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

ENVIRONMENTAL IMPACT ASSESSMENT STUDY BRIEF NO. ESB- 187/2008

PROJECT TITLE: IMPROVEMENT OF FRESH WATER SUPPLY TO CHEUNG CHAU
(hereinafter known as the "Project")

NAME OF APPLICANT: WATER SUPPLIES DEPARTMENT
(hereinafter known as the "Applicant")

1. BACKGROUND

1.1 An application (No. ESB-187/2008) 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 24 April 2008 with a project profile (No. PP-351/2008) (the Project Profile).

1.2 The Project is to construct and operate a new submarine water main across Adamasta Channel from Lantau to Cheung Chau to replace the existing submarine water main, which is serving as emergency back up, to improve the reliability of water supply to Cheung Chau. Location plan of the Project is shown in Appendix 1 of the Project Profile and is reproduced in Appendix A in this study brief. The Project will comprise the followings :-

(i) Laying of submarine water main of approximately 1400m in length and 500mm in diameter across Adamasta Channel;

(ii) Construction of landfall and associated works within Lantau South Country Park, Lantau Island; and

(iii) Construction of landfall and associated works near Tai Kwai Wan, Cheung Chau.

1.3 The Project is a designated project under :

(i) Item C.12, Part 1, Schedule 2 of the EIAO : … *a dredging operation which is less than 500m from the nearest boundary of an existing or planned … (iii) bathing beach; … (vii) coastal protection area; …*; and

(ii) Item Q.1, Part 1, Schedule 2 of the EIAO : *All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in an existing or gazetted proposed country park or ….*

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;

(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 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 provide information on the consideration of alternative options of water main alignment, landfalls locations and construction method with a view to avoiding or minimizing the potential environmental impacts to environmentally sensitive areas 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 played in the selection;

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

(v) 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;

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

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

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

(ix) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise

during the construction and operation of the Project in relation to the sensitive receivers and potential affected uses;

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

(xi) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and

(xii) to design and specify environmental monitoring and audit requirements to 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 Project proposed in the Project Profile and mentioned in section 1.2 above. The EIA study shall address the likely key issues described below, together with any other key issues identified during the course of the EIA study :

(i) the potential water quality impacts on water system(s) including the Southern Water Control Zone arising from laying of submarine water main and any other marine works activities during construction of the Project and treatment/sterilization of water main prior to commissioning of the Project;

(ii) the potential impacts to both terrestrial and marine ecological resources including the Lantau South Country Park, coastal protection areas at Cheung Chau, corals, marine benthic communities, intertidal habitats and marine mammals, in particular Finless Porpoise (*Neophocaena phocaenoides*) and Chinese White Dolphin (*Sousa chinensis*), during construction and commissioning of the Project;

(iii) the potential fisheries impacts, in particular the Cheung Sha Wan Fish Culture Zone, during construction and commissioning of the Project;

(iv) the potential impacts on archaeological deposits in and on the seabed of the Project area and the Tai Kwai Wan Archaeological Site likely to be affected by construction of the Project;

(v) the potential noise impact on the sensitive receivers in Cheung Chau near the Project during construction of the Project; and

(vi) 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

3.3 Consideration of Alternatives

3.3.1 Need of the Project

The Applicant shall provide information on the need of the Project, including the purpose and objectives of the Project, and describe the scenarios with and without the Project.

3.3.2 Consideration of Alternative Water Main Alignments and Landfalls Locations

The Applicant shall present in the EIA report the consideration of alternative alignments of the submarine water main and alternative locations of the landfalls of the Project with a view to reducing the water quality, ecological and fisheries 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 Consideration of Alternative Construction Methods and Sequences of Works

Taking into consideration of the combined effect with respect to the severity and duration of the construction impacts to the affected sensitive receivers, the EIA study shall explore different construction methods, types of backfilling material and sequences of works for laying of the submarine water main with a view to avoiding or minimizing adverse water quality, marine ecological and fisheries impacts. A comparison of the environmental benefits and disbenefits of applying different construction methods and sequences of works shall be made.

3.4 Technical Requirements

The Applicant shall conduct the EIA study to address all environmental aspects of the activities as described in Sections 3.1, 3.2 and 3.3 above. The assessment shall be based on the best and latest information available during the course of the EIA study. The Applicant shall include in the EIA report details of the construction programme and methodologies. The Applicant shall clearly state in the EIA report the time frame and work programmes of the Project and other concurrent projects, and assess the cumulative environmental impacts from the Project with all interacting projects as identified in the EIA study. The EIA study shall include the following technical requirements on specific impacts.

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.

