本署檔號
OUR REF: (30) in EP 2/N9/C/152
來函檔號
YOUR REF:
電　話
TEL. NO.: 2835 1105
圖文傳真
FAX NO: 2591 0558
電子郵件
E-MAIL:
網　址
HOMEPAGE: http://www.epd.gov.hk

**Environmental Protection Department**
**Branch Office**
28th Floor, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong.

環境保護署分處
香港灣仔
軒尼詩道
一百三十號
修頓中心廿八樓

27 January 2015

**By Registered Post & Fax**

The Hongkong Electric Co., Ltd.

(Attn: )

Dear ,

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

**Project Title: Improvement Dredging for Lamma Power Station Navigation Channel**
**(Application No. ESB-282/2014)**

I refer to your above application received on 15 December 2014 for an EIA Study Brief under Section 5(1)(a) of the EIA Ordinance.

In accordance with Section 5(7)(a) of the EIA Ordinance and after public inspection of the project profile, I issue the attached EIA Study Brief (No. ESB-282/2014) for your preparation of an EIA report.

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

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

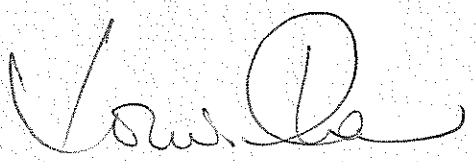
If the EIA report is selected by ACE for submission and presentation, you are expected to provide ACE with an account of the environmental issues arising from the project, major

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

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

Should you have any queries on the above application, please contact my colleague Mr. Simon Ho at 2835 1153.

Yours sincerely,



(Louis P.L. Chan)
Principal Environmental Protection Officer
for Director of Environmental Protection

Encl.

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

# Environmental Impact Assessment Study Brief No. ESB-282/2014

**Project Title:** **Improvement Dredging for Lamma Power Station Navigation Channel**
**(hereinafter known as the "Project")**

**Name of Applicant:** **The Hong Kong Electric Company, Ltd.**
**(hereinafter known as the "Applicant")**

## 1. BACKGROUND

1.1 An application (No. ESB-282/2014) 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 15 December 2014 with a Project Profile (No. PP-518/2014) (hereinafter referred as the "Project Profile").

1.2 The Project Profile proposes to carry out improvement dredging to deepen and maintain the seabed level in the Lamma Power Station Navigation Channel (the "Channel") to a minimum channel depth for marine passage no less than -15.5mCD (approx. -15.65mPD). The Project area is located in the West Lamma Channel near the Western Coast of Lamma Island as shown in Figure 1 in Appendix A of this Study Brief.

1.3 The Channel was originally formed in 1981 to facilitate the delivery of coal to the existing Lamma Power Station by ocean going vessels. In order to maintain safe clearance of these vessels through the Channel, dredging of naturally accumulated sediment in the Channel is required to maintain a minimum depth between the seabed and sea level to be specified by the Marine Department.

1.4 The Project is classified as a Designated Project under C.12 of Part I Schedule 2 of the EIAO, a dredging operation exceeding 500,000 $m^3$.

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

1.6 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed designated projects and related activities that are taking place concurrently. This information will contribute to decisions by the Director on:

(i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;

(ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and

(iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

## 2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

(i) to describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project 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 present the consideration of alternatives to avoid and minimise the potential adverse environmental impacts including the choice of smaller coal vessels, alternative alignment of channel, etc;

(iv) to identify and quantify emission sources (including air quality, noise, water quality and waste, etc. as appropriate) and determine the significance of impacts on sensitive receivers and potential affected uses;

(v) to identify and quantify any potential losses or damage and other potential impacts to ecology, flora, fauna and natural habitats and to propose measures to mitigate these impacts;

(vi) to propose the provision of mitigation measures so as to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;

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

(viii) 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;

(ix) 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 environmental impacts and cumulative effects and reduce them to acceptable levels;

(x) to investigate the extent of 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

(xi) to design and specify the 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 fully complied with.

