MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU – SHENZHEN – HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009)

Revised Contamination Assessment Plan (Part I) for Mai Po Ventilation Building Works Area (Revision D)

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Position: Environmental Team Leader

Date: 10 MAR 2010

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9 March 2010
By Post and email

Attn : Dr. Glenn Frommer

Dear Sir

Express Rail Link
Consultancy Agreement No. C806
Independent Environmental Checker (IEC)
Environmental Permit No.: EP-349/2009
Condition 2.21 – Revised Contamination Assessment Plan (Part I) for Mai Po Ventilation Building Works Area (Version D)

I refer to the captioned submission received on 9 March 2010. Pursuant to the EP Condition 2.21, I hereby verify the Contamination Assessment Plan (Part I) for Mai Po Ventilation Building Works Area (Version D).

Yours faithfully,
for MOTT MACDONALD HONG KONG LIMITED

Dr. Anne Kerr
Independent Environmental Checker (IEC)

AECOM

Gammon Construction Limited

Environmental Impact Assessment of Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

Revised Contamination Assessment Plan (Part I) for Mai Po Ventilation Building Works Area

March 2010

	Name	Signature
Prepared & Checked:	Catherine Po	
Reviewed & Approved:	Lawrence Tsui	

Version:	D	Date: 9 March 2010

The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and AECOM Environment accepts no responsibility for its use by others.

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Important Message
Rebranding as AECOM
To better serve our clients, all Maunsell AECOM operations in Hong Kong have been integrated into one operating entity and rebranded as AECOM. The ENSR Asia (HK) Limited operation is now part of AECOM Asia Co. Ltd.

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1. INTRODUCTION

1.1 AECOM Asia Company Limited (AACL) was commissioned by Gammon Construction Limited (GCL) as the environmental consultant to undertake the supplementary land contamination assessment at Mai Po Ventilation Building Works Area under the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL). The Hong Kong Section of the XRL will be a 26-km long underground rail line on a dedicated track that runs from the terminus located in West Kowloon to the boundary at Huanggang, as shown in **Figures NOL/ERL/300/C/XRL/ENS/M57/501-503**.

1.2 An Environmental Impact Assessment (EIA) for the Hong Kong Section of XRL was conducted and approved under the Environmental Impact Assessment Ordinance (EIAO) on 28 September 2009 (Register No. AEIAR-143/2009). An Environmental Permit (EP) No. EP-349/2009 was granted by the Director of Environmental Protect (DEP) on 16 October 2009.

1.3 During the time of EIA Study, some of the land lots/facilities within the development area were not fully surveyed and/or assessed due to site constraints. In this respect, the approved EIA specifies those inaccessible lots/facilities needed to be further assessed after land resumption and prior to the commencement of the constructions works at respective site. Pursuant to EP Condition 2.21, revised contamination assessment plan (CAP) with updated sampling and testing schedule based on respective site condition, supplementary contamination assessment reports (CARs) and if contamination found, supplementary remediation action plan (RAP) should be submitted to Environmental Protection Department (EPD) for approval prior to the commencement of works.

1.4 Table 9.8 of the approved EIA report provides a detailed summary for the initial findings for each potential site. According to the table, there are five sites (Site A, C, D and E and WSW) within Mai Po Ventilation Building Works Area (MPV) which require further site assessment. The location of MPV along the alignment and the general site layout plan has been shown in **Figures NOL/ERL/300/C/XRL/ENS/M57/501** and **504.** The findings from the initial site appraisal are also provided in Figure NOL/ERL/300/C/XRL/ENS/M57/202 of the approved CAP. Given that Site WSW was encroached upon the Project Area of the Proposed Comprehensive Development at Wo Shang Wai, Yuen Long (WSW) EIA, Site WSW would be assessed / remediated in accordance with the Environmental Permit conditions (EP-311/2008) of that particular EIA by its own project proponent. A review of the WSW CAR/RAP/Remediation Report (RR) will be conducted to confirm that all remediation works, if required, has been completed prior to the commencement of works at MPV. In case, there are any uncompleted remediation works within Site WSW when Site WSW is taken up by the permit holder of EP-349/2009, the contractor responsible for the construction works at MPV should take up the responsibility of the remediation works. It should be noted that no construction works or development for XRL shall be carried out within WSW (i.e. area encroached upon project area of WSW EIA) prior to the completion of the remediation works.

1.5 Access was only granted for Site A, E and western portion of Site C (i.e. Site C2) at the time of reporting. Due to the tight construction schedule and different land resumption stages, this revised Contamination Assessment Plan (Part I) is therefore prepared to summarize the findings of further site appraisal at these accessible sites and supplement the approved CAP by providing updated sampling and testing schedule based on current site condition.

1.6 For the remaining part of Site C (i.e. Site C1) and Site D, separate supplementary CAP(s) will be prepared and submitted to EPD for approval when site access is permissible.

2. ENVIRONMENTAL LEGISLATION, STANDARDS AND GUIDELINES

2.1 Assessment of land contamination sources shall be conducted in accordance with the approved EIA report, environmental standards and non-statutory guidelines recommended in the approved CAP *viz.* in general accordance with the requirement stipulated in "*Guidance Note for Contaminated Land Assessment Remediation*" (Guidance Note 1) and "*Guidance Notes for Investigation and*

Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair / Dismantling Workshop" (Guidance Note 2) issued by Environmental Protection Department (EPD). In addition, the Risk Based Remediation Goals (RBRGs) stipulated in the "*Guidance Manual for Use of Risk-based Remediation Goals for Contamination Management*" (The Guidance Manual) issued by EPD shall also be adopted as the criteria for assessing soil and groundwater contamination.

3. FURTHER SITE INSPECTION AND OBSERVATION

3.1 Further site visit to MPV Site A, C2 and E was conducted on 28 August 2009 to inspect and ascertain contaminative sources/hotspots, in accordance with the recommendation delineated in Table 5.7 and Table 5.8 of the approved CAP. **Figure NOL/ERL/300/C/XRL/ENS/M57/504** shows the works boundary of MPV.

3.2 At the time of site inspection, all the above-mentioned sites were inspected with photo-documentation. **Table 3.1** summarises the findings of the site inspections and **Figure NOL/ERL/300/C/XRL/ENS/M57/505-507** illustrate each site layout and proposed locations of potential contamination hotspots for site investigation with the support of photo-documentation. Identification of hotspots was mainly based on latest site observations and information from approved CAP.

Table 3.1 Findings of the Latest Site Inspection

Site ID	Status in Approved CAP	Site Area	Current Status	Site Inspection Results	Site Investigation Proposed?	Drawing Reference
A	Suspected Recycling Facility	5000m^2	Vacant (Surrendered)	The site was suspected to be operated as a recycling facility based on observation at the surrounding in previous site visits conducted in the course of EIA study (Table 5.7 of the approved CAP referred). During site inspection on 28 August 2009, the site was found to be vacant with some inert wastes (mainly wooden racks and bags of plastic tape) left on the concrete paved ground and no apparent stains observed. Sources of adverse land contamination were also not identified. However, as the site was suspected to be a recycling facility in the past, site investigation is proposed as a conservative approach to screen the potential land contamination aroused.	Yes	**Figure NOL/ERL/300/C/XRL/ENS/M57/505** (Figure NOL/ERL/300/C/XRL/ENS/M57/013 under approved CAP for reference of previous site condition)
C2 (Western Portion of the whole Site C	Container truck parking area	1500m^2	Vacant (Surrendered)	The site was suspected to be a container truck parking area with repair maintenance activities based on observation at the surrounding during previous site visits conducted in the course of EIA study (Table 5.7 of the approved CAP referred). During site inspection on 28 August 2009, the site was observed being divided into two portions. The western portion of Site C (Site C2) was found surrendered and left vacant while the eastern portion is still under operation (Site C1). As observed, the western portion of the Site was concrete/asphalt paved. Only minor patches of stains were found on the asphalt paved ground with no other contaminative activities identified during site inspection. Based on the site observation and findings in approved CAP, site investigation is proposed to assess the site condition in general.	Yes	**Figure NOL/ERL/300/C/XRL/ENS/M57/506** (Figure NOL/ERL/300/C/XRL/ENS/M57/013 under approved CAP for reference of previous site condition)

