



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

Agreement No. CE 47/2011 (WS)

Seventh Safety Review of Small Service Reservoirs -
Investigation

Draft BRIEF (09 December 2011)

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Investigation

BRIEF

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1. Introduction

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), hereafter referred to as the General Conditions of Employment, the Special Conditions of Employment, the Schedule of Fees and any other detailed instructions issued by the Director's Representative.

2. Description of the Project

2.1 Under the United Kingdom Reservoirs Act 1975, raised reservoirs having a storage capacity exceeding 25,000 cubic metres are required to be inspected from time to time by an independent 'qualified engineer' who should produce inspection reports with recommendations on the measures or any remedial works to be carried out in respect of the safety of the reservoirs. The Water Supplies Department (WSD) has adopted this aspect of the United Kingdom Reservoirs Act as a requirement for the proper maintenance of the impounding reservoirs and service reservoirs, and has been employing consultancy services for inspection of the impounding reservoirs and service reservoirs and advice on reservoir safety issues.

2.2 Because of the extremely high population density and the hilly terrain of Hong Kong, some small service reservoirs with capacity not exceeding 25,000 cubic metres are constructed on hillsides close to densely populated areas. They may pose a significant risk to the safety of the public and water leakage from the service reservoirs, if any, may in the long term affect the stability of the slopes in the vicinity of the service reservoirs. To address these problems, the current practice of inspecting large service reservoirs by an independent 'qualified engineer' has been extended to cover the small service reservoirs and

quantitative landslip risk assessment (QRA) has been carried out on the slopes and/or earth retaining structures in the vicinity of the service reservoirs. In this Assignment, consultancy services will be employed for carrying out the inspection and QRA of forty nine (49) small service reservoirs.

3. Objectives of the Assignment

The objectives of the Assignment are:

- (a) To assess the conditions of such service reservoirs listed in Appendix I as may be specified in instructions in writing issued by the Director's Representative from time to time, and to make recommendations on how to enhance the safety of such service reservoirs;
- (b) To assess the landslip risk of the slopes and earth retaining structures that may be affected by water leakage from such service reservoirs listed in Appendix I as may be specified in instructions in writing issued by the Director's Representative from time to time, and to rank the risk level of such service reservoirs; and
- (c) To provide advisory services on any matters related to the safety of any service reservoirs, impounding reservoirs, slopes and earth retaining structures as may be specified in instructions in writing issued by the Director's Representative from time to time.

4. Description of the Assignment

4.1 The Assignment comprises all necessary data collection, reviews, studies, assessments, investigations, consultation, site inspections, field works and provision of advisory services and recommendations, etc. as set out in Clause 6 of this Brief to achieve the objectives in Clause 3 above. The Assignment shall cover, but not be limited to, the following major tasks:

- (a) To carry out service reservoir inspections by the Advisor as defined in Clause 6(A) of the Special Conditions of Employment

for such service reservoirs listed in Appendix I as may be specified in instructions in writing issued by the Director's Representative from time to time, subject to any deletion or replacement in accordance with Clause 4.2 below;

- (b) To carry out QRAs by a Registered Professional Engineer (Geotechnical) in Hong Kong and the Advisor for the slopes and earth retaining structures that may be affected by water leakage from such service reservoirs listed in Appendix I as may be specified in instructions in writing issued by the Director's Representative from time to time; and
- (c) To provide advisory services on any matters related to the safety of any service reservoirs, impounding reservoirs, slopes and earth retaining structures as may be specified in instructions in writing issued by the Director's Representative from time to time.

4.2 There is no guarantee that the Consultants will be instructed to inspect all the service reservoirs listed in Appendix I. The Director's Representative reserves the right to delete any service reservoirs listed in Appendix I, for which inspections have not been carried out, to delete any QRAs included in this Assignment or to delete any advisory services. The Director's Representative also reserves the right to add any service reservoirs to Appendix I, to add any QRAs or to add any advisory services. The Director's Representative will notify the Consultants of the deletion or addition in writing.

4.3 The Consultants shall not carry out any inspections, QRA or advisory service without receiving prior instructions in writing from the Director's Representative.

4.4 The inspection periods for the service reservoirs shown in Appendix I are tentative only and are subject to change. The Director's Representative will notify the Consultants of the exact inspection periods in writing. The Advisor, if from overseas, is expected to stay in Hong Kong for not more than eight weeks for each inspection period shown in Appendix I.

5. Deliverables

5.1 The non-technical Deliverables to be produced by the Consultants in this Assignment and submitted to the Director's Representative are as follows:

- (a) Programme in accordance with Clause 8.3 of this Brief.
- (b) Progress Reports in accordance with Clause 9 of this Brief within the first seven working days of each month.
- (c) Financial Reports in accordance with Clause 10 of this Brief within the first seven working days of each month.
- (d) Records of meetings and correspondence with others and responses to comments.
- (e) Insurance Policy in accordance with Clause 19 of this Brief prior to the commencement of the Agreement.

5.2 The technical Deliverables to be produced by the Consultants for the service reservoir inspections, QRAs and advisory services under the Assignment and submitted to the Director's Representative are as follows:

- (a) Preliminary Service Reservoir Inspection Report (5 copies) in accordance with Clause 6.4(h) of this Brief for each service reservoir required to be inspected as specified in instruction in writing issued by the Director's Representative within two weeks after completion of the inspection of the service reservoir concerned. The Preliminary Service Reservoir Inspection Reports shall be signed by the Advisor.
- (b) Draft Service Reservoir Inspection Report (2 copies) in accordance with Clause 6.4(i) of this Brief for each service reservoir required to be inspected as specified in instruction in writing issued by the Director's Representative within two months after completion of the inspection of the service reservoir concerned. The reports shall be accompanied by all such plans,

data and other documents as may be necessary or required by the Director's Representative. Upon receipt of the comments of the Director's Representative, the Consultants shall take into consideration of the comments, make revisions and submit 2 copies each of the revised report and the responses to comments received for each service reservoir within one month. Upon agreement by the Director's Representative, the Consultants shall submit 5 copies of the agreed Service Reservoir Inspection Report for each service reservoir within one month. All agreed Service Reservoir Inspection Reports shall be signed by the Advisor.

