

West Kowloon Cultural District

Contamination Assessment Plan

February 2012

West Kowloon Cultural District Authority

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1. Introduction

1.1 Project Background

The idea and form of developing a 40 ha site on the northern shore of the magnificent Victoria Harbour of Hong Kong for arts and cultural facilities has had a rich history of discussion in the Hong Kong community. As a result of those discussions, a community consensus has been reached that the vision of Hong Kong should be to develop the area, now called the West Kowloon Cultural District (WKCD), into a world-class integrated arts, cultural, entertainment and commercial district. Those discussions have suggested a list of Core Arts and Cultural Facilities (CACF) including 15 performing arts venues, a cultural institution with museum functions (named “M+”) and an Exhibition Centre (EC).

The WKCD is an important strategic project that would support Hong Kong’s development as a creative economy and global metropolis. It is a major initiative to meet the long-term infrastructure needs of the Hong Kong’s arts and cultural development. In addition, it could foster organic growth and the development of cultural and creative industries, attract and nurture talents, promote international exchange and co-operation, enhance the quality of life for citizens and make Hong Kong the cultural gateway to the Pearl River Delta.

The discussions have also revealed a great deal of expectations and aspirations towards the direction that the development of the WKCD should be directed towards. Remarks during that period include that the WKCD needs an optimal mix of arts and cultural facilities, a combination of large and small performing venues, to enhance artistic quality, meet established demand, fill market gaps, and help nurturing young and budding artists. The arts and cultural facilities should also suitably be clustered together with the commercial, catering and retail facilities so as to create people flow and synergy. Space should also be set aside to promote creative industries in the WKCD such as publishing, advertising, design, visual arts and cinema studios etc. Major standalone facilities should be built with iconic architectures so as to serve as the symbolic and anchor buildings in the WKCD to enhance its aesthetic appeal to both local residents and visitors from all over the world. Space should be also reserved in the WKCD to facilitate arts education, international cultural institutions and cultural exchange and co-operation.

In terms of planning, the community remarked that the WKCD should not be seen as an isolated development. Accessibility from and connectivity to the neighbouring community should be carefully thought through to help integrate the arts and cultural facilities in the WKCD with its neighbouring areas with a view to cultivate cultural ambience in the district and its immediate vicinity. Ample open space and a vibrant harbour-front should be provided to respond to the growing trend towards lowering building density, greater public awareness about good harbour-front planning and rising public aspiration for quality of life. The development should, however, adhere to prudent and transparent financing principles ensuring that the arts and cultural facilities are financially sustainable in the sense that the WKCD Authority (WKCDA) should have the availability to such sources of revenue as to be able to underpin the operation of the facilities without direct recourse to the Government.

The WKCDA, empowered by the WKCDA Ordinance, was set up by the Government with the full support of the Legislative Council (LegCo) in October 2008 to take forward the WKCD project.

The WKCDA is responsible for the preparation of a comprehensive DP. The WKCDA intends to prepare the DP in three stages, namely:

- i. To conduct an exercise to gauge stakeholders' expectations and aspirations for the DP of the WKCD as well as their views on the design and functional requirements of the CACF;
- ii. To prepare three Conceptual Plan (CP) Options; and
- iii. In the light of public comments on the CP Options collected in a Public Engagement (PE) exercise, select one option out of the three with any modifications as deemed fit by the WKCD.

The Selected Option with modifications would then be developed into a DP for submission to the Town Planning Board (TPB) for consideration, and then to the Chief Executive in Council for approval. If approved, the DP would serve as the basis for implementation.

1.2 Site Description

The WKCD site is located on the West Kowloon Reclamation south of Austin Road West and the Western Harbour Crossing Toll Plaza as shown in **Figure 1.1**. The site is currently zoned as "Other Specified Uses" annotated "Arts, Cultural, Entertainment, Commercial and Other Uses" under the South West Kowloon Outline Zoning Plan, and comprises approximately 40ha of previously undeveloped land bordering the Jordan/Tsim Sha Tsui area.

The site reserved for the WKCD development is currently occupied by local roads, temporary storage/parking facilities, a temporary promenade at the Waterfront and a number of existing infrastructure facilities such as ventilation buildings for the Western Harbour Crossing and the MTR railway line, a sea water pumping station, etc. Parts of the WKCD site are also currently occupied by the Tsim Sha Tsui Fire Station, and by the works site and temporary works areas for the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) project.

Under the current Development Plan based on the "City Park" Conceptual Plan scheme, the key land uses within the future WKCD is illustrated in **Figure 1.2**.

1.3 Designated Projects under EIA Ordinance

The Project is a designated project by virtue of Item 1 of Schedule 3 of the EIAO, which specifies an "engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100 000". The Project also includes the following individual designated projects defined under Schedule 2 of the EIAO:

- (i) a flyover more than 100m in length between abutments over the Western Harbour Crossing toll plaza (Item A.8, Part I, Schedule 2);
- (ii) an underpass more than 100m in length under the built areas (Item A.9, Part I, Schedule 2); and
- (iii) any individual project(s) that fall under Schedule 2 of the EIAO to be identified during the course of the EIA study.

A Project Profile (PP-453/2011) was submitted to EPD on 14 October 2011, and an EIA Study Brief (ESB-237/2011) was issued on 21 November 2011.

1.4 Structure of the Plan

This Contamination Assessment Plan (CAP) covers the requirements as specified in Section 3.4.9 of the EIA Study Brief. The structure of the CAP is laid out as follows:

- Section 2 presents the assessment objectives, criteria and methodology.
- Section 3 presents findings of the site appraisal, which included a desk-top study and a site reconnaissance survey.
- Section 4 presents the site investigation plan for the potential contaminated sites.
- Section 5 presents the assessment conclusion.

2. Assessment Objectives, Criteria and Methodology

2.1 Objectives

The objectives of this CAP are to:

- Review the present and historical land uses in relation to possible land contamination within or in the proximity of the Project area;
- Identify any potential land contamination hot spots;
- Evaluate the environmental impacts associated with the potential land contamination identified within or in the proximity of the Project area; and
- Propose where necessary, the sampling and laboratory chemical analysis required to determine the nature and extent of any potential land contamination identified.

This CAP has been prepared for submission to the Environmental Protection Department (EPD) for approval.

In accordance with the requirement specified in Clause 3.4.9.1 of the EIA Study Brief, if any contaminated land uses as stated in Sections 3.1 and 3.2 of Annex 19 in the Technical Memorandum on EIA Process (EIAO-TM) of the EIAO are identified, the carrying out of a land contamination assessment is required and measures shall be proposed to avoid disposal.

2.2 Relevant Standards, Guidelines and Requirements

The relevant standards and guidelines on land contamination assessment and remediation include the following:

- Section 3 of Annex 19 to the EIAO-TM;
- Guidance Note for Contaminated Land Assessment and Remediation (August 2007);
- Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management (RBRGs Guidance Manual) (December 2007); and
- Practice Guide for Investigation and Remediation of Contaminated Land (August 2011).

The uses that may have the potential to cause land contamination include among others:

- Oil installations including oil depots and petrol filling stations;
- Gas works;
- Power plants;
- Shipyards/boatyards;
- Chemical manufacturing/processing plants;
- Steel mills/metal workshops;
- Car repairing and dismantling workshops; and
- Scrap yards.

2.3 Assessment Methodology

Desktop appraisal and site reconnaissance were undertaken to identify the presence of any potentially contaminative land within or in the proximity of the Project area.

Relevant information were collected and reviewed as part of the desktop study, including:

- Historical aerial photographs of the Project area;
- Records of active (current) and inactive (past) registered chemical waste producers in the areas of interest from the Environmental Protection Department (EPD);
- Records of current and past dangerous good (DG) licences in the areas of interest from the Fire Services Department (FSD);
- Records of accidents that involved spillage/leakage of chemical waste or DG from EPD and FSD; and
- Previously approved studies.

Site reconnaissance surveys were undertaken to identify current land uses in the Project area and verify the findings of the desktop appraisal.

3. Site Appraisal

3.1 Project Area and its Environs

The WKCD site is located on the West Kowloon Reclamation south of Austin Road West and the Western Harbour Crossing Toll Plaza. The site is currently zoned as “Other Specified Uses” annotated “Arts, Cultural, Entertainment, Commercial and Other Uses” under the South West Kowloon Outline Zoning Plan, and comprises approximately 40 ha of previously undeveloped land bordering the Jordan/Tsim Sha Tsui area. The site reserved for the WKCD development is currently occupied by local roads, temporary storage/parking facilities, a temporary promenade at the Waterfront and a number of existing infrastructure facilities such as ventilation buildings for the Western Harbour Crossing and the MTR railway line, sea water pumping station, etc. Parts of the WKCD site are also currently occupied by the Tsim Sha Tsui Fire Station, and by the works site and temporary works areas for the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) project.

3.2 Desktop Study

3.2.1 Review of Historical Aerial Photographs

Relevant historical aerial photographs taken between 1963 and 2004 and covering the Project area, where available, were collected and reviewed. The historical land uses identified from the review are summarised below for evaluation of potential land contamination.

Table 3.1 Land Use History of Project Area

Date	Ref. no.	Height (ft)	Land Use
25/01/1963	5186	2,700	open sea, bare ground, low rise buildings
29/01/1976	13085	4,000	open sea, bare ground, low rise buildings
27/09/1995	CN11223	3,500	reclaimed land, construction site, low rise buildings
28/09/2004	CW59616	4,000	reclaimed land, bare ground, ventilation buildings, low rise buildings
25/07/2008	CS13725	6,000	reclaimed land, bare ground, ventilation buildings, parking facilities, construction site, low rise buildings

* Please refer to Appendix A for the selected aerial photos

3.2.2 Review Previously Approved Studies/Reports

The relevant study area for this project as mentioned in the Contamination Assessment Plan (CAP) and the Contamination Assessment Report and Remediation Action Plan (CAR/RAP) of the approved Kowloon Southern Link (KSL) EIA Report (Ref. No. EIA-098/2004) were reviewed. As stated in Section 3.5.2 of the KSL CAP, there are two underground fuel oil storage tanks at Tsim Sha Tsui (TST) Fire Station, one for storage of diesel and the other for petrol. The volume of each tank is approximately 4.6m³ and have been used for more than 30 years, with no record of previous spillage/leakage at the time. Information extracted from the approved CAP and CAR/RAP of KSL is provided in **Appendix B** for reference.

The CAP for KSL proposed five sampling locations, two of which are located in the immediate vicinity of the TST Fire Station (drillholes ref. KSD100/DHEPZ052 and KSD100/DHE056). As documented in Section 5 of the approved CAR/RAP for KSL, laboratory test results for samples taken from those two drillholes (as shown in **Appendix B**) indicated no contamination with reference to the Dutch B levels (the standards

adopted at the time of preparing the KSL EIA). However, given that the Risk Based Remediation Goals (RBRG) has been introduced by EPD for land contamination assessment since August 2007 to replace Dutch B levels, the previous site investigation results from the KSL study were checked against the RBRG criteria in order to confirm compliance under the new assessment criteria.

Based on the RBRG land use classification under the Guidance Manual, the WKCD development (which includes planned residential developments) should be classified under the more stringent “Urban Residential” land use category. **Table 3.2** shows the corresponding RBRG standards against the results from KSL.

