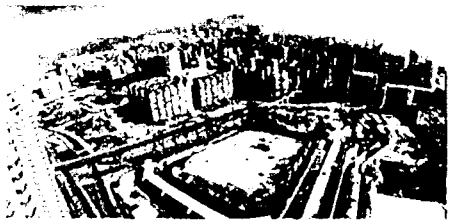
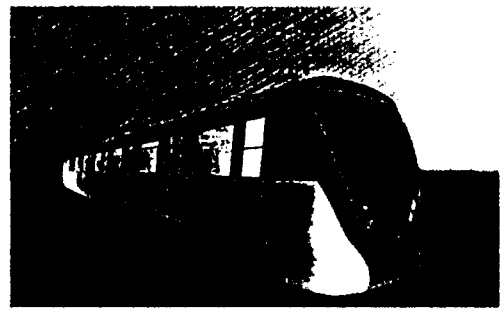
APPENDIX – 10-1

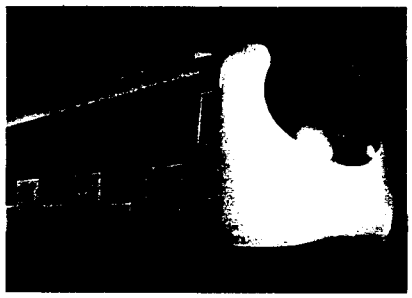
Contamination Assessment Plan

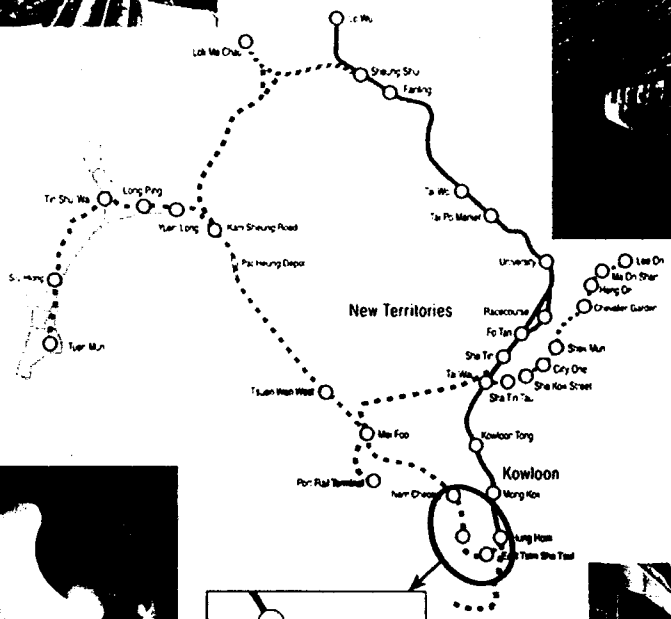
Kowloon-Canton Railway Corporation
New Railway Projects Division

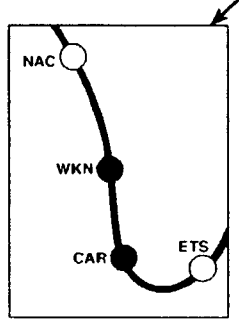
Kowloon Southern Link KSL
Environmental Impact Assessment & Associated Services
Contamination Assessment Plan (4th Revision)











ARUP

Ove Arup & Partners Hong Kong Ltd

KCR 九廣鐵路

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CONTENTS

ABBREVIATION

Arup	Ove Arup and Partners Hong Kong Ltd
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CDG	Completely decomposed granite
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
DP	Designated Project
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
ERE	East Rail Extension
ETS	East Tsim Sha Tsui
FS	Fire Station
FSD	Fire Services Department
GEO	Geotechnical Engineering Office
GIU	Geotechnical Information Unit
KCRC	Kowloon Canton Railway Corporation
KSL	Kowloon Southern Link
MD	Marine deposits
MPHQ	Marine Police Headquarters
M/SDG	Moderately or slightly decomposed granite
NAC	Nam Cheong
PAHs	Polyaromatic Hydrocarbons
PPFS	Preliminary Project Feasibility Study
RAP	Remediation Action Plan
TBM	Tunnel Boring Machine
TCLP	Toxicity Characteristic Leaching Procedure
TM-EIA	Technical Memorandum on Environmental Impact Assessment Process
TPH	Total Petroleum Hydrocarbon
TST	Tsim Sha Tsui
WKN	West Kowloon
WR	West Rail

1. INTRODUCTION

1.1 Background

Ove Arup & Partners (Arup) was commissioned by Kowloon Canton Railway Corporation (KCRC) to undertake an Environmental Impact Assessment (EIA) of the proposed Kowloon Southern Link (KSL) under the Contract No. GSA 5100 "Environmental Impact Assessment & Associated Services".

The proposed KSL project is classified as a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). Pursuant to Section 5(7)(a) of the EIAO, EPD issued to KCRC a study brief (ref: EIA Study Brief No: ESB-097/2002 dated March 2002) [1] to carry out an EIA study.

A preliminary assessment of the environmental issues of the proposed project and a study of the pros and cons of the 4 alignment options were provided in a Preliminary Project Feasibility Study of KSL completed in 2001[2 & 3]. Land contamination impact is one of the issues to be addressed in the EIA study. A land contamination assessment shall be conducted prior to construction of the KSL alignment to assess any potential land contamination.

Legislation and non-statutory guidance for carrying out the land contamination assessment is provided in the following:

- Technical Memorandum on Environmental Impact Assessment Process (TM-EIA) [4];
- ProPECC PN 3/94 – Contaminated Land Assessment and Remediation [5]; and
- Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops [6].

Prior to the commencement of intrusive site investigation work, a Contamination Assessment Plan (CAP) shall be prepared and submitted to EPD for approval. Upon approval of the CAP by EPD, it is required to conduct a contamination assessment, and to compile the findings in a Contamination Assessment Report (CAR). If the report confirms contamination of the site, a Remediation Action Plan (RAP) is required to propose suitable and viable measures for site clean up. The RAP will be submitted together with the CAR as a combined document for EPD endorsement. Site clean up will commence once the CAR/RAP are vetted and approved by EPD.

The Contamination Assessment Plan (CAP) dated February 2003 was agreed-in-principle by EPD. The CAP was revised in June 2003 as the alignment near the West Kowloon Station has been slightly shifted to the east. This updated CAP was based on one railway station design in October 2003, in which the general alignment remains unchanged. Response to comments on previous CAP are given in Annex 4.

1.2 Alignment Description

1.2.1 Canton Road Alignment

KCRC proposes to construct and operate a new railway line with one new railway station as shown in Figure 1 to improve the accessibility to Tsim Sha Tsui (TST) and West Kowloon districts. The proposed 3.7km underground KSL will connect the new KCRC East TST Station

to the current West Rail (WR) terminus at Nam Cheong Station, with its alignment running under Salisbury Road, Canton Road and West Kowloon Reclamation area. Upon KSL's completion, the WR train service will terminate at Hung Hom.