- (c) Draft QRA Reports (3 copies) in accordance with Clause 6.5(c) of this Brief for each service reservoir required to be inspected as specified in instruction in writing issued by the Director's Representative within two months after completion of the inspection of the service reservoir concerned. The reports shall be accompanied by all such plans, data and other documents as may be necessary or required by the Director's Representative. Upon receipt of the comments of the Director's Representative, the Consultants shall take into consideration of the comments, make revisions and submit 3 copies each of the revised report and the responses to comments received for each service reservoir within one month. Upon agreement by the Director's Representative, the Consultants shall submit 6 copies of the agreed QRA Report for each service reservoir within one month.

- (d) Draft Advisory Services Task Reports (2 copies) in accordance with Clause 6.6 of this Brief for each task of advisory service instructed by the Director's Representative within the time limit to be agreed with the Director's Representative. The reports shall be accompanied by all such plans, data and other documents as may be necessary or required by the Director's Representative. Upon receipt of the comments of the Director's Representative, the Consultants shall take into consideration of the comments, make revisions and submit 2 copies each of the revised report and the responses to comments received for each task within one month. Upon agreement by the Director's Representative, the Consultants shall submit 5 copies of the agreed Advisory Services Task Report for each task within one month.

- (e) Draft Final Report (5 copies) in accordance with Clause 6.7 of this Brief within four months after completion of the inspection of all service reservoirs required to be inspected in accordance with the instruction in writing issued by the Director's Representative. The report shall be accompanied by all such plans, data and other documents as may be necessary or required by the Director's Representative. Upon receipt of the comments of the Director's Representative, the Consultants shall take into consideration of the comments, make revisions and submit 5 copies each of the revised report and the responses to comments received within one month. Upon agreement by the Director's Representative, the Consultants shall submit 8 copies of the agreed Final Report within one month. The Final Report shall be signed by the Advisor.

5.3 The Consultants shall submit the soft copies in duplicate on compact discs (CDs) approved by the Director's Representative of the endorsed, approved or final versions of the documents, reports, programmes, drawings, records, etc. of the following, submitted in any Deliverables listed in, but not be limited to, Clauses 5.1 and 5.2 of this Brief. The CDs shall be clearly labeled on the surface the contents of files stored therein.

- (a) All drawings (using AUTOCAD or other compatible softwares approved by the Director's Representative) produced in this Assignment.
- (b) All photographs (in JPEG or other compatible format approved by the Director's Representative) taken in this Assignment.
- (c) All reports and documents (using Microsoft Office or other compatible softwares approved by the Director's Representative) produced in this Assignment.
- (d) The programmes (using Suretrak or other compatible software approved by the Director's Representative) produced in this Assignment.

5.4 The Consultants shall provide any other reports, papers, submissions,

programmes, estimates, calculations, certificates, plans, drawings and any other documents in connection with the Assignment and as required by the Director's Representative.

- 5.5 The Consultants shall keep one set of all correspondence in relation to the Assignment. At the request of the Director's Representative, the Consultants shall submit to the Director's Representative a copy of the correspondence which should be properly filed, classified and indexed to enable easy reference, search and retrieval of information.
- 5.6 The Consultants shall draw the Employer's attention to any Deliverables that are under licences and any pre-existing copyrights or patents on any Deliverables and 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 licences, copyrights, patents or restrictions.

6. Services to be Provided by the Consultants

- 6.1 Further to Clause 1 of the General Conditions of Employment, in general terms, the services to be rendered by the Consultants comprise all necessary reviews, studies, investigations, consultation, site inspections, surveys, liaison and co-ordination, preliminary design works, field works and provision of advice to achieve the objectives in Clause 3 of this Brief.
- 6.2 The duties of the Consultants shall be as defined in the General Conditions of Employment and the Special Conditions of Employment and as amplified, extended and set out in this Brief.
- 6.3 In performing the Assignment, the Consultants shall provide the following general services :
- (a) Advise the Director's Representative in writing of any immediate remedial works or improvement works that need to be implemented to rectify any defects or to alleviate the hazard of any high risk features identified in relation to the safety of the inspected service reservoirs or the associated slopes or earth retaining structures in

the vicinity.

- (b) Comply with all reasonable instructions from the Director's Representative and with all relevant Government Circulars, Departmental Instructions and Technical Memoranda that are relevant to the carrying out of the Assignment and as directed by the Director's Representative.
- (c) Prepare and submit a programme covering the work of the Assignment and such revised programmes as may be necessary in accordance with Clause 8.3 of this Brief.
- (d) Prepare and submit progress reports and financial reports in accordance with Clauses 9 and 10 of this Brief.
- (e) Attend progress meetings and other ad-hoc meetings as required by the Director's Representative.
- (f) Draw the attention of the Director's Representative in writing immediately upon identification of any potential slippage in the progress of the Assignment or any potential significant cost deviation, and propose necessary mitigation measures to restore progress and to control the expenditure.
- (g) Provide any information and services related to the Assignment as may from time to time be required by the Director's Representative.
- (h) Carry out all necessary reviews, studies and make such investigations, inquiries and surveys as are necessary for satisfactory completion of the Assignment and collect all necessary information available from WSD, the Geotechnical Engineering Office (GEO) and other government departments.
- (i) Carry out investigations which shall include reviews of the past investigations and studies, field reconnaissance, geotechnical data collection, service reservoir and water leakage data collection, aerial photographic interpretation and field surveys as well as physical inspections of the internal and external conditions of the service reservoirs, slopes and earth retaining structures in the

vicinity. The investigations shall exclude cutting, drilling and breaking of concrete, field and laboratory testing for obtaining concrete and geotechnical parameters, geophysical surveys and other ground investigations requiring mobilization of boring equipment and ground excavation unless with the prior instruction from the Director's Representative in writing.

