



Water Supplies Department
The Government of the Hong Kong Special Administrative Region

Agreement No. CE 52/2011(WS)
Modernisation of East Wing of Tsuen Wan Water Treatment Works
Investigation

BRIEF
(dated 6 December 2011)

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1. Introduction

1.1 This Brief is to be read in conjunction with the Memorandum of Agreement, the General Conditions of Employment of Engineering and Associated Consultants for an Investigation Assignment (1997 Edition) [hereinafter referred to as the General Conditions of Employment], the Special Conditions of Employment and the Schedule of Fees.

2. Description of the Project

2.1 Tsuen Wan Water Treatment Works (TWWTW) was commissioned in 1957 and was updated in two stages in 1971 and 1979 to a nominal capacity of 318,000 m³/day. However, it can currently only maintain a reliable output of about 200,000 m³/day due to aging of the plant. In order to avoid further deterioration of the treatment works output, it was proposed to modernise the east wing of TWWTW to a nominal capacity of 180,000 m³/day with the west wing maintaining the existing reliable output of 100,000 m³/day during the modernization. The reliability of the output capacity and the capability of the treatment works to cope with the fluctuation of raw water qualities will be enhanced after the modernization works.

2.2 The Project comprises the modernisation of east wing of TWWTW to a nominal capacity of 180,000 m³/day together with the associated works as follows:

- (a) Demolition of the existing facilities of the east wing of TWWTW including mixing tanks No.3 and No.4 and filters No.13 to No. 24, the existing Chemical Store Room and Staff Quarters;
- (b) Modernisation of the existing east wing of TWWTW to the proposed reliable output of 180,000m³/day;

- (c) Construction of the associated facilities which should include, but not limited to, a store for hydrated lime with jumbo bag handling system, alum saturation tanks, a chemical house for preparation and dosing of alum and hydrated lime, an additional chemical store, an on-site laboratory, a permanent workshop and a visitor centre; and
 - (d) Provision of all other associated civil, geotechnical, mechanical and electrical works.
- 2.3 The existing layout of TWWTW and the proposed layout after modernization are shown in Appendix I.
- 2.4 The general background of the Project is as described in Planning Report No. 6/2010 issued by the Development (2) Division of Water Supplies Department (WSD) and the Technical Feasibility Statement (TFS) dated 25 August 2009.
- 2.5 The Project is classified as a Designated Project under item E.2 of Part I and item 6 of Part II, Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) as the project involves modernising the East Wing of TWWTW with a capacity of more than 100,000 m³/day. Under the EIA Ordinance, an Environmental Permit (EP) from the Environmental Protection Department (EPD) is required for the implementation of the Project.
- 2.6 In applying for the required EP, an EIA and an EIA report for the Project should be prepared for the approval of the Director of Environmental Protection (DEP). The project profile, which was submitted to the DEP on 5 August 2011, is attached at Appendix II of this Brief. The EIA Study Brief No. ESB 235/2011 for the Project issued by the DEP on 14 September 2011 is attached at Appendix III of this Brief.
- 2.7 As TWWTW is classified as a Potentially Hazardous Installation in view of its storage of chlorine, a hazard assessment study was carried out. The Hazard Assessment as mentioned in Clause 15.1(c) of this Brief for the existing TWWTW with a design capacity of 318,000 m³/day was endorsed by the Coordinating Committee on Land-use Planning and Control relating to Potentially Hazardous Installation (CCPHI) on 30 September 2004.

- 2.8 According to Section 4.5, Chapter 12.4 of the Hong Kong Planning Standards and Guidelines, where appropriate, a chlorine hazard assessment study to quantify the risks, investigate risk mitigation measures and implement the recommended mitigation measures for TWWTW during and after its modernisation should be carried out. Submission of the hazard assessment to the CCPHI for consideration and endorsement will be required.
- 2.9 A comprehensive review of the existing and modernised TWWTW should be carried out on, but not limited to, hydraulic assessment of the treatment works structures and pipeworks, fresh water and sludge treatment and disinfection processes, sludge disposal processes, chemical storage and dosing requirements, electricity supply arrangement, instrumentation and control arrangement, optimization of energy and manpower resources for operation and maintenance of the treatment plant. Improvement works to the existing treatment works such as modification to the existing treatment works layout for better accessibility, mechanisation and automation in chemical preparation and dosing processes, practical and cost-effective solution to achieve reduction in energy consumption and maintenance and operation costs of the treatment plant should also be studied.
- 2.10 The Project is scheduled for commencement in August 2017 for completion of construction and commissioning in July 2020 and July 2021 respectively.

3. Objective of the Assignment

- 3.1 The objective of this Assignment is to study the options for modernisation of east wing of TWWTW, identify alternative sites and alignments if necessary, carry out EIA for the project, obtain EP for the project and prepare preliminary designs, contract strategy, programmes and cost estimates to enable the detailed design to proceed.

4. Description of the Assignment

- 4.1 This Assignment is to carry out the following:
- (a) Identification and evaluation of all available options for the proposed

modernisation, taking into consideration of the findings of the Planning Reports and TFS.

- (b) An assessment on the capital cost as well as the operation and maintenance costs for each of the feasible options.
- (c) Recommending the most cost effective option for the proposed modernisation.
- (d) A review of the suitability of the sites and an identification of alternative sites and alignments, if necessary.
- (e) Defining the extent and requirements of site investigation and laboratory testing necessary for the design and completion of the proposed works and supervise site investigation works and laboratory testing. Supervision shall be considered as work carried out under Clause 5 of the Schedule of Fees.
- (f) A review of the restrictions, including hydraulics, imposed by the current and future works of WSD and others (including other Government departments) and recommendation of ways of resolving the same.
- (g) Traffic Impact Assessment.
- (h) Hazard Assessment.
- (i) Drainage Impact Assessment.
- (j) Natural Terrain Landslide Hazards Assessment.
- (k) Geotechnical Assessment.
- (l) Value Management Studies.
- (m) An assessment of the landscape and visual impact of the proposed works and proposed ways to minimize the same.
- (n) Identifying the need for and carrying out as necessary Heritage Impact

Assessment and Tree Surveys

- (o) Conducting an EIA and preparation of an EIA report in accordance with the EIA Study Brief issued by the DEP and the EIA Ordinance.
- (p) Advising and assisting the Employer in obtaining approval for the EIA report in accordance with the EIA Ordinance, including public consultation and presentation to the Advisory Council on the Environment if required.
- (q) Advising and assisting the Employer in obtaining environmental permits for the Employer for constructing, operating and decommissioning the Project in accordance with the EIA Ordinance.
- (r) Assessing the impact on the operation of the existing west wing of TWWTW due to the modernisation, both in the construction and operation stages, and recommending appropriate mitigation measures.
- (s) Formulating isolation/connection arrangements and recommending feasible measures to maintain the normal operation of the west wing of TWWTW and to prevent contamination of the treated water during the construction stage.
- (t) A review of the requirement of land.
- (u) A review of accessibility requirements for plant operators and visitors and recommending and suitably incorporating in site and building layouts accessibility provisions in new buildings and alterations to those in existing buildings.
- (v) Reviewing and assessing the short term and long term impacts of the Project to the existing slopes, structures and other facilities, in particular those related to their structural integrity and building serviceability.
- (w) Recommending measures to protect the structural integrity of the structures of TWWTW during the construction stage.
- (x) Public consultation.

- (y) Liaison with relevant Government departments.
- (z) Preliminary designs for the proposed works.
- (aa) Contract strategy, programme and cost estimates for the proposed works.

5. Deliverables

5.1 The Deliverables to be produced by the Consultants throughout the period of the Agreement and submitted to the Director's Representative are as follows:

- (a) Programme of Implementation of Assignment (4 copies) in accordance with Clause 8 of this Brief.
- (b) Progress Reports (4 copies) in accordance with Clause 9 of this Brief. (To be submitted within the first 5 working days of each month.)
- (c) Financial Reports (4 copies) in accordance with Clause 10 of this Brief. (To be submitted within 5 working days from the end of the reporting period.)
- (d) Insurance policy (1 copy) in accordance with Clause S5 of the Special Conditions of Employment. (To be submitted prior to the commencement of the Agreement.)
- (e) Site Investigation Desk Study Report (6 copies) in accordance with Clause 6.4 of this Brief. (To be submitted within 8 weeks from the commencement of the Agreement.)
- (f) Site Investigation Report (6 copies) in accordance with Clause 6.4 of this Brief. (To be submitted within 2 weeks after the completion of the site investigation.)
- (g) C&D Material Management Plan in accordance with Clause 6.4(o) of this Brief. (To be submitted within 4 months from the commencement of the Agreement)

- (h) Geotechnical Assessment Report (6 copies) in accordance with Clause 6.5 of this Brief. (To be submitted within 2 weeks after the completion of the Geotechnical Assessment.)
- (i) Traffic Impact Assessment Report (6 copies) in accordance with Clause 6.6 of this Brief. (To be submitted within 2 weeks after the completion of the Traffic Impact Assessment.)
- (j) Drainage Impact Assessment Report (6 copies) in accordance with Clause 6.7 of this Brief. (To be submitted within 2 weeks after the completion of the Drainage Impact Assessment.)
- (k) Natural Terrain Landslide Hazards Assessment Report (6 copies) in accordance with Clause 6.8 of this Brief. (To be submitted within 2 weeks after the completion of the Natural Terrain Landslide Hazards Assessment.)
- (l) Draft EIA Inception Report for the Project and EIA Inception Report for the Project (10 copies each) in accordance with Clause 6.10(e) of this Brief. (To be submitted within 4 months and 6 months from the commencement of the Agreement respectively.)
- (m) Deliverables of all working papers in connection with the EIA for the Project to DEP (up to 50 copies each) as described in Clause 6.10(m) of this Brief. (To be submitted upon completion of the respective working papers.)
- (n) Draft EIA Report for the Project with Executive Summary and EIA report for the Project with Executive Summary (10 copies each) in accordance with Clause 6.10 of this Brief. A translation in Chinese of the Executive Summary (10 copies) shall be submitted in conjunction with the EIA Report for the Project. The Consultants shall also provide an electronic copy for the EIA Report for the Project with Executive Summary (bilingual in both English and Chinese) in a format in accordance with Appendix J of the EIA Study Brief for the Project at Appendix III of this Brief. (To be submitted within 8 months and 10 months from the commencement of the Agreement respectively.)