1.2.2 Alternative Route Alignments Considered

A total of 4 alignment options had been considered, including

- Option 1: Canton Road Scheme
- Option 2: Kowloon Park Drive Scheme
- Option 3: Kowloon Point Scheme
- Option 4: Harbour City Scheme

All the 4 options have approximately the same alignment from the north of West Kowloon Station to the West Rail Nam Cheong Station. It runs basically parallel to the existing Airport Express and follows the alignment in the Government's Second Railway Development Study (RDS-2) Report of May 2000.

According to the proposed scheme of RDS-2, the alignment to the south of WKN is located within West Kowloon assuming the implementation of the Kowloon Point Reclamation and the location of the Kowloon Point Station on the reclaimed land. However, as there is no confirmation of the implementation date for the Kowloon Point Reclamation, it is therefore impossible to adopt the original RDS-2 alignment. Alternative alignments have therefore been identified to the south of the WKN Station.

2. STUDY OBJECTIVES

The main objective of this assessment is to determine the likelihood of contamination at the areas along the alignment. The assessment study will also identify the types and extent of contaminants, and to assess the requirements for the disposal of contaminated soils and groundwater, if any. It should be noted that in accordance with EPD's *Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops*, the disposal of contaminated soils to landfill should be the last resort, and alternative methods of disposal should be used where possible. Any potential impacts to the construction programme or to the construction workers will also be considered and mitigation measures advised, where appropriate.

The scope of this CAP includes:

- review available borehole and geological information along the alignment;
- review the relevant environmental legislation, guidelines and standards;
- identify typical types of the potential contamination activities, including both past and present activities;
- detail the requirements for the collection of soil samples (where possible) from each borehole/trial pit for laboratory analysis to identify the types and concentrations of contaminants;
- detail the requirements for the collection of groundwater sample for analysis, from each sampling point where the water table is encountered; and

- detail the laboratory analysis requirements for all collected samples, with the chemical testing parameters specified.

3. SITE APPRAISAL

3.1 Geology

The regional geology of the study area is shown on the 1:20 000 Geological Map, Sheet 11, Hong Kong and Kowloon, from the Hong Kong Geological Survey and reproduced in Figure 2.

The main rock type within the Kowloon peninsula comprises an equigranular medium grained biotite monzogranite of the Kowloon Granite. The superficial deposits in the TST area have an embayment of marine sand beach deposits stretching from the shoreline at Salisbury Road up Nathan Road to just north of Mody Road. The marine sand and beach deposit are also shown to run along and lie below Canton Road with the deposit extending to the west into the area of reclamation.

Alluvial deposits are shown to extend from Austin Road into the project area to below the former typhoon shelter and underlie the marine deposits in this area.

To the north of the former Jordan Ferry piers the alignment runs across the reclamation areas at the former Yau Ma Tei typhoon shelter. The geological map indicates that marine deposits should exist in this area and some marine sands may lie below the old reclaimed areas to the north of the shelter.

3.2 Ground Condition

Geological sections for the whole alignment are shown in Figure 3.

Along Salisbury Road, the upper-most 2 to 4m of soil (approximately) is fill materials. Below this is a 5m thick of marine deposits made up of beach sand deposits. These deposits comprise typically loose to medium dense sands, which occasionally have silt and clay mixed into the material. The next 5m is made up of alluvium which comprises a sequence of mixed brown silty and clayey fine to medium sands and gravels. The lowest stratum recorded (down to a depth of 15m) is predominantly completely decomposed granite (CDG) and moderately to slightly decomposed granite (M/SDG). M/SDG can be described as a strong to very strong pink mottled grey and black speckled medium grained granite with medium to widely spaced joints. The average groundwater level recorded at Salisbury Road is about 3m below the surface.

At Canton Road, the CDG layer is approximately 15 to 30m thick lying underneath a thin layer of fill material (1 to 5m). The CDG layer has its thickest accumulations along the Canton Road and in the reclamation area. The average groundwater level recorded is about 1-2m below the surface. The thickness of top fill layer gradually increases to 20m at the West Kowloon Reclamation Area where the majority of the alignment will be located within this area. The average groundwater levels recorded are about 6-7m and 3m below ground in West Kowloon Reclamation Area and Tai Kok Tsui respectively.

3.3 Historical Information

The development history has been considered from a review of historical maps of Hong Kong and aerial photography. There have been several phases of reclamation over the whole alignment and they are shown on Figure 4. Across the southern and western Kowloon Peninsula the

majority of reclamation was carried out before 1904. Reclamation in several other small areas shown along the main TST waterfront and were completed by 1982. The West Kowloon Reclamation was formed as part of the Airport Core Programme and except for the area known as YM6 was completed by 1995. The remaining area of YM6 reclamation is currently under construction.

Aerial photographs of 1964, 1974, 1985 and 1995 have been reviewed. There were industrial facilities (e.g. shipyards, warehouse) along the waterfront of Canton Road in 1964 and 1974 (Figures 5 and 6). Most of the shipyards during that period did not have specific precautionary measures to prevent spillage of oil onto the ground. Aerial photographs reveal that the TST Fire Station and the commercial buildings were constructed during early 1970's and early 1980's (Figures 6 and 7) and the area next to the TST fire station was open storage/ car parking area between 1985 and 1995. The remaining area of YM6 reclamation, the waterfront of the Canton Road Government Office, was the typhoon shelter and the dockyard of the Marine Department (Figures 7 and 8).

Further up north was the Yau Ma Tei typhoon shelter and Tai Kok Tsui. These areas had not been reclaimed in 1985. In Tai Kok Tsui, the landuses were identified in accordance with street maps from 1996 to 2002 [7]. Most buildings were residential uses except two factory buildings located at Sham Mong Road.

The factory building located at the intersection of Kok Cheung Street and Pok Man Street, Tai Kok Tsui Centre (existing Skyway House), was constructed in 1982 and was reconstructed into a commercial building in 2000. A petrol filling station had been at the ground floor of the building since the factory building occupied. Another factory building located immediately north of the Tai Kok Tsui Centre had been occupied since early 1974.

Review of the 1980 survey map [8] revealed that there was ex-shipyard operation located to the south of Chui Yu Road opposite the Tung Chaw Street Park. It is located at more than 200m to the northeast of the KSL alignment and is now redeveloped into residential premises.

The available historical information also indicates that the potential of land contamination caused from accidental spillage or change of land use is unlikely. There is no record indicating the presence of incineration facilities, burn pits or facilities that utilizes high temperature along the proposed alignment.

3.4 Site Inspection

A site inspection was conducted on 24 June 2002 to obtain more information regarding the current industrial activities, and to confirm potentially contaminated sampling locations for the intrusive site investigation. All land lots/ sites within a distance of 300m from the boundary of the alignment have been inspected.

