

Environmental Impact Assessment Ordinance (Cap. 499) Section 5 (7)
Environmental Impact Assessment Study Brief No. ESB-132/2005

Project Title: Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun
(hereinafter known as the “Project”)

Name of Applicant: Water Supplies Department
(hereinafter known as the “Applicant”)

1. BACKGROUND

1.1 An application (No. ESB-132/2005) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the captioned Applicant on 30 August 2005 with a project profile No. PP-258/2005 (the Project Profile).

1.2 The proposed Project is to construct and operate a new western cross harbour main and associated land mains. The indicative route of the proposed water mains is shown in the Project Profile and is reproduced in Annex A of this study brief. The proposed Project will comprise the following:

- (i) an approximately 2100 meter of 1200mm nominal diameter of submarine watermain across Victoria Harbour from its connection at Lin Cheung Road in West Kowloon to the existing Sai Ying Pun Fresh Water Pumping Station in Sheung Wan;
- (ii) an approximately 2200 meter of 1200mm nominal diameter of associated land watermains.

1.3 Based on the scope of the Project Profile, the submarine watermain component of the Project is identified as a Designated Project as defined under Item E.3 of Part 1 Schedule 2 of the EIAO

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

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

- (i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the proposed project;
- (ii) the conditions and requirements for the detailed design, construction and operation of the proposed project to mitigate against adverse environmental consequences wherever practicable; and
- (iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

- (i) to describe the proposed project and associated works together with the requirements for carrying out the proposed project;
- (ii) to identify if there are other types of Designated Projects under Part I Schedule 2 of the EIAO to be covered in the Project;
- (iii) to consider alternative alignment(s) and landing points of the submarine watermain, alternative construction method(s) and sequence(s), and to compare their environmental benefits and dis-benefits with the view of selecting the preferred options from the environmental perspective;
 - (iv) to identify and describe the elements of the community and environment likely to be affected by the proposed project and/or likely to cause adverse impacts to the proposed project, including both the natural and man-made environment;
- (v) to identify and quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
- (vi) to identify and quantify any potential losses or damage to flora, fauna and natural habitats and to propose measures to mitigate these impacts;
- (vii) to identify any negative impacts on fisheries and to propose measures to mitigate these impacts;
- (viii) to identify any negative impacts on sites of cultural heritage and to propose measures to mitigate these impacts;
- (ix) to propose the provision of infrastructure or mitigation measures so as to minimize pollution, visually intrusive sediment plume dispersion, environmental disturbance and nuisance during construction of the project;
- (x) to investigate the feasibility, practicability, effectiveness of the proposed mitigation measures.
 - (xi) to identify, predict and evaluate the residual (i.e. after practicable mitigation) environmental impacts and the cumulative effects expected to arise during the construction phase of the project in relation to the sensitive receivers and potential affected uses;
 - (xii) to identify, assess and specify methods, measures and standards, to be included in the detailed design and construction of the project which are necessary to mitigate these environmental impacts and reducing them to acceptable levels;
 - (xiii) to investigate the extent of secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study as well as subsequent provision of necessary modifications;
- (xiv) to design and specify the environmental monitoring and audit requirements, if required, to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted.

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 Environmental Impact Assessment Ordinance (hereinafter referred to as “the TM”), are fully complied with.

3.2 The Scope

The scope of this EIA study shall cover the Project proposed in the Project Profile and the works and facilities mentioned in Section 1.2 above. The EIA study shall address the 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 and known potential developments in the vicinity of the Project:

- i) the potential water quality impacts arising from the dredging, laying of pipe and backfilling works for the construction of the submarine watermain.
- ii) the potential noise and dust impacts arising from the construction works of the Project.
- iii) the potential impacts on sites of cultural heritage of marine archaeological deposit likely to be affected by the construction works of the Project.
- iv) the potential fisheries impact arising from the Project.

3.3 Consideration of Alternative Alignment Options and Construction Methods

3.3.1 Need for the Project

The Applicant shall present in the EIA the information on the need for the Project and the Project’s implementation programme.