### 3.2 The Scope

3.2.1 The scope of this EIA study shall cover the construction and operation (including maintenance dredging) of the Project mentioned in Sections 1.2 and 1.3 above, for the purpose of assessing whether the environmental impacts shall comply with the criteria of the TM. The EIA study shall address the likely key issues described below, together with any other key issues identified during the course of the EIA study:

i) the potential water quality impacts arising from the dredging and other associated activities during the construction and operation of the Project;

ii) the potential impacts to marine ecology (especially Finless Porpoise) arising from the dredging and other associated activities during the construction and operation of the Project;

iii) the potential impacts on fisheries arising from the dredging and other associated activities during the construction and operation of the Project ;

iv) the potential hazard to life arising from the dredging and other associated activities in the vicinity of the existing submarine gas pipeline that is connected to the Lamma Power Station, during the construction and operation of the Project;

v) the potential waste management implications arising from the construction and operation of the Project;

vi) potential noise impact on the sensitive receivers due to the dredging and associated activities, including impact from construction equipment during construction and operation of the Project;

vii) the recurrent environmental implications arising from the maintenance dredging associated with the operation of the Project; and

viii) the cumulative environmental impacts of the above arising from the dredging and other associated activities of the Project together with other construction activities that are taking place concurrently.

### 3.3 Consideration of Alternative Options and Construction Methods

3.3.1 <u>The Need of Project</u>

The Applicant shall report on or provide information related to the need and justification for the Project described in Section 1.2 and 1.3 above. The Applicant shall explain clearly the purpose and objectives of the Project and describe the scenarios with and without the Project.

3.3.2 Consideration of Alternatives

The Applicant shall consider and present information on identified feasible alternatives other than the proposed option as presented in the Project Profile, and if applicable taking into account the relevant findings of other options addressed in previous studies as well as any studies conducted to reflect the latest changes and developments identified during the course of the EIA study. A comparison of the environmental benefits and dis-benefits of possible options, including the alignments of channel, dredging methods/ rates, and phased or staged implementation, shall be made on the sensitive areas within the study boundary. The Applicant shall also consider the use of smaller coal vessel that may help reduce the need for dredging. The comparison shall assist in the formulation of the recommended preferred option, which shall, in principle, avoid or minimize adverse environmental impacts to the maximum practicable extent. The EIA report shall focus on and describe adequately the part that environmental factors played in arriving at the preferred option for the Project.

3.3.3 Need for Maintenance Dredging

The Applicant shall assess and quantify the frequency and the likely extent of maintenance dredging required, the type / sequence of dredging methods to be used and the associated potential environmental impacts.

**3.4 Technical Requirements**

3.4.1 The Applicant shall conduct the EIA study to address the environmental aspects of the activities as described in Section 3.2 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The Applicant shall include in the EIA report details of the construction programme and methodologies. The Applicant shall assess 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 on specific impacts:

3.4.2 Water Pollution

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

3.4.2.2 The assessment area for the water quality impact assessment shall cover the Southern and Western Buffer Water Control Zone as designated under the Water Pollution Control Ordinance (Cap. 358) and the water sensitive receivers in the vicinity of the Project. The assessment area can be extended to include other areas likely to be impacted by the Project.

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

3.4.2.4 The Applicant shall describe clearly the frequency and rate of maintenance dredging, including detailed substantiation of the assumptions adopted, and shall assess and evaluate the recurrent water quality impacts of the maintenance dredging activities.

3.4.3 Marine Ecological Impact

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

3.4.3.2 The assessment area shall be the same as the assessment area for Water Quality Impact Assessment described in section 3.4.2.2 above or the areas likely to be impacted by the Project.

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

3.4.3.4 The Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area. The assessment shall cover all construction and operation phases including maintenance dredging.

3.4.4 Fisheries Impact

3.4.4.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing fisheries impact as stated in Annexes 9 and 17 of the TM. The assessment shall cover any potential impact of the proposed project on capture fisheries, during the construction and operation phase including maintenance dredging.