The landuses along Canton Road are mainly commercial buildings and hotels. The TST Fire Station comprises of four wings in a Z shape with a 14 storey residential block. Petrol and diesel filling facilities are provided in the Fire Station. The area between the TST fire station and the Canton Road Government Office is an open space currently occupied by the Highway Department (HyD) and car/ coach parking facilities.

The West Kowloon Reclamation Area is mainly an unoccupied land or with newly constructed residential and commercial developments.

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 4.55m^3. 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 22.75m^3. 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.

Although the factory building next to Skyway House is now a commercial and trading premises, it has been an industrial building since 1974. Information on the industrial activities at that period of time is not available. However, typical industrial activities would include garment, machinery manufacturing, printing and publishing. These activities may pose potential contamination issues.

The ex-shipyard operation near Tung Chow Street Park has been changed to residential development. It may have possible residual marine deposits contamination.

4. FIELD SAMPLING APPROACH

4.1 Sampling Locations

Site appraisals have identified TST Fire Station, the former shipyard sites within the West Kowloon Reclamation, Canton Road Government Office and Tai Kok Tsui, petrol filling station at the intersection of Kok Cheung Street and Pok Man Street (under Skyway House), and the factory building at Sham Mong Road as potential contamination areas.

Five sampling drillholes are selected for soil and groundwater sampling to evaluate the potential impacts to the nearby sensitive receivers at each area. The actual locations are given in Table 4-1 and Figure 10.

Table 4-1: Sampling locations

Drillhole reference	Provisional drillhole location		Representative location
	Easting (m)	Northing (m)	
KSD100/DHEPZ052	835341	818059	Tsim Sha Tsui Fire Station
KSD100/DHE056	835293	818131	West Kowloon Reclamation
KSD100/DH063	835241	818274	Ex-government dockyard at Canton Road Government Office
KSD100/DHEPZ113 (1)	834521	820078	Petrol filling station under Skyway House
			Factory building at Sham Mong Road
KSD100/DH120	834306	820413	Ex-shipyard site in Tai Kok Tsui

Note:
(1) KSD100/DHEPZ113 is the closest drillhole to both the petrol filling station and the factory building, it is thus representative of both potential contaminated sources.

4.2 Depth of Sampling Points

Five sampling drillholes have been proposed for soil and groundwater samples. However, it is not possible to determine the exact depths of samples to be taken at each sampling location prior to the site investigation. This is because the actual subsurface conditions, such as the type of material, discoloured soil, visual/olfactory signs of contamination and the level of the water table are not known. An experienced on-site Land Contamination Specialist shall be provided by the G.I. Contractor, who shall be responsible for the supervision of the entire site investigation, and will determine on-site the appropriate sampling depths, sample location points, and the number of soil and groundwater samples required from each sampling location. The on-site Land

Contamination Specialist shall have at least 7 years experience on land contamination or land remediation projects.

The depth of samples to be taken at the proposed locations should cover those soil layers where soil will be encountered by the workers, excavated and removed during the construction work. In general, soil samples will be collected from each drillhole at depths of 0.5m and 1.5m from within the inspection pit, then at a depth of 3.0m and thereafter at 3.0m depth intervals within fill materials. Groundwater samples will be collected at each sampling point where groundwater is encountered.

4.3 Sampling Methodology

4.3.1 General

The sampling work will be undertaken following appropriate protocols, to minimise the potential for cross-contamination between samples and between different sampling locations. The soil sampling methods are based on techniques developed by USEPA. These methods include decontamination procedures, sample collection, preparation and preservation, and chain-of-custody documentation.

For general land contamination assessments, samples are collected by drillholes as the sampling depth will often exceed 3.0m. This will minimise the chance of cross-contamination between samples that are often observed when using the trial pit method. When conducting the intrusive investigations, care will be taken to avoid underground utilities.

Samples for laboratory testing will be taken with clean stainless steel hand tools and clean latex gloves and placed in rigid containers made of a material that is non-reactive with the likely contaminants.

In addition to the samples collected for laboratory analysis, a strata log will be kept for record of additional data to aid in the interpretation of results. Information on the general structure of the subsurface strata including grain size, colour, and wetness, and the depth and thickness of each soil/rock layer will be noted. The presence of any foreign material such as metals, wood, or plastics is also to be recorded.

4.3.2 Decontamination Procedures

Equipment in contact with the ground shall be thoroughly decontaminated between each sampling event to minimize the potential for cross contamination. The equipment shall be decontaminated by steam cleaning, then washed with phosphate-free detergent and finally rinsed with water. Moreover, water shall be used during drilling only if necessary. Addition of water shall be minimized to avoid cross-contamination of the soil.

During sampling and decontamination activities, disposable latex gloves shall be worn to prevent the transfer of contaminants from other sources. Disposable accessories, such as latex gloves, will be discarded after use.

4.3.3 Soil Sample Collection

As stated above, soil samples will be collected from the drillholes at depths of approximately 0.5m, 1.5m, 3.0m and thereafter at 3.0m depth interval, as appropriate. The on-site Land Contamination Specialist will decide the appropriate depths for sampling on a point by point basis.

A clean stainless steel hand tools shall be used to collect the sample from the required depth. The sample shall be transferred to an appropriate, clean, glass bottle or other suitable sampling container provided by the laboratory. The sample container shall be labelled with the required information such as the sample location code, sampling depth, date and time, etc. Samples shall then be stored in the dark (e.g. an icebox) and maintained between 2°C – 4°C, but not frozen. They will be packed in a cooler with icepacks and delivered to the laboratory within 24 hours. All samples shall be collected under chain-of-custody protocols.

4.3.4 Groundwater Sample Collection

Groundwater samples shall be collected at each drillhole after all the required soil samples have been collected. Each sample shall be truly representative of the groundwater at the point from which it is taken, without dilution or contamination by water from other sources or by other material. A groundwater monitoring well shall be installed at each drillhole, and upon completion of installation of monitoring wells, approximately five times volumes of well shall be flushed to remove silt and drilling fluid residue from the wells. The wells shall then be allowed to stand for a day to permit groundwater conditions to equilibrate. Groundwater level and thickness of free product layer, if present, shall be measured by dip meter and interface probe respectively, before groundwater samples are taken. Moreover, prior to groundwater sampling, the sampling wells shall be purged (at least three times volumes of well) to remove fine-grained materials and to collect freshly refilled groundwater samples. After purging, one groundwater sample shall then be collected at each sampling well with a Teflon bailer. Field measurement of temperature and pH shall also be taken for each of the samples. The free products, if present, shall also be sampled to allow identification by the laboratory.

If the permeability of the surrounding strata and storage is low, dewatering by pumping may dry up the hole, in which case the on-site Land Contamination Specialist will decide whether the requirement to pump out three times the liquid volume is to be waived.