3.4.1.2 The study area for the water quality assessment shall cover the Southern Water Control Zone as designated under the Water Pollution Control Ordinance (Cap 358). The 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 bathing beaches and secondary contact recreational zones, areas of ecological or conservation values such as Lantau South Country Park, Coastal Protection Areas in Cheung Chau, natural coastal shore, habitats of marine mammals (e.g. Finless Porpoise and Chinese White Dolphin), marine benthic communities, intertidal habitats and coral communities, fish spawning and nursery grounds, fish culture zones, sea water intakes and typhoon shelters 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 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 attached to this study brief. Possible impacts due to the dredging, fill extraction, backfilling, transportation and disposal of dredged materials and other marine works activities shall include changes in hydrology, flow regime, sediment erosion and deposition patterns, morphological change of seabed profile, water and sediment quality, fisheries, marine benthic communities, intertidal habitats, coral communities and marine mammals. The prediction shall include possible different construction stages or sequences and operation stage of the Project. Affected sensitive receivers shall be identified by the assessment tool with indications of degree of severity.

3.4.1.5 The Applicant shall take into account and include any likely different construction stages or sequences of the Project in the assessment. The assessment shall have regard to the phasing, frequency, duration and rate of dredging, backfilling and its sediment loading. Essentially the assessment shall address the following in the water quality impact assessment :-

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 operation;

(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 operation, 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 and sediment quality objectives, criteria and standards for the water system(s) and the sensitive receivers;

(v) Review of the construction sequences and methods, and the operation of the Project to identify any change of water courses, shoreline or bathymetry, flow regimes and catchment types or areas. The selected method shall take into consideration the need to protect relevant water sensitive receivers;

(vi) Identification, analysis and quantification of existing and future water and sediment pollution sources, including point and non-point discharges to surface water runoff, and analysis of the provision and adequacy of future facilities to reduce such pollution. An emission inventory on the quantities and characteristics of these existing and future pollution sources in the assessment area shall also be provided. Field investigation and laboratory tests, as appropriate, shall be conducted to fill in any relevant information gaps;

Impact Prediction

(vii) Prediction and quantification, by mathematical modelling or other technique approved by the Director, of 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 of this study brief. Possible impacts include changes in hydrology, flow regime, sediment erosion or deposition, water and sediment quality and the effects on the marine organisms due to such changes. The prediction shall include possible different construction stages or sequences and operation stage of the Project;

(viii) Identification and quantification of dredging, fill extraction, backfilling, sediment/mud transportation and disposal activities and requirements. Potential dumping ground(s) and sand borrowing ground(s) 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 potential for the release of contaminants during dredging shall be addressed using the chemical testing results derived from sediment samples collected on site and relevant historic data. Appropriate laboratory tests such as elutriate tests shall be performed on the sediment samples to simulate and quantify the degree of mobilization of various contaminants such as metals, ammonia, trace organic 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 chemical and biological laboratory test methods to be used shall be subject to the approval of the Director. The Applicant shall also assess 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 and backfilling;

(ix) Assessment of potential cumulative impacts due to other projects, activities

or pollution sources in the vicinity of the identified water system(s) and sensitive receivers that may have a bearing on the environmental acceptability of the Project;

(x) Recommendation of appropriate mitigation measures to avoid or minimize the impacts identified above, in particular suitable methods and arrangements for dredging, backfilling, sediment/mud transportation and disposal during construction stage and chemical disposal during commissioning stage to mitigate any adverse impact. 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 shall be assessed using appropriate mathematical models as set out in Appendix B to this study brief;

Waste Water and Non-point Sources Pollution

(xi) Proposal for upgrading or providing effective infrastructure, water pollution prevention and mitigation measures to be implemented during the construction and operation stages so as to reduce the water and sediment quality impacts to within standards. The potential impact of chemicals to be selected for sterilization of the water main prior to commissioning of the Project on the marine ecological environment and the amount of wastewater to be generated through this sterilization process shall be estimated and assessed. Arrangements to treat and handle this wastewater shall be proposed with a view to avoid adverse water quality, marine ecological and fisheries impacts. Requirements to be incorporated in the project contract document shall also be proposed;

(xii) Investigation and proposal, as appropriate, of the best management practices to reduce storm water and non-point source pollution; and

(xiii) Evaluation and quantification of residual impacts on the water systems(s) and the sensitive receivers with regard to appropriate water and sediment quality objectives, criteria, standards or guidelines.

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 be same as the assessment area for water quality impact assessment and shall also include any other areas likely to be impacted by the Project. The assessment area for terrestrial ecological impact shall include areas within 500m distance from the site boundary of the Project and also any other areas likely to 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 aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the Project shall avoid or minimise impacts on recognised sites of conservation importance such as Lantau South Country Park, Coastal Protection Areas in Cheung Chau, important habitats of marine mammals (e.g. Finless Porpoise and Chinese White Dolphin), marine benthic communities, intertidal

habitats and coral communities. The assessment shall identify and quantify as far as possible the potential ecological impacts to the natural environment and the associated wildlife groups and habitats/species arising from the Project including its construction and operation phases as well as the subsequent management and maintenance of the proposals.