- (j) Draw the attention of the Director's Representative in writing the extent of further ground investigations, surveys and studies required to implement the recommended proposals in relation to safety of service reservoirs, slopes and earth retaining structures.
- (k) Prepare action plans for emergency works, design with necessary and sufficient details, plans, drawings, profiles, sections, specifications, programme of works and cost estimates required to implement the recommended proposals in relation to safety of service reservoirs, slopes and earth retaining structures as and when instructed by the Director's Representative.
- (l) Draw the attention of the Director's Representative the need to consider any legal implications and consequences arising out of or in relation to the Assignment.
- (m) Agree the presentation and format of all items of Deliverables in accordance with Clause 5 of this Brief with the Director's Representative prior to preparing the Deliverables.
- (n) Prepare and submit the Deliverables in accordance with the timing, quantities and requirements in Clause 5 of this Brief.
- (o) Take cognizance of all relevant procedures, manuals, circulars, handbooks, standards, guidelines and documents in use by the Employer, including, but not limited to, the following, in the provision of the Services:

	<u>Title</u>	<u>Issuing Authority</u>
(i)	Civil Engineering Design Manuals	Water Supplies Department

	<u>Title</u>	<u>Issuing Authority</u>
(ii)	Project Administration Manual for Engineering Works	Water Supplies Department
(iii)	Project Administration Handbook for Civil Engineering Works	Civil Engineering and Development Department
(iv)	General Specification for Civil Engineering Works 2006 Edition or any subsequent corrigenda, revisions and editions	The Government of the Hong Kong Special Administrative Region
(v)	Standard Drawings for Civil Engineering Works	Water Supplies Department
(vi)	Mechanical and Electrical Standard Specifications	Water Supplies Department
(vii)	Manual of Mainlaying Practice – 1997 Edition or any subsequent corrigenda, revisions and editions	Water Supplies Department
(viii)	Standard Methods of Measurement for Civil Engineering Works – 1992 Edition or any subsequent corrigenda, revisions and editions	Civil Engineering and Development Department
(ix)	Geotechnical Manual for Slopes (1984, 2 nd Edition, Reprinted in 2011)	Geotechnical Engineering Office
(x)	Geoguide 5 – Guide to Slope Maintenance (2003, 3rd Edition.)	Geotechnical Engineering Office
(xi)	The New Priority Ranking Systems for Man-made Slopes and Retaining Walls	Geotechnical Engineering Office
(xii)	Natural Terrain Landslides Inventory	Geotechnical Engineering Office
(xiii)	Geoguide 2 – Guide to Site Investigation	Geotechnical Engineering Office
(xiv)	GEO Report No. 56 – Application of Prescriptive Measures to Slopes and Retaining Walls (1999, 2 nd Edition)	Geotechnical Engineering Office

	<u>Title</u>	<u>Issuing Authority</u>
(xv)	Code of Practice on Inspection and Maintenance of Water Carrying Services Affecting Slopes (1996 Edition)	Water Supplies Department
(xvi)	Handbook on Selection, Appointment and Administration of Engineering and Associated Consultants Revision No. 10 (October 2010)	Engineering and Associated Consultants Selection Board
(xvii)	EACSB Circulars	Engineering and Associated Consultants Selection Board
(xviii)	Public Works Department, Lands and Works Branch, Works Branch/Works Bureau, Environment, Transport and Works Bureau and Development Bureau Technical Circulars	Development Bureau
(xix)	Planning, Environment and Lands Branch/Bureau Technical Circulars	The then Housing, Planning and Lands Bureau
(xx)	Departmental Instructions	Water Supplies Department
(xxi)	Technical Circulars	Civil Engineering and Development Department
(xxii)	Technical Circulars	Drainage Services Department
(xxiii)	Technical Circulars	Highways Department
(xxiv)	Professional Persons Environmental Consultative Committee (ProPECC) Practice Notes	Planning Department
(xxv)	Stormwater Drainage Manual	Drainage Services Department
(xxvi)	General Specifications for Electrical Installation in Government Buildings of the Hong Kong Special Administrative Region (2007 Edition)	Architectural Services Department
(xxvii)	Code of Practice for the Electricity (Wiring) Regulations (2009 Edition)	Electrical & Mechanical Services Department
(xxviii)	Information for Reservoir Panel Engineers, Reservoirs	The Institution of Civil Engineers

<u>Title</u>	<u>Issuing Authority</u>
Act 1975	
(xxix) Regulations for Electrical Installations 17 th Edition including amendments	The Institution of Electrical Engineers
(p) Consult, liaise and coordinate with authorities/government departments including but not limited to those listed below, and public utility companies, that have an interest in or an effect on or which are affected by the Assignment or having rights or powers in connection with the Assignment in accordance with the requirement of Clause 19 of the General Conditions of Employment.	
(i) Agriculture, Fisheries and Conservation Department;	
(ii) Architectural Services Department;	
(iii) Buildings Department;	
(iv) Civil Engineering and Development Department including Geotechnical Engineering Office;	
(v) Development Bureau;	
(vi) District Councils of Home Affairs Department;	
(vii) District Lands Offices of Lands Department;	
(viii) District Offices of Home Affairs Department;	
(ix) District Survey Offices of Lands Department;	
(x) Drainage Services Department;	
(xi) Environmental Bureau;	
(xii) Environmental Protection Department;	
(xiii) Fire Services Department;	
(xiv) Food and Environmental Hygiene Department;	
(xv) Food and Health Bureau;	
(xvi) Government Laboratory;	
(xvii) Government Logistics Department;	
(xviii) Government Property Agency;	
(xix) Highways Department;	
(xx) Home Affairs Bureau;	
(xxi) Hong Kong Police Force;	
(xxii) Hong Kong Observatory;	
(xxiii) Housing Department;	
(xxiv) Lands Department;	
(xxv) Leisure and Cultural Services Department;	

- (xxvi) Planning Department;
- (xxvii) Transport and Housing Bureau;
- (xxviii) Transport Department; and
- (xxix) Water Supplies Department.

