

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

Environmental Impact Assessment Study Brief No. ESB-154/2006

**Project Title: West Kowloon Drainage Improvement – Lai Chi Kok Transfer Scheme
Inter-Reservoirs Transfer Scheme (IRTS) – Water Tunnel between Kowloon
Byewash Reservoir and Lower Shing Mun Reservoir**

(hereinafter known as the "Project")

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

1. BACKGROUND

1.1 An application (No. ESB-154/2006) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the Applicant on 29 September 2006 with a project profile (No. PP-298/2006) (the Project Profile).

1.2 The Project is to construct a fresh water transfer tunnel of approximately 2.8 km long with 3 m inside diameter between Kowloon Byewash Reservoirs and Lower Shing Mun Reservoir. The Project is to alleviate recurrent flooding in Sham Shui Po, Cheung Sha Wan and Lai Chi Kok and forms part of the overall flood control strategy for West Kowloon. The project will reduce the quantity of the overflow from the Kowloon Group of Reservoirs into the Lai Chi Kok Transfer Scheme by transferring water from Kowloon Byewash Reservoirs into Lower Shing Mun Reservoir via the new water tunnel. The Project will substantially reduce the scope of Lai Chi Kok Transfer Scheme and make better use of water collected by Kowloon Group of Reservoirs¹ which otherwise overflows into the Butterfly Valley and discharge into the sea during rainstorm. The water transfer tunnel will be located beneath the Kam Shan Country Park and will cross over the High Island Water Tunnel as shown in Appendix I of the project profile, reproduced here as Appendix A and described below :-

- (a) construction of a fresh water transfer tunnel, approximately 2.8km long with 3m diameter;
- (b) construction of an intake structure at Kowloon Byewash Reservoir; and
- (c) construction of an outfall structure at Lower Shing Mun Reservoir.

1.3 The Project partly falls within Kam Shan Country Park. It is therefore a designated project under Item Q.1 of Part I, Schedule 2 of the EIAO which specifies: *“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 special area, a conservation area, an existing or gazetted proposed marine park or marine reserve, a site of cultural heritage, and a*

¹ Kowloon Group of Reservoirs are Kowloon Reservoir, Shek Lei Pui Reservoir, Kowloon Reception Reservoir and Kowloon Byewash Reservoir.

site of special scientific interest". In accordance with section 5(1)(a) of the EIAO, a person who is planning a designated project shall apply to the Director of Environmental Protection (the Director) for an EIA study brief to proceed with an EIA study for the project.

- 1.4 Pursuant to section 5(7)(a) of the EIAO, the Director issues this EIA study brief to the Applicant to carry out an EIA study.
- 1.5 The purpose of this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently. This information will contribute to decisions by the Director on :
 - (i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;
 - (ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
 - (iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

2. OBJECTIVES OF THE EIA STUDY

- 2.1 The objectives of the EIA study are as follows :
 - (i) to describe the Project and associated works together with the requirements for carrying out the Project;
 - (ii) to identify and describe the elements of the 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;
 - (iii) to provide information on the consideration of alternatives to avoid and minimise the potential adverse environmental impacts on the sensitive uses that may be subject to the adverse environmental impacts of the proposed developments and associated works; to compare the environmental benefits and dis-benefits of each of the different options; to provide reasons for selecting the preferred option(s) and to describe the part of environmental factors played in the selection of the preferred option(s);
 - (iv) to identify and quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
 - (v) to identify and quantify any potential losses or damages and other potential impacts on flora, fauna and natural habitats and to propose measures to mitigate these impacts;
 - (vi) to identify any potential landscape and visual impacts and to propose measures to mitigate these impacts;
 - (vii) to identify and assess any adverse impacts on historical buildings/structures and archaeological sites and to propose measures to mitigate these impacts;
 - (viii) to propose the provision of infrastructure or mitigation measures so as to

minimise pollution, environmental disturbance and nuisance during construction and operation of the Project;

- (ix) to investigate the feasibility, practicability, effectiveness and implications of the proposed mitigation measures;
- (x) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise during the construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;
- (xi) to identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate these environmental impacts and cumulative effects and reduce them to acceptable levels;
- (xii) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and
- (xiii) to design and specify the environmental monitoring and audit requirements to ensure the effective implementation of the recommended environmental protection and pollution control measures.