3.4.2.4 The assessment shall include the followings :

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

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

(iii) If any information gap is identified in (ii) above, carrying out of necessary ecological field surveys (e.g. dive survey) and investigations to verify the information collected, to fill the information gaps identified and to fulfil the objectives of the EIA study. The field surveys shall include but not be limited to corals, benthic communities and intertidal habitats;

(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 taking into consideration the seasonal variations, 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 showing the types and locations of habitats/species in the Study Area with special attention to those with conservation interests, including the followings :

- Lantau South Country Park;
- Coastal Protection Areas in Cheung Chau;
- coral communities (including all hard corals, octocorals and black corals);
- marine benthic communities and intertidal habitats (including rocky shores and sandy shores);
- marine mammals, in particular Finless Porpoises and Chinese White Dolphin; 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 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 Lantau South Country Park, coral communities, important benthic communities and intertidal habitats, and marine mammals (e.g. Finless Porpoises and Chinese White Dolphin), in the context of the Project;

(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 laying of submarine water main, dredging and construction of landfalls and other associated works, etc), indirect (e.g. changes in water qualities, hydrodynamics properties, sedimentation rates and pattern, hydrology, noise and other disturbance generated by the construction and operation 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 grounds, reduction of ecological carrying capacity, habitat fragmentation, and in particular the followings :

(a) Potential destruction or disturbance to ecological habitats at the Lantau South Country Park and the Coastal Protection Areas in Cheung Chau;

(b) Potential impacts to marine benthic communties and intertidal habitats (including rocky shores and sandy shores);

(c) Potential deterioration or disturbance to corals (including all hard corals, octocorals and black corals); and

(d) Potential impacts to marine habitats/species of conservation value, including Finless Porpoises, Chinese White Dolphin and any others discovered during the course of the 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 operation phases of the Project as well as the subsequent management and maintenance requirement of the Project;

(viii) Recommendations for possible alternatives, such as modification/change of construction methods, water main alignment and landfalls locations, and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified during construction and operation of the Project;

(ix) Evaluation of the feasibility and effectiveness of the recommended

mitigation measures and 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 severity 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.

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 Southern Water Control Zone and include any other areas likely to be impacted by the Project. Special attention shall be given to the fishing activities and fishing spawning and nursery grounds within the assessment area and the Cheung Sha Wan Fish Culture Zone.

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 and quantification as far as practicable of the existing capture and culture fisheries activities;

(iii) Description and quantification as far as practicable 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 and indirect, onsite and offsite impacts on capture fisheries such as loss or disturbance of fishing grounds, spawning and nursery grounds and disruption of fishing activities;

(vi) Identification and evaluation of any direct and indirect, onsite and offsite impacts on culture fisheries such as water quality deterioration in fish culture zone;

(vii) Recommendations on 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

(viii) Review of the need for monitoring and, if necessary, recommendation of monitoring and auditing programme.

3.4.4 **Impact on Cultural Heritage**

3.4.4.1 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.

3.4.4.2 The cultural heritage impact assessment shall include a Marine Archaeological Investigation (MAI) and a Terrestrial Archaeological Investigation (TAI).

a) 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 Guidelines for 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, Task 4 – Remote Operated Vehicle/Visual Diver Survey/Watching Brief 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).

b) Terrestrial Archaeological Investigation (TAI)
The study area for TAI shall include the landfall sites and works areas that may have adverse impacts on known and unknown archaeological sites. Special attention shall be paid to the landfall of the water main at Cheung Chau and the impacts on Tai Kwai Wan Archaeological Site. The Applicant shall engage a qualified archaeologist who shall obtain a License from the Antiques Authority before undertaking field evaluation under the provision of the Antiques and Monuments Ordinance (Cap.53). The Applicant shall draw necessary reference to relevant sections of the Guidelines for Cultural Heritage Impact Assessment in Appendix D of this study brief.

3.4.4.3 The Applicant shall demonstrate that the disturbance to those sites of cultural heritage are avoided to the maximum practicable extent by modification of the 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 sites 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.

3.4.5 Construction Waste Management Implications

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

3.4.5.2 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 based on the sequence and duration of these activities. The Applicant shall adopt design, general layout, construction methods and programme to minimize the generation of public fill/inert construction and demolition materials (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 that can be taken in the planning and design stages, e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered;

(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 methods/options for each type of wastes shall be described. The disposal methods/options recommended for each type of wastes shall take into account the result of the assessment in item (c) below; and

(c) The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use/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;
- wastewater discharge;
- ecology, in particular ecological habitats at the Lantau South Country Park and the Coastal Protection Areas in Cheung Chau; and
- public transport.