Table 3.2: Comparison of KSL site investigation results against RBRG criteria

Chemical Parameters (tested in KSL CAR/RAP)	Units	RBRG Limit Level for ‘Urban Residential’	Maximum Concentration Detected in Drillhole KSD100/DHEPZ052	Maximum Concentration Detected in Drillhole KSD100/DHE056
Metals				
Cadmium	mg/kg	73.8	0.5	0.02
Chromium	mg/kg	221	13	0.9
Copper	mg/kg	2950	6.4	1.4
Nickel	mg/kg	1480	4	0.7
Lead	mg/kg	258	93	140
Zinc	mg/kg	10000	170	18
Mercury	mg/kg	11	0.5	0.2
Arsenic	mg/kg	22.1	4.3	1.5
Barium	mg/kg	10000	75	41
Cobalt	mg/kg	1480	4.1	5.5
Molybdenum	mg/kg	369	9.5	4.9
Tin	mg/kg	10000	<5	<5
TPH				
C6 – C9	mg/kg	1410(C6-8), 2240(C9)	<2	<2
C10 –C14	mg/kg	2240	<50	<50
C15 – C28	mg/kg	2240(C15-16), 10000(C17-28)	<100	246
C29 – C36	mg/kg	10000	<100	167
BTEX				
Benzene	mg/kg	0.704	<0.2	<0.2
Ethylbenzene	mg/kg	709	<0.2	<0.2
Toluene	mg/kg	1440	<0.2	<0.2
Meta - & Para Xylene	mg/kg	95	<0.4	<0.4
Ortho Xylene	mg/kg		<0.2	<0.2
Others				
Cyanide	mg/kg	1480	<1	<1
Sulphate (acid soluble)	mg/kg	-	0.96	0.04

Source: KSL EIA Report, Appendix 10-2 – Contamination Assessment Report and Remediation Action Plan

As shown in **Table 3.2**, the results from the CAR/RAP for KSL are all well within the RBRG limit levels, which reaffirms the findings of the CAR/RAP for KSL.

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Aside from the TST Fire Station, the ex-government dockyard was also identified in the KSL study as a potentially contaminated site, however, it is located entirely outside the WKCD Project boundary, and as mentioned in the CAR/RAP for KSL, the contamination at the ex-government dockyard was found to be localized and was planned to be remediated under KSL project. Based on the aforementioned information, no historical land contamination is anticipated within the WKCD Project area that has been covered by the KSL EIA.

Relevant information from the West Kowloon Cut and Cover Section (WKCC) of the Express Rail Link (XRL) project including CAP and CAR of the approved XRL EIA Report were also reviewed. The study area of the WKCC partly falls within the Project area of WKCD. Site appraisal conducted for XRL has concluded that within the WKCD Project boundary, there were no adverse land contamination impacts identified. In the CAP for WKCC, sampling and testing plan was only recommended for the area of City Golf Club which is located entirely outside the WKCD Project boundary and therefore has no implication on the WKCD Project.

3.2.3 Review of Records from Government Departments

Relevant data, including records of active and inactive registered chemical waste producers, records of current and past dangerous goods (DG) licences, and records of any accident that involved spillage/leakage of chemical waste or DG within or in the immediate vicinity of the WKCD Project area were collected from EPD and FSD. Records of registered chemical waste producers collected from EPD are presented in **Appendix C**. Replies from the two Government departments in response to the information requests are presented in **Appendix D** for reference.

A review of the records from EPD revealed that while there are a number of registered chemical waste producers in the area surrounding the WKCD Project, the Project area will not encroach into these existing facilities. There was also no record of any accident that involved spillage/leakage of chemical waste within or in the proximity of the WKCD Project area.

Reply from FSD revealed that the only licensed DG stores in the proximity of WKCD Project area are the two underground fuel oil storage tanks (each with a capacity of 4,600 litres) located at the TST Fire Station, but no incident records of spillage/leakage of DG were identified.

3.2.4 Site Reconnaissance Survey

Site reconnaissance surveys were carried out from July to December 2011 to identify current land uses along the Project area and to verify the findings of the desktop appraisal. In general, the site has been used as a waterfront promenade, temporary works area for XRL, temporary open storage and parking facilities as shown in **Appendix E**. The following land uses were identified:

- Local roads;
- Temporary storage/parking facilities;
- A temporary promenade at the Waterfront;
- A number of existing infrastructure facilities such as ventilation buildings for the Western Harbour Crossing and the MTR railway line, sea water pumping station, etc.
- Tsim Sha Tsui Fire Station; and

- Works site and temporary works areas for the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL project).

3.3 Prediction and Evaluation of Environmental Impacts

Based on the findings from the desktop study, the current land uses, including potentially contaminative uses within or in the vicinity of the Project area, have been identified as summarized in **Table 3.3**.

Table 3.3: Summary of Site Appraisal Results

Areas	Current Land Use	Historical Land Use	Potential Land Contamination Impact on the Project Area	Need for Further Site Investigation
Tsim Sha Tsui (TST) Fire Station	Fire station	Fire station	Petroleum Carbon Ranges, Volatile organic compounds (VOC) and semi-VOC (SVOC)	Yes
Other land uses in West Kowloon Reclamation Area	Temporary works area, parking area, open area, ventilation buildings, waterfront promenade	Reclaimed land, open sea; (near eastern boundary) open area	No contaminative land uses were identified	No

There are two underground fuel oil storage tanks at the existing TST Fire Station within the WKCD site. Although there were no records of any accidents involving spillage/leakage of chemical waste or DG within or in the proximity of the WKCD Project area, it is proposed to carry out further site investigation for the TST Fire Station location to identify any potential sources of land contamination that may be due to, but not limited to, leakage or spillage from the fuel oil tanks, pipes, or during refilling. The reason is as follows.

Based on the latest WKCD implementation programme, it is aimed to commence construction works for the critical elements of WKCD in as early as 2013 so as to commission the Phase 1 arts and cultural facilities in stages from 2014/2015 to 2020. While the existing TST Fire Station is scheduled to be relocated in phases, it will unlikely be relocated before 2020. During the period between now and 2020, the TST Fire Station will remain in operation, and leakage or spillage from the underground fuel oil tanks or pipes, or during refilling might occur. As such, further site visit and site investigation/laboratory chemical analysis are suggested to be conducted after land acquisition but prior to demolition of the two underground tanks and associated pipes, so that the investigation results will be up to date.

The site investigation should be assessed by a competent land contamination specialist, and the specialist shall carry out the assessment to determine whether the location of the TST Fire Station is contaminated and to assess the extent of any contamination identified. Should any area be identified/suspected of being contaminated, soil and groundwater samples should be collected for analysis, and the sampling points should be located at or near potential sources of contamination, e.g. near the underground storage tanks or pipes. The recommended testing as described in **Section 4** of this CAP should be undertaken or referenced to identify any contamination.

The updated CAP should include proposals on the sampling and analysis and shall be submitted to EPD for approval prior to the demolition work. Upon approval of the CAP, the Project Proponent shall conduct a land contamination assessment and the findings shall be presented in a CAR. If land contamination is confirmed with reference to the relevant RBRG levels, the Project Proponent shall prepare a RAP in which further hotspots of contaminated soil that require soil remediation shall be identified. **Section 4** of this

report provides an outline of the proposed site investigation plan to be conducted after land acquisition but prior to demolition of the two underground tanks and associated pipes at the TST Fire Station.

4. Proposed Site Investigation Plan

4.1 Purpose of Site Investigation

The proposed site investigation aims to identify the presence (if any) and the extent of contamination (soil/groundwater) at the TST Fire Station area of the WKCD Project. A sampling and analytical programme is proposed based on the RBRG Guidance Manual and EPD's Guidance Note for Contaminated Land Assessment and Remediation and also Practice Guide for Investigation and Remediation of Contaminated Land (August 2011). The site investigation programme should be implemented once site access to the TST Fire Station area is granted and after EPD endorsement is obtained, but prior to demolition of the two underground fuel oil storage tanks and associated pipes.

The proposed sampling locations will be confirmed by a competent land contamination specialist once site access or land acquisition is granted. Any proposed locations, if needed, will be submitted to EPD for endorsement before the site investigation work begins. **Table 4.1** summarizes the review of potential contaminated sites and the corresponding sampling and analysis proposal.

Table 4.1: Proposed Borehole Location

Location	Testing Parameters	Sampling Depth*
Underground Fuel Storage Tanks and associated pipes	Petroleum Carbon Ranges, Volatile organic compounds (VOCs) and Semi-VOC (SVOC)	0.5m, 1.5m, 3.0m, 4.0m below the base of underground fuel storage tanks

* Sampling depth is the level below ground level or concrete slab

4.2 Scope of Site Investigations

The sampling locations and depths are recommended based on the best available information acquired and have made reference to the guidelines on sampling and analysis recommended in the relevant Guidance Notes (**Section 2.2**). The proposed site investigation programme are outlined as follows.

Soil samples should be taken to identify the potential contamination vertical profile taking into consideration the proposed excavation levels. Sub-samples should be taken from recovered undisturbed samples at nominally 0.5, 1.5, 3.0 and 4.0 m below the base of underground fuel storage tanks with depth variations made to suit proposed excavation depths. Groundwater samples will be taken from the base of all drill holes (if encountered).

Field testing should encompass head space tests by use of a Photo Ionizing Detector (PID) (where applicable) to identify the presence of any potential Volatile Organic Chemicals (VOCs), and identification of any significant free-product thickness lying above the groundwater table by use of an interface meter.

4.3 Quality Assurance / Quality Control

4.3.1 Soil Sampling

Soil samples shall be labelled uniquely and unambiguously. The nature of soil material sampled shall be recorded at different depths. Information such as depth, sampling location and other information such as any non-standard sampling events shall be recorded as well. The description of soil samples shall include but not limited to:

- Test site where the sample is collected.
- Sample identification number.
- Soil sampling depth (with respect to the lowest level of concrete pavement/cover, if any)
- Estimated physical characteristics
- Colour photographs

All samples shall be stored in portable cool box with frozen chilled packs at 0-4°C whilst in the field or in transit. Samples shall be returned to the laboratory on the same evening as the day of sampling. A chain-of-custody form shall be completed for all the samples delivered. Each sample tube shall be sealed such that leakage into and out of the tube is minimized.

Strata logging for boreholes shall be conducted by a qualified geologist during the drilling and sampling. The logs shall include general stratigraphic description, soil sampling depth, sample notation and level of groundwater. The presence of rocks/boulders/cobbles and foreign objects (e.g. wood, metals and plastics) shall also be recorded.

All equipment used for sample handling and storage shall be decontaminated before and after collection of each sample. Standard procedures for cleaning the drilling rig and sampling equipment is described below:

- Clean with fresh water and lab-grade detergent (use brush if necessary) to remove particulate matter and surface film;
- Rinse thoroughly with tap water (for drilling equipment) or distilled water (for sampling equipment);
- After field cleaning, the equipment shall be handled by personnel wearing clean gloves to avoid re-contamination. If the equipment is not to be used immediately, it should be covered with clean plastic sheeting or put in a box to avoid re-contamination; and
- The drilling equipment and sampling equipment shall be cleaned according to the above procedures between sampling holes.

4.3.2 Groundwater Sampling

If groundwater is encountered during excavation, groundwater samples should also be collected at all trial pits. The trial pit should be pumped to near dry and allowed to stand for 24 hours. Groundwater samples should then be collected using a decontaminated bucket/bailer.

Groundwater samples should be immediately transferred to new, clean, laboratory-supplied “darken” type glass jars for sample storage/transport after collection. Groundwater samples should be placed in the glass jars with zero headspace and promptly sealed with a septum-lined cap. The samples should be placed in ice chests, cooled and maintained at a temperature of about 4°C until delivered to the analytical laboratory immediately after collection.

The floating layer shall be removed/recovered and analysed separately from the main aqueous phase of the groundwater (as far as is reasonably practicable). All samples will be uniquely labelled.

Between samples, all equipment used for sample handling and storage shall be thoroughly decontaminated with laboratory-grade detergent. Samples shall be stored in appropriate pre-washed containers (provided by the laboratory) and immediately put in an insulated cool box. The sample containers and the box shall

be tightly closed and sufficient chilling packs or ice shall be provided to maintain a temperature of 0-4 °C inside the box.

Chilled groundwater samples shall be transferred to the custody of a HOKLAS accredited laboratory or one of its Mutual Recognition Arrangement Partners on the same day as sampling. A chain-of-custody system shall be operated in triplicate as part of the QA/QC procedure. The accredited laboratory QA/QC procedures shall be precisely followed.

