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

ENVIRONMENTAL IMPACT ASSESSMENT STUDY BRIEF NO. ESB- 151/2006

PROJECT TITLE: DEVELOPMENT OF A 100MW OFFSHORE WIND FARM IN HONG KONG
(hereinafter known as the "Project")

NAME OF APPLICANT: THE HONGKONG ELECTRIC CO. LTD.
(hereinafter known as the "Applicant")

1. BACKGROUND

1.1 An application (No. ESB-151/2006) for an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 3 July 2006 with a project profile (No. PP-293/2006) (the Project Profile).

1.2 The Project is to construct and operate an offshore wind farm with installed capacity of about 100MW. Two potential offshore sites, (a) Southwest Lamma and (b) Southeast Ninepin, are identified for the Project. The site locations are shown in Figure 3.1a and 3.2a. of the Project Profile and are reproduced in Appendix A in this study brief. The development and operation of the Project will comprise the following key items:

(i) One Offshore Wind Monitoring Mast;

(ii) Tentatively 40 sets of 2.5MW Class Offshore Wind Turbine;

(iii) One Offshore Substation; and

(iv) Submarine Transmission Cables connecting the Wind Turbines to Offshore Substation and to the existing power grid on land.

1.3 The Project is a designated project under Item D.1, Part I, Schedule 2 of the EIAO, *Public utility electricity power plant.*

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 taking place concurrently. This information will contribute to decisions by the Director on :

(i) the acceptability of adverse environmental consequences that are likely to arise as a result of the Project and the associated activities of the Project;

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

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

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

(i) to describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project and the types of designated project(s) 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 both the natural and man-made environment and the associated environmental constraints;

(iii) to consider alternative options with a view to avoiding or minimizing the potential environmental impacts to ecological sensitive areas, for (a) the Southwest Lamma site, in the Southern Water Control Zone and, for (b) the Southeast Ninipin site, in the Mirs Bay, Port Shelter, Eastern Buffer and Southern Water Control Zones, and other sensitive uses; to compare the environmental benefits and disbenefits of each of the different options; to provide reasons for selecting the preferred option(s) and to describe the part environmental factors play in the selection;

(iv) to identify and quantify any potential loss or damage and other potential impacts to ecology and fisheries resources, flora, fauna and natural habitats and to propose measures to mitigate these impacts;

(v) to identify and quantify water pollutant emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;

(vi) to identify and evaluate any potential landscape and visual impacts and to consider alternative location, layout, design and chromatic scheme to minimize potential visual impact and propose measures to mitigate these impacts;

(vii) to identify the negative impacts on any historical and archaeological resources and to propose measures to mitigate these impacts;

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

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

(x) 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 of the Project in relation to the

sensitive receivers and potential affected uses;

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

(xii) 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

(xiii) to design and specify environmental monitoring and audit requirements to check the effective implementation of the recommended environmental protection and pollution control measures.

3. DETAILED REQUIREMENTS OF THE EIA STUDY

3.1 The Purpose

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 EIAO (hereinafter referred to as "the TM") are met.

3.2 The Scope

The scope of this EIA study shall cover the proposed works shown in Figure 3.1a and 3.2a of the Project Profile (No. PP-293/2006), which is reproduced in Appendix A of this EIA study brief and shall cover the Project 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 and the cumulative environmental impacts of the Project, through interaction or in combination with other existing, committed and planned projects in the vicinity of the Project :

(i) the potential impacts to the ecological resources within the assessment area as referred to in section 3.4.2.2, including the Green Turtle (*Chelonia mydas*), the potential marine park at South Lamma, the Cape D'Aguilar Marine Reserve and Site of Special Scientific Interest (SSSI), the marine benthic and littoral communities in particular amphioxus (e.g. *Branchiostoma belcheri*, a Grade II State Protected Species of China), the coral communities including hard corals, octocorals and black corals, in particular, those near Ninepin Groups, Lamma Island, Victor Rock, Tung Lung Chau, Po Toi, Sung Kong, Cape Collinson and Cape D'Aguilar Marine Reserve, the potential artificial reef deployment site, the marine mammals, in particular Finless Porpoise (*Neophocaena phocaenoides*) and Chinese White Dolphin (*Sousa chinensis*), and the avifauna, in particular, migratory birds, during construction, operation and subsequent management and maintenance of the Project;

(ii) the potential impacts to the development and operation of the potential marine park at the south of Lamma Island and marine reserve at Cape D'Aguilar;

(iii) the potential impacts to the fisheries resources and fishing activities within the assessment area as referred to in section 3.4.3.2, including the loss of fishing grounds, the effect on fish culture zones , e.g. Tung Lung Chau and Po Toi and fish spawning and nursery grounds and the livelihood of fishermen in Hong Kong as referred to in section 3.4.3.4 of this study brief;

(iv) the potential water quality impact, due to seabed disturbance from dredging, foundation works, cable laying and other marine works that may be required for construction of the Project;

(v) the effect of the offshore wind farm and its associated infrastructures such as offshore substation, submarine transmission cables and cable landing points on the coastal processes and the potential impacts on the ecological sensitive sites due to the possible changes of regional sediment movement and sedimentation patterns;

(vi) the potential landscape and visual impacts on existing and planned sensitive receivers during construction and operation of the Project;

(vii) the waste arising as a result of the construction activities of the Project; and

(viii) the potential impacts on the marine and terrestrial archaeological deposit in the Project area, the alignment of transmission cables, the cable landing point and its vicinity as referred to in section 3.4.6.2 of this Study Brief, likely to be affected by the dredging and construction works.

3.3 Consideration of Alternatives

3.3.1 The Applicant shall provide information on their selection of the proposed sites among other potential sites and any relevant previous studies, including the justification for choosing the proposed sites. Factors that have been taken into account to avoid or reduce the potential environmental impacts of the Project shall be included and explained in the EIA report. Other factors or constraints affecting the site selection, construction and operation of the Project shall also be stated.

3.3.2 The Applicant shall present in the EIA report the consideration of alternative designs, such as choice of site(s), alternative site layout, size, number and installed capacity configuration of wind turbines, chromatic treatment, transmission cable alignment(s) and landing point(s), of the Project with a view to reducing the visual, landscape and ecological impacts during construction and operation of the Project. Other factors or constraints affecting the design of the Project shall also be stated.

3.3.3 Having regard to the effects on the environment during the construction period and the severity of the construction impacts, the Applicant shall explore different construction methods for the construction of foundation, submarine transmission cable laying and cable protection for the Project, with a view to avoiding or minimizing adverse environmental impacts. The Applicant shall focus on the ecological valuable habitats/species, such as coral communities, potential artificial

reef deployment site, green turtle, marine mammals (e.g., Finless Porpoise and Chinese White Dolphin), amphioxus, (e.g., *Branchiostoma belcheri)*, avifauna (e.g. migratory birds), and fish spawning ground. A comparison of the environmental benefits and disbenefits of applying different construction methods shall be made.

