

### 10. LAND CONTAMINATION

#### 10.1 Introduction

This section presents the results of the investigations into the potential environmental issues associated with land contamination, and where appropriate, previews areas for further assessment in the subsequent construction phases of the MOS Extension.

#### 10.2 Environmental Legislation and Non-Statutory Guidelines

Assessments of land contamination are guided by the EPD's guidance document *Professional Persons Environmental Consultative Committee Practice Note 3/94 - Contaminated Land Assessment and Remediation* (ProPECC PN 3/94), the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO TM), and EPD's 1999 *Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations; Boatyards; and Car Repair/Dismantling Workshops*. In accordance with ProPECC PN 3/94 and the *Guidance Notes*, the assessment evaluation should:

- provide a clear and detailed account of the present use of the land in question and the relevant past land use history, in relation to possible land contamination;
- identify those areas of potential contamination and associated impacts, risks or hazards; and
- as required, submit a plan to evaluate the actual contamination conditions for soil and/or groundwater.

Under the ProPECC PN 3/94 note, and in the absence of any formal legislation requiring cleanup of soil and groundwater contamination in Hong Kong, the "*Dutch Ministry of Housing, Planning and Environmental Soil and Groundwater Standards*" (the Dutch List) (1994) are used as reference criteria by the EPD for the classification of contaminated materials.

Under the *EIAO TM, Annex 19: Guidelines for Assessment of Other Impacts*, and the 1999 *Guidance Notes*, consideration shall be given to a number of potentially contaminating historical land uses, including petrol filling stations, boatyards and car repair/dismantling workshops.

The following legislation, documents and guidelines may also cover or have some bearing upon land contamination and the handling, treatment and disposal of contaminated waste in Hong Kong:

- Water Pollution Control Ordinance (WPCO);
- Waste Disposal Ordinance (Cap 354);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); and

- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, Environmental Protection Department (1992).

In this section, a review of the proposed alignment is provided with indications as appropriate to, the level of assessment conducted, further investigations that may be required and a view as to the scope of those investigations.

### 10.3 Assessment Methodology

The objective of the current study is to identify and assess any concerns with respect to potential soil and groundwater contamination along the proposed MOS Extension.

The following methodology has been adopted in this study:

- preliminary review of the current and historical land uses to evaluate the likely level of potential for any soil and ground contamination;
- description of the likely nature of any potential contamination;
- a preliminary review of potential environmental impacts or health concerns arising as a result of the development or during future use of the land as a result of exposure to potentially contaminated materials; and
- overview of typical mitigation measures.

The MOS Extension will involve the construction and operation of approximately 11.4 km of railway track, with ancillary facilities including the Tai Wai Depot, nine stations, two public transport interchanges, two infeed substations and five rectifier stations. The extension will provide commuters with a direct link to the wider East Rail network, greatly improving accessibility to and from the central business areas of Hong Kong for NENT commuters.

Excavation works will be required for the construction of these structures and for the viaduct foundations. These areas relate to sites along the alignment at which there may be interphase with the underlying soil, and hence the potential impacts where land contamination is identified as a significant issue.

#### 10.3.1 Reference Sources

During this study reference to the following sources of information has been made:

- August 1996 Railway Development Study Report KE4 (Phase II (Part 1) Tai Wai to Ma On Shan) prepared by MVA Asia and Maunsell Consultants;
- *Hong Kong Ordinance Survey* maps (1:1000 and 1:1200 scale) from 1974 to 1997 along the proposed alignment;
- Selected aerial photos along the alignment route from 1980 to 1997;
- Outline Zoning Plans (OZP's) along the alignment;

- Hong Kong Geological Survey Memoir No. 1, covering geology of Sha Tin (along the alignment);
- Hong Kong Geological Survey Solid and Superficial Geology Series Map No. 7, Sha Tin; and
- correspondence with various Government Departments.

A list of the aerial photographs reviewed during the course of the study is presented in *Table 10.3a*.

