or advisory bodies received and identified by the Applicant during the course of the EIA study, and describe how the relevant concerns have been taken into account.

## 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. When submitting the EIA report to the Director, the Applicant shall provide a summary, pointing out where in the EIA report the respective requirements of this EIA study brief and the TM (in particular Annexes 11 and 20) 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 M. The Applicant shall, upon request, make additional copies 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 Sections 1.2 and 1.4 of this EIA study brief and in the Project Profile (No. PP-587/2019), 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 APPENDICES**

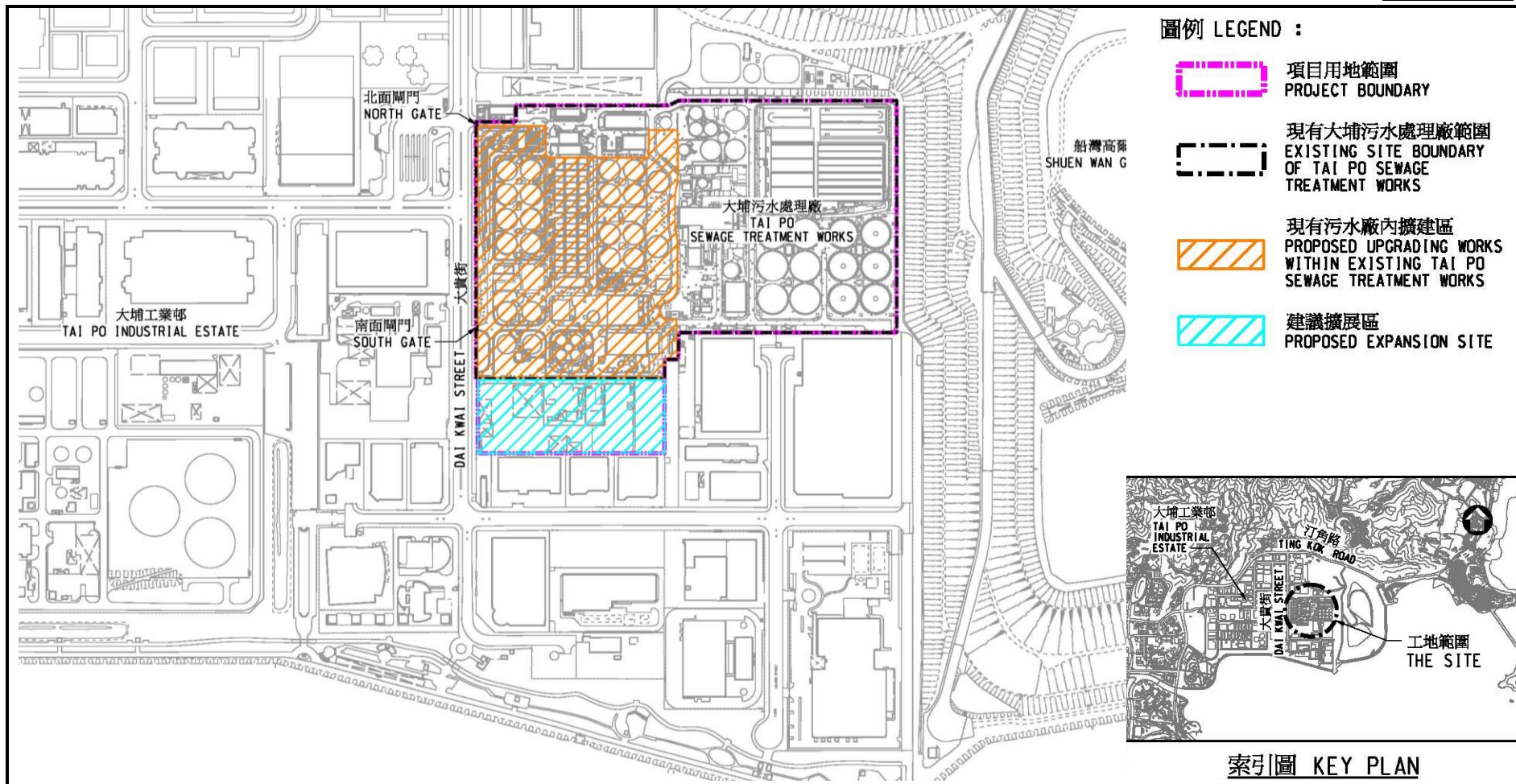
- 7.1 This EIA study brief includes the following appendices:

- Appendix A – Project Location Plan
- Appendix B – Requirements for Air Quality Impact Assessment
- Appendix C – Requirements for Water Quality Impact Assessment
- Appendix D – Requirements for Ecological Impact Assessment
- Appendix E – Requirements for Fisheries Impact Assessment
- Appendix F – Requirements for Hazard to Life Assessment
- Appendix G – Requirements for Landfill Gas Hazard Assessment
- Appendix H – Requirements for Assessment of Waste Management Implications
- Appendix I – Requirements for Land Contamination Assessment
- Appendix J – Requirements for Noise Impact Assessment
- Appendix K – Requirements for Landscape and Visual Impact Assessment
- Appendix L – Implementation Schedule
- Appendix M – Requirements for EIA Report Documents

--- END OF EIA STUDY BRIEF ---

October 2019  
Environmental Assessment Division  
Environmental Protection Department

**Appendix A**



**Project Title : Upgrading of Tai Po Sewage Treatment Works**  
**工程項目名稱 : 大埔污水處理廠擴建工程**

(This figure is prepared based on Figure 1 of Project Profile No.: PP-587/2019)  
 (本圖是根據工程項目簡介 PP-587/2019 圖 1 編製)