4.3.3 Quality Control (QC) Samples

The following QC samples for soil and groundwater will be collected for laboratory analysis during the sampling process:

- ONE equipment blank (i.e. equipment “rinsate”) per 20 samples
- ONE field blank per 20 samples
- ONE set of duplicate sample per 20 samples

4.3.4 Health and Safety Measures

All field personnel should wear appropriate Personal Protective Equipment (PPE) while performing site investigation, such as eye goggles, masks, safety helmet, protective gloves, protective clothing, safety shoes, etc. All personnel should always maintain basic personal hygiene standard and be responsible for maintaining and storing their own PPE in a secure location before leaving the site.

Eating, drinking and smoking shall be prohibited within the site area. The specific safety measures to be taken depend on the site conditions, the nature and magnitude of contamination, and relevant regulations related to site safety.

4.4 Scope of Laboratory Testing

Laboratory testing shall be undertaken as follows:

- The ground investigation contractor transports soil samples (or groundwater samples) in appropriate storage containers on the same day of recovery to the testing laboratory.
- Samples shall be tested at a HOKLAS accredited laboratory or one of its Mutual Recognition Arrangement partners
- All laboratory testing methods must be accredited by the HOKLAS or one of its Mutual Recognition Arrangement partners.
- The Laboratory shall take relevant soil subsamples for laboratory testing.
- The Laboratory shall carry out the laboratory tests for soil and groundwater samples as detailed respectively in **Tables 4.2** and **4.3**.
- The Laboratory shall report laboratory test results from recovered soil/groundwater (where applicable) sampling during the site investigation period.
- The accredited laboratory QA/QC procedures shall be precisely followed.

Table 4.2: Laboratory Testing for Soil Samples

Chemical Category	Testing Parameters	RBRG for "Urban Residential" Scenario (mg/kg)*
Petroleum Carbon Ranges	C ₆ -C ₈	1410
	C ₉ -C ₁₆	2240
	C ₁₇ - C ₃₅	10000*
Semi-Volatile Organic Chemicals (SVOCs)	Acenaphthene	3510
	Acenaphthylene	2340
	Anthracene	10000*
	Benzo(a)anthracene	12
	Benzo(a)pyrene	1.2
	Benzo(b)fluoranthene	9.88
	Benzo(k)fluoranthene	120
	Benzo(g,h,i)perylene	1800
	bis-(2-Ethylhexyl)phthalate	30
	Chrysene	
	Dibenzo(a,h)anthracene	871
	Fluoranthene	1.2
	Fluorene	2400
	Hexachlorobenzene	2380
	Indeno(1,2,3-cd)pyrene	0.243
Napthalene	12	
Phenanthrene	182	
Phenols	10000*	
Pyrene	10000*	
Volatile Organic Chemicals (VOCs)	Acetone	9590
	Benzene	0.704
	Bromodichloromethane	0.317
	2-Butanone	10000*
	Chloroform	0.132
	Ethylbenzene	709
	Methyl tert-Butyl Ether	6.88
	Methylene Chloride	1.3
	Styrene	3220
	Tetrachloroethene	0.101
	Toluene	1440
	Trichloroethene	0.523
	Xylenes (Total)	95

* indicates a 'ceiling limit' concentration.

Table 4.3 Laboratory Testing for Groundwater Samples

Parameter	Testing Parameters	RBRG for “Urban Residential” Scenario (mg/L) ⁺
Petroleum Carbon Ranges	C6-C8	82.2
	C9-C16	714
	C17- C35	12.8
Volatile Organic Chemicals (VOCs)	Acetone	10000*
	Benzene	3.86
	Bromodichloromethane	2.22
	2-Butanone	10000*
	Chloroform	0.956
	Ethylbenzene	1020
	Methyl tert-Butyl Ether	153
	Methylene Chloride	19
	Styrene	3020
	Tetrachloroethene	0.25
	Toluene	5110
	Trichloroethene	1.21
	Xylenes (Total)	112
Semi-Volatile Organic Chemicals (SVOCs)	Acenaphthene	10000*
	Acenaphthylene	1410
	Anthracene	10000*
	Benzo(a)anthracene	-
	Benzo(a)pyrene	-
	Benzo(b)fluoranthene	0.539
	Benzo(k)fluoranthene	-
	Benzo(g,h,i)perylene	-
	bis-(2-Ethylhexyl)phthalate	-
	Chrysene	58.1
	Dibenzo(a,h)anthracene	-
	Fluoranthene	10000*
	Fluorene	10000*
	Hexachlorobenzene	0.0589
	Indeno(1,2,3-cd)pyrene	-
	Napthalene	61.7
	Phenanthrene	10000*
Phenols	-	
Pyrene	10000*	

* indicates a ‘ceiling limit’ concentration.

4.5 Interpretation of Results and Reporting

As the WKCD site will involve residential development, the laboratory test results shall be mainly assessed against the EPD’s RBRG requirements for “Urban Residential” scenario for soil and groundwater contamination assessment (see **Tables 4.2** and **4.3**). If any chemicals which are not listed in the RBRG list are found, the relevant USEPA risk-based screening level shall be adopted for the assessment.

The assessment results of potential contamination shall be presented in a Contamination Assessment Report (CAR) and, if necessary, a Remediation Action Plan (RAP), for approval by EPD.

5. Conclusion

In accordance with the requirement set out in Clause 3.4.9 of the EIA Study Brief, this CAP is prepared as part of the Land Contamination Assessment study.

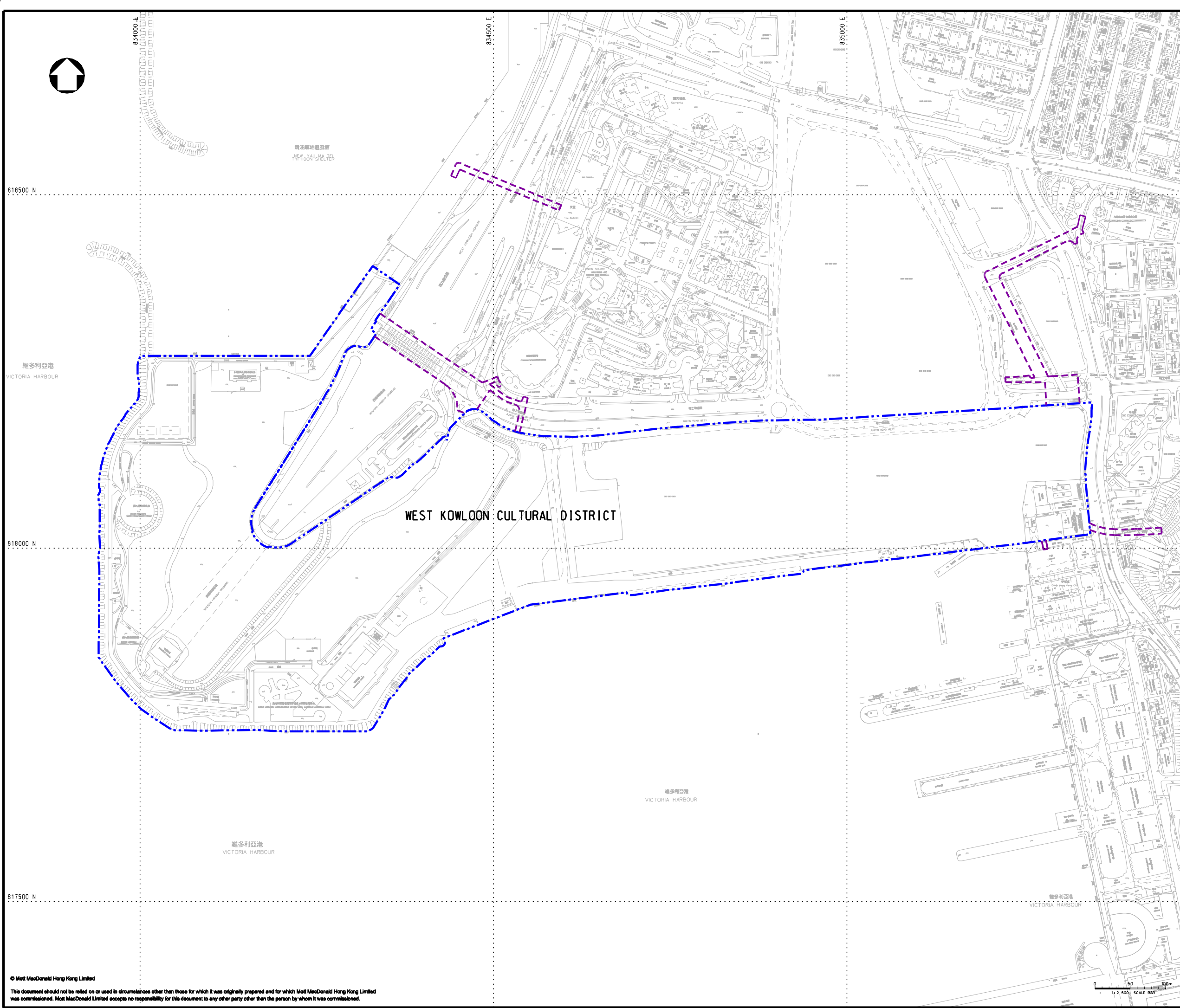
An investigation into the current and historical land uses with respect to potential land contamination at the WKCD Project area has been undertaken, including a desktop study and a reconnaissance survey. Based on the findings of the site appraisal on the existing and historical land uses in the Project area and review of relevant records and reports, adverse land contamination impacts associated with the construction and operation of the WKCD Project is not anticipated except for the two underground fuel oil storage tanks located at the existing TST Fire Station within the WKCD site.

As the existing TST Fire Station will remain in operation until its relocation in phases, which will unlikely be started before 2020, it is proposed to carry out further site investigation after obtaining access to the Fire Station but prior to demolition of the underground fuel oil tanks and associated pipes in order to obtain up-to-date site investigation findings for assessment of land contamination that may occur between now and its future relocation.

FIGURES



- LEGEND:**
- BOUNDARY OF WEST KOWLOON CULTURAL DISTRICT
 - - - BOUNDARY OF EXTERNAL CONNECTIONS (INDICATIVE SUBJECT TO FUTURE DESIGN & ARRANGEMENT)



P1	JAN 12	MING	FIRST ISSUE	HY	AFK
Rev	Date	Drawn	Description	Ch'kd	App'd

Client
WEST KOWLOON CULTURAL DISTRICT AUTHORITY



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Hong Kong
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www.mottmac.com.hk

Project
PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title
SITE LOCATION AND PROJECT AREA

Designed	DC	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	DC	Approved	AFK
Scale at A1	Status	Rev	
1:2500	PRE	P1	

Drawing Number **FIGURE 1.1**



LEGEND:

- BOUNDARY OF WEST KOWLOON CULTURAL DISTRICT
- OPEN SPACE (INCLUDING OUTDOOR PERFORMANCE VENUES)
- OTHER SPECIFIED USES

NOTE:

1. LAND USE BOUNDARIES ARE INDICATIVE ONLY.

P1	JAN 12	MING	FIRST ISSUE	HY	AFK
Rev	Date	Drawn	Description	Ch'kd	App'd

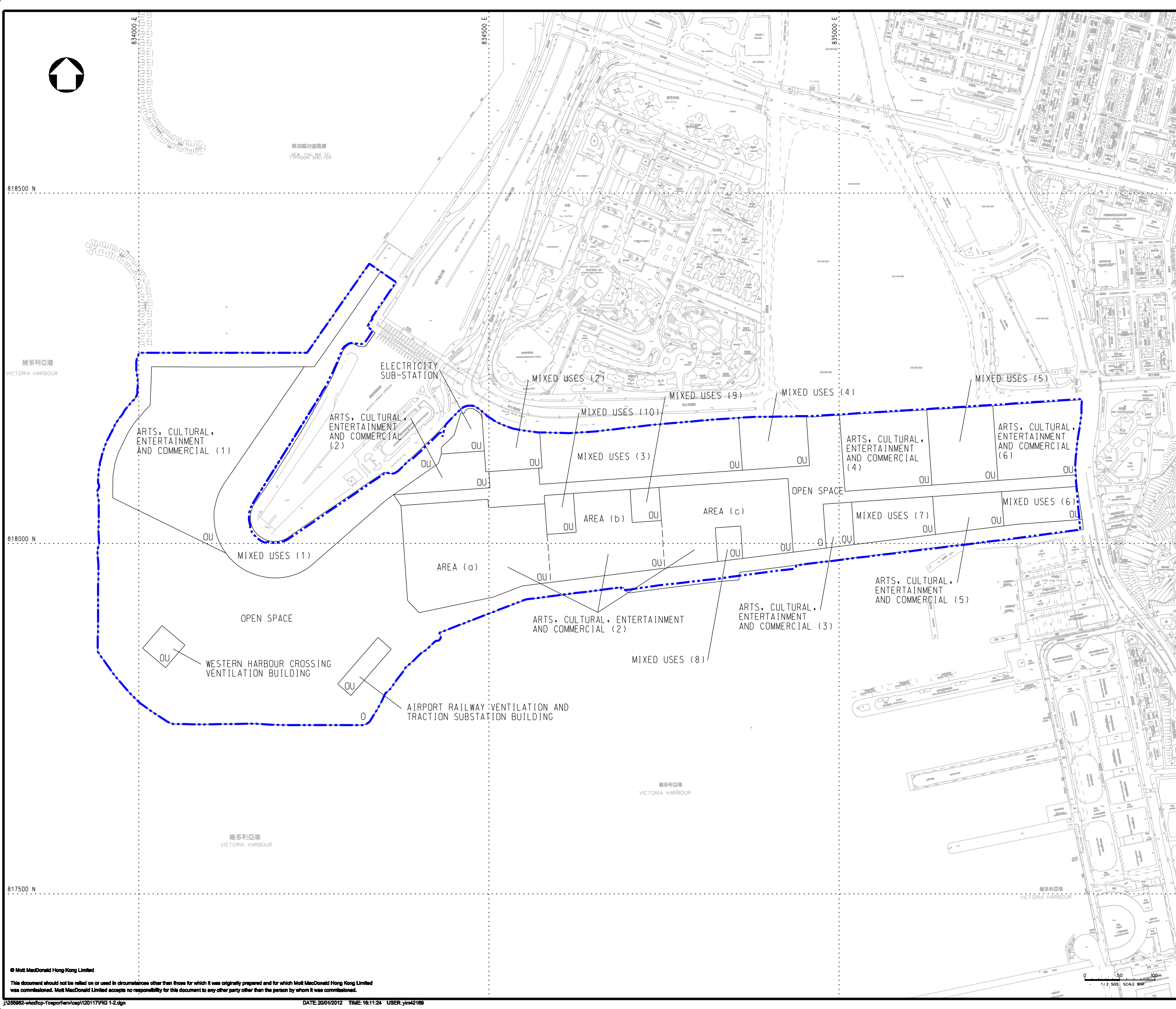
WEST KOWLOON CULTURAL DISTRICT AUTHORITY

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PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

KEY LAND USES WITHIN THE WKCD

Designed	DC	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	DC	Approved	AFK
Scale at A1	Status		Rev
1:2500	PRE		P1
Drawing Number	FIGURE 1.2		



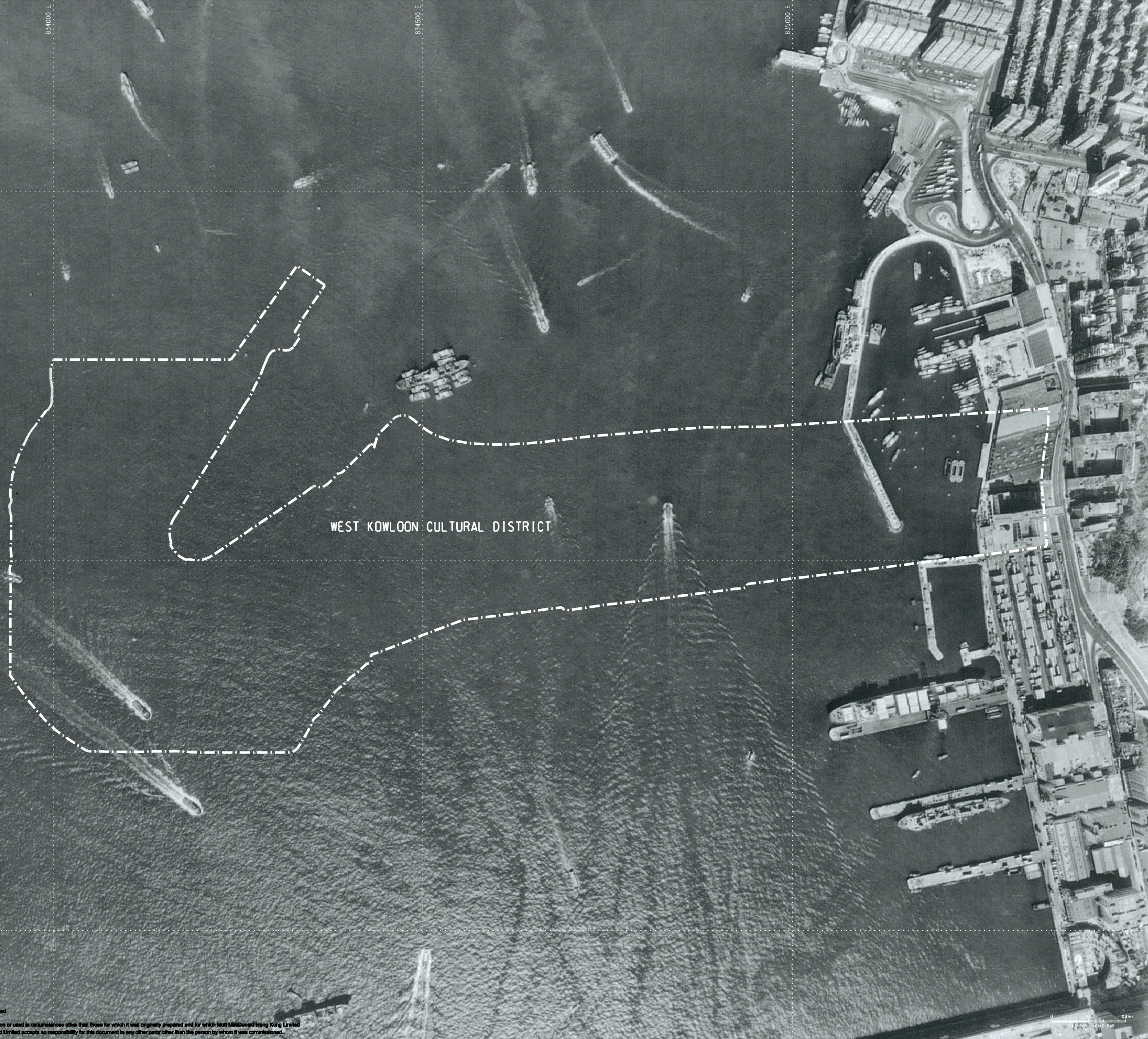
APPENDIX A

Representative Historical Aerial Photographs



LEGEND:

PROJECT BOUNDARY



Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	JAN 12	MING	FIRST ISSUE	HY	AFK

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Project

PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title

AERIAL PHOTO OF PROJECT AREA IN 1976

Designed	HY	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	HY	Approved	AFK
Scale at A1	1:2500	Status	PRE
Drawing Number		Rev	P1

FIGURE A1



819000 N

834000 E

834500 E

835000 E

818500 N

818000 N

WEST KOWLOON CULTURAL DISTRICT

0 50 100m
1:2,500 SCALE BAR

LEGEND:

PROJECT BOUNDARY

Rev	Date	Drawn	Description	Ch'kd	App'd
P1	JAN 12	MING	FIRST ISSUE	HY	AFK

Client

WEST KOWLOON CULTURAL DISTRICT AUTHORITY



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Project

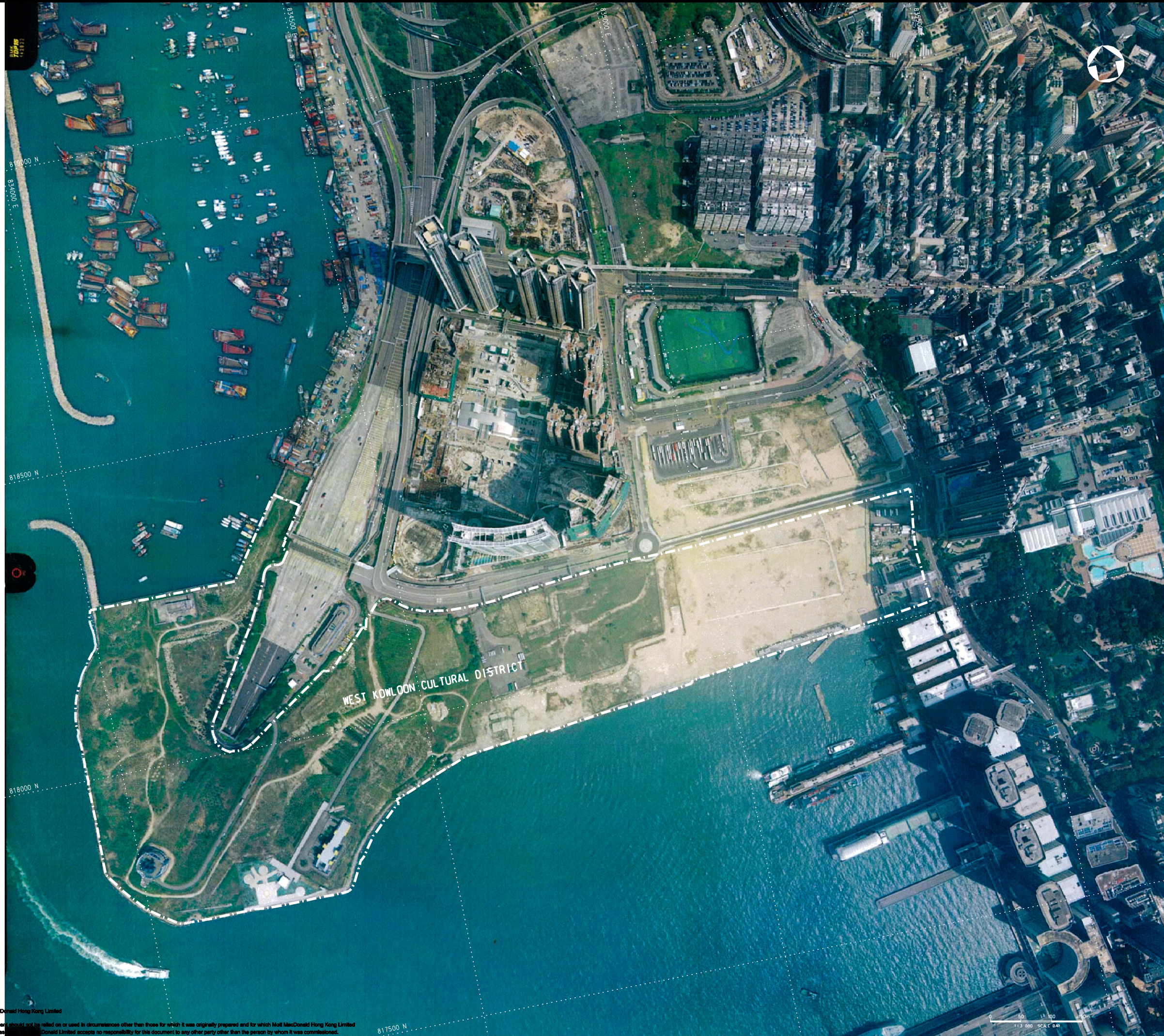
PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title

AERIAL PHOTO OF PROJECT AREA IN 1995

Designed	HY	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	HY	Approved	AFK
Scale at A1	1:2500	Status	PRE
Rev			P1

