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

Environmental Impact Assessment Study Brief No. ESB-266/2013

Project Title:

Desalination Plant at Tseung Kwan O
(hereinafter known as the "Project")

Name of Applicant:

Water Supplies Department
(hereinafter known as the "Applicant")

1. BACKGROUND

- 1.1 An application (No. ESB-266/2013) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 5 December 2013 with a project profile (No. PP-497/2013) (the Project Profile).
- 1.2 The Project is to construct and operate a desalination plant using Seawater Reverse Osmosis (SWRO) technology in Tseung Kwan O (TKO) Area 137. The Project comprises the following components/works:
- (i) a new desalination plant in TKO Area 137 with an initial capacity of 50 million m³ per annum, expandable to an ultimate capacity of 90 million m³ per annum in the future;
 - (ii) a dedicated trunk feed system for the transfer of fresh water output from the desalination plant to the existing Tseung Kwan O Primary Fresh Water Service Reservoir (TKOPFWSR) in Po Lam. The system consists of a new pumping station, a new treated water storage tank, about 9 km of 1200 mm diameter fresh water mains along Wan Po Road, Po Hong Road and Tsui Lam Road, and the associated pipeworks and ancillary facilities including fittings/valves, leakage, flow and pressure monitoring facilities etc. The exact location and details of the new pumping station shall be identified during the EIA study;
 - (iii) natural slope mitigation works including construction of debris barriers and boulder

traps at the toe of the slope and stabilization of natural slopes and boulders on the natural slope within the Clear Water Bay Country Park, which overlooks the northeast boundary of the new desalination plant at TKO Area 137; and

- (iv) all the associated civil, structural, geotechnical, landscaping, electrical and mechanical works.

The location and general layout of the Project are shown in Appendix A of this study brief.

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

- (i) Item E.2 – *Water treatment works with a capacity of more than 100,000m³ per day;*
- (ii) Item K.13 – *A dangerous goods godown with a storage capacity exceeding 500 tonnes;*
- (iii) Item Q.1 – *Earthworks partly or wholly in an existing country park.*

1.4 Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection (the Director) issues this EIA study brief to the Applicant to carry out an EIA study.

1.5 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently. This information will contribute to decisions by the Director on:

- (i) the acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;
- (ii) the conditions and requirements for the design, construction and operation of the Project to mitigate against adverse environmental consequences; and
- (iii) the acceptability of residual impacts after the proposed mitigation measures is 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 and the types of designated projects to be covered by 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 natural and man-made environment and the associated environmental constraints;
- (iii) to provide information on the consideration of alternative development options of the Project including, but not limited to, the extent, layout, design and the construction methods with a view to avoiding and minimizing potential environmental impacts to environmentally sensitive areas and sensitive uses; to compare the environmental benefits and dis-benefits of different options; to provide reasons for selecting the preferred option(s) and to describe the part environmental factors played in the selection of preferred option(s);
- (iv) to identify and quantify emission sources (including air quality, noise, water quality, etc. as appropriate) and determine the significance of impacts on sensitive receivers and potential affected uses and to propose measure to mitigate these impacts;
- (v) to identify and quantify any potential loss or damage and other potential impacts to fisheries, flora, fauna and natural habitats and to propose measure to mitigate these impacts;
- (vi) to identify any potential landscape and visual impacts and to propose measures to mitigate these impacts;
- (vii) to propose the provision of infrastructures or mitigation measures to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;
- (viii) to investigate the feasibility, practicability, effectiveness and implications of the proposed mitigation measures;

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- (ix) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise during the construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;
 - (x) 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;
 - (xi) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and
 - (xii) to design and specify environmental monitoring and audit requirements to ensure the effective implementation of the recommended environmental protection and pollution control measures.

3. DETAILED REQUIREMENTS OF THE EIA STUDY

3.1 The Purpose

- 3.1.1 The purpose of this study brief is to scope the key issues of the EIA study and to specify the environmental issues that are required to be reviewed and assessed in the EIA report. The Applicant has to demonstrate in the EIA report that the criteria in the relevant sections of the Technical Memorandum on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance (hereinafter referred to as “the TM”) are complied with.

3.2 The Scope

- 3.2.1 The scope of this EIA study shall cover the Project and associated works proposed in the Project Profile and mentioned in Section 1.2 above. The EIA study shall address the likely key issues described below, together with any other key issues identified during the course of the EIA study:
 - (i) the potential air quality impacts on the sensitive receivers during construction and

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- operation of the Project;
- (ii) the potential noise impacts on the sensitive receivers during construction and operation of the Project;
 - (iii) the potential water quality impacts on water system(s) and relevant water sensitive receivers (e.g. gazetted bathing beaches at Clear Water Bay and Big Wave Bay, seawater intakes at Junk Bay and Siu Sai Wan, shoreline at the Coastal Protection Area from Cape Collinson to Big Wave Bay, shores at the Coastal Protection Area at Tai Miu Wan, coral assemblages in waters of Junk Bay and Tai Miu Wan, and along the coastlines of Fat Tong Chau, Cape Collinson and north of Tung Lung Chau, Fish Culture Zone at Tung Lung Chau), during construction and operation of the Project;
 - (iv) the potential waste management impacts and land contamination issues during construction and operation of the Project including sludge generated from the desalination process;
 - (v) the potential impacts on ecology and fisheries, in particular to Clear Water Bay Country Park, Tung Lung Chau Fish Culture Zone, coral assemblages in waters of Junk Bay and Tai Miu Wan, and along the coastlines of Fat Tong Chau, Cape Collinson and north of Tung Lung Chau, intertidal habitat, marine benthic communities including shoreline at the Coastal Protection Area from Cape Collinson to Big Wave Bay, shores at the Coastal Protection Area at Tai Miu Wan, due to construction and operation of the Project;
 - (vi) the potential landscape and visual impacts arising from the above-ground structures and associated works of the Project to the sensitive receivers;
 - (vii) the potential landfill gas hazard on site during the construction and operation of the Project;
 - (viii) the potential hazard to life on construction workers and other sensitive receivers to be identified for Potentially Hazardous Installations (PHI) due to storage, handling and transport of chlorine in forms of gas and liquid, and other dangerous goods (DGs) including sodium hypochlorite solution, carbon dioxide, caustic soda, hydrochloric and sulphuric acid; and
 - (ix) the potential cumulative impacts of the Project, through interaction or in combination

with other existing, committed and planned projects in the vicinity of the Project, such as explosive stores (if co-exist with the Project during construction and operation of the Project) and transport routes in TKO, Fill Bank at TKO Area 137, South East New Territories (SENT) Landfill, TKO Stage I Restored Landfill, TKO Stage II/III Restored Landfill and the proposed SENT Landfill extension and those impacts that may have a bearing on the environmental acceptability of the Project.