Site ID	Status in Approved CAP	Site Area	Current Status	Site Inspection Results	Site Investigation Proposed?	Drawing Reference
E	Container truck parking area with car wash and paint booth	6000m^2	Vacant (Surrendered)	Previous site inspection indicated that the site was occupied for truck parking with some car washing and painting activities undertaken on the eastern portion of the site (Table 5.8 of the approved CAP referred). During site inspection on 28 August 2009, the garage was found to be surrendered. Wastes (mainly consists of wooden racks, bricks, hoarding) were left on site. Spillages of oils were found near the location of ex-paint booth and potential land contamination is considered likely. To access the potential contamination aroused from previous site operation and recent observation, site investigation is proposed within Site E.	Yes	**Figure NOL/ERL/300/C/XRL/ENS/M57/507** (Figure NOL/ERL/300/C/XRL/ENS/M57/013 under approved CAP for reference of previous site condition)

4. SAMPLING AND TESTING PLAN FOR SITE INVESTIGATION

4.1 Based on the findings of further site inspection and information acquired from approved CAP, a total of 20 sampling locations are proposed within the three potential contaminated sites to access potential contamination at contamination hotspots and the site condition in general. The proposed sampling locations are illustrated in **Figure NOL/ERL/300/C/XRL/ENS/M57/505-507.** The selection of potential chemicals of concern (COCs) recommended for laboratory analysis at each proposed sampling location is reference to the nature of historical use of each site, the Guidance Note 1 and 2, Guidance Manual and the approved CAP. As recommended in Guidance Note 1, Petroleum carbon factions, polyaromatic hydrocarbons (PAH) and BTEX (benzene, toluene, ethylbenzene & xylene) would be selected for potential petroleum contamination analysis and metals were suggested for assessing the concern of general inorganic contamination. The sampling and testing plan, together with rationales for selecting the sampling locations, are summarized in **Table 4.1**.

4.2 The exact sampling locations of the site investigation (SI) shall be determined on site and subject to fine adjustment due to site specific conditions (e.g. locations, presence of foundations, underground utilities, delivery pipes and services).

Table 4.1 Sampling and Testing Plan for MPV (Site A, C2 and E)

Proposed Sampling Location[1]	Sampling Method	Sample Matrix[2,3]		Parameters to be Tested[4]						Rationale
				Petroleum Carbon Ranges	VOC[5]	SVOC[5]	Heavy Metals	PCB	Cyanide	
A01-A12	Borehole	Soil	0.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	X	X	Given that Site A was suspected to be a recycling facility in the past (Table 5.7 of approved CAP referred), there may be potential land contamination concern aroused from its operation with waste handling/recycling, even though the site was found to be concrete paved without apparent stains in the latest site inspection, SI is proposed around the site as a screening.
		Soil	1.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	X	X	
		Soil	3.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	X	X	
		Soil	4.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	X	X	
		Soil	6.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	X	X	
		GW	If present^	X	X	X	-	X	-	
C2-01 to C2-03	Borehole	Soil	0.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	Given that Site C was suspected to be container truck parking area with repair maintenance activities in the past (Table 5.7 of approved CAP referred), there may be potential land contamination concern aroused from the maintenance activities undertaken within the site. The site was, however, found to be concrete/asphalt paved in general with no contaminative activities identified in the latest site visit. To assess the potential contamination concern aroused from historical operation as container truck parking area with repair maintenance activities, SI are proposed to assess the ground condition around the site in general.
		Soil	1.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	3.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	4.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	6.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		GW	If present^	X	X	X	-	-	-	
E-01 to E-05	Borehole	Soil	0.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	Site E was found to be a container truck parking area with car wash and paint booth in the approved CAP(Table 5.8 of approved CAP referred). During latest site inspection, Site E was found to be vacant/surrendered, sampling locations are therefore proposed based on approved CAP. However, as oil stains were identified during latest site inspection, additional parameters e.g.
		Soil	1.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	3.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	4.5m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		Soil	6.0m BBC	X	X	X	Pb, CrIII, CrVI, Cu, Zn	-	-	
		GW	If present^	X	X	X	-	-	-	

										petroleum hydrocarbons were proposed.

Remarks:
1. Locations are shown in **Figures NOL/ERL/300/C/XRL/ENS/M57/505-507**.
2. BBC= below base of concrete slab; GW=groundwater
3. Exact sampling depth shall be determined on site and subject to fine adjustment due to site specific conditions (e.g. hard rocks or groundwater encountered (if any).
4. X = testing proposed
5. Since RBRG value of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, bis-(2-Ethylhexyl)phthalate, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene and Phenol were not available for groundwater, the captioned chemicals parameters would not be tested in groundwater sample.
^ Samples will only be collected if groundwater is encountered during SI works.

Soil Sampling Method and Depth of Sampling

4.3 All soil boring / excavation and sampling should be supervised by a land contamination specialist.

4.4 Borehole should be undertaken by means of dry rotary drilling method, i.e. without the use of flushing medium, to prevent cross-contamination during sampling. For safety reasons, an inspection pit should be excavated down to 2.0m below ground to inspect for underground utilities at the proposed borehole location. Considering only surface contaminative works were identified during site appraisal in approved CAP and the information provided by FSD indicated no registered dangerous goods issued at the area with potential land contamination concern (which is considered to imply no registered underground services tanks), sampling is proposed to 6m below base of concrete (BBC). Should contamination identified at 6m based on the laboratory results, sampling at further depths, if necessary, down to the end of excavation levels should be conducted to confirm the vertical extent of contamination.

4.5 Disturbed soil samples should be collected at depth of 0.5m and 1.5m BBC. Soil boring using drill rigs should then be performed from depth of 2.0m to the maximum boring depth. Undisturbed samples should be collected at, 3m, 4.5m and 6m BBC to capture the potential contaminated soil. Groundwater sample should be collected if encountered. The deepest depth of sampling should be of up to 6m below ground. Where there are suspected signs of contamination, extra samples should be taken for laboratory analysis.

4.6 At each sampling location/depth, sufficient quantity of soil sample (as specified by the laboratory) should be taken. All soil samples should be uniquely labelled. Backup samples should be retained and stored at 0 - 4 ºC in laboratory.

Strata Logging

4.7 Strata logging for boreholes should be undertaken during the course of drilling/digging and sampling by a qualified geologist. The logs should include the general stratigraphic description, depth of soil sampling, sample notation and level of groundwater (if encountered). The presence of rocks/boulders/cobbles and foreign materials such as metals, wood and plastics should also be recorded.

Free Product and Groundwater Level Measurement

4.8 The thickness of any free product and ground water level if present at sampling locations should be measured with an interface probe. The free product if encountered in sufficient amount should be collected for laboratory analysis to determine the composition.

Groundwater Sampling

4.9 It is proposed to collect groundwater samples if groundwater is encountered at the sampling locations.

4.10 For each proposed borehole sampling location, a groundwater sampling well should be installed into the boreholes if groundwater is encountered or agreed by the land contamination specialist. A typical design of groundwater monitoring well is shown in **Figure NOL/ERL/300/C/XRL/ENS/M57/500.** After installation of the monitoring wells, the depth to water table at all monitoring wells should be measured at the same time with an interface probe in order to delineate the groundwater table contours at the subject site. Well developments (approximately five well volumes) should be carried out to remove slit and drilling fluid reside from the wells. The wells should then be allowed to stand for a day to permit groundwater conditions to equilibrate. Groundwater level and thickness of free product layer, if present, should be measured at each well before groundwater samples are taken.

4.11 Prior to groundwater sampling, the monitoring wells should be purged (at least three well volumes) to remove fine-grained materials and to collect freshly refilled representative groundwater samples.

4.12 After purging, one groundwater sample should then be collected at each well using Teflon bailer and decanted into appropriate sample vials or bottles in a manner that minimizes agitation and volatilization of VOCs from the samples. All samples should be uniquely labelled.

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

Sample Size and Decontamination Procedures

4.14 All equipment in contact with the ground should be thoroughly decontaminated between each excavation, drilling and sampling event to minimise the potential for cross contamination. The equipment (including drilling pit, digging tools and soil/groundwater samplers) should be decontaminated by steam cleaning or high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed by distilled / deionised water.