Drawing Number **FIGURE A2**



LEGEND:
 PROJECT BOUNDARY

Rev	Date	Drawn	Description	Ch'kd	App'd
P1	JAN 12	MING	FIRST ISSUE	HY	AFK

Client
WEST KOWLOON CULTURAL DISTRICT AUTHORITY



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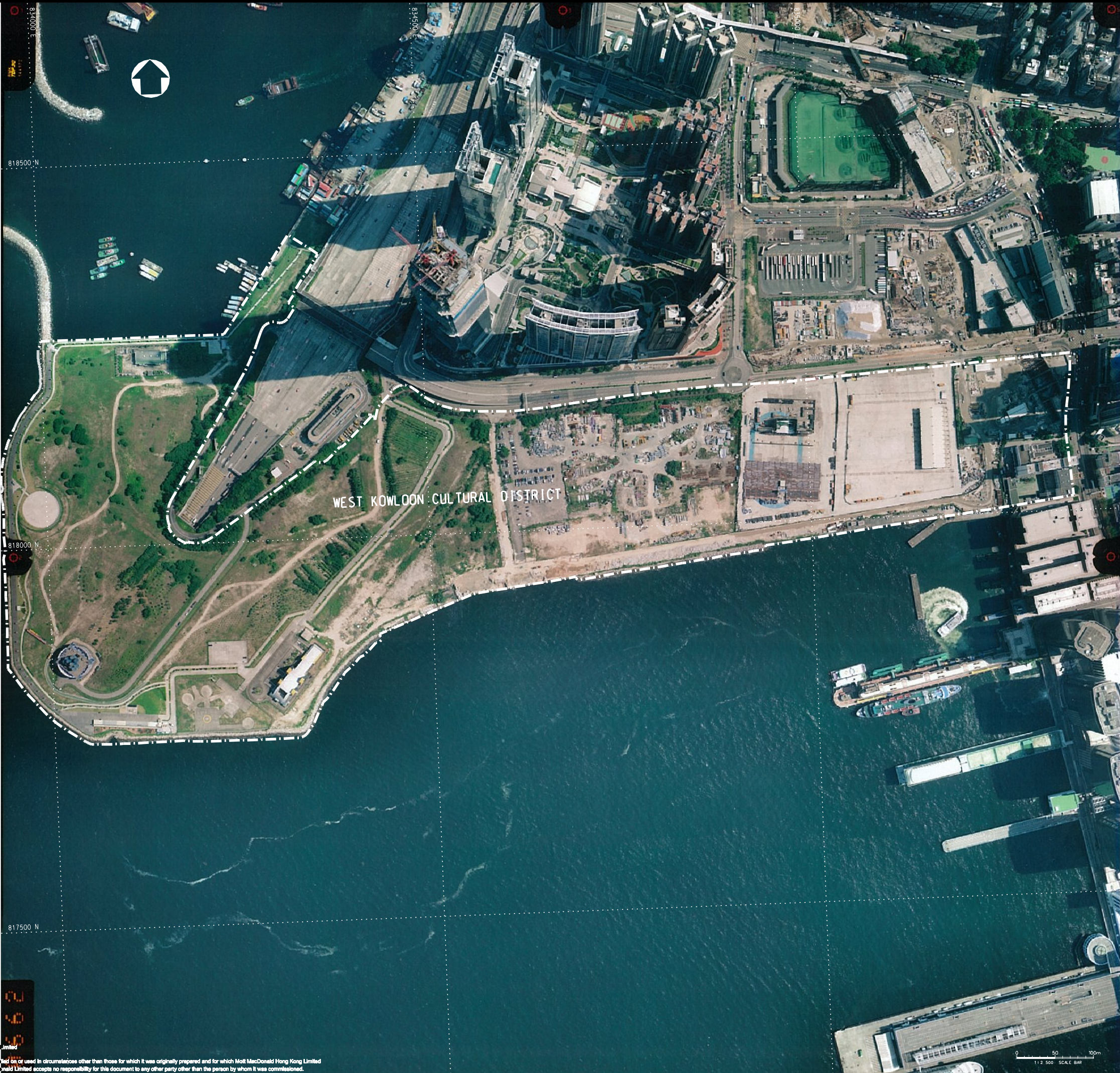


Project
PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title
AERIAL PHOTO OF PROJECT AREA IN 2004

Designed	HY	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	HY	Approved	AFK
Scale at A1	Status	Rev	
1:3000	PRE	P1	

Drawing Number
FIGURE A3



LEGEND:
 PROJECT BOUNDARY

Rev	Date	Drawn	Description	Ch'kd	App'd
P1	FEB 12	MING	FIRST ISSUE	HY	AFK

Client
WEST KOWLOON CULTURAL DISTRICT AUTHORITY

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 www.mottmac.com.hk

Project
PROJECT CONSULTANCY STUDY FOR WEST KOWLOON CULTURAL DISTRICT DEVELOPMENT PLAN

Title
AERIAL PHOTO OF PROJECT AREA IN 2008

Designed	HY	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	HY	Approved	AFK
Scale at A1	Status	Rev	
1:2500	PRE	P1	

Drawing Number **FIGURE A4**

APPENDIX B

Information extracted from CAP and CAR of Kowloon Southern Link Project

In Tai Kok Tsui, most buildings are residential in the vicinity of the alignment. The petrol filling station still exists at the ground level of Skyway House. The factory building next to the petrol filling station has been converted to commercial and trading purposes with only general mechanical repairs at the ground level, which is paved with concrete.

3.5 Potential Impacts

The potential land contamination areas are shown in Figure 9 and described below.

3.5.1 Along Canton Road

Canton Road has been developed from past industrial activities to commercial use (e.g. hotel and office etc.) for more than 20 years. The extensive amount of utilities works (e.g. cabling, gas work, road maintenance, etc.) carried out along Canton Road over the years has diminished the possibility of having contaminated soil in the top fill material which is only about 5m depth.

3.5.2 TST Fire Station to Canton Road Government Office

Information of the underground oil storage tanks inside TST Fire Station has been provided by the Fire Services Department (FSD). There are two underground tanks located near the shower room block at approximately 60m to the west of the alignment (Annex 1), one for storage of diesel and the other for petrol. The volume of each tank is approximately 4.55m³. The tanks have been used for more than 30 years and there is no record on previous spillage or leakage of fuel into the soils and groundwater. Since Cut-&-Cover methodology will be adopted for this section, potential impacts on workers during the construction phase is possible, if contaminated soil is present.

The ex-dockyard site at West Kowloon Reclamation, between the Canton Road Government Offices and TST Fire Station, has been an open space since the 1980s. A launching shaft for TBM will be located there. Potential impacts on workers are possible if contaminated soil is present.

The ex-government maintenance workshop located at the waterfront of the Canton Road Government Office had been operated for more than 20 years before reclamation. It may have possible residual marine deposits contamination.

3.5.3 West Kowloon Reclamation Area

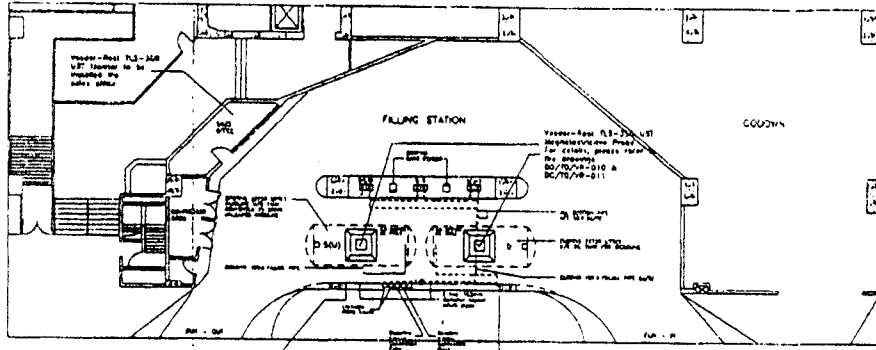
Latest geological information suggests that there are still marine deposits in this area (Figure 3). Marine deposit will be sampled during the GI to confirm any presence of contaminated deposit. The test results will be presented in the Sediment Quality Report, which is out of the scope of this CAP.

3.5.4 Tai Kok Tsui

The petrol filling station located at Skyway House is approximately 50m from the KSL alignment. According to the information provided by the filling station operator, the filling station had been operated since 1982. There are two underground tanks located at the basement level, one for storage of unleaded gasoline and the other for diesoline (Annex 1). The volume of each tank is approximately 22.75m³. The tanks are supported on a concrete base with no direct contact between the tanks and the rooms. Information on previous spillage or leakage of diesel fuel is not available.

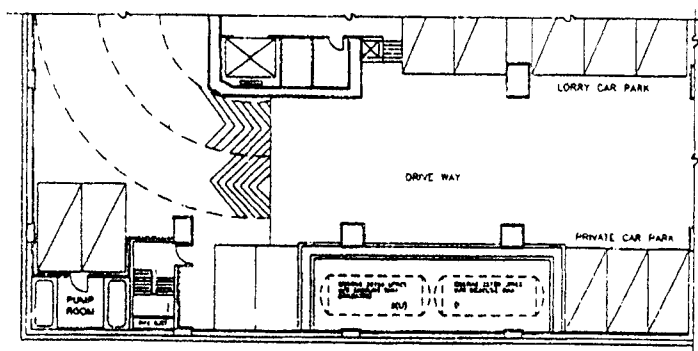
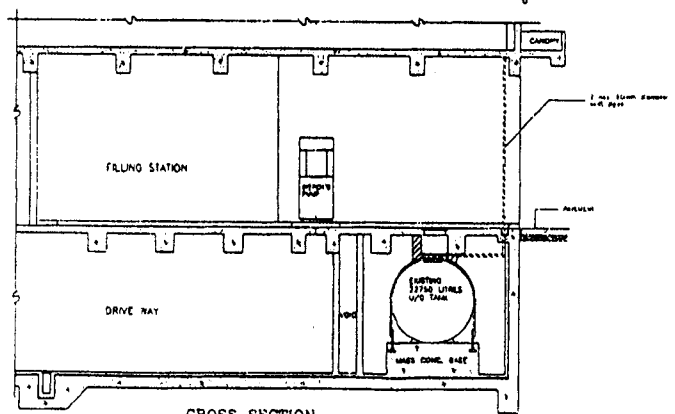
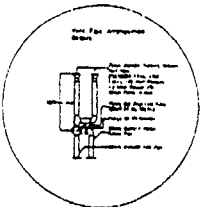
ANNEX 1

INFORMATION ON UNDERGROUND OIL TANKS



Note
Veeder-Root TLS-350 Underground Storage Tank (UST)
Monitoring System is a system which including.
Veeder-Root TLS-350 UST Monitor &
Veeder-Root TLS-350 UST Magnetostrictive Probe

- LEGEND
- 0 ENCLOSURE
 - 1 REDUCER
 - 2 DATE VALVE
 - 3 ANGLE CHECK VALVE
 - 4 (U) - GASOLINE (UNLEADED)



SHELL HONG KONG LTD.

Shell Kok Cheung Street Filling Station

Subject: Station Layout

Title: General Arrangement

NO	REASON	DATE	DESIGNER	APPROVED	DATE	REVISION
1						

REVISIONS

1:1 100 IN A0

REDUCED COPY

SEA

Existing Jetty

Existing Jetty
TO BE DEMOLISHED
(BY PORT WORK DIV.)

WEST BLOCK

SHOWER ROOM BLOCK

PETROL
PUMP
STAND

1000 GAL
WASTE
OIL
TANK
UNDER

1000 GAL
DIESEL
TANK
UNDER

1000 GAL
PETROL
TANK
UNDER

DRILL TOWER

COVERED-DRILL AREA

Underground Oil Storage Tank at Taim Sha Tsui Fire Station



4. ASSESSMENT CRITERIA

4.1 Soils

The results of soil analysis were compared with Dutch "B" Values as given in ProPECC Note PN3/94" as this level had been adopted as the remediation target in most cases in Hong Kong. However, there is no criterion for dioxins and furans (i.e. Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)). The United State Environmental Protection Agency (USPEA) criterion of 1ppb TEQ (1ng/g, Toxicity Equivalent Unit) is therefore adopted as the assessment criterion. This criterion has been used as the remediation target for residential sites in the USA and in another approved EIA study^[10].