EIA Study Brief No. :  
 環評研究概要編號 :

ESB-321/2019

**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 operation stages of the Project.
  - (ii) Provision of an account, where appropriate, of the consideration/ measures that have been taken into consideration during the planning of the Project to avoid and minimise the air pollution impact. The Applicant shall consider alternative locations of the new treatment facilities, alternative sewage treatment processes, alternative construction methods and phasing programmes to minimise the air quality impact during construction and operation stages of the Project.
  - (iii) Presentation of background air quality levels in the study area for the purpose of evaluating cumulative air quality impacts during construction and operation stages of the Project. If the PATH (Pollutants in the Atmosphere and their Transport over Hong Kong) model is used to estimate the future 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, committed and planned 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 and 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. Confirmation regarding the validity of the assumptions adopted and the



magnitude of the activities (e.g. volume of construction material to be handled, etc.) shall be obtained from the relevant government departments/authorities, where applicable, and documented in the EIA report.

- (iii) Identification of chimneys and obtainment of relevant chimney emission data in the assessment area, where appropriate, by carrying out a survey for assessing the cumulative air quality impact of air pollutants through chimneys. The Applicant shall ensure and confirm the validity of the emission data used in their assessment. Any errors found in their emission data used may render the submission invalid.
- (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.
- (iii) Where necessary, the Applicant shall consider and evaluate direct mitigation measures, including but not limited to water-spraying, re-scheduling construction programme to minimise concurrent dust impact arising from different construction sites, for fugitive dust control. The Applicant shall describe the means of transportation and their routings involved, with a view to addressing potential dust nuisance caused by transportation activities. Any mitigation measures recommended for fugitive dust control should be well documented in the EIA report.
- (iv) A monitoring and audit programme for the construction phase of the Project shall be devised to verify the effectiveness of the proposed control measures so as to ensure proper control of fugitive dust emission.
- (v) The applicant shall ensure that any odour emission resulting from the construction activities of the Project is properly controlled and meet the

relevant criteria as stipulated in section 1 of Annex 4 of the TM. A monitoring and audit programme for the construction phase of the Project shall be devised to verify the effectiveness of the proposed control measures so as to ensure proper odour emission control.

#### 4. Operational Phase Air Quality Impact

- (i) The Applicant shall assess the expected air quality impact arising from the activities in the proposed Project site, including odour and gaseous emissions, if any, from the sewage treatment plant and associated facilities, and odour from transport of sludge and organic waste/ pre-treated food waste, during the operational phase based on assumed reasonably worst case scenario under normal operating condition.
- (ii) If the Applicant anticipates that the Project will give rise to significant operational phase air quality impacts likely to exceed the recommended limits in the TM at the ASRs, a quantitative assessment should be carried out to evaluate the operational phase air quality impacts at the identified ASRs. The Applicant shall follow the methodology set out in section 5 below when carrying out the quantitative assessment.
- (iii) A monitoring and audit programme for the operational stage shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper operational odour control.

#### 5. Quantitative Assessment Methodology

- (i) The Applicant shall conduct the quantitative assessment by applying the general principles enunciated in the modelling guidelines in Appendix B-1 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.
- (ii) 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. In case of doubt, prior agreement between the Applicant and the Director on the specific modelling details should be sought.
- (iii) The Applicant shall identify the key/representative air pollution parameters (types of pollutants and averaging time concentrations) to be evaluated and provide explanation for selecting such parameters for assessing the impact from the Project.

- (iv) The Applicant shall calculate the overall 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.
- (v) For the quantitative assessment of the odour emission impact upon the identified ASRs, the odour emission strength/ rates shall be based on the results of odorous air sampling/ measurement conducted directly at the odour emission sources within the assessment area as defined in section 3.4.4.2. The details of such odorous air sampling/ measurement, including the methodology and calculation of the odour emission strength/rates, shall be presented in the EIA report.

## 6. Mitigation Measures for Air Quality Impact

### Consideration for Mitigation Measures

- (i) When 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.

### Evaluation of Residual Air Quality Impact

- (ii) Upon consideration of mitigation measures, if the mitigated air quality impact still exceeds the relevant criteria in Annex 4 of the TM, the Applicant shall identify, predict, and evaluate the residual air quality impact in accordance with section 4.4.3 and section 4.5.1(d) of the TM.

## 7. Submission of Emission Calculation Details and Model Files

All input and output file(s) of the model run(s), including those files for the generation of pollution contours as well as the emissions calculation worksheets, shall be submitted to the Director in electronic format together with the submission of the EIA report.

**Appendix B-1****Air Quality Modelling Guidelines**

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

The air quality modelling guidelines shall include the following guidelines as published on the website of the Environmental Protection Department

([https://www.epd.gov.hk/epd/english/environmentinhk/air/guide\\_ref/guide\\_aqa\\_model.html](https://www.epd.gov.hk/epd/english/environmentinhk/air/guide_ref/guide_aqa_model.html)):

- i) Guidelines on Choice of Models and Model Parameters (Revised);
- ii) Guidelines on Assessing the ‘Total’ Air Quality Impacts (Revised);
- iii) Guidelines on the Use of Alternative Computer Models in Air Quality Assessment;
- iv) Guidelines on the Estimation of PM<sub>2.5</sub> for Air Quality Assessment in Hong Kong; and
- v) Guidelines on the Estimation of 10-minute Average SO<sub>2</sub> Concentration for Air Quality Assessment in Hong Kong.