**Table 10.3a Aerial Photographs Reviewed**

Year/Date	Photographs	Notes
1997 (Nov 1)	CN18807/CN18806	from 10,000 feet
1994 (Oct 12)	CN8524/CN8525	from 10,000 feet
1990 (Dec 3)	A24313/A24314	from 10,000 feet
1990 (Mar 21)	A21063/A21062	from 4,000 feet
1988 (Nov 3)	A15105/A15104	from 10,000 feet
1988 (Nov 3)	A15123/A15124	from 10,000 feet
1985 (Oct 11)	67238/67239	from 10,000 feet
1985 (Oct 11)	67277/67278	from 10,000 feet
1985 (Oct 3)	A02407/A02408	from 4,000 feet
1985 (Oct 3)	A02438/A02439	from 4,000 feet
1980 (no date)	33124/33125/33126	from 4,000 feet

Note: Photographs reviewed for generalised land changes, as well as development of specific properties.

## 10.4 Potential Sources of Impact

The potential impacts from contaminated soil and groundwater are presented below.

### 10.4.1 Health Risk to Site Workers

Site construction workers may become exposed to contaminated soils and groundwater during earth moving operations and the construction of building foundations or underground services. The main exposure routes for site construction workers is direct ingestion of contaminated materials through poor hygiene and eating or smoking on site or through direct contact with potentially toxic or harmful contaminants in sediments.

#### **10.4.2 Disposal of Contaminated Soil**

In the event that any contaminated soils are identified during SI works or further environmental investigations, they may require remediation or disposal prior to or as part of the construction programme, and prior agreement will need to be reached with EPD to ensure that these materials are dealt with appropriately. Any contaminated soils which are excavated will require treatment and/or off site disposal at an appropriate site which is licensed to accept 'contaminated' soils. The actual type(s) and concentration of contaminants will determine the actual disposal requirement, following agreement of the proper disposal option with the Waste Facilities Management Group of the EPD.

#### **10.4.3 Contaminated Groundwater Disposal**

Where excavations take place below the groundwater table, there will be a need to dewater the operations for safety and construction purposes. Where dewatering takes place through layers of contaminated material or where any contaminated soil is being excavated and/or dewatered, the groundwater may become contaminated, requiring appropriate handling and disposal. Depending on the level of contamination encountered, and subject to the agreement of the EPD, groundwater will need to be disposed of in an appropriate manner and to ensure compliance with the *Water Pollution Control Ordinance (WPCO)*.

#### **10.4.4 Potential Health Risks to Future Users of the Site**

During the operational phase of the works, there is considered to be the potential for impact associated with contaminated soils which may remain *in situ* following development of the station and alignment. Maintenance workers or workers who may be commissioned to perform extensions or alterations to the stations and alignment at a later stage may come into contact with such materials at which time, all of the above mentioned impacts may be applicable. However, if contaminated material is identified, measures will be taken either to ensure this material is mitigated, removed or to ensure direct contact with *in situ* materials is avoided.

### **10.5 Prediction of Impacts**

The presence of any potential contamination along the alignment of the MOS Extension is related to the historical and current uses to which land has been put both within and adjacent to the planned development. Reviews of the historical and current land uses have therefore been undertaken to ascertain the potential sources of any impacts. The findings of these investigations are presented in the subsequent paragraphs.

#### **10.5.1 Review of Historic and Current Land Uses**

A review of historical maps and selected historical aerial photos indicates that the majority of the proposed alignment, stations and depot is to be developed on land which has primarily been heavily developed for residential/commercial use (i.e from Hin King

Estate to the Tolo Highway Interchange in Sha Tin), or recently reclaimed land developed for residential uses (i.e. from Chevalier Garden to Lee On Estate along the southern Tide Cove shoreline). There is little available information to indicate that there has been any major industrial usage along the route alignment. The only landuses that have been identified as potentially contaminating sources are the petrol station sites, as listed in *Tables 10.5a-c*.

Table 10.5a Site History - Tai Wai Depot to Sha Kok Estate

Location	Year	General Primary Land Usage
Tai Wai Station/Depot (to Shing Mun River Channel)	1989/90/91	plant quarantine centre, kennels, pool complex, road, HK School of Motoring, sports ground, temporary structures, playground, bus terminus, bike paths
	1983/84	plant quarantine centre, kennels, construction in progress (CIP), road, temporary structures,
	1976/77	kennel, temporary structures, nursery, footpaths, agriculture, pond, temple
Sha Tin Tau Station (Shing Mun River to east point of Tsang Tai Uk Recreation Ground)	1989/90	road, bike track, Sha Tin Tau Temporary Housing Area (THA), shrine, tennis courts, recreation ground
	1983	road, CIP, Sha Tin Tau THA, shrine, open area
	1977	temporary structures, agriculture, shrine, pond
Sha Kok Street (east point of Tsang Tai Uk Recreation Ground to Sha Tin Wai Road)	1989	playground, basketball court, road, bike track, housing estate
	1982/83	CIP, open space, road, basketball court, footbridge, housing estate
	1976/77	agriculture, ponds, marsh, CIP, temporary structures