3. DETAILED REQUIREMENTS OF THE EIA STUDY

3.1 The Purpose

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 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) potential air quality impact from the construction of the Project, taking into account the cumulative impact from the existing and planned sources of pollution in the vicinity of the Project, on the sensitive receivers within the study area as detailed in Section 3.4.1, in particular the Tai Po Road Water Staff Quarters which is located about 140m from the proposed intake structure at Kowloon Byewash Reservoir;
- (ii) potential noise impact from the construction of the Project, taking into account the cumulative impact from other concurrent projects in the vicinity of the project, on the sensitive receivers within the study area as detailed in Section 3.4.2, in particular the Tai Po Road Water Staff Quarters;

- (iii) potential water quality impact from the construction of the Project on the relevant water system(s), e.g. the water gather grounds and the reservoirs;
- (iv) potential impacts of various types of waste arising from the construction of the Project;
- (v) potential hazard to life on construction workers and other sensitive receivers to be identified, given Shek Lei Pui Water Treatment Works (SLP WTW) is a Potentially Hazardous Installations (PHI) due to the use of liquid chlorine on site, and the possible use of explosives for blasting;
- (vi) potential ecological impact from the construction and operation of the Project, including its management and maintenance, on the Kam Shan and Lion Rock Country Parks, sites of ecological importance and wildlife groups or habitats/species of conservation importance;
- (vii) potential landscape and visual impacts from the construction and operation of the Project, e.g. on the landscape and visual resources of the Kam Shan and Lion Rock Country Parks;
- (viii) potential cultural and heritage impacts on graded buildings/structures including the Grade II Dam and Valve House of the Kowloon Byewash Reservoir, the Grade II Dam (Northeast) and Valve House of the Shek Lei Pui Reservoir; and
- (ix) cumulative environmental impacts of the Project, through interaction or in combination with other existing, committed and planned developments in the vicinity of the Project including and that those impacts may have a bearing on the environmental acceptability of the Project.

3.3 Consideration of Alternatives

3.3.1 Need for the Project

The Applicant shall study and review the need for the Project and provide information to justify the need. The Applicant shall explain clearly the purpose and objectives of the Project and describe the scenarios with and without the Project.

3.3.2 Consideration of Different Alignment Options

In addition to the proposed alignment set out in the Project Profile, the Applicant shall consider other feasible alternative options for the proposed project, provide justification for the selected alignment, including description of the environmental factors considered in the alignment selection process and attempts made to avoid ecological sensitive areas and the historical buildings/structures.

3.3.3 Consideration of Alternative Construction Methods and Sequences of Works

Taking into consideration the combined effect with respect to the severity and duration of the construction impacts to the affected sensitive receivers, the EIA study shall explore alternative construction methods and sequences of works for the Project,

in particular to avoid the use of explosives, with a view to avoiding prolonged adverse environmental impacts to the maximum practicable extent. A comparison of the environmental benefits and dis-benefits of applying different construction methods and sequences of works shall be made.

3.3.4 Selection of Preferred Scenario

Taking into consideration of the findings in sub-sections 3.3.2 and 3.3.3 above, the Applicant shall recommend with full justifications the adoption of the preferred scenario that will avoid or minimise adverse environmental effects arising from the Project, and adequately describe the part that environmental factors played in arriving at the final selection.

3.4 **Technical Requirements**

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 EIA study shall include the following technical requirements on specific impacts.

3.4.1 **Air Quality Impact**

3.4.1.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing air quality impact as stated in Annexes 4 and 12 of the TM, respectively.

3.4.1.2 The study area for air quality impact assessment shall be defined by a distance of 500 metres from site boundary of the Project shown in Appendix A or other project alignments as identified in the EIA, which shall be extended to include major emission sources that may have a bearing on the environmental acceptability of the Project. The assessment shall include the existing, planned and committed sensitive receivers within the study area. Such assessment shall be based on the best available information at the time of the assessment.

3.4.1.3 When carrying out quantitative assessment, the Applicant shall assess the air pollutant concentrations with reference to the relevant sections of the guidelines in Appendices B-1 to B-3 attached to this study brief, or other methodology as agreed by the Director.

3.4.1.4 The air quality impact assessment shall include the following:

(i) Background and Analysis of Activities

(a) Provide background information relating to air quality issues relevant to the Project, e.g. description of the types of activities of the Project that may affect air quality during construction stage.