**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 operation of the Project.
2. The Applicant shall predict, quantify and assess any water quality impacts arising from the construction and operation of the Project by appropriate mathematical modelling and/or other techniques proposed by the Applicant and approved by the Director. The mathematical modelling requirements are set out in Appendix C-1. Possible impacts due to, but not limited to, effluent discharge, thermal/cooling water and biocide discharge, overflow of sewage pumping stations, emergency discharges and site runoff shall include changes in hydrology, flow regime, sediment erosion and deposition patterns, morphological change of seabed profile, water quality and sediment quality. The prediction shall include possible different construction stages or sequences of the Project. Affected sensitive receivers shall be identified by the assessment tool with indications of degree of severity.
3. The assessment shall include, but not be limited to the following:
  - (i) the assessment on operation stage shall have regard to the frequency, duration, volume and flow rate of the discharges and its pollutant;
  - (ii) the water quality impacts of temporary and accidental discharges of the sewage treatment works to the surrounding waterbodies, including Tolo Harbour and Channel Water Control Zone during construction and operation stages of the Project;
  - (iii) the water quality impacts of chemical spillage during construction and operation stages of the Project in particular the accidental spillage associated with transfer and storage of chemicals during operation of the Project;
  - (iv) the water quality impacts during the receiving and co-digesting of organic waste/ pre-treated food waste; and
  - (v) the water quality impacts during the operation of the treated sewage effluent reuse and the arrangement if the supply of the treated sewage effluent exceeds the demand.
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) characterise water quality of the water systems and sensitive receivers, which might be affected by the Project based on existing best available information and through appropriate site survey and tests when existing data are insufficient;
- (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 land use 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, flow regimes of water bodies, catchment types or areas, erosion or sedimentation due to the Project and any other hydrological changes 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 polluted discharge generated from the Project, contaminants release from works on marine sediment and sediment release or re-suspension from works into water bodies;
- (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) 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. The use of disinfection shall be carefully evaluated;
- (x) 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;

- (xi) analyse 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;
- (xii) 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. The Applicant shall assess the capacity of the sewerage systems including, but not limited to, the downstream public sewerage to ensure the quantity of treated effluent that could be discharged from the Upgraded Tai Po Sewage Treatment Works is within the limits. Effluent generated from the Project shall require appropriate collection, treatment and disposal;
- (xiii) investigate and develop best management practices to reduce storm water and non-point source pollution as appropriate;
- (xiv) 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;
- (xv) evaluate, predict and characterise the effluent characteristics of the Project with different levels of treatment and disinfection processes. The Applicant shall predict the effluent characteristics by making reference to the influent characteristics from both sewage and organic waste/ pre-treated food waste, anticipated performance of the treatment and disinfection process at the proposed sewage treatment works, the finding of previous studies, and conducting additional samplings and tests if needed;
- (xvi) devise mitigation measures to avoid or minimise the impacts identified above. The residual water quality impacts of the water systems with regard to the relevant water quality objectives, criteria, standards or guidelines shall be assessed and quantified using appropriate mathematical models set out in Appendix C-1 to this EIA study brief; and
- (xvii) recommend appropriate mitigation measures, including a contingency plan, to minimise the duration and impact of temporary and accidental discharges during operation stage of the Project.

**Appendix C-1****Hydrodynamic and Water Quality Modelling Requirements**Modelling software general

1. The modelling software shall be fully 3-dimensional capable of accurately simulating the stratified condition, salinity transport, and effects of wind and tide on the water body within the model area.
2. The modelling software shall consist of hydrodynamic, water quality, sediment transport, thermal and particle dispersion modules. All modules shall have been proven with successful applications locally and overseas.
3. The hydrodynamic, water quality, sediment transport and thermal modules shall be strictly mass conserved at all levels.
4. An initial dilution model shall be used to characterise the initial mixing of the effluent discharge, and to feed the terminal level and size of the plume into the far field water quality modules where necessary. The initial dilution model shall have been proven with successful applications locally and overseas.

Model details – Calibration & Validation

1. The models shall be properly calibrated and validated against applicable existing and/or newly collected field data before their use in this study in the Hong Kong waters, including the Victoria Harbour, Western Buffer, Eastern Buffer, Southern, and Tolo Harbour and Channel Water Control Zones, defined under the Water Pollution Control Ordinance.. The field data set for calibration and validation shall be agreed with EPD.
2. Tidal data shall be calibrated and validated in both frequency and time domain manner.
3. For the purpose of calibration and validation, the model shall run for not less than 15 days of real sequence of tide (excluding model spin up) in both dry and wet seasons with due consideration of the time required to establish initial conditions.
4. In general the hydrodynamic models shall be calibrated to the following criteria:

<u>Criteria</u>	<u>Level of fitness with field data</u>
• tidal elevation (@)	< 8 %
• maximum phase error at high water and low water	< 20 minutes
• maximum current speed deviation	< 30 %
• maximum phase error at peak speed	< 20 minutes



- maximum direction error at peak speed < 15 degrees
  - maximum salinity deviation < 2.5 ppt
- @ Root mean square of the error including the mean and fluctuating components shall meet the criteria at no less than 80% of the monitoring stations in the model domain
5. The Applicant shall be responsible for acquiring/developing and calibration of the models for use in this study themselves. They may make reference to the models developed under the Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (Agreement No. CE 42/97). They may also propose to use other models subject to agreement with EPD.