(iii) Dredging, Excavation, Backfilling and Dumping

(a) Identification and quantification as far as practicable of dredging,

excavation, fill extraction, backfilling, sediment/mud 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 agreed with the Director prior to the commencement of the tests. The categories of sediments/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 appropriate treatment and/or disposal arrangement and demonstrate its feasibility; and

(b) Identification and evaluation of the best practical dredging/excavation methods to minimize dredging/excavation and dumping requirements and demand for fill sources based on the criterion that existing sediment/mud shall be left in place and not to be disturbed as far as possible.

3.4.6 **Construction 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 the following:

(i) Determination of Assessment Area

The study area for the noise impact assessment shall generally include areas within a distance of 300m from the site boundary of the Project or other project locations as identified in the EIA. Subject to the agreement of the Director, the assessment area can be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the outer Project limit, provides acoustic shielding to those receivers at distances further away from the Project. Subject to the agreement of the Director, the assessment area shall be expanded to include NSRs at distances over 300m from the Project, which are affected by the construction of the Project. The assessment area for the construction noise impact assessment shall also cover areas within 300m of any works sites proposed under the Project.

(ii) Provision of Background Information

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

(iii) Identification of Noise Sensitive Receivers

(a) The Applicant shall refer to Annex 13 of the TM when identifying the NSRs. The NSRs shall include existing NSRs and planned/committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by Lands Department and any land use and development applications approved by the Town Planning Board. Photographs of existing NSRs shall be appended to the EIA report.

(b) The Applicant shall select assessment points to represent the identified NSRs for carrying out quantitative noise assessment described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment. A map showing the locations and descriptions such as name of building, use, and floor of the selected assessment points shall be given.

(iv) Provision of an Emission Inventory of the Noise Sources

The Applicant shall provide an inventory of noise sources including representative construction equipment for the purpose of carrying out the construction noise assessment. Confirmation of the validity of the inventory shall be obtained from the relevant government departments/authorities and documented in the EIA report.

(v) Construction Noise Assessment

(a) The Applicant shall carry out assessment of noise impact from construction (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. The criteria in Table 1B of Annex 5 of TM shall be adopted in the assessment.

(b) If the unmitigated construction noise levels are found exceeding the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including movable barriers, enclosures, quieter alternative methods, rescheduling and restricting hours of operation of noisy tasks) to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance at the affected NSRs shall be given.

(c) 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. In case the Applicant considers that there is an unavoidable need to conduct certain type of construction works during the restricted hours, justifications shall be provided with the

assessment of the degree and duration of the noise impact. 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 shall be explicitly stated in the EIA report.

(d) The assessment shall cover the cumulative noise impacts due to the construction works of the Project and other concurrent projects identified during the course of the EIA study.

(vi) Assessment of Side Effects and Constraints

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

3.4.7 Illustrative Materials for Landscaping Measures

The Applicant shall include in the EIA report the design proposals, covering appearance, façade treatment, colour scheme and texture of materials used, etc., of the landfalls and the landscaping design measures at the landfalls locations. Annotated illustrative materials such as computer-generated photomontages, oblique aerial photographs, photographs, plans, elevation and section drawings shall be used as appropriate to illustrate the visual/aesthetic effects of the landfalls.

3.4.8 Summary of Environmental Outcomes

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

3.4.9 Environmental Monitoring and Audit (EM&A) Requirements

3.4.9.1 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.

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

3.4.9.3 The Applicant shall prepare a project implementation schedule (in the form of a checklist as shown in Appendix E 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. REPORTING REQUIREMENTS

5.1 In preparing the EIA report, the Applicant shall refer to Annex 11 of the TM for the contents of an EIA report. The Applicant shall also refer to Annex 20 of the TM, which stipulates the guidelines for the review of an EIA report.

5.2 The Applicant shall supply the Director with 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 1.3 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EIA report and 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.