3.3 **Consideration of Alternatives**

3.3.1 Need of the Project

The Applicant shall provide information on the need and siting of the Project, including the purpose, objectives, the site selection process and environmental benefits of the Project, and describe the scenarios with and without the Project.

3.3.2 Consideration of Alternative Development Options

The Applicant shall present in the EIA report the consideration of alternative development options, including the extent, layout and design for the Project with a view to avoiding or reducing environmental impacts during construction and operation of the Project. Other factors or constraints affecting the design and layout of the Project shall be stated. A comparison of the environmental benefits and dis-benefits of alternative development options shall be made with a view to recommending the preferred option(s) to avoid and/or minimize adverse environmental effects, including avoidance approach to prevent any ecological impacts on the Clear Water Bay Country Park.

3.3.3 Consideration of Alternative Construction Methods and Sequences of Works

Taking into consideration of the combined effect with respect to the severity and duration of the construction impacts to the affected sensitive receivers, the EIA study shall explore different construction methods and sequences of works of the Project with a view to avoiding or minimizing adverse environmental impacts during construction of the Project. A comparison of the environmental benefits and dis-benefits of applying different construction methods and sequences of works shall be included in the EIA study.

3.3.4 Selection of Preferred Scenario

Taking into consideration of the findings in sub-sections 3.3.2 and 3.3.3 above, the

Applicant shall recommend/justify the adoption of the preferred scenario that will maximise environmental benefits and avoid or minimize adverse environmental effects arising from the Project, and adequately describe the part that environmental factors played in arriving at the final selection.

3.4 **Technical Requirements**

3.4.1 The Applicant shall conduct the EIA study to address the environmental aspects described in Section 3.2 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The Applicant shall include in the EIA report details of the construction programme and methodologies for assessing environmental impacts of the Project. The Applicant shall clearly state the time frame, staged implementation programme and works programmes of the Project and other concurrent projects, for assessing the cumulative environmental impacts from the Project and interacting projects as identified in the EIA study. The EIA study shall include the following technical requirements specified below and in the Appendices of this EIA study brief.

3.4.2 **Air Quality Impact**

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

3.4.2.2 The study area for air quality impact assessment shall be defined by a distance of 500 meters from the boundary of the Project site, with consideration to be extended to include major existing, planned and committed air pollutant emission sources, including but not limited to, the existing Fill Bank at TKO Area 137, Biodiesel Plant at TKO Industrial Estate, SENT Landfill and the proposed SENT Landfill extension that may have a bearing on the environmental acceptability of the Project. The assessment shall include the existing, committed and planned sensitive receivers within the study area. The assessment shall also take into account the impacts of emission sources from nearby concurrent projects, such as the proposed SENT Landfill extension. The assessment shall be based on the best available information at the time of the assessment.

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

3.4.3 **Noise Impact**

- 3.4.3.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing noise impact as stated in Annexes 5 and 13 of the TM.
- 3.4.3.2 The assessment area for the noise impact assessment shall generally include areas within 300m from the boundary of the Project site. Subject to the agreement of the Director, the assessment area could be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the outer Project limit, provides acoustic shielding to those receivers at distances further away from the Project. The assessment area shall be expanded to include NSRs at distances over 300m from the Project which are affected by the construction and operation of the Project. The assessment shall also take into account the impacts of emission sources from nearby concurrent projects, such as the proposed SENT Landfill extension.
- 3.4.3.3 The noise impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix C.

3.4.4 **Water Quality Impact**

- 3.4.4.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing water pollution as stated in Annexes 6 and 14 of the TM.
- 3.4.4.2 The study area for the water quality impact assessment shall include areas within 500 meters from the site boundary of the Project and 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. The following sensitive receivers and other sensitive receivers identified during the course of the EIA study shall be included and assessed in the water quality impact assessment:
- Tung Lung Chau Fish Culture Zone;
 - fisheries resource including spawning and nursery grounds at the coastal water of Tit Cham Chau;
 - coral assemblages in waters of Junk Bay and Tai Miu Wan, Tai Long Pai and along the coastlines of Fat Tong Chau, Cape Collinson and north of Tung Lung Chau;
 - shoreline at the Coastal Protection Area from Cape Collinson to Big Wave Bay;
 - Big Wave Bay Beach, Shek O Beach and Clearwater Bay Beaches;
 - shores at the Coastal Protection Area at Tai Miu Wan;
 - Siu Sai Wan Flushing Water Intake

3.4.4.3 The water quality impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix D.

3.4.5 Sewerage and Sewage Treatment Implication

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

3.4.5.2 The assessment of the sewerage and sewage treatment implication arising from the operation of the Project shall follow the detailed technical requirements given in Appendix E.

3.4.6 Waste Management Implication and Land Contamination Assessment

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

3.4.6.2 The assessment of the waste management implication arising from construction and operation of the Project shall follow the detailed technical requirements given in Appendix F1.

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

3.4.6.4 The assessment of the potential land contamination issue shall follow the detailed technical requirements given in Appendix F2.

3.4.7 Ecological Impact (Terrestrial and Aquatic)

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

3.4.7.2 The assessment area for the purpose of terrestrial ecological impact assessment shall include areas within 500m distance from the site boundary of the Project and any other areas likely to be impacted by the Project. Potential ecological impact due to the

development of the Project and slope stabilization works on the Clear Water Bay Country Park shall be assessed. For aquatic ecology, the assessment area shall be the same as the water quality impact assessment described in Section 3.4.4.