- (q) Consult, liaise and coordinate with consultants and contractors that have an interest in or an effect on or who are affected by the Assignment.
- (r) Identify, communicate, liaise and correspond directly with the bodies, departments, organizations and persons from whom useful information could be obtained in connection with and for the implementation of the Assignment further to Clause 19 of the General Conditions of Employment and Sub-clauses (p) and (q) of this Clause. The Consultants shall provide a copy of such correspondence, records of telephone discussion, minutes of meeting to the Director's Representative for his record and information.
- (s) Comply with the requirements of all relevant ordinances, regulations, standards and guidelines, including, but not limited to, the following in the provision of the Services:
 - (i) Air Pollution Control Ordinance;
 - (ii) Animals and Plants (Protection of Endangered Species) Ordinance;
 - (iii) Antiquities and Monuments Ordinance;
 - (iv) Buildings Ordinance;
 - (v) Copyright Ordinance;
 - (vi) Country Parks Ordinance;
 - (vii) Dangerous Goods Ordinance;
 - (viii) Electricity Ordinance;
 - (ix) Environmental Impact Assessment Ordinance;
 - (x) Factories and Industrial Undertakings Ordinance;
 - (xi) Gas Safety Ordinance;
 - (xii) Lands (Resumption) Ordinance;
 - (xiii) Lands (Miscellaneous Provisions) Ordinance;
 - (xiv) Noise Control Ordinance;
 - (xv) Occupational Safety and Health Ordinance;

- (xvi) Roads (Works, Use and Compensation) Ordinance;
- (xvii) Road Traffic Ordinance;
- (xviii) Town Planning Ordinance;
- (xix) Waste Disposal Ordinance;
- (xx) Waterworks Ordinance;
- (xxi) Water Pollution Control Ordinance; and
- (xxii) Any other Ordinance having a bearing on the works of the Assignment.

(t) Take cognizance of, but not be limited to, the following projects during the course of the Assignment:

- (i) Systematic Identification and Maintenance Responsibility of Slopes in the Territories (SIMAR) by Lands Department.
- (ii) Examination and Report on the Safety of Reservoirs - Seventh Formal Independent Inspection and Advisory Services by Water Supplies Department.
- (iii) Examination and Report on the Safety of Reservoirs - Eighth Formal Independent Inspection and Advisory Services by Water Supplies Department.
- (iv) Inspection of Buried Watermains Affecting Slopes by Water Supplies Department.
- (v) Landslip Preventive Measures Programme by Geotechnical Engineering Office.
- (vi) Replacement and Rehabilitation of Water Mains by Water Supplies Department.
- (vii) Engineer Inspections and Upgrading Works for WSD Slopes, 2006-2007 Programme – Design and Construction.
- (viii) Improvement to Hong Kong Central Mid Level and High Level Areas Water Supply - Remaining Works - Design and Construction.

- (ix) Salt Water Supply System for Pok Fu Lam Area - Design and Construction.
- (x) Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun - Design and Construction.
- (xi) Expansion of Tai Po Water Treatment Works and Ancillary Raw Water and Fresh Water Transfer Facilities - Design and Construction.
- (xii) Alternative Raw Water Supply to Yau Kom Tau Water Treatment Works from Au Tau Raw Water Pumping Station - Investigation, Design and Construction.
- (xiii) Integration of Ma On Shan and Pak Kong Fresh Water Supply Systems - Investigation, Design and Construction.
- (xiv) Improvement of Shing Mun, Beacon Hill, Golden Hill and Tai Lam Chung (Sections L, M, N & O) Catchwater Systems - Investigation, Design and Construction.
- (xv) Improvement Works to Water Supply Facilities of New Territories West Region and Hong Kong & Islands Region of Water Supplies Department - Design and Construction.
- (xvi) Improvement Works to Water Supply Facilities of New Territories East Region and Kowloon Region of Water Supplies Department - Design and Construction.
- (xvii) Engineer Inspections, Preventive Maintenance Works and Upgrading Works for WSD Slopes 2009 - 2010 Programme - Design and Construction.
- (xviii) Water Supply to Housing Development at Anderson Road - Design and Construction.
- (xix) Implementation of Pressure Management and District Metering for the Fresh Water Distribution Systems of the

Western, Central, Eastern, Sai Wan, Kowloon West and Tsuen Wan East Major Supply Zones –Design and Construction.

(xx) Improvement of fresh water supply to Cheung Chau - Design and Construction.

6.4 The Consultants shall provide the following services for the service reservoir inspections and report the findings:

- (a) Arrange and carry out service reservoir inspections in sufficient detail by the Advisor in a similar manner as that required in the United Kingdom Reservoirs Act 1975 and advise on the observations and findings in the Preliminary Service Reservoir Inspection Reports in accordance with Clause 5 of this Brief.
- (b) Review past investigations and studies, and carry out physical inspections and examination of the internal and external conditions of the service reservoirs and the associated slopes and earth retaining structures in the vicinity. The external inspections shall also cover all other super-structures, sub-structures, manholes and chambers, compartments, installations for the delivery of water to and from the service reservoirs, adjacent ground surfaces, natural and man-made slopes and earth retaining structures in the vicinity of the service reservoirs. The Consultants shall also obtain and examine the data on water flows and levels where appropriate.
- (c) Advise on matters related to the safety of service reservoirs, including safety assessments on the structures and components of the service reservoirs, all associated pipework fittings and fixtures, surface and sub-soil drainage systems and the adjacent slopes and earth retaining structures which may be affected by leakage from the service reservoirs and/or have effects on the safety of the service reservoirs. The Consultants shall collect data and assimilate information for the water leakage investigation of the service reservoirs.
- (d) Investigate and assess the conditions of the existing provisions and evaluate the reliability of the water leakage prevention, detection

and collection systems of the service reservoirs. The evaluation of the reliability of the water leakage prevention, detection and collection systems shall include the various causes of breakdown of such systems and the extent of water leakage penetrating into the surrounding ground from each cause so as to assess the effect of service reservoir water leakage on the stability of the slopes and the earth retaining structures in the vicinity of the service reservoirs. The Consultants shall also provide recommendations on the remedial works and improvement works needed to mitigate the identified water leakage.