(b) Give an account, where appropriate, of the consideration/measures that had been taken into consideration in the planning of the Project to abate the air pollution impact. That is, the Applicant shall consider alternative construction methods/phasing programmes to minimize the constructional air quality impact.

(c) Present background air quality levels in the assessment area for the purpose

of evaluating cumulative constructional air quality impacts.

(ii) Identification of Air Sensitive Receivers (ASRs) and Examination of Emission / Dispersion Characteristics

- (a) Identify and describe existing and planned/committed ASRs that would likely be affected by the Project, including those earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans. The Applicant shall select the assessment points of the identified ASRs that represent the worst impact point of these ASRs. A map showing the location and description such as name of buildings, their uses and height of the selected assessment points shall be given. The separation distances of these ASRs from the nearest emission sources shall also be given.
- (b) Provide a list of air pollutant emission sources, including any nearby emission sources which are likely to have impact related to the Project based on the analysis of constructional activities in Sub-section 3.4.1.4(i) above. Examples of construction stage emission sources include stockpiling, blasting, concrete batching and vehicular movements on unpaved haul roads on site, etc. Confirmation of validity of the assumptions and magnitude of the activities (e.g. volume of construction material handled, etc.) shall be obtained from the relevant government departments/authorities and documented.

(iii) Construction Phase Air Quality Impact

- (a) The Applicant shall follow the requirements stipulated under the Air Pollution Control (Construction Dust) Regulation to ensure that construction dust which may arise as a result of the works are controlled within the relevant standards as stipulated in Section 1 of Annex 4 of the TM. A monitoring and audit programme for the construction phase shall be devised to verify the effectiveness of the control measures proposed so as to ensure proper construction dust control.
- (b) If the Applicant anticipates that the Project will give rise to significant construction dust impacts likely to exceed recommended limits in the TM at the ASRs despite the incorporation of the dust control measures proposed in accordance with Sub-section 3.4.1.4(iii)(a) above, a quantitative assessment shall be carried out to evaluate the construction dust impact at the identified ASRs. The Applicant shall follow the methodology set out in Sub-section 3.4.1.4(iv) below when carrying out the quantitative assessment.

(iv) Quantitative Assessment Methodology

- (a) The Applicant shall apply the general principles enunciated in the modelling guidelines in Appendices B-1 to B-3 while making allowance for the specific characteristics of the Project. This specific methodology must be documented in such level of details (preferably with tables and diagrams) to allow the readers of the assessment report to grasp how the model is set up to simulate the situation at hand without referring to the model input files. Details of the calculation of the emission rates of air pollutants for

input to the modelling shall be presented in the report. The Applicant must ensure consistency between the text description and the model files at every stage of submission. In case of doubt, prior agreement between the Applicant and the Director on the specific modelling details should be sought.

- (b) The Applicant shall identify the key/representative air pollutant parameters (types of pollutants and the averaging time concentration) to be evaluated and provide explanation for choosing these parameters for the assessment of the impact of the Project.
- (c) The Applicant shall calculate the cumulative air quality impact at the identified ASRs and compare these results against the criteria set out in Section 1 of Annex 4 in the TM. The predicted air quality impacts (both unmitigated and mitigated) shall be presented in the form of summary table and pollution contours, to be evaluated against the relevant air quality standards and on any effect they may have on the land use implications. Plans of a suitable scale should be used to present pollution contour to allow buffer distance requirements to be determined properly.
- (v) Mitigation Measures for Non-compliance

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

- (vi) Submission of Model Files

All input and output file(s) of the model run(s) shall be submitted to the Director in electronic format.

3.4.2 Noise Impact

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

3.4.2.2 The noise impact assessment shall include the following :

- (i) Determination of Assessment Area

The study area for the noise impact assessment shall include all areas within 300m from site boundary of the Project shown in Appendix A or other project alignments as identified in the EIA. Subject to the agreement of the Director, the assessment area could be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the outer project limit, provides acoustic shielding to those receivers at further distance behind. Subject to the agreement from the Director, the assessment area shall be expanded to include NSRs at larger distance that 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 required for determining 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 all existing NSRs and all planned/committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans.

(b) The Applicant shall select assessment points to represent all 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 location and description such as name of building, use, and floors of each and every selected assessment point shall be given.