After the dewatering process (and allowing groundwater to percolate back into the hole if it has been pumped dry), enough quantity of groundwater sample shall be collected from each drillhole, and then stored in different sample containers for analysis. Immediately after collection, samples shall be transferred to labelled sample containers containing the necessary preservatives (supplied by the laboratory). Samples shall be stored between 2°C – 4°C, and delivered to the laboratory within 24 hours. All samples shall be collected under chain-of-custody protocols.

4.3.5 Sample Size and Handling Criteria

A laboratory has been consulted for the particular sample size, sample containers and preservative procedures for each chemical analysis of the soil and groundwater. The laboratory's recommendations are summarised in Table 4-2. The containers shall be marked with sampling point codes and the depths at which the samples were taken. Samples shall be stored between 2°C – 4°C, and delivered to the laboratory within 24 hours.

Table 4-2: Summary of sample handling criteria

Analytical Parameters	Sample Size	Sample Container	Preservation	Notes
Soil Sample				
All major analytes in soil sample	2 X 500ml	Glass Jar with Teflon Lined Lid	Refrigeration at 2°C – 4°C	The soil jar must be filled to minimise headspace when volatiles are to be determined
Groundwater Sample				
Metals	250ml	Clear Plastic Bottle	Nitric Acid (HNO_3)	For Dissolved Metals the sample must be filtered prior to acidification.
TPH (C_6 – C_9) and BTEX	2 X 40ml	Glass Jar with Teflon Lined Lid	Hydrochloric Acid (HCl)	The vials must be filled for zero headspace.
PAHs	1L	Amber Glass Bottle with Teflon Lined Cap	Refrigeration at 2°C – 4°C	-
TPH (C_{10} – C_{36})	1L	Amber Glass Bottle with Teflon Lined Cap	Refrigeration at 2°C – 4°C	-
Total Cyanide	250ml	White Plastic Bottle	Sodium Hydroxide (NaOH) & Cadmium Nitrate ($Cd(NO_3)_2$)	-
Sulphate	250ml	Clear Plastic Bottle	Refrigeration at 2°C – 4°C	-
Dioxins	2L	Amber Glass Bottle with Teflon Lined Cap	Refrigeration at 2°C – 4°C	-

5. ANALYTICAL PROGRAMME

5.1 Analytical Parameters

The selected soil and groundwater samples collected from each of the sampling points shall be analysed for:

- ***Dutch List Metals***, including Arsenic (As), Barium (Ba), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Tin (Sn) and Zinc (Zn);
- ***Total Cyanide (Total CN);***
- ***Sulphates;***
- ***Total Petroleum Hydrocarbon (TPH)***;
- ***Dioxins*** (for Drillholes KSD100/DH063 & KSD100/DH120 only)

Subject to the analytical results of TPH, the following analysis shall be conducted:

- ***Benzene, Toluene, Ethylbenzene and Xylene (BTEX);*** and
- ***Polyaromatic Hydrocarbons (PAHs).***

If the subject site area is assessed as contaminated, and excavation and disposal is envisaged as the only suitable cleanup method, then the soil samples from the most contaminated area shall be treated by ***Toxicity Characteristic Leaching Procedure (TCLP)*** subject to the direction of the Land Contamination Specialist. The TCLP treated effluent shall then be tested for Cadmium Chromium, Copper, Nickel, Lead, Zinc, Mercury, Tin, Silver, Antimony, Arsenic, Beryllium, Thallium, Vanadium, Selenium and Barium.

5.2 Analytical Methodology

The various determination techniques (the majority of which were developed by the US Environmental Protection Agency) are as follows:

- **Dutch List Metals** – to include analysis the presence of heavy metals (except mercury), using the USEPA 6020 Method: *Inductively Coupled Plasma – Mass Spectrometry (ICP-MS)*. Mercury will be analysed by using the APHA 19th Method No.3112B: *Cold Vapour-Flow Injection Mercury Analyser*;
- **Total Cyanide (Total CN)** – to analyse the presence of cyanides in soil and groundwater, using the APHA 19th Method No. 4500-CN-C&E: *Distillation and Colorimetric Methods*;
- **Sulphates** – to analyse the presence of sulphates in soil and groundwater, using the APHA 19th Method No. 4500-SO_4^{2-}-E: *Colorimetric Method*;
- **TPH (Total Petroleum Hydrocarbons)** – to analyse the presence of trace organics (carbon-based) in soil and groundwater, using the USEPA 8015A Method: *Gas Chromatography – Flame Ionisation Detection (GC-FID)* and USEPA 8260A Method - *Gas Chromatography – Mass Spectrometry (GC-MS)*;
- **PAHs and BTEX (Benzene, Toluene, Ethylbenzene, and Xylene)** – to analyse the presence of trace organics in soil and groundwater, using the USEPA 8260A Method: *Gas Chromatography – Mass Spectrometry (GC-MS)*;
- **Dioxins** – to analyse the presence of dioxins in soil and groundwater, using the USEPA 8290 Method: *Gas Chromatography/High-Resolution – Mass Spectrometry (HRGC/HRMS)*;
- **TCLP** – to determine the mobility of both organic and inorganic analytes present in soil, using USEPA 1311 Method: *Toxicity Characteristic Leaching Procedure*.

A list of the recommended analytical methods and detection limits for the soil and groundwater analyses are given in Tables 5-1 and 5-2 respectively for reference.

All collected soil and groundwater samples shall be analysed for Dutch List Metals, Total Cyanide, Sulphates and TPH. The need for BTEX and PAHs analysis will depend on the test results of TPH. Dioxins shall be analysed for the soil and groundwater samples collected from Drillholes KSD100/DH063 & KSD100/DH120. A HOKLAS accredited (or equivalent) testing laboratory shall be appointed to conduct chemical analysis for the soil and groundwater samples.

Table 5-1 : Analytical methods and detection limits for soil samples

Parameters	Preparation (Extraction) Method	Determination Method	Detection Limit (mg/kg)
Metals			
Arsenic (As)	USEPA 3051	USEPA 6020	0.5
Barium (Ba)	USEPA 3051	USEPA 6020	0.1
Cadmium (Cd)	USEPA 3051	USEPA 6020	0.02
Chromium (Cr)	USEPA 3051	USEPA 6020	0.1
Cobalt (Co)	USEPA 3051	USEPA 6020	0.1
Copper (Cu)	USEPA 3051	USEPA 6020	0.1
Lead (Pb)	USEPA 3051	USEPA 6020	0.1
Mercury (Hg)	USEPA 3051	APHA 3112B	0.1
Molybdenum (Mo)	USEPA 3051	USEPA 6020	0.1
Nickel (Ni)	USEPA 3051	USEPA 6020	0.05
Tin (Sn)	USEPA 3051	USEPA 6020	5
Zinc (Zn)	USEPA 3051	USEPA 6020	5
TPH			
Volatiles (C6 – C10)	USEPA 5030A	USEPA 8260A	2
Extractable (C11 – C14)	Mechanical Agitation	USEPA 8015A	50
Extractable (C15 – C28)	Mechanical Agitation	USEPA 8015A	50
Extractable (C29 – C36)	Mechanical Agitation	USEPA 8015A	50
BTEX			
Benzene	USEPA 5030A	USEPA 8260A	0.2
Toluene	USEPA 5030A	USEPA 8260A	0.2
Chlorobenzene	USEPA 5030A	USEPA 8260A	0.2
Ethylbenzene	USEPA 5030A	USEPA 8260A	0.2
Meta-& Para Xylene	USEPA 5030A	USEPA 8260A	0.4
PAHs	Mechanical Agitation	USEPA 8270B	1
Total CN	APHA 4500-CN·A,B	APHA 4500-CN·C,E	1
Sulphate	In-house method	APHA 4500-SO_4^{2-}E	1
Dioxins	USEPA 8290	USEPA 8290	<1ppb
TCLP	USEPA 1311	-	-

Note:
Other equivalent methods agreed with EPD can be adopted.