- (o) Deliverables of EIA Report for the Project with Executive Summary (each bilingual in both English and Chinese) to the DEP all in accordance with Appendix J of the EIA Study Brief for the Project at Appendix III of this Brief. (To be submitted upon completion of the EIA Report for the Project.)
- (p) Draft Environmental Monitoring and Audit (EM&A) Manual and EM&A Manual in accordance with Clause 6.10(p) of this Brief. (10 copies plus 1 soft copy in electronic file stored in CD-ROM). (To be submitted within 9 months and 11 months from the commencement of the Agreement respectively.)
- (q) EIA report approved by the DEP for the Project (10 copies plus soft copy in electronic file stored in CD-ROM). (To be submitted within 1 month upon approval by the DEP.)
- (r) Deliverables of the EIA Reports approved by the DEP for the Project (up to 100 copies) to others as specified in Clause 6.10(q) of this Brief. (To be submitted within 1 month upon approval of the EIA Report for the Project by the DEP.)
- (s) Hydraulic Assessment and Surge Analysis Report (6 copies) in accordance with Clause 6.11 of this Brief. (To be submitted within 5 months from the commencement of the Agreement.)
- (t) Hazard Assessment Report (6 copies) in accordance with Clause 6.12 of this Brief. (To be submitted within 6 months from the commencement of the Agreement.)
- (u) Heritage Impact Assessment Report (6 copies) in accordance with Clause 6.13 of this Brief. (To be submitted within 5 months from the commencement of the Agreement.)
- (v) Report on Value Management Studies (4 copies) in accordance with Clause 6.14 of this Brief. (To be submitted within 4 weeks after the conduction of Value Management Workshop.)

- (w) Risk Treatment Plans, Risk Management Plans and Risk Registers of the Project in accordance with Clause 6.15 of this Brief. (The first set submission to be submitted within 4 months from the commencement of the Agreement and the updated submission is to be submitted at bi-monthly intervals or on request by the Director's Representative.)
- (x) Draft Options Selection Reports and Options Selection Reports (10 copies each) in accordance with Clause 6.17(o) of this Brief. (To be submitted within 8 months after the commencement of the Agreement.)
- (y) Information papers in both Chinese and English (up to 100 copies for each consultation) as requested by the Director's Representative and in accordance with Clause 6.16 of this Brief for consultation with District Councils, or other public bodies and community groups. (To be submitted 4 weeks prior to the consultation.)
- (z) Technical papers and working papers in connection with the Assignment (5 copies each). (To be submitted upon completion of the respective technical papers and working papers.)
- (aa) Presentation materials (2 hard copies and 1 digital copy) including colour drawings mounted on boards, photographs and slides in connection with the Assignment, programme and progress for consultation with District Councils, or other public bodies and community groups. (To be submitted 2 weeks prior to the presentation.)
- (ab) Technology Transfer Workshop for Government staff (a maximum number of 100 staff members) and Working Paper (up to 100 sets in hard copies and 1 set in electronic files copy stored in CD-ROMs) as specified in Clause 6.20 of this Brief. The working paper shall be available at least 1 month prior to the workshop to be provided towards the end of the Assignment.
- (ac) Records of meetings and correspondence with others (1 copy). (To be submitted within 5 working days from the date of meeting.)
- (ad) Draft Report (20 copies) including drawings, for circulation to Government departments and others involved in or affected by the

proposed works for comments. (To be submitted by the key date specified in Clause 8.3 of this Brief.) The Draft Report shall be fully comprehensive and detailed enough to show the Consultants' findings and recommendations including, a description of the objectives and requirements of the Investigation, the assumptions and input data, the alternatives considered, the recommended options, the methodology used in arriving at the results and the factors considered in developing the recommendations. The Draft Report shall also include a schedule showing how and where in the Report the items listed in Clause 6 of this Brief have been addressed. All the review, studies and investigations carried out under the Assignment shall also form part of the Draft Report. The Consultants shall submit responses to comments received prior to finalization of the Draft Report. Drawings shall be prepared by Computer-Aided-Drafting (CAD) in AutoCAD DXF or DWG format conforming to the CAD Standard for Works Projects version 1.03.00 (or later versions as agreed between the Employer and the Consultants from time to time) as posted on the Development Bureau's web site http://www.devb-wb.gov.hk/electronic_services/comp_aid_draft_standard/cad_standard/index.aspx?langno=1&nodeid=634. Drawings shall also be submitted in Geographic Information System format compatible with WSD Digital Mapping System. The Consultants shall also submit soft copies of the drawings in CD-Rom.

- (ae) Draft Final Report (16 copies) in accordance with Clause 6.21 of this Brief (To be submitted to the Director's Representative for approval by the key date specified in Clause 8.3 of this Brief.)
- (af) Final Report (16 copies) in accordance with Clause 6.21 of this Brief. (To be submitted to the Director's Representative by the key date specified in Clause 8.3 of this Brief.)
- (ag) Executive Summary (16 copies). The Executive Summary shall outline the major issues considered and the findings of the Investigation. The Executive Summary of the Final Report is to be submitted with a Chinese translation. (To be submitted in conjunction with the Draft Final Report and the Final Report)

5.2 The Consultants shall draw the Employer's attention to any Deliverables that are under licence, have any pre-existing copyright or patent or have any other restrictions whatsoever affecting the Employer's use of the same and, if required by the Director's Representative, to establish the existence of any licence, copyright, patent or restriction.

6. Services to be provided by the Consultants

6.1 General

- (a) Comply with all instructions from the Director's Representative and with all relevant Government circulars, Departmental Instructions and technical memoranda as directed by the Director's Representative.
- (b) Draw to the attention of the Director's Representative the need to consider any implications and consequences arising out of or in relation to the Assignment and any other alternative proposals.
- (c) Consider in detail the economic, financial, technical, environmental, legal and social implications of the Assignment and recommend to the Director's Representative an order of preference for the alternative proposals.
- (d) Carry out all necessary surveys, levels and soundings and make such investigations and inquiries as are necessary for the satisfactory completion of the Assignment.
- (e) Attend progress meetings at monthly intervals or at such other intervals as required by the Director's Representative.
- (f) Liaise with and seek agreement of the Geotechnical Engineering Office and any concerned parties on any matters of geotechnical concern arising from the proposed works.
- (g) Prepare the various reports as stated in Clause 5 of this Brief.
- (h) Prepare and submit a programme covering the work of the Assignment

and such revised programmes as may be necessary in accordance with Clause 8 of this Brief.

- (i) Take cognizance of all relevant Ordinances, regulations, procedures, standards, guidelines, manuals, circulars, handbooks in use by the Employer including the following during the course of the Assignment: -

| <u>Title</u> | <u>Issuing Authority</u> |
|--|--------------------------|
| (a) Civil Engineering Design Manual | WSD |
| (b) Manual of Mainlaying Practice | WSD |
| (c) Code of Practice on Monitoring and Maintenance of Water-carrying Services Affecting Slopes | The then ETWB |
| (d) Project Administration Handbook for Civil Engineering Works (PAH) | CEDD |
| (e) Project Administration Manual for Engineering Works | WSD |
| (f) Standard Drawings | WSD |
| (g) Standard Drawings | CEDD |
| (h) General Specification for Civil Engineering Works | Government of HKSAR |
| (i) Standard Method of Measurement for Civil Engineering Works | Government of HKSAR |
| (j) Stormwater Drainage Manual | DSD |
| (k) Hong Kong Planning Standards and Guidelines | PlanD |

| <u>Title</u> | <u>Issuing Authority</u> |
|--|--------------------------|
| (l) Public Works Departmental, Lands and Works Branch, Works Branch, Works Bureau, Environment, Transport and Works Bureau and Development Bureau Technical Circulars | DEVB |
| (m) Planning, Environment and Lands Bureau (Branch), Planning and Lands Bureau and Housing, Planning and Lands Bureau Technical Circulars | HPLB |
| (n) Departmental Instructions | WSD |
| (o) Professional Persons Environmental Consultative Committee (Pro PECC) Practice Notes | PlanD |
| (p) Technical Circulars/Memoranda | DSD |
| (q) Technical Circulars/Memoranda | HyD |
| (r) Technical Circulars/Memoranda | CEDD |
| (s) Technical Memoranda on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance | EPD |
| (t) Guidelines on Traffic Impact Assessment and Day-Time Ban Requirements for Road Works on Traffic Sensitive Routes | HyD |
| (u) Circular Letters and Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment | FSD |

