

ANNEX C

CONTAMINATED ASSESSMENT PLAN

Tai Wai to Ma On Shan EIA

Annex C

CONTAMINATED ASSESSMENT PLAN (CAP)

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1. INTRODUCTION

1.1 Background

The Tai Wai to Ma On Shan Environmental Impact Assessment Study (MOS EIA) identified the potential for contaminated land impacts to arise within a 500 m zone either side of the proposed railway and associated facilities. The specific land uses that may give rise to land contamination are a number of petrol stations, which are included in the historical land uses identified by the EPD as having "the potential to cause or have caused land contamination". The EIA concluded that there was a negligible potential that negative impacts may occur, or have occurred, within the study zone as a result of the historical migration of leaks or spillages of contaminants from the petrol station sites.

Although land contamination impacts to the proposed alignment were not considered to be likely, it was nonetheless recommended that the significance of any potential land contamination impacts to the MOS Extension be evaluated further during the detailed design phase of the Project's development. In particular, as a precautionary principle, it was recommended that preliminary contaminated land investigations be undertaken as an "opportunistic" part of the geotechnical or ground investigations that will be carried out during the future detailed engineering studies.

The MOS alignment will not pass through any petrol filling stations, therefore any future sampling will be conducted as close as practical to the petrol station sites.

1.2 Legislation and Non-statutory Guidelines

Section 3.1 of Annex 19 of the Technical Memorandum on the Environmental Impact Assessment Process (TMEIA) requires that consideration is given historical land uses that have the potential to cause or have caused land contamination. Such historical landuses include oil installations and petrol stations, and vehicle repair workshops. Where such landuses are identified during an EIA, *Section 3.1.1 of Annex 19 of the TMEIA* requires that a CAP is produced. As the MOS EIA identified a number of petrol filling stations within its study area, this CAP has been prepared to outline the appropriate actions for investigating possible contamination. Depending upon the results of the contamination assessment, a Remediation Action Plan (RAP) may be developed as required by the TMEIA.

Assessments of land contamination sources and the potential impacts to particular development projects are investigated under the EPD's direction and oversight in accordance with their Practice Note for Professional Persons (*ProPECC PN 3/94*), *Contaminated Land Assessment and Remediation*, the 1997 Technical Memorandum on Environmental Impact Assessment Process (EIA Ordinance) (EIAO TM) and the May 1999 *Guidance Notes for the Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops*.

In *ProPECC PN 3/94*, the Dutch Ministry of Public Housing, Land-Use and Environment Guidelines (1994) are used as criteria by the EPD for evaluating what is classified as a contaminated material.

1.3 Objective

The main objective of this CAP and future investigation is to further determine the likelihood that contamination may have occurred, and to define soil and/or groundwater contamination levels which may exist, and to assess the requirements for disposal of contaminated soil and groundwater (where encountered). If possible, the investigation should detail the quantity of material which is contaminated and thus requiring special handling and disposal. Any potential impacts to the construction programme or to construction workers will also be considered, where appropriate.

Depending upon the severity of any contamination identified from field investigations and upon the recommendations of the subsequent Contamination Assessment Report (CAR), a Remediation Action Plan (RAP) shall, if appropriate, be developed and implemented to mitigate or remove any contaminated material and its source.

1.4 Implications of Contaminated Land

As part of the contaminated land impact assessment for the MOS EIA, preliminary desk top studies and site visits identified a number of properties in or adjacent to the proposed route alignment that were considered to be potentially contaminating land uses, as defined by the EPD. The primary land uses of concern were noted to comprise petrol filling stations and industrial areas (*see Figures 10.5a and 10.5b of the EIA report*).

As detailed in the EIA, there have been no reported accidents, incidents or spillages at the identified premises, and any potential contamination would most likely be localised. (A copy of the relevant correspondence with the FSD (ref: *ERM correspondence with FSD Regional Office, Sha Tin (60) in FP/NT 311/03*) is appended to this CAP as *Attachment 1*.)