3.4.4.2 The assessment area shall be the same as that for the water quality impact assessment. This assessment area shall be extended to include other areas likely to be impacted by the construction or operation of the Project. Special attention should be given to potential loss or disturbance of fishing ground, fisheries habitat, spawning and nursery grounds, water quality deterioration at sensitive receivers such as fish culture zones or artificial reefs.

3.4.4.3 The fisheries impact assessment for construction and operation (including maintenance dredging) of the Project shall follow the detailed technical requirements given in Appendix D of this EIA study brief. The Applicant shall describe clearly the frequency and rate of maintenance dredging, including detailed substantiation of the assumptions adopted, and shall assess and evaluate the recurrent fisheries impacts of the maintenance dredging activities.

3.4.5 Hazard to Life

3.4.5.1 The Applicant shall conduct a risk assessment to assess the risks posed by the dredging works on the existing submarine natural gas pipeline. The assessment shall identify the possible hazards associated with the dredging works to the public, in particular the potential risks to damage the submarine pipeline during the dredging works. The Applicant shall ensure that sufficient measures are taken to minimize the risks posed to the submarine pipeline and take into account the requirements stated in previous risks assessments or EIA for the submarine pipeline (including the assessment conducted for the Project "1,800 MW Gas-fired Power Station at Lamma Extension"). The methodology of assessment shall be agreed with the Director prior to the commencement of the assessment.

3.4.6 Noise Impact

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

3.4.6.2 The noise impact assessment shall include construction noise and marine traffic noise impact assessment of the existing, committed and planned NSRs earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development applications approved by the Town Planning Board, in the vicinity of the Project.

3.4.6.3 The noise impact assessment of the Project shall follow the detailed technical requirements given in Appendix E.

3.4.7 Waste Management Implications

3.4.7.1 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.

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

3.4.8 Environmental Monitoring and Audit (EM&A) Requirements

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

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

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

## 3.5 Presentation of Summary Information

3.5.1 Summary of Environmental Outcomes

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

3.5.2 Summary of Environmental Impacts

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

3.5.3 Documentation of Key Assessment Assumptions and Limitations of Assessment Methodologies

To facilitate retrieval, the EIA report shall contain a summary including the assessment methodologies and key assessment assumptions adopted in the EIA study, the limitations of these assessment methodologies/assumptions. The proposed use of any alternative assessment tool(s) or assumption(s) have to be justified by the Applicant, with supporting documents based on cogent, scientific and objectively derived reason(s). The supporting documents shall be provided in the EIA report.

# 4. DURATION OF VALIDITY

4.1 The Applicant shall notify the Director of the commencement of the EIA study. If the EIA study does not commence within 36 months after the date of issue of 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 H of this EIA study brief. The Applicant shall, upon request, make additional copies of the above documents available to the public, subject to payment by the interested parties of full costs of printing.

## 6. OTHER PROCEDURAL REQUIREMENTS

6.1 If there is any change in the name of Applicant for this EIA study brief during the course of the EIA study, the Applicant must notify the Director immediately.

6.2 If there is any key change in the scope of the Project mentioned in section 1.2 of this EIA study brief and in Project Profile (No. PP-518/2014), 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.