| | <u>Title</u> | <u>Issuing Authority</u> |
|------|--|--------------------------|
| (v) | General Specification for Electrical Installation in Government Buildings of the Hong Kong Special Administrative Region | ArchSD |
| (w) | General Specification for Fire Service Installations in Government Buildings of the Hong Kong Special Administrative Region | ArchSD |
| (x) | General Specification for Air Conditioning, Refrigeration, Ventilation and Central Monitoring & Control System Installation in Government Buildings of the Hong Kong Special Administrative Region | ArchSD |
| (y) | Code of Practices for Energy Efficiency of Electrical Installations, Lighting Installations and Air Conditioning Installations | EMSD |
| (z) | Code of Practice for the Electricity (Wiring) Regulations | EMSD |
| (aa) | Regulations for Electrical Installations | IET |
| (ab) | IEE Wiring Regulations | IET |
| (ac) | Standard Specifications for Mechanical and Electrical Works | WSD |
| (ad) | Electrical Project Design Manual | WSD |
| (ae) | Mechanical Project Design Manual | WSD |
| (af) | Feasibility Study on Cleaning and Disinfection of Service Reservoirs and Disposal of the Effluent (Agreement No. CE 19/94) | WSD |

| <u>Title</u> | <u>Issuing Authority</u> |
|--|--|
| (ag) Design Guide for Polyethylene (PE) Pipelines for Water Supply Purpose | WSD |
| (ah) Geotechnical Manual for Slopes | GEO |
| (ai) Geoguide 1: Guide to Retaining Wall Design | GEO |
| (aj) Geoguide 2 – Guide to Site Investigation | GEO |
| (ak) Geoguide 3 – Guide to Rock and Soil Descriptions | GEO |
| (al) Geoguide 4 – Guide to Cavern Engineering | GEO |
| (am) Geoguide 5: Guide to Slope Maintenance | GEO |
| (an) Stores and Procurement Regulations | Financial Services and the Treasury Bureau |
| (ao) Dangerous Goods Ordinance | Government of HKSAR |
| (ap) Factories and Industrial Undertakings Ordinance | Government of HKSAR |
| (aq) Boilers and Pressure Vessels Ordinance | Government of HKSAR |
| (ar) Electricity Ordinance | Government of HKSAR |
| (as) Fire Services Ordinance | Government of HKSAR |

(j) Consult the authorities listed below, as required by Clause 19 of the General Conditions of Employment, and obtain their approval, where necessary, to the proposed works, the working methods and the programme for the works.

- Agriculture, Fisheries and Conservation Department (AFCD)
- Antiquities and Monuments Office of Leisure and Cultural Services Department (AMO)
- Architectural Services Department (ArchSD)
- Buildings Department (BD)
- Bus Companies
- Civil Engineering and Development Department (CEDD)
- Co-ordinating Committee on Land-use Planning and Control relating to Potentially Hazardous Installations (CCPHI)
- District Lands Office of Lands Department (DLO)
- District Office of Home Affairs Department (DO)
- District Survey Office of Lands Department (DSO)
- Drainage Services Department (DSD)
- Environmental Protection Department (EPD)
- Fire Services Department (FSD)
- Food and Environmental Hygiene Department (FEHD)
- Geotechnical Engineering Office of Civil Engineering and Development Department (GEO)
- Government Property Agency (GPA)
- Government Secretariat: Development Bureau (DEVB)
- Government Secretariat: Environment Bureau (ENB)
- Government Secretariat: Transport and Housing Bureau (THB)
- Highways Department (HyD)
- Lands Department (LandsD)
- Leisure and Cultural Services Department (LCSD)
- Planning Department (PlanD)

- Hong Kong Police Force (HKPF)
 - Housing Department (HD)
 - Transport Department (TD)
 - Water Supplies Department (WSD) including New Territories East Region, New Territories West Region, Kowloon Region, Hong Kong & Islands Region, Customer Services Division, Operations and Slope Safety Unit, Development Divisions, Water Science Division, Design Division, Construction Division, Project Management Division, Consultants Management Division, Mechanical & Electrical/Projects Division and Mechanical & Electrical/Maintenance Division.
 - All other relevant utility companies, Government departments and authorities.
- (k) Identify all facilities, installations and existing rights that may be affected by the Assignment.
- (l) Provide technical support for the Director's Representative to attend meetings with District Councils, rural committees, or other public bodies and community groups in public consultations. This assistance is to include the preparation of information papers (including the required information on greening works in accordance with ETWB TCW No. 34/2003) in both English and Chinese and presentation materials such as colour drawings, photographs and slides in both hard copies and computerised format, and to attend the meetings.
- (m) Provide Chinese translation of the Reports, Information Papers and Executive Summary referred to in Clauses 5.1(n), 5.1(o), 5.1(x) and 5.1(af) of this Brief respectively. This translation shall be carried out by competent translators or translation firms. The translation should be of reasonable quality in rhetoric and phraseology to convey precisely the original meaning of the English version.
- (n) The Consultants shall perform Systematic Risk Management in accordance with ETWB Technical Circular (Works) No. 6/2005 and ETWB Risk Management User Manual to identify risks and uncertainties associated with the Project and recommend treatment measures aiming to reduce these risks and uncertainties to acceptable level and to ensure

timely completion of the Project and within budget and to the required quality. This may include arranging risk management workshops, meeting with relevant stakeholders, preparing the risk treatment plans, risk management plans and risk registers, etc. The Consultants shall employ a dedicated professional staff equipped with relevant experience in this field to perform the duty of the Risk Manager.

- (o) The Consultants shall nominate a professional acceptable to the Employer to be named as the contact person of the Employer in applications for excavation permits and, where applicable, emergency excavation permits pursuant to the requirements of the Land (Miscellaneous Provisions) Ordinance, Cap 28.
- (p) The Consultants shall carry out all duties imposed upon the Employer under the Land (Miscellaneous Provisions) Ordinance, Cap 28 or under the conditions of the excavation permits and, where applicable, emergency excavation permits in so far as such duties have not been imposed only on the Contractor under the Ordinance or under the Contract.
- (q) Notwithstanding Clause (p), the Consultants shall not be liable to the Employer in respect of obligations stipulated under the following conditions of the excavation permits and, where applicable, emergency excavation permits: -
 - (i) the condition stipulated in the excavation permits and, where applicable, the emergency excavation permits relating to the obligation and liability of the Permittee to indemnify the Government against all losses and claims for injury or damage to any person or property, nuisance, disruption or interference whatsoever which may arise out of or in consequence of the work of the Permittee, and against all claims, demands, proceedings, damages, costs, charges or expenses whatsoever in respect thereof or in relation thereto; and
 - (ii) the condition stipulated in the excavation permits and, where applicable, emergency excavation permits relating to the obligation and liability of the Permittee to make good or pay for any works as a result of or in consequence of the work of the Permittee.

- (r) Clause (q) is without prejudice to Clause 22 of the General Conditions of Employment.
- (s) The Consultants shall ensure that the Contractors comply with the permit conditions imposed by the Authority under the Land (Miscellaneous Provisions) Ordinance, Cap 28, including those conditions stipulated in the excavation permits and, where applicable, emergency excavation permits to be observed by the Nominated Permittee or by both the Permittee and the Nominated Permittee and those stipulated in the excavation permits and, where applicable, emergency excavation permits to be observed by the Permittee but which the Contractors are required to comply with under the Contracts.
- (t) In respect of permit conditions which are stipulated in the excavation permits and, where applicable, emergency excavation permits to be complied with by the Permittee but which are required to be complied with by the Contractors under the Contracts, if notwithstanding Clause (s) the Contractors have failed to comply with these conditions, the Consultants shall take such actions so as to ensure that these conditions are complied with by the Employer in his capacity as the Permittee irrespective of whether these actions are required to be carried out by the Contractors under the Contracts.
- (u) Clauses (o) to (t) above shall apply only with respect to excavation in street maintained by the HyD that requires excavation permits and, where applicable, emergency excavation permits under the Ordinance for execution of the Works.
- (v) The Consultants shall engage a competent person to supervise the excavation works on behalf of the Employer, maintain a documented system for supervising the excavation works and maintain a documented system to ensure that the Contractors comply with their duties in relation to excavation works. The attention of the Consultants is drawn to section 10T(5) and (6) of the Land (Miscellaneous Provisions) Ordinance, Cap 28.
- (w) Liaise with all relevant parties who have an interest in or are affected by the Project, in carrying out this Assignment.

6.2 Review of Proposed Sites for the modernisation of east wing of TWWTW and Alignments of the Water Mains

- (a) Review the proposed sites for the modernisation of the east wing of TWWTW and the proposed alignments for the water mains; and identify any alternatives and recommendations that will:
 - (i) result in a more cost effective solution;
 - (ii) reduce the impact on the environment of the surroundings;
 - (iii) reduce the disruption to vehicular and pedestrian traffic;
 - (iv) reduce the inconvenience to the public;
 - (v) phase in more readily with works by others including other Government departments;
 - (vi) reduce the risk to or the effect on adjacent slopes; and
 - (vii) facilitate future operation and maintenance.
- (b) Examine all facilities, installations and existing rights that may be affected by the proposed works.
- (c) Identify the need for resumption of land, clearance or reprovisioning and liaise with the relevant bodies to determine the practicalities and programme for doing so.
- (d) Identify any additional land requirements, such as borrow areas, dumping areas, works areas, storage areas and access roads necessary for the completion of the works.
- (e) Prepare necessary land plans and other relevant information to enable arrangements for land acquisition and clearance for the works and the works areas to be made.