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

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

(v) Construction Noise Assessment

(a) 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.

(b) For ground-borne noise impacts, the criteria and assessment methodology shall be agreed with the Director (with reference to Section 4.4.2(c) of the TM). Site measurements at appropriate locations may be required in order to obtain the empirical input parameters required in the ground-borne noise model.

(c) To minimise the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable. In case blasting works will be involved, it should be carried out, as far as practicable, outside the sensitive hours of 7 p.m. to 7 a.m. on Monday to Saturday and any time on a general holiday,

including Sunday. For blasting that must be carried out during the above-mentioned sensitive hours, the noise impact associated with the removal of debris and rocks should be fully assessed and adequate mitigation measures should be recommended to reduce the noise impact as appropriate.

- (d) For tunnelling, noise impact (including air-borne noise and ground-borne noise) associated with the operation of powered mechanical equipment, in particular, tunnel boring machines or equivalent, shall be assessed. If the equipment, such as a tunnel boring machine and associated facilities, is used, the methodology/model for assessing ground-borne noise impact from these equipments/facilities shall be agreed with the Director prior to obtaining the empirical parameters required in the ground-borne noise model. Cumulative impacts with other projects shall be covered if appropriate.
- (e) 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 minimise the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance shall be given.
- (f) 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.

(vii) Evaluation of Constraints on Planned Noise Sensitive Development/Landuses

For planned noise sensitive uses which will still be affected even with all practicable direct technical remedies in place, the Applicant shall propose, evaluate and confirm the practicality of additional measures within the planned noise sensitive uses and shall make recommendations on how these noise sensitive uses will be designed for the information of relevant parties.

The Applicant shall take into account agreed environmental requirements /

constraints identified by the study to assess the development potential of concerned sites which shall be made known to the relevant parties.

3.4.3 Water Quality Impact

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

3.4.3.2 The assessment area for the purpose of this water quality impact assessment shall cover the project area(s) as shown in Appendix A or other project alignments as identified in the EIA, plus any stream courses and the associated water system in the vicinity that may be affected by the project.

3.4.3.3 The Applicant shall identify and analyse physical, chemical and biological disruptions of marine, estuarine, fresh water or ground water system(s) arising from construction of the Project.

3.4.3.4 The Applicant shall include 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 which might be affected by the Project;
- (ii) Characterization of water and sediment quality based on existing information or appropriate site survey/tests as appropriate;
- (iii) Identification and analysis of relevant existing and planned future activities and beneficial uses related to the water system(s) and identification of all water sensitive receivers within the assessment area;
- (iv) Identification of pertinent water and sediment quality objectives, criteria and standards for the water system(s) and all of the sensitive receivers identified in (iii) above;
- (v) Identification of any alteration of any water courses, natural streams/ponds, wetland, change of shoreline or bathymetry, change of flow regimes, change of ground water levels, change of catchment types or areas;
- (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;
- (vii) Identification of the location of the water table within the project boundary and its distance to the proposed tunnel alignment;

Impact Prediction

- (viii) Prediction and quantification 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. Possible impacts include changes in hydrology, flow regime, sediment erosion or deposition, water and sediment quality and the effects on the aquatic organism due to such changes. The prediction shall include possible different construction stages or sequences;

- (ix) Prediction of potential water quality impact on the water systems and sensitive receivers if the tunnel alignment fall within the phreatic zone, which is right under the water table and are permanently saturated with groundwater, during the stage of tunnel construction;
- (x) Cumulative impacts due to other projects, activities or pollution sources within a boundary around the assessment area, subject to the agreement of the Director shall also be predicted and quantified;

Waste Water and Non-point Sources Pollution

- (xi) proposal for upgrading or providing any effective infrastructure, water pollution prevention and mitigation measures to be implemented during the construction stage so as to reduce the water and sediment quality impacts to within standards. Requirements to be incorporated in the project contract document shall also be proposed;
- (xii) Best management practices to reduce storm water and non-point source pollution shall be investigated and proposed as appropriate; and
- (xiii) 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.

Protection of Water Gathering Ground

- (xiv) Specification of an emergency contingency plan for the construction phase of the project to contain and remove all accidental spillage along roads at short notice so as to prevent/minimize the quantities of contaminants from reaching water gathering grounds.

3.4.4 Waste Management Implications

3.4.4.1 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 respectively.