3.3.2 Consideration of Different Alignment Options

The Applicant shall consider any other feasible watermain alignment options for the project, taking into account of other planned projects in the vicinity, including the Western Harbour Submarine Gas Pipeline. Alternative locations of landing points for connecting to land mains shall also be investigated. The Applicant shall compare the environmental benefits and dis-benefits of each of the possible alignment options and locations of landing point and provide reasons for selecting the final preferred option including the environmental factors played in the selection.

3.3.3. Consideration of Other Construction Methods and Sequences of Works

Having regard to the cumulative effects of the construction period and the severity of the construction impacts to the affected sensitive receivers, the Applicant shall explore other alternative construction methods (including those indicated in the Project Profile, i.e. the closed grab dredger method, and other possible methods to be investigated during the course of the EIA study) and sequences of works for the Project, with a view to proposing the best practical method to avoid prolonged adverse environmental impacts to the maximum practicable extent. A comparison of the environmental benefits and dis-benefits of applying different construction

methods and sequence of works shall be made to demonstrate the role played by environmental factors in the selection of the preferred option.

3.3.4 Need for Maintenance Dredging

The Applicant shall investigate whether there would be any need for maintenance dredging during the operation stage. If such a need is identified, the Applicant shall assess and quantify the frequency as well as the likely extent of maintenance dredging required, and the associated potential water quality impact. It is also necessary to assess and quantify such water quality impacts if the maintenance dredging is expected to deploy dredging method and sequence different from the watermain laying activities.

Technical Requirements

3.4 The Applicant shall conduct the EIA study to address all environmental aspects of the activities as described in Sections 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 assess the cumulative environmental impacts from the Project with other interacting projects. The Applicant shall include in the EIA report details of the construction programme and methodologies.

3.5 The Applicant shall review previously approved studies or EIA reports which are relevant to the Project and extract relevant information for the purpose of this EIA study. The following studies or EIA reports shall be referred to:

- Western Harbour Submarine Gas Pipeline and Associated Station
- Proposed Submarine Gas Pipelines from Cheng Tou Jiao Liquefied Natural Gas Production Plant, Hong Kong

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

3.6.1 Water Quality Impact

3.6.1.1 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.

3.6.1.2 The assessment area for the water quality impact assessment shall include the Victoria Harbour and Western Buffer Water Control Zones stipulated under the Water Pollution Control Ordinance (WPCO, Cap. 358); and all areas within 500m from the Project boundary. This assessment area could be extended to include existing and new drainage system; and any associated water system(s) affected by the construction or operation of the Project during the course of the EIA study including Green Island.

3.6.1.3 The Applicant shall identify and analyse physical, chemical and biological disruptions of marine, estuarine or fresh water system(s), drainage system, catchment area(s), stormwater channel(s) and coastal water(s) arising from the construction and operation of the Project.

3.6.1.4 The Applicant shall predict, quantify and assess any water quality impacts arising from the Project on the affected water system(s) and their sensitive receivers by proposing appropriate techniques approved by the Director. Potential impacts shall include, but are not limited to, those arising from: the dredging and backfilling for the laying of the submarine pipeline; hydrostatic tests of the water mains system; sewage, wastewater and surface runoff from construction activities.