- (f) Liaise and assist in negotiations with relevant bodies on matters of land resumption, clearance and reprovisioning works.
- (g) Identify those parts of the proposed alignments for the water mains where the use of a construction technique other than open cut must be used and describe the recommended technique.
- (h) Identify locations on the proposed and existing drainage systems that are considered suitable to receive connections from the overflow and washout pipes of TWWTW and the washout points on the proposed alignments for the water mains.
- (i) Identify locations on the proposed alignments for the water mains suitable for the fire hydrants required by the Fire Services Department.
- (j) Identify locations where special geotechnical considerations are necessary to meet requirements of GEO and describe the considerations to be made.
- (k) Identify those parts of the proposed alignments for the water mains that are located in carriageways and footways that are subject to road opening restriction.
- (l) Identify the existing utilities and structures that require diversion or modification to suit the proposed alignments for the water mains and establish the procedures, practicalities and programme for doing so.
- (m) Identify locations on the proposed alignments for the water mains for sectional valves, branch tees and connection of new mains to existing mains to suit the operational needs of the New Territories West Region of WSD.

6.3 Water Treatment Process

- (a) Make reference to and take into account the raw water to be supplied to TWWTW and the requirements of the treated water quality objectives in Planning Report No. 6/2010, or any updated requirements provided by WSD, during the course of the Assignment. Due consideration shall also be given to the cost, efficiency, hydraulic, land, environment, operation,

maintenance, the trend of raw water quality and the application of a unique treatment process for the east wing of TWWTW to a reliable output of 180,000 m³/day after its modernisation.

- (b) Identify, review, evaluate and conduct detailed comparisons of all available options of water treatment process, taking into consideration the requirements of this Brief, and the findings and conclusions revealed in the studies and investigations of this Assignment. Particularly, the possibility of having the west wing of TWWTW mothballed after the completion of the modernisation of the east wing of TWWTW should also be taken into consideration. At least three different options have to be prepared, taking due account of the constraints that may be imposed by the existing TWWTW and interfacing with the proposed modernisation works. Recommend to the Director's Representative for approval the most suitable option together with full justifications and the extent and implications of any modifications and enhancement works required in respect of the water treatment process.
- (c) Review the capability of the existing monitoring and control equipment, including the distributed control system and its instrumentation equipment, and evaluate if the water treatment processes can be modified with a higher degree of mechanisation, automation and advanced technology with fall back manual control so as to allow a more efficient plant operation with minimal manpower requirements and variable output to meet demand fluctuations and other operational requirements of the east wing of TWWTW after its modernisation to the reliable output of 180,000 m³/day.
- (d) Review the existing chemical dosing process and recommend new methodology or advanced chemical storage and dosing requirements where appropriate for TWWTW, including both the west wing and the east wing after its modernisation to the reliable output of 180,000 m³/day.
- (e) Review the existing washwater recovery, and sludge handling, dewatering and disposal arrangement and recommend improvement and upgrading works, in addition to the modernisation works required to cope with the reliable output of east wing of TWWTW after its modernisation to 180,000 m³/day, with a view to enhancing operation and maintenance ease.

- (f) Incorporate the findings and recommendations of the above review, studies and investigations into the implementation scheme.

6.4 Site Investigation

- (a) Define the requirement of the site investigation and laboratory testing. Determine, recommend, design, manage and supervise the site investigation and laboratory testing. The Consultants shall obtain the approval from the Director's Representative before carrying out the site investigation and laboratory testing.
- (b) Prepare a Site Investigation Desk Study Report for the proposed site investigation and laboratory testing. The report shall document the information examined (including available reference documents, aerial photographs and site investigation and testing reports, with Geotechnical Information Unit reference where appropriate), describe the geological setting of the site, and indicate the location of utilities within and surrounding the site and the land status. It shall state the need, scope and objectives of the proposed additional site investigation and laboratory testing, and give the estimated depths of proposed drill holes and the likely amount of rock drilling. It shall also include a proposed supervision plan for both the site investigation and laboratory testing works, giving the names and curriculum vitae of the proposed supervisory personnel. The Consultants shall arrange for the report to be vetted and signed by a qualified and experienced professional if the report has not been prepared by such a person. A copy of the Desk Study Report shall be passed to the nominated supervisory personnel to convey to them the available information and the aims of the proposed site investigation and laboratory testing.
- (c) Site investigation and associated laboratory testing may be carried out under the term contracts administrated respectively by the Geotechnical Projects (GP) and Standards & Testing (S&T) Divisions of the GEO in accordance with GEO Ground Investigation Note No. 1/2006 (or its latest version). The Consultants shall liaise with CGE/GP and CGE/S&T respectively to establish the programme of site investigation and laboratory testing. The Consultants shall pass a copy of the Desk Study

Report to CGE/GP together with the request for arranging the site investigation and laboratory testing. The Consultants shall obtain the necessary permissions and approvals for carrying out the site investigation works. The Consultants shall allow a lead time of 3 months between submission of the request for site investigation works and laboratory testing and the actual commencement of the respective works and allow time required for the production of the site investigation and laboratory testing reports. The Consultants shall carry out planning and supervision of site investigation works and laboratory testing, check site investigation and laboratory testing reports produced under the term contracts, review and amend the site investigation and laboratory testing proposals if necessary during the execution of the site investigation works and testing. CGE/GP and CGE/S&T shall be advised of any proposed special testing, as well as any rock testing required, at an early stage of the Assignment. A list of tests available under the GEO term contracts and associated test methods specified can be obtained from CGE/GP and CGE/S&T.

- (d) Liaise with GEO Term Contractor and/or WSD Term Contractor regarding those site investigations to be carried out by them.
- (e) If the individual estimated cost of the site investigation exceeds \$3 million, contractors on DEVB's List of Approved Suppliers of Materials and Specialist Contractors for Public Works Category of Ground Investigation Field Work will have to be engaged by letting individual contracts to carry out the site investigation. The Consultants shall submit the draft tender documents for the individual contracts to CGE/GP for comment in accordance with WBTC No. 13/90 at least six weeks prior to the intended date for tendering. The Consultants shall also submit the priced contract documents, quarterly reports on the performance of the contractors and final site investigation reports to the GP Division of GEO in accordance with WBTC No. 13/90. Prepare all necessary drawings, plans, specifications and documents sufficient for calling for tenders, and assist the Employer in calling tenders for carrying out these works.
- (f) Engage competent specialist contractors to carry out special surveys, site investigation and laboratory testing as necessary. Prepare sketches and other documents for any special site investigation and laboratory testing, invite and analyse tenders from specialist contractors, submit tender

reports to make recommendations to the Director's Representative on acceptance of tenders for acceptance. The successful contractor will be employed by the Employer by means of service orders issued in accordance with the Stores and Procurement Regulations.

- (g) Liaise with the WSD Term Contractor, the GEO Term Contractor, other contractors including specialist contractors engaged under sub-Clause (f) above, utility companies and all Government departments and authorities concerned to obtain permissions for the site investigation including the application for Excavation Permits and access permission. Provide and enter relevant information for obtaining Excavation Permits and any extensions thereof through the Excavation Permit Management System (XPMS) administered by HyD. Prepare temporary traffic arrangement schemes as required.
- (h) Identify all utilities, facilities, installations and existing rights that may be affected by the site investigation. Liaise with and obtain consent from the concerned parties for carrying out the site investigation, including the consent for diversion or relocation of the utilities, facilities and installations if necessary.
- (i) Carry out all necessary surveys, setting out, levels and sounding, make such investigation and inquiries and search site records as are necessary for the satisfactory completion of the site investigation.
- (j) Supervise the site investigation including reinstatement, and ensure that pedestrian and vehicular traffic arrangements and the provisions for supporting, watching, guarding and lighting of any excavations are to a standard that will enhance the public image of WSD. Report on the contractor's performance. Take measurements of findings and photographs. Take measurements of work done and prepare quantities for payment for the works. Supervise laboratory testing. The Consultants shall provide adequate qualified and experienced personnel to plan, direct and supervise the site investigation and laboratory testing. The recommendations of Geoguide 2 regarding the requirements of the personnel for supervision of site investigation and laboratory testing should be followed.

- (k) The work of supervising site investigation and laboratory testing shall be considered as work carried out under Clause 5 of the Schedule of Fees.
- (l) Prepare and submit reports on the results, findings and conclusions of the site investigation and laboratory testing including drawings to show the location of all existing services, underground structures and obstructions.
- (m) Determine the extent of any further site investigations, surveys and studies required for detailed design purposes.
- (n) Determine the extent of the excavations for the construction of the proposed works that will be carried out in rock or artificial hard material and assess the volume of rock and artificial hard material to be excavated.
- (o) Determine the quantity of earthworks, develop a fill sourcing and disposal strategy and design dump sites and associated haul roads, in consultation with Public Fill Committee (PFC) of CEDD and EPD, and explore and identify suitable recycled inert construction and demolition (C&D) material to be used for site formation and road and drainage construction. Draw up a C&D Material Management Plan (C&DMMP) in accordance with ETWB TCW No. 33/2002. The C&DMMP shall be endorsed by CEDD Vetting Committee. Attend the Vetting Committee Meeting to present the plan if necessary. The endorsed C&DMMP shall be submitted to the PFC for approval.