3.4.4.2 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 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 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 fully evaluated. Measures that can be taken in the planning and design stages e.g. by modifying the design approach and in the construction stage for maximizing waste reduction shall be separately considered.
- (b) After considering all the opportunities for reducing waste generation and maximizing re-use, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal options for each type of waste shall be described in detail. The disposal options recommended for each type of wastes shall take into account the result of the assessment in item (c) below. The EIA report shall also state clearly the transportation routings and the frequency of the trucks / vessels involved, any barging point or conveyor system to be used, the stockpiling areas and the agreed disposal outlets for the wastes identified; and
- (c) The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas :
- potential hazard;
 - air and odour emissions;
 - noise;
 - wastewater discharge; and
 - public transport.

3.4.5 Hazard To Life

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

Explosives

3.4.5.2 The Applicant shall investigate alternative construction method to avoid the use of explosives. If there is use of explosives for the construction activities and the storage or blasting location is in close proximity to populated areas and/or Potentially Hazardous Installation sites (i.e. Shek Lei Pui Water Treatment Works (SLP WTW)), the Applicant shall carry out hazard assessment as follows:

- (i) Identify hazardous scenarios associated with the transport, storage and use of explosives and then determine a set of relevant scenarios to be included in a Quantitative Risk Assessment (QRA);
- (ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;
- (iii) Compare individual and societal risks with the criteria for evaluating hazard to

- life stipulated in Annex 4 of the TM; and
- (iv) Identify and assess practicable and cost-effective risk mitigation measures.

The methodology of hazard assessment shall be agreed and approved by the Director.

Chlorine

3.4.5.3 The Applicant shall investigate methods to avoid and/or minimize chlorine risks during construction. The Applicant shall carry out hazard assessment to evaluate the risk to construction workers of the Project due to the transport, storage and use of chlorine associated with the operations at SLP WTW. The hazard assessment shall include the following:

- (i) Identify hazardous scenarios associated with the transport, storage and use of chlorine at SLP WTW and determine a set of relevant scenarios to be included in a QRA;
- (ii) Execute a QRA of the set of hazardous scenarios determined in (i), expressing population risks in both individual and societal terms;
- (iii) Compare individual and societal risks with the criteria for evaluating hazard to life stipulated in Annex 4 of the TM; and
- (iv) Identify and assess practicable and cost-effective risk mitigation measures.

The methodology of hazard assessment shall be agreed and approved by the Director.

3.4.6 Ecological Impact (Terrestrial and Aquatic)

3.4.6.1 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.

3.4.6.2 The assessment area for the purpose of this ecological impact assessment shall include all areas within 500 m distance from site boundary of the Project shown in Appendix A or other project alignments as identified in the EIA, or the area likely to be impacted by the project.

3.4.6.3 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 proposed project shall avoid impacts on recognised sites of conservation importance and wildlife groups or habitats/species of conservation importance. The assessment shall identify and quantify as far as possible the potential ecological impacts on the natural environment and the associated wildlife groups and habitats/species arising from the Project during the construction and operation phases including its management and maintenance. Assessment of the potential ecological impacts associated with the Project including haul roads and works areas shall also be included. The potential impact of draining down of the Kowloon Byewash Reservoir and Lower Shing Mun Reservoir during the construction and operation phases should be addressed.

3.4.6.4 The assessment shall include the following :

- (a) review the findings of relevant studies/surveys and collate the available information regarding the ecological characters of the assessment area;
- (b) evaluate the information collected and identify any information gap relating

to the assessment of potential ecological impacts to the terrestrial and aquatic environment;