3.4.7.3 The ecological impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix G.

3.4.8 **Fisheries Impact**

3.4.8.1 The applicant shall follow the criteria and guidelines for evaluating and assessing fisheries impact as stated in Annexes 9 and 17 of the Technical Memorandum under EIA Ordinance.

3.4.8.2 The assessment area shall be the same as the water quality impact assessment described in Section 3.4.4. 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.

3.4.8.3 The fisheries impact assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix H.

3.4.9 **Landscape and Visual Impacts**

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

3.4.9.2 The assessment area for landscape impact assessment shall include all areas within a 500m distance from the site boundary of the Project. The assessment area for the visual impact assessment shall be defined by the visual envelope of the Project. The following sensitive receivers and other sensitive receivers identified during the course of the EIA study shall be included and assessed in the landscape and visual impact assessment:

- residents in the Island Resort;
- residents in Fullview Garden;
- residents in LOHAS Park;
- residents in residential developments in TKO Area 85;
- residents of TKO New Town;

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- users of the Clearwater Bay Golf and Country Club;
 - users of the Clear Water Bay Country Park;
 - users of High Junk Peak Country Trail;
 - future users of the open space of SENT Landfill and its extension

3.4.9.3 The landscape and visual impact assessments for construction and operation of the Project shall follow the detailed technical requirements given in Appendix I.

3.4.10 **Landfill Gas Hazard**

3.4.10.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing landfill gas hazards as stated in Section 1.1(f) in Annex 7 and Section 3.3 in Annex 19 of the TM respectively. In particular, the landfill gas hazard assessment shall be carried out in accordance with the "Landfill Gas Hazard Assessment Guidance Note" (1997) issued by the Director and shall entail two main components, which are qualitative risk assessment and landfill gas precautionary/protection design.

3.4.10.2 The landfill gas hazard assessment shall follow the detailed technical requirements given in Appendix J.

3.4.11 **Hazard to Life**

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

3.4.11.2 The hazard to life assessment for construction and operation of the Project shall follow the detailed technical requirements given in Appendix K.

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

3.4.12.1 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, define the scope of EM&A requirements for the Project in the EIA study.

3.4.12.2 Subject to the confirmation of the EIA study findings, the Applicant shall follow the guidelines for an EM&A programme as stated in Annex 21 of the TM. The Applicant shall also propose if there is any need for real-time reporting of monitoring data for the Project through a dedicated internet website.

3.4.12.3 The Applicant shall prepare a Project Implementation Schedule in the form of a checklist as shown in Appendix L of this EIA study brief. It shall contain the EIA study recommendations and mitigation measures with reference to the implementation programme.

3.5 **Presentation of Summary Information**

3.5.1 Summary of Environmental Outcomes

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

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. **REPORT REQUIREMENTS**

5.1 In preparing the EIA report, the Applicant shall refer to Annex 11 of the TM for the contents of an EIA report. The Applicant shall also refer to Annex 20 of the TM, which stipulates the guidelines for the review of an EIA report. The Applicant shall accompany with the submission of the EIA report a summary, pointing out where in the EIA report the respective requirements of this EIA Study have been addressed and fulfilled.

5.2 The Applicant shall supply the Director with hard and electronic copies of the EIA report and the executive summary in accordance with the requirements given in Appendix M. The Applicant shall, upon request, make additional copies of EIA report/documents available to the public, subject to payment by the interested parties of full costs of printing.

6. OTHER PROCEDURAL REQUIREMENTS

- 6.1 If there is any change in the name of Applicant for this EIA study brief during the course of the EIA study, the Applicant must notify the Director immediately.
- 6.2 If there is any key change in the scope of the Project mentioned in Section 1.2 of this EIA study brief and in Project Profile (No. PP-497/2013), the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover the key changes, and the additional issues, if any, that the EIA study must also address. If the changes to the Project fundamentally alter the key scope of 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 Noise Impact Assessment

Appendix D – Requirements for Water Quality Impact Assessment

Appendix E – Requirements for Assessment of Sewerage and Sewage
Treatment Implication