Table 5-2 : Analytical methods and detection limits for water samples

Parameters	Preparation (Extraction) Method	Determination Method	Detection Limit (μg/L)
Metals			
Arsenic (As)	USEPA 3005A	USEPA 6020	10
Barium (Ba)	USEPA 3005A	USEPA 6020	1
Cadmium (Cd)	USEPA 3005A	USEPA 6020	0.2
Chromium (Cr)	USEPA 3005A	USEPA 6020	1
Cobalt (Co)	USEPA 3005A	USEPA 6020	1
Copper (Cu)	USEPA 3005A	USEPA 6020	1
Lead (Pb)	USEPA 3005A	USEPA 6020	1
Mercury (Hg)	USEPA 3005A	APHA 3112B	0.5
Molybdenum (Mo)	USEPA 3005A	USEPA 6020	1
Nickel (Ni)	USEPA 3005A	USEPA 6020	1
Tin (Sn)	USEPA 3005A	USEPA 6020	1
Zinc (Zn)	USEPA 3005A	USEPA 6020	10
TPH			
Volatiles (C6 – C10)	USEPA 5030A	USEPA 8260A	20
Extractable (C11 – C14)	USEPA 3510B	USEPA 8015A	25
Extractable (C15 – C28)	USEPA 3510B	USEPA 8015A	25
Extractable (C29 – C36)	USEPA 3510B	USEPA 8015A	25
BTEX			
Benzene	USEPA 5030A	USEPA 8260A	2
Toluene	USEPA 5030A	USEPA 8260A	2
Chlorobenzene	USEPA 5030A	USEPA 8260A	2
Ethylbenzene	USEPA 5030A	USEPA 8260A	2
Meta-& Para Xylene	USEPA 5030A	USEPA 8260A	4
Ortho Xylene	USEPA 5030A	USEPA 8260A	2
PAHs	USEPA 3510B	USEPA 8270B	4
Total CN	APHA 4500-CN-A,B	APHA 4500-CN-C,E	1
Sulphates	--	APHA 4500-SO_4^{2-}-E	1
Dioxins	USEPA 8290	USEPA 8290	<1ppb

Note:
Other equivalent methods agreed with EPD can be adopted.

5.3 Quality Control

Analysis of samples shall be conducted according to standard procedures set by the USEPA, and shall also conform to standards set in ISO/IEC Guide 25 – "General requirements for the competence of calibration and testing laboratories".

During site investigation, the samples collected shall be representative of the actual field conditions. Only pre-cleaned sampling equipment shall be used to collect samples, and care shall be taken to prevent any cross-contamination of soil or groundwater samples. Sterilised and preserved (if necessary) containers shall be provided by the laboratory.

5.4 Sample Handling, Packaging and Transport

The soil and groundwater sampling shall be conducted by an experienced sampling technician (provided by the G.I. Contractor), and the appropriate procedures shall be adhered to. Sampling methodologies are based on the techniques developed by the USEPA. Collection tools shall be cleaned thoroughly before, in-between and after sampling. Special care shall be taken to prevent any cross contamination of the samples during collection, handling, and storage.

Sample containers shall be laboratory cleansed, airtight, and made of glass or other suitable materials with Teflon-lined lids to ensure that the container does not react with the sample or absorb contaminants. Care shall be taken when recording and labelling the sample information on the containers. Information such as the date/time, sample point codes, depths, and any other relevant data shall be included. Samples shall be stored in an icebox (at about 2°C – 4°C) immediately after collection and labelled, until they can be transported to the laboratory for analysis.

6. CONTAMINATION ASSESSMENT

6.1 Data Interpretation

Once the sampling and laboratory analysis have been completed, the data will be compiled and analysed to determine the extent of contamination on site. The Dutch ABC Guidelines for soils will be adopted, since more recent Intervention Guidelines require a conversion to standard soils. The Dutch ABC Guidelines and Target & Intervention Guidelines are presented in Annexes 2 and 3 respectively.

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 initial assessment will be therefore based on use of the relevant Dutch "C" Value as a screening tool, followed by a risk assessment approach where elevated concentrations of contaminants are present.

Reference will also be made to a number of international standards such as those from the UK, US, Canada, and Australia, and local EPD guidelines where applicable. Based on on-site observations and the analytical results, professional judgement will be provided regarding the potential and extent of soil and groundwater contamination.

6.2 Risk Assessment

For evaluation of the groundwater contamination results, a simple risk assessment will still be required although Hong Kong does not use groundwater as a drinking water resource. In accordance with EPD's *Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops*, such a risk assessment programme will identify the possible sources of contamination, potentially sensitive receivers, the potential migration pathways and exposure routes, and contaminant concentration at possible points of exposure to sensitive receivers. The exposure point concentration will then be compared with the allowable levels of contamination for the identified receptors to determine what, if any, remediation or mitigation measures are necessary.

7. REPORTING

7.1 Contamination Assessment Report

After completion of the site investigation, a CAR will be prepared, which summarises the entire contamination assessment programme, investigation procedures and methodologies, presents the visual observations made during the investigation, and the analytical results of soil and groundwater samples. The data interpretation and risk assessment results mentioned in Section 6 will also be included in the CAR. The CAR will be submitted to the EPD for endorsement.

7.2 Remediation Action Plan

As necessary and required, the appropriate remediation methods will be selected in light of any contamination being detected and the proposed end uses will follow EPD's *Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops*. As there are presently no standards for the cleaning up of soils and groundwater in Hong Kong, any proposed recommendations will examine the relevant issues of soils and groundwater treatment versus disposal.

If contamination is confirmed, a RAP will be prepared. The RAP will include the objectives of remediation action, evaluation of different remediation alternatives, design and operation of remediation, and the implementation programme for the proposed remediation method. The RAP will be submitted together with the CAR as a combined document for EPD endorsement. Site clean up will commence once the CAR/RAP are vetted and approved by EPD.