Note: In addition to aerial photographs, information obtained by reference to Hong Kong Ordinance Survey maps (1:1000 scale, reference 7SW24B, 7SW19D, 7SW20C, 20SW20A, 20SW20B, 7SE16A, 7SE11C, 7SE11D)

Table 10.5b Site History - Wong Uk Village to Sai Sha Road Roundabout

Location	Year	General Primary Land Usage
City One (from Sha Tin Wai Road to Siu Lek Yuen Road)	1989	road, gardens, hill, <b><u>Two Petrol Stations</u></b> , electric substation, bike track, open area, bus terminus, Child Assessment Centre & school dental clinic, <b><u>Sha Tin Industrial Centre factory (built after 1985), CIP</u></b> , Prince of Wales Hospital  (note: large area north of proposed alignment comprising Yuen Chau Kok and City One residential flats under construction after 1985)
	1983	road, CIP, hill, <b><u>Sha Tin Wai Temporary Industrial Area</u></b> , electric substation, bus terminus, THA, playground; Prince of Wales Hospital (note: most buildings south of proposed alignment up to Sha Tin Wai Road under construction after 1980, when road was built)
	1976/77	hill, ponds, Sha Tin Hoi (Tide Cove)
Shek Mun (from Siu Lek Yuen Road to Sha Tin Fisherman's New Village)	1987-90	open area, bike track, roads, nullah, CIP (including large roundabout on Tate's Cairn Highway), football pitch, footpath, sewage treatment works, fisherman's new village. (note: Shek Mun Industrial Area between Tate's Cairn Highway and River under construction after 1984; Residential units along south shore of Shing Mun River channel built after 1985)
	1981-83	CIP, road, open area, nullah, reclamation in progress (RIP), jetty, Tide Cove
	1974-79	Tide Cove, jetty
Chevalier Garden (from Sha Tin New Fisherman's Village to Sai Sha Road Roundabout)	1994	CIP, RIP along Tide Cove; CIP, small reclamation works along Tide Cove shoreline (Area 77, Area 90)
	1989/90	Former natural shoreline along Tide Cove and Shing Mun River built up, CIP, RIP
	1981/85	Tide Cove, CIP, RIP
	1974-79	Tide Cove, undeveloped areas along shore

Note: **Land uses underlined and highlighted in bold indicate potential contamination sources.**

In addition to aerial photographs, information obtained by reference to Hong Kong Ordinance Survey maps (1:1000 scale, reference 7SE11D, 7SE12A, 7SE7C, 7SE7A, 7SE7B, 7SE2D, 7SE3A, 7NE23C, 7NE23B)

Table 10.5c Site History - Sai Sha Road Roundabout to Lee On Estate

Location	Year	Primary Land Usage
Heng On Station (Sai Sha Road Roundabout to Hang Kwong Street)	1994	CIP, small reclamation works along Tide Cove shoreline (Area 77, Area 90); most residential units west of proposed alignment (Kam Fung Court, Fok On Garden) under construction from 1994
	1989	CIP, reclamations of Tide Cove Shoreline (Area 77 and Area 90) adjacent to mouth of Shing Mun River; residential units south of proposed alignment built from 1985 to 1988
	1985	CIP, (Heng On Estate, Yiu On Estate under construction); Major reclamation works in progress along Tide Cove shore
	1978/9	Tide Cove
Ma On Shan Station (Hang Kwong Street to Kam Ying Road)	1994	CIP, small reclamation works along Tide Cove shoreline (area 77, Area 90); most residential units west of proposed alignment (Kam Fung Court, Fok On Garden) under construction from 1994
	1989	CIP, reclamations west of proposed alignment completed, road, bike path; most residential units south of proposed alignment built from 1985 to 1988
	1985	CIP, shoreline areas along Tide Cove under reclamation, marsh areas, temporary structures, some agriculture
	1978-82	Tide Cove, agriculture, marsh, temporary structures, footpath
Lee On Station (Kam Ying Road to east of Lee On Estate)	1989	road, bike track, CIP (most of residential buildings around Lee On Estate built after 1988)
	1985	temporary structures, agriculture, footpath (primarily undeveloped)
	1976-82	temporary structures, agriculture, footpath, undeveloped land

Note: In addition to aerial photographs, information obtained by reference to Hong Kong Ordinance Survey maps (1:1000 scale, reference 7NE23B, 7NE18D, 7NE19C, 7NE19A, 7NE19B).