- 3.6.1.5 The Applicant shall address water quality impacts due to the construction phase and operational phase of the Project. Essentially, the assessment shall address the following :
- (i). Collect and review background information on affected existing and planned water systems, their respective catchments and sensitive receivers which might be affected by the Project;
 - (ii). Characterize water and sediment quality of the water systems and sensitive receivers, which might be affected by the Project based on existing best available information or through appropriate site survey and tests;
 - (iii). Identify and analyse relevant existing and planned future activities, beneficial uses and water sensitive receivers related to the affected water system(s). The Applicant should refer to those uses specified in the relevant Outline Zoning Plan, Outline Development Plans and Layout Plans, and any other relevant published landuse plans;
 - (iv). Identify pertinent water and sediment quality objectives, criteria or standards for the water system(s) and the sensitive receivers identified in (i), (ii) & (iii) above, including ecologic and fisheries sensitive receivers for the assessments covered in Sections 3.6.2 and 3.6.7.
 - (v). Review construction methods and sequence of the Project to identify any alteration of existing shoreline or bathymetry, flow regimes, ground water levels and catchment types or areas.
 - (vi). Review the specific construction sequence and methods of the Project, such as, the dredging and filling methods; dredging rates; handling, treatment and disposal of effluent arising from hydrostatic test.
 - (vii). Identify and quantify existing and likely future water and sediment pollution sources and loading (to include maintenance dredging, if found necessary, during operational phase of the Project). An emission inventory on the quantities and characteristics of these existing and likely future pollution sources in the study area shall also be provided. Field investigation and laboratory test, shall be conducted as appropriate to fill relevant information gaps.
 - (viii). Predict and quantify, by mathematical modelling or other technique approved by the Director, the impacts due to the Project on the water system(s) and their sensitive receivers. The mathematical modelling requirements are set out in Annex B of this Study Brief. Possible impacts include change in hydrology, flow regime, sediment erosion or deposition, water and sediment quality and the effects on the marine or aquatic organisms or fisheries due to such changes in the affected water bodies. The prediction shall take into account and include possible different construction stages of the Project.
 - (ix). Assess the cumulative impacts due to other related concurrent and planned projects activities or pollution sources along the selected watermain alignment that may have a bearing on the environmental acceptability of the Project. This shall include assessing the potential cumulative water quality impacts arising from, the associated works of the Project, and other activities and planned projects to be approved by the Director.
 - (x). Identify and quantify dredging, fill extraction, back filling, mud/ sediment transportation and disposal activities and requirements. Potential fill source and dumping ground to be involved shall also be identified. Field investigation, sampling

- and laboratory tests to characterize the sediment/mud concerned shall be conducted as appropriate. The potential release of contaminants during dredging and other marine works shall be addressed using the chemical testing results derived from sediment and marine water samples collected on site and relevant historical data. Appropriate laboratory tests such as elutriate tests in accordance with the 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, oxygen demand, ammonia, nutrients, trace organic contaminants (including PCBs, PAHs, TBT and chlorinated pesticides) 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 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, back filling and dumping.
- (xi) Predict, quantify and assess impacts on the hydrodynamic regime, water and sediment quality of the water system(s) and the sensitive receivers due to the activities identified above. The prediction and quantification of impacts caused by sediment re-suspension and contaminants release shall be carried out by mathematical modelling (requirements as set out in Annex B of this Study Brief) or other techniques to be approved by the Director.
 - (xii) Evaluate the impacts of dredging, back filling and dumping, in particular sediment re-suspension and contaminants release, and their effects on ecological sensitive receivers at Green Island as identified in Section 3.6.2.
 - (xiii) Review, evaluate and identify best practicable dredging and backfilling methods to minimize, to the maximum extent, marine mud disturbance, the need for dumping and any demand for fill sources. The Applicant shall work on the presumption that existing marine mud shall be left in place and not be disturbed as far as possible. The selected method shall take into consideration the need to protect ecological sensitive receivers identified at Green Island as required under Section 3.6.2. The selected method shall also take into consideration the need to reduce to the maximum extent the creation of visually intrusive sediment plume to key vantage points, such as commercial buildings fronting the harbour. Where appropriate, the effectiveness of mitigation measures to reduce the size of such plumes shall be included.
 - (xiv) The Applicant shall devise mitigation measures to avoid or minimize the impacts identified. The residual impacts on the water system(s) and the sensitive receiver with regard to the relevant water and sediment quality objective, criteria, standards or guidelines shall be assessed and quantified using appropriate mathematical modelling as set out in Annex B to this Study Brief or other techniques to be approved by the Director.
 - (xv) The Applicant shall assess the potential impact to the marine, coastal or land environment when applying the hydrostatic tests. The chemicals and their respective concentrations to be used for the tests, the potential for their escape into the environment during the testing and their secondary impact on the receiving environment, the effectiveness of any proposed mitigations shall be covered. If necessary, the dispersion of these chemicals shall be assessed and quantified using appropriate mathematical modelling as set out in Annex B to this Study Brief or other techniques to be approved by the Director.