4.2 Groundwater

The Dutch ABC Values for groundwater are based on the use of groundwater for potable supply. As this is rarely the case in Hong Kong, the Dutch B Values are not necessarily appropriate for assessing the requirement of groundwater remediation, particularly within urban areas where there may be numerous diffuse sources of historical contamination within the vicinity.

An assessment is therefore based on the Dutch C Value as a screening tool, followed by a risk assessment approach where elevated concentrations of contaminants are present.

5. INTERPRETATION OF RESULTS

5.1 Soil Contamination

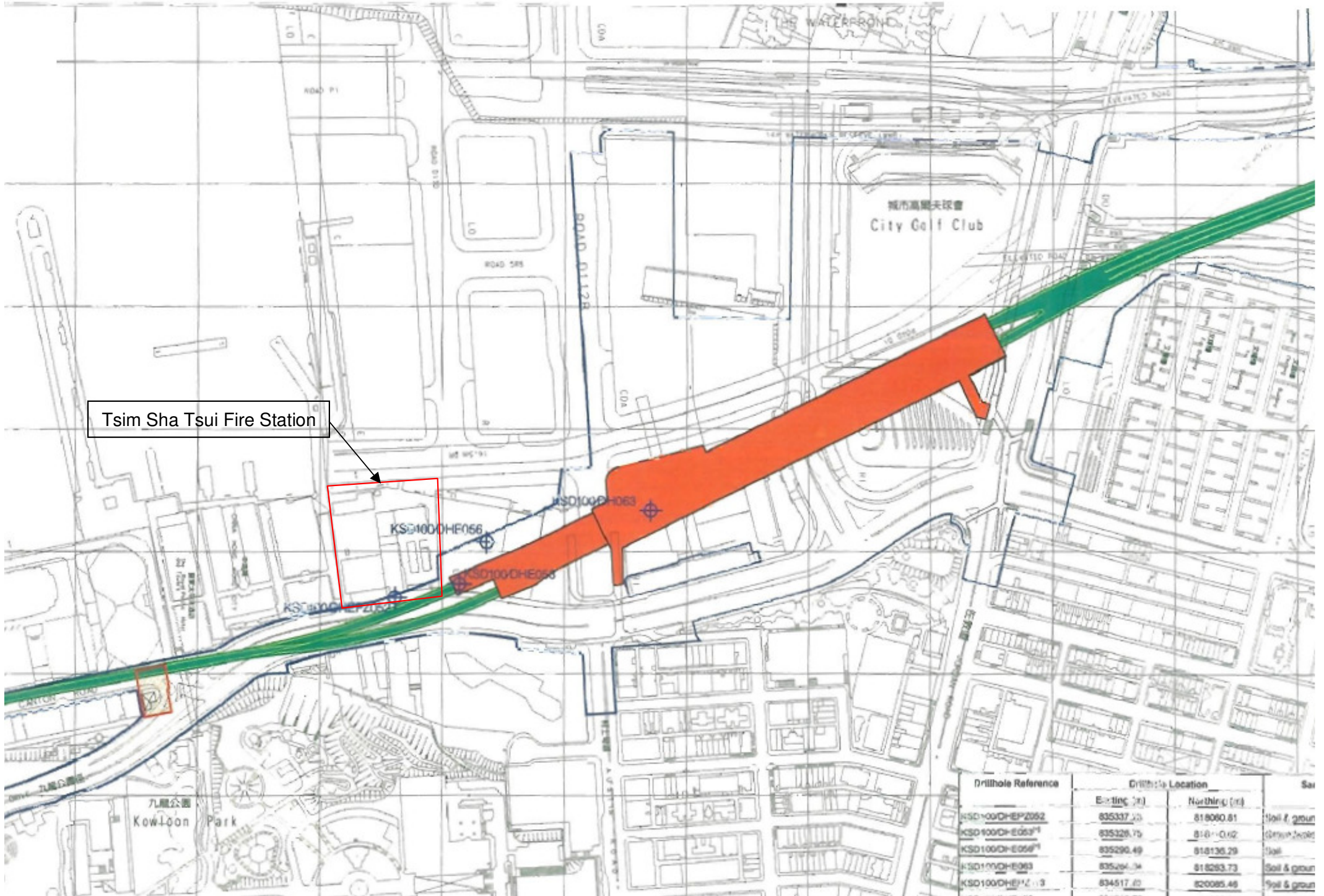
A total of 33 soil samples have been collected from 5 drillholes. All the soil samples collected are within the vertical excavation extent for KSL construction. Results indicate that all soil samples are below the Dutch B levels except 1 soil sample collected from KSD100/DH063, of which the lead concentration exceeded the Dutch B level but within the Dutch C level. The analytical results exceeding the Dutch B Levels are given in Table 5-1 and for all soil samples are detailed in Annex 2.

Table 5-1: Summary of soil samples exceeding Dutch B Level

Drillhole reference	Depth	Contaminant	Concentration (mg/kg dry soil)	Dutch B Limit (mg/kg dry soil)	Dutch C Limit (mg/kg dry soil)	Exceedance
KSD100/DH063	1.5m	Lead	220	150	600	> B and < C

The nature and distribution of the contaminated soil samples indicate that contamination is present at discrete hotspot. The finding is supported by the pattern of landuse on this site, which involved ex-dockyard of the Marine Department and typhoon shelter. Analytical results suggest that contamination is not spatially continuous, and is generally limited in depth.

However, it is Government policy that soils containing contaminants in excess of the Dutch B Levels should be remediated. Details of the soil remediation method and the disposal criteria of the contaminated soils are described in Section 6.





DRILLHOLE RECORD

HOLE No. KSD100/DHE056

SHEET 1 of 3

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC

CO-ORDINATES

CONTRACT No. KAW820

MACHINE & No. CS-6

E 835290.49

DATE from 08/11/02 to 12/11/02

N 818136.29

FLUSHING MEDIUM Water

ORIENTATION Vertical

GROUND LEVEL 3.71 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
1 08/11/2002	Sw							INSPECTION PIT	3.61	0.10			Grey CONCRETE
										0.50			Reddish brown (2.5 YR 5/4), clayey very silty fine to coarse SAND with some angular fine to medium gravel sized quartz and rock fragments (FILL)
										1.00			
										1.50			
										2.00			
2									1.21	2.50			
										3.00			Soft, reddish brown (2.5 YR 5/4), slightly sandy silty CLAY with occasional angular to subangular fine to medium gravel sized quartz and rock fragments (FILL)
3			0						0.71	3.00			
									3.50	Loose, brown (7.5 YR 4/4), slightly clayey silty fine to coarse SAND with occasional angular fine to medium gravel sized quartz and rock fragments (FILL)			
4			0						(2.2, 1.1, 1.2) N=5	3.95			
									4.00				
5		3.05m 18:00	33							4.50			Brown (7.5 YR 4/4) mottled white, slightly silty sandy angular to subangular fine to medium GRAVEL sized quartz and rock fragments (FILL)
									5.00	Firm, brown (7.5 YR 4/4), slightly sandy silty CLAY with occasional angular to subangular fine gravel sized quartz and rock fragments (FILL)			
6	Sw 6.00 Pw	2.40m 08:00	73						(3.2, 1.2, 2.3) N=8	5.80			Dark grey (4/7) mottled black, slightly clayey slightly silty fine to coarse SAND with some angular fine to coarse gravel sized quartz and moderately weak to moderately strong rock fragments (FILL)
									6.00				
7			38							6.50			Soft, dark brown (7.5 YR 3/2), slightly silty slightly sandy CLAY with occasional angular to subangular fine gravel sized quartz and rock fragments and occasional shell fragments (DISTURBED MARINE DEPOSIT?)
									7.00				
8			0						(3.3, 3.4, 4.7) N=18	7.50			Dark grey (4/7) mottled white, clayey silty fine to medium SAND with occasional angular fine gravel sized quartz and rock fragments and some shell fragments (DISTURBED MARINE DEPOSIT?)
									8.00				
9			50							9.00			Dark grey (4/7) mottled white, slightly sandy angular fine to coarse GRAVEL sized strong granite and asphalt fragments with many shell fragments (DISTURBED MARINE DEPOSIT?)
									9.50				
10			65						(4.3, 3.3, 7.17) N=30	9.95			Medium dense, grey (5/7) and brown (7.5 YR 4/4), slightly clayey slightly silty fine to coarse SAND with occasional angular to subangular fine gravel sized quartz fragments (DISTURBED MARINE DEPOSIT?)
									10.00	Dense, light yellowish brown (10 YR 6/4),			

	SMALL DISTURBED SAMPLE		STANDARD PENETRATION TEST	LOGGED	C.M. Ting
	PISTON SAMPLE		IN-SITU VANE SHEAR TEST	DATE	16/11/2002
	U76 UNDISTURBED SAMPLE		PERMEABILITY TEST	CHECKED	I.S. McGlen
	U100 UNDISTURBED SAMPLE		IMPRESSION PACKER TEST	DATE	18/11/2002
	MAZER SAMPLE		PACKER TEST		
	SPT LINER SAMPLE		PIEZOMETER TIP		
	WATER SAMPLE		OBSERVATION WELL TIP		

REMARKS

1. Inspection pit excavated to 3.00m depth.
2. Water sample carried out at 5.80m depth when the drillhole was at 29.69m depth.

Lam Geotechnics Limited

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DRILLHOLE RECORD

HOLE No. KSD100/DHE056

SHEET 2 of 3

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC

CO-ORDINATES
E 835290.49
N 818136.29

CONTRACT No. KAW820

MACHINE & No. CS-6

DATE from 08/11/02 to 12/11/02

FLUSHING MEDIUM Water

ORIENTATION Vertical

GROUND LEVEL 3.71 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
11			45				10zbs	30					slightly clayey slightly silty fine to coarse SAND with some angular to subangular fine gravel sized quartz fragments (DISTURBED MARINE DEPOSIT?) 10.50 - 10.95m: some shell fragments.
			63				89zbs	31			10.50		
12	3.20m 18:00		83				(2,3, 2,4,5,8) N=19	33	-7.29	-11.00			Medium dense, grey (6/) and light reddish brown (2.5 YR 6/4) mottled yellow, slightly clayey slightly silty fine to coarse SAND with occasional subangular to subrounded fine gravel sized quartz fragments (ALLUVIUM)
			90				87zbs	34			11.45		
13	2.10m 08:00		90				(2,2, 3,3,4,6) N=16	35	-8.29	-12.00			Soft to firm, light grey (7/) mottled yellow, slightly sandy clayey SILT (ALLUVIUM)
			100				32zbs	36			11.50		
14			100				(4,4, 4,7,9,13) N=33	37	-8.79	-12.50			Extremely weak, red and reddish brown mottled white, completely decomposed medium grained GRANITE (Firm to stiff, slightly sandy silty CLAY with occasional fine gravel sized quartz fragments)
							38				12.95		
15			100				(2,7, 11,12, 13,14) N=50	39					Extremely weak, brown and yellowish brown mottled white and black, completely decomposed medium grained GRANITE (Slightly clayey silty fine to coarse SAND with occasional fine gravel sized quartz fragments)
							40				14.00		
16			100					41					
							42				14.10		
17			100					43					
							44				14.55		
18			100					45					
							46				15.00		
19			100					47					
							48				16.00		
20			100				(4,8, 13,16, 20,26) N=75	49	-13.29	-17.00			
							50				16.10		
								51					
								52					
								53					
								54					

<ul style="list-style-type: none"> ↑ SMALL DISTURBED SAMPLE ▢ PISTON SAMPLE ▨ U76 UNDISTURBED SAMPLE ▩ U100 UNDISTURBED SAMPLE ▧ MAZIER SAMPLE ▤ SPT LINER SAMPLE △ WATER SAMPLE 	<ul style="list-style-type: none"> ↓ STANDARD PENETRATION TEST ∨ IN-SITU VANE SHEAR TEST ⊥ PERMEABILITY TEST ⊕ IMPRESSION PACKER TEST ⊖ PACKER TEST ⊙ PEZOMETER TP □ OBSERVATION WELL TP 	<p>LOGGED <u>C.M.Ting</u></p> <p>DATE <u>16/11/2002</u></p> <p>CHECKED <u>I.S.McGlen</u></p> <p>DATE <u>18/11/2002</u></p>	REMARKS
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DRILLHOLE RECORD