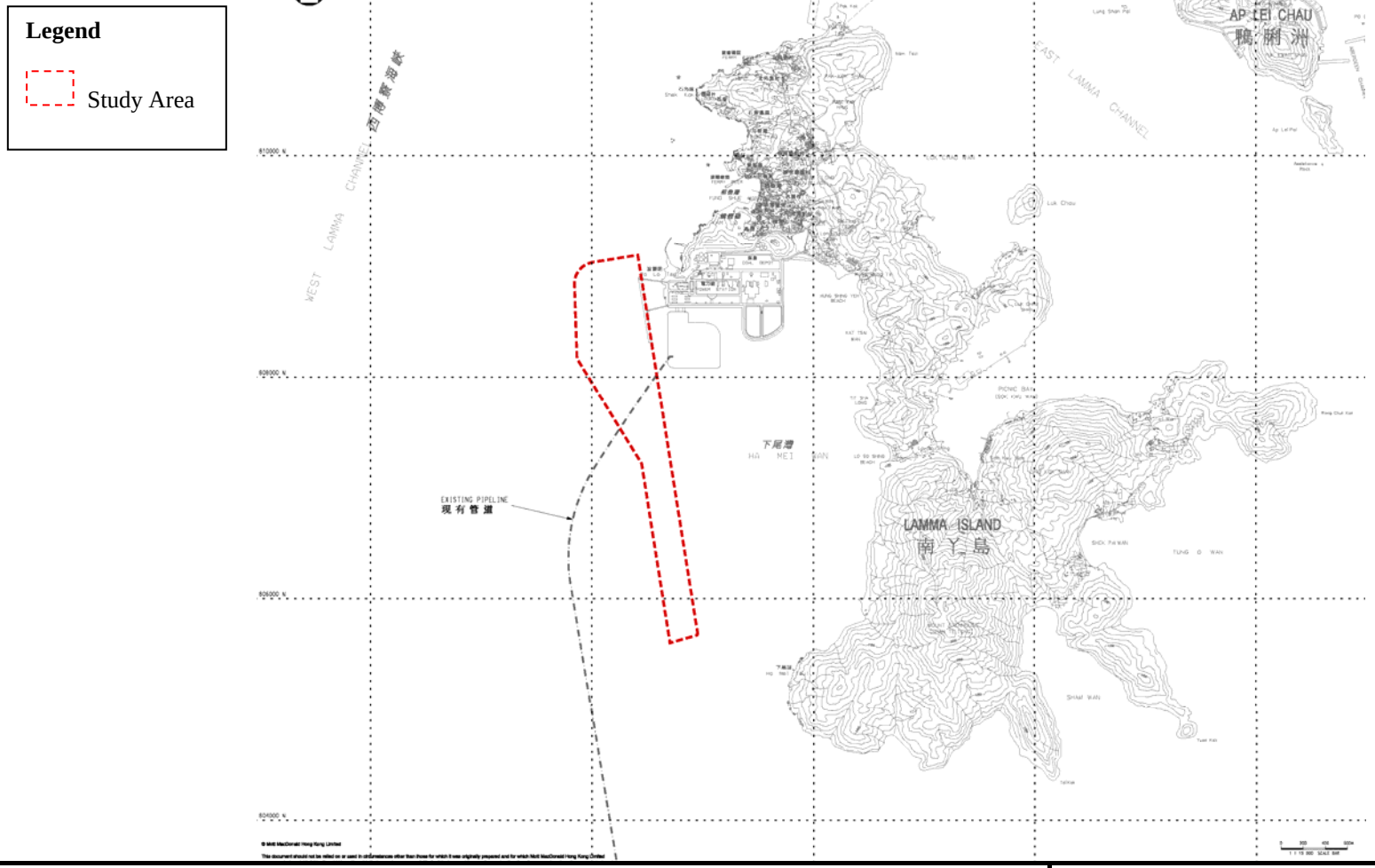
## 7. LIST OF APPENDICES

7.1 This EIA study brief includes the following appendices:

| | | |
|---|---|---|
| Appendix A | – | Location of the Project Site |
| Appendix B | – | Requirements for Water Impact Assessment |
| Appendix B-1 | – | Hydrodynamic and Water Quality Modelling Requirements |
| Appendix C | – | Requirements for Ecological Impact Assessment (Marine) |
| Appendix D | – | Requirements for Fisheries Impact Assessment |
| Appendix E | – | Requirements for Noise Impact Assessment |
| Appendix F | – | Requirements for Assessment of Waste Management Implication |
| Appendix G | – | Implementation Schedule of Recommended Mitigation Measures |
| Appendix H | – | Requirements for EIA Report Documents |

-- END OF EIA STUDY BRIEF –

January 2015
Environmental Assessment Division
Environmental Protection Department




| | | |
|---|---|---|
| Project Title: Improvement Dredging for Lamma Power Station Navigation Channel<br><br>Location Plan [Originated from the Figure 1.1 of Project Profile No. PP- 518/2014] | **EIA Study Brief No.: ESB-282/2014**<br><br>**Figure 1 of Appendix A** | |

**Appendix B**

## Requirements for Water Quality Impact Assessment

1. The Applicant shall identify and analyse physical, chemical and biological disruptions of marine water system(s), the associated catchment area(s) and coastal water arising from construction and operation of the Project.