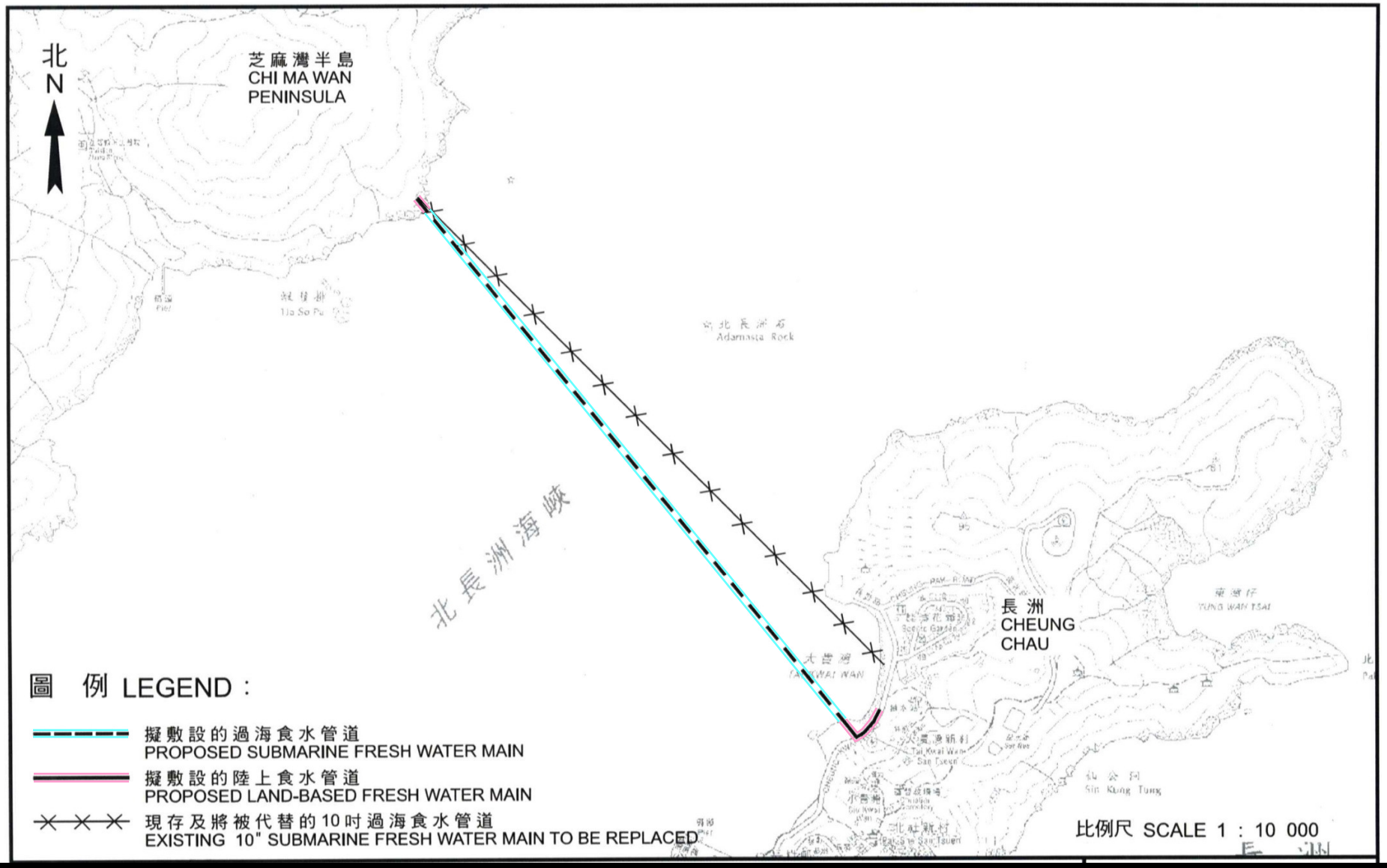
6. OTHER PROCEDURAL REQUIREMENTS

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-351/2008), 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 ---

May 2008
Environmental Assessment Division,
Environmental Protection Department



Project Title: Improvement of Fresh Water Supply to Cheung Chau

Location Plan (Plan originated from Appendix I of Project Profile No. PP-351/2008)

EIA Study Brief No.: ESB-187/2008

Appendix A

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, 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 operation phases of the project. Where appropriate, the assessment shall also include maintenance dredging. Scenarios to be assessed shall cover the baseline condition and scenarios with various different options proposed by the Applicant in order to quantify the environmental impacts and improvements that will be brought about by these options. Corresponding pollution load, bathymetry and coastline shall be adopted in the model set up.

2. Hydrodynamic, 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

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 deploy high resolution boomer, side scan sonar, an echo sounder and high resolution multi beam sonar. The multi beam data must be presented as processed digital terrain models to facilitate the archaeological analysis. 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 in and on the seabed which may be archaeological material.

d. Detailed examination of the multi beam sonar data to assess the archaeological potential of the sonar contacts.

(3) Establishing Archaeological Potential

3.1 The data examined during Task 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 material there would be no need for further work.

3.3 Charts should be presented at 1:500 scale and show each survey contact. Its dimensions and exact location should also be shown.

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

4.1 Subject to the outcome of Task 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 Task 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.

Report

Three copies of the final report should be submitted to the AMO for record.

- END -

Appendix D

Guidelines for Cultural Heritage Impact Assessment

Introduction

The purpose of the guidelines is to assist the understanding of the requirements in assessing impact on archaeological and built heritage. The guidelines will be revised by the Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department from time to time, where appropriate, and when required.