### 10.5.2 Current Land Use

A summary of the current landuses along the alignment is given in Table 10.5d, and the landuses with the potential to give rise to contamination sources are identified in Figures 10.5a and b. Of the potentially contaminating landuses that were identified, the Sha Tin Wai Temporary Industrial Area has now been removed and therefore does not present a contamination concern.

Whilst the Sha Tin Industrial Centre is still operational, the former and current 'industrial' uses of the site have been investigated and do not give rise to contamination concerns. This conclusion is amplified since the proposed alignment is on viaduct in the

vicinity of the industrial area, resulting in minimal interface with the soil. It is therefore judged that the industrial landuses do not present any contamination concerns. These premises have not therefore been considered further within this land contaminated study.

As the petrol filling stations and vehicle maintenance centre are still present in the vicinity of the alignment, they are considered to be the only current potentially contaminating land uses, according to the EPD guidance documents.

Table 10.5d Current Land Use Along the Ma On Shan Alignment

Location	General Current Land Use of Area
Tai Wai Station/Depot	Existing KCR tracks; <b>School of Motoring</b> ; Sports Ground and playground; Tai Wai KCR Station; Bus terminus; Public swimming pools
Sha Tin Tau Station	Adjacent to Shing Mun River Channel; Sha Tin Tau Temporary Housing Area; Major roadways
Sha Kok Station	Jat Min Cheun and Pok Hong Estates (residential and commercial); Sha Kok Street
City One Station	Wong Uk Village; <b>Two Petrol stations</b> ; Siu Tan CLP Electric Substation; Residential and Commercial Buildings; Bus Terminus; Pamela Youde Child Development Centre; Construction areas along Chap Wai Kon Street.
Shek Mun Station	Nullah; <b>petrol station</b> ; <b>vehicle maintenance centre</b> , Sha Tin Industrial Centre building; playground; temporary structures.
Route alignment along Tate's Cairn Highway	Tate's Cairn Highway; Sha Tin Hospital; Sha Tin New Fisherman's Village; Public Sewage Treatment Works; Nullah
Chevalier Garden Station	Area 77, Area 90 Reclamation Construction in progress; Sai Sha Roadways
Heng On Station	Sai Sha Roadways; Kaw On Court Residences
Ma On Shan Station	Car Park and commercial complex; Bayshore Towers; Sunshine City; Ma On Shan Centre (All residential); Ma On Shan Health Centre.
Lee On Station	Lee On Estate, Saddle Ridge Garden, Villa Athena, and Kam Lung Court (All residential); Small incinerator near Lok Wo Sha

Note: Land uses underlined and highlighted in bold indicate potential contamination sources.

Generalised, based on map and aerial photo review. See discussion below.

## 10.6 Evaluation of Impacts

The evaluation of the potential impacts associated with the presence of the identified petrol filling stations and vehicle maintenance centre, is presented below.