#### Model details – Simulation

1. The water quality modelling results shall be qualitatively explainable, and any identifiable trend and variations in water quality shall be reproduced by the model. The water quality model shall be able to simulate and take account of the interaction of dissolved oxygen, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, temperature, suspended solids, contaminants release of dredged and disposed material, air-water exchange, *E. coli* and benthic processes. It shall also simulate salinity. Salinity results simulated by hydrodynamic models and water quality models shall be demonstrated to be consistent.
2. The sediment transport module for assessing impacts of sediment loss due to marine works shall include the processes of settling, deposition and re-erosion. The values of the modelling parameters shall be agreed with EPD. Contaminants release and DO depletion during dredging and dumping shall be simulated by the model.
3. The models shall at least cover the Ma Wan Channel, Cheung Chau, East Lamma Channel, Victoria Harbour, Tathong Channel Nine Pin Islands, Po Toi Islands, and the Tolo Harbour and Tolo Channel to incorporate all major influences on hydrodynamic and water quality. A fine grid model may be used for detailed assessment of this study. It shall either be linked to a far field model or form part of a larger model by gradual grid refinement. The coverage of the fine grid model shall be properly designed such that it is remote enough so that the boundary conditions will not be affected by the project. The model coverage area shall be agreed with EPD.
4. In general, grid size at the area affected by the project shall be less than 400 m in open waters and less than 75 m around sensitive receivers. The grid shall also be able to reasonably represent coastal features existing and proposed in the project. The grid schematisation shall be agreed with EPD.
5. The Applicant shall submit a Water Quality Modelling Plan for agreement with EPD before proceeding to modelling assessment. The Plan shall at least demonstrate that the models meet the requirements as set out under the sections of Modelling software general, Model details – Calibration & Validation and Model details – Simulation in

this Appendix.

### Modelling assessment

1. The assessment shall include the construction and operation phases of the project. Where appropriate, the assessment shall also include maintenance dredging. Scenarios to be assessed shall cover the baseline condition and scenarios with various different options proposed by the Applicant in order to quantify the environmental impacts and improvements that will be brought about by these options. Corresponding pollution load, bathymetry and coastline shall be adopted in the model set up.
2. Hydrodynamic, sediment transport and thermal modules, where appropriate, shall be run for at least a real sequence of 15 days spring-neap tidal cycle in both the dry season and the wet season. Water quality module shall run for a complete year incorporating monthly variations in Pearl River discharges, solar radiation, water temperature and wind velocity in the operational stage. If necessary, construction stage impacts may be assessed by simulating typical spring-neap cycles in the dry and wet seasons. All model simulations should be initialised with proper model spin up.
3. For assessing temporary discharges via the emergency outfall, the Applicant shall estimate discharge loading, pattern and duration. The worst case scenario shall include discharge near slack water of neap tide. A period of at least 15 days spring-neap cycle in wet season, but long enough for recovery of the receiving water, shall be simulated. Detailed methodology shall be agreed with EPD.
4. The results shall be assessed for compliance of Water Quality Objectives.
5. The impact on all sensitive receivers shall be assessed.
6. Cumulative impacts due to other projects, activities or pollution sources within a boundary to the agreement of EPD shall also be predicted and quantified.
7. All modelling input data and results shall be submitted in digital media to EPD upon request.

**Appendix D****Requirements for Ecological Impact Assessment (Terrestrial and Aquatic)**

1. In the ecological impact assessment, the Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area. The aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the Project shall avoid or minimise impacts on recognised sites of conservation importance and other ecologically sensitive areas. The assessment shall identify and quantify as far as possible the potential ecological impacts to the natural environment and the associated wildlife groups and habitats/species arising from the Project including its construction and operation phases as well as the subsequent management and maintenance of the proposals.
2. The assessment shall include the followings:
  - (i) Review of the findings of relevant studies/surveys and collection of the available information regarding the ecological characters of the assessment area;
  - (ii) Evaluation of information collected and identification of any information gap relating to the assessment of potential ecological impact, and determine the ecological field surveys and investigations that are needed for an impact assessment as required in the following sections;
  - (iii) Carrying out necessary field surveys of at least 6 months covering both the wet and dry seasons, and investigations to verify the information collected in sub-section (ii) above, to fill the information gaps identified and to fulfill the objectives of the EIA study. The field surveys shall cover flora, fauna and any other habitats/ species of conservation importance, and shall include surveys for intertidal/ benthic communities;
  - (iv) Establishment of the general ecological profile of the assessment area based on data of relevant previous studies/surveys and results of the ecological field surveys, if any, and description of the characteristics of each habitat found. Major information to be provided shall include :
    - (a) description of the physical environment, including all recognised sites of conservation importance and other ecologically sensitive areas, and assessment of whether these sites/areas will be affected by the Project or not;
    - (b) habitat maps of suitable scale (1:1000 to 1:5000) showing the types and locations of habitats/species in the assessment area;
    - (c) ecological characteristics of each habitat type such as size, vegetation,

- type, species present, dominant species found, species diversity and abundance, community structure, seasonal pattern, ecological value and inter-dependence of the habitats and species, and presence of any features of ecological importance;
- (d) representative colour photos of each habitat type and any important ecological features identified; and
  - (e) species found that are rare, endangered and/or listed under local legislation, international conventions for conservation of wildlife/ habitats or Red Data Books.
- (v) Investigation and description of the existing wildlife uses of the various habitats with special attention to those wildlife groups and habitats with conservation interests, including but not limited to:
- (a) pre-roosting and/or roosting location(s) of Collared Crow (*Corvus torquatus*) and Black Kite (*Milvus migrans*), and flight paths of Collared Crow;
  - (b) pre-roosting and/or roosting location(s) of ardeids and their flight paths;
  - (c) coral communities;
  - (d) any other habitats or species identified as having special conservation interests by this EIA study.
- (vi) Using suitable methodology and considering also other projects in the vicinity of the Project area reasonably likely to occur at the same time, identification and quantification as far as possible of any direct, indirect, on-site, off-site, primary, secondary and cumulative ecological impacts, such as destruction of habitats, reduction of species abundance/diversity, loss of roosting, breeding and feeding grounds, reduction of ecological carrying capacity, loss in ecological linkage and function, habitat fragmentation and any other possible disturbance caused by the Project, and in particular the followings :
- (a) noise, glare, dust and other human disturbance to wildlife during construction and operation phases of the Project;
  - (b) indirect ecological impacts due to changes in the water quality and hydrology, as a result of surface run-off, discharge of treated effluent and any associated disinfection activities, temporary sewage overflow, accidental discharge of untreated sewage, etc. in the watercourses, drainage channels and other wetland habitats in the assessment area during construction and operation phases;