- (e) Advise on the effects of water leakage from the inspected service reservoirs and the combined effects of water leakage from other adjacent or nearby service reservoirs on the stability of the inspected service reservoirs and the associated slopes and earth retaining structures in the vicinity.
- (f) Identify, evaluate and recommend the short term and long term mitigation measures, remedial works and improvement works required to enhance the safety of the service reservoirs.
- (g) Advise details of any necessary investigations, such as the number, location and types of samples, the method of taking and testing the samples, the interpretation of the test results, etc. required for implementing the recommendations of this Assignment.
- (h) The Preliminary Service Reservoir Inspection Reports shall report the observations and findings of the inspected service reservoirs and the associated slopes and earth retaining structures, the preliminary recommendations on the safety of the inspected service reservoirs and the associated slopes and earth retaining structures, and the remedial works and improvement works immediately required.
- (i) The Consultants shall include the following information in the Service Reservoir Inspection Report for each service reservoir required to be inspected as specified in instruction in writing issued by the Director's Representative:

- (i) General Information

Provide information, such as the name and address of the Advisor preparing the reports, the panel to which the Advisor is appointed and the date of expiry of the Advisor's appointment, the name and location of the service reservoirs, the name and address of the owner, the name and address of the Consultants, a summary of the dates of inspections, the extent and nature of the inspections, the areas covered by the inspections, the reasons for the inspections and the information and particulars made available for the inspections.

(ii) General Description of the Service Reservoir

Provide a description of the external and internal arrangement of the service reservoir and the associated water supplies network to and from the service reservoir.

(iii) Conditions of the Service Reservoir found during Inspections

Provide information of the following with appropriate figures, sketches, drawings, plans and photographic records (in colour) of the service reservoir indicating the salient points covered by the inspections.:

- (1) Conditions of the structural elements.
- (2) Conditions of the inlet, outlet, washout and overflow systems, including the associated valves, pipeworks and controlling devices.
- (3) Conditions of the surface and sub-soil drainage systems.
- (4) Conditions of the water leakage prevention, detection and collection systems.
- (5) Conditions of the slopes and earth retaining structures in the vicinity of the service reservoir.
- (6) Conditions of other super-structures, sub-structures, fittings and fixtures associated with the service

reservoir.

- (7) Monitoring and instrumentation.
 - (8) Water leakage from the service reservoir.
 - (9) Settlement and movement of the service reservoir walls.
 - (10) Movement of surrounding lands, slopes and earth retaining structures which may affect the stability of the service reservoir.
 - (11) Seismic risk.
 - (12) Adequacy and efficiency of the overflow systems.
 - (13) Safety margin between the service reservoir roof level and overflow level.
 - (14) Any alteration to the overflow sill.
 - (15) Any alteration in level to which water may be stored.
 - (16) Adequacy and efficiency of the water inflow and outflow systems and the means of controlling and lowering the water level.
 - (17) Effects of water leakage on the slopes and earth retaining structures in the vicinity of the service reservoir.
 - (18) Stability of the service reservoir structures and the slopes and earth retaining structures in the vicinity.
 - (19) Correctness of the records kept for the service reservoir and recommendation on any corrections or improvement of the records.
 - (20) Any other matters in relation to the safety of the service reservoir observed.
- (iv) Findings and Recommendations on Remedial Works and Improvement Works Required
- (1) Summarize the main findings and results of the inspections for the service reservoir.

- (2) Recommend remedial works and improvement works that are necessary in the interest of safety of the service reservoir and the slopes and earth retaining structures in the vicinity that may be affected by water leakage from the service reservoir and/or have effects on the safety of the service reservoir. The Consultants shall take cognizance of the findings of the QRAs and provide details for implementing the recommendations, which shall include the materials and the method statement for the works, programme of the works and cost estimates as appropriate.
- (3) Recommend the priorities in carrying out the remedial works and improvement works.

(v) Monitoring and Supervision

- (1) Recommend the requirements to monitor the performance of the service reservoir and the water leakage prevention, detection and collection systems of the service reservoir.
- (2) Recommend the requirements to monitor the slopes and earth retaining structures in the vicinity that may be affected by water leakage from the service reservoir and/or have effects on the safety of the service reservoir.
- (3) Recommend any additional monitoring equipment required.
- (4) Take cognizance of the findings of the inspections and the QRAs in all the recommendations.

(vi) Recommendations on the Frequency of Inspection

- (1) Recommend the frequency of inspection for the service reservoir, the slopes and the earth retaining structures in the vicinity, taking cognizance of the findings of the inspections and the QRAs in the recommendations.
- (2) Recommend the time of the next independent inspection.

6.5 The Consultants shall provide the following services for the QRAs and report the findings :

- (a) Determine, propose and obtain agreement from GEO on the exact extent of slopes and earth retaining structures in the vicinity of the service reservoirs to be included in the QRAs. The slopes and earth retaining structures located within a distance of 300 m from the corresponding service reservoir shall be considered.
- (b) Carry out the QRAs for the service reservoirs under inspection. The QRAs should focus on the reliability of the water leakage prevention, detection and collection systems, the various causes of breakdown of such systems resulting in water leakage penetrating into the surrounding ground and the effect of such water leakage on the stability of the slopes and the earth retaining structures in the vicinity of the service reservoirs. The QRAs shall include, but not be limited to, the following key tasks:
 - (i) Review all relevant past geotechnical investigations and studies, including the design and construction details of the service reservoirs and their associated drainage systems, slopes and earth retaining structures.
 - (ii) Take cognizance and make use of the results of the service reservoir inspections, the QRAs and the QRA methodology developed in Agreement No. CE 26/2006 or other QRA methodology as directed by the Director's Representative, and all other relevant existing information in undertaking the Assignment.
 - (iii) Organize, coordinate and manage all interrelated inspections, investigations, surveys and any other activities for the completion of the Assignment, and avoid duplication of the works in particular for those works which can disrupt the operation of the water supply system.
 - (iv) Carry out visual inspections of the slopes and earth retaining structures by a Registered Professional Engineer (Geotechnical), advise the Director's Representative on the

necessity of any field works, such as chunam stripping to facilitate the inspections, and supervise/conduct the necessary field works as and when instructed by the Director's Representative.