- (c) carry out necessary ecological field surveys (the duration of which shall be at least 4 months to cover both wet and dry seasons) and investigations to verify the information collected, fill the information gaps identified and fulfill the objectives of the EIA study;
- (d) establish the general ecological profile of the assessment area based on data of relevant previous studies/surveys and results of the ecological field surveys, and describe the characteristics of each habitat found. Major information to be provided shall include :
 - (i) description of the physical environment including recognised sites or habitats of conservation importance;
 - (ii) habitat maps of suitable scale (1:1000 to 1:5000) showing the types and locations of habitats/species in the assessment area with special attention to those with conservation importance including monkeys, water monitor (*Varanus salvator*), Beale's turtle (*Sacalia bealei*), bats and any other habitats/species identified as having special conservation importance by this EIA study;
 - (iii) ecological characteristics of each habitat type such as size, vegetation type, species present, dominant species found, species diversity and abundance, community structure, seasonal patterns, ecological value, inter-dependence of the habitats and species, and presence of any features of ecological importance;
 - (iv) representative colour photos of each habitat type and any important ecological features identified;
 - (v) species found that are rare, endangered and/or listed under local legislation, international conventions for conservation of wildlife/habitats or red data books;
- (e) investigate and describe the existing wildlife uses of various habitats with special attention to those wildlife groups and habitats identified as having conservation importance by this EIA study;
- (f) describe all recognized sites of conservation importance in the proposed development site and its vicinity including Kam Shan Country Park and Lion Rock Country Park and assess whether these sites will be affected by the proposed development or not;
- (g) provide information and assess the potential effect of the proposed fresh water transfer tunnel on the water table;
- (h) provide cross-sectional diagrams of the Project for reference.
- (g) using suitable methodology, identify and quantify as far as possible any direct, indirect, on-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 and habitat fragmentation;

- (h) evaluate the significance and acceptability of the ecological impacts identified using the criteria in Annex 8 of the TM;
- (i) recommend possible alternatives (such as modifications of layout and design) and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified;
- (j) 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;
- (k) determine and quantify as far as possible the residual ecological impacts after implementation of the proposed mitigation measures;
- (l) evaluate the severity and acceptability of the residual ecological impacts using the criteria in Annex 8 of the TM; and
- (m) review the need for and recommend any ecological monitoring programme required.

3.4.7 Landscape and Visual Impacts

3.4.7.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing landscape and visual impacts for any above ground structures and work areas as stated in Annexes 10 and 18 of the TM, respectively. Landscape and visual impacts during both construction and operation stages within the study area shall be assessed.

3.4.7.2 The study area for the landscape impact assessment shall include all areas within a 500m distance from the works limit of the above ground elements of the Project shown in Appendix A or other project alignments as identified in the EIA, while the assessment area for the visual impact assessment shall be defined by the visual envelope of the Project. The defined visual envelope must be shown on a plan in the EIA report.

3.4.7.3 The Applicant shall review relevant outline development plans, outline zoning plans, layout plans, other published land use plans, planning briefs and studies which may identify areas of high landscape value, and recommend open space and amenity designations. Any guidelines on landscape strategies, landscape framework, urban design concept, building height profiles, designated view corridors, open space network and landscape links that may affect the appreciation of the project should also be reviewed. The aim is to gain an insight to the future outlook of the area affected so as to assess whether the Project can fit into surrounding setting. Any conflict with the published land use plan(s) should be highlighted and appropriate follow-up action should be recommended.

3.4.7.4 The Applicant shall describe, appraise, analyse and evaluate the existing landscape resource and character of the assessment area. For judging the significance of landscape and visual impacts, reference should be made to Guidance Note No. 8/2002 "Preparation of Landscape and Visual Impact Assessment under the

Environmental Impact Assessment Ordinance”. Annotated oblique aerial photographs and plans of suitable scale showing the baseline landscape character areas and landscape resources and mapping of impact assessment shall be extensively used to present the findings of the impact assessment. Descriptive text shall provide a concise and reasoned judgment from a landscape and visual point of view. The assessment shall particularly focused on the sensitivity of the landscape framework and its ability to accommodate change. The Applicant shall identify the degree of compatibility of the Project with the existing and planned landscape settings. The landscape impact assessment shall quantify the potential landscape impacts as far as possible, so as to illustrate the significance of such impacts arising from the Project. Clear mapping of the landscape impact is required. A tree survey shall be carried out and the impacts on existing trees shall be addressed. Cumulative landscape and visual impacts of the Project with other existing, committed and planned developments in the study area shall be assessed.

3.4.7.5 The Applicant shall assess the visual impacts of the Project. Clear illustrations including mapping of visual impact are required. The assessment shall include the following:

- (i) identification and plotting of visual envelope of the Project within the assessment area;
- (ii) identification of the key groups of sensitive receivers including park visitors within the visual envelope with regard to views from the ground level and elevated vantage points;
- (iii) description of the visual compatibility of the Project with the surrounding and the existing and planned setting, and its obstruction and interference with the key views of the adjacent areas; and
- (iv) description of the severity of visual impacts in terms of nature, distance and number of sensitive receivers.