3.6.2 Marine Ecological Impact

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

3.6.2.2 The assessment area for the purpose of this ecological impact assessment shall be the same as the assessment area for Water Quality Impact Assessment, and to include any other area likely to be impacted by the Project, such as Green Island.

3.6.2.3 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. The assessment shall identify and quantify the potential ecological impacts associated with the Project.

3.6.2.4 The assessment shall include the following major tasks:

- (i) review the findings of relevant studies 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 impacts to coastal and aquatic environment;
- (iii) carry out necessary field surveys and investigations to verify the information collected, fill the information gaps identified and fulfil the objectives of the EIA study;
- (iv) establish the general ecological profile and describe the characteristics of each habitat found; major information to be provided shall include :
 - (a) description of the physical environment;
 - (b) habitat maps of suitable scale showing the types and locations of habitats in the assessment area;
 - (c) ecological characteristics of each habitat type such as size, vegetation and/or substrate type, species present, dominant species found, species diversity and abundance, community structure, seasonal patterns, 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;
 - (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) investigate and describe the existing wildlife uses of various habitats;
- (vi) describe recognized sites of conservation importance in the assessment area, and assess whether these sites will be affected by the Project or not;
- (vii) using suitable methodology, identify and quantify any direct, indirect, on-site, primary, secondary and cumulative ecological impacts such as destruction of habitats,

- reduction of species abundance/diversity, loss of feeding and breeding grounds, reduction of ecological carrying capacity and habitat fragmentation.;
- (viii) identify ecological sensitive receivers including sensitive elements of marine, subtidal, and intertidal communities/ habitats which would be potentially affected directly or indirectly by the Project. The corals at Green Island shall be included as one of the major sensitive receivers;
 - (ix) evaluate the significance and acceptability of the ecological impacts identified using well-defined criteria;

Ecological Mitigation

- (x) consider, evaluate and recommend possible alternatives and practicable mitigation measures to avoid, minimize, and/or compensate for the adverse ecological impacts identified.
- (xi) evaluate the feasibility and effectiveness of the recommended mitigation measures and define the scope, type, location, implementation arrangement, subsequent management and maintenance of such measures;
- (xii) determine and quantify the residual ecological impacts after implementation of the proposed mitigation measures;
- (xiii) evaluate the severity and acceptability of the residual ecological impacts using well-defined criteria and determine if off-site mitigation measures are necessary to mitigate the residual impacts; and
- (xiv) review and recommend any ecological monitoring programme required.

3.6.3 Noise Impact (Construction Stage)

3.6.3.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing the construction noise impacts arising from the Project as stated in Annexes 5 and 13 of the TM respectively. In response to Section 4.4.2(h) of the TM, the Applicant shall review and consider any lessons learnt from other similar projects for incorporation in the current proposal to avoid in the first instance or minimize potential noise impacts.

3.6.3.2 The noise impact assessment shall include the following:

(i) Determination of Assessment Area

The study area shall include all areas within a distance of 300m from the Project boundary. The study area may 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 located further away. In this case, the study area shall be agreed with the Director. Subject to the agreement of the Director, the assessment area shall be expanded to include NSRs at greater distance which would be affected by the construction of the Project.

(ii) Provision of Background Information and Existing Noise Levels

The Applicant shall provide background information relevant to the Project, e.g. relevant previous or current studies. Unless involved in the planning standards, e.g. those for planning of fixed noise sources, no existing noise levels are particularly required.

(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 and Layout Plans, and other relevant published land use plans.
- (b) The Applicant shall select assessment points to represent all identified NSRs for carrying out quantitative noise assessment as described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment. A map shall be given showing the location of each and every selected assessment points.