- (c) disturbance to pre-roosting/ roosting Collared Crows and Black Kites and obstruction of flight lines of Collared Crow;
  - (d) disturbance and obstruction of flight lines of roosting ardeids;
  - (e) impacts on birds due to collision to buildings; and
  - (f) cumulative impacts due to development of Shuen Wan Golf Course and other concurrent projects.
- (vii) Evaluation of ecological impact based on the best and latest information available during the course of the EIA study, using quantitative approach as far as practicable and covering construction and operation phases of the Project as well as the subsequent management and maintenance requirement of the Project;
- (viii) Recommendations for possible alternatives and practicable mitigation measures, such as restriction of works at specified season or time, adoption of appropriate construction methods and/or programme, to avoid, minimise and/or compensate for the adverse ecological impacts identified during construction and operation of the Project;
- (ix) Evaluation of the feasibility and effectiveness of the recommended mitigation measures and definition of the scope, type, location, implementation arrangement, resources requirement, subsequent management and maintenance of such measures;
- (x) Determination and quantification as far as possible of the residual ecological impacts after implementation of the proposed mitigation measures;
- (xi) Evaluation of the significance and acceptability of the residual ecological impacts by making reference to the criteria in Annex 8 of the TM; and
- (xii) Review of the need for and recommendation on any ecological monitoring programme required.

**Appendix E****Requirements for Fisheries Impact Assessment**

1. Existing information regarding the assessment area shall be reviewed. Based on the review results, the assessment shall identify data gap and determine if there is any need for field surveys to collect adequate and updated baseline information. If field surveys are considered necessary, the assessment shall recommend appropriate methodology, duration and timing for such surveys.
2. The fisheries impact assessment shall cover any potential direct, indirect, short-term and long-term impacts on capture and culture fisheries during the construction and operation stages of the Project.
3. The fisheries impact assessment shall provide the following information:-
  - (i) description of the physical environmental background;
  - (ii) description and quantification of the existing fisheries activities;
  - (iii) description and quantification of the existing fisheries resources;
  - (iv) identification of parameters (e.g. water quality parameters) and areas that are important to fisheries and will be affected;
  - (v) prediction and evaluation of any direct/indirect, onsite/offsite impacts on fisheries, such as potential loss and disturbance of fishing ground, fisheries habitat, nursery area and aquaculture sites caused by the project ;
  - (vi) evaluation of cumulative impacts on fisheries due to other planned and committed concurrent development projects at or near the assessment area;
  - (vii) proposals of practicable mitigation measures with details on justification, description of and programme feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of the measures; and
  - (viii) review for the need of monitoring during the construction and operation stages of the Project and, if necessary, proposal for a monitoring and audit programme.

**Appendix F****Requirements for Hazard to Life Assessment****Biogas**

1. The Applicant shall investigate methods to avoid and/or minimise risk from biogas during the construction and operation stages of the Project. The Applicant shall carry out hazard assessment to evaluate potential hazard to life due to biogas.
2. The hazard assessment shall include the following:
  - (i) Identify hazardous scenarios associated with the generation, storage, utilisation, processing and transmission (if applicable) of biogas due to the Project and hazardous scenarios due to neighbouring dangerous goods (DGs) facilities which may cause impact to the biogas facilities of the Project (including but not limited to DGs stores at Linde HKO Limited) and then determine a set of relevant scenarios to be included in a Quantitative Risk Assessment (QRA);
  - (ii) Execute a QRA of the set of hazardous scenarios determined in sub-section (i) above, expressing population risks in both individual and societal terms;
  - (iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and
  - (iv) Identify and assess practicable and cost-effective risk mitigation measures.
3. The methodology to be used in the hazard assessment shall be consistent with previous studies having similar issues.

**Fuel Gas Dangerous Goods including Liquefied Petroleum Gas and Town Gas**

4. The Applicant shall carry out hazard assessment to evaluate the risk due to fuel gas dangerous goods (DGs) facilities in the vicinity, including Zama Industries Limited and Apex Print Limited during construction and operation stages of the Project. The Applicant shall provide the estimated numbers of construction workers and staff of the Project during construction and operation stages of the Project respectively, and seek the Director's agreement on whether the hazard assessment has to cover risk due to Tai Po Gas Production Plant. The hazard assessment shall include the following:
  - (i) Identify hazardous scenarios associated with the fuel gas DG facilities with a view to determining a set of relevant scenarios to be included in a QRA;
  - (ii) Execute a QRA of the set of hazardous scenarios determined in sub-section (i) above, expressing population risks in both individual and societal terms;

- (iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and
  - (iv) Identify and assess practicable and cost-effective risk mitigation measures.
- 5. The methodology to be used in the hazard assessment shall be consistent with previous studies having similar issues.