3.4.7.6 Annotated illustration materials such as coloured perspective drawings, plans and section / elevation diagrams, oblique aerial photographs, photographs taken at vantage points and computer-generated photomontage shall be adopted to fully illustrate the landscape and visual impacts of the Project. In particular, the landscape and visual impacts of the Project with and without mitigation measures shall also be properly illustrated in existing and planned setting by computer-generated photomontage so as to demonstrate the effectiveness of the proposed mitigation measures. All computer graphics shall be compatible with Microstation DGN file format or as agreed with the Director. The Applicant shall record the technical details such as system set-up, software, data files and function in preparing the illustration, which may need to be submitted for verification of the accuracy of the illustrations.

3.4.8 Impacts on Cultural Heritage

3.4.8.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing the cultural heritage impacts as stated in Annex 10 and 19 of the TM, respectively.

3.4.8.2 The Applicant shall conduct a cultural heritage impact assessment (CHIA) to identify known and unknown heritage items within the assessment area (as described in

sections 1.2 and 3.2) that may be affected by the Project and its associated works to assess the direct and indirect impacts on the heritage items. The information of all the identified archaeological sites and historic buildings and structures including their ownerships, historical background, 1:1000 scale location plans, photographs and the like shall be provided. A plan showing the location of both the proposed works and all identified cultural heritage resources shall be included. The Applicant shall consider referring to the relevant sections of the Criteria of Cultural Heritage Impact Assessment in Appendix C for this CHIA.

3.4.8.3 Any potential physical disturbance caused by works during construction and operation of the project to the built heritage (The Grade II Dam and Valve House of the Kowloon Byewash Reservoir, the Grade II Dam (Northeast) and Valve House of the Shek Lei Pui Reservoir), other identified archaeological sites and historic buildings and structures shall be identified and avoided, if applicable. Direct and indirect impacts (including visual impact, impacts due to demolition and vibration associated with the construction activities of the Project) on all identified archaeological sites, historic buildings and structures shall be assessed. Appropriate presentation methods, such as perspective drawings, plans and section /elevation diagrammes, photo retouching and photomontage, shall be used of the visual impact assessment an the recommended mitigation measures.

3.4.8.4 The applicant shall assess the extent to which those cultural heritage resources that might be affected and recommend possible alternatives, (such as other feasible tunnel alignment options, modification of design and construction method, and so forth). Practicable monitoring and mitigation measures including identification of implementation agents and periods to avoid or minimize the impacts on each of the affected cultural heritage resources shall be recommended, if applicable.

3.4.9 Summary of Environmental Outcomes

The EIA report shall contain a summary of the key environmental outcomes arising from the EIA study, including the population and environmentally sensitive areas protected, environmentally friendly designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of 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 construction and operation phases of the Project and, if affirmative, to define the scope of 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 This EIA study brief is valid for 36 months counting from the date of its issuance. If

the EIA study does not commence within this period, the Applicant shall apply to the Director for a fresh EIA study brief before commencement of the EIA study. The Applicant shall advise the Director the date of 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 20 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 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 Portable Document Format (PDF version 5.0 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. Hyperlinks to all figures, drawings and tables in the EIA report and executive summary shall be provided in the main text from where respective references are made. All graphs in the report shall be in interlaced GIF format unless otherwise agreed by the Director.
- 6.5 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.
- 6.6 When the EIA report and the executive summary are made available for public inspection under s.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.
- 6.7 To facilitate public involvement in the EIA process, the applicant shall produce 3-dimensional electronic visualisations of the major findings and elements of the EIA report, including baseline environmental information, the environmental situations with and without the project, key mitigated and unmitigated environmental impacts, and key recommended environmental mitigation measures so that the public can