2. The Applicant shall predict, quantify and assess any water quality impacts arising from the Project on the water system(s) and the sensitive receivers 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 B-1. Possible impacts due to the dredging, fill extraction, backfilling, transportation and disposal of dredged materials, other marine works activities, effluent discharge and site runoff shall include changes in hydrology, flow regime, sediment erosion and deposition patterns, morphological change of seabed profile, water and sediment quality, marine and freshwater organisms/community. 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 water quality impact assessment shall cover the following, but not limited to, major areas of concern:

General

(i) Collection and review of background information on the existing water system(s) and their respective catchments, and sensitive receivers which may be affected by the Project during construction and operational stage;

(ii) Characterization of water and sediment quality of the related water system(s) and sensitive receivers, which may be affected by the Project during construction and operational stage, based on existing information or appropriate site survey/tests;

(iii) Identification and analysis of the existing and future activities and beneficial uses related to the water system(s) and identification of the water sensitive receivers. The Applicant shall refer to those developments and uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans;

(iv) Identification of pertinent water quality objectives, criteria and standards for the water system(s) and the water sensitive receivers (including but not limited to fish culture zones, coral communities, beaches, water intake points, etc) around the works site;

(v) identification and quantification of all activities, including review of the dredging sequences and methods with regard to the phasing, frequency, duration and rate of dredging (including maintenance dredging) to identify any change of bathymetry and/or flow regimes;

(vi) Identification, analysis and quantification of existing and future water pollution sources, generated by the Project and discharged to the marine waters in relevant Water Control Zone(s) as designated under the Water Pollution Control Ordinance (Cap358), existing and maintenance dredging of marine sediment for the navigation channel.

(vii) Establishment and provision of an emission inventory on the quantities and characteristics of these existing and future pollution sources in the assessment area. Field investigation and laboratory tests, as appropriate, shall be conducted to fill in

any relevant information gaps;

Impact Prediction

(viii) Prediction and quantification, by mathematical modelling or other technique approved by the Director, of construction and operational impacts on the water system(s) and the sensitive receivers due to those alterations and changes identified in (v) above and the pollution sources identified in (vi) above. The mathematical modelling requirements are set out in Appendix B-1 of this study brief. Possible impacts include changes in hydrology, flow regime, sediment erosion or deposition, water quality and the effects on the marine organisms due to such changes. The location, nature, extent and rate of such works for the Project shall be clearly identified and evaluated. The assessment shall also take into account the additional pollution loading and oxygen demand exerted by sediment disturbed. The prediction shall include possible different construction stages or sequences and different operation stages of the Project;

(ix) Identification and quantification of all dredging and marine works activities and requirements. Field investigation, sampling and laboratory tests to characterize the sediment/mud concerned shall be conducted as appropriate. The potential for the release of contaminants during dredging and other marine works shall be addressed using the chemical test results derived from sediment and marine water samples collected on site and relevant historic data. Appropriate laboratory tests and analyses shall be performed on the sediment samples to simulate and quantify the degree of mobilization of various contaminants into the water column during dredging. The ranges of parameters to be analyzed; the number, location, depth of sediment, type and methods of sampling; sample preservation; and laboratory test methods to be used shall be subject to the approval of the Director. The Applicant shall also address the pattern of the sediment deposition, sedimentation rate, potential increase in turbidity and suspended solid levels in the water column and at the sensitive receivers and others water quality impacts such as oxygen depletion due to the disturbance of sediments during dredging and other marine works activities. The prediction and quantification of impacts on the hydrodynamic regime, and impact caused by sediment re-suspension and contaminants release shall be carried out by techniques to be approved by the Director;

(x) Assessment of the cumulative impacts due to other concurrent and planned projects, activities or pollution sources along the identified water system(s) and water sensitive receivers that may have a bearing on the environmental acceptability of the Project;

(xi) The Applicant shall devise mitigation measures to avoid or minimize the impacts identified above, including identification and evaluation of the best practicable dredging methods to minimize dredging and dumping requirements as far as possible. The residual impacts on the water system(s) and the sensitive receivers 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 B-1 to this study brief or other methods approved by the Director.