3.4 Technical Requirements

The assessment shall base on the best and latest information available during the course of the EIA study and covering the construction and operation phases of the Project and the subsequent management and maintenance requirements of the Project. The Applicant shall assess the cumulative environmental impact from the Project with other interacting projects. The Applicant shall include in the EIA report details of the construction programme and methodologies.

The EIA study shall meet the following technical requirements on specific impacts, unless otherwise, approved by the Director specifically in writing.

3.4.1 Water Quality Impact

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

3.4.1.2 The study area for this water quality assessment shall cover the Mirs Bay, Port Shelter, Eastern Buffer and Southern Water Control Zones as designated under the Water Pollution Control Ordinance (Cap.358). This study area can 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. Sensitive receivers including habitats/species of conservation importance (e.g. green turtle), potential marine park at South Lamma, Cape D'Aguilar, Marine Reserve and SSSI, coral communities, marine mammals (e.g. Finless Porpoise and Chinese White Dolphin), amphioxus (e.g. *Branchiostoma belchie)*, fish spawning grounds, fish culture zones, bathing beaches and secondary contact recreation zones and sea water intakes shall be addressed in the water quality assessment.

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

3.4.1.4 The Applicant shall take into account and include likely different construction stages or sequences and operation of the Project in the assessment. The assessment shall address the following:

(i) Collection and review of background information on the existing and planned water system(s) and their respective sensitive receivers which might be affected by the construction and operation of the Project;

(ii) Characterization of water and sediment quality of the water system(s) and sensitive receivers which might be affected by the Project based on existing information or appropriate site survey and tests;

(iii) Identification and analysis of the existing and planned 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 indicated on the relevant Outline Zoning Plans, Outline Development Plans and Layout Plans;

(iv) Identification of pertinent water and sediment quality objectives and establishment of other appropriate water and sediment quality criteria or standards for the water system(s) and the sensitive receivers in sub-section 3.4.1.4(i) above;

(v) Evaluation of the spatial design of the wind farm, foundation types, construction sequences and methods, and operation of the Project for the purpose of selecting an environmentally acceptable option. The Applicant shall consider practical arrangements to avoid adverse effects of the Project on the ecological sensitive receivers due to changes of local erosion and sedimentation patterns;

(vi) Identification and evaluation of any change of shoreline or bathometry, water course, catchment type or area, flow regimes or hydrodynamic condition;

(vii) Identification and evaluation of existing and committed water and sediment pollution sources and loading, including point and non-point discharges generated during the construction and operation stages of the Project, and the potential contamination of sediments due to cementing and grouting the foundations as the case may be;

(viii) Establishment and provision of a pollution load inventory on the quantities and characteristics of existing and likely future water and sediment pollution sources identified in (vii) above. Field investigation and laboratory tests shall be conducted as appropriate to fill in any major information gaps;

(ix) Analysis on the provision of wastewater treatment facilities in terms of capacity and level of treatment to reduce pollution arising from both the point and non-point discharges identified in (vii) above;

(x) Identification and evaluation of the practicable dredging methods to minimize dredging and dumping requirements and demand for fill sources based on the principle that existing marine mud shall be left in place and not to be disturbed;

(xi) Identification and quantification of dredging, fill extraction, backfilling, mud/sediment transportation and disposal activities and requirements. Potential fill source and dumping ground to be involved shall be identified. Field investigation, sampling and laboratory tests to characterize the sediment/mud shall be conducted as appropriate. The potential for the release of contaminants during dredging shall be addressed using the chemical testing results from sediment and marine water samples collected on site and relevant historic data. Appropriate laboratory tests such as elutriate tests in accordance with the United States Army Corps of Engineers (USACE) method and sediment pore water (interstitial water) analyses shall be performed on the sediment samples to simulate and quantify the degree of mobilization of various contaminants such as metals, ammonia, nutrients, oxygen demand and trace organic contaminants (including Polychlorinated

Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Tributyltin (TBT) and chlorinated pesticides) into the water column during dredging. The ranges of parameters to be analyzed, the number, location and depth of sediment, the type and methods of sampling, the sample preservation and the chemical laboratory test methods to be used shall be subject to the approval of the Director. The Applicant shall address the pattern of the sediment deposition and the potential increase in turbidity and suspended solid levels in the water column and at the sensitive receivers due to the disturbance of sediments during dredging, backfilling and dumping;

(xii) Prediction and quantification, by appropriate mathematical modelling and/or other techniques proposed by the Applicant and approved by the Director, of the impacts on the water system(s) and the sensitive receivers due to the construction and operation of the Project. The mathematical modelling requirements are set out in Appendix B to this study brief. Possible impacts shall include changes in shoreline or bathymetry, hydrology, flow regimes, catchment type or areas, sediment erosion and deposition pattern, water and sediment quality, cumulative impacts through interaction or in combination with other existing, committed and planned projects in the vicinity of the Project and the effects, including the cumulative effects, on the marine organisms due to such changes in the study area;

(xiii) The Applicant shall devise mitigation measures to avoid or minimize the impacts identified above, in particular suitable dredging, disposal and backfilling methods shall be recommended to mitigate any adverse impacts. The residual impacts on the water system(s) and the sensitive receivers with regard to the relevant water and sediment quality objectives, criteria, standards or guidelines shall be assessed and quantified using appropriate mathematical models set out in Appendix B to this study brief;

(xiv) Assessment of the potential cumulative construction and operational water quality impact arising from the associated works of the Project, the planned projects, activities and/or pollution sources within the study area. These shall include the dumping activities near Ninepins Islands, East of Tung Lung Chau and South Cheung Chau, borrowing activity at West Po Toi, proposed Hong Kong Offshore Wind Farm in Southeastern Waters (EIAO ref: EIA Study Brief No. ESB-146/2006), potential sand reserves in the eastern waters, activities or pollution sources in the identified water system(s);

(xv) Evaluation of the potential for and associated water quality impacts on the study area arising from accidental vessel collisions within the Project area during construction and maintenance of the Project. The Applicant shall devise a contingency plan for control and mitigation of the associated pollution impacts;

(xvi) Investigation and identification of the infrastructure upgrading or provision, water pollution prevention and mitigation measures to be implemented during the construction and operational phases of the Project so as to avoid or reduce the water and sediment quality impacts. Best management practices to reduce storm water and non-point source pollution shall be investigated and proposed as appropriate; and

(xvii) Evaluation and quantification of residual impacts on the water system(s) and

the sensitive receivers with regard to the appropriate water and sediment quality objectives, criteria, standards or guidelines using appropriate mathematical models as set out in Appendix B in this study brief.