However, the potential contamination implications for the development of the MOS Extension relate to the following:

- Disposal of contaminated soils which could potentially arise during any excavation works. At present, information available on the volumes of soil indicates that in the order of 500,000 m³ of spoil will require disposal during construction of the viaduct structures. As no site specific sampling or analysis has been performed, the exact quantity of soils which may be contaminated is unknown, although current information suggests that it would probably be a small or negligible amount, if any.
- Disposal of potentially contaminated groundwater where excavations take place below the water table.

- Potential health risks to site construction personnel during the construction works or during subsequent maintenance works involving excavation. This potential impact is likely to be minimised since mechanical excavators are likely to be used for the majority of any excavation works thereby minimising the worker's interface with potentially contaminated soils.

It should be noted that, as the source of the potential contamination from all of the commercial petrol station sites (although not the Hong Kong School of Motoring site and vehicle maintenance centre) is likely from outside the boundary of the MOS Extension worksite, it may not be feasible to gain immediate access onto the private properties in question to undertake any detailed site investigations as part of the CAP at this stage. This is supported by the fact that the identification of any potentially contaminating landuse within the Study Area does not constitute legal right to access a particular property, and any contamination identified within the worksite zone and judged to be potentially caused from a particular off-site source site may be extremely difficult to prove given the increase in distance of the worksite from the source. In addition, there is presently no polluter-pays principle legislation in Hong Kong, and with the exception of the specific clauses in Annex 19 of the EIA Ordinance TM. The presence of contaminated soil becomes a waste disposal issue, based upon the limitations that arise for the handling and disposal of contaminated material.

2. SCOPE AND METHODOLOGY OF THE ASSESSMENT

2.1 Scope

Further to the Study Brief, the scope of the proposed contamination investigation involves the following:

- Further investigations, where permitted by the petrol companies, into the operations of the petrol filling stations in order to determine the likelihood of any contamination incidents (i.e spillages) that may have occurred at the sites in question and caused a negative impact to the subject site.
- Where spillage incidents may have occurred or are documented, drilling of an adequate number of soil borings at the works site to delineate the extent and severity of any potential impact from the off-site source, and to provide appropriate coverage of the areas in question. The depth of each boring will be determined based on field conditions, but is estimated to be a maximum of approximately 3 to 5 m depth. The locations may be within the footprints and/or vicinity of the proposed viaducts, and as detailed above, may be investigated with preliminary "opportunistic" sampling as part of the GI phase. At present, the exact locations of the engineering boreholes is undetermined.
- Collection of a minimum of three soil samples at each of the drill holes, at depths of within 0.5 m of the surface, and approximately 3 m, or at a location determined by the on-site geologist.
- Where encountered, collection of at least one representative grab groundwater sample from the drilling or excavation areas.
- Soil samples will be analysed for Total Petroleum Hydrocarbons (TPH), benzene, toluene, ethyl benzene, and xylene (BTEX), and heavy metals listed in the Dutch Guidelines. A selected number of the soil samples will be analysed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and the Toxicity Characteristic Leaching Procedure (TCLP), as appropriate and based upon field conditions (i.e representative of worst case contamination seen). Samples for VOC/SVOC analysis will be selected on the basis of field monitoring using a hand held organic vapour meter.
- Chemical analysis of groundwater samples, if collected, for TPH, VOCs and SVOCs.

2.2 Methodology

2.2.1 Further Investigation into the Operations of the Petrol Filling Stations

Where permitted by the petrol companies, it is proposed to undertake further investigations into the operating procedures of the petrol filling stations in order to

determine the likelihood of any incidents that may have given rise to contamination. However, it is noted that the effectiveness of these investigations will be dependant upon the co-operation of the concerned petrol companies who may not, for legal reasons, be willing to release what they consider as sensitive information. The issues to be addressed during these investigations will be as follows:

- a review of specific retailers' documentation, where available and not proprietary, regarding fuel purchases, volume dispensation, and inventory reconciliation, to provide evidence of any discrepancies which might indicate a loss or release of product from the sites in question;
- the identification and location of the above ground and underground storage vessels, tanks and their associated piping, and as appropriate, details of containment or any leakage incidents at the sites, to identify any potential soil and groundwater contamination concerns (note: this will include assessing whether any integrity evaluations have been performed, such as tank tightness tests or product and fill line testing);
- a review of any chemical handling and storage procedures and operational management on the subject sites, as they relate to potential soil and groundwater contamination (note: where appropriate, this will be supplemented by interviews with operators or station personnel, retail management, or others involved with the fuelling or related maintenance activities and day to day operation of the station sites, to establish procedures and record of any known incidents); and
- identification of any liquid or solid hazardous raw materials product and waste generation, handling, storage and disposal practices from the operations of the petrol filling stations.