Maintenance Dredging

(xii) The Applicant shall describe clearly the frequency and rate of maintenance dredging, including detailed substantiation of the assumptions adopted, and shall assess and evaluate the recurrent water quality impacts of the future maintenance dredging activities.

**Appendix B-1**

## Hydrodynamic and Water Quality Modelling Requirements

**Modelling software general**

1. The modelling software shall be fully 3-dimensional capable of accurately simulating the stratified condition, salinity transport, and effects of wind and tide on the water body within the model area.

2. The modelling software shall consist of hydrodynamic, water quality, sediment transport, thermal and particle dispersion modules. All modules shall have been proven with successful applications locally and overseas.

3. The hydrodynamic, water quality, sediment transport and thermal modules shall be strictly mass conserved at all levels.

Model details – Calibration & Validation

1. The models shall be properly calibrated and validated against applicable existing and/or newly collected field data before their use in this study in the Hong Kong waters, the Pearl Estuary and the Dangan (Lema) Channel. The field data set for calibration and validation shall be agreed with EPD.

2. Tidal data shall be calibrated and validated in both frequency and time domain manner.

3. For the purpose of calibration and validation, the model shall run for not less than 15 days of real sequence of tide (excluding model spin up) in both dry and wet seasons with due consideration of the time required to establish initial conditions.

4. In general the hydrodynamic models shall be calibrated to the following criteria:

| Criteria | Level of fitness with field data |
|---|---|
| • tidal elevation (@) | < 8 % |
| • maximum phase error at high water and low water | < 20 minutes |
| • maximum current speed deviation | < 30 % |
| • maximum phase error at peak speed | < 20 minutes |
| • maximum direction error at peak speed | < 15 degrees |
| • maximum salinity deviation | < 2.5 ppt |

@ Root mean square of the error including the mean and fluctuating components shall meet the criteria at no less than 80% of the monitoring stations in the model domain

5. The 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.

Model details – Simulation

1. The water quality modelling results shall be qualitatively explainable, and any identifiable trend and variations in water quality shall be reproduced by the model. The water quality model shall be able to simulate and take account of the interaction of dissolved oxygen, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, temperature,

suspended solids, contaminants release of dredged and disposed material, air-water exchange, *E. coli* and benthic processes. It shall also simulate salinity. Salinity results simulated by hydrodynamic models and water quality models shall be demonstrated to be consistent.

2. The sediment transport module for assessing impacts of sediment loss due to marine works shall include the processes of settling, deposition and re-erosion. The values of the modelling parameters shall be agreed with EPD. Contaminants release and DO depletion during dredging and dumping shall be simulated by the model.

3. The models shall at least cover the 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.

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.

Modelling assessment

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.

2. 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.

3. The results shall be assessed for compliance of Water Quality Objectives.

4. The impact on all sensitive receivers shall be assessed.

5. Cumulative impacts due to other projects, activities or pollution sources within a boundary to the agreement of EPD shall also be predicted and quantified.

-END-

## Appendix C

### Requirements for Ecological Impact Assessment (Marine)

1. The Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area. The aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the Project shall avoid or minimise impacts on conservation areas, sites of special scientific interest and other ecological sensitive areas. The assessment shall identify and quantify as far as possible the potential ecological impacts, both directly by physical disturbance and indirectly by changes of water quality and hydrodynamic regime to the natural environment and the associated wildlife groups and habitats / species arising from the Project including its construction phases as well as the subsequent management and maintenance of the proposals.