Appendix F1 – Requirements for Assessment of Waste Management
Implication

Appendix F2 – Requirements for Land Contamination Assessment

Appendix G – Requirements for Ecological Impact Assessment

Appendix H – Requirements for Fisheries Impact Assessment

Appendix I – Requirements for Landscape and Visual Impact Assessment

Appendix J – Requirements for Landfill Gas Hazard Assessment

Appendix K – Requirements for Hazard to Life Assessment

Appendix L – Implementation Schedule

Appendix M – Requirements for EIA Report Documents

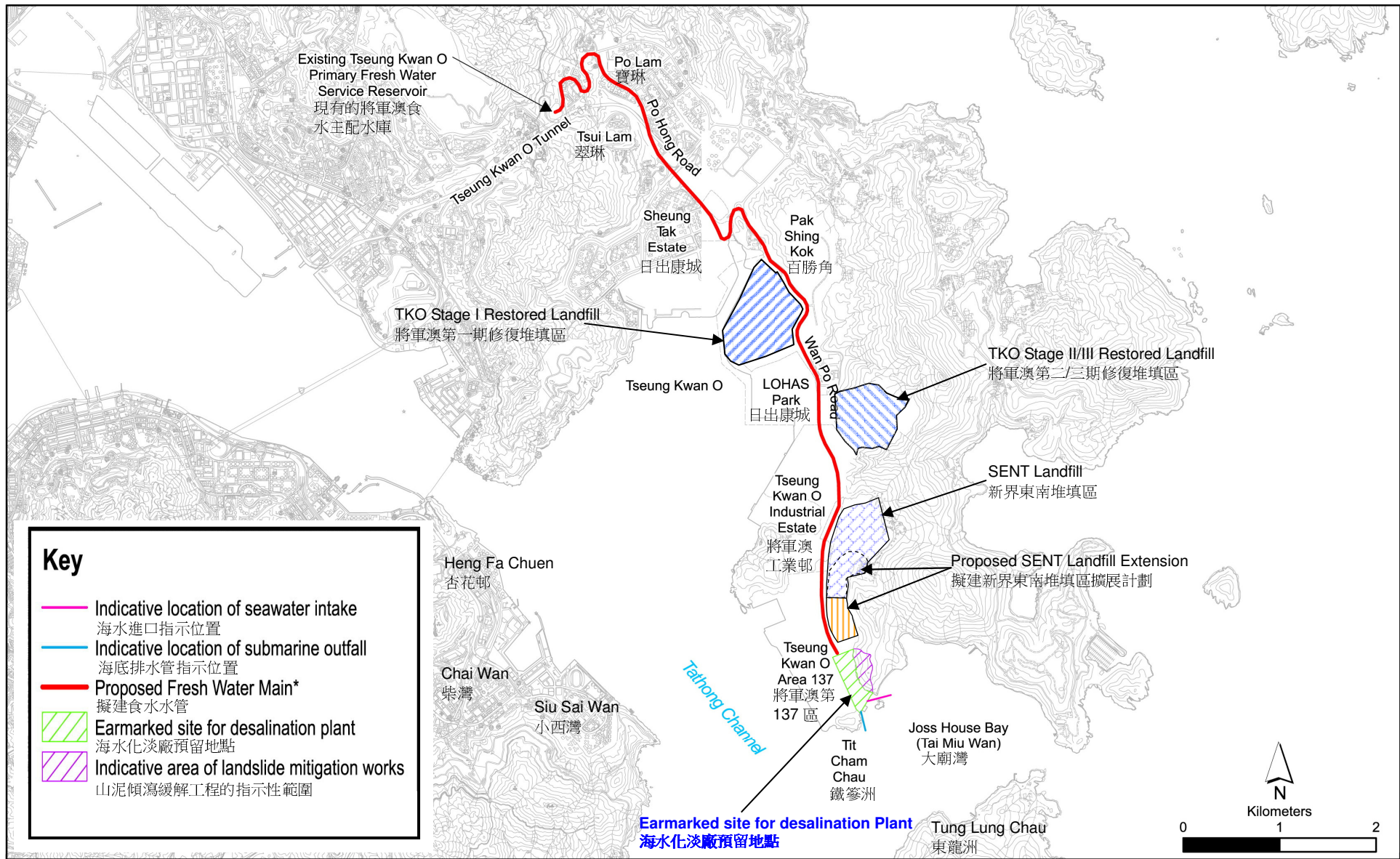
--- END OF EIA STUDY BRIEF ---

January 2014

Environmental Assessment Division

Environmental Protection Department

Location of the Proposed Desalination Plant at Tseung Kwan O



Project Title: Desalination Plant at Tseung Kwan O
 工程項目名稱: 將軍澳海水化淡廠
 Location of the Proposed Desalination Plant at Tseung Kwan O
 擬建將軍澳海水化淡廠的位置

(Plan originated from Appendix I of the Project Profile reference: PP-497/2013)
 (圖則源自工程項目簡介編號 PP-497/2013 內的附錄 I)



Appendix B**Requirements for Air Quality Impact Assessment**

The air quality impact assessment shall include the following:

1. Background and Analysis of Activities
 - 1.1 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.
 - 1.2 Provision of an account, where appropriate, of the consideration/ measures that have been taken into consideration during the planning of the Project to abate the air pollution impact. The Applicant shall consider alternative layout, alternative construction methods/phasing programmes, and alternative operation modes to minimize the air quality impact during construction and operation stages of the Project.
 - 1.3 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 PATH (Pollutants in the Atmosphere and their Transport over Hong Kong) model is used to estimate the background air quality, details for the estimation of the 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
 - 2.1 Identification and description of existing, planned and committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning Plans, 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.
 - 2.2 Provision of a list of air pollution emission sources, including any nearby emission sources which are likely to have impact related to the Project based on the analysis of the construction and operation activities in Section 1 above. Examples of construction stage emission sources include stockpiling, material handling and vehicular movements on unpaved haul roads on site, etc. Examples of operation stage emission sources include odour emissions from transportation, storage and handling of sludge. Confirmation regarding the validity of the assumptions adopted and the magnitude of the activities (e.g. volume of construction material handled, odour emission strength, etc.) shall be obtained from the relevant government departments/authorities and documented.
 - 2.3 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 at the existing, committed and planned ASRs within the assessment area shall be assessed, based on the best information available at the time of assessment.

3. Construction Phase Air Quality Impact

- 3.1 The Applicant shall follow the requirements of the Air Pollution Control (Construction Dust) Regulation to ensure that construction dust impacts are controlled within the relevant standards as stipulated in Section 1 of Annex 4 of the TM. A monitoring and audit programme for the construction phase 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.
- 3.2 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.

4. Operational Phase Air Quality Impact

- 4.1 The Applicant shall assess the potential air quality impact arising from the activities in the proposed Project site, including odour from the sludge generated from the desalination treatment process based on assumed reasonably worst case scenario under normal operating condition. The evaluation shall be based on the strength of the emission sources identified in Section 2 above. The Applicant shall follow the methodology set out in Section 5 below when carrying out the assessment.
- 4.2 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. 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

- 5.1 The Applicant shall apply the general principles enunciated in EPD's "Guidelines for Local Scale Air Quality Assessment Using Models" while making allowance for the specific characteristic of the Project. The Applicant must ensure consistency between the text description and the model files at every stage of submission for review. In case of doubt, prior agreement between the Applicant and the Director on the specific modelling details shall be sought.
- 5.2 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.

5.3 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.

6. Mitigation Measures for Non-compliance

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

7. Submission of Model Files

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

Appendix C**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.
 - 1.3 The Applicant shall provide information on the expected traffic flow to be generated from the operation of the Project and to justify the need for carrying out any further quantitative road traffic noise assessment. The quantitative assessment of road traffic noise of the Project, if needed, shall follow the detailed requirements given in Section 3.2.
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.
 - 2.1.2 For ground-borne construction noise impact, the Applicant shall propose assessment methodology and computational model which shall be confirmed with the Director, with reference to Section 4.4.2 of the TM, prior to the commencement of the assessment. Site measurements at appropriate locations may be required in order to obtain the empirical input parameters required in the computational model.
 - 2.2 Identification of Construction Noise Impact
 - 2.2.1 Identification of Assessment Area and Noise Sensitive Receivers
 - (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 meters 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.