2.2.2 Intrusive Investigations

The land resumption schedule has not yet been completed, so access arrangements will be problematic. Intrusive investigations, such as drilling and soil sampling, may not be performed until the land take has been completed or specific access issues are resolved.

Prior to commencing any intrusive investigations, a site specific *Health and Safety Plan* (HSP) will be prepared, to assess the planned work activities, their potential hazards, the contaminants expected to be encountered, and required personal protective equipment (PPE) necessary for this investigation.

Following access arrangements and clearance to drill on or in the vicinity of the private properties, boreholes will be drilled using a mobile drill rig, hand auger or suitable sampling tool. Prior to drilling, the drill equipment will be decontaminated, as detailed below, and this procedure will be repeated after use at each borehole to avoid potential cross contamination between boreholes, and during sampling to ensure that any contamination from the surface of the site does not affect deeper substrata or the groundwater.

During the drilling process, the lithology will be recorded by the on-site geologist. The sites in question are presented in *Figures 10.5a* and *10.5b* of the *EIA Report*. The final borehole depth will be dependent upon the site conditions at the discretion of the on-site geologist. *Figures 10.5a* and *10.5b* of the *EIA Report* outlines the locations of the petrol sites, and *Table 2.2a* presents details of the rationale for the sample locations and possible pollutants which may be found there.

Whilst on site, visual inspections will be undertaken and recorded for evidence of any open burning, areas of dead or stressed vegetation, areas of stained soil, signs of recent soil disturbances, on site disposal of municipal or hazardous wastes, oil slicks or discolouration on surface waters, storage of materials, any abnormal odours, impoundments, and wells, casings or indications of presence of septic tanks.

Scope and Methodology

Table 2.2a Sampling and Investigation Locations

Site Location Number	Site Location	Potential Source	Possible Pollutants	Test Methods (US EPA Method) (for soil or groundwater samples)
1	HK School of Motoring	petrol station fuel tank and vehicle maintenance activity	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS/TCLP
2	Petrol station 1 on Kong Pui Street	petrol station fuel tanks, possible vehicle maintenance	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS TCLP
3	Petrol station 2 on Kong Pui Street	petrol station fuel tanks, possible vehicle maintenance	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS TCLP
4	Petrol station on Yuen On Street	petrol station fuel tanks, possible vehicle maintenance	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS TCLP
5	Petrol Station on Lok Shing Street	petrol station fuel tanks, possible vehicle maintenance	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS TCLP
6	Vehicle Maintenance Centre at Shek Mun Station, adjacent On Ming Street	vehicle maintenance activity	hydrocarbons (fuel, oil lubricants) and solvents (degreasers)	TPH by US EPA 8015M VOCs by US EPA 8260 SVOCs by US EPA 8270 Metals by AA/ICPMS TCLP

Refer to Figures 10.5a and 10.5b of the EIA Report and photographs for locations and detail.

2.2.3 Sampling Programme

The sampling programme will be undertaken following appropriate protocols so as to minimize the potential for cross-contamination between sampling locations. The soil sampling methodologies are based on methods developed by the US EPA. These methods include decontamination procedures, sample collection, preparation and preservation, and chain-of-custody documentation, as outlined below.

Decontamination Procedures

Sampling equipment used during the course of the investigation programme will be decontaminated using the following procedures.

- manual wash and scrub with non phosphate detergent;
- distilled water rinse; and
- air drying.

During sampling and decontamination activities, disposable latex gloves should be worn to prevent transfer of contaminants from other sources. Any disposable equipment such as latex gloves should be discarded after each use.

Provisions will be made, if required, for containing decontamination fluids and washwater, pending analysis prior to disposal. However, as this liquid volume is expected to be very small and not contaminated, disposal to sanitary sewer may also be considered.