4.15 Prior to sampling, the laboratory responsible for analysis should be consulted on the particular sample size and preservation procedures that are necessary for each chemical analysis.

4.16 The sample containers should be laboratory cleaned, sealable, water-tight, made of glass or other suitable materials with aluminium or Teflon-lined lids, so that the container surface will not react with the sample or adsorb contaminants. No headspace should be allowed in the containers which contain samples to be analysed for VOCs, Petroleum Carbons Range or other volatile chemicals.

4.17 The containers should be marked with the sampling location codes and the depths at which the samples were taken. If the contents are hazardous, this should be clearly marked on the container and precautions taken during transport. Samples should be stored at between 0-4 ºC but never frozen. Samples should be delivered to laboratory within 24 hours of the samples being collected and analysed within the respective retention period but should not more than 10 days.

QA/QC Procedures

4.18 QA/QC samples should be collected in the following frequency during the SI. Chain of Custody protocol should be adopted.

- 1 duplicate sample per 20 samples for full suite analysis as shown in **Table 4.1**;
- 1 equipment blank per 20 samples for full suite analysis as shown in **Table 4.1**;
- 1 field blank per 20 samples for full suite analysis as shown in **Table 4.1**; and
- 1 trip blank per trip for the analysis of Petroleum Carbon Ranges C_6-C_8 and BTEX (Benzene, Toluene, Ethylbenzene and Xylene).

4.19 Based on the sampling and testing plan as outlined in **Table 4.1**, the total number of duplicate, equipment blank, field blanks for Site A, C2 and E would be estimated in **Table 4.2**.

Table 4.2 Estimated Number of Duplicate, Equipment Blank, Field Blanks

Site	Number of Soil Samples	Number of Groundwater Samples	Estimated Number of QA/QC Samples*	
			Soil	Groundwater
A	60	12	3 sets	1 set
C2	15	3	1 sets	1 set
E	25	5	2 sets	1 set

Note:
* In addition to duplicate, equipment blank, field blanks, trip blank should also be performed for every transportation of samples from sites to laboratory.

Health and Safety

4.20 The specific safety measures to be taken depend on the nature and content of contamination, the site conditions and the regulations related to site safety requirements. Workmen Compensation Insurance and third party insurance must be provided for the SI.

4.21 Extreme care should be exercised when toxic gases or other hazardous materials are encountered. Any abnormal conditions found shall be reported immediately to the safety officer and the land contamination specialist.

4.22 The SI contractor shall establish and maintain a Health and Safety Plan before commencement of the SI that will include the following:

(a) Instruction of works on work procedures, safe practices, emergency duties, and applicable regulations;

(b) Regularly scheduled meetings of the workers in which the possible hazards, problems of the job, and related safe practices are emphasized and discussed;

(c) Good housekeeping practices; and

(d) Availability of and instruction in the location, use and maintenance of personal protective equipment.

4.23 The SI Contractor shall maintain equipment and supplies reasonably required in an emergency, including lifesaving, evacuation, rescue and medical equipment in good working order and condition at all times. The SI Contractor shall use all reasonable means to control and prevent fires and explosions, injury to personnel and damage to equipment of property. Without limiting the foregoing, the SI Contractor shall:

(a) Maintain proper safety devices, barriers to minimize hazards during performance of the work;

(b) Prohibit smoking and open flames and the carrying of matches and lighters;

(c) Develop and maintain a written emergency plan applicable to the Work and Site;

(d) Maintain equipment in good operating condition and have emergency and first aid equipment ready for immediate use, where applicable;

(e) Conduct equipment tests to ensure that equipment is properly placed and in good operating condition, and that workers are able to respond to emergency situations;

(f) Require all workers employed or retained by the Contractor, or a subcontractor, to at all time wear clothing suitable for existing work, weather and environmental conditions; and

(g) The personnel are required to wear respirator and gloves for vapour exposure protection, if necessary. Safety helmet and protective boots should be worn.

5. LABORATORY ANALYSIS

5.1 Laboratory analysis is proposed in order to screen the presence of potential contaminants that are of concern at the Study Area. **Table 5.1** summarizes the parameters, the minimum requirement of the reporting limits and reference methods for the laboratory analyses of soil and groundwater samples for this land contamination study.

Table 5.1 Parameters, Detection Limits and Reference Methods for Laboratory Analyses

Item	Parameter	Soil		Groundwater	
		Detection limits (mg/kg) or otherwise stated	Testing Method	Detection limits (µg/L) or otherwise stated	Testing Method
VOCs					
1	Acetone	50	HOKLAS accredited In-house method EP074 (reference method: USEPA 8260B)	500	HOKLAS accredited In-house method EP074 (reference method: USEPA 8260B)
2	Benzene	0.2		5	
3	Bromodichloromethane	0.04^		5	
4	2-Butanone	5		50	
5	Chloroform	0.04^		5	
6	Ethylbenzene	0.5		5	
7	Methyl tert-Butyl Ether	0.5		5	
8	Methylene Chloride	5		50	
9	Styrene	0.5		5	
10	Tetrachloroethene	0.04^		5	
11	Toluene	0.5		5	
12	Trichloroethene	0.04^		5	
13	Xylenes (Total)	1.5		15	
SVOCs					
14	Acenaphthene	0.5	HOKLAS accredited In-house method EP075 (reference method: USEPA 8270D)	2	HOKLAS accredited In-house method EP075 (reference method: USEPA 8270D)
15	Acenaphthylene	0.5		2	
16	Anthracene	0.5		2	
17	Benzo(a)anthracene	0.5		NA	
18	Benzo(a)pyrene	0.5		NA	
19	Benzo(b)fluoranthene& Benzo(k)fluoranthene	1.0		1^	
20	Benzo(g,h,i)perylene	0.5		NA	
21	bis-(2-Ethylhexyl) phthalate	5.0		NA	

Item	Parameter	Soil		Groundwater	
		Detection limits (mg/kg) or otherwise stated	Testing Method	Detection limits (µg/L) or otherwise stated	Testing Method
22	Chrysene	0.5		1^	
23	Dibenzo(a,h)anthracen	0.5		NA	
24	Fluoranthene	0.5		2	
25	Fluorene	0.5		2	
26	Hexachlorobenzene	0.2^		4	
27	Indeno(1,2,3-cd)pyrene	0.5		NA	
28	Naphthalene	0.5		2	
29	Phenanthrene	0.5		2	
30	Phenol	0.5		NA	
31	Pyrene	0.5		2	
Metals					
32	Chromium III	1	HOKLAS accredited In-house method EG025 (reference method: APHA 3500Cr:B)	NA	HOKLAS accredited In-house method EG025 (reference method: APHA 3500Cr:B)
33	Chromium VI	1			
34	Copper	1	HOKLAS accredited In-house method EG020 (reference method: USEPA 6020)		HOKLAS accredited In-house method EG020 (reference method: USEPA 6020)
35	Lead	1			
36	Zinc	1			
Petroleum Carbon Ranges					
37	C6 - C8	5	HOKLAS accredited In-house method EP071 (reference method: USEPA 8260B/8015C)	20	HOKLAS accredited In-house method EP071 (reference method: USEPA 8260B/8015C)
38	C9 - C16	200		500	
39	C17 - C35	500		500	
PCB					
40	PCB	0.1	HOKLAS accredited In-house method EP066 (reference method: USEPA 8270D)	1	HOKLAS accredited In-house method EP066 (reference method: USEPA 8270D)
Other Inorganic Compounds					

Item	Parameter	Soil		Groundwater	
		Detection limits (mg/kg) or otherwise stated	Testing Method	Detection limits (µg/L) or otherwise stated	Testing Method
41	Cyanide, free	1	HOKLAS accredited In-house method EK026MD (reference method: APHA 4500 CN C, N)	NA	HOKLAS accredited In-house method EK026MD (reference method: APHA 4500 CN C, N)

Notes:
^The extract of samples will be concentrated to maintain the lowest possible method reporting limits.
NA = Not Applicable

5.2 For sampling and laboratory analyses, chain of custody procedure should be included as QA/QC procedure.

5.3 All laboratory analyses for soil and groundwater samples should be conducted by a Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited laboratory. All laboratory test methods should be accredited by the HOKLAS or one of its Mutual Recognition Arrangement partners.