6.5 Geotechnical Assessment

- (a) Liaise with and seek agreement of GEO and any other concerned parties on any matters of geotechnical concern arising from the proposed works.
- (b) Prepare and submit a Geotechnical Assessment report to GEO for approval. This report, which shall identify any fundamental geotechnical constraints at the proposed sites and the geotechnical feasibility of the proposed works, should include the following information:
 - (i) An outline of the topography, geology and groundwater conditions of the site.

- (ii) A general description of the proposed works and discussions of how the existing geotechnical features, such as slopes, retaining walls and adjacent foundations, will affect or be affected by such works.
- (iii) A discussion that demonstrates the feasibility of the proposed works, including descriptions and evaluation of construction methods and sequence of works.
- (iv) Schematic plans and sections of the proposed site formation works and foundation works, taking the above discussion into account.
- (v) A plan showing the scope and extent of the proposed ground investigation specifying, by reference to Section 15.3 of Geoguide 2: Guide to Site Investigation, the level of independent site supervision of the works to be undertaken.
- (vi) Recommendations on any investigations of the stability of existing slopes and retaining walls as well as any preventive or remedial works that may be needed.
- (vii) Description of intended study to assess the potential natural terrain hazards arising from landsliding and boulder/rock falls and any mitigation measures that may be needed.

6.6 Traffic Impact Assessment

- (a) Carry out a Traffic Impact Assessment for the proposed works in accordance with the Guidelines on Traffic Impact Assessment and Day-Time Ban Requirements for Road Works on Traffic Sensitive Routes issued by the Research and Development Division of HyD referenced RD/GN/021 and dated July 1995 or later version (Guidelines on TIA).
- (b) The Traffic Impact Assessment for road works should cover the roads/road junctions to be affected by the works, i.e. the roads/road junctions along the proposed alignment of the water mains. Finalize and agree with TD the boundaries of the study area prior to the commencement of the study.

- (c) Carry out traffic counts for the Traffic Impact Assessment.
- (d) Identify any traffic lights that will need adjustment and any traffic diversions or road closures required to facilitate the carrying out of the proposed works.
- (e) Identify those parts of the works that will require special measures for pedestrian traffic and recommend how the provisions for these special measures are to be made.
- (f) Identify any special measures required by HyD, TD and HKPF for carrying out the proposed works and recommend how the provisions for these special measures are to be made.
- (g) Identify those parts of the pipelines that must be constructed by trenchless techniques to avoid unacceptable traffic conditions.
- (h) Prepare report on the results, findings and conclusions of the study and incorporate the same into the implementation scheme.
- (i) Present the results of the study to all concerned parties or persons as required.

6.7 Drainage Impact Assessment

- (a) Make reference to and take into account the findings and recommendations in Planning Report No. 6/2010 and other relevant reports and studies and carry out studies, field measurements, and investigations on temporary and permanent drainage impacts arising from the proposed works.
- (b) Prepare project profile to define the necessity, scope and requirement of the DIA and, after agreement by the Director's Representatives, conduct DIA Study and submit DIA Report in accordance with ETWB TCW No. 2/2006.
- (c) Liaise with and seek agreement of DSD, WSD and any other concerned parties or persons on all matters relating to the drainage impacts of the

proposed works.

- (d) Prepare report on the results, findings and conclusions of the study and incorporate the same into the preliminary design.

6.8 Natural Terrain Landslide Hazard Assessment

6.8.1 Natural terrain landslide hazards assessment shall follow the guidelines given in GEO Report No. 138 and shall include the following: -

- (a) Propose appropriate study area for the agreement of the GEO.
- (b) Undertake a thorough review of all available geotechnical and geological information relevant to the study area.
- (c) Carry out an Aerial Photograph Interpretation (API) using all available aerial photographs of the study area, geological maps, Natural Terrain Landslide Inventory, Boulder Field Inventory, existing ground investigation information and relevant geotechnical reports, to identify any significant past events and the current status of the study area.
- (d) Undertake all necessary field work to validate the findings of the desk study and to provide sufficient detailed information about drainage lines, rock outcrops, significant boulders and boulder fields, soil exposures, landslide scarps, seepages and stream flows, open slope and drainage line morphology and vegetation for the preparation of a well reasoned assessment of the landslide hazard that may affect the proposed site.
- (e) Based on the information obtained from the desk study and the fieldwork, judge the most likely sources of instability on the slopes above the proposed site, the likely magnitude of such instability, including the volume of landslide debris, the paths that such debris would follow and the estimated debris travel distance of the resulting debris.
- (f) Recommend the types of measures that would be appropriate to mitigate against the assessed hazards. These may include in-situ stabilisation, mitigation works in the travel path to retard, store or deflect debris or protective works on the proposed site itself. Prepare preliminary designs

of the mitigation measures with a plan and a rough order of the cost of the measures. Prepare a detailed maintenance schedule with an estimate of the related capital and recurrent costs.

- (g) Prepare and submit a report presenting the results of the study to GEO for approval. The report shall contain all necessary photographs, tables, figures and drawings, including cross sections, to adequately illustrate the reasoning given in the text of the report. In particular, the report shall contain the following key drawings:
- (i) Cross-sections down each debris travel path from the identified potential landslide source locations and boulder/rock fall locations to the proposed site.
 - (ii) An Engineering Geology Map at a scale of 1:1,000 showing:
 - the solid and superficial geology of the study area;
 - the locations of exposures of soil and rock, annotated with key information about the nature of such materials;
 - sites of past instability, e.g. landslip scars, annotated with key information of the instability; and
 - drainage courses with comments regarding any areas of seepage or likely seepage.
 - (iii) A Natural Terrain Hazards Map at a scale of 1:1,000 showing:
 - likely landslide sources, annotated;
 - likely boulder fall and/or rock fall locations;
 - debris flow paths from landslide sources with the likely distance that debris will travel; and
 - boulder fall and/or rock fall trajectories with the likely travel distance of the boulders and the rock blocks.
 - (iv) A Mitigation Measures Strategy Map at a scale of 1:1,000 showing preliminary layout and suggested mitigation measures.

6.9 Interfacing Requirements and Restrictions from Work by Others

6.9.1 Identify those works being carried out or to be carried out by others, including other Government departments, that may have impact on the works and identify appropriate measures including entrustment, special working methods, phasing or programming for the works to minimize road excavations, resolve interfacing issues, overcome the difficulties caused by these restrictions and to minimize disruption to the public.

6.10 Environmental Impact Assessment

- (a) The Project is classified as a Designated Project under item E.2 of Part I and item 6 of Part II, Schedule 2 of the EIA Ordinance (Cap. 499). Under the EIA Ordinance, an EP from the Environmental Protection Department (EPD) is required for the implementation of the Project. The project profile, which was submitted to the DEP, is attached at Appendix II of this Brief. The EIA Study Brief for the Project issued by the DEP is attached at Appendix III of this Brief. The Consultants shall also refer to the EIA Project Profile and Study Brief of the Project in the EIA Ordinance Register Office of EPD and the EIA Ordinance website (<http://www.epd.gov.hk/eia>)
- (b) The Consultants shall conduct an EIA for the Project and prepare an EIA report in accordance with the EIA Study Brief issued by the DEP (as attached in Appendix III) and the EIA Ordinance, and advise and assist the Employer in obtaining approval from the DEP for the EIA report for the Project in accordance with the EIA Ordinance, including public consultation and presentation to the Advisory Council on the Environment.
- (c) The Consultants shall advise and assist the Employer in obtaining environment permits for the Employer for constructing, operating and decommissioning the Project in accordance with the EIA Ordinance.
- (d) The Assignment shall be conducted and reports shall be prepared with maximum flexibility to respond to change in design requirements and layout of the proposed works during the course of the Assignment. The Consultants are deemed to have taken into account these conditions in submitting the Lump Sum fee proposal.