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- (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, 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 maximize 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 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. Operational Noise Assessment

3.1 Fixed Noise Sources

3.1.1 Fixed Noise Sources Impact Assessment Methodology

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

3.1.2 Identification of Assessment Area and Noise Sensitive Receivers

- (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 meters 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.

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- (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 assessment purpose. However, such parameters and conditions together with any constraints identified shall be confirmed with the relevant responsible parties including Planning Department and Lands Department.

3.1.3 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 including desalination treatment plant, high pressure pumps, exhaust fans for ventilation systems and emergency generator set (if required), etc.
- (b) The Applicant shall provide document or certificate, accepted by recognized national/international organization, 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.

3.1.4 Prediction and Evaluation of Fixed Noise Sources Impact

3.1.4.1 Scenarios

- (a) The Applicant shall quantitatively assess the fixed noise sources impact with respect to criteria set in Annex 5 of the TM, of unmitigated scenario and mitigated scenario at assessment years 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 operational modes shall be confirmed with relevant departments/authorities and documented in the EIA report.

3.1.4.2 Prediction of Noise Impact

- (a) The Applicant shall present the predicted noise levels in Leq (30 min) 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 noise sources impact associated with the operation of the proposed 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.

3.1.5 Mitigation of Fixed Noise Sources Impact

Where the predicted fixed noise sources impact exceeds the criteria set in Table 1A of Annex 5, 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 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 maximize the protection for the NSRs as far as possible should be clearly substantiated and documented in the EIA report.

3.1.6 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 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.

3.2 Road Traffic Noise

3.2.1 Assessment Methodology of Traffic Noise Levels

The Applicant shall calculate the expected road traffic noise from Wan Po Road using the methods described in the U.K. Department of Transport's "Calculation of Road Traffic Noise" (1988). Calculations of future road traffic noise shall be based on the peak hour traffic flow in respect of the maximum traffic projection within a 15-year period upon commencement of operation of the Project. The Applicant shall calculate the traffic noise levels at the *representative* NSRs along Wan Po Road.

3.2.2 Presentation of Noise Levels

The Applicant shall present the prevailing and future traffic noise levels in L10 (1hr) at the NSRs on tables and plans of suitable scales. A quantitative assessment at the representative NSRs along Wan Po Road shall be carried out and compared against the criteria set out in Table 1A of Annex 5 in the TM. The potential noise impact along Wan Po Road shall be quantified by estimating the total number of dwellings, classrooms and other noise sensitive elements that will be exposed to noise levels exceeding the criteria set out in Table 1A of Annex 5 of the TM.

3.2.3 Traffic Noise Model

The EIA report shall contain sample calculation and input parameters for such assessment points as requested by the Director. Also, the Applicant shall provide the input data set of the traffic noise model in the format of electronic files in the report. The Applicant shall prepare and provide drawings of appropriate scales to show the road segments, topographic

barriers, and assessment points of sensitive receivers input into the traffic noise model.

3.2.4 Mitigation of Traffic Noise Impact

After rounding of the predicted noise levels according to the U.K. Department of Transport's "Calculation of Road Traffic Noise" (1988), the Applicant shall propose direct technical remedies in all situations where the predicted traffic noise level exceeds the criteria set out in Table 1A of Annex 5 in the TM and the noise from traffic induced by the proposed desalination plant contributes significantly to the overall traffic noise level. Specific reasons for not adopting certain direct technical remedies in the design to reduce the traffic noise to a level meeting the criteria in the TM or to maximize the protection for the NSRs as far as possible shall be clearly laid down and quantified. The total number of dwellings, classrooms and other noise sensitive elements that will benefit from the provision of direct technical remedies shall be provided. The total number of dwellings, classrooms and other noise sensitive elements that will still be exposed to noise levels above the criteria with implementation of all recommended direct technical remedies shall be quantified.

3.3 Assessment of Side Effects and Constraints

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

3.4 Evaluation of Constraints on Planned Noise Sensitive Developments/Land uses

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

Appendix D**Requirements for Water Quality Impact Assessment**

1. The Applicant shall identify and analyse physical, chemical and biological disruptions of the water system(s) arising from the construction and operation of the Project.
2. The Applicant shall predict, 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 D-1. Possible impacts due to the marine works activities, effluent discharge, the use and discharge of any biocide and anti-foulant, 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 water quality impacts of the site run-off and marine works including but not limited to impacts on suspended solid level, dissolved oxygen and contaminant release, during the construction stage;
 - (ii) the assessment on impacts on water quality of the receiving water bodies and water sensitive receivers on operation stage shall have regard to the frequency, duration, volume and flow rate of the discharge and pollutants under normal operation of the plant and when the plant is under dormant or standby mode if any discharge may also be made;
 - (iii) the water quality impacts of temporary, accidental and emergency discharges at the desalination plant during construction and operation of the Project, which shall include the impact on the receiving water bodies and water sensitive receivers due to the emergency discharge under any constraints of dispersive capacities of the receiving water bodies under various tidal stages;
 - (iv) the potential impact on the water bodies and water sensitive receivers of any secondary water quality impacts (such as eutrophication or algal bloom) due to changes in water quality caused by the operation of the desalination plant or emergency discharge from the Project;
 - (v) 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; and
 - (vi) the water quality impacts due to construction and operation of the new submarine water intake and discharge outfall (such as potential sedimentation effect) including the need for any maintenance works of the intake or outfall.
4. The Applicant shall address water quality impacts due to the construction phase and

operational phase of the Project. Essentially, the assessment shall address the following:

- (i) collect and review background information on affected existing and planned water systems, their respective catchments and sensitive receivers which might be affected by the Project;
- (ii) characterize water quality of the water systems and sensitive receivers, which might be affected by the Project based on existing best available information or through appropriate site survey and tests;
- (iii) identify and analyse relevant existing and planned future activities, beneficial uses and water sensitive receivers related to the affected water system(s). The Applicant should refer to, *inter alia*, those developments and uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans, and any other relevant published 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 existing shoreline or bathymetry, change of water holding/flow regimes of water bodies (for example, due to the water intake or discharge from the project), ground water levels and change of 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 and non-point sources discharge to surface water runoff, cooling water discharge, sewage from workforce and other discharges (e.g. Reverse Osmosis concentrate and other process waste streams) generated from the Project, contaminants release from works on marine sediment and sediment release or re-suspension from works into water bodies;
- (viii) evaluate, predict and characterize the various discharges of the Project. The Applicant shall predict the discharge characteristics by making reference to the intake water characteristics, dosage of any chemicals, anticipated performance of the treatments including wastewater treatments and disinfection processes at the proposed desalination plant, the finding of previous studies, and conducting additional samplings and tests if necessary. The Applicant shall compare the merits and dis-merits of different disinfection methods with respect to the affected sensitive receivers in the local area;
- (ix) evaluate, predict and characterize the discharge characteristics based on provision of any plant sterilization (e.g. on any water pipes) processes of the project;
- (x) determine the best available disposal means of the various discharges which

minimize water quality impact of the affected water systems;

- (xi) include the parameters of dissolved oxygen, pH, temperature, suspended solids, salinity, sulphite (if sodium bisulphite is used as dechlorination agent), total residual chlorine and chlorination by-products (if chlorination is considered as an option of disinfection), contaminants release, bacteria or other pathogens, nutrient level changes of the water bodies, and any other pollutants due to the discharges from the project, etc.;
- (xii) 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;
- (xiii) 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;
- (xiv) predict and quantify the impacts on the water system(s) and its/their sensitive receivers including users of the 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 and exposure pathway of the sensitive receivers to the pollutants;
- (xv) 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;
- (xvi) analyze the provision and adequacy of existing and planned future facilities to handle and minimize water pollution arising from the pollution sources identified in (vii) above;
- (xvii) develop effective infrastructure upgrading or provision including necessary sewerage connection, contingency plan, water pollution prevention and mitigation measures to be implemented during construction and operation stages, emergency discharges in the case of any plant failure, so as to reduce the water quality impacts to within standards;
- (xviii) investigate and develop best management practices to reduce storm water and non-point source pollution as appropriate;
- (xix) 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;
- (xx) assess the cumulative impacts due to other related concurrent and planned projects, activities or pollution sources along the identified water system(s) and sensitive receivers that may have a bearing on the environmental acceptability of the Project through mathematical modelling. This shall include the potential cumulative

operational water quality impact arising from other cooling water systems;

- (xxi) devise mitigation measures to avoid or minimize 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 D-1 to this study brief; and
- (xxii) recommend appropriate mitigation measures, including a contingency plan, to minimize the duration and impact of emergency discharges during operation stage of the Project.

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

- 1.1 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.
- 1.2 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.
- 1.3 The hydrodynamic, water quality, sediment transport and thermal modules shall be strictly mass conserved at all levels.
- 1.4 An initial dilution model shall be used to characterize the initial mixing of the effluent discharge, and to feed the terminal level and size of the plume into the far field water quality modules where necessary. The initial dilution model shall have been proven with successful applications locally and overseas.

2. Model details – Calibration & Validation

- 2.1 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, the Pearl Estuary and the Dangan (Lema) Channel. The field data set for calibration and validation shall be agreed with EPD.
- 2.2 Tidal data shall be calibrated and validated in both frequency and time domain manner.
- 2.3 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.
- 2.4 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

- 2.5 The consultants 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.

3. Model details – Simulation

- 3.1 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 salinity. Salinity results simulated by hydrodynamic models and water quality models shall be demonstrated to be consistent. The model shall be able to simulate and take account of the interaction of temperature, dissolved oxygen, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, suspended solids, contaminants release of dredged and disposed material, air-water exchange, *E. coli* and benthic processes.
- 3.2 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 any marine works shall be simulated by the model.
- 3.3 The models shall at least cover the Hong Kong waters, the Pearl Estuary and the Dangan Channel to incorporate all major influences on hydrodynamic and water quality. A fine grid model may be used for detailed assessment of this study. It shall either be linked to a far field model or form part of a larger model by gradual grid refinement. The coverage of the fine grid model shall be properly designed such that it is remote enough so that the boundary conditions will not be affected by the project. The model coverage area shall be agreed with EPD.
- 3.4 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 schematization shall be agreed with EPD.

4. Modelling assessment

- 4.1 The assessment shall include the construction and operational phase 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.
- 4.2 Mixing zone analyses shall be performed using the near field model. The model shall be run for different combinations of discharge flow rates and loads, current speeds and ambient water quality and stratification profiles to simulate the effluent plume discharging into the receiving water system(s). The results shall be statistically analyzed to determine the spatial and temporal variations of pollutant concentrations in the plume and the extent and sizes of the mixing zones. Critical conditions reflecting the lowest initial dilutions and highest pollutant concentrations shall be identified and assessed.
- 4.3 Hydrodynamic, water quality, sediment transport and thermal modules, where appropriate,

shall be run for (with proper model spin up) at least a real sequence of 15 days spring-neap tidal cycle in both the dry season and the wet season.

- 4.4 For assessing temporary discharges, 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.
- 4.5 The results shall be assessed for compliance of Water Quality Objectives.
- 4.6 The impact on all sensitive receivers shall be assessed.
- 4.7 Cumulative impacts due to other projects, activities or pollution sources within a boundary to the agreement of EPD shall also be predicted and quantified.
- 4.8 All modelling input data and results shall be submitted in digital media to EPD.