5.4 Extra soil samples shall be stored at 0-4 ºC and tested for Toxicity Characteristics Leaching Procedure (TCLP) before submission of Remediation Action Plan (RAP) if excavation and landfill disposal is identified as the last resort.

5.5 The criteria are set primarily in terms of TCLP limits shown in **Table 5.2**.

Table 5.2 Laboratory Testing Requirements for TCLP Analysis

Parameter	Test Methods*	Detection limit (mg/L)	Landfill Disposal Criteria TCLP Limit (ppm)
TCLP Leachate Preparation allowed by analysis for:			
Antimony (Sb)	USEPA 1311 and 6020A	2	150
Arsenic (As)		2	50
Barium (Ba)		2	1,000
Beryllium (Be)		1	10
Cadmium (Cd)		1	10
Chromium (Cr)		1	50
Copper (Cu)		2	250
Lead (Pb)		3	50
Nickel (Ni)		1.5	250
Selenium (Se)		0.2	1
Silver (Ag)		2	50
Thallium (Ti)		1	50
Tin (Sn)		2.5	250
Vanadium (V)		4	250
Zinc (Zn)		10	250
Mercury (Hg)		0.2	1

* Equivalent internationally recognized standard methods could also be used.

6. INTERPRETATION OF RESULTS

6.1 With reference to the *Guidance Note for Contaminated Land Assessment and Remediation*, interpretation of results shall be based on the comparison with the Risk-based Remediation Goals (RBRGs) as stipulated in Table 2.1 and Table 2.2 of the Guidance Manual.

6.2 The RBRGs are developed based on a risk assessment approach to suit the local environmental conditions and community needs in Hong Kong. Decisions on contaminated soil and groundwater remediation are based on the nature and extent of the potential risks that are posed to human receptors as a result of exposure to chemicals in the soil and/or groundwater. Four types of land use scenarios are set under RBRGs to reflect the typical *physical settings in Hong Kong under which people could be exposed to contaminated soil and groundwater. A description of each land use is as foll*ows:

- Urban residential – Sites located in an urban area where main activities involve habitation by individuals. The typical physical setting is a high rise residential building situated in a housing estate that has amenity facilities such as landscaped yards and children's playgrounds. The receptors are residents who stay indoors most of the time except for a short period each day, during which they are outdoors and have the chance of being in direct contact with soil at landscaping or play areas within the estate.

- Rural residential – Sites located in a rural area where the main activities involve habitation by individuals. These sites typically have village-type houses or low rise residential blocks surrounded by open space. The receptors are rural residents who stay at home and spend some time each day outdoors on activities such as gardening or light sports. The degree of contact with the soil under the rural setting is more than that under the urban setting both in terms of the intensity and frequency of contact.

- Industrial – Any site where activities involve manufacturing, chemical or petrochemical processing, storage of raw materials, transport operations, energy production or transmission, etc. Receptors include those at sites where part of the operation is carried out directly on land and the workers are more likely to be exposed to soil than those working in multi-storey factory buildings.

- Public parks – Receptors include individuals and families who frequent parks and play areas where there is contact with soil present in lawns, walkways, gardens and play areas. Parks are considered to be predominantly hard covered with limited areas of predominantly landscaped soil. Furthermore, public parks are not considered to have buildings present on them.

6.3 In addition to the RBRGs, screening criteria (soil saturation limits, Csat, developed for Non-aqueous Phase Liquid [NAPL] in soil and water solubility limits for NAPL in groundwater) for the more mobile organic chemicals must be considered to determine whether a site requires further action.

6.4 Since future land uses of the areas within this project area of industrial use or railway development, RBRGs (industrial) should be adopted for this land contamination assessment. Relevant soil and groundwater RBRGs level for this land contamination study including the soil staturation limit and solubility limit are presented in the following table. Should the future land uses of any of the areas within this project be changed, re-testing and, if necessary, remediation works, should be conducted in accordance to relevant RBRG.

Table 6.1 Relevant RBRGs for Soil and Groundwater - Industrial

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
VOCs				
Acetone	10,000	***	10,000,000	***
Benzene	9.21	336	54,000	1,750,000
Bromodichloromethane	2.85	1,030	26,200	6,740,000
2-Butanone	10,000	***	10,000,000	***
Chloroform	1.54	1,100	11,300	7,920,000
Ethylbenzene	8,240	138	10,000,000	169,000
Methyl tert-Butyl Ether	70.1	2,380	1,810,000	***
Methylene Chloride	13.9	921	224,000	***
Styrene	10,000	497	10,000,000	310,000
Tetrachloroethene	0.777	97.1	2,950	200,000
Toluene	10,000	235	10,000,000	526,000
Trichloroethene	5.68	488	14,200	1,100,000
Xylenes (Total)	1,230	150	1,570,000	175,000
SVOCs				
Acenaphthene	10,000	60.2	10,000,000	4,240
Acenaphthylene	10,000	19.8	10,000,000	3,930
Anthracene	10,000	2.56	10,000,000	43.4
Benzo(a)anthracene	91.8	NA	NA	NA
Benzo(a)pyrene	9.18	NA	NA	NA
Benzo(b)fluoranthene	17.8	NA	7,530	1.5
Benzo(g,h,i)perylene	10,000	NA	NA	NA
Benzo(k)fluoranthene	918	NA	NA	NA
bis-(2-Ethylhexyl)phthalate	91.8	NA	NA	NA
Chrysene	1,140	NA	812,000	1.6
Dibenzo(a,h)anthracene	9.18	NA	NA	NA
Fluoranthene	10,000	NA	10,000,000	206
Fluorene	10,000	54.7	10,000,000	1,980
Hexachlorobenzene	0.582	NA	695	6,200
Indeno(1,2,3-cd)pyrene	91.8	NA	NA	NA
Naphthalene	453	125	862,000	31,000
Phenanthrene	10,000	28	10,000,000	1000
Phenol	10,000	7,260	NA	NA
Pyrene	10,000	NA	10,000,000	135

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
Metals				
Chromium III	10,000	NA	NA	NA
Chromium VI	1,960	NA	NA	NA
Copper	10,000	NA	NA	NA
Lead	2,290	NA	NA	NA
Zinc	10,000	NA	NA	NA
Petroleum Carbon Ranges				
C6 - C8	10,000	1000	1,150,000	5,230
C9 - C16	10,000	3000	9,980,000	2,800
C17 - C35	10,000	5000	178,000	2,800
PCB				
PCB	0.748	NA	5,110	31
Other Inorganic Compound				
Cyanide, Free	10,000	NA	NA	NA

Note: NA - Not Available
*** indicates that the Csat value/ solubility limit exceeds the 'ceiling limit' therefore the RBRG applies

7. REPORTING

7.1 After completion of the site investigation, a supplementary CAR which reports the detailed methodology of site investigation, assessment criteria, on-site observations and the analytical results from the site investigation works, will be submitted to EPD for endorsement.

7.2 If land contamination is confirmed within the works areas, a supplementary Remediation Action Plan (RAP) which formulates remedial measures should be submitted to EPD for endorsement. The contaminated site should be cleaned up according to the approved supplementary RAP and a supplementary Remediation Report (RR) to demonstrating completion of remedial actions should be prepared and submitted to EPD for endorsement prior to the commencement of construction works within the contaminated site.