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

The Applicant shall provide inventory of noise sources including representative construction equipment assumed for assessing construction noise associated with the dredging, laying of pipe and backfilling works. Confirmation of the validity of the inventory shall be obtained from the relevant government departments or authorities.

(v) Construction Noise Assessment

- (a) Based on best information, the assessment shall cover the cumulative noise impacts due to the construction works of the Project and other projects and works in the vicinity.
- (b) The Applicant shall carry out assessment of noise impact from construction (excluding percussive piling) of the project during day time, i.e. 7 a.m. to 7 p.m., on weekdays other than general holidays in accordance with the methodology stipulated in paragraphs 5.3. and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of the TM shall be adopted in the assessment.
- (c) 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, re-scheduling and restricting hours of operation of noisy task) to minimize the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance shall be given.
- (d) In case the Applicant would like to evaluate whether construction works in restricted hours as defined under the Noise Control Ordinance (NCO) are feasible or not in the context of programming construction works, reference should be made to the relevant technical memoranda issued under the NCO. Regardless of the results of the construction noise impact assessment for restricted hours, the Noise Control Authority will process the Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary conditions/situations. This aspect should be explicitly stated in the noise chapter and the conclusions and recommendations chapter in the EIA report.

(vi) Assessment of Side Effects and Constraints

The Applicant shall identify, assess and propose means to minimise any side effects and to resolve any potential constraints due to the inclusion of any recommended

direct technical remedies.

3.6.4 Waste Management Implications

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

3.6.4.2 The assessment of waste management implications shall cover the following :

(i) Analysis of Activities and Waste Generation

The Applicant shall identify the quantity, quality and timing of the waste arising as a result of the construction and operation activities, based on the sequence and duration of these activities.

(ii) Proposal for Waste Management

(a) Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation and on-site or off-site reuse shall be fully 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 maximising waste reduction shall be separately considered.

(b) Having taken into account the opportunities for reducing waste generation and maximizing reuse, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal options for each type of waste described in detail. The disposal method recommended for each type of wastes shall take into account the result of the assessment set out in (c) below.

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

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

(iii) Dredging, Filling and Dumping

(a) 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 also 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 method; and the laboratory to be used shall be subject to the approval of the Director. Any seriously contaminated sediment which requires special treatment and/or disposal arrangement in accordance with WBTC No.34/2002 shall be identified by both chemical and biological tests. If the presence of such sediment is confirmed, the Applicant shall

identify the most appropriate treatment and/or disposal arrangement and demonstrate its feasibility.

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

3.6.5 Air Quality Impact

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

3.6.5.2 The assessment area for air quality impact shall general be defined by a distance of 500m from the proposed project boundary.

3.6.5.3 The Applicant shall review the constructional dust impact arising from land based work of the project with respect to the following:

Background and analysis of activities

- (i) provide background information relating to air quality issues relevant to the project, e.g. description of the types of activities of the projects.
- (ii) give an account of the considerations/ measures that had been considered in the planning of the project to abate the air pollution impact. That is, the Applicant should consider alternative construction methods/ phasing programmes to minimize the constructional air quality impact.
- (iii) present the background air quality levels in the assessment area for the purpose of evaluating the cumulative constructional air quality impacts.

Identification of ASRs

- (iv) identify and describe representative existing and planned/committed air sensitive receivers (ASRs) that would likely be affected by the project. The Applicant shall select the assessment points of the identified ASRs such that they represent the worst impact point of these ASRs. A map showing the location and a description including the name of the buildings, their uses and height of the selected assessment points shall be given. The separation distances of these ASRs from the nearest emission sources should also be given.
- (v) provide an exhaustive list of air pollutant emission sources, including any nearby emission sources, which are likely to have impact on the project. Examples of constructional stage emission sources include stock piling, concrete batching and vehicular movements on unpaved haul roads on site, etc.