- END -

Appendix E**Requirements for Assessment of Sewerage and Sewage Treatment Implication**

The Applicant shall study and assess the need and impacts of discharging sewage to the existing/planning sewerage systems in TKO District. The assessment shall include the following:

1. review and confirm whether the existing/planned sewerage systems and sewage treatment works in TKO District will provide adequate capacity for the Project;
2. if the existing/planned sewerage layout or capacities cannot cope with the maximum discharges, the Applicant shall provide new sewerage system and/or on-site sewage treatment facilities to receive and transport the sewage arising during the operation of the designed to meet the current government standards and requirements;
3. identify the appropriate alignment and layouts of the new sewerage to connect to the existing/planned/future sewerage systems in TKO District; and
4. set out the design, operation and maintenance requirements and identify the party responsible for the construction and maintenance of any proposed sewerage and sewage treatment facilities, such as pumping station(s) and sewage treatment plant, including electrical and mechanical components to eliminate the problem of septicity incurred in long rising main(s) during low flows and to facilitate maintenance. The above shall be agreed by DSD and EPD (Twin rising mains for each pumping station should be provided to make sure that the proposed sewage rising mains are maintainable without shutting down and discharging untreated sewage into the natural stream/drainage channel directly).

Appendix F1**Requirements for Assessment of Waste Management Implication**

The assessment of waste management implication and land contamination 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 materials, floating refuse, sewage sludge, screening, grits, chemical wastes 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 minimize the generation of public fill/inert construction and demolition (C&D) materials and maximize the use of public fill/inert C&D materials for other construction works.

2. Proposal for Waste Management

- (i) Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation, on-site or off-site re-use and recycling shall be fully evaluated. Measures that can be taken in the planning and design stages e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered;
- (ii) After considering the opportunities for reducing waste generation and maximizing re-use, the types and quantities of 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 2 (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;
 - ecology; and
 - public transport.

3. Excavation/Dredging and Dumping

- (i) The Applicant shall identify and quantify all excavation/dredging, excavated/dredged 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 characterize the sediment/mud concerned shall be conducted. The ranges of parameters to be analyzed; the number, type and methods of sampling; sample preservation; chemical and biological laboratory test methods to be used shall be agreed with the Director (with reference to Section 4.4.2(c) of the TM) prior to the commencement of the tests and document in the EIA report for consideration. The categories of sediment/mud which are to be disposed of in accordance with a permit granted under the Dumping at Sea Ordinance (DASO) shall be identified by both chemical and biological tests and their quantities shall be estimated. If the presence of any serious contamination of sediment/mud which requires special treatment/disposal is confirmed, the Applicant shall identify the most appropriate treatment and/or disposal arrangement and demonstrate its feasibility. The Applicant shall provide supporting document, such as agreement by the relevant facilities management authorities, to demonstrate the viability of any treatment/disposal plan.

- (ii) The Applicant shall identify and evaluate the best practical excavation/dredging methods to minimize excavation/dredging 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 F2

Requirements for Land Contamination Assessment

1. The Applicant shall identify all land lots and sites within the Project boundary, which, due to their past or present land uses, are potential contaminated sites. A detailed account of the present activities and past land use history in relation to possible land contamination shall be provided.
2. If any potential contaminated land lots/sites are identified, the Applicant shall carry out the land contamination assessment in accordance with Sections 3.1 and 3.2 of Annex 19 of the TM accordingly.
3. The list of potential contaminants which are anticipated to be found in these potential contaminated sites shall be provided and the relevant remediation options shall be discussed.

Appendix G**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 minimize impacts on recognized 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 detailed 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 which shall cover the wet and dry seasons, the duration of which shall be at least 6 months, and investigation to verify the information collected, fill the information gaps as identified in (ii) above, and to fulfill the objectives of the EIA study. The field surveys shall cover but not be limited to flora, fauna and any other habitats/species of conservation importance, and shall include terrestrial, subtidal and intertidal survey, benthic community survey, and underwater dive survey for coral communities;
 - (iv) Establishment of the general ecological profile of the assessment area based on information collected in the tasks mentioned in sub-section (i) to (iii) above, and describe the characteristics of each habitat found, the data set should be comprehensive and representative, and is up to date and valid for the purpose of this assessment. Major information to be provided shall include:
 - (a) description of the physical environment, including all recognized 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 and species of conservation interest 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, 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 the following:
 - (a) woodlands and plantations;
 - (b) vertebrates (e.g. avifauna, mammals, fish, herpetofauna);
 - (c) macroinvertebrates (e.g. butterflies, odonates, crustaceans, coral communities);
 - (d) the intertidal and subtidal habitats of Fat Tong Chau, Tai Miu Wan and north of Tung Lung Chau; and
 - (e) any other habitats, animals and plants identified as having special conservation interest 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, reduction of species abundance/diversity, loss of feeding grounds, reduction of ecological carrying capacity, habitat fragmentation, and in particular the followings :
 - (a) loss of habitats as mentioned in Section (v) above;
 - (b) disturbance to animal and plants, especially those as mentioned in Section (v) above; and
 - (c) indirect ecological impacts due to potential changes in the water quality, hydrodynamics properties, sedimentation hydrology as a result of surface run-off and discharges on habitats as mentioned in Section (v) above during the construction and operation stages of the Project.
- (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) Evaluation for possible alternatives, such as alternative locations and alignment of the Project and modification/change of construction methods and/or programme, and practicable mitigation measures to avoid, minimize 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 define 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 using well-defined criteria in Annex 8 of the TM and determine if off-site mitigation measures are necessary to mitigate the residual impacts and if affirmative, guidelines and requirements laid down in Annex 16 of the TM should be followed; and
 - (xii) Review of the need for and recommendation on any ecological monitoring programme required.

Appendix H**Requirements for Fisheries Impact Assessment**

1. Existing information regarding the assessment area shall be reviewed. Based on the review results, the assessment shall identify any data gap and determine if there is any need for field surveys to collect adequate 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 short-term and long-term impacts on capture and culture fisheries during the construction and operation phases of the Project.
3. The fisheries impact assessment shall include the following information:
 - (i) description of the physical environmental background;
 - (ii) description and quantification of the existing capture and culture fisheries activities;
 - (iii) description and quantification of the existing capture and culture fisheries resources;
 - (iv) identification of parameters (e.g. water quality parameters) and areas of fisheries importance;
 - (v) prediction and evaluation of any direct/indirect and on-site/off-site impacts on fisheries (such as loss or disturbance of fishing ground, fisheries habitat; water quality deterioration at sensitive receivers such as fish culture zone;
 - (vi) evaluation of cumulative impacts on fisheries;
 - (vii) proposal of practicable alternatives or mitigation measures with details on justification, description of scope and programme feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of the measures so as to protect the fisheries habitat and sustain the important fisheries spawning and nursery ground, such as modification on the seawater intake area to prevent large quantities of eggs and larvae trapped and killed; and
 - (viii) review for the need of monitoring during construction and operation phases of the Project and, if necessary, proposal of a monitoring and audit programme.