8. REFERENCES

[1] Environmental Impact Assessment Study Brief No. ESB-097/2002 dated March 2002, issued by EPD

[2] KCRC Final Environmental Impact Assessment Report (Updated) – Kowloon Southern Link KSL-100 Preliminary Project Feasibility Study and Project Proposal dated July 2001

[3] KCRC Final PPFS Report – Volume 2A – Text (Updated) Kowloon Southern Link KSL-100 Preliminary Project Feasibility Study and Project Proposal dated July 2001

[4] Technical Memorandum on Environmental Impact Assessment Process (EIA Ordinance) (TM-EIA), (1997), published by EPD

[5] Contaminated Land Assessment and Remediation, ProPECC PN 3/94, (1994), published by EPD

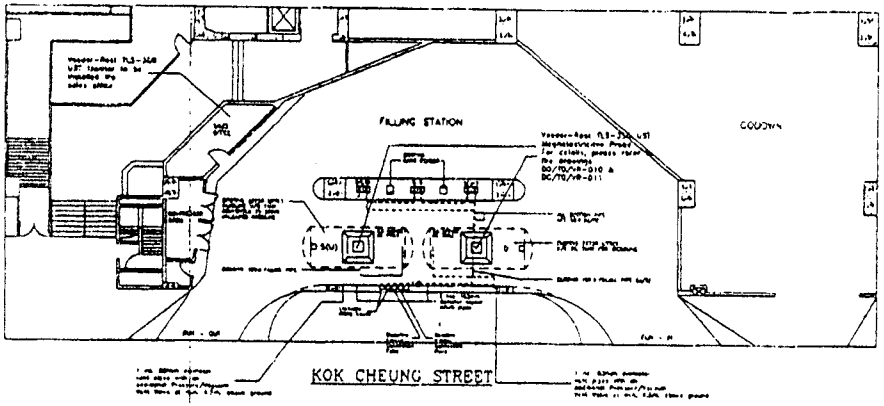
[6] Guidance Notes for the Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops, (1999), published by EPD

[7] Hong Kong Directory, Universal Publications, Ltd dated 1996, 1998, 2000 and 2002.

[8] Survey map 1980 Grid, Sheet Number 11-NW-D Series HP5C, 1:5000, Survey and Mapping Office, Buildings and Lands Department

ANNEX 1

INFORMATION ON UNDERGROUND OIL TANKS

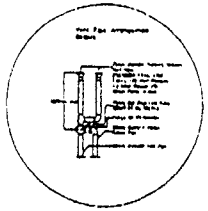


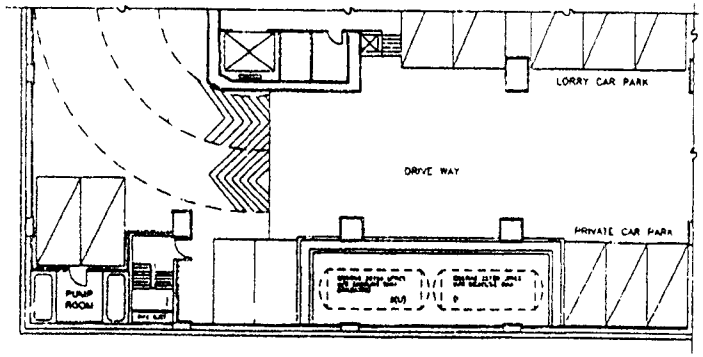
Note

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

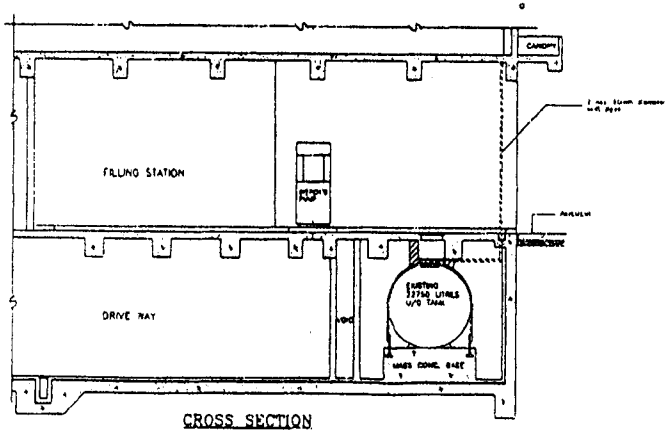
LEGEND :

D GASOLINE
R REDUCER
B GATE VALVE
F ANGLE CHECK VALVE
1 (U) - GASOLINE (UNLEADED)





BASEMENT FLOOR PLAN



CROSS SECTION

SHELL HONG KONG LTD.

Shell Kok Cheung Street Filling Station

SUBJECT Station Layout

Title : General Arrangement

NO	REASON	DATE
REVISIONS		

SCALES 1 : 100 in A0

DRAWING NUMBER

NUMBERS CROSSED OUT ARE SUPERSEDED DRAWINGS.

REDUCED COPY

Underground Oil Storage Tank at Tsim Sha Tsui Fire Station

ANNEX 2

DUTCH ABC GUIDELINES

Soil and ground water criteria used in The Netherlands for contaminated land ("Dutch List")

Component		Soil (mg/kg dry soil) A	B	C	Ground water (ug/L) A	B	C
1. Metals							
Cr		100	250	800	20	50	200
Co		20	50	300	20	50	200
Ni		50	100	500	20	50	200
Cu		50	100	500	20	50	200
Zn		200	500	3000	50	200	800
As		20	30	50	10	30	100
Mo		10	40	200	5	20	100
Cd		1	5	20	1	2.5	10
Sn		20	50	300	10	30	150
Ba		200	400	2000	50	100	500
Hg		0.5	2	10	0.2	0.5	2
Pb		50	150	600	20	50	200
2. Inorganics							
NH_4 (as N)		–	–	–	200	1000	5000
F (total)		200	400	2000	300	1200	4000
CN	(tot.free)	1	10	100	5	30	100
	(tot.comb.)	5	50	500	10	50	200
S (total)		2	20	200	10	100	300
Br (total)		20	50	300	100	500	2000
PO_4 (as P)		–	–	–	50	200	700
3. Aromatics Compounds							
Benzene		0.01	0.5	5	0.2	1	5
Ethylbenzene		0.05	5	50	0.5	20	60
Toluene		0.05	3	30	0.5	15	50
Xylenes		0.05	5	50	0.5	20	60
Phenols		0.02	1	10	0.5	15	50
Total		0.1	7	70	1	30	100
4. Polycyclic Hydrocarbons							
Naphthalene		0.1	5	50	0.2	7	30
Anthracene		0.1	10	100	0.1	2	10
Fenanthrene		0.1	10	100	0.1	2	10
Flouranthene		0.1	10	100	0.02	1	5
Pyrene		0.1	10	100	0.02	1	5
1,2–benzopyrene		0.05	1	10	0.01	0.2	1
Total		1	20	200	0.2	10	40
5. Chlorinated Hydrocarbons							
Aliphatics							
	(Individual)	0.1	5	50	1	10	50
	(Total)	0.1	7	70	1	15	70
Chlorobenzenes							
	(Individual)	0.05	1	10	0.02	0.5	2
	(Total)	0.05	2	20	0.02	1	5
Chlorophenols							
	(Individual)	0.01	0.5	5	0.01	0.3	1.5
	(Total)	0.01	1	10	0.01	0.5	2
Chlor. PAHs (Tot.)		0.05	1	10	0.01	0.2	1
PCB's (Tot.)		0.05	1	10	0.01	0.2	1
EOCL (Tot.)		0.1	8	80	1	15	70
6. Pesticides							
Chlorinated organics							
	(Individual)	0.1	0.5	5	0.5	0.2	1
	(Total)	0.1	1	10	0.1	0.5	2
Pesticides							
	(Total)	0.1	2	20	0.1	1	5
7. Other Pollutants							
Tetrahydrofuran		0.1	4	40	0.5	20	60
Pyridine		0.1	2	20	0.5	10	30
Tetrahydrothiofene		0.1	5	50	0.5	20	60
Cyclohexanes		0.1	6	60	0.5	15	50
Styrene		0.1	5	50	0.5	20	60
Gasoline		20	100	800	10	40	150
Mineral oil		100	1000	5000	20	200	600