- (v) Assess the existing conditions of the slopes and earth retaining structures in the vicinity of the service reservoirs.
 - (vi) Consider the effect of different degree of water leakage on the stability of the slopes and earth retaining structures in the vicinity of the service reservoirs.
 - (vii) Collect data and assimilate information for geotechnical studies of the affected slopes and earth retaining structures, and assess the consequence and risk-to-life due to water leakage induced landslip for the QRAs.
 - (viii) Advise slope safety issues and monitoring requirements.
 - (ix) Using the QRA methodology developed in Agreement No. CE 26/2006 or other QRA methodology as directed by the Director's Representative, evaluate and compare the risk level of the service reservoirs, rank the risk level of the service reservoirs, prioritize the remedial works and improvement works required to mitigate the identified risks on the service reservoirs.
 - (x) Prepare the QRA Reports.
- (c) Include the following information in the QRA Report for a service reservoir :

(i) General Information

Provide information, such as the name and location of the service reservoir, the name and address of the owner, the name and address of the Consultants preparing the report, the name and address of the Advisor, the panel to which the Advisor is appointed and the date of expiry of the Advisor's

appointment, the name and address of the Registered Professional Engineer (Geotechnical) in Hong Kong carrying out the slope inspections, a summary of the dates of inspections, the extent and nature of the inspections, the area covered by the inspections, the reasons for the inspections and the information and particulars made available for the inspections.

(ii) General Description of Inspections and QRA

- (1) Provide a description of the slopes and earth retaining structures affected by water seepage from the service reservoir. The description of the slopes and earth retaining structures shall include the area affected by water seepage from the service reservoir, all relevant past investigation, studies, historical performance and previous works of the affected slopes and earth retaining structures.
- (2) Include the dates and time of the inspections, the extent and nature of the inspections and the areas covered by the inspections.
- (3) Provide appropriate figures, sketches, drawings, plans and photographic records (in colour copy) indicating the salient points covered by the inspections.

(iii) Conditions Found

- (1) Provide information on the conditions found on service reservoir water leakage and the associated drainage systems, the reliability and the various causes of breakdown of the water leakage prevention, detection and collection systems.
- (2) Provide information on the conditions found on the slopes and earth retaining structures and the effect of actual and potential water leakage from the service reservoir on them.

(iv) Risk Assessments

- (1) Provide information on the structures and number of lives at risk considered in the risk assessments. The information shall include the location of the structures relative to the service reservoir, the nature of the structures and the risk on the structures.
- (2) Evaluate the risk level of the service reservoir by the QRA methodology developed in Agreement No. CE 26/2006 or other QRA methodology as directed by the Director's Representative. State any assumptions made to the input data and make an assessment of the order of accuracy of the risk assessment for the service reservoir taking into account all uncertainties involved in the risk assessment. The assessed order of accuracy shall be factored into the ranking of the service reservoirs for priority action in the Final Report.

(v) Findings and Recommendations on Remedial Works Required

- (1) Summarise the main findings and results of the QRAs for the service reservoir.
- (2) Recommend the remedial works and improvement works necessary for enhancing the safety of the slopes and earth retaining structures in the vicinity of the service reservoir and set the priorities for these works. Provide sufficient details for implementing the recommendations, which shall include the materials, method statement, programme and cost estimates for the works as appropriate.
- (3) Recommend options of practical risk mitigation measures to the identified risks.

(vi) Monitoring and Supervision

- (1) Recommend the requirements to monitor the nearby slopes and earth retaining structures that may be affected by water leakage from the service reservoir.
- (2) Recommend any additional monitoring equipment required.

6.6 The Consultants shall provide the following advisory services :

- (a) Advise the Director's Representative on any matters in relation to the safety of any service reservoirs (which may be service reservoirs listed in Appendix I or service reservoirs not listed in Appendix I), impounding reservoirs and the associated adjacent slopes and earth retaining structures as may be specified in instructions in writing issued by the Director's Representative from time to time. The advisory services shall include:
 - (i) review and comment on the service reservoir safety inspections and/or the QRA reports produced by other consultants;
 - (ii) supervise or conduct the necessary field works, studies, investigations and design of the remedial works or improvement works in the interest of the safety of the impounding reservoirs or service reservoirs or slopes or earth retaining structures as and when required by the Director's Representative.

The tasks for the Advisory Services will be formally issued in writing to the Consultants by the Director's Representative at such times the Director's Representative considers appropriate.

- (b) In case of emergency or as the situation warrants, the Advisor shall be available in Hong Kong within 30 hours upon receipt of written instruction issued by the Director's Representative on the provision of emergency services on matters related to the safety of impounding reservoirs or service reservoirs.

- 6.7 The Consultants shall submit a Final Report concluding the Assignment, prepare and summarise the assessments and observations. The Final Report should cover :
- (a) the summary of the main findings and recommendations of the service reservoir inspections and QRAs;
 - (b) the risk level of the service reservoirs and a risk based ranking of the service reservoirs and the priority of implementation of any risk mitigation measures recommended, taking into account any constraint in the water supply systems, such as operational requirements, seasonal demand of water supplies, temporary diversion of water supply networks, etc.; and
 - (c) review the risk level and ranking of the service reservoirs in item (b) above with the consideration of completion of the remedial works recommended by the Advisor.
- 6.8 Instruction to undertake any of the works stipulated in Clause 4 of this Brief shall be issued by the Director's Representative before the expiration of the Agreement Period. Notwithstanding the requirements of Clause 8.5 of this Brief, the Consultants shall execute all such tasks even if the completion date for any task agreed in accordance with Clause 8 of this Brief is beyond the expiry of the Agreement Period, provided that the task for which the agreed completion date does not extend 6 months beyond the expiry of the Agreement Period. The Director, however, reserves the right to assign any of the uncompleted tasks to another party after the expiration of the Agreement Period.