Mitigation Measures

- (vi) The Applicant shall follow the requirements of the Air Pollutant Control (Construction Dust) Regulation and propose any other remedies or mitigation measures in dust control to ensure construction dust impacts are controlled within the relevant standards as stipulated in section 1 of Annex 4 of the TM.

3.6.6 Cultural Heritage Impact

The Applicant shall engage a qualified marine archaeologist to review available

information to identify whether there is any possible existence of sites or objects of cultural heritage, for example shipwreck, within the seabed that will be affected by the marine works of the Project. The result of the review shall be presented as a written report and charts. If possible existence of sites or objects of cultural heritage are found, a Marine Archaeological Investigation (MAI) shall be required. 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). The requirements of the MAI are set out in Annex C of this EIA study brief.

3.6.7 Fisheries Impact

The Applicant shall investigate the fishing activities within the coastal and marine areas affected by the Project, and assess the potential of any fisheries impact that might arise from the construction and operation of the Project. If there is potential for fishery impact, the Applicant shall follow the criteria and guidelines contained in Annexes 9 and 17 of the TM for evaluating and assessing fisheries impact.

3.6.8 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, and the environmental benefits of environmental protection measures recommended.

4. ENVIRONMENTAL MONITORING & AUDIT (EM&A) REQUIREMENTS

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

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

4.3 The Applicant shall prepare a project implementation schedule (in the form of a checklist) containing all the EIA study recommendations and mitigation measures with reference to the implementation programme.

5. DURATION OF VALIDITY

5.1 The Applicant shall notify the Director of the commencement of the EIA study. If the EIA study does not commence within 36 months after the date of issue of this EIA study brief, the Applicant shall apply to the Director for a fresh EIA study brief before commencement of the EIA study.

6. REPORT REQUIREMENTS

6.1 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.

6.2 The Applicant shall supply the Director with the following number of copies of the EIA report and the executive summary:

- (i) 40 copies of the EIA report in English and 50 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 (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.
- 6.3 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 Report prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in DynaDoc Format (version 3.0 or later) [for Chinese documents] and in Portable Document Format (PDF version 3.0 or later) [for English documents], 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 Report shall be included in the beginning of the document, and all graphics in the report shall be in interlaced GIF format.
- 6.4 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.
- 6.5 When the EIA Report and the Executive Summary are made available for public inspection under section 7(1) of the EIA Ordinance, 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.