- (e) The Consultants shall prepare and submit Inception Report to the Director's Representative for his approval which shall include the following:
- (i) the understanding and appreciation of the objectives of the EIA for the Project;
 - (ii) the approach and methodology for the various parts of the EIA for the Project including the identification of the Area of Influence;
 - (iii) a works programme, with major work tasks and key decision points identified and briefly described including a schedule detailing the submission of reports, working papers and technical notes; and
 - (iv) organization and staffing of the study team and the curricula vitae of the key study team members.
- (f) The Consultants shall on behalf of the Employer apply to the DEP for approval of the EIA report for the Project, and at the same time lodge the application for obtaining the EP for the Project. Upon advised by the DEP, the Consultants shall arrange for the advertisement and public inspection of the EIA report for the Project. When required and as a part of the consultation exercise, the Consultants shall also present the EIA report for the Project to the EIA Sub-committee of Advisory Council on the Environment, Environmental Assessment Panel of the LegCo, District Council, Rural Committee and any other public consultation meetings to brief his/her case against the relevant environmental impacts generated.
- (g) The Consultants shall attend, upon requested by the Director's Representative, Environmental Study Management Group meetings convened by the DEP to provide a forum for discussion on the requirements arising from the EIA for the Project, the methodology or the initial findings of the EIA.
- (h) The Consultants shall prepare and supply all necessary drawings, documents and presentations, and attend, serve and report to the meetings.
- (i) The Consultants shall liaise, communicate and correspond directly with

the following authorities on behalf of the Employer to obtain information or comments necessary for the completion of the EIA for the Project:

- (i) EPD on EIA studies, recommended environmental mitigation measures, implementation of environmental protection and pollution control, mitigation measures and monitoring programme, and the application of an EP for the Project;
- (ii) Antiquities and Monuments Office of Leisure and Cultural Services Department on the historical, archaeological and cultural heritage impact assessment study;
- (iii) EPD, Food and Environmental Hygiene Department and Leisure and Cultural Services Department on the requirements of pollution control measures to limit water contamination and air, dust, odour, noise and site run-off nuisance during construction of the works under the Assignment;
- (iv) Leisure and Cultural Services Department on amenity, civic, community, recreational facilities, if necessary;
- (v) Secretariat, Public Fill Committee on allocation of designated outlet for disposal on inert construction and demolition material;
- (vi) Fire Services Department on the fire protection and dangerous goods store requirements;
- (vii) District Lands Office and District Survey Office of Lands Department, Planning Department and Government Property Agency on all land and land related matters including surveying and mapping;
- (viii) District Office of Home Affairs Department on matters affecting the public interest at large, relating to public consultations of the EIA for the Project as well as undertake presentations and attend meetings with District Offices, various Rural Committee and District Council including their sub-committees;

(ix) Planning Department on matters relating to landscape and visual impact assessment; and

(x) Agriculture, Fisheries and Conservation Department on matters relating to ecological impact assessment.

The Consultants should copy relevant correspondence to the Director's Representative for information.

(j) In addition to the above, the Consultants shall liaise with all other parties involved in this Assignment. Any correspondence, notes or minutes arising from these liaisons shall be copied to the Director's Representative for information.

(k) The Consultants shall take into account, where available, the findings of all previous and current relevant environmental impact assessment studies.

(l) The Consultants shall demonstrate in the EIA Report for the Project that the criteria in the relevant sections of the Technical Memorandum on EIA Process (hereinafter referred to as the TM) are fully complied with. In preparing the EIA Report for the Project, the Consultants shall refer to Annex 11 of the TM for the contents of the report. The Consultants shall also refer to Annex 20 of the TM, which stipulates the guidelines for the review of the EIA Report. The EIA Report for the Project shall contain a summary of the key environmental outcomes arising from the EIA, including the population and recommended, key environmental problems avoided, compensation areas included, the environmental benefits of environmental protection measures recommended and residual impact. The Consultants shall prepare and contain all the EIA recommendation and mitigation measures with reference to the implementation programme into the EIA Report for the Project.

(m) The Consultants shall prepare and submit all working papers (comprising Inception Report and EIA Report for the Project) to, among others, the Director's Representative and the DEP for comments.

(n) As regards compliance with laws, the Consultants shall observe the followings:

- (i) the EIA for the Project is a tool to identify potential environmental impacts arising from the Project and to provide a basis for decisions for the implementation of the Project, but it does not automatically exempt the Project from licensing requirements and approvals from relevant authorities; and
 - (ii) the Consultants shall comply with and observe all Ordinances, by-laws, regulations and rules for the time being in force in Hong Kong governing the control of any form of pollution for environmental protection.
- (o) The Consultants shall pay due consideration to beneficial and adverse effects, short and long term effects, secondary and induced effects, cumulative effects, synergistic effects and transboundary effects of any potential impacts in the assessment and analysis and make recommendation on the most appropriate measures to effectively mitigate the impact to an acceptable level.
- (p) The Consultants shall prepare and submit Environmental Monitoring and Audit (EM&A) Manual to the Director's Representative for his approval which shall include the following:
- (i) duties of the environmental team with respect to the EM&A requirements during construction stage;
 - (ii) information on project organization and programming of construction activities for the Project;
 - (iii) requirements with respect to the construction schedule and the necessary EM&A programme to track the varying environmental impact;
 - (iv) definition of Action and Limit levels;
 - (v) establishment of event and action plans;
 - (vi) requirements of reviewing pollution sources and working

procedures required in the event of non-compliance of the environmental criteria;

(vii) requirements of presentation of EM&A data and appropriate reporting procedures; and

(viii) any revisions or supplements to the above as may be required by the Director's Representative or by the DEP through the Director's Representative.

(q) The Consultants shall send sufficient copies of the EIA reports approved by the DEP for the Project to the public reference libraries of Leisure and Cultural Services Department, the Public Enquiry Service Centre of relevant District Office(s) and the library of the Legislative Council Secretariat all in accordance with the ETWB TCW No. 13/2003 (or its latest version).

(r) The Consultants shall advise and assist the Employer in preparation of the Environmental Implications Paragraph for submission of the Public Works Subcommittee (PWSC) Paper. For this purpose, the Consultants shall provide an estimation with breakdown and total cost of implementing the environmental mitigation measures required in the EIA report approved by the DEP for the Project.

(s) The Consultants shall incorporate all findings and recommendations of the above EIA into the preliminary design.

6.11 Hydraulic Assessment and Surge Analysis for the Project

(a) Carry out detailed hydraulic assessment and surge analysis covering the entire existing/proposed raw water and the entire existing/proposed treated water transfer systems, taking into account of any changed circumstances, increased flows in the raw water and the treated water transfer systems and all anticipated/intended modes of operation of the systems.

(b) Review the adequacy of the existing surge protection facilities and recommend appropriate surge protection facilities on existing and/or proposed waterworks installations.

- (c) Set up a hydraulic profile with hydraulic modelling and/or calculation for the existing and modernised TWWTW, check and review the overall, hydraulic and treatment, performance of the existing and modernised TWWTW.
- (d) Prepare and submit reports to the Director's Representative.
- (e) Incorporate the findings and recommendations of the above hydraulic assessment and surge analysis into the implementation scheme.

6.12 Hazard Assessment

- (a) Make reference to Final QRA Report as mentioned in Clause 15.1(c) of this Brief, carry out a hazard assessment in consultation with EPD for the modernisation of east wing of TWWTW to a reliable output of 180,000 m³/day, and the associated transportation of any dangerous goods such as liquid chlorine or any other alternative disinfectants to quantify risks and recommend risk mitigation measures to comply with the “as low as reasonably practicable (ALARP)” principle used in the Hong Kong Planning Standards and Guidelines or any updated Guidelines. The Consultants shall take into account any potential or proposed development in vicinity of TWWTW, if appropriate, when carrying out the Hazard Assessment.
- (b) Prepare and submit a report presenting the results of the study to the CCPHI for consideration and endorsement if necessary.
- (c) Present the results of the review/studies to all concerned parties or persons including District Councils if necessary.

6.13 Heritage Impact Assessment (HIA)

- (a) Carry out surveys and confirm to AMO whether there are heritage sites including declared monuments, proposed monuments, sites and buildings graded by the Antiquities Advisory Board, sites of archaeological interest or Government historic sites identified by AMO within or in the vicinity of the project boundary.

- (b) Submit a proposed Study Brief on the scope of the HIA when required by AMO.
- (c) Liaise with and seek agreement of AMO on the scope of the HIA and all matters relating to the heritage impacts of the proposed works.
- (d) After agreement by the Director's Representatives, conduct HIA Study and submit HIA Report in accordance with DEVB TCW No. 6/2009.
- (e) Consult the public (e.g. District Councils, Area Committees and other stakeholders on heritage conservation) on the proposed works project if adverse impact on any heritage site is anticipated.

6.14 Value Management (VM) Studies

- (a) Identify areas of the Project suitable for the VM studies and recommend for the agreement of the Director's Representative on the scope of the VM studies. The VM studies shall be carried out in accordance with Section 1.4.2 of Chapter 1 of PAH as mentioned in Clause 6.1(i)(d) and the "Guideline for Value Management Studies" issued by WSD dated February 1999.
- (b) The VM facilitators must be subject to the prior agreement of the Director's Representative.
- (c) Conduct VM studies, and prepare reports on the results, findings and conclusions of the VM studies.
- (d) Prepare and submit the results, findings and conclusions of the VM studies to WSD.

6.15 Systematic Risk Management

6.15.1 The Consultants shall perform Systematic Risk Management in accordance with ETWB TCW No. 6/2005 and ETWB Risk Management User Manual to identify risks and uncertainties associated with the Project and recommend treatment measures aiming at reducing these risks and uncertainties to acceptable level and

to ensure timely completion of the Project and within budget and to the required quality. This may include arranging risk management workshops, meeting with relevant stakeholders, preparing the risk treatment plans, risk management plans and risk registers, etc. The Consultants shall employ a dedicated professional staff equipped with relevant experience in this field to perform the duty of the Risk Manager.

6.16 Public Consultation

- (a) Identify District Councils, relevant committees, public consultation bodies and community groups with whom public consultations are to be made and prepare a strategy and programme for doing so.
- (b) Prepare information papers and presentation materials with Chinese translation and attend meetings of the public bodies to be consulted and assist with the presentation as necessary. The number of such meetings is estimated to be forty over which the Employer shall pay the extra cost on a time charge basis.