7. Response to Queries

The Consultants shall respond to queries under Clause 20 of the General Conditions of Employment raised on a date within 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 Agreement Period for this Assignment is 30 months from the date for commencement of the Agreement, which is set to be the date of signing the memorandum of the Agreement to be confirmed in due course. The Agreement Period may be extended subject to the agreement between the Consultants and the Director's Representative.
- 8.2 The inspections of the forty nine (49) service reservoirs are tentatively scheduled to be carried out as indicated in Appendix I. The inspection periods shown in Appendix I are subject to change. The Consultants shall not commence any inspection without prior written instruction from the Director's Representative. For each service reservoir required to be inspected as specified in instructions in writing issued by the Director's Representative, the Director's Representative will notify the Consultants of the exact period of inspection in writing. The Consultants, upon receipt of the written notice, shall carry out the inspection at such time as instructed by the Director's Representative.
- 8.3 Pursuant to Clause 26(B) of the General Conditions of Employment, the Consultants shall submit the draft programme and revised draft programme, and the Director's Representative shall agree, or instruct, within the following periods:

Submission of the draft : Within 4 weeks of the due date for programme commencement of the Agreement.

Agreement of the draft : Within 4 weeks from receipt of the programme draft programme or instruction for submission of the revised draft programme.

Submission of the revised : Within 2 weeks from the instruction draft programme of the Director's Representative.

The draft programme and revised draft programme shall be in the form of a bar chart showing the activities for each individual service reservoir inspection, QRA and advisory service to be carried out, target dates for

particular tasks, any decision dates that may be required for the uninterrupted progress of the Assignment and the critical path. 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 programme. The key dates for the submission of reports shall be in accordance with Clause 5 of this Brief.

- 8.4 In case an agreement cannot be arrived at between the Director's Representative and the Consultants regarding the completion date for any task, such completion date shall be reasonably fixed by the Director.
- 8.5 All works shall be completed within the Agreement Period unless otherwise agreed by the Director's Representative. The Consultants shall endeavour to ensure that the Assignment is carried out in accordance with the programme and shall submit regular reviews as part of the progress reports referred to in Clause 9 of this Brief.

9. Progress Reports

The Consultants shall submit to the Director's Representative progress reports at monthly intervals or at such other intervals as the Director's Representative requires on all aspects of the Services relating progress to the programme referred to in Clause 8 of this Brief. The format of the report is to be agreed with the Director's Representative. The reports shall include a list of those parts of the Services of which the execution is behind the programme together with proposals to expedite progress, so as to complete the work by the due dates.

10. Financial Management

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

10.2 Before the commencement of any service reservoir inspections, QRAs or advisory services task, the Consultants shall submit to the Director's Representative a preliminary cost estimate of each task in a format to be agreed with the Director's Representative. The Consultants, within one month after inspection of the service reservoir, shall submit a cost estimate of each task for the service reservoir inspections, QRAs or advisory services task in terms of staff costs and out-of-pocket expenses to the Director's Representative for agreement. In the event of failure to reach an agreement, the Director's Representative shall determine the cost estimate for the task. The Employer shall not be liable for paying the Consultants for any staff input and expenses incurred in excess of the cost estimate for the task unless such staff input and expenses are authorised in writing by the Director's Representative prior to such staff input or expenses being incurred. The Consultants shall complete the task within the agreed cost estimate or the cost estimate determined by the Director's Representative, as the case may be.

11. Standards and Specifications

The Consultants shall adopt such technical and design standards and specifications as are in current use by WSD or, if non-existent, British Standard 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 modification or if by the adoption of the current standards or specifications 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. Variations and Other Commitments

Not used.

13. Director's Representative

The Director's Representative as defined in the General Conditions of

Employment shall be the Assistant Director/Development of WSD or such other person as may be authorised 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 WSD officers. If the Consultants are dissatisfied with a decision or instruction of any such officers, the matter shall be referred to the Director's Representative for a ruling. During the course of the Assignment, the Consultants shall report direct to the Director's Representative.

14. Control of the Project and Assignment

The Director's Representative or such other officers of WSD as may be authorised by the Director's Representative will provide guidance to the Consultants to monitor the progress of the Assignment. Meetings will be held at such time to be determined by the Director's Representative and shall be attended by the Consultant's Project Manager and, when appropriate, other representatives of the Consultants. The Consultants shall be required to attend meetings with the concerned committees, conferences, boards, groups and make reports to the Director's Representative. The Consultants shall also be required to produce documents for serving or reporting to these bodies.

15. Information and Facilities Provided by the Employer

15.1 Relevant documents including reports, drawings and other background materials are listed in Clause 15.2 of this Brief. The Consultants can inspect all available documents relevant to the Assignment at the regional offices or at the Reservoir Safety Section of WSD by prior arrangement with the Director's Representative. 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 Sales Section of the Information Services Department or the Map Publication Centres of the Lands Department.

15.2 The following information, where available, will be provided for reference of the Consultants:

- (a) Record drawings of the service reservoirs and the associated structures.
- (b) Records of any alteration and/or addition to the service reservoirs.
- (c) Engineers' and Inspectors' inspection reports.
- (d) Relevant information such as service reservoir storage capacity, inflow/outflow records, drop test results, operation data, etc.

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 Manager 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 At the commencement of the Assignment, the Consultants shall submit for the approval of the Director's Representative a list of professional and technical staff to be engaged in the Assignment. The Consultants shall obtain prior approval from the Director's Representative to any subsequent change of the project staff.

17. Specialist and Sub-consultant Services

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 Lands Department, where available for the area covered by this Assignment, can be obtained free of charge on application to the Director's Representative.
- 18.2 All field survey works required for the proper execution of the Assignment shall be the duty of the Consultants unless otherwise provided for in the Agreement. 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 Appendix II specifies the division of responsibility for other survey work among the Consultants, the Lands Administration Office and Survey and Mapping Office as well as the relevant sub-offices at district level of the Lands Department.

19. Insurance

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 estimated overall expenditure for the Agreement, subject to a maximum of HK\$ 150 million and a minimum of HK\$ 10 million.