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
Metals				
Chromium III	10,000	NA	NA	NA
Chromium VI	1,960	NA	NA	NA
Copper	10,000	NA	NA	NA
Lead	2,290	NA	NA	NA
Zinc	10,000	NA	NA	NA
Petroleum Carbon Ranges				
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Figures

HONG KONG BORDER

820000 E

840000 N

836000 N

832000 N

TBM

INSERTA

D & B

TBM

C & C

TBM

D & B

MATCH LINE
FOR CONTINUATION
SEE DWG. NOL/ERL/300/C/XRL/ENS/M57/502

MPV - MAI PO
VENTILATION BUILDING

NTV - NGAU TAM
MEI VENTILATION BUILDING

TPP - TAI KONG PO
EMERGENCY ACCESS POINT

SSS - SHEK KONG
STABLING SIDINGS

ERS - EMERGENCY
RESCUE STATION

PHV - PAT HEUNG
VENTILATION BUILDING

TUW - TSE UK TSUEN
WORKS AREA

TSW - TAI SHU HA
ROAD WEST MAGAZINE SITE

MATCH LINE
FOR CONTINUATION
SEE DWG. NOL/ERL/300/C/XRL/ENS/M57/503

0 200 400 600 800 1000
METRES
1 : 40000

INSERTA

MAI PO
SAN TSUEN

CASTLE PEAK ROAD - MAI PO

MAI PO ROAD

SAN TAM ROAD

SAN TIN HIGHWAY

MAPLE GARDENS

ROYAL PALMS

KEY LOCATION PLAN

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- UNDERGROUND FACILITIES
- AREA OF CONCERN IN THIS REVISED CAP

CONSTRUCTION METHODS:

(C & C)	CUT & COVER
(D & B)	DRILL & BLAST TUNNEL
(TBM)	TUNNEL BORING MACHINE TUNNEL

NOTE:

ALL CONSTRUCTION SHAFTS AND VENTILATION BUILDINGS WILL BE CONSTRUCTED BY CUT AND COVER METHOD

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REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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ORIGINATOR

AECOM

CADD REF.
NOL_ERL_300_C_XRL_ENS_M57_501A.dgn

TITLE
NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
OVERALL VIEW OF ALIGNMENT

SCALE 1 : 40000 (A3)

FIGURE NO. NOL/ERL/300/C/XRL/ENS/M57/501

REV. A

832000 E

836000 E

828000 E

824000 N

820000 N

MATCH LINE
FOR CONTINUATION
SEE DWG NO. NOL/ERL/300/C/XRL/ENS/M57/501

D & B

SMV - SHING MUN
VENTILATION BUILDING

SYW - SHEK YAM
WORKS AREA

KCV - KWAI CHUNG
VENTILATION BUILDING

MLW - MEI LAI ROAD
WORKS AREA

LCW - LAI CHI KOK
WORKS AREA

RCB - RAMBLER CHANNEL
BARGING POINT

TBM

C & C

NCV - NAM CHEONG
VENTILATION BUILDING

MKV - MONG KOK WEST
VENTILATION BUILDING

NCB - NAM CHEONG
BARGING POINT

PTI - PUBLIC
TRANSPORT INTERCHANGE

WKT - WEST KOWLOON
TERMINUS

WKB - WEST KOWLOON
BARGING POINT

TSUEN WAN

RAMBLER

VICTORIA

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- UNDERGROUND FACILITIES

CONSTRUCTION METHODS:

(C & C)	CUT & COVER
(D & B)	DRILL & BLAST TUNNEL
(TBM)	TUNNEL BORING MACHINE TUNNEL

NOTE:

ALL CONSTRUCTION SHAFTS AND VENTILATION BUILDINGS WILL BE CONSTRUCTED BY CUT AND COVER METHOD

0 200 400 600 800 1000
METRES

1 : 40000

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DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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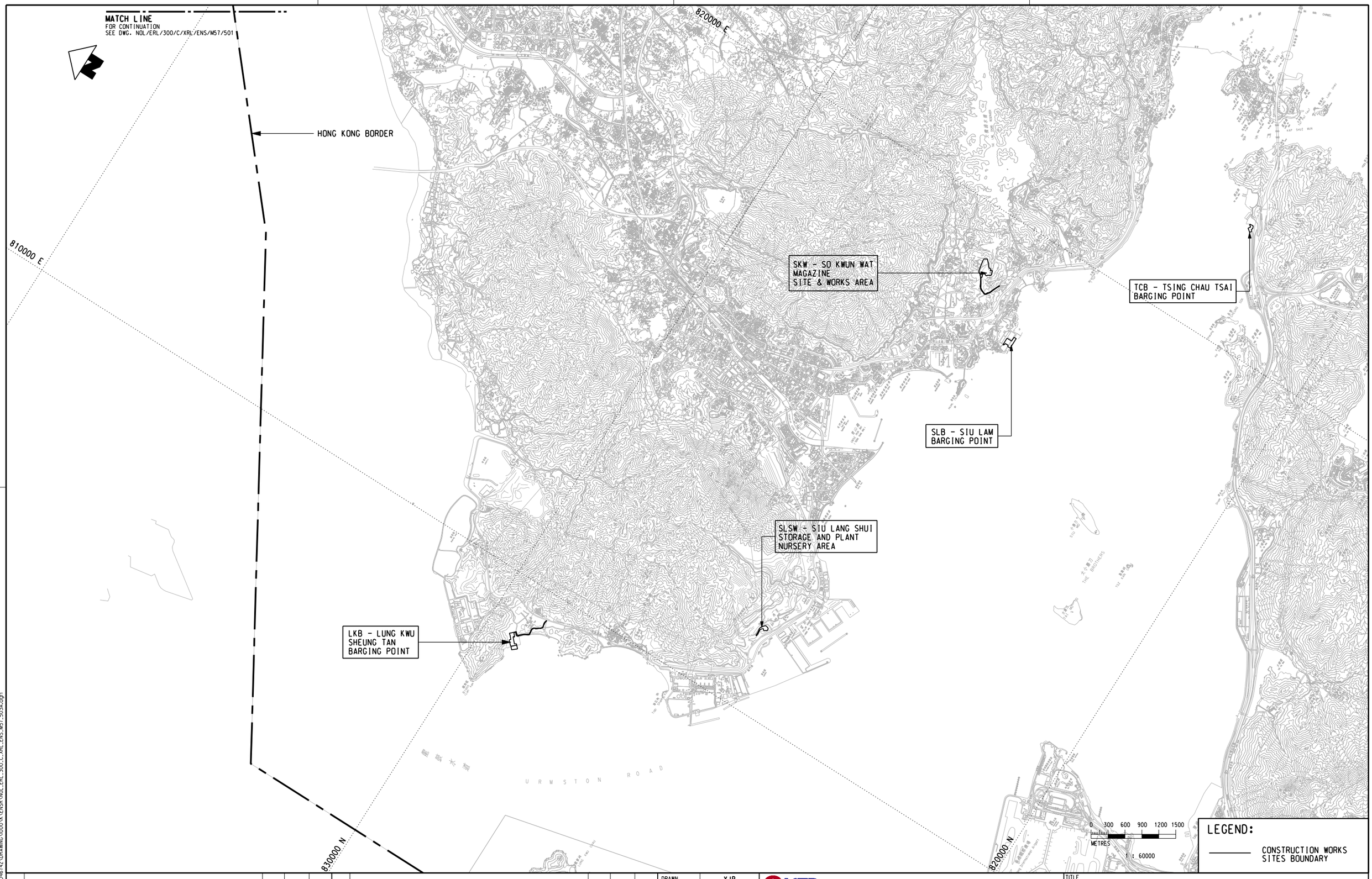
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TITLE

NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
OVERALL VIEW OF ALIGNMENT

SCALE	FIGURE NO.	REV.
1 : 40000 (A3)	NOL/ERL/300/C/XRL/ENS/M57/502	A



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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