A comprehensive Cultural Heritage Impact Assessment (CHIA) includes a baseline study, an impact assessment study associated with the appropriate mitigation measures.

(1) Baseline Study

1.1 A baseline study shall be conducted:

a. to compile a comprehensive inventory of heritage sites within the proposed project area, which include:

(i) all archaeological sites (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) cultural landscapes include places associated with historic event, activity, or person or exhibiting other cultural or aesthetic values, such as sacred religious sites, battlefields, a setting for buildings or structures of architectural or archaeological importance, historic field patterns, clan graves, old tracks, *fung shui* woodlands and ponds, and etc.

b. to identify the direct and indirect impacts on the heritage sites 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 on its settings or impinging 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, ecological damage, new recreation or other daily needs to be caused by the new 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 research and a field evaluation.

1.3. Desk-top Research

1.3.1 Desk-top research should be conducted to analyse, collect and collate extant information. It shall include but not limited to:

a. List of declared monuments protected by the Antiquities and Monuments Ordinance (Chapter 53).
b. Graded historic buildings and sites.
c. Government historic sites identified by the Antiquities and Monuments Office (AMO).
d. Lists and archives kept in the Reference Library of the Antiquities and Monuments Office of the Leisure and Cultural Services Department including archaeological sites, declared monuments, proposed monuments, deemed monuments and recorded historical building & structures identified by the AMO.
e. 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.
f. 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.
g. Any other unpublished archaeological investigation and excavation reports kept by the AMO.
h. 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.
i. Cartographic and pictorial documents. Old and recent maps and aerial photos searched in the Maps and Aerial Photo Library of the Lands Department.
j. Existing geological information (for archaeological desk-top research).
k. Discussion with local informants.

1.4 Field Evaluation

1.4.1 General

The potential value of the project area with regard 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 and consultations with appropriate individuals or organisations should be conducted by those with expertise in local heritage to clarify the situation.

1.4.2 Field survey on historic buildings and structures

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, the associated cultural

landscape features and the associated intangible cultural heritage (if any) of each historic building or structure.

c. Interview with local elders and other informants on local historical, architectural, anthropological and other cultural information related to the historic buildings and structures.
d. Historical and architectural appraisal of the historic buildings and structures, their associated cultural landscape and intangible cultural elements.

1.4.3 Archaeological Survey

a. Appropriate methods for pricing and valuation of the archaeological survey, including by means of a Bill of Quantities or a Schedule of Rates should be considered in preparing specifications and relevant documents for calling tenders to carry out the archaeological survey. The specifications and relevant documents should be sent to the Antiquities and Monuments Office for agreement prior to calling tenders to conduct the archaeological survey.

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

c. 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.

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

(i) Definition of areas of natural land undisturbed in the recent past.
(ii) 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.
(iii) 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.
(iv) 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.
(v) The quantity and location of auger holes and test pits should be agreed with the Antiquities and Monuments Office prior to applying for a licence.
(vi) A qualified land 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.

e. A Marine Archaeological Investigation (MAI) following *Guidelines for MAI* may be required for projects involving disturbance of seabed.

1.4.4 If the field evaluation identifies any additional heritage sites within the study area which are of potential historic or archaeological importance and not recorded by AMO, the findings should be reported to the AMO as soon as possible.

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 heritage sites supported by full description of their significance. The description should contain detailed geographical, historical, archaeological, architectural, anthropological, ethnographic and other relevant data supplemented with illustrations below and photographic and cartographic records, if required.

1.5.2 A master layout plan showing all the identified archaeological and built heritage within the study area should be provided in the report. All the identified heritage sites should be properly numbered with their locations indicated on the master layout plan.

1.5.3 Historic Buildings/ Structures/ Sites

a. A map in 1:1000 scale showing the boundary of each historic item.
b. Photographic records of each historic item.
c. Detailed recording form of each historic item including its construction year, previous and present uses, architectural characteristics, as well as legends, historic persons and events, cultural landscape features and cultural activities associated with the structure.
d. A cross-referenced checklist including the reference number of each historical item, their photo and drawing reference, as well as the page number of the detailed recording form of each identified historical item for easy cross-checking of individual records.

1.5.4 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 land surveyor.
d. *Guidelines for Archaeological Reports* should be followed (Annex 1).

1.5.5 A full bibliography and the source of information consulted should be provided to assist the evaluation of the quality of the evidence. To facilitate verification of the accuracy,

the AMO will reserve the right to examine the full details of the research materials collected under the baseline study.