3.4.2. **Ecological Impact (Terrestrial and Marine)**

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

3.4.2.2 The assessment area for marine ecological impact shall cover Mirs Bay, Port Shelter, Eastern Buffer and Southern Water Control Zones as designated under the Water Pollution Control Ordinance or any areas likely be impacted by the Project.

3.4.2.3 In the ecological impact assessment, the Applicant shall examine the flora, fauna and other components of the ecological habitats within the assessment area. The assessment shall aim to protect, maintain or rehabilitate the natural environment. In particular, the Project shall avoid impacts on wildlife groups or habitats/species with conservation interests including corals (e.g. hard corals, octocorals and black corals), artificial reef deployment site, green turtle (*Chelonia mydas*), marine mammals (e.g. Finless Porpoise and Chinese White Dolphin), amphioxus (e.g. *Branchiostoma belcheri),* avifauna (e.g. migratory birds) and potential marine park at South Lamma and Cape D'Aguilar Marine Reserve. The assessment shall identify and evaluate 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 Project.

3.4.2.4 The assessment shall include the following major tasks:

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

(ii) evaluate information collected and identify any information gap relating to the assessment of potential ecological impact;

(iii) carry out ecological field surveys and investigations to fill in the information gaps identified in Sections 3.4.2.4 (ii) above and fulfil the objectives of the EIA study. The field surveys, if any, shall include coral communities, marine benthic communities, marine mammals and avifauna in particular, any migratory birds that might be affected by the project. The benthic survey shall cover at least 6 months duration covering both wet and dry seasons and the avifauna surveys shall cover at least 9 months covering from March to August. The survey for marine mammals shall cover a duration of at least 12 months covering four seasons.

(iv) establish the general ecological profile of the assessment area based on data of relevant previous studies/ surveys and results of the ecological field surveys, and taking into consideration the seasonal variations, and describe the characteristics of each habitat found. Major information to be provided shall include:

(a) description of the physical environment; including recognized sites of conservation importance and assess whether these sites will be

affected by the Project or not;

(b) habitat maps of suitable scale showing the types and locations of habitats/species in the assessment area with special attention to those with conservation interests, including the following:

- coral communities (including hard corals, octocorals and black corals);
- green turtles (*Chelonia mydas*);
- marine mammals, in particular Finless Porpoises and Chinese White Dolphin;
- other notable marine benthic or littoral communities, in particular amphioxus, e.g. *Branchiostoma belcheri*;
- avifauna, in particular migratory birds; and
- any other habitats/species identified as having special conservation interest by this EIA study.

(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 habitat types and any important ecological features identified;

(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 coral communities, amphioxus, marine mammals and avifauna in the context of the Project;

(vi) using suitable methodology and considering also other works activities from other projects likely to occur at the same time including those listed out in sub-section 3.4.1.4(xiv), identify and evaluate any direct such as loss of habitats due to construction of wind turbines, other supporting facilities and laying of submarine cables, indirect such as changes in flight path, water qualities, hydrodynamics properties, sedimentation rates and pattern, hydrology, rotation, noise and other disturbance generated by the wind turbines and other supporting facilities, on-site, off-site, primary, secondary and cumulative ecological impacts such as destruction of habitats, reduction of species abundance/diversity, loss of feeding grounds, reduction of ecological carrying capacity, habitat fragmentation, and in particular the following:

- deterioration or disturbance to corals (including hard corals,

octocorals and black corals) or other marine habitats/species of conservation value, including any discovered during the course of the EIA study;

- potential impacts e.g. obstruction or interference to migration and navigation, physical injury to green turtles (*Chelonia mydas*) during construction and operational stages;
- removal or disruption of potentially valuable benthic and littoral communities, such as amphioxus, e.g. *Branchiostoma belcheri.*;
- potential impacts to aquatic organisms during construction and avifauna during operational stage due to rotation of the wind turbines, noise produced by the wind turbines and the glare due to reflection of sunlight;
- potential impacts of habitat use by marine mammals due to the presence of a contiguous array of turbines within their habitat; and
- potential impacts or disturbance e.g. physical injury, underwater noise to marine mammals in particular Finless Porpoises and Chinese White Dolphin during construction e.g. dredging for foundations and cable installations, piling works for foundations and during operation e.g. underwater noise generated by the wind turbines.

(vii) evaluation of ecological impact shall be 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. The assessment shall cover cumulative impact on ecological resources due to other concurrent and/or planned projects including those listed out in sub-section 3.4.1.4(xiv);

(viii) recommendations for possible alternatives, such as modification/change of layout design, construction site and method, spacing and alignment of wind turbines and submarine cables and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified during construction and operation of the Project such as, construction of the Project at times that will minimize impacts to marine mammals, corals, amphioxus and avifauna;

(ix) evaluation of the feasibility and effectiveness of the recommended mitigation measures and determination 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 severity and acceptability of the residual ecological impacts using the criteria in Annex 8 of the TM; and

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

3.4.3 Fisheries Impact

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

3.4.3.2 The assessment area for fisheries impact assessment shall cover the Mirs Bay, Port Shelter, Eastern Buffer and Southern Water Control Zones as designated under the Water Pollution Control Ordinance or any areas likely to be impacted by the project. Special attention shall be given to the fishing activities within the Project area and fish culture zones at Tung Lung Chau, Po Toi and Po Toi O, Sok Kwu Wan, Lo Tik Wan and Cheung Sha Wan.

3.4.3.3 The assessment shall cover any potential impact on both capture and culture fisheries, during the construction and operation phases. Existing information available from relevant studies/surveys 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 the field surveys.

3.4.3.4 The fisheries impact assessment shall include the following tasks:

(i) Description of the physical environmental background;

(ii) Description of the existing capture and culture fisheries activities, in particular, identification of the number of fishermen or fishing vessels with high dependence on the affected area (express as % time spent fishing in the area or % fishing income or fisheries production derived from the sea) are affected. Identification of the number of aquaculturists or aquaculture farms affected.

(iii) Description and quantification of the existing fisheries resources e.g. major fisheries products and stocks;

(iv) Identification of parameters e.g. water quality parameters and areas that will be affected;

(v) Identification and evaluation of any direct/indirect and onsite/offsite impacts of fisheries and loss of fishing grounds;

(vi) Evaluation of impacts and make recommendations for any environmental mitigation measures with justification, description of scope and programme, feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of such recommendations; and

(vii) Review the need for monitoring and, if necessary, recommend a monitoring and auditing programme.

3.4.4 Landscape and Visual Impact

3.4.4.1 The Applicant shall follow the criteria and guidelines as stated in Annexes 10 and 18 of the Technical Memorandum for evaluating and assessing the landscape and

visual impacts. The Applicant may consider making reference to the EIAO Guidance Note No. 8/2002 on Preparation of Landscape and Visual Impact Assessment under the EIAO. Landscape and visual impacts during both construction and operation phases within the assessment area as defined by section 3.4.4.2 of this study brief shall be assessed.