HOLE No. KSD100/DHE056

SHEET 3 of 3

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC	CO-ORDINATES E 835290.49 N 818136.29	CONTRACT No. KAW820
MACHINE & No. CS-6		DATE from 08/11/02 to 12/11/02
FLUSHING MEDIUM Water	ORIENTATION Vertical	GROUND LEVEL 3.71 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
21	Pw 21.00 Hw		100				(4, 10, 21, 31, 55, 80) N=187	55 56 57		20.10 20.55			As sheet 2 of 3
22		3.30m 18:00 2.10m 08:00					↓ 15. 40/40mm, 100/35mm 100blts/35mm	58 59 60 61	-17.29	21.00 22.00 22.10 22.25		V/IV	Extremely weak to very weak, yellowish brown and brown mottled white and black, completely to highly decomposed medium grained GRANITE (Slightly clayey slightly silty fine to coarse SAND with some fine to medium gravel sized granite fragments)
23			100					62		23.00			
24	Hw 24.00		98	81	80	NI 10.0 0	↓ 50/40mm, 100/35mm 100blts/35mm	63 64		23.70 23.80 23.88 24.00		IV/III III/II	Strong, pinkish grey spotted white and black, slightly decomposed medium grained GRANITE with closely to widely, occasionally very closely spaced, rough planar and undulating, limonite stained, kaolin (<1mm) infilled joints, dipping at 0°-10° and 70°-80°
25			100	95	95	20.0 5.3				24.10		II	24.00-24.10m: weak to moderately weak, brown, highly to moderately decomposed (Coarse GRAVEL and occasional cobble sized weak to moderately weak rock fragments)
26						0				25.22			24.10-25.10m: moderately strong to strong, pink, moderately to slightly decomposed
27			100	100	100	7.5 0.7				26.72			26.60-26.72m: occasional dissolution features
28			100	100	100	0				27.90			27.85-28.25m: subvertical
29			100	100	100					28.73			
30		3.20m 18:00								-25.98 -29.69			End of investigation hole at 29.69m

<ul style="list-style-type: none"> □ SMALL DISTURBED SAMPLE □ PISTON SAMPLE □ U76 UNDISTURBED SAMPLE □ U100 UNDISTURBED SAMPLE □ MAZER SAMPLE □ SPT LINER SAMPLE △ WATER SAMPLE 	<ul style="list-style-type: none"> ↓ STANDARD PENETRATION TEST ∨ IN-SITU VANE SHEAR TEST ∩ PERMEABILITY TEST ∩ IMPRESSION PACKER TEST ∩ PACKER TEST ∩ PEZOMETER TIP ∩ OBSERVATION WELL TIP 	<p>LOGGED <u>C.M.Ting</u></p> <p>DATE <u>16/11/2002</u></p> <p>CHECKED <u>I.S.McGlen</u></p> <p>DATE <u>18/11/2002</u></p>	REMARKS
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Lam Geotechnics Limited

Office: 23/F World Trade Centre, 280 Gloucester Rd., Causeway Bay, Hong Kong.
 Laboratory: 26/F, Unit 3, Honour Ind. Centre, No. 6, Sun Yip St., Chaiwan, Hong Kong.
 Tel: 2882 - 3939 Fax: 2882 - 3331



DRILLHOLE RECORD

HOLE No. KSD100/DHEPZ052

SHEET 1 of 4

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC	CO-ORDINATES E 835337.23 N 818060.81	CONTRACT No. KAW820
MACHINE & No. CS15		DATE from 05/12/02 to 09/12/02
FLUSHING MEDIUM Water	ORIENTATION Vertical	GROUND LEVEL 4.18 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
1 05/12/2002	Sw							INSPECTION PIT	4.08	0.10			Grey (N5) BRICK
									0.50	0.50			Loose, brown (7.5 YR 4/4) and yellowish red (5 YR 4/6) mottled black, clayey silty fine to coarse SAND with some angular fine to medium gravel sized quartz and rock fragments (FILL)
									1.00	1.00			
									1.50	1.50			
									2.00	2.00			
									2.50	2.50			
									3.00	3.00			
									3.50	3.50			
									4.00	4.00			
									4.45	4.45			
2 05/12/2002			100						10bbs	5.00			Loose, very dark grey (N3/) and strong brown (7.5 YR 5/6), slightly silty fine to coarse SAND with occasional angular to subrounded fine gravel sized quartz fragments and occasional shell fragments (FILL-derived from Marine Deposit) 5.40-5.50m: many coral fragments
			70						5.50				
			100						6.00				
			60						6.45				
			10						7.00				
			38bbs						7.50				
			47bbs						8.00				
			19						8.45				
			20						9.00				
			21						9.50				
3 06/12/2002	Sw 8:00 Pw	2.50m 18:00 2.20m 08:00							(1,1, 1,0,2,2) N=5	-0.82			
									13bbs				
4 06/12/2002									(1,1, 1,1,2,2) N=6				
									75bbs				
									14				
									15				
									16				
									17				
									18				
									19				
									20				
									21				
5 06/12/2002									(2,1, 2,2,2,1) N=7				
									96bbs				
6 06/12/2002													
									73bbs				

<ul style="list-style-type: none"> SMALL DISTURBED SAMPLE PISTON SAMPLE U76 UNDISTURBED SAMPLE U100 UNDISTURBED SAMPLE MAZER SAMPLE SPT LINER SAMPLE WATER SAMPLE 	<ul style="list-style-type: none"> STANDARD PENETRATION TEST IN-SITU VANE SHEAR TEST PERMEABILITY TEST IMPRESSION PACKER TEST PACKER TEST PIEZOMETER TP OBSERVATION WELL TP 	<p>LOGGED <u>C.M.Ting</u></p> <p>DATE <u>11/12/2002</u></p> <p>CHECKED <u>I.S.McGlen</u></p> <p>DATE <u>13/12/2002</u></p>	<p>REMARKS</p> <ol style="list-style-type: none"> 1. Inspection pit excavated to 3.00m depth. 2. Acoustic televiewer carried out at 24.12-30.98m depth. 3. Packer test carried out at 26.75-31.05m depth. 4. Water sample taken at 6.50m depth when the drillhole was at 6.50m depth. 5. Piezometer installed at 17.00m depth. 6. Standpipe installed to 8.00m depth.
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Lam Geotechnics Limited

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 Tel: 2882 - 3939 Fax: 2882 - 3331



DRILLHOLE RECORD

HOLE No. KSD100/DHEPZ052

SHEET 2 of 4

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC

CO-ORDINATES
E 835337.23

CONTRACT No. KAW820

MACHINE & No. CS15

N 818060.81

DATE from 05/12/02 to 09/12/02

FLUSHING MEDIUM Water

ORIENTATION Vertical

GROUND LEVEL 4.18 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
11			90				(5,10,10,12,14,14) N=50	24 25 26		10.45			10.00-10.45m: very dense
			67bts						27	-6.82	11.00		
12		2.60m 18:00 2.30m 08:00	100					28 29		11.50			Black (N2.5f) mottled grey, slightly clayey silty fine to coarse SAND with some subangular to subrounded fine gravel sized quartz fragments and occasional shell fragments (FILL-derived from Marine Deposit)
			44bts						30 31	-7.32	12.00		
13			50					32 33		12.55			Greenish grey (10 Y 5/1) mottled white and yellow, clayey silty fine to coarse SAND with occasional angular to subangular fine gravel sized quartz fragments (ALLUVIUM)
			18bts						34 35	-8.47	12.55		
14	Pw 13.65 Hw		100					36 37		13.15			Extremely weak, brown mottled white and black, completely decomposed medium grained GRANITE (Clayey silty fine to coarse SAND with occasional fine gravel sized quartz fragments)
			67bts						38	-9.32	13.50		V
15			100					39 40		13.73			
			100bts						41		13.80		
16			100				(5,6,8,10,11,15) N=44	42 43		14.80			
			100						44		14.90		
17			100					45 46		15.35			
			100						47	-12.72	15.80		
18			100				(4,9,8,10,10,13) N=41	48 49		16.80			Extremely weak, dark brown mottled white and black, completely decomposed medium grained GRANITE (Stiff, clayey sandy SILT with occasional fine gravel sized quartz fragments)
			100						50	-13.62	17.35		V
19			100					51 52		17.80			Extremely weak, brown mottled black and yellow, completely decomposed medium grained GRANITE (Slightly clayey silty fine to coarse SAND with some fine gravel sized quartz and granite fragments)
			100						53		18.80		
20			100				(5,7,8,10,11,14) N=43	54 55		18.90			
			100						56		19.35		
			100					57		19.80			

<ul style="list-style-type: none"> SMALL DISTURBED SAMPLE PISTON SAMPLE U76 UNDISTURBED SAMPLE U100 UNDISTURBED SAMPLE MAZIER SAMPLE SPT LINER SAMPLE WATER SAMPLE 	<ul style="list-style-type: none"> STANDARD PENETRATION TEST IN-SITU VANE SHEAR TEST PERMEABILITY TEST IMPRESSION PACKER TEST PACKER TEST PIEZOMETER TP OBSERVATION WELL TIP 	<p>LOGGED <u>C.M.Ting</u></p> <p>DATE <u>11/12/2002</u></p> <p>CHECKED <u>I.S.McGlen</u></p> <p>DATE <u>13/12/2002</u></p>	REMARKS
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Lam Geotechnics Limited

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 Laboratory: 26/F., Unit 3, Honour Ind. Centre, No. 6, Sun Yip St., Chaiwan, Hong Kong.
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DRILLHOLE RECORD

HOLE No. KSD100/DHEPZ052

SHEET 3 of 4

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC

CO-ORDINATES

CONTRACT No. KAW820

MACHINE & No. CS15

E 835337.23
N 818060.81

DATE from 05/12/02 to 09/12/02

FLUSHING MEDIUM Water

ORIENTATION Vertical

GROUND LEVEL 4.18 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RQD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
21			100					51 52 53		20.80 20.90 21.24			As sheet 2 of 4
22		2.20m 18:00								21.80			
23		2.10m 08:00	0					54 55		22.80 22.90			
24	Hw 23.73		100	82	60	11.8 >20 13.6				23.73		III	Moderately strong, pinkish brown mottled white and brown, moderately decomposed medium grained GRANITE with very closely to closely, occasionally extremely closely spaced, rough planar and undulating, limonite and manganese oxide stained joints, dipping at 0°-10°, 35°-45° and 70°-80°
25			72	50	50	>20 NR				24.66 25.00			24.20-24.35m: with subvertical joints 25.00-25.27m: no recovery inferred to be completely to highly decomposed GRANITE
26			100	90	84	>20 1.7				21.09 25.27 21.44 25.62		V/IV III	
27			99	99	99	13.3 1.2				26.88		II	Strong, pinkish grey spotted white and black, slightly decomposed medium grained GRANITE with medium to widely, occasionally very closely and closely spaced, rough undulating and smooth planar, limonite, manganese oxide and chlorite stained, kaolin (<1mm) infilled joints, dipping at 5°-15°, 20°-30° and 60°-70° 26.50-26.75m: with subvertical joints
28						10.0 2.0				28.23			
29			100	100	100					28.84			
30			100	100	100					29.74			

- SMALL DISTURBED SAMPLE
- PISTON SAMPLE
- U75 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- SPT LINER SAMPLE
- WATER SAMPLE
- STANDARD PENETRATION TEST
- IN-SITU VANE SHEAR TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- PACKER TEST
- PEZOMETER TIP
- OBSERVATION WELL TIP

LOGGED C.M.Ting
DATE 11/12/2002
CHECKED I.S.McGlen
DATE 13/12/2002

REMARKS

Lam Geotechnics Limited

Office: 23/F World Trade Centre, 280 Gloucester Rd., Causeway Bay, Hong Kong.
Laboratory: 26/F., Unit 3, Honour Ind. Centre, No. 6. Sun Yip St., Chaiwan, Hong Kong.
Tel 2882 - 3939 Fax 2882 - 3331



DRILLHOLE RECORD

HOLE No. KSD100/DHEPZ052

SHEET 4 of 4

PROJECT Kowloon - Canton Railway Corporation Ground Investigation (Stage 1) of Kowloon Southern Link

METHOD IP+W+RC

CO-ORDINATES

CONTRACT No.