1.6 Finds and Archives

1.6.1 Archaeological finds and archives should be handled following *Guidelines for Handling of Archaeological Finds and Archives (Annex 2).*

(2) Impact Assessment Study

2.1 Identification of impact on heritage

2.1.1 The impact assessment study must be undertaken to identify the impacts on the heritage sites 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 expert(s) in local heritage.

2.1.2 During the assessment, both the direct impacts such as loss or damage of important features as well as indirect impacts should be clearly stated, such as adverse visual impact on built heritage, landscape change to the associated cultural landscape features of the built heritage, temporary change of access to the heritage sites during the work period, change of ground level or water level which may affect the preservation of the archaeological and built heritage *in situ* during the implementation stage of the project.

2.1.3 The evaluation of heritage impact assessment may be classified into five levels of significance based on type and extent of the effects concluded in the CHIA study:

a. Beneficial impact: the impact is beneficial if the project will enhance the preservation of the heritage site(s) such as improving the flooding problem of the historic building after the sewerage project of the area;
b. Acceptable impact: if the assessment indicates that there will be no significant effects on the heritage site(s);
c. Acceptable impact with mitigation measures: if there will be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures, such as conduct a follow-up Conservation Proposal or Conservation Management Plan for the affected heritage site(s) before commencement of work in order to avoid any inappropriate and unnecessary interventions to the building;
d. Unacceptable impact: if the adverse effects are considered to be too excessive and are unable to mitigate practically;
e. Undetermined impact: if the significant adverse effects are likely, but the extent to which they may occur or may be mitigated cannot be determined from the study. Further detailed study will be required for the specific effects in question.

2.1.4 Preservation in totality must be taken as the first priority as it will be a beneficial impact and will enhance the cultural and socio-economical environment if suitable measures to integrate the heritage site into the proposed project are carried out.

2.1.5 If, due to site constraints and other factors, only preservation in part is possible, this must be fully justified with alternative proposals or layout designs which confirm the impracticability of total preservation.

2.1.6 Total destruction must be taken as the very last resort in all cases and shall only be recommended with a meticulous and careful analysis balancing the interest of preserving local heritage as against that of the community as a whole. Assessment of impacts on heritage sites shall also take full account of, and follow where appropriate, 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.

2.2 Mitigation Measures

2.2.1 It is always a good practice to recognize the heritage site 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.

2.2.2 Mitigation is not only concerned with minimizing adverse impact on the heritage site but also should give consideration of potential enhancement if possible (such as to improve the access to the built heritage or enhance the landscape and visual quality of built heritage).

2.2.3 Mitigation measures shall not be recommended or taken as *de facto* means to avoid preservation of heritage sites. They must be proved beyond all possibilities to be the only practical course of action. Heritage sites are to be in favour of preservation unless it can be demonstrated that there is a need for a particular development which is of paramount importance and outweighs the significance of a heritage site.

2.2.4 If avoidance of the heritage site is not possible, amelioration can be achieved by minimizing the potential impacts and the preservation of the heritage site, 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 heritage site and affects the character and integrity of the heritage site.

2.2.5 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.

2.3 The Impact Assessment Report

2.3.1 A detailed description and plans should be provided to elaborate on the heritage site(s) to be affected. Besides, please also refer to paragraph 4.3.1(d), items 2.10 to 2.14 of Annex 19 and other relevant parts of the Technical Memorandum, other appropriate presentation methods for mitigation proposals like elevations, landscape plan and photomontage shall be used in the report extensively for illustrating the effectiveness of the measures.

2.3.2 To illustrate the landscape and visual impacts on built heritage, as well as effects of the mitigation measures, choice of appropriate presentation methods is important. These methods include perspective drawings, plans and section/ elevation diagrams, photographs on scaled physical models, photo-retouching and photomontage. These methods shall be used extensively to facilitate communication among the concerned parties.

2.3.3 The implementation programme for the agreed mitigation measures should be able to be executed and should be clearly set out in the report together with the funding proposal. These shall form an integral part of the overall redevelopment project programme and financing of the proposed redevelopment project. Competent professionals must be engaged to design and carry out the mitigation measures.

2.3.4 For contents of the implementation programme, reference can be made to Annex 20 of the Technical Memorandum on Environmental Impact Assessment Process. 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 heritage site, if any, during the planning and design stage of the proposed project must be addressed in details.

2.3.5 Supplementary information to facilitate the verification of the findings shall be provided in the report including but not limited to:

a. layout plan(s) in a proper scale illustrating the location of all heritage sites within the study area, the extent of the work area together with brief description of the proposed works;
b. all the heritage sites within the study area should be properly numbered, cross-reference to the relevant drawings and plans.
c. an impact assessment cross-referenced checklist of all the heritage sites within the study area including heritage site reference, distance between the heritage site and work area, summary of the possible impact(s), impact level, summary of the proposed mitigation measure(s), as well as references of the relevant plans, drawings and photos; and
d. a full implementation programme of the mitigation measures for all affected heritage sites to be implemented with details, such as by whom, when, where, to what requirements and the various implementation responsibilities of individual parties.