3.4.4.2 The assessment area for landscape impact assessment shall include all areas within a 500m distance from the Project while the assessment area for the visual impact assessment shall be defined by the visual envelope of the Project.

3.4.4.3 The Applicant shall review relevant plan(s) and/or studies which may identify areas of high landscape value and recommend marine park, country park, coastal protection area, green belt and conservation area designations. 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 statutory town plan(s) and any published land use plans shall be highlighted and appropriate follow-up action shall be recommended in the EIA report. In particular, the Applicant shall take into account the cumulative impact with proposed Hong Kong Offshore Wind Farm in Southeastern Waters (EIAO ref: EIA Study Brief No. ESB-146/2006) during design of the layout of the wind farms to minimize combined visual impact and project interface problems.

3.4.4.4 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 evaluating landscape and visual impact significance as required under the TM. 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 judgement 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. The landscape impact assessment shall illustrate the significance of the potential landscape impact arising from the Project. Mapping of the landscape impact is required.

3.4.4.5 The Applicant shall assess the visual impacts of the Project. Illustration including mapping of visual impact is required. The assessment shall include the following:

(i) Identification and plotting of visual envelope of the Project;

(ii) Identification of the key groups of sensitive receivers within the visual envelope with regard to views from ground level, sea level and elevated vantage points. In particular, visual impact to the residents and tourists/visitors at Lamma Island, Cheung Chau, Hei Ling Chau, eastern part of Lantau Island, eastern and southern parts of Hong Kong Island, Clear Water Bay Peninsular, High Island and other nearby islands should be considered.

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

(iv) The severity of visual impacts in terms of distance, nature and number of sensitive receivers shall be identified. The visual impact particularly due to the aviation safety requirements and glare impact of the Project shall also be considered in the assessment. The visual impact of the Project with and without mitigation measures shall be included so as to demonstrate the effectiveness of the proposed mitigation measures.

3.4.4.6 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, choose of site options, alternative design and construction methods that would avoid or reduce the identified landscape and visual impacts shall be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The 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 the adverse effects identified above, including provision of a landscape design.

3.4.4.7 The mitigation measures shall also include the 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 visually sensitive receivers. Parties shall be identified for the on-going management and maintenance of the proposed mitigation works.

3.4.4.8 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 photomontages shall be adopted to illustrate the landscape and visual impacts of the Project. In particular, the landscape and visual impacts of the Project with and without mitigation measures shall also be properly illustrated in existing and planned setting 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.

3.4.5 Construction Waste Management Implications

3.4.5.1 The Applicant shall follow the criteria and guidelines as stated in Annexes 7 and 15 of the TM for evaluating and assessing waste management implications arising from construction of the Project.

3.4.5.2 The assessment of waste management implications shall cover the followings:

(i) Analysis of Activities and Waste Generation

The Applicant shall identify the quantity, quality and timing of the waste and chemical waste arising as a result of the construction activities of the Project. The Applicant shall adopt design, general layout, construction methods and programme to minimize the generation of public fill/inert C&DM and maximize the use of public fill/inert C&DM for other construction works.

(ii) Proposal for Waste Management

(a) Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation, on-site or off-site re-use and recycling shall be evaluated. Measures which 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 considered;

(b) 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 options for the wastes shall be described. The disposal options recommended for each type of wastes shall take into account the result of the assessment in item (c) below. The EIA report shall also 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

(c) The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and disposal of wastes shall be addressed and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas :

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

(iii) Dredging and Filling

Identification and quantification of dredging, fill extraction, filling, mud/sediment transportation and disposal activities and requirements. Potential fill source and dumping ground to be involved shall be identified. Field investigation, sampling and chemical and biological laboratory tests to characterize the sediment/mud concerned shall be conducted as appropriate. The ranges of parameters to be analyzed; the number, type and methods of sampling; sample preservation; chemical and biological laboratory test methods to be used shall be subject to the approval of the Director. The categories of sediments which are to be disposed of in accordance with a permit granted under the Dumping At Sea Ordinance shall be identified by both chemical and biological tests and their quantities shall be estimated. If the presence of any seriously contaminated sediment which requires special treatment/disposal is confirmed, the Applicant shall identify the appropriate treatment and/or disposal arrangement and demonstrate its feasibility.

3.4.6 **Impact on Cultural Heritage**

3.4.6.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing the cultural heritage impacts as stated in Annexes 10 and 19 of the TM.

3.4.6.2 Marine Archaeological Investigation (MAI)

The Applicant shall engage a qualified marine archaeologist to review available information to identify whether there is any possible existence of sites of objects of cultural heritage, for example shipwreck, within seabed that will be affected by the marine and dredging works of the Project. The information shall include the information as stipulated in Task 1 – Baseline Review and Task 2 – Geophysical Survey according to the Requirements of Marine Archaeological Investigation at Appendix C of this study brief. The result of the review shall be presented as a written report and charts. If sites or objects of cultural heritage are found, a MAI is required within the said area. The MAI shall be carried out by a qualified marine archaeologist who shall obtain a Licence from the Antiquities Authority under the provision of the Antiquities and Monuments Ordinance (Cap 53).

Terrestrial Archaeological Investigation (TAI)

The Terrestrial Archaeological Investigation shall include desktop review on the archaeological potential of landing point. Area within 100 meters from the landing point of the cable at Cape Collinson shall be included. If the works have potential adverse impact on the site of archaeological potential of the landing area, a fieldwork evaluation should be conducted by a qualified archaeologist, who should obtain a License from the Antiques Authority in accordance with the Antiques and Monuments Ordinance (Cap.53). The Applicant shall consider referring to the relevant sections of the Criteria for Cultural Heritage Impact Assessment in Appendix E of this study brief for the TAI.

3.4.6.3 The Applicant shall demonstrate that the disturbance, such as access, to those sites of cultural heritage are avoided to practicable extent by modification of the layout and design of the Project. For those identified sites of cultural heritage that may still be directly and indirectly affected by the Project, the Applicant shall recommend practicable mitigation measures and monitoring to avoid or minimise the adverse impacts on the site of cultural heritage. A checklist including the affected sites of cultural heritage, identified impacts, recommended mitigation measures as well as the implementation agent and period shall be given in the EIA report.

3.4.7 Summary of Environmental Outcomes

The EIA report shall contain a summary of the key environmental outcomes arising from the EIA study, including the population and environmentally sensitive areas protected, environmentally friendly designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of the Project and of the environmental protection measures recommended.