6.17 Preliminary Designs

- (a) Prepare preliminary designs including landscaping design, all calculations and drawings. The preliminary designs shall include such basic information which will allow the detailed design of the works to be carried out and shall take into account all requirements, restraints, findings and conclusions identified from the studies required by this Brief, and all requirements and restrictions in the Planning Report No. 6/2010 and from the concerned Government departments and utility companies.
- (b) Consult all authorities having rights or powers in connection with the Project, the works or the site. Obtain the necessary approval from these authorities for construction of the proposed works.
- (c) Recommend methods of removal and locations for the disposal of the surplus excavated material from the proposed works.
- (d) Liaise with the Hong Kong and Islands, Kowloon, New Territories East and New Territories West Regions of WSD for any works associated with

the Assignment which may interrupt the operation or reduce the reliability of the existing supply system.

- (e) Liaise with the Hong Kong and Islands, Kowloon, New Territories East, New Territories West Regions, Development, Water Science, Mechanical and Electrical/Projects and Mechanical and Electrical/Maintenance Divisions of WSD regarding the requirements on mechanical and electrical plant and equipment including remote monitoring and control equipment, and SCADA System.
- (f) Liaise with the New Territories West Region of WSD in respect of requirements for branch tees, sectional valves, washouts, air valves, leakage detection facilities, other necessary devices, the arrangement for connection of the proposed mains to the existing mains, and abandonment of the old water mains.
- (g) Liaise with the New Territories West Region, Mechanical and Electrical Projects Division, Mechanical and Electrical Maintenance Division and Water Science Division of WSD in respect of any improvement works to the existing TWWTW such as modification to the existing layout for better accessibility, the mechanisation and automation of chemical preparation and dosing processes, practical and cost-effective solutions to achieve reduction of the costs for energy, maintenance and operation of the system.
- (h) Identify all utilities, facilities, installations and existing rights that may be affected by the proposed works. Liaise with and obtain consent from the concerned parties for construction of the proposed works including the consent for diversion or relocation of the utilities, facilities and installations if necessary.
- (i) Identify any materials or services that are required prior to or separately from the main works contracts.
- (j) Carry out design check on existing structures affected by the proposed works under the Assignment and recommend measures to protect the structural integrity and building serviceability of the existing structures during the construction stage.

- (k) Carry out review of the existing facilities in TWWTW affected by the proposed works on aspects such as hydraulic assessment of the structures and pipeworks, fresh water and sludge treatment and disinfection processes, chemical storage and dosing requirements, electricity supply arrangements, instrumentation and control arrangements, optimisation of energy and manpower resources for efficient operation and ease of maintenance of the plant.
- (l) Review the proposed changes to the fresh water supply zones in Planning Report No. 6/2010 due to re-distribution of the treatment capacities between TWWTW and Yau Kom Tau WTW during and after the modernisation of east wing of TWWTW to a reliable output of 180,000 m³/day.
- (m) Recommend provisions for waste detection arrangement after liaison with the Leakage Management Section of WSD.
- (n) Review the proposed pipe sizes in case of significant changes of the alignments of the proposed water mains.
- (o) Identify, review, evaluate and conduct detailed comparisons of at least three different options of the scheme layout and the water treatment process for the modernisation of east wing of TWWTW and the associated raw water and fresh water transfer facilities, taking account of the capital cost, recurrent costs, the requirements of this Brief, and the findings, conclusions and recommendations revealed in the studies and investigations in this Assignment. Submit and present draft Options Selection Reports and recommend to the Director's Representative for approval the most cost effective option for the modernisation of east wing of TWWTW with outline scheme and layout as detailed in Clause 6.17(p) of this Brief. Within 2 weeks after the submission of the draft Options Selection Report to the Director's Representative, the Consultants shall give presentation on the findings and recommendations of the draft Options Selection Report. The Consultants shall allow a period of 2 months for the Employer to endorse the recommended/selected option for their planning and undertaking of the subsequent preliminary design and the associated investigation/studies for the recommended/selected option.

The content for the presentation shall be submitted at least 1 week prior to the presentation for the agreement of the Director's Representative.

- (p) Produce and submit a comprehensive scheme including site, building and E&M plant and equipment and building services layouts for the approval of the Director's Representative for the modernisation of east wing of TWWTW and the associated raw water and fresh water transfer facilities, with capability of being operated efficiently at various specific capacities ranging between the minimum and maximum reliable throughputs to tie in with demand fluctuations and other operational requirements. The scheme shall include sufficient general arrangement layouts, sections and other constraints identified during the study to illustrate how east wing of TWWTW can be modernised successfully.
- (q) Consult with CLP and coordinate any works associated with the requirement of power supplies as necessary for the proposed works. The Consultants shall also assist in negotiation with CLP on all works relating to the provision of power supply for the proposed works.
- (r) Review and revise as necessary the electrical installation design of the buildings.
- (s) Identify the existing operational constraints in TWWTW and recommend methods to overcome the constraints.
- (t) Prepare architectural and landscaping proposals, agree these with the Director's Representative and incorporate them into the Preliminary Design. The architectural and landscape proposals shall include details on any green planting, tree felling, transplanting, colour scheme, aesthetic features, architectural finishes and amenity works necessary for the Assignment. The Consultants shall liaise closely with the building and landscape maintenance authority at the onset of producing the Preliminary Design to avoid any potential maintenance problems.
- (u) After receiving the endorsement of the outline scheme and layout from the Director's Representative, produce a Preliminary Design for the modernisation of east wing of TWWTW and the associated raw water and fresh water transfer facilities. Prepare layout plans, architectural and

landscaping plans, drawings, profiles, sections, specifications and calculations. The layout plans, architectural and landscaping plans (on A1 size sheets) should be prepared in 1:1,000 or 1:500 scale, as directed by the Directive's Representative, showing the implementation scheme of the works. An outline layout plan (on A1 size sheets) should also be produced to show all the works and site areas for the Assignment and should be of a quality suitable for publicity purposes.

6.18 Contract Strategy, Programme and Cost Estimates

- (a) Recommend the contractual arrangements for carrying out each part of the proposed works.
- (b) Advise on the most suitable form of contract for all or any part of the proposed works together with proposals for resident site staff set up.
- (c) Prepare a list of pipe materials that are subject to prolonged delivery and recommend those materials that must be procured prior to inviting tenders for mainlaying work.
- (d) Prepare a programme for the design and construction of the proposed works.
- (e) Prepare an estimate of the cost for carrying out the proposed works with the following shown separately:
 - (i) Procurement of pipes, valves and fittings.
 - (ii) Procurement of major mechanical and electrical plant.
 - (iii) Construction, with each proposed entrustment, works order or contract shown separately.
 - (iv) Consultants fees and other reimbursable items.
 - (v) Salaries and other reimbursable items for resident site staff.
 - (vi) Any other costs.

- (f) Prepare a cash flow analysis.

6.19 Land Requirements

- (a) Identify the need for resumption of land, clearance or reprovisioning and liaise with the relevant bodies to determine the practicalities and programme for doing so.
- (b) Identify any additional land requirements, such as borrow areas, dumping areas, works areas, storage areas and access roads necessary for the completion of the works.
- (c) Prepare necessary land plans and other relevant information to enable arrangements for land acquisition and clearance for the works and the works areas to be made.
- (d) Liaise and assist in negotiations with relevant bodies on matters of land resumption, clearance and reprovisioning works.

6.20 Technology Transfer Workshop

- (a) The Consultants shall provide a one-day technology transfer workshop and a working paper towards the end of the Assignment in order to transfer the experience gained, including the water treatment process and hydraulic aspects, during the course of the Assignment. The purpose of the workshop and the working paper is to assist Government staff to appreciate the implementation scheme of the existing part and modernised part of TWWTW and the associated raw water and fresh water transfer facilities.
- (b) The working paper shall provide detailed technical aspects in the implementation scheme, including the water treatment process and hydraulic aspects, during the course of the Assignment. The workshop will be attended by a maximum number of 100 staff members from the Government.

- (c) The Consultants shall propose the contents of the working paper, the date, time and venue of the workshop and the facilitator for convening the workshop for the approval of the Director's Representative. The working paper shall be available at least 1 month prior to the workshop. The Consultants shall also arrange for the venue for convening the workshop and shall pay for the charges for renting the venue and all other associated costs including the working paper. The Consultants shall provide all necessary hardware, software, training aids and training materials for the workshop.

6.21 Final Report

6.21.1 The Consultants shall prepare and submit the Final Report summarising all the work done in this Assignment, including various assessments, studies, surveys, investigations together with the findings, conclusions and recommendations, and the implementation scheme for the modernisation of east wing of TWWTW and the associated raw water and fresh water transfer facilities for approval by the Director's Representative. The Final Report shall, amongst other things, also include the philosophy, criteria, parameters, assumptions, method of analysis and operation intents, cost estimates, implementation programme, recurrent consequences, contract forms, works packages, mechanical and electrical plant and equipment including pumping plant, power supply plant, and water treatment plant and equipment, monitoring and control, SCADA System, DCS, energy management system and alternative proposals/design of the works. The Final Report shall also include the project delivery strategy and the contract strategy most suitable for timely implementation of the works under the Assignment. Prior to submission of the Final Report, the Draft Final Report should be circulated to relevant parties and Government departments for comments.