2. The assessment shall include the followings:

   (i) Review of the findings of relevant studies / surveys and collection of the available information regarding the ecological characters of the assessment area;

   (ii) Evaluation of information collected, identification of any information gap relating to the assessment of potential ecological impact, and determination of the ecological field surveys and investigations that are needed for a comprehensive assessment as required under (iii) below;

   (iii) Carrying out necessary ecological field surveys (the duration of which shall be at least 6 months covering wet and dry seasons) and investigations 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 include but not be limited to flora, fauna and any other habitats/species of conservation importance, and shall include subtidal survey, benthic community survey, and underwater dive survey for coral communities;

   (iv) Establishment of the general ecological profile of the Study Area based on data of relevant previous studies / surveys and results of the ecological field surveys, and description of the characteristics of each habitat found; major information to be provided shall include :

      (a) description of the physical environment, including all recognized sites of conservation importance, and assessment of whether these sites 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 extent, substrate, size, 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

(a) corals;

(b) Finless Porpoise (Neophocaena phocaenoides);

(c) Green Turtle;

(d) any other notable benthic or littoral communities; and

(e) any other habitats/species identified as having special conservation interest by this EIA study.

(vi) Using suitable methodology and considering also other works activities from other projects reasonably likely to occur at the same time, identification and quantification as far as possible of any direct (e.g. loss of habitats due to various elements such as excavation works and other associated works of the Project), indirect (e.g. changes in water qualities, hydrodynamics properties, hydrology, accidental discharge of untreated sewage, noise and other disturbance generated by the construction and operational activities etc), on-site, off-site, primary, secondary and cumulative ecological impacts such as destruction of habitats, reduction of species abundance / diversity, loss of feeding and breeding grounds, reduction of ecological carrying capacity, habitat fragmentation, and in particular the followings:

(a) Disturbance to animals and plants;

(b) Impacts due to potential changes in water quality, hydrodynamics properties;

(c) Impacts to marine fauna, in particular Finless Porpoise, associated with changes in marine traffic during construction and operation phases especially increased risk of vessel collision and underwater noise; and

(d) Potential impacts to any others habitats / species of conservation value discovered during the course of the EIA study;

(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 operational phases of the Project as well as the subsequent management and maintenance requirement of the Project. Potential cumulative ecological impact on habitats and species of conservation interest arising from the Project and interacting projects as identified in the EIA study shall be evaluated;

(viii) Recommendations for possible alternatives, such as modification / change of construction methods and practicable mitigation measures (e.g. avoiding dredging operation during period with high Finless Porpoise use, imposing speed limit to construction vessels) 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 definition of the scope, type, location, implementation arrangement, resources requirement, subsequent management and maintenance of such measures;

(x) Determination and quantification as far as possible of the residual ecological impacts after implementation of the proposed mitigation measures;

(xi) Evaluation of the significance and acceptability of the residual ecological impacts by making reference to the criteria in Annex 8 of the TM; and

(xii) Review of the need for and recommendation on any ecological monitoring programme required.

(xiii) The Applicant shall describe clearly the frequency and rate of maintenance dredging, including detailed substantiation of the assumptions adopted, and shall assess and evaluate the recurrent marine ecological impacts of the maintenance dredging activities.

-END-

**Appendix D**

## Requirements for Fisheries Impact Assessment

1. Existing information regarding the assessment area shall be reviewed. Based on the review results, the assessment shall identify data gap and determine if there is any need for field surveys. 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 provide the following information:-

   (i) Description of the physical environmental background;

   (ii) Description and quantification of existing capture fisheries activities;

   (iii) Description and quantification of existing fisheries resources;

   (iv) Identification of parameters (e.g. water quality parameters) and areas that are important to fisheries;

   (v) Prediction and evaluation of any direct/indirect, onsite/offsite impacts on fisheries (such as potential loss or disturbance of fishing grounds, fisheries habitats, spawning or nursery grounds); water quality deterioration at aquaculture sites and artificial reefs and hydrological disruptions caused by the Project (including those associated with future maintenance dredging);

   (vi) Evaluation of cumulative impacts;

   (vii) Proposals for practicable mitigation measures with details on justification, description of and programme feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of the measures; and

   (viii) Review of the need for monitoring during the construction and operation phase of the Project (including future maintenance dredging) and, if necessary, propose a monitoring and audit programme.