3.4.8 Environmental Monitoring and Audit (EM&A) Requirements

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

3.4.8.2 Subject to the confirmation of the EIA study findings, the Applicant shall comply with the requirements as stipulated in Annex 21 of the TM. The Applicant shall also propose real-time reporting of monitoring data for the Project through a dedicated internet website.

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

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 the issuance 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.

5.2 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 in English 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 sub-section 5.2 (i) above as required under section 7(1) of the EIAO, to be supplied upon advice by the Director for public inspection.

(iii) 20 copies of the EIA report in English and 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.

5.3 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.

5.4 In addition, to facilitate the public inspection of the EIA report via the EIAO Internet Website, the applicant shall provide electronic copies of both the EIA report and the executive summary prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 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 the 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 the respective references are made. Graphics in the report shall be in interlaced GIF format unless otherwise agreed by the Director.

5.5 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.

5.6 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.

5.7 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.

5.8 To facilitate public involvement in the EIA process, the applicant shall produce 3-dimensional electronic visualisations of the major findings and elements of the EIA report, including baseline environmental information, the environmental situations with or without the Project, key mitigated and unmitigated environmental impacts, and key recommended environmental mitigation measures so that the public can understand the Project and the associated environmental issues. The visualisations shall be based on the EIA report and released to the public. The visualisations shall be submitted in CD-ROM or other suitable means agreed with the Director in commonly readable formats. Unless otherwise advised or agreed by the Director, the number of copies of CD-ROM required shall be the same as that for EIA reports under section 5.2.

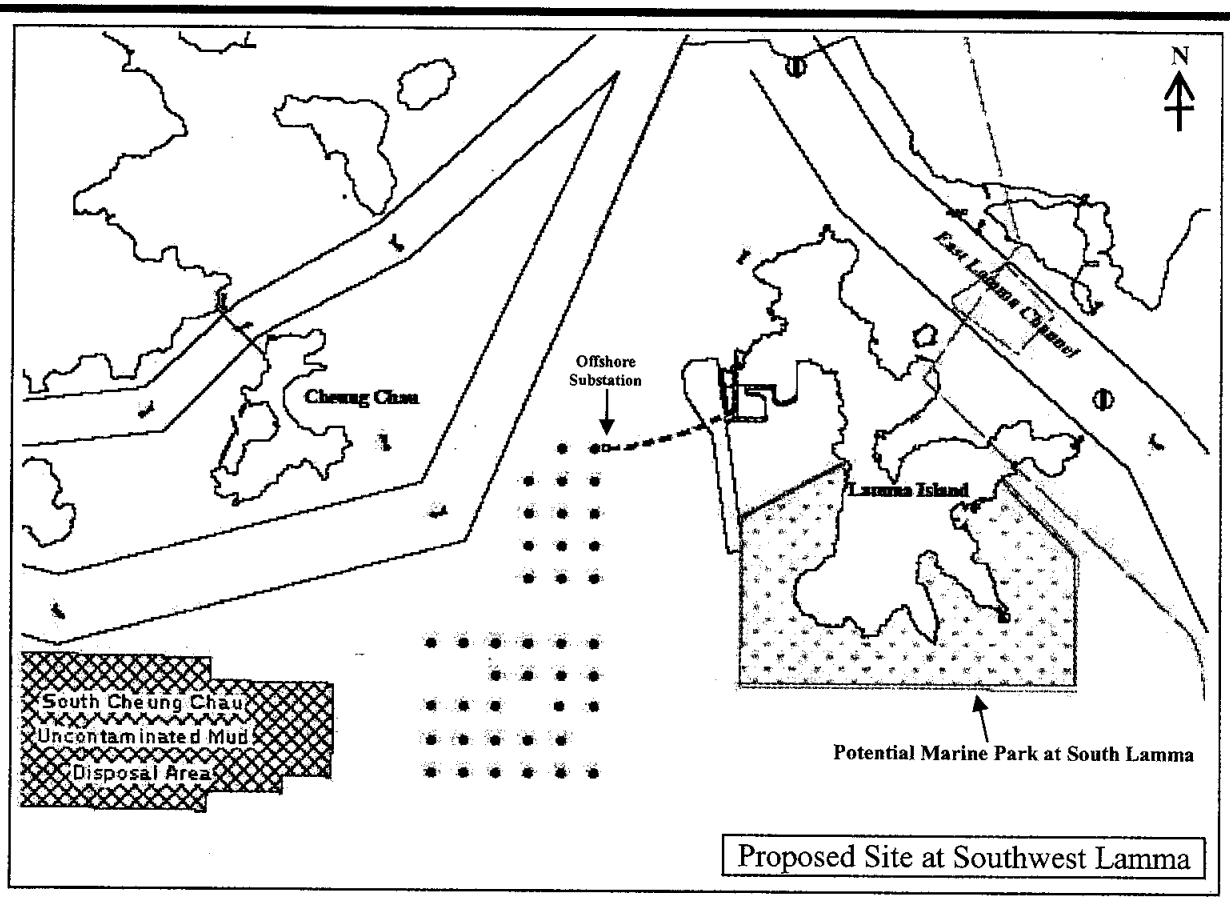
6. OTHER PROCEDURAL REQUIREMENTS

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.