Soil Sample Collection

Soil samples will be placed into appropriate clean glass bottles or sampling containers (provided by the laboratory) immediately after collection. They will then be transferred to an ice box or cooler container, also provided by the laboratory. Samples will be kept as cool as possible, by regularly replacing the icepacks. All samples should be collected under chain of custody protocols as described below.

Soil samples will be collected for head space analysis using an appropriate organic vapour meter, to assist in the selection of any samples for analysis for volatile or semivolatile organic compounds. The meter will be calibrated before use to a known calibration standard of isobutylene gas.

Groundwater Sample Collection

Groundwater samples will be collected to be representative of the conditions at proposed channel. Field measurements of temperature, pH, and specific conductance (SC) will be taken from the samples.

A bottom loading PVC or disposable Teflon[®] bailer will be used to collect the groundwater grab samples from the boring. The bailer will be decontaminated before use, and in between sampling. Immediately after collection, samples will be transferred to labelled sample containers containing the necessary preservatives (supplied by the laboratory). Samples will be packed in the coolers with icepacks prior to shipment under chain of custody to the laboratory.

2.2.4 Sample Management

The drilling and sampling will be performed by qualified site investigation contractors. All samples collected will be placed in a cooler with ice and kept at less than 4 degrees Celsius. Samples will be dispatched to the analytical laboratory for analysis as soon as possible following sampling. All samples will be handled under chain of custody protocols and relinquished to the laboratory representative at the drill site or at a location specified by laboratory.

2.3 Analytical Programme

2.3.1 Analysis

The selected soil samples submitted from each of the borings will be analysed for:

- total petroleum hydrocarbons (TPH) plus BTEX by USEPA Method 8015; and
- Dutch List metals by Atomic Absorption (AA) and ICPMS.

In addition, if field evidence indicates the presence of contamination (ie any discolouration, odour, or instrument response on the organic vapour meter), then a selected number of these samples will also be analysed for:

- volatile organic compounds (VOCs) by USEPA Method 8240; and
- semivolatile organic compounds (SVOCs) by USEPA Method 8270.

A number of the samples will be tested for the Toxicity Characteristic Leaching Procedure (TCLP) by USEPA 1311/6010/7000 Series Methods. This will be required in order to determine the viability of any future landfill disposal of contaminated material.

Where encountered, up to two total groundwater samples collected from the investigation programme borings will be analysed for TPH, SVOCs, and VOCs, to provide an indication of contamination.

2.3.2 Quality Control and Quality Assurance (QA/QC)

Samples collected should be representative of field conditions. At each sampling location, soil and groundwater samples should be collected using pre-cleaned sampling equipment. All sample containers should be provided by the contracted laboratory who guarantee their sterilisation and preservative contents.

The following samples should be collected during the field investigation:

- one groundwater duplicate for the full suite of analyses;
- one trip blank for analysis of VOCs (prepared prior to field investigation and transported with VOC samples); and
- one equipment (rinsate) blank for the full suite of analyses. Precision will be calculated as the relative percent difference (RPD) between the original sample and the blind duplicate. For water and soil, the acceptance criteria for precision are 20% RPD and 30% RPD, respectively. Accuracy will be assessed by analysis of trip blanks and rinsate blanks to ensure that no bias is present in the analytical data. If any compound is detected in the trip blank or rinsate blank, the data will be qualified.

2.3.3 Analytical Laboratory

Analysis of samples will be carried out by an appropriately qualified analytical laboratory located in Hong Kong. The laboratory shall maintain high standards of analytical and technical services for the detection of trace organic contaminants. All analysis will be conducted according to standard procedures set by the US EPA.

2.4 Programme Schedule

The scheduling of the programme will be dependant upon the timing of the geotechnical or ground investigations carried out during the detailed engineering studies. However, the overall programme will comprise the following activities:

- required revisions and endorsement of the CAP by EPD (this task includes meetings, and if required, additional site appraisals);
- where permitted, completing investigations and interviews into the operations of the petrol filling stations;
- mobilisation of the drilling subcontractor (pending land resumption issues or the private property access arrangements) and contracting analytical laboratory;
- field sampling programme (number of days in field depends on number of sample locations to be employed);
- analytical programme/laboratory turnaround (normal turnaround time is expected 10 days to two weeks); and
- assessment and reporting of the results in a draft contamination assessment plan (CAR), including development of any site specific remedial action plans (RAP) as required (estimated minimum of three weeks).