These values are not "standards" but rather guidelines for use in assessing the significance of contaminated land. A simplified explanation of the ABC levels : A–level implies unpolluted, B–level implies pollution present and further investigation required, C–level implies significant pollution present and cleanup (preferably back to the A–level) required.

ANNEX 3

TARGET & INTERVENTION GUIDELINES

Target and Intervention Guideline

Parameter	Soil		Groundwater	
	optimum	action	optimum	action
	[mg/kg dry weight]	[mg/kg dry weight]	[µg/l]	[µg/l]
METALS				
Arsenic	29	55	10	60
Barium	200	625	50	625
Lead	85	530	15	75
Cadmium	0.8	12	0.4	6
Chromium	100	380	1	30
Cobalt	20	240	20	100
Copper	36	190	15	75
Molybdenum	10	200	5	300
Nickel	35	210	15	75
Mercury	0.3	10	0.05	0.3
Zinc	140	720	65	800
CYANIDES				
Free	1	20	5	1500
Complexed (pH<5)	5	650	10	1500
Complexed (pH>5)	5	50	10	1500
Thiocyanate			20	1500
AROMATICS				
Benzene	0.05	2	0.2	30
Ethylbenzene	0.05	50	0.2	150
Phenol	0.05	40	0.2	2000
Toluene	0.05	130	0.2	1000
Xylene	0.05	25	0.2	70
Cresol		5		200
Catechin		20		1250
Resorein		10		600
Hydroquinone		10		800
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)				
Anthracene			0.02	5
Benzo(a)pyran			0.001	0.5
Fluoroanthrene			0.005	1
Naphtalene			0.1	70
Phenanthrene			0.03	5
Chrysene			0.002	0.05
Benzo(a)fluoranthrene			0.003	0.5
Benzo(k)fluoranthrene			0.001	0.05
Benzo(g,h,i)perylene			0.0002	0.05
Indenol(1,2,3-c,d)pyrene			0.0004	0.05
Total PAH	1	40		
CHLORINATED HYDROCARBONS				
1,2 Dichloroethane		4	0.01	400
Dichloromethane		20	0.01	1000
Tetrachloromethane	0.001	1	0.01	10

CHLORINATED HYDROCARBONS (Continuous)				
Tetrachloroethane	0.01	4	0.01	40
Trichloromethane	0.001	10	0.01	400
Trichloroethene	0.001	60	0.01	500
Vinylchloride		0.1		0.7
Monochlorobenzene			0.01	180
Dichlorobenzol (total)	0.01		0.01	50
Trichlorobenzol (total)	0.01		0.01	10
Tetrachlorobenzol (total)	0.01		0.01	2.5
Pentachlorobenzene	0.0035		0.01	1
Hexachlorobenzene	0.0025		0.01	0.5
Chlorobenzole		30		
Monochlorophenol	0.0025		0.25	100
Dichlorophenol	0.003		0.08	30
Trichlorophenol	0.001		0.025	10
Tetrachlorophenol	0.001		0.01	10
Pentachlorophenol	0.002	5	0.02	3
Chlorophenol (total)		10		
Chloronapthylene		10		6
PolyChloroBiphenyl	0.02	1	0.01	0.01
PESTICIDES				
DDT/DDE/DDD (total)	0.0025	4		0.01
Aldrin	0.0025			
Dieldrin	0.0005		0.02ng/l	
Endrin	0.001			
Aldrin+Dieldrin+Endrin		4		0.1
alpha HCH	0.0025			
beta HCH	0.001			
gamma HCH	0.05 µg/l		0.2 ng/l	
HCH combined		2		1
Carbaryl		5	0.01	0.1
Carbofuran		2	0.01	0.1
Maneb		35		0.1
Atrazin	0.05 µg/l	6	0.0075	150
MISCELLANEOUS				
Tetrahydrofuran	0.1	0.4	0.5	1
Pyridine	0.1	1	0.5	3
Tetrahydrothiophan	0.1	90	0.5	30
Cyclohexanone	0.1	270	0.5	15000
Styrene	0.1	100	0.5	300
Mineral Oil	50	5000	50	600
Phthalate (total)	0.1	60	0.5	5

ANNEX 4

RESPONSE TO COMMENTS

FAX COVER SHEET

Original copy NOT sent/~~to be sent~~ separately
Total no. of pages including this page: 1

Environmental Protection Department
環境保護署

FROM: Director of Environmental Protection

TO: Kowloon-Canton Railway Corporation
(Attn.: Mr. Vic McNally)

OUR REF.: (89) in Annex (26) to EP1/G/72 pt. L

TEL NO.: 2835 1871

YOUR REF.: ( ) in NRD/KSL/GEN/000421

DATE: 14 January 2003

YOUR FAX NO.: 2601 5287

OUR FAX NO.: 2591 0558

Kowloon Southern Link (KSL)
EIA Study Brief ESB-097/2002
Contamination Assessment Plan (CAP)

We refer to the responses to comments and the revised text of the CAP enclosed in your letter dated 24.12.2002.

2. We have no comment on the responses to comments.

3. Regarding the revised text, your attention is drawn on the first paragraph under section 4.2 "Depth of Sampling Points". With reference to the other approved Environmental Impact Assessment reports, *"the on-site Land Contamination Specialist shall have at least 7 years (instead of 3 years) experience on land contamination or land remediation project."* Please amend this sentence accordingly.