KAW820

E 835337.23

MACHINE & No. CS15

N 818060.81

DATE from 05/12/02 to 09/12/02

FLUSHING MEDIUM Water

ORIENTATION Vertical

GROUND LEVEL

4.18 mPD

Drilling Progress	Casing size	Water level at end/start of shift	TCR %	SCR %	RCD %	Fracture Index	Tests	Samples	Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
31		2.30m 18:00				1.3			-26.87	31.05	++++		As sheet 3 of 4
32													End of investigation hole at 31.05m
33													
34													
35													
36													
37													
38													
39													
40													

	SMALL DISTURBED SAMPLE		STANDARD PENETRATION TEST
	PISTON SAMPLE		IN-SITU VANE SHEAR TEST
	U76 UNDISTURBED SAMPLE		PERMEABILITY TEST
	U100 UNDISTURBED SAMPLE		IMPRESSION PACKER TEST
	MAZIER SAMPLE		PACKER TEST
	SPT LINER SAMPLE		PIEZOMETER TIP
	WATER SAMPLE		OBSERVATION WELL TIP

LOGGED C.M.Ting
 DATE 11/12/2002
 CHECKED I.S.McGlen
 DATE 13/12/2002

REMARKS

Lam Geotechnics Limited

Office: 23/F World Trade Centre, 290 Gloucester Rd., Causeway Bay, Hong Kong.
 Laboratory: 26/F., Unit 3, Honour Ind. Centre, No. 6. Sun Yip St., Chaiwan, Hong Kong.
 Tel: 2882 - 3939 Fax: 2882 - 3331

APPENDIX C

Current and Past Records of Registered Chemical Waste Producer

Appendix C List of Current and Past Records of Registered Chemical Waste Producer

No.	Name of Chemical Waste Producer	Waste Premises Address	Business Nature
1	Fire Services Department	Tsim Sha Tsui Fire Station Complex, 333 Canton Road, Tsim Sha Tsui, Kowloon	Fire Services Department
2	Fire Services Department	Block South, 333 Canton Road, Kowloon	Fire Station
3	Link 200 Joint Venture	Canton Road	Construction
	Bachy Soletanche Group Limited	KIL 11080, Kowloon Station Development, Site C, Package 3, Kowloon	Construction
4	Bachy Soletanche Group Limited	MTRC Express Rail Link West Kowloon Terminus, Austin Road West, Kowloon (Contract No. 803D) (Site Areas 13.20B, 13.60 and 13.36)	Construction
5	Bachy Soletanche Group Limited	MTRC Express Rail Link West Kowloon Terminus, Austin Road West, Kowloon (Contract No. 803A) (Area No.: Part of 13.31 and 13.34 at Yau Ma Tei and Tsim Sha Tsui, Kowloon)	Construction
6	Bachy Soletanche Group Limited	Typhoon Shelter, Kowloon	Construction
7	China State Construction Engineering Corporation	Airport Railway Kowloon Station, Kowloon	Construction site
8	Laing O'Rourke – Hsin Chong – Paul Y. Joint Venture	Construction site at West Kowloon Terminus Station (South), Tsim Sha Tsui, Kowloon (Site area: 13.4)	Construction
9	MTR Corporation Limited	MTR-Kowloon Station (Kowloon Intake Cell & Ventilation Building) Tsim Sha Tsui	Railway Services – Maintenance
10	Sanfield Building Contractors Ltd.	West Kowloon Reclamation Area, near MTRC Ventilation Building, Kowloon.	Construction
11	Sanfield Engineering Construction Limited	Western Harbour Crossing – Improvement at Kowloon Exit	Construction
12	Tysan Foundation Ltd.	Construction site of West Kowloon Terminus, Area 13.35B and 13.39 (Site A – North, Contract No.: 803B), MTRC Express Rail Link	Foundation Engineering
13	Tysan Foundation Ltd.	Construction site at West Kowloon Terminus, Areas 13.23, 13.32, 13.33B and 13.37 (Site A – North, Contract No.: 803B), MTRC Express Rail Link	Foundation Engineering
14	Vibro – Chun Wo Joint Venture	West Kowloon Terminus Piles (Site A South), Contract 803C	Pile Foundation

No.	Name of Chemical Waste Producer	Waste Premises Address	Business Nature
15	Western Harbour Tunnel Co. Ltd.	KIL11067 (九龍避風塘西區海底隧道行政大樓)	Vehicular Tunnel
16	Wo Hing – Penta-Ocean Joint Venture	West Cross Harbour, Typhoon Shelter, Kowloon	Construction
17	Bachy Soletanche Group Limited	Typhoon Shelter, Kowloon	Construction
18	China State Construction Engineering (Hong Kong) Limited	Construction Site of Replacement and Rehabilitation of Water Mains Stage 3 – Mains in West Kowloon	Construction

APPENDIX D

Replies from EPD and FSD

本署檔案
OUR REF: () In EP430/W3/1 Pt.1
來函檔案
YOUR REF:
KMY/SHC/SB/EC/c/T255962/04.02/L0158
KMY/SHC/SB/CL/T255962/07.02/L0161
電話
TEL. NO.: 2150 8022
圖文傳真
FAX NO: 2402 8275
電子郵件
E-MAIL:
網址
HOMEPAGE: <http://www.epd.gov.hk>

Environmental Protection Department
Environmental Compliance Division
Regional Office (East)
8/F., Cheung Sha Wan Government Offices
303 Cheung Sha Wan Road
Kowloon

環境保護署
環保法規管理科
區域辦事處(東)
九龍長沙灣道 303 號
長沙灣政府合署 8 樓



(Bay fax: 2827 1823)

20th December 2011

Mott MacDonald,
20/F Two Landmark East,
100 How Ming Street,
Kwun Tong, Kowloon.
(Attn.: Mr Eric Ching)

Dear Sir,

West Kowloon Cultural District
Request for Chimney Information for Air Quality Assessment and
Request for Chemical Waste Producer Information for Land Contamination Assessment

We refer to your letters dated 2nd and 8th December 2011.

Regarding to your request for chimney information, you may find relevant details in the register kept by the Authority under section 39 of the Air Pollution Control Ordinance (APCO) for those chimneys in connection with licensed specified processes (SPs). In accordance to section 39(2) of the APCO, you may inspect the register during normal office hours with prior written application. However, for chimneys other than SPs, we cannot disclose the information without owners' consent.

As per your request for Chemical Waste Producer information, you may wish to know that our Territory Control Office (address: 25th floor, Southorn Centre, 130 Hennessy Road, Wan Chai, Hong Kong) maintains a register of waste producers in accordance to sections 6(2) and 6(3) of the Waste Disposal (Chemical Waste)(General) Regulation. The register contains information such as names of the chemical waste producers, locations of the premises where the chemical wastes are produced as well as the descriptions of the business or activities in the course of or in connection with which the chemical wastes are produced.

This register is open for inspection by the public during normal office hours. You are also entitled to obtain a certified copy of an entry in the register upon payment of prescribed fee (HK\$60 per entry).

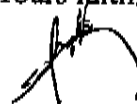
I hope the above would assist preparation of your assessments.



同心耕耘廿五載 共創綠色新世代

25 Years of Sustained Effort for a Greener Future

Yours faithfully,



(LAM Ka-ho)

Environmental Protection Officer
Regional Office (East)
For Director of Environmental Protection

本署檔案
 OUR REF: () in EP430/W3/1 Pt.1
 來函檔案
 YOUR REF:
 KMY/SHC/SB/EC/c/T255962/04.02/L0158
 KMY/SHC/SB/CL/T255962/07.02/L0161
 電話
 TEL. NO.: 2150 8022
 圖文傳真
 FAX NO.: 2402 8275
 電子郵件
 E-MAIL:
 網址
 HOMEPAGE: <http://www.epd.gov.hk>

**Environmental Protection Department
 Environmental Compliance Division
 Regional Office (East)**

8/F., Cheung Sha Wan Government Offices
 303 Cheung Sha Wan Road
 Kowloon



環境保護署
 環保法規管理科
 區域辦事處(東)
 九龍長沙灣道303號
 長沙灣政府合署8樓

(Bay fax: 2827 1823) (Fax only)

23rd December 2011

Mott MacDonald,
 20/F Two Landmark East,
 100 How Ming Street,
 Kwun Tong, Kowloon.
 (Attn.: Mr Eric Ching)

Dear Sir,

West Kowloon Cultural District
Request for Information for Land Contamination Assessment

We refer to your letter dated 8th December 2011 and you colleague's follow-up call on 22nd December 2011.

There is no register of chemical spillage accident kept by EPD for public inspection.

Yours faithfully,

(LAM Ka-ho)

Environmental Protection Officer
 Regional Office (East)
 For Director of Environmental Protection



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25 Years of Sustained Effort for a Greener Future

消防處

香港九龍尖沙咀東部康莊道1號
消防總部大廈



FIRE SERVICES
DEPARTMENT
FIRE SERVICES HEADQUARTERS
BUILDING,
No.1 Hong Chong Road,
Tsim Sha Tsui East, Kowloon,
Hong Kong.

本處檔號 OUR REF. : (102) in FSD GR 6-5/4 R
來函檔號 YOUR REF. : KMY/ SHC/SB/CL/T255962/07.02/L0162
電子郵件 E-mail : hkfsdenq@hkfsd.gov.hk
圖文傳真 FAX NO. : 2739 5879
電話 TEL NO. : 2733 7743

	To	Action	Informan	Copy	Sign	Date
1	SB				SB	
2	eching				21/1	4/1
3	BL				21/1	4/1
4						

Mott MacDonald Hong Kong Limited
20/F Two Landmark East,
100 How Ming Street,
Kwun Tong, Kowloon,
Hong Kong.
(Attn: Mr. Stephen BINGHAM)

Rec'd JAN 2012

3 January 2012

By fax (2827 1823) & post

Dear Mr. BINGHAM,

West Kowloon Cultural District – Development Plan
Request for Information of Chemical Waste Producer &
Chemical Spillage Accident

I refer to your letter of 8th December 2011 regarding the captioned request and reply below in response to your questions seriatim:-

1. There are dangerous goods storing at the captioned address. Please refer to **Appendix A** for details.
2. According to our record, no incident record was found at the aforesaid location with your given conditions.

Should you have further questions, please feel free to contact the undersigned or Ms. Shirley CHAN at 2733 7532.

Yours sincerely,

(LAM Chi-man)
for Director of Fire Services

Appendix A

Western Kowloon Cultural District – Development Plan

Request for Information of Dangerous Goods

Type of Dangerous Goods	Quantity	Method of Storage	Location
Petrol	4,600 litres	In an approved underground tank	Tsim Sha Tsui Fire Station, No. 333 Canton Road, Kowloon.
Diesel	4,600 litres	In an approved underground tank	
Cat. 2, 3, 4, 5, 6 & 9	For storage of seized dangerous goods	In containers / cylinders stored at the dangerous goods stored on G/F	

APPENDIX E

Site Photographs

Appendix E Site Photos



Photo 1 View of Waterfront Promenade (1)



Photo 2 View of Waterfront Promenade (2)



Photo 3 Temporary open storage and parking facilities



Photo 4 Temporary works area for XRL



Photo 5 Local Road



Photo 6 Tsim Sha Tsui Fire Station



Photo 7 Seawater Pumping Station



Photo 8 Ventilation building for the Western Harbour Crossing



Photo 9 Ventilation buildings for the Airport Railway