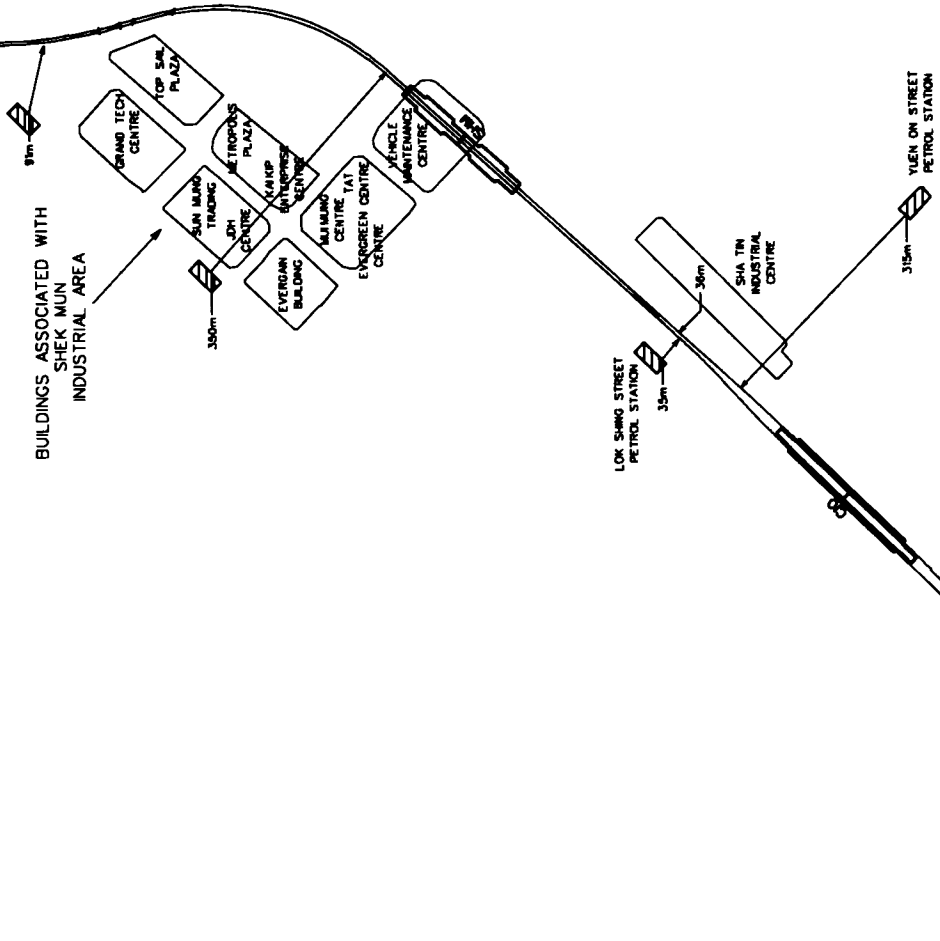
### 10.6.1 Sources of Impact

As there has been very little industrial usage of land along the alignment, overall contamination concerns are considered to be low. The only potential concerns relate to