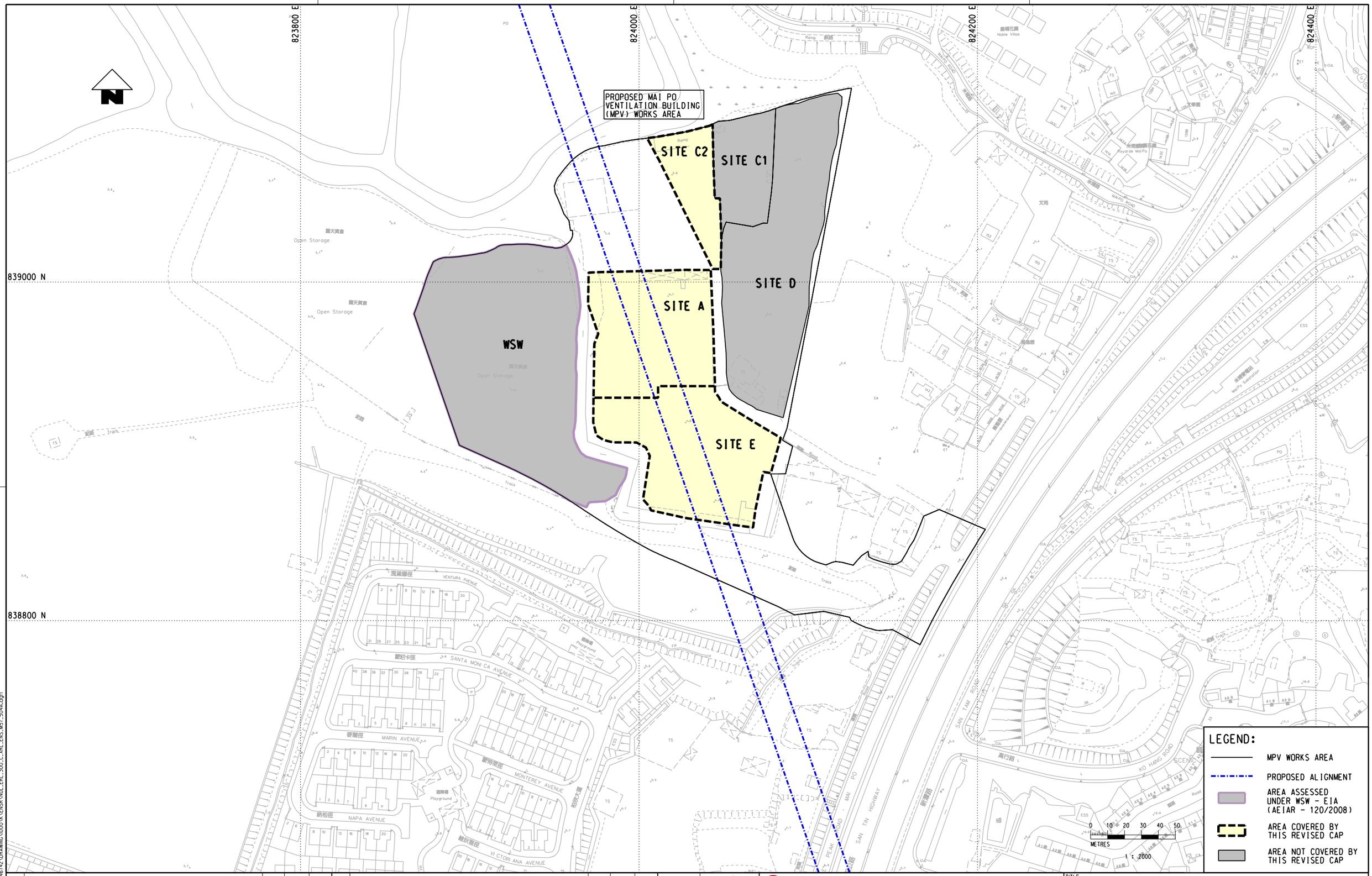
DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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ORIGINATOR
AECOM
CADD REF.
NOL_ERL_300_C_XRL_ENS_M57_503A.dgn

TITLE
NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
OVERALL VIEW OF ALIGNMENT

SCALE 1 : 60000 (A3)
FIGURE NO. NOL/ERL/300/C/XRL/ENS/M57/503
REV. A



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REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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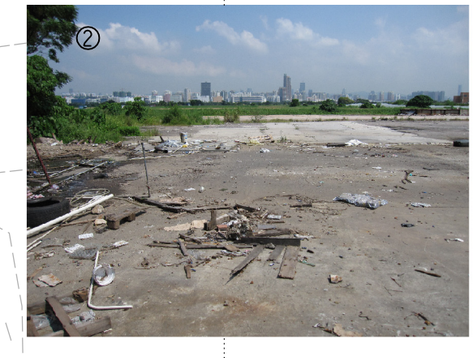
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CADD REF. NOL_ERL_300_C_XRL_ENS_M57_504A.dgn

TITLE
NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
SITE LAYOUT PLAN

SCALE	FIGURE NO.	REV.
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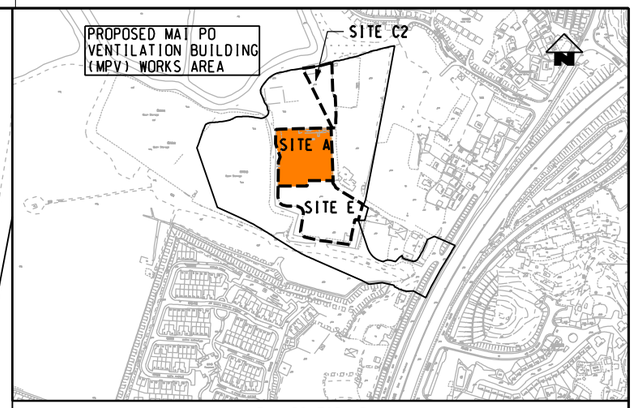




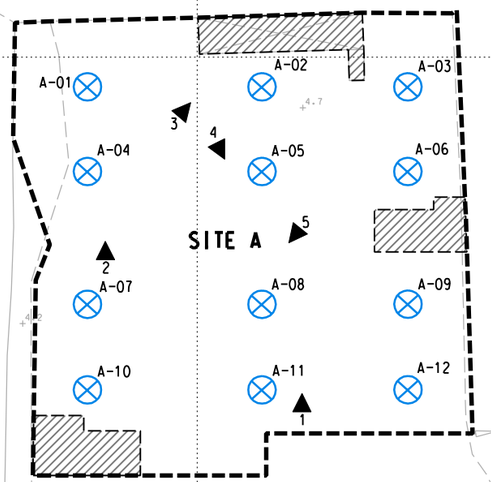








KEY LOCATION PLAN



839000 N

838900 N

823900 E

824000 E

824100 E

824200 E

露天貨倉

Open Storage

泥路

Track 泥路

道路 Road

0 5 10 15 20 25
METRES
1 : 1000

SITE ID	POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED IN APPROVED CAP	CURRENT LAND USES	HOTSPOTS IDENTIFIED	APPROXIMATE AREA OF THE SITE / AREA OF CONTAMINATIVE ACTIVITIES	TOTAL NUMBER OF SAMPLING POINT(S) PROPOSED WITHIN THE SITE
A	SUSPECTED RECYCLING INDUSTRY	VACANT	NO (SITE CLEAR UP DURING SITE INSPECTION)	5,000m²/ 5,000m²*	12**

NOTES:

THE SITE LAYOUT IS INDICATIVE ONLY.

* SINCE THE SITE WAS CLEAR BEFORE SITE INSPECTION, HOTSPOTS CANNOT BE IDENTIFIED. THE APPROXIMATE AREA OF CONTAMINATIVE ACTIVITIES ARE CONSIDERED TO BE THE SAME AS THE AREA OF THE SITE.

** THE NUMBER OF SAMPLING POINTS ARE PROPOSED BY GRID ARRANGEMENT

LEGEND:

- MPV WORKS AREA
- AREA COVERED BY THIS REVISED CAP
- CONCRETE SLAB WITH RAMP
- AREA OF CONCERN
- 1 — DIRECTION OF PHOTO TAKEN
- A-01 — PROPOSED SAMPLING LOCATION

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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ORIGINATOR AECOM