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

1. The Applicant shall review relevant Outline Zoning Plans, Development Permissions Area Plans, Outline Development Plans, Layout Plans, other relevant published land use plans, planning briefs and 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 carry out a baseline review on both the landscape and visual aspects of the study area. 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 Project. Clear mapping of the landscape impact is required. Regarding the nature conservation, the Applicant shall identify and evaluate the geological features and impacts on volcanic rocks, such as volcanic fissure vents at the western shore of Tai Miu Wan and volcano associated quartz monzonite dyke intrusions along the shore near Clear Water Bay Golf Club. Where applicable, a broad brush 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. Descriptive text shall provide a concise and reasoned judgment from a visual point of view. Cumulative visual impact of the Project with other existing, committed and planned developments in the assessment area shall be assessed. The assessment shall include the following:
 - (i) identification and plotting of visual envelope of the Project;
 - (ii) 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;
 - (iii) description of the visual compatibility of the Project with the surrounding and the existing and planned setting, and its obstruction and interference with the key views within the visual envelope;

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- (iv) the assessment shall take into account the factors affecting the sensitivity of receivers (including value and quality of existing views, availability and amenity of alternative views, type and estimated number of receiver population, duration of view and degree of visibility) and the magnitude of change of view (including compatibility of the Project with the surrounding landscape and planned setting, duration of impacts under construction and operation phases, scale of development, reversibility of change, viewing distance and potential blockage of view) for evaluating of visual impacts. The visual impacts of the Project with and without mitigation measures shall also be included so as to demonstrate the effectiveness of the proposed mitigation measures; and
- (v) evaluations and explanations of factors considered in arriving the significance thresholds of visual impact.
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 minimize adverse effects identified above, including provision of a master landscape plan annotated with landscape and visual mitigation/enhancement measures.
5. The mitigation measures shall also include the preservation of vegetation and natural landscape resources, 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. A practical programme for the implementation of the recommended 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. 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 J**Requirements for Landfill Gas Hazard Assessment**

The assessment shall include the following technical tasks:

1. review of background information (including landfill gas monitoring data) and studies related to TKO Stage I Restored Landfill, TKO Stage II/III Restored Landfill, SENT Landfill, and the proposed SENT Landfill extension;
2. identification of the nature and extent of the sources, including the likely concentrations and/or amounts of hazardous emissions which might have the potential for impacts on the Project and impacts from the Project to the potential receivers;
3. identification of the possible pathways through the ground, underground cavities, utilities or ground water, and the nature of these pathways through which the hazardous emissions must traverse if they were to reach the Project;
4. identification of the potential receivers associated with the Project which are sensitive to the impacts of the hazardous emissions;
5. qualitative assessment on the degree of risk which the hazardous emissions may impose on the receivers for each of the source-pathway-receiver combinations; and
6. design of suitable level of precautionary measures and contingency plan for the Project and the potential receivers, if needed.

Appendix K**Requirements for Hazard to Life Assessment**

1. The Applicant shall investigate methods to avoid and/or minimize risks from chlorine and other DGs. The Applicant shall carry out hazard assessment to evaluate potential hazard to life during construction and operation stages of the Project. The hazard assessment shall include the following:
 - (i) Identify hazardous scenarios associated with the transport (on-site and off-site), storage and use of chlorine and other DGs at the Project 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 (i), expressing population risks in both individual and societal terms;
 - (iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and
 - (iv) Identify and assess practicable and cost-effective risk mitigation measures.
2. The hazard assessment shall also include a cumulative risk assessment of the Project, through interaction or in combination with other existing, committed and planned developments involving DGs in the vicinity of the Project (e.g. explosive stores and transport routes in TKO).
3. The methodology to be used in the hazard assessment shall be agreed with the Director and be consistent with previous studies having similar issues (e.g. Sha Tin to Central Link and In-situ Reprovisioning of Sha Tin Water Treatment Works).

Appendix L

Implementation Schedule of Recommended Mitigation Measures

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures*	Objectives of the Recommended Measures & Main Concerns to Address	Implementation Agent	Location/Duration of the Measure	Implementation Stages* (Des, C, O)	Relevant Legislation & Guidelines

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

** Des = Design, C = Construction, O = Operation

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) 50 copies of the EIA report and 80 copies of the executive summary (each bilingual in both English and Chinese) as required under section 6(2) of the EIAO to be supplied at the time of application for approval of the EIA report.
 - (ii) When necessary, addendum to the EIA report and the executive summary submitted in item (i) above as required under section 7(1) of the EIAO, to be supplied upon advice by the Director for public inspection.
 - (iii) 20 copies of the EIA report and 50 copies of the executive summary (each bilingual in both English and Chinese) with or without Addendum as required under section 7(5) of the EIAO, to be supplied upon advice by the Director for consultation with the Advisory Council on the Environment.
2. To facilitate public inspection of EIA report via EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA report and executive summary prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 1.3 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EIA report and executive summary shall be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EIA report and executive summary shall be provided in the main text from where respective references are made. Graphics in the report shall be in interlaced GIF format unless otherwise agreed by the Director.
3. The electronic copies of the EIA report and the executive summary shall be submitted to the Director at the time of application for approval of the EIA report.
4. When the EIA report and the executive summary are made available for public inspection under section 7(1) of the EIAO, the content of the electronic copies of the EIA report and the executive summary must be the same as the hard copies and the Director shall be provided with the most updated electronic copies.
5. To promote environmentally friendly and efficient dissemination of information, both hardcopies and electronic copies of future EM&A reports recommended by the EIA study shall be required and their format shall be agreed by the Director.