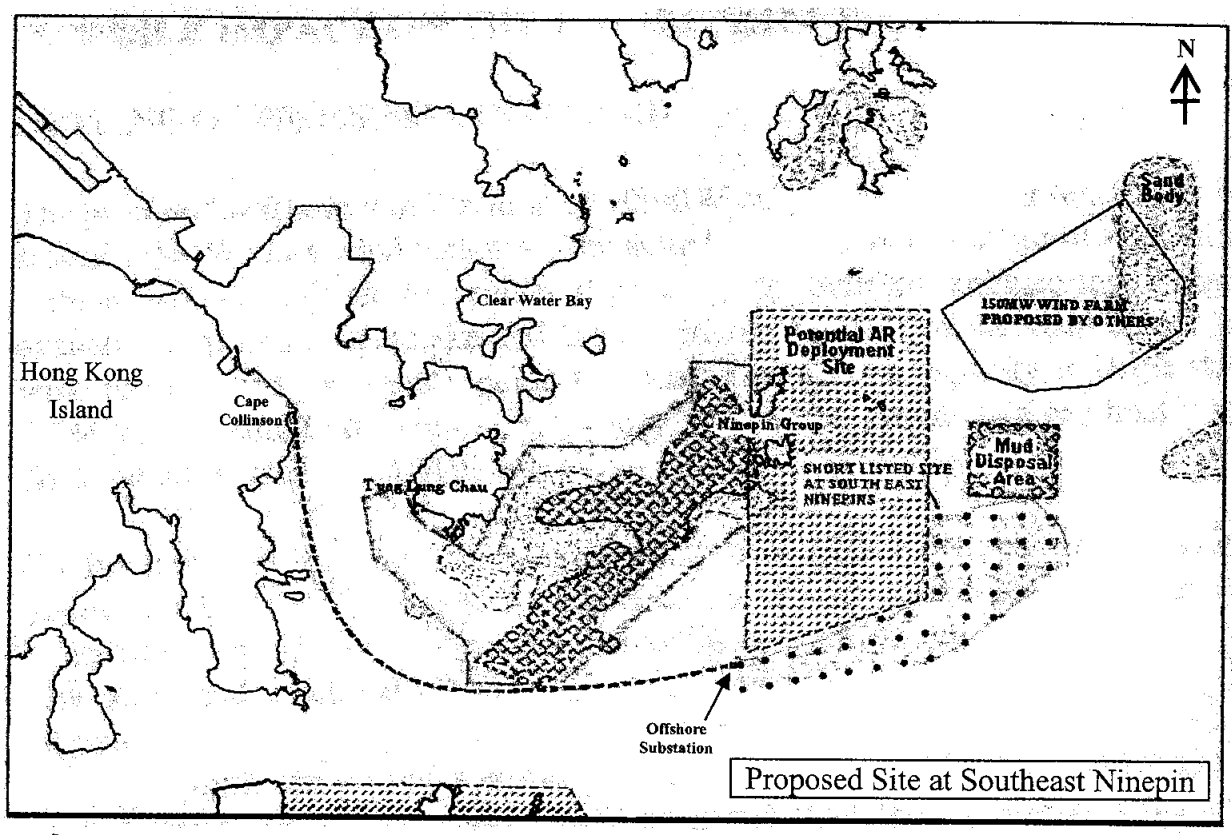
6.2 If there is any key change in the scope of the Project mentioned in section 1.2 of this EIA study brief and in Project Profile (No. PP-293/2006), the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover 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.

--- END OF EIA STUDY BRIEF ---

August 2006
Environmental Assessment Division,
Environmental Protection Department



Proposed Site at Southwest Lamma



Proposed Site at Southeast Ninepin

Legend:

- Proposed Wind Turbines
- Proposed Transmission Cable
- Mud Disposal Area
- Potential Artificial Reef Deployment Site
- Sand Body

Project: Development of a 100MW Offshore Wind Farm in Hong Kong

Appendix A: Location Plans (Plans modified from Figure 3.1a & 3.2a of Project Profile No. PP-293/2006) **[Scale: NTS]**

EIA Study Brief

Application No.: ESB-151/2006

Appendix B

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 and particle dispersion modules. All modules shall have been proven with successful applications locally and overseas.

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

Model details – Calibration & Validation

1. No field data collection is required for model calibration for this study. However, the models shall be properly calibrated and validated before its use in this study in the Hong Kong waters, the Pearl Estuary and the Dangan (Lema) Channel, with the field data collected by:

    - Hydraulic and Water Quality Studies in Victoria Harbour (1987)
    - Port and Airport Development Strategy - Enhancement of WAHMO Mathematical Models (1990)
    - Strategic Sewage Disposal Scheme Stage II - Oceanic Outfall, Oceanographic Surveys and Modelling (1992)
    - Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool (1998)
    - Environmental Protection Department (EPD)'s routine monitoring data
    - Tidal data from Hong Kong Observatory, Macau and relevant Mainland Authorities

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 (rms)	< 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

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 (DO), 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 would not be affected by the waterway and the proposed disposal ground. 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 schematization shall be agreed with EPD.

Modelling assessment

1. The assessment shall include the construction and operation phases of the project. Where appropriate, the assessment shall also include maintenance dredging. Scenarios to be assessed shall cover the baseline condition and scenarios with various different options proposed by the Applicant in order to quantify the environmental impacts and improvements that will be brought about by these options. Corresponding pollution load, bathymetry and coastline shall be adopted in the model set up. Mitigation measures shall be proposed and residual impacts shall be quantified as one of the modeling scenarios. A detailed analysis of the effects of local erosion and sedimentation patterns in the ecological sensitive sites identified within the assessment area as a result of the Project shall be included.

2. Hydrodynamic, water quality and sediment transport, 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. If assessment of accidental spillage is required, potential locations, quantities and rates of spill shall be identified and quantified. The spill modelling shall cover combinations of different tides, wind and season conditions. The methodology for modelling spill and scenarios to be covered should be agreed with EPD.

4. The results shall be assessed for compliance of Water Quality Objectives. Any changes in hydrodynamic regime shall be assessed. Daily erosion / sedimentation rate shall be computed and its ecological impact shall be assessed.

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

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

- END -

Appendix C

Guidelines for Marine Archaeological Investigation (MAI)

The standard practice for MAI should consist of four separate tasks, i.e. (1) Baseline Review, (2) Geophysical Survey, (3) Establishing Archaeological Potential and (4) Remote Operated Vehicle (ROV)/Visual Diver Survey/Watching Brief.

(1) Baseline Review

1.1 A baseline review should be conducted to collate the existing information in order to identify the potential for archaeological resources and, if identified, their likely character, extent, quality and value.

1.2 The baseline review will focus on known sources of archive data. It will include:

a. Geotechnical Engineering Office (GEO) – the Department holds extensive seabed survey data collected from previous geological research.

b. Marine Department, Hydrographic Office – the Department holds a substantial archive of hydrographic data and charts.

c. The Royal Naval Hydrographic Department in the UK – the Department maintains an archive of all survey data collected by naval hydrographers.

1.3 The above data sources will provide historical records and more detailed geological analysis of submarine features which may have been subsequently masked by more recent sediment deposits and accumulated debris.

(2) Geophysical Survey

2.1 Extensive geophysical survey of the study area should be deployed by using high resolution boomer, side scan sonar and an echo sounder. The data received from the survey would be analysed in detail to provide:

a. Exact definition of the areas of greatest archaeological potential.

b. Assessment of the depth and nature of the seabed sediments to define which areas consist of suitable material to bury and preserve archaeological material.

c. Detailed examination of the boomer and side scan sonar records to map anomalies on the seabed which may be archaeological material.

(3) Establishing Archaeological Potential

3.1 The data examined during Tasks 1 and 2 will be analysed to provide an indication of the likely character and extent of archaeological resources within the study area. This would facilitate formulation of a strategy for investigation.

3.2 The results would be presented as a written report and charts. If there is no indication of archaeological potential there would be no need for further work.

(4) Remote Operated Vehicle (ROV)/Visual Diver Survey/Watching Brief

4.1 Subject to the outcome of Tasks 1, 2 and 3, accepted marine archaeological practice would be to plan a field evaluation programme to acquire more detailed data on areas identified as having archaeological potential. The areas of archaeological interest can be inspected by ROV or divers. ROV or a team of divers with both still and video cameras would be used to record all seabed features of archaeological interest.