Agreement No. CE 47/2011 (WS)

Seventh Safety Review of Small Service Reservoirs - Investigation

List of Service Reservoirs

Item	Service Reservoir	Capacity	Region	Tentative inspection period
1	Bowen Drive S.W. S/R	6154m ³	HK&I	September – October 2012
2	Cheung Chau F.W. S/R	3383m ³	HK&I	
3	Cheung Chau No.2 F.W. S/R	3401m ³	HK&I	
4	Cheung Chau No.3 F.W. S/R	3173m ³	HK&I	
5	Conduit Road F.W. S/R	7164m ³	HK&I	
6	Kennedy Town S.W. S/R	845m ³	HK&I	
7	Beacon Hill IL S.W. S/R	666m ³	K	
8	Ho Man Tin HL F.W. S/R	24153m ³	K	
9	Anderson Road F.W. S/R	8886m ³	NTE	
10	Tai Po Tau F.W. Primary S/R	18538m ³	NTE	
11	Tai Wo Tsuen F.W. S/R	4884m ³	NTW	
12	Tsing Yi North HL F.W. S/R	9306 m ³	NTW	
13	Tsuen Wan West LL S.W. S/R	3532m ³	NTW	
14	Hatton Road S.W. Tank	470m ³	HK&I	February – March 2013
15	Hatton Road No.2 S.W. Tank	470m ³	HK&I	
16	Lamma Island F.W. S/R	6300m ³	HK&I	
17	North Point F.W. S/R	24467m ³	HK&I	
18	North Point HL F.W. S/R	4628m ³	HK&I	
19	North Point HL S.W. S/R	2418m ³	HK&I	
20	Fung Wong S.W. S/R	8188m ³	K	
21	Lok Fu S.W. S/R	8597m ³	K	
22	Tui Min Hoi F.W. S/R	1222m ³	NTE	
23	Anderson Road No.2 F.W. S/R	15000m ³	NTE	

24	Tsuen Wan West HL S.W. S/R	673m ³	NTW	July – August 2013
25	Tsuen Wan F.W. S/R	21450m ³	NTW	
26	Mount Nicholson F.W. S/R	3360m ³	HK&I	
27	Pokfulam F.W. S/R	1184m ³	HK&I	
28	Queen Mary Hospital F.W. Tank	464m ³	HK&I	
29	Red Hill F.W. S/R	12434m ³	HK&I	
30	Shau Kei Wan No.2 F.W. S/R	18608m ³	HK&I	
31	Tai Hang No.2 F.W. S/R	3600m ³	HK&I	
32	Ma Chai Hang F.W. S/R	10888m ³	K	
33	Sau Mau Ping S.W. S/R	6910m ³	K	
34	Ma On Shan No.2 F.W. S/R	24000m ³	NTE	
35	Tsing Yi North LL S.W. S/R	2333m ³	NTW	
36	Tuen Mun North S.W. S/R	11782m ³	NTW	
37	Lai King Headland S.W. S/R	532m ³	NTW	
38	Ap Lei Chau No.2 F.W. S/R	7752m ³	HK&I	December 2013 – January 2014
39	Ap Lei Chau S.W. S/R	1503m ³	HK&I	
40	Chung Hom Kok F.W. S/R	2295m ³	HK&I	
41	Kotewall Road F.W. S/R	7314m ³	HK&I	
42	Shau Kei Wan HL S.W. S/R	750m ³	HK&I	
43	Tai Tung Shan F.W. S/R	4500m ³	HK&I	
44	Yau Ma Tei S.W. S/R	11315m ³	K	
45	Yau Tong S.W. S/R	2574m ³	K	
46	Sheung Wong Yi Au No.2 F.W. S/R	4088m ³	NTE	
47	Tseung Kwan O West HL S.W. S/R	570m ³	NTE	
48	Tsing Yi North HL S.W. S/R	667m ³	NTW	
49	Tuen Mun East F.W. S/R	23237m ³	NTW	

Note:

1. F.W. = Fresh Water; S.W. = Salt Water; HL = High Level; LL = Low Level; IL = Intermediate Level; S/R = Service Reservoir
2. The Advisor, if from overseas, is expected to stay in Hong Kong for not more than eight weeks for each inspection period.

3. The Consultants should read Clauses 4 and 6 of this Brief for the details of the Services to be provided in this Agreement.

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Seventh Safety Review of Small Service Reservoirs - Investigation

Responsibility for Survey Work

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

Description	Responsibility of
(1) (a) Provision of basic horizontal and vertical survey control	Survey and Mapping Office
(b) Checking of given control point values and establishment of survey control network(s) based on survey control given vide (a)	Consultants
(2) (a) Provision of basic mapping (at 1/1000 or other standard mapping relevant to the Assignment)	Survey and Mapping Office (excluding those specified as to be provided by the Consultants in the Assignment)
(b) Updating and verification of accuracy of information shown on plans supplied vide (a) as necessary in relation to the Assignment	Consultants
(c) Carrying out detailed surveys for site investigation and for preparation of design and contract documents as necessary in relation to the Assignment	Consultants
(3) Supply of existing cadastral plans and records and co-ordinate data	District Survey Office

Appendix II (Cont'd)

Description	Responsibility of
(4) Computation of detailed dimensional layouts of roads, drainage and WSD reserves, platforms, etc	Consultants (Checked and accepted by District Survey Office)
(5) Determination of site/lot boundaries, calculation of areas, etc. in connection with the agreed dimensioned layouts	District Survey Office (in liaison with District Lands Office)
(6) (a) Processing of resumption and surrender for privately owned land in Development Area	District Lands Office (in liaison with District Survey Office and Consultants)
(b) Resumption and surrender plans and demarcation of lands to be resumed	District Survey Office (in liaison with District Lands Office and Consultants)
(7) (a) Setting-out of roads, drainage works formation areas, etc.	Contractors (Checked and accepted by Consultants, usually by resident site staff under their supervision)
(b) Initial site survey, and interim and final payment surveys	Consultants, usually by resident site staff under their supervision (joint survey with contractors or agreed survey with contractors)
(8) Preparation of proposal plans for Government land allocations and grants	District Survey Office (in liaison with District Lands Office)
(9) Preparation of dimensioned plans and setting out of boundaries of sites and lots for Government land allocations and for grant to architects (Government and Housing Authority)	District Survey Office
(10) As-constructed surveys (including records of levels on all underground pipelines, etc.)	Consultants, usually by resident site staff under their supervision