**Appendix G****Requirements for Landfill Gas Hazard Assessment**

1. The landfill gas hazard assessment shall follow the Landfill Gas Hazard Assessment Guidance Note issued by the Director and 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 Shuen Wan Restored 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 Project 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 and types of protection measures and contingency plan for the construction and operation of the developments proposed under the Project.
  - (vii) Identification of monitoring requirements for assessing the adequacy and performance of the implemented protection measures.

**Appendix H****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 arising as a result of the construction and operation activities of the Project based on the sequence and duration of these activities, e.g. any dredged/excavated sediment/mud, construction and demolition (C&D) materials, sewage sludge, screening, grits, chemical waste and other wastes which will be generated during construction and operation stages.
- (ii) The Applicant shall adopt appropriate design, general layout, construction methods and programme to minimise the generation of public fill/inert C&D materials and maximise 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 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 maximising waste reduction shall be separately considered;
- (ii) After considering the opportunities for reducing waste generation and maximising 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 the result of the assessment in section (iv) below;
- (iii) The EIA report shall state 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; and
- (iv) The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use/disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas:
  - potential hazard;
  - air and odour emissions;
  - noise;

- wastewater discharge; and
- public transport.

### 3. Dredging/Excavation and Dumping

- (i) The Applicant shall identify and estimate dredging/excavation, dredged/excavated sediment/mud transportation and disposal activities and requirements. Potential dumping ground to be involved shall also be identified. Appropriate field investigation, sampling and chemical and biological laboratory tests to characterise the sediment/mud concerned shall be conducted for marine disposal option. The ranges of parameters to be analysed; 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 document in the EIA report for consideration. The categories of sediment/mud which are to be disposed of in accordance with 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 contamination of sediment/mud which requires special treatment/disposal is confirmed, the Applicant shall identify the appropriate treatment and/or disposal arrangement and demonstrate its viability in consultation with relevant authorities.
- (ii) The Applicant shall identify and evaluate the practical dredging/excavation methods to minimise dredging/excavation and dumping requirements based on the criterion that existing sediment/mud shall be left in place and not to be disturbed as far as possible.

**Appendix I****Requirements for Land Contamination Assessment**

1. The Applicant shall identify the potential land contamination site(s) within the Project Area (Appendix A refers) and, if any, within the boundaries of associated areas (e.g. work areas) of the Project.
2. 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 layout plan) and a complete past land uses history, in chronological order, in relation to possible land contamination (including accident records and change of land use(s) and the like).
3. If any contaminated land uses as stated in Sections 3.1 and 3.2 of Annex 19 in the TM is identified, the Applicant shall carry out the land contamination assessment as detailed from sub-section (i) to (iii) below and propose measure to avoid disposal :-
  - (i) During the course of the EIA study, the Applicant shall submit a Contamination Assessment Plan (CAP) to the Director for endorsement prior to conducting an actual contamination impact assessment of the land or site(s). The CAP shall include proposal with details on representative sampling and analysis required to determine the nature and the extent of the contamination of the land or site(s). Alternatively, the Applicant may refer to other previously agreed and still relevant and valid CAP(s) for the concerned site(s).
  - (ii) Based on the endorsed CAP, the Applicant shall conduct a land contamination impact assessment and submit a Contamination Assessment Report (CAR) to the Director for endorsement. If land contamination is confirmed, a Remediation Action Plan (RAP) to formulate viable remedial measures with supporting documents, such as agreement by the relevant facilities management authorities, shall be submitted to the Director for approval. The Applicant shall then clean up the contaminated land or site(s) according to the approved RAP, and a Remediation Report (RR) to demonstrate adequate clean-up should be prepared and submitted to the Director for endorsement prior to the commencement of any development or redevelopment works within the Project Area. The CAP, CAR and RAP shall be documented in the EIA report.
  - (iii) If there are potential contaminated sites which are inaccessible for conducting sampling and analysis during the course of the EIA study, e.g. due to site access problem, the Applicant's CAP shall include :
    - (a) a review of the available and relevant information;

- (b) an initial contamination evaluation of these sites and possible remediation methods;
- (c) a confirmation of whether the contamination problem at these sites would be surmountable;
- (d) a sampling and analysis proposal which shall aim at determining the nature and the extent of the contamination of these sites ; and
- (e) where appropriate, a schedule of submission of revised or supplementary CAP, CAR, RAP and RR as soon as these sites become accessible.

**Appendix J****Requirements for Noise Impact Assessment**

The noise impact assessment shall include the following:

**1. Description of the Noise Environment**

- 1.1 The Applicant shall describe the prevailing noise environment in the EIA report.
- 1.2 The Applicant shall conduct prevailing background noise surveys to determine the standards for evaluating noise impact from fixed noise source. The respective noise environment should be documented in the EIA report.

**2. Construction Noise Impact Assessment****2.1 Construction Noise Impact Assessment Methodology**

- 2.1.1 The Applicant shall carry out construction noise impact assessment (excluding percussive piling) of the Project 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.

**2.2 Identification of Construction Noise Impact****2.2.1 *Identification of Assessment Area and Noise Sensitive Receivers (NSRs)***

- (a) The Applicant shall propose the assessment area for agreement of the Director before commencing the assessment. The assessment area for the construction noise impact assessment shall generally include areas within 300 metres from the boundary of the Project and the works of the Project.
- (b) The Applicant shall identify all existing NSRs in the assessment area and select assessment points to represent identified NSRs for carrying out quantitative construction noise impact assessment described below.
- (c) The assessment points shall be confirmed with the Director prior to the commencement of the quantitative construction noise impact assessment and may be varied subject to the best and latest information available during the course of the EIA study.
- (d) 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. Photographs of existing NSRs shall be appended to the EIA report.