4.2 Owing to the heavy marine traffic in Hong Kong, the ROV/visual diver survey may not be feasible to achieve the target. If that is the case, an archaeological watching brief is the most appropriate way to monitor the dredging operations in areas of identified high potential to obtain physical archaeological information.

4.3 A sampling strategy for an archaeological watching brief would be prepared based on the results of Tasks 1, 2 and 3 to focus work on the areas of greatest archaeological potential. Careful monitoring of the dredging operations would enable immediate identification and salvage of archaeological material. If archaeological material is found, the AMO should be contacted immediately to seek guidance on its significance and appropriate mitigation measures would be prepared.

4.4 If Task 4 is undertaken, the results would be presented in a written report with charts.

- END -

Appendix D

Implementation Schedule

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

Appendix E

Criteria for Cultural Heritage Impact Assessment

(1) Baseline Study

1.1 A baseline study shall be conducted:

a. to compile a comprehensive inventory of archaeological sites (including marine archaeological sites), historic buildings and structures within the proposed project area, which include:

(i) all sites of archaeological interest (including marine archaeological sites);
(ii) all pre-1950 buildings and structures;
(iii) selected post-1950 buildings and structures of high architectural and historical significance and interest; and
(iv) landscape features include sites of historical events or providing a significant historical record or a setting for buildings or monuments of architectural or archaeological importance, historic field patterns, tracks and fish ponds and cultural element such as *fung shui* woodlands and clan grave.

b. to identify the direct and indirect impacts on the site of cultural heritage at the planning stage in order to avoid causing any negative effects. The impacts include the direct loss, destruction or disturbance of an element of cultural heritage, impact in its settings causing impinge on its character through inappropriate sitting or design, potential damage to the physical fabric of archaeological remains, historic buildings or historic landscapes through air pollution, change of ground water level, vibration, recreation pressure and ecological damage by the development. The impacts listed are merely to illustrate the range of potential impacts and not intended to be exhaustive.

1.2 The baseline study shall also include a desk-top study and a field evaluation.

1.3. Desk-top Study

1.3.1 Desk-top searches should be conducted to analyse, collect and collate extant information. They include:

a. Search of the list of declared monuments protected by the Antiquities

and Monuments Ordinance (Chapter 53).

b. Search of the list of deemed monuments through the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department.
c. Search of the list of sites of cultural heritage identified by the AMO.
d. Search of publications on local historical, architectural, anthropological, archaeological and other cultural studies, such as, Journals of the Royal Asiatic Society (Hong Kong Branch), Journals of the Hong Kong Archaeological society, Antiquities and Monuments Office Monograph Series and so forth.
e. Search of other unpublished papers, records, archival and historical documents through public libraries, archives, and the tertiary institutions, such as the Hong Kong Collection and libraries of the Department of Architecture of the University of Hong Kong and the Chinese University of Hong Kong, Public Records Office, photographic library of the Information Services Department and so forth.
f. Search of any other unpublished archaeological investigation and excavation reports kept by the AMO.
g. Search of historical documents in the Public Records Office, the Land Registry, District Lands Office, District Office and the Hong Kong Museum of History and so forth.
h. Search of cartographic and pictorial documents. Maps of the recent past searched in the Maps and Aerial Photo Library of the Lands Department.
i. Study of existing Geotechnical information (for archaeological desk-top research).
j. Discussion with local informants.

1.4 Field Evaluation

1.4.1 The potential value of the project area with regard to the cultural heritage could be established easily where the area is well-documented. However, it does not mean that the area is devoid of interest if it lacks information. In these instances, a site visit combined with discussions with appropriate individuals or organisations should be conducted by those with expertise in the area of cultural heritage to clarify the position.

1.4.2 Historic buildings and structures survey

a. Field scan of all the historic buildings and structures within the project area.
b. Photographic recording of each historic building or structure including the exterior (the elevations of all faces of the building premises, the roof, close up for the special architectural details) and the interior (special architectural details), if possible, as well as the surroundings of each historic building or structure.
c. Interview with local elders and other informants on the local historical, architectural, anthropological and other cultural information related to the historic buildings and structures.
d. Architectural appraisal of the historic buildings and structures.

1.4.3 Archaeological Survey

A licence shall be obtained from the Antiquities Authority for conducting an archaeological survey. It takes at least two months to process the application.

A detailed archaeological survey programme should be designed to assess the archaeological potential of the project area. The programme should clearly elaborate the strategy and methodology adopted, including what particular question(s) can be resolved, how the archaeological data will be collected and recorded, how the evidence will be analyzed and interpreted and how the archaeological finds and results will be organized and made available. Effective field techniques should also be demonstrated in the programme. The programme should be submitted to the Antiquities and Monuments Office for agreement prior to applying for a licence.

The following methods of archaeological survey (but not limited to) should be applied to assess the archaeological potential of the project area:

a. Definition of areas of natural land undisturbed in the recent past.
b. Field scan of the natural land undisturbed in the recent past in detail with special attention paid to areas of exposed soil which were searched for artifacts.
c. Conduct systematic auger survey and test pitting. The data collected from auger survey and test pitting should be able to establish the

horizontal spread of cultural materials deposits.

d. Excavation of test pits to establish the vertical sequence of cultural materials. The hand digging of 1 x 1 m or 1.5 x 1.5 m test pits to determine the presence or absence of deeper archaeological deposits and their cultural history.
e. The exact quantity and location of auger holes and test pits should be agreed with the Antiquities and Monuments Office prior to applying for a licence.
f. A qualified surveyor should be engaged to record reduced levels and coordinates as well as setting base points and reference lines in the course of the field survey.

1.4.4 If the field evaluation identifies any additional sites of cultural heritage within the study area which are of potential historic or archaeological importance and not recorded by AMO, the office should be reported as soon as possible. The historic and archaeological value of the items will be further assessed by the AMO.

1.5 The Report of Baseline Study

1.5.1 The study report should have concrete evidence to show that the process of the above desk-top and field survey has been satisfactorily completed. This should take the form of a detailed inventory of the sites of cultural heritage supported by full description of their cultural significance. The description should contain detailed geographical, historical, archaeological, architectural, anthropological, ethnographic and other cultural data supplemented with illustrations below and photographic and cartographic records.

1.5.2 Historic Buildings and Structures

a. A map in 1:1000 scale showing the boundary of each historic building or structure.
b. Photographic records of each historic building or structure.
c. Detailed record of each historic building or structure including its construction year, previous and present uses, architectural characteristics, as well as legends, historic persons and events, and cultural activities associated with the structure.