7. Response to Queries

7.1 The Consultants shall respond to queries under Clause 20 of the General Conditions of Employment raised prior to a date 3 months after the final submission of the Deliverables required under the Agreement. Such date shall be confirmed in writing to the Consultants by the Director's Representative.

8. Programme of Implementation

8.1 The due date for commencement of the Agreement is 28 May 2012.

8.2 Pursuant to Clause 26(B) of the General Conditions of Employment, the Consultants shall submit the draft programme and revised draft programmes and the Director's Representative shall agree, or instruct, within the following periods:

- (a) Submission of the draft programme : Within 2 weeks of the due date for commencement of the Agreement.
- (b) Agreement of the draft programme or instruction for submission of the revised draft programme : Within 2 weeks from receipt of the draft programme.
- (c) Submission of the revised draft programme : Within 2 weeks from the instruction of the Director's Representative.

The draft programme and revised draft programmes shall detail the activities to be carried out, key dates for key activities, target dates for particular tasks and any decision dates that may be required for the uninterrupted progress of the Assignment. The Consultants shall discuss with the Director's Representative during the above periods to agree the timing of submission of reports, other documents and plans for each of the main elements of the Assignment, for inclusion in the draft programme and revised draft programmes.

8.3 The following key activities of this Assignment are to be completed within the following key dates: -

| Key Activity | Key dates (from commencement of the Agreement) |
|----------------------------------|---|
| Submission of Draft Report | 12 months |
| Submission of Draft Final Report | 18 months |
| Submission of Final Report | 19 months |

9. Progress Reports

9.1 The Consultants shall submit to the Director's Representative progress reports at monthly intervals on all aspects of the Services relating progress to the Programme referred to in Clause 8 of this Brief. The reports shall include a list of those parts of the Services the execution of which are behind the Programme together with proposals to expedite progress, so as to complete the work by the due dates. The reports shall also include updated expenditure forecasts in accordance with Clause 10 of this Brief.

10. Financial Management

10.1 At bi-monthly intervals or at such other intervals as the Director's Representative may require, the Consultants shall submit a report on the current and the forecast expenditures on the Assignment and the fees due to the Consultants, in a form to be agreed by the Director's Representative.

11. Standards and Specifications

11.1 The Consultants shall adopt such technical and design standards and specifications as are in current use by Government works departments and TD or, if non-existent, European Standards, British Standards, or other appropriate international standards, Codes of Practice and Specifications. Should instances

arise for which suitable standards or specifications do not exist or for which the current standards or specifications appear to require modifications or if by the adoption of current standards the Consultants would incur additional expenses not within reasonable contemplation, the Consultants shall submit recommendations on appropriate alternatives to the Director's Representative for agreement.

12. Not used

13. Director's Representative

13.1 The Director's Representative as defined in the General Conditions of Employment shall be the Assistant Director/New Works of Water Supplies Department or such other person as may be authorized by the Director of Water Supplies in writing and notified to the Consultants. The Director's Representative may delegate any of the powers and functions vested in him to other officers. If the Consultants are dissatisfied with a decision or instruction of any such officer the matter shall be referred to the Director's Representative for a ruling.

13.2 During the course of the Agreement, the Consultants shall report direct to the Director's Representative.

14. Control of the Project and Assignment

14.1 Pursuant to Clause 13 of the General Conditions of Employment, the Consultants shall attend meetings of relevant committees, public consultation bodies and District Councils as required by Clause 6.16 of this Brief. The total amount of this kind of meeting time is estimated to be not more than 160 hours, beyond which the extra cost shall be reimbursed by the Employer on a time charge basis.

14.2 The Consultants when necessary shall communicate and correspond directly with other Government departments/parties, utility undertakers and various divisions of WSD to obtain information in connection with the Project, copying such correspondence to the Director's Representative.

15. Information and Facilities Provided by the Employer

15.1 All available information relevant to the Assignment will be provided to the Consultants. The relevant reports giving the background information are as follows:

- (a) Planning Report No. 6/2010 'Modernisation of the East Wing of Tsuen Wan Water Treatment Works'
- (b) 'Feasibility Study on Modernization of Tsuen Wan Water Treatment Works – Final Study Report' dated March 2004
- (c) 'Reassessment of Chlorine Hazard for Eight Existing Water Treatment Works: Hazard Assessment for Tsuen Wan Water Treatment Works – Final Report' dated January 2001

15.2 The Consultants shall indicate for guidance those documents which they currently hold and those of which a copy may be needed, should the Assignment be awarded to them. A copy of each of the documents indicated as needed will be supplied free of charge by the Director's Representative on request from the Consultants, except those currently available from the Publications Sales Unit of the Information Services Department. In the case of plans and drawings, one transparency and two prints of each plan or drawing shall be provided free of charge if requested by the Consultants.

16. Consultants' Office and Staffing

16.1 The Consultants shall maintain for the duration of this Agreement an office in Hong Kong under the control of the Project Director of the Consultants who shall be responsible for the Assignment. He shall have adequate authority and sufficient professional, technical and administrative support staff in all relevant disciplines to ensure progress to the satisfaction of the Director's Representative.

- 16.2 The Consultants shall also provide the staff and manpower input in accordance with the technical proposal made at the tender stage, and that the Director's Representative shall have the right to check the time-log record of the Consultants' staff deployed for the consultancy assignment.
- 16.3 In the event, for reasons beyond his control, the Consultants are unlikely to provide or maintain any key staff in the technical proposal, he should report to the Director's Representative as soon as practicable and propose for the Director's Representative's approval a substitute staff having qualification and experience comparable with the staff who is leaving the project team.

17. Specialist and Sub-consultant Services

- 17.1 The Consultants shall provide all specialist and sub-consultant services required for the satisfactory completion of the Assignment. No additional fees or expenses for the provision of such services rendered locally or overseas shall be payable by the Employer except as otherwise provided for in the Schedule of Fees.

18. Surveys

- 18.1 One velograph and two prints of topographical mapping at 1:20,000, 1:5,000 and 1:1,000 scales prepared by the Survey and Mapping Office of the LandsD, where available for the area covered by the Project for which the Assignment forms a part, can be obtained free of charge on application to the Director's Representative. For the supply of Government digital map data, the Consultants will be charged a fee for handling. This fee shall be included in the Lump Sum.
- 18.2 All field survey work required for the proper execution of the Assignment shall unless otherwise provided for in the Agreement, be the duty of the Consultants. A copy of field notes, field data and resultant plans arising from these surveys shall be handed over to the Director's Representative upon completion of the Assignment. The accuracy as well as presentation of these surveys should be of a standard agreed by the Director's Representative.

18.3 The Consultants shall be responsible for all engineering surveys required in connection with the Assignment. The division of responsibility among the Consultants, the Lands Administration Office, and the Survey and Mapping Office of the Lands Department for other surveying required in connection with the Assignment shall be as follows:

| | Task | Responsibility of |
|-----|---|---|
| (a) | (i) Provision of basic horizontal and vertical survey control | Survey and Mapping Office |
| | (ii) Checking of given control point values and establishment of survey control network(s) based on survey control given vide (i) | Consultants |
| (b) | (i) Provision of basic mapping (at 1:1,000 scale or other standard mapping relevant to the Assignment) | Survey and Mapping Office (excluding those specified as to be provided by the Consultants in the Agreement) |
| | (ii) Updating and verification of accuracy of information shown on plans supplied vide (i) as necessary in relation to the Assignment. | Consultants |
| | (iii) Carrying out detailed surveys for site investigation and for preparation of design and contract documents as necessary in relation to the Assignment. | Consultants |
| (c) | (i) Supply of digital data | Land Information Centre, LandsD |

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| (ii) | Provision of a plan of the study area to the Land Information Centre for data preparation. | Director's Representative |
| (iii) | Completion of "Undertakings by Government Department for provision of Digital Data from Land Information Centre, LandsD to Consultants" form. | Director's Representative |
| (iv) | Completion of Digital Data Order form. | Consultants |
| (v) | Completion of "Undertaking by Consultants on the use of Government Digital Data from the Land Information Centre, Lands Department" form. | Consultants |
| (vi) | Before data collection, payment of the charges for the storage media and labour to prepare the data when informed by the Land Information Centre prior to data collection and collection of the Demand Note. | Consultants |
| (d) | Supply of existing cadastral plans and records and co-ordinate data. | DSO |
| (e) | Computation of detailed dimensioned layouts of roads, drainage and WSD reserves, platforms, etc. | Consultants (checked and accepted by DSO) |
| (f) | Determination of site/lot boundaries, calculation of areas, etc. in connection with the agreed dimensioned layouts. | DSO (in liaison with DLO) |

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|-----|------|--|---|
| (g) | (i) | Processing of resumption and surrender for privately owned land in Development Area. | DLO (in liaison with DSO and Consultants) |
| | (ii) | Resumption and surrender plans and demarcation of lands to be resumed. | DSO (in liaison with DLO and Consultants) |
| (h) | | Preparation of proposal plans for Government land allocations and grants. | DSO (in liaison with DLO) |
| (i) | | Preparation of dimensioned plans and setting out of boundaries of sites and lots for Government land allocation and for grants to architects (Government and Housing Authority). | DSO |

19. Insurance

- 19.1 The amount of insurance cover to be maintained in accordance with sub-clause (A) of Clause 47 of the General Conditions of Employment shall be twice the Lump Sum value of the fee, subject to a maximum of HK\$150 million and a minimum of HK\$10 million.

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