**2.2.2 *Inventory of Noise Sources***

The Applicant shall identify and quantify an inventory of noise sources for representative construction equipment for the purpose of construction noise impact assessment.

## 2.3 Prediction and Evaluation of Construction Noise Impact

### 2.3.1 *Phases of Construction*

The Applicant shall identify representative phases of construction that would have noticeable varying construction noise emissions at existing NSRs at the assessment area for agreement of the Director before commencing the construction noise impact assessment.

### 2.3.2 *Scenarios*

The Applicant shall quantitatively assess the construction noise impact, with respect to criteria set in Annex 5 of the TM, of unmitigated scenario and mitigated scenario at different phases of construction of the Project.

### 2.3.3 *Prediction of Noise Impact*

- (a) The Applicant shall present the predicted noise levels in Leq (30 min) dB(A) at the selected assessment points at various representative floor levels (in m P.D.) on tables and plans of suitable scale.
- (b) The assessment shall cover the cumulative construction noise impact resulting from the construction works of the Project and other concurrent projects identified during the course of the EIA study on existing NSRs within the assessment area.
- (c) The potential construction noise impact under different phases of construction shall be quantified by estimating the total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM.
- (d) The Applicant shall, as far as practicable, formulate a reasonable construction 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 works in restricted hours as defined under the NCO are feasible or not in the context of programming construction works, reference should be made to 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.

## 2.4 Mitigation of Construction Noise Impact

### 2.4.1 *Direct Mitigation Measures*

Where the predicted construction noise impact exceeds the criteria set in Table 1B of Annex 5 of the TM, the Applicant shall consider and evaluate direct mitigation measures including but not limited to, movable barriers, enclosures, quieter alternative methods, re-scheduling, restricting hours of operation of noisy tasks, etc. The feasibility, practicability, programming and effectiveness of the recommended mitigation measures shall be assessed. Any direct mitigation measures recommended should be well documented in the report. Specific reasons for not adopting certain direct mitigation measures to reduce the noise to a level meeting the criteria in the TM or to maximise the protection for the NSRs as far as possible should be clearly substantiated and documented in the EIA report.

## 2.5 Evaluation of Residual Construction Noise Impact

Upon exhaust of direct mitigation measures, if the mitigated noise impact still exceeds the relevant criteria in Annex 5 of the TM, the Applicant shall identify, predict, evaluate the residual construction noise impact in accordance with section 4.4.3 of the TM and estimate the total number of existing dwellings, classrooms and other noise sensitive elements that will be exposed to residual noise impact exceeding the criteria set in Annex 5 in the TM.

## 3. **Fixed Noise Sources Impact Assessment**

### 3.1 Fixed Noise Sources Impact Assessment Methodology

The Applicant shall carry out fixed noise sources impact assessment from the Project in accordance with the methodology in paragraph 5.2 of Annex 13 of the TM.

### 3.2 Identification of Fixed Noise Sources Impact

#### 3.2.1 *Identification of Assessment Area and Noise Sensitive Receivers (NSRs)*

- (a) The Applicant shall propose the assessment area for agreement of the Director before commencing the assessment. The assessment area for the fixed noise impact shall generally include areas within 300 metres from the boundary of the Project and the works of the Project.
- (b) The Applicant shall identify all existing, committed and planned NSRs in the assessment area and select assessment points to represent identified NSRs for carrying out fixed noise sources impact assessment described below.



- (c) The assessment points shall be confirmed with the Director prior to the commencement of the quantitative fixed noise sources impact assessment and may be varied subject to the best and latest information available during the course of the EIA study.
- (d) 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. Photographs of existing NSRs shall be appended to the EIA report.
- (e) For planned noise sensitive land uses without committed site layouts, the Applicant should use the relevant land use and planning parameters and conditions to work out representative site layouts for fixed noise sources impact assessment purpose. However, such parameters and conditions together with the representative site layouts and any constraints identified shall be confirmed with the relevant responsible parties including Planning Department and Lands Department.

### 3.2.2 *Inventory of Noise Sources*

- (a) The Applicant shall identify and quantify an inventory of noise sources for fixed noise sources impact assessment. The inventory of noise sources shall include, but not limited to noise associated with any permanent and temporary industrial noise sources.
- (b) The Applicant shall provide document or certificate, with a methodology accepted by recognised national/international organisation, for the sound power level of each type of fixed noise sources.
- (c) Validity of the inventory shall be confirmed with the relevant government departments/authorities and documented in the EIA report.

## 3.3 Prediction and Evaluation of Fixed Noise Sources Impact

### 3.3.1 *Scenarios*

- (a) The Applicant shall quantitatively assess the fixed noise sources impact of the Project, with respect to the criteria set in Annex 5 of the TM, of unmitigated scenario and mitigated scenario at assessment year of various operation modes including, but not limited to,
  - (i) the worst operation mode which represents the maximum noise emission in connection of identified noise sources of the Project; and
  - (ii) any other operation modes as confirmed with the Director.

- (b) Validity of the above operation modes shall be confirmed with relevant departments/authorities and documented in the EIA report.

### 3.3.2 *Prediction of Noise Impact*

- (a) The Applicant shall present the predicted noise levels in Leq (30 min) dB(A) at the selected assessment points at various representative floor levels (in m P.D.) on tables and plans of suitable scale.
- (b) The assessment shall cover the cumulative fixed noise sources impact associated with the operation of the Project on existing, committed and planned NSRs within the assessment area.
- (c) The potential fixed noise sources impact under different scenarios shall be quantified by estimating the total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM.