Annex 1

Guidelines for Archaeological Reports

I. General

1. All reports should be written in a clear, concise and logical style.
2. The reports should be submitted in A4 size and accompanying drawings of convenient sizes.
3. Draft reports should be submitted to the Antiquities and Monuments Office (AMO) for comments within two months after completion of archaeological work unless otherwise approved by AMO.
4. The draft reports should be revised as required by AMO and relevant parties. The revised reports should be submitted to AMO within three weeks after receiving comments from AMO and relevant parties.
5. At least 3 hard copies of the final reports should be submitted to AMO for record purpose.
6. At least 2 digital copies of the final reports in both Microsoft Word format and Acrobat (.PDF) format without loss of data and change of appearance compared with the corresponding hard copy should be submitted to AMO. The digital copies should be saved in a convenient medium, such as compact discs with clear label on the surface and kept in protective pockets.

II. Suggested Format of Reports

1. Front page:
   - Project/Site name
   - Nature of the report
     e.g. (Draft/Final)
     Archaeological Investigation/Survey Report
     Archaeological Impact Assessment Report
     Watching Brief Report
     Rescue Excavation Report
     Post-excavation Report
   - Organization
   - Date of report

2. Contents list
   Page number of each section should be given.

3. Non-technical summary (both in English and Chinese with not less than 300 words each)
   This should outline in plain, non-technical language, the principal reasons for the archaeological work, its aims and main results, and should include reference to authorship and commissioning body.

4. Introduction
   This should set out background leading to the commission of the reports. The location, area, scope and date of conducting the archaeological work must be

given. The location of archaeological work should be shown on maps in appropriate scales and with proper legends.

5. Aims of archaeological work
These should reflect the aims set in the project design.

6. Archaeological, historical, geological and topographical background of the site
Supporting aerial photos and maps (both old and present) in appropriate scales, with proper legends and with the site locations clearly marked on should be provided.

7. Methodology
The methods used including any variation to the agreed project design should be set out clearly and explained as appropriate.

8. Result
This should outline the findings, known and potential archaeological interests by period and/or type. Their significance and value with reference/inclusion of supporting evidence should be indicated. For impact assessment, the likely effect of the proposed development on the known or potential archaeological resource should be outlined.

9. Conclusion
This should include summarization and interpretation of the result.

10. Recommendation
Recommendations on further work and the responsible party as well as a brief planning framework should be outlined.

11. Reference and bibliography
A list of all primary and secondary sources used should be given. Director and members of the archaeological team and author of the report should be listed.

12. Supporting illustrations
They should be clearly numbered and easily referenced to the text. They should be scanned and saved in TIFF or JPEG formats.

A. Maps
Archaeological work locations, such as auger hole and test pit locations (with relevant coordinates certified by a qualified land surveyor), should be clearly shown on maps in appropriate scales, with proper legends, grid references (in 8 digits) and captions.

B. Drawings of test pits, archaeological features and finds
The below scales should be followed:

Cross section and profile drawings of test pits	1:20
Archaeological feature drawings	1:10
Finds drawings	1:1

If drawings of the above stated scales are not appropriate to be incorporated into the report under certain occasions, reduced copy of the drawings with the same scales are acceptable. Proper captions, legends and indication of reduced size should be given.

C. Photos of site and finds
All photos should be at least in 3R size with proper captions and scales. They should be clearly numbered and easily referenced to the text. They should be scanned and saved in TIFF or JPEG formats.

13. Supporting data in appendices
These should consist of essential technical details to support the result. These may include stratigraphy record of test pits and auger holes, record of general and special finds discovered with description, quantity and context number/stratigraphical sequence, index of field archives.

14. Comment and Response
All comments and responses from AMO and relevant parties should be attached.

III. Green Measures

1. All reports should be of single line spacing and printed on both sides of the paper.

2. Excessive page margins should be avoided. A top/bottom margin of 2 cm and left/right margin of 2.5 cm are sufficient.

3. Use of blank paper should be avoided as far as possible.

4. Suitable font type of font size 12 should be used generally in balancing legibility and waste reduction objective.

Annex 2

Guidelines for Handling of Archaeological Finds and Archives

General

1. Site Code
The Licensee should contact the Central Archaeological Repository (CAR) of the Antiquities and Monuments Office (AMO) about the allocation of site code before the commencement of the project to avoid duplicate of site code assignment.

I. 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[1] should be adopted for marking permanent identification number on an object.
- 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.

[1] ***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.

- 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 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.

II. 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 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.

- END -

Appendix E

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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