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**Appendix E**

## Requirements for Noise Impact Assessment

The noise impact assessment shall include the following:

2. Provision of Background Information and Existing Noise Levels

(i) The Applicant shall provide background information relevant to the Project, including relevant previous or current studies.

3. Construction Noise Assessment

(i) Construction Noise Impact Assessment Methodology

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. 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.

(ii) Identification of Construction Noise Impact

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 metres from the boundary of the Project and the works of the Project.

b. The Applicant shall identify 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 course of the EIA study.

d. A map showing the location and description such as name of building, use, and floor of each and every selected assessment point shall be given. Photographs of existing NSRs shall be appended to the EIA report.

2. 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.

(iii) Prediction and Evaluation of Construction Noise Impact

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. 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.

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.

4. Mitigation of Construction Noise Impact

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.

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.

-END-

**Appendix F**

## Requirements for Assessment of Waste Management Implication

The assessment of waste management implication 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 (including maintenance dredging of the Project) activities of the Project based on the sequence, duration, method and process of these activities e.g. any dredged sediment/mud, construction and demolition (C&D) materials, floating refuse and other wastes which will be generated during construction and/or operational stages. The Applicant shall adopt appropriate construction methods and programme to minimize the generation of public fill/inert C&D materials and maximize the use of public fill/inert C&D materials for other construction works;

(ii) The Applicant shall consider alternative project designs/ measures to avoid/ minimize floating refuse accumulation / entrapment and measures/ proposals for the potential floating refuse problem, e.g. regular collection of the floating refuse along the coast. Regarding the potential trapping of floating refuse along the shoreline of the Project, the Applicant shall estimate as far as practicable the amount of floating refuse to be found/trapped along the shoreline of the Project in construction stage and after the completion of the Project (if any). The Applicant shall develop an effective plan / design to avoid/ minimize the trapping of floating refuse. If floating refuse problem is identified and needs to be dealt with, the Applicant shall propose appropriate measures to deal with this floating refuse in a proper and acceptable manner e.g. to collect, recycle, reuse, store, transport and dispose of;

(iii) 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 (iv) below. The EIA report shall also state clearly the transportation routings and the frequency of the trucks/vessels involved, any barging point or conveyor system to be used, the stockpiling areas and the disposal outlets for the wastes identified; and

(iv) The impact caused by handling (including stockpiling, labelling, packaging and storage), collection, transportation and re-use/disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas :

- potential hazard;
- air and odour emissions;
- noise;
- wastewater discharge; and
- public transport.

2. Dredging/Excavation, Filling and Dumping

(i) The Applicant shall identify and quantify all dredging/excavation, dredged/excavated sediment/mud transportation and disposal activities and requirements. Potential dumping ground to be involved shall also be identified. Appropriate field investigation, sampling and chemical and biological laboratory tests to 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 dredging/excavation methods to minimize dredging/excavation and dumping requirements based on the criterion that existing sediment/mud shall be left in place and not to be disturbed as far as possible.

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**Appendix G**

## Implementation Schedule of Recommended Mitigation Measures

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

## 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 bilingual (in both English and Chinese) executive summary as required under section 6(2) of the EIAO to be supplied at the time of application for approval of the EIA report.

   (ii) When necessary, addendum to the EIA report and the executive summary submitted in item (i) above as required under section 7(1) of the EIAO, to be supplied upon advice by the Director for public inspection.

   (iii) 20 copies of the EIA report and 50 copies of the bilingual (in both English and Chinese) executive summary with or without Addendum as required under section 7(5) of the EIAO, to be supplied upon advice by the Director for consultation with the Advisory Council on the Environment.

2. To facilitate public inspection of EIA report via EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA report and executive summary prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 4.0 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EIA report and 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.

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