7. OTHER PROCEDURAL REQUIREMENTS

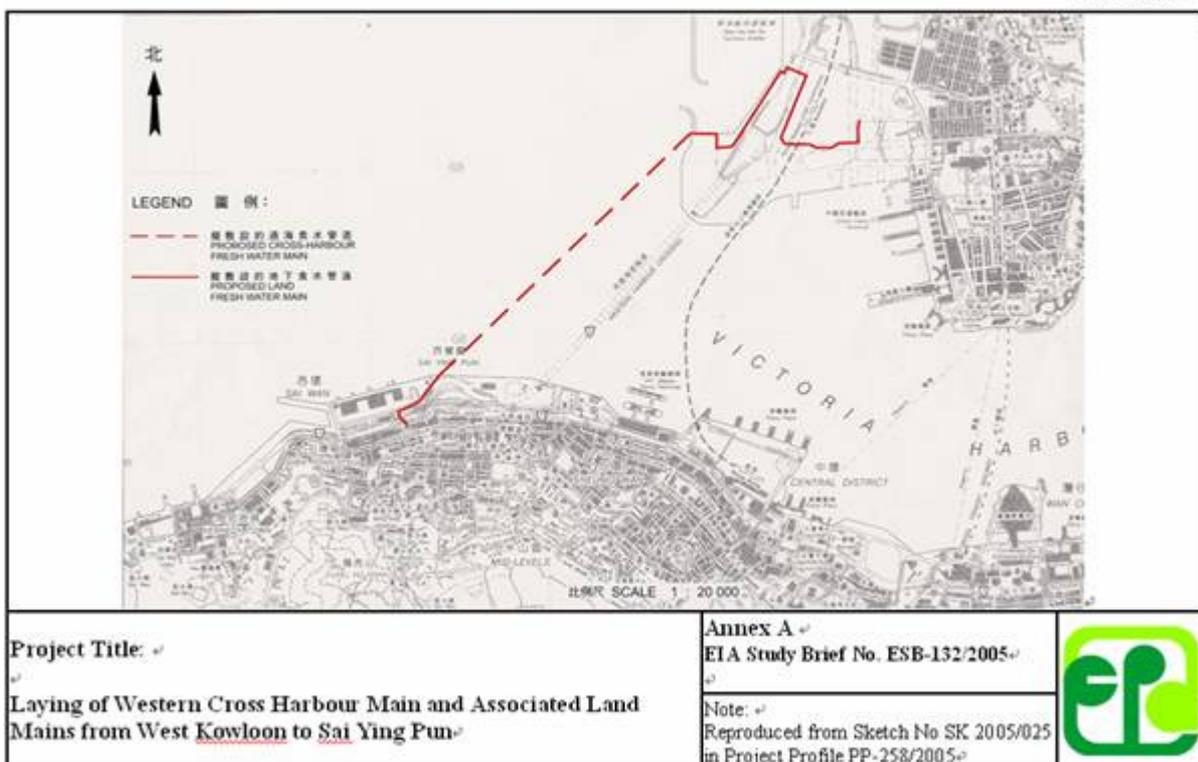
7.1 During the EIA study, if there is any change in the name of the Applicant for this EIA study brief, the Applicant mentioned in this study brief must notify the Director immediately.

7.2 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-258/2005, 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 this EIA study brief, the Applicant shall apply to the Director for another EIA study brief afresh.

--- END OF EIA STUDY BRIEF ---

October 2005
 Environmental Assessment Division,
 Environmental Protection Department

Annex A



Annex A 1



Annex B

Environmental Impact Assessment Study Brief No. ESB-132/2005

Project Title: Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying PunHydrodynamic 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 effect 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. The hydrodynamic, water quality, sediment modules shall have been proven with successful applications locally and overseas.
3. The models shall be strictly mass conserved at all levels.
4. An initial dilution model may be used to characterize the initial mixing of the hydrostatic test effluent discharge, and to feed the terminal level and size of the plume into the far field water quality modules where necessary. The initial dilution model shall have been proven with successful applications locally and overseas.

Model Details – Calibration & Validation

1. 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 relevant field data collected from:
 - 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 Development and Upgrading of Assessment Tool (1998)
 - EPD's routine monitoring data
 - Tidal data from HK 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 :

<u>Criteria</u>	<u>Level of fitness with field data</u>
• tidal elevation (rms)	<8%
• maximum phase error at HW and LW	<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, phytoplankton, organic and inorganic nitrogen, phosphorus, silicate, BOD, temperature, suspended solids, air-water exchange, *E. coli.*, contaminant release of dredged and disposed material, and benthic processes. It shall also be able to 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 the Director. 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 Dangan (Lema) Channel to incorporate all major influences and hydrodynamic and water quality. A fine grid model may be used for detailed assessment of this study. It shall either be dynamically linked to a far field model or form part of a larger model by gradual grid refinement. The coverage of the proposed model shall be properly designed such that it is remote enough so that the boundary conditions would 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 400m in open waters and less than 75m around sensitive receivers. The grid schematisation shall be agreed with EPD.

Modelling assessment

1. 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 particle dispersion modules, where appropriate, shall be run for (with proper model spin up) for at least a real sequence of 15 days spring-neap tidal cycle in both dry season and the wet season.
3. The modelled 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.
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.
6. All modelling input data and results shall be submitted in digital media to EPD.

Annex C

Environmental Impact Assessment Study Brief No. ESB-132/2005**Project Title: Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun****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 and an echo sounder. The data received from the survey would be analyzed 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 material 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 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 Antiquities and Monuments Office (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 ~