BUILDINGS ASSOCIATED WITH SHEK MUN INDUSTRIAL AREA

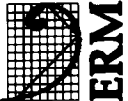


TWO PETROL STATIONS ON HONG PAK STREET  
10m

SCALE 1:10000

LOCATION OF POTENTIAL LAND CONTAMINATION SOURCES

Environmental Resources Management




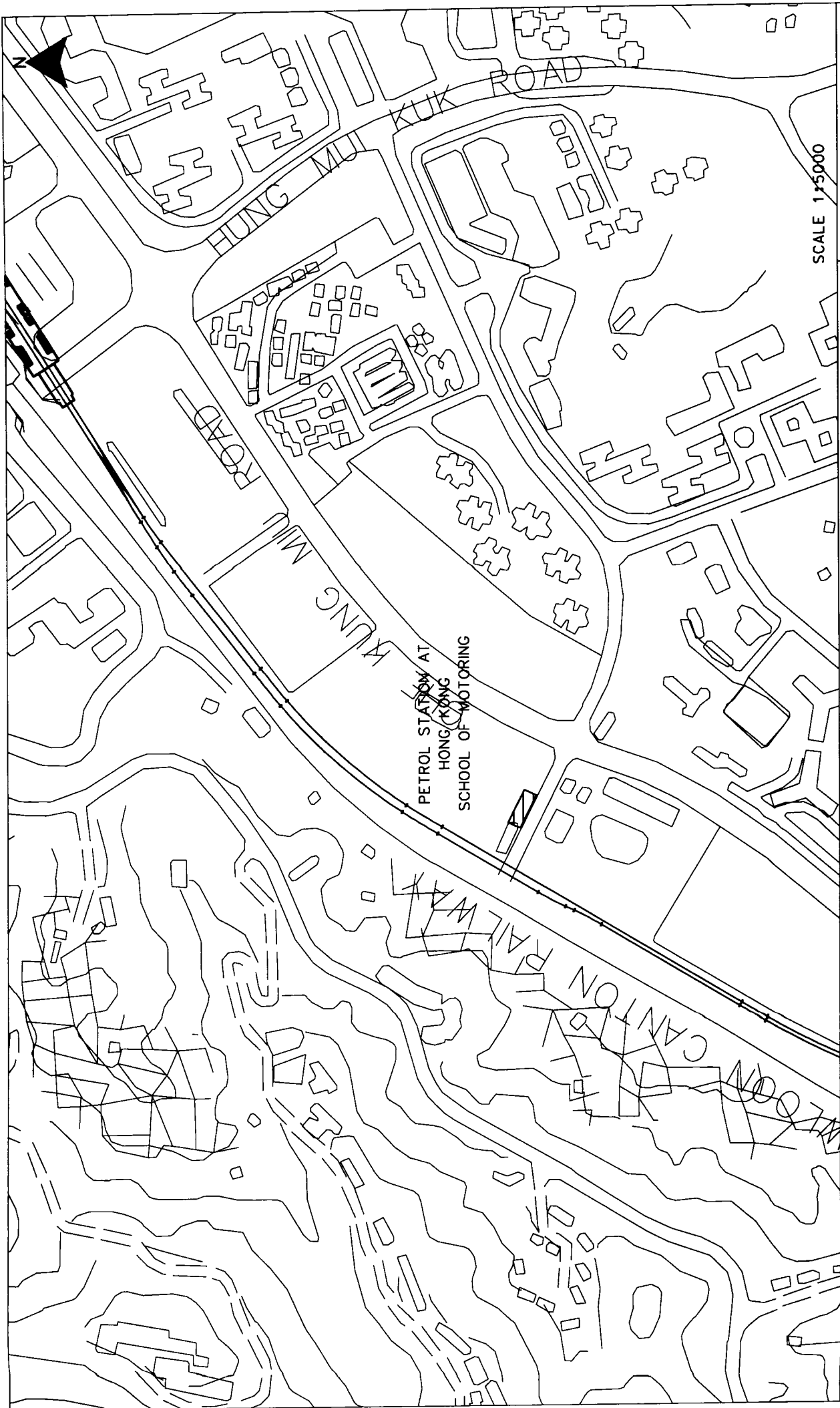
KEY  Petrol Station

FIGURE 10.5a



**Environmental  
Resources  
Management**

**KEY**  
 Petrol Station

**LOCATION OF POTENTIAL LAND CONTAMINATION SOURCES  
(HONG KONG SCHOOL OF MOTORING)**

SCALE 1:5000

FIGURE 10.5b

the presence of a small vehicle maintenance and fuelling facility at the Hong Kong School of Motoring, two long-standing petrol stations near the intersection of Kong Pui Street and Yuen Chau Kok Road to the west of the proposed City One Station, a vehicle maintenance centre crossing the alignment at Shek Mun Station, and one recently built petrol station located on Lok Shing Street immediately west of the Nullah between City One Station and the Shek Mun Station. All the identified potential contamination concerns lie within the 500 m consultation boundary of the scheme. The small vehicle maintenance and fuelling facility at the Hong Kong School of Motoring and vehicle maintenance centre are both situated within the boundary of the proposed development, whilst each of the other petrol filling stations are situated outside of the actual site works boundary. There is a potential concern with a fourth petrol station site, located on Yuen On Street, which would lie between City One Station and the Shek Mun Station. However, this is approximately 300 m from the proposed alignment and thus not considered a concern. Overall, contamination concerns from these facilities would only arise if any leakages or spillages have migrated from the petrol filling stations through to areas where workers might come into contact with the soil.

The ages and condition of any underground storage tanks which may be associated with the remaining petrol stations are currently unknown, as is the incidence of any spillages or related accidents that may have occurred during loading/unloading, and any leakages from the tanks throughout their usage. However, according to correspondence with the Fire Services Department Regional Office in Sha Tin (ref: (60) in FP/NT 311/03), there is no record in relation to fuel spillage at the petrol stations that would have resulted in releases of potentially contaminating substances.

Since the incidence of any unreported spillages or leakages is unknown, there still remains a very small, yet unquantified potential for impacts to arise from the migration of contaminants from the petrol filling stations to the site of the MOS Extension, or from other unidentified sources such as illegal dumping. With regard to the migration of contaminants from the petrol filling stations to the site of the MOS Extension, it is considered that relatively large volumes of contaminating materials would have to be either spilt or released at the petrol filling stations for them to migrate, in any significant quantities, to the areas of concern that could cause a significant negative impact to such areas. In the event of prolonged leakages from underground storage tanks, it is suspected that such releases are unlikely to have occurred without being reported as an incident to the Fire Services Department, or without being identified and rectified by the petrol companies.