(Anthony Y.K. Ho)
Environmental Protection Officer
for Director of Environmental Protection

c.c. Ove Arup & Partners (Attn: Mr. Sam Tsoi) Fax: 2268 3950

Internal:
S(WS)2

Kowloon Southern Link (KSL)
EIA Study Brief ESB-097/2002
Contamination Assessment Plan (CAP)

Department	Comments	OAP Letter Ref:	Responses
EPD Ref: (68)inAn(26)toEP1/G/72VII Dated 28 November 2002	(a) Requirements in Paragraph 3.4.6.1 of the EIA study Brief: In accordance with the EIA Study Brief requirements, please state in the CAP whether there were any (i) accident records, (ii) fire records, (iii) change of land use and (iv) signs of incineration facilities, burn pits or facilities that utilizes high temperature burning which could result land contamination along the proposed KSL alignment. When this information is available, please review whether any additional sampling locations will be required (apart from the 5 sampling locations recommended in section 4.1 of the CAP).		Review of the available information indicate that the mentioned activities is unlikely be happened along the proposed alignment. The potential of land contamination caused by those activities is therefore minimal. As such, it is recommended to retain the 5 sampling locations currently proposed. The text in the CAP will be updated accordingly.
	(b) Section 1.2 "Alignment Description": In accordance with the EIA Study Brief, the Canton Road alignment has not been agreed for the moment, and there should be considerations in the future EIA Report on alternative rail alignments, station designs and also subway alignments for the KSL. The alignment options and/or the relevant EIA Study Brief requirements should therefore be stated in this section for clarify.		Noted. A new section will be included to state that a separate WP will be prepared for route selection to satisfy the respective requirements in the Study Brief.
	(c) Section 4.2 "Depth of Sampling Points" In accordance with the recommendations in this section, there will be an experienced on-site Land Contamination Specialist to determine the exact depths of samples. Hence, it is prudent to list out the qualifications of the Specialist in the CAP.		The specialist will has at least 3 years experience in land contamination.
	(d) Table 5-1 "Analytical Methods and Detection Limits for Soil Samples" The detection limit for dioxins should be <1ppb for comparison with the 1ppb cleanup criterion.		Noted.

Department	Comments	OAP Letter Ref:	Responses
	(e) Section 7.2 "Remediation Action Plan" It should be noted that the Dutch B values are currently being used as the soil cleanup target for most of the cases in Hong Kong. According to the Dutch ABC guidelines, only level A is unpolluted and this level should preferably be achieved in any cleanup. Level B already implies pollution present. However, taking into consideration that the Dutch indices may be stringent for the Hong Kong situation, we would generally accept Level B as the cleanup target which means that any contamination higher than this level should be remediated to at or below the Dutch B criteria.		Noted.

Design Review Records

NRD

KCR 九廣鐵路

Contract No. : GSA - 5100

Submission No.: -

Title of Submission: Working Paper on Land Contamination Assessment

Instruction for completing the form :
1. Name of Reviewer - Full name of reviewer
2. Document / Drawing reference - Reference clause/section or Drawing No. of document under reviewed
3. NEW RAILWAY PROJECTS comment - Comment made by NEW RAILWAY PROJECTS reviewers
4. Consultant Response - For each comment item, clearly and precisely states where and how NRD comment is addressed
5. Action Due Date - A calendar date or programme milestone
6. Status - Put "C" when item closed and further action from Consultant not required

ITEM NO.	NAME OF REVIEWER	DOCUMENT / DRAWING REFERENCE	NEW RAILWAY PROJECTS COMMENT	CONSULTANT RESPONSE		STATUS (C-closed; blank-open) (COMPLETED BY NRD)
				RESPONSE	ACTION DUE DATE	
1.	EPD – Mr Anthony Ho (27) in An.(26) to EP1/G/72 VI dated 6/9/02	Section 5.5.3, page 5	It should be noted that contaminated sediment should not be regarded as a land contamination issue and any need for disposal of these materials should be considered (in accordance with the WBTC No. 3/2000) separately from the land contamination assessment and land decontamination work.	Noted. The GI has made provision for WBTC No. 3/2000		
2.		Section 6.1, page 6	Figures in larger scale showing the relative locations of the TST Fire Station, the previous shipyard site at West Kowloon Reclamation, the petrol filling station at Skyway House, the factory building at Sham Mong Road and the KSL alignment should be provided. Moreover, layout plans or sketches showing the locations of the petrol and diesel filling facilities (including any underground storage tanks) and maintenance areas in the TST Fire Station and the underground fuel storage tanks at the petrol filling station at Skyway House should be provided in the CAP (to be submitted prior to the commencement of the site investigation work) in order for us to consider whether the proposed sampling locations are appropriate and adequate.	Large scale drawings will be provided. Requests have been sent to the FS station and the operator of the petrol filling station to obtain the latest available information.		
3.		Section 6.2, page 6	The depth of samples to be taken at the proposed locations should cover those soil layers where soil will be encountered by the workers, excavated and removed during the construction work.	Note.		

Design Review Records

NRD

KCR 九廣鐵路

Contract No. : GSA - 5100

Submission No.: -

Title of Submission: Working Paper on Land Contamination Assessment

Instruction for completing the form :

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ITEM NO.	NAME OF REVIEWER	DOCUMENT / DRAWING REFERENCE	NEW RAILWAY PROJECTS COMMENT	CONSULTANT RESPONSE		STATUS (C-closed; blank-open) (COMPLETED BY NRD)
				RESPONSE	ACTION DUE DATE	
4.		Section 6.3.2, page 7	Equipment in contact with the ground should be thoroughly decontaminated between each sampling event to minimize the potential for cross contamination. The equipment should be decontaminated by steam cleaning, then washed with phosphate-free detergent and finally rinsed with deionised water. Moreover, potable water should be used during drilling only if necessary. It should be noted that addition of water should be minimized to avoid cross-contamination of the soil.	This will be incorporated during the sampling.		

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5.		Section 6.3.4, page 8	It should be noted that groundwater samples should be collected only after all the required soil samples have been collected at each of the proposed sampling locations. A groundwater monitoring well should then be installed at each of the drill holes, and upon completion of installation of monitoring wells, well developments (approximately five well volumes) should be carried out to remove silt and drilling fluid residue 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 before groundwater samples are taken. Moreover, prior to groundwater sampling, the sampling wells should be purged (at least three well volumes) to remove fine-grained materials and to collect freshly refilled groundwater samples. After purging, one groundwater sample should then be collected at each sampling well with a Teflon bailer. The free products should also be sampled to allow identification by the laboratory. The groundwater sampling procedures should be stated clearly in the CAP to be submitted.	Noted.		
6.		Section 7.1, page 8	The full list of metal parameters as indicated in the Dutch ABC list should be covered.	Noted.		

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7.		Appendix 3, A1	It is noted that the Dutch ABC Guidelines will be used for the evaluation of the soil results. However, both the Dutch ABC Guidelines and the Dutch Intervention values are not appropriate to be used for assessing groundwater contamination since groundwater is not used as potable supply in Hong Kong.	Noted.		