3. PROJECT ADMINISTRATION

3.1 Assessment and Reporting

A draft Contamination Assessment Report (CAR) will be developed which presents the findings of the further desk top investigations, and the contamination assessment programme, after obtaining analytical results from the laboratory. The report will present the methodology used during the soil boring and sampling work, details of field observations, and other findings of the investigation programme. It will include visual observations made during the investigation programme, provision of data regarding boreholes and analytical results from any soil and groundwater sample analyses. As there are currently no legislative standards requiring clean up of soil and groundwater contamination in Hong Kong, the analytical results will be compared against international standards for soil and groundwater contamination (Dutch Standards). Arising from the on-site observations and the quantitative sampling results received, professional judgement will be provided regarding soil and groundwater contamination. In relation to the proposed construction programme and special design of this study (viaduct structures), the necessity of appropriate mitigation measures will be determined in consultation with EPD. For the evaluation of any groundwater contamination results, some kind of simple risk assessment will be required, although in Hong Kong there is usually no use of groundwater as a drinking water resource. As per the EPD's *Guidance Notes for Investigation and Remediation of Contaminated Sites*, such a risk assessment programme will identify the possible sources of contamination, potential sensitive receivers, the potential migration pathways and exposure routes, and contaminant concentrations at possible points of exposure to sensitive receivers. Exposure point concentrations will then be compared with allowable levels of contamination for identified receptors to determine what, if any, remediation or mitigation measures are necessary.

As necessary and required, an appropriate remediation method will be selected in light of the contamination detected and the proposed end uses, and in accordance with the *1999 Guidance Notes*. Any proposed recommendation will examine the relevant issues of soil and groundwater treatment versus disposal, as well as outline requirements for construction workers to follow to limit potential future exposures in the event that future construction activities encounter contamination. The Remediation Action Plan (RAP) will then be prepared in consultation with the EPD. The results of the contamination investigation programme, the CAR, and the objectives of the RAP will all be reviewed with EPD prior to finalisation.

It should be noted that no estimate of the time frame for any mitigation is presented at this time. Appropriate mitigation, as necessary, will incorporate the proposed land use with the contamination type as well as concentrations.

ATTACHMENT 1

ERM correspondence with FSD Regional Office, Sha Tin (60) in FP/NT 311/03

C1890/C3/b

消防處
防火總區
新界區辦事處

香港新界沙田源禾路 26 號
沙田消防局閣樓



FIRE SERVICES DEPARTMENT
FIRE PROTECTION COMMAND
NEW TERRITORIES REGIONAL OFFICE

M/F, Shatin Fire Station,
26 Yuen Wo Road,
Shatin, New Territories,
Hong Kong.

本處檔號 Our Ref.: (60) in FP/NT 311/03

來函檔號 Your Ref.:

圖文傳真 Fax: 852-2604 4425

電話 Tel. No.: 2604 7223

13 April 1999

Environmental Resources Management
6/F Hecny Tower
9 Chatham Road,
Tsimshatsui
Kowloon, H.K.

Dear Sirs,

East Rail Extensions – Tai Wai to Ma On Shan
Environmental Impact Assessment

I refer to your letter dated 30.3.99 and the tele-conversation between your goodself and my Mr. K.F. LEUNG on 8.4.1999.

Please be informed that there is no record of incidents in relation to fuel spillage at the petrol filling stations situated within the captioned areas.

Should you have any enquiry, please contact Mr. K.F. LEUNG at 2604 7223.

Jun Coicoy

Yours faithfully,

(WONG Kin-cheong)
for Director of Fire Services

Date Received by ERM:
20 APR 1999
Login Ref: 1M-1118

File No: 7SK/Flr: 3	Ref: C1890	
Issued by: APC	Date: 20/4	
Approved by: Noted WKC/SKY/ac		
Copy to: APC	Date: 20/4	Action req: Info.
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