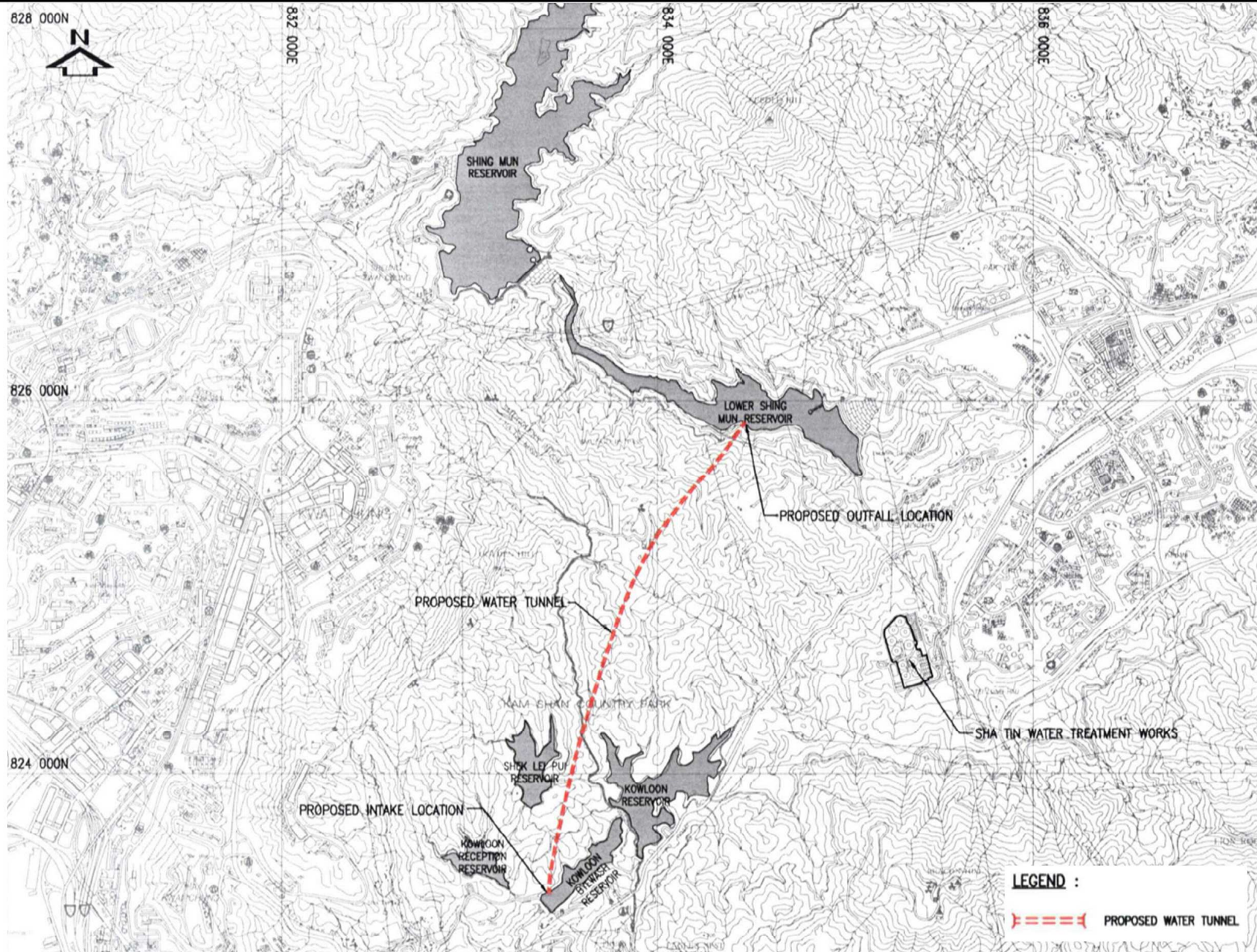
understand the project and the associated environmental issues. The visualisations shall be based on the report and released to the public. The visualisations shall be submitted in CD-ROM or other suitable means agreed with the Director in commonly readable formats. Unless otherwise advised or agreed by the Director, the number of copies of CD-ROM required shall be the same as that for EIA reports under clause 6.2 above.

7. OTHER PROCEDURAL REQUIREMENTS

- 7.1 During the EIA study, if there is any change in the name of Applicant (as representing his or her organisation) 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-298/2006), the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover the key changes, and the additional issues, if any, that the EIA study must also cover to address these key changes. 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 ---

November 2006
Environmental Assessment Division,
Environmental Protection Department



**Project Title - West Kowloon Drasinage Improvement - Lai Chi Kok Transfer Scheme
 Inter-Reservoir Transfer Scheme
 Water Tunnel between Kowloon Byewash Reservoir and Lower Shing Mun Reservoir**

Appendix A - Location Plan (Plan originated from Appendix I of Project Profile no. PP-298/2006)

**EIA Study Brief
 Application No.:
 ESB-154/2006**