CADD REF. NOL_ERL_300_C_XRL_ENS_M57_505A.dgn

TITLE

NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
PROPOSED SI LOCATIONS

SCALE	FIGURE NO.	REV.
1 : 1000 (A3)	NOL/ERL/300/C/XRL/ENS/M57/505	A

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823900 E

824000 E

824100 E

824200 E

839100 N

839000 N

PROPOSED MAI PO VENTILATION BUILDING (MPV) WORKS AREA

SITE C2

C2-01

C2-02

C2-03

VACANT

Ramp

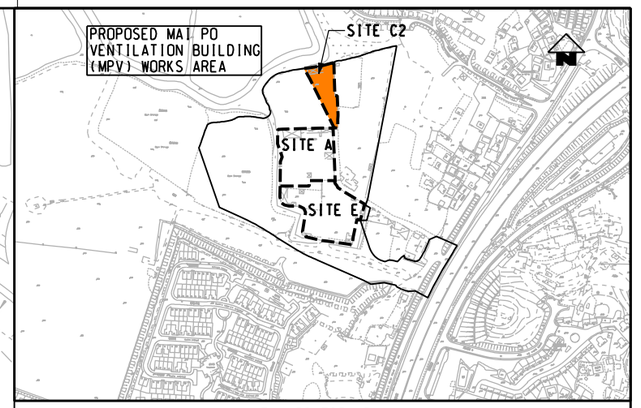
斜路

米埔路

泥路

文苑





KEY LOCATION PLAN

SITE ID	POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED IN APPROVED CAP	CURRENT LAND USES	HOTSPOTS IDENTIFIED	APPROXIMATE AREA OF THE SITE / AREA OF CONTAMINATIVE ACTIVITIES	TOTAL NUMBER OF SAMPLING POINT(S) PROPOSED WITHIN THE SITE
C2	SUSPECTED CONTAINER TRUCK PARKING AREA WITH REPAIR/MAINTENANCE ACTIVITIES	VACANT	NO (VACANT DURING SITE INSPECTION)	1,500m² /1,500m² *	3**

NOTES:

THE SITE LAYOUT IS INDICATIVE ONLY.

* SINCE THE SITE WAS FOUND VACANT DURING SITE INSPECTION, HOTSPOTS CANNOT BE IDENTIFIED. THE APPROXIMATE AREA OF CONTAMINATIVE ACTIVITIES IS CONSIDERED TO BE THE SAME AS THE AREA OF THE SITE.

** BASED ON THE HISTORICAL LAND USES AND FINDINGS OF SITE APPRAISAL, 3 BOREHOLES ARE PROPOSED TO ACCESS THE CONDITION IN GENERAL.

LEGEND:

- MPV WORKS AREA
- AREA COVERED BY THIS REVISED CAP
- AREA OF CONCERN
- FENCE
- 1 — DIRECTION OF PHOTO TAKEN
- C2-01 — PROPOSED SAMPLING LOCATION

0 5 10 15 20 25
METRES
1 : 1000

REV	DESCRIPTION	BY	DATE	APPROVED
REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

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CADD REF. NOL_ERL_300_C_XRL_ENS_M57_506B.dgn

TITLE

NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
PROPOSED SI LOCATIONS

SCALE	FIGURE NO.	REV.
1 : 1000 (A3)	NOL/ERL/300/C/XRL/ENS/M57/506	B

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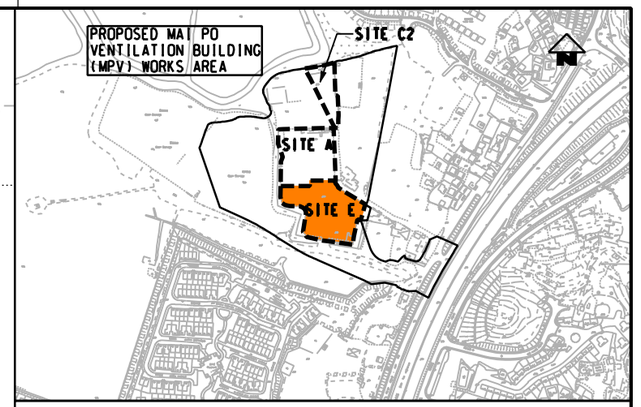




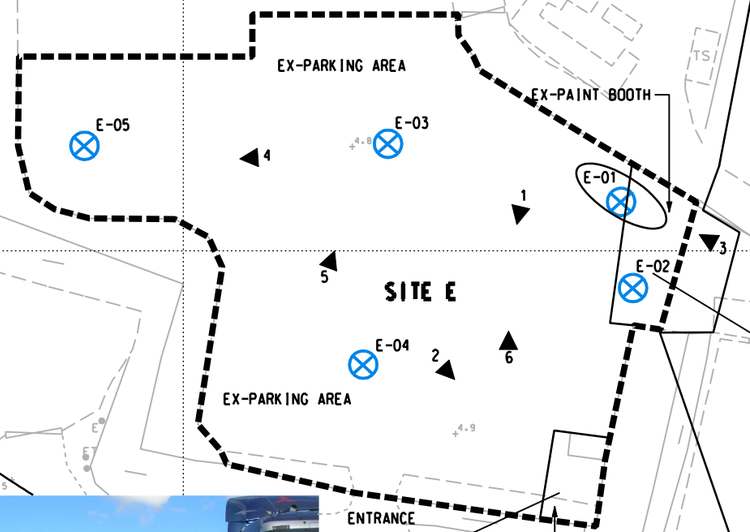
PREVIOUS SITE CONDITION (AS SHOWN IN APPROVED CAP)



PREVIOUS SITE CONDITION (AS SHOWN IN APPROVED CAP)



KEY LOCATION PLAN



839000 N
838900 N
838800 N
823900 E
824000 E
824100 E
824200 E

SITE ID	POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED IN APPROVED CAP	CURRENT LAND USES	HOTSPOTS IDENTIFIED	APPROXIMATE AREA OF THE SITE / AREA OF CONTAMINATIVE ACTIVITIES	TOTAL NUMBER OF SAMPLING POINT(S) PROPOSED WITHIN THE SITE
E	VEHICLE REPAIR WORKSHOP	VACANT (SITE CLEAR DURING INSPECTION)	PAINT BOOTH (FROM APPROVED CAP)	6,000m²/150m²	5*

NOTES:

THE SITE LAYOUT IS INDICATIVE ONLY.

* THE SITE WAS CLEAR BEFORE SITE INSPECTION. GIVEN THAT THE SITE IS WELL PAVED WITH CONCRETE AND SPILLAGE OF OIL LIKE SUBSTANCE WAS FOUND NEAR THE PREVIOUS LOCATION OF PAINT BOOTH. THE PROPOSED SAMPLING LOCATION E-01 IS CONSIDERED CAPABLE TO CAPTURE THE POTENTIAL LAND CONTAMINATION AROUSED FROM THE PAINT BOOTH/ SPILLAGE OF OIL LIKE SUBSTANCE WITH MINOR SHIFT FROM THE PROPOSED LOCATION IN APPROVED CAP. THE REMAINING SAMPLING LOCATIONS ARE PROPOSED AS THE APPROVED CAP.

LEGEND:

- MPV WORKS AREA
- AREA COVERED BY THIS REVISED CAP
- AREA OF CONCERN
- 1 — DIRECTION OF PHOTO TAKEN
- E-01 — PROPOSED SAMPLING LOCATION
- LOCATION WITH STAINS