As a result of the distance of the petrol stations from the construction worksite and the absence of any reported incidents in relation to the petrol stations under consideration, the potential for any contaminants to have migrated from these petrol filling stations to the MOS worksite is considered, through professional judgement, to be minimal. The potential concerns are further reduced as the alignment in the vicinity of the petrol stations will be on viaduct, therefore minimising the extent of any works requiring contact with the potentially impacted soils. It is therefore considered that the potential for any

contamination from these petrol stations to cause impacts upon the construction works will be negligible.

**10.6.2 Potential Impacts**

Typical contaminants associated with petrol station land use activities include hydrocarbons, fuels and lead. Potential impacts may arise from localised spillages and the possible presence of underground storage tanks (USTs). These contaminants may cause negative impact to sensitive receivers, including humans, during construction works or during the operational phase. A description of general hazardous properties of typical compounds which may have been used or stored at petrol station sites is presented in *Table 10.6a*.

There is currently only preliminary information available on the volumes of soil which will require excavation and disposal during the construction of the MOS stations and railway alignments. It is currently estimated that the total amount of excavated material arising from all the foundation works along the whole alignment will be in the order of 500,000 m<sup>3</sup>. As a consequence, the volume of material that will be produced in the vicinity of the identified petrol filling stations, and thus has the potential to be contaminated, will be substantially less.

**Table 10.6a General Properties of Hazardous Substances Potentially Found at Petrol Stations**

Typical Material	General Hazardous Properties
Petroleum hydrocarbons (including benzene, toluene, xylenes, and ethyl benzene - BTEX)	<ul style="list-style-type: none"> <li>•Can be toxic by inhalation, ingestion and contact</li> <li>•Concentrations may be flammable</li> </ul>
Oils, oily wastes	<ul style="list-style-type: none"> <li>•Can be toxic by contact</li> <li>•Concentrations may be flammable</li> </ul>
Thinners, solvents, degreasants*	<ul style="list-style-type: none"> <li>•Toxic by contact, inhalation and ingestion</li> </ul>
Heavy Metals* (including copper, chromium, lead, and zinc)	<ul style="list-style-type: none"> <li>•Can be toxic by ingestion and contact</li> <li>•Most are toxic to fish, plants, and marine plants (especially copper)</li> <li>•Specific precautions may be required in relation to monitoring and dust control in site formation works</li> </ul>
Acids (batteries)*	<ul style="list-style-type: none"> <li>•Toxic and harmful by contact</li> <li>•Corrosive to metal, concrete</li> </ul>
Polycyclic Aromatic Hydrocarbons (PAHs)	<ul style="list-style-type: none"> <li>•Toxic by contact and ingestion</li> </ul>

\* These materials are more likely, although not solely restricted, to being present at garages with vehicle service areas.

## 10.7 Recommended Mitigation

The only potentially contaminating landuses that have been identified in the vicinity of the proposed alignment are the petrol filling stations. However, each of these is located outside of, and in some cases a considerable distance from, the worksite area. In the case of the vehicle maintenance centre and the Hong Kong School of Motoring, the vehiclefilling and maintenance areas were noted to be small, with only two filling pumps located at the School of Motoring. Consequently, the potential for any contaminated land impacts to occur due to the migration of contaminants from these installations to the site of the MOS Extension is considered to be minimal.

### 10.7.1 Further Investigations

The investigation has identified landuses with the theoretical potential to give rise to land contamination as defined in the EPD guidance documents. Whilst the investigation has concluded that these landuses, in the form of petrol filling station sites, have only a minimal potential to cause contaminated land impacts to the site of the MOS Extension, it is nonetheless a requirement under Annex 19 of the EIAO TM and the 1999 *Guidance Notes* that a Contamination Assessment Plan (CAP) is prepared and included within the EIA. A stand alone CAP has been prepared and is submitted in Annex C of this Report for the approval of the EPD. The CAP will be updated in light of EPD's comments, and the exact sampling locations and testing parameters will be included in the finalised CAP. Following receipt of the EPD's approval, the CAP will be implemented and the findings of the investigations will be reported in the Contamination Assessment Report (CAR).