1.5.3 Archaeological Sites

a. A map showing the boundary of each archaeological site as supported and delineated by field walking, augering and test-pitting;
b. Drawing of stratigraphic section of test-pits excavated which shows the cultural sequence of a site.
c. Reduced levels, coordinates, base points and reference lines should be clearly defined and certified by a qualified surveyor.

1.5.4 A full bibliography and the source of information consulted should be provided to assist the evaluation of the quality of the evidence. It is expected that the study and result are up to an internationally accepted academic and professional standard.

1.6 Finds and Archives

1.6.1 Archaeological finds and archives should be handled following the *Guidelines for Handling of Archaeological Finds and Archives (Appendix).*

(2) Impact Assessment

2.1 Culture heritage impact assessment must be undertaken to identify the impacts of the sites of cultural heritage which will be affected by the proposed development subject to the result of desktop research and field evaluation. The prediction of impacts and an evaluation of their significance must be undertaken by an expert in cultural heritage. During the assessment, both the direct impacts such as loss or damage of important features as well as indirect impacts such as change of ground water level which may affect the preservation of the archaeological and built heritage in situ should be stated. A detailed description and plans should be provided to elaborate to what extent the site of cultural heritage will be affected.

2.2 Preservation in totality must be taken as the first priority. Please refer to paragraph 4.3.1(c), item 2 of Annex 10, items 2.6 to 2.9 of Annex 19 and other relevant parts of the Technical Memorandum on Environmental Impact Assessment Process for the detailed requirements of the impact assessment.

(3) Mitigation Measures

3.1 It is always a good practice to recognise the site or monument early in the planning stage and site selection process, and to avoid it, i.e. preserve it in-situ, or leaving a buffer zone around the site. Built heritage, sites and landscapes are to be in favour of preservation unless it can be shown that there is a need for a particular development which is of paramount importance and outweighs the significance of the heritage feature.

3.2 If avoidance of the cultural heritage is not possible, amelioration can be achieved by reduction of the potential impacts and the preservation of heritage features, such as physically relocating it. Measures like amendments of the sitting, screening and revision of the detailed design of the development are required to lessen its degree of exposure if it causes visual intrusion to the cultural heritage and affecting its character.

3.3 All the assessments should be conducted by an expert in cultural heritage and further evaluated and endorsed by the Antiquities and Monuments Office and the Antiquities Advisory Board.

3.4 Besides refer to paragraph 4.3.1(d), items 2.10 to 2.14 of Annex 19 and other relevant parts of the Technical Memorandum. Proposals for mitigation measures should be accompanied with a master layout plan together with all detailed treatment, elevations, and landscape plan. A rescue programme, when required, may involve preservation of the historic building or structure together with the relics inside, and its historic environment through relocation, detailed cartographic and photographic survey or preservation of an archaeological site "by record", i.e. through excavation to extract the maximum data as the very last resort.

3.5 The programme for implementation of agreed mitigation measures should be able to be implemented. It is to be clearly stated in the EIA report, as required in Annex 20 of the Technical Memorandum. In particular, item 6.7 of Annex 20 requires to define and list out clearly the proposed mitigation measures to be implemented, by whom, when, where, to what requirements and the various implementation responsibilities. A comprehensive plan and programme for the protection and conservation of the partially preserved Site of Cultural Heritage, if any, during the planning and design stage of the proposed project must be detailed.

***Appendix* to Appendix E**

Guidelines for Handling of Archaeological Finds and Archives

I. General

1. Site Code
   The Licensee should contact the Central Archaeological Repository (CAR) of the Antiquities and Monuments Office (AMO) [Contact Person: Mr. Michael TANG, Tel: 2384 5446; Email: mkstang@lcsd.gov.hk] about the allocation of site code before the commencement of the project to avoid duplicate of site code assignment.

II. Archaeological Finds

2. Cleaning
   Every excavated finds should be properly cleaned before handing over to the CAR of the AMO.

3. Marking
   - All the excavated finds should be cleaned before marking object number.
   - "Sandwich" technique should be adopted for marking permanent identification number on an object. *(Please see annex for detail)*
   - Every special finds should be marked with site code, context number and object number, etc.
   - All representative samples collected from general finds should be marked.
   - For the finds which is too small, has unstable surface, or leather, textiles or wood, it should not be marked/labeled directly and should be bagged separately or attached with tags by tying. The tag should contain information about the object number, context number and site code, etc.

4. Labeling and bagging
   - A label should be attached on each bag.
   - Information about the object number, context number, test-pit number, site code and bag number should be stated clearly on the label.
   - Finds excavated within the same context should be bagged together. However, if they have been categorized according to their types, materials or characteristics, separate bagging is required.

5. Conservation
   - To refit and reconstruct pottery vessels by appropriate adhesive. A heat and waterproof adhesive, e.g. product of H. Marcel Guest Ltd., is recommended.
   - Any adhesives which are not reversible or will damage artefacts, e.g. the pottery vessel should not be applied on the finds.

6. Finds register
A clear finds register with information about the finds description, quantity, form, weight, dimensions and field data should be prepared for handover to the CAR.

III. Field Archives and Laboratory Records

7. Field archives include field dairy, context recording sheet, special finds recording sheet, soil sample/sample recording sheet, map, survey sheet and video/visual records etc. Laboratory records also form part of the archaeological archives, which include finds processing record, conservation record, finds drawings and photos, records of typological analysis and objects card etc.

8. All the aforesaid archives should be handed over to the CAR after the compilation of the excavation report. Attention should be drawn to the followings:

- All the field archives should be submitted together with their indexes.
- The video footage should be submitted together with a detailed script introducing the content of the video record.
- All the slides, colour/black & white negatives and digital photographs should be submitted together with their contact prints and indexes.

Handover of Finds

9. Packing
- Every special finds should be protected with tissue paper, bubble sheet or P.E. foam with shock-proofed packing. No packing material other than the aforesaid items should be used.
- All the general finds should be stored in heavy duty plastic container with shock-proofed packing.
- The heavy duty plastic container, e.g. product of the Star Industrial Co., Ltd. (No. 1849 or 1852), is recommended.
- For oversized finds, prior advice on packing method should be sought from the AMO.

10. Handover procedure
- The Licensee should arrange to transport the finds and archives to the CAR upon the completion of the finalized excavation report.
- Separate handover forms for finds and archives should be signed by the representatives of the Licensee and the AMO.

Annex to *Appendix* to Appendix E

Steps for "Sandwich" technique

1. First of all, the object should be marked in appropriate area and size that does not impact important diagnostic or aesthetic parts of the object.

2. Clean the area to be marked.

3. Apply a thin coat of clear reversible lacquer on the area. Use white lacquer if the object is dark in colour. Let the base coat dry completely.

4. Use a permanent water-based ink to write the object number on top of the base coat. Let ink dry completely.

5. Apply a top coat of clear varnish.

6. Let the marking dry completely before packing.