0 5 10 15 20 25 METRES
1 : 1000

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	11/SEP./2009

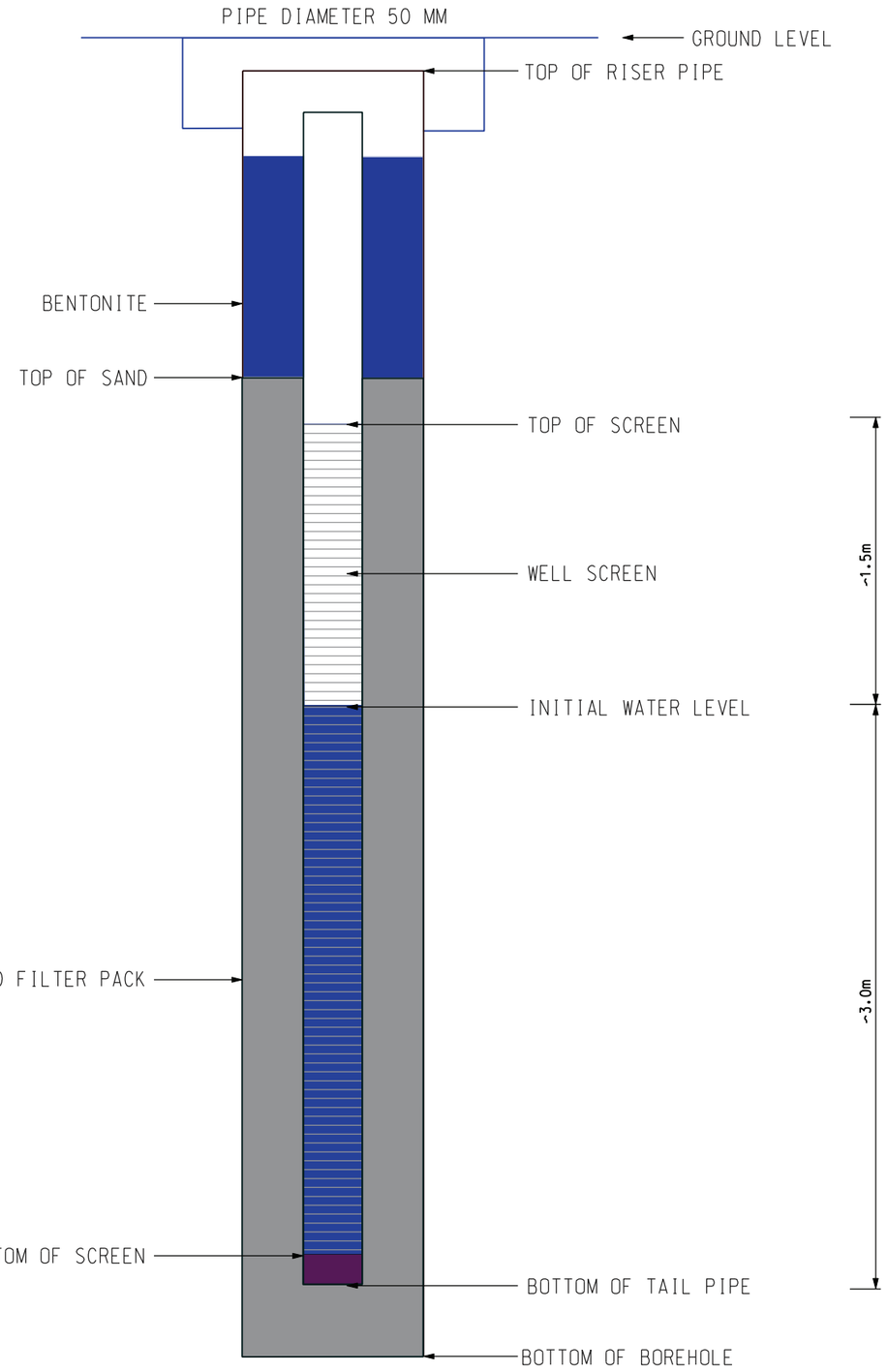
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MTR
EXPRESS RAIL LINK
ORIGINATOR AECOM
CADD REF. NOL_ERL_300_C_XRL_ENS_M57_507A.dgn

TITLE
NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
PROPOSED SI LOCATIONS

SCALE 1 : 1000 (A3) | FIGURE NO. NOL/ERL/300/C/XRL/ENS/M57/507 | REV. A

PLOT DRV: R:\ustnsef\MTR\PLOTDRIVER\WINDOWS\AICOLOUR.ptt
MODELNAME: Default
FILENAME: p:\projects\60046742\DRAWING\000\XA\ENSR\NOL_ERL_300_C_XRL_ENS_M57_507A.dgn
PRINTED BY: DAIKL
2009-10-29 10:49:24



PLOT DRV: R:\ustnset\MTR\PLOTDRVER\WINDOWS\A3 COLOUR.pltPRINTED BY: XUCF 2009-10-21 15:16:36
MODELNAME: Default
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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	LC
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	26/JUL/2008

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MTR
EXPRESS RAIL LINK
ORIGINATOR AECOM
CADD REF. NOL_ERL_300_C_XRL_ENS_M57_500A.dgn

TITLE
NOL / ERL-300
REVISED CAP FOR MPV WORKS AREA
TYPICAL DESIGN OF GROUNDWATER SAMPLING WELL

SCALE	FIGURE NO.	REV.
N.T.S.	NOL/ERL/300/C/XRL/ENS/M57/500	A

Appendix A

Supporting Document from ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

23 February 2010 Fax and Post

Gammon Construction Limited

Rm128, 1/F
Lee Hang Industrial Bldg,
No.10 Cheung Yue Street,
Cheung Sha Wan, Kowloon

Attn: Mr Chen Wing Hon

Our Ref: L028A_10/IL

Hong Kong Section of Guangzhou-Shenzhen Hong Kong Express Rail Link (XRL)
Laboratory Analyses for Land Contamination Assessment

Dear Mr Chen,

With reference to your email dated on 16 December 2009, I would like to provide the current method reference used for your reference.

Should you have any question, please feel free to contact us.

Best Regards,

Ivan Leung
Manager-Customer Services

ALS Technichem (HK) Pty Ltd
Part of the **ALS Laboratory Group**
11/F Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T.
Phone +852 2610 1044 Fax +852 2610 2021 www.alsenviro.com
A Campbell Brothers Limited Company

Item	Testing Parameters	Reporting limit in Soil mg/kg	Reporting limit in Groundwater µg/L
VOC ALS In house Method Code : EP074 Accredited Status : HOKLAS accredited Method Reference used : USEPA 8260B			
1	Acetone	50	500
2	Benzene	0.2	5
3	Bromodichloromethane	*0.04	5
4	2-Butanone	5	50
5	Chloroform	*0.04	5
6	Ethylbenzene	0.5	5
7	Methyl tert-Butyl Ether	0.5	5
8	Methylene Chloride	5	50
9	Styrene	0.5	5
10	Tetrachloroethene	*0.04	5
11	Toluene	0.5	5
12	Trichloroethene	*0.04	5
13	Xylenes (Total) meta- and para-xylene, Ortho-xylene	1.5	15
SVOC ALS In house Method Code : EP075 Accredited Status : HOKLAS accredited Method Reference used : USEPA 8270D			
14	Acenaphthene	0.5	2
15	Acenaphthylene	0.5	2
16	Anthracene	0.5	2
17	Benzo(a)anthracene	0.5	NA
18	Benzo(a)pyrene	0.5	NA
19	Benzo(b)fluoranthene	1	*1
20	Benzo(k)fluoranthene		
21	Benzo(g,h,i)perylene	0.5	NA
22	bis-(2-Ethylhexyl)phthalate	5	NA
23	Chrysene	0.5	*1
24	Dibenzo(a,h)anthracene	0.5	NA
25	Fluoranthene	0.5	2
26	Fluorene	0.5	2
27	Hexachlorobenzene	*0.2	4
28	Indeno(1,2,3-cd)pyrene	0.5	NA
29	Naphthalene	0.5	2
30	Phenanthrene	0.5	2
31	Phenol	0.5	NA
32	Pyrene	0.5	2

Item	Testing Parameters	Reporting limit in Soil mg/kg	Reporting limit in Groundwater µg/L
Heavy Metal (Cadmium, Copper, Lead, Nickel and Zinc) ALS In house Method Code : EG020 Accredited Status : HOKLAS accredited Method Reference used : USEPA 6020 **Mercury** ALS In house Method Code : EG035 Accredited Status : HOKLAS accredited Method Reference used : APHA 3112 B **Chromium VI** ALS In house Method Code : EG025 Accredited Status : HOKLAS accredited Method Reference used : APHA 3500Cr:B			
33	Cadmium	0.2	NA
34	Chromium III	1	NA
35	Chromium VI	1	NA
36	Copper	1	NA
37	Lead	1	NA
38	Mercury	0.2	0.5
39	Nickel	1	NA
40	Zinc	1	NA
Petroleum Carbon Range ALS In house Method Code : EP071 Accredited Status : HOKLAS accredited Method Reference used : USEPA 8260B/8015C			
41	C6 - C8	5	20
42	C9 - C16	200	500
43	C17 - C35	500	500
PCB Petroleum Carbon Range ALS In house Method Code : EP066 Accredited Status : HOKLAS accredited Method Reference used : USEPA 8270D			
44	PCB	0.1	1
Free Cyanide ALS In house Method Code : EK026MD Accredited Status : HOKLAS accredited Method Reference used : APHA 4500 CN C,N			
45	Cyanide, free	1	NA

* The extract of samples will be concentrated to maintain the lowest possible method reporting limits.