As the potential for negative impact is judged to be negligible, the CAP recommends that specific site investigations are undertaken as part of the Project's detailed design phase in order to verify this conclusion. These investigations will enable the significance of any potential land contamination to be evaluated as an "opportunistic" part of the geotechnical/ground investigations that are to be undertaken during this future phase. Such opportunistic investigations should comprise review of field activities or detailed field screening of drill cuttings for the presence of any organic vapours, which may be indicative of the presence of contamination. As appropriate, additional preliminary soil sampling may be performed, with chemical analysis of samples for related potential contaminants from near the surface and at selected depths, such as 3 to 5 metre depths. Analysis will be performed, as appropriate, for the parameters listed in Table 3.1 of the 1999 Guidance Documents. At present, the exact locations of the engineering boreholes are undetermined.

The results of this preliminary sampling exercise will determine whether contaminated land is, in fact, an issue that needs to be addressed further. If any preliminary sample analysis results indicate the presence of potential contaminants such as petroleum, then there may be a need to update or amend the current CAP in light of the findings. It should be noted that, as the source of the potential contamination is likely to be from outside the boundary of the MOS Extension worksites, it may not be feasible to gain immediate access onto the private property or properties in question to undertake any detailed site investigations as part of a revised contamination assessment programme.

If land contamination is confirmed, a Remediation Assessment Plan (RAP) shall be prepared, and both the CAR and the RAP shall be submitted as a combined report to the EPD for approval. If applicable and required in consultation with the EPD, the contaminated site shall be remediated in accordance with the approved CAR/RAP.

With the exception of the specific clauses in *Annex 19* of EIA Ordinance TM, it should be noted that there is presently no legislation in Hong Kong that requires clean up of soil and groundwater contamination. The presence of contaminated soil or groundwater becomes a waste disposal issue, based upon the limitations that arise for the handling and disposal of contaminated material.

### **10.7.2 Mitigation Measures**

As stated above, it is considered unlikely that contaminated land issues will be a concern during either the construction or operation of the MOS Extension. However, as a precaution, it is recommended that standard good practice is implemented during the construction phase to minimise any potential exposure to contaminated soils or groundwater. These measures include:

- The use of bulk earth-moving excavator equipment will minimise construction workers' potential contact with contaminated materials;
- Exposure to any contaminated materials may be minimised by the wearing of appropriate clothing and personal protective equipment such as gloves (when interacting directly with contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during such activities;
- Vehicles containing any contaminated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions;
- Only licensed waste hauliers should be used to collect and transport any contaminated material to an appropriate disposal site and procedures should be developed to ensure that illegal disposal of wastes does not occur;
- The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the *Waste Disposal Ordinance (Cap 354)*, *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)*, as required;
- Records of the quantities of wastes generated and disposed of should be maintained; and
- In accordance with good construction practice, silt traps should be used to reduce the impact to drainage caused by suspended solids (SS) arising from disturbed ground, or any construction materials such as cement and gravel. Groundwater should be disposed of in accordance with the *WPCO*.

## 10.8 Conclusions

Contaminated land issues have not been identified as a major concern for the MOS Extension. The only potential issues relate to one small petrol filling facility at the Hong Kong School of Motoring, a vehicle maintenance centre at the site of the proposed Shek Mun Station, and a number of commercial petrol filling stations that have been identified within the study area consultation zone. However, as each of the commercial petrol filling stations is located outside of, and in some cases a considerable distance from the construction work areas, the potential for any impacts is judged to be minimal. The concerns are reduced further as there have been no reported spillages or leakages from these facilities. In addition, the railway in the vicinity of these petrol filling stations will be on viaduct, thereby reducing the need for contact with any potentially contaminated soils during the construction and operation of the railway. It is considered highly unlikely that there would have been any migration of contaminants from the petrol stations to the work site in any significant quantity to cause negative impacts. Therefore, potential impacts are considered negligible.

As specific landuses with the potential to give rise to land contamination have been identified (i.e. petrol stations), Annex 19 of the EIAO TM requires that a Contamination Assessment Plan, (CAP) be prepared. The CAP is presented in Annex C to this report and recommends that the potential for contamination is assessed through opportunistic site investigations undertaken as part of the geotechnical/ground investigation during the detailed engineering design works. The results of these investigations will determine whether contaminated land is, in fact, an issue that needs to be addressed further. If the presence of contaminants is confirmed then there may be a need to update or amend the current CAP in light of the findings, and perform further investigations. However, as the source of any potential contamination is likely to be from outside the boundary of the MOS Extension worksites, it may not be currently feasible to gain access onto the private property or properties in question to undertake any detailed site investigations as part of a revised contamination assessment programme.