## 3.4 Mitigation of Fixed Noise Sources Impact

### 3.4.1 *Direct Mitigation Measures*

Where the predicted fixed noise sources impact exceeds the criteria set in Table 1A of Annex 5 of the TM, the Applicant shall consider and evaluate direct mitigation measures including but not limited to noise barrier/enclosure, screening by noise tolerant buildings, etc. The feasibility, practicability, programming and effectiveness of the recommended mitigation measures shall be assessed. Any direct mitigation measures recommended shall be well documented in the report. Specific reasons for not adopting certain direct mitigation measures to reduce the noise to a level meeting the criteria in the TM or to maximise the protection for the NSRs as far as possible should be clearly substantiated and documented in the EIA report.

## 3.5 Evaluation of Residual Fixed Noise Sources Impact

Upon exhaust of direct mitigation measures, if the mitigated noise impact still exceeds the relevant criteria in Annex 5 of the TM, the Applicant shall identify, predict, evaluate the residual fixed noise sources impact in accordance with section 4.4.3 of the TM and estimate the total number of existing dwellings, classrooms and other noise sensitive elements that will be exposed to residual noise impact exceeding the criteria set in Annex 5 in the TM.

**Appendix K****Requirements for Landscape and Visual Impact Assessment**

1. The Applicant shall review relevant plan(s) and/or studies which may identify areas of high landscape value and recommend country park, coastal protection area, green belt and conservation area designations. Any guidelines on landscape and urban design strategies and frameworks that may affect the appreciation of the Project shall also be reviewed. The aim is to gain an insight to the future outlook of the area affected so as to assess whether the Project can fit into the surrounding setting. Any conflict with the statutory town plan(s) and any published land use plans shall be highlighted and appropriate follow-up action shall be recommended.
2. The Applicant shall describe, appraise, analyse and evaluate the existing and planned landscape resources and character of the assessment area. A system shall be derived for judging landscape and visual impact significance. Annotated oblique aerial photographs and plans of suitable scale showing the baseline landscape character areas and landscape resources and mapping of impact assessment shall be extensively used to present the findings of impact assessment. Descriptive text shall provide a concise and reasoned judgment from a landscape and visual point of view. The sensitivity of the landscape framework and its ability to accommodate change shall be particularly focused on. The Applicant shall identify the degree of compatibility of the Project with the existing and planned landscape setting, recreation and tourism related uses, and scenic spot. The landscape impact assessment shall quantify the potential landscape impact as far as possible so as to illustrate the significance of such impacts arising from the proposed development. Clear mapping of the landscape impact is required. Tree survey shall be carried out and the impacts on existing trees shall be addressed. Cumulative landscape and visual impacts of the Project with other committed and planned developments shall be assessed.
3. The Applicant shall assess the visual impacts of the Project. Clear illustration including mapping of visual impact is required. The assessment shall include the following:
  - (i) identification and plotting of visual envelope of the Project;
  - (ii) appraisal of existing visual resources and character as well as the future outlook of the visual system of the assessment area;
  - (iii) identification of the key groups of existing and planned sensitive receivers within the visual envelope with regard to views from ground level, sea level and elevated vantage points;
  - (iv) description of the visual compatibility of the Project with the surrounding and the planned setting, and its obstruction and interference with the key views of the study areas; and

- (v) identification 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 be included so as to demonstrate the effectiveness of the proposed mitigation measures.
4. The Applicant shall evaluate the merits of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area. In addition, alternative location, layout, design, built-form and construction method that will avoid or reduce the identified landscape and visual impacts shall be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The mitigation measures proposed shall not only be concerned with damage reduction but shall also include consideration of potential enhancement of existing landscape and visual quality. The Applicant shall recommend mitigation measures to minimise adverse effects identified above, including provision of a master landscape plan.
5. The mitigation measures shall also include the preservation of vegetation, transplanting trees in good condition and value, provision of screen planting, re-vegetation of disturbed lands, compensatory planting, woodland restoration, design of structure, provision of finishes to structure, colour scheme and texture of material used and any measures to mitigate the impact on the existing and planned land use and visually sensitive receivers. Parties shall be identified for the on going management and maintenance of the proposed mitigation works to ensure their effectiveness throughout the construction phase and operation phase of the Project, associated works, supporting facilities and essential infrastructures. A practical programme and funding proposal for the implementation of the recommendation measures shall be provided.
6. Annotated illustration materials such as colour perspective drawings, plans and section/elevation diagrams, annotated oblique aerial photographs, photographs taken at vantage points, and computer-generated photomontage shall be adopted to fully illustrate the landscape and visual impacts of the Project. In particular, the landscape and visual impacts of the Project with and without mitigation measures from representative viewpoints, particularly from views of the most severely affected visually sensitive receivers (i.e. worst case scenario), shall be properly illustrated in existing and planned setting at four stages (existing condition, Day 1 with no mitigation measures, Day 1 with mitigation measures and Year 10 with mitigation measures) by computer-generated photomontage so as to demonstrate the effectiveness of the proposed mitigation measures. Computer graphics shall be compatible with Microstation DGN file format. The Applicant shall record the technical details in preparing the illustration, which may need to be submitted for verification of the accuracy of the illustration.

**Appendix L**

**Implementation Schedule of Recommended Mitigation Measures**

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

**Appendix M****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) 30 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) and in Portable Document Format (PDF), unless otherwise agreed by the Director. For both of the HTML and PDF versions, 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. The EIA report, including drawings, tables, figures and appendices shall be viewable by common web-browsers including Internet Explorer 8, Firefox 23, Chrome and Safari 8 or later versions as agreed by the Director, and support languages including Traditional Chinese, Simplified Chinese and English.
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.