

## 10. LAND CONTAMINATION ISSUE

### Introduction

- 10.1 Contaminated land refers to the land which has been polluted by hazardous substances as a result of industrial operations carried out on site over a number of years. These contaminants, if present, may pose hazardous risks or cause adverse effects to the land users and the nearby environment.
- 10.2 The implications of land contamination associated with the Project and its works areas have been assessed with reference to the EIA Study Brief. This section summarises the site appraisal results from the Contamination Assessment Plans (CAPs) and site investigation results as reported in the Contamination Assessment Report (CAR), together with overall findings and recommendations relevant to the EIA.

### Environmental Legislation, Standards and Guidelines

- 10.3 The relevant environmental legislation guidelines and standards on land contamination include the following:
- (i) *Section 3 (Potential Contaminated Land Issues) of Annex 19 “Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts” of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).*
  - (ii) *Guidance Note for Contaminated Land Assessment and Remediation” (Guidance Note 1)*  
Guidance Note 1 sets out the requirements for proper assessment and management of potentially contaminated sites such as oil installations (e.g. oil depots, petrol filling stations), gas works, power plants, shipyards/boatyards, chemical manufacturing/processing plants, steel mills/metal workshops, car repairing/dismantling workshops and scrap yards. In addition, this Guidance Note provides guidelines on how site assessments should be conducted and analysed and suggests practical remedial measures that can be adopted for the cleanup of contaminated sites.
  - (iii) *Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair /Dismantling Workshop” (Guidance Note 2)*  
Guidance Note 2 specifically sets out guidance for land contamination assessment and remediation for sites previously used for petrol filling stations, boatyards and vehicle repair/dismantling workshops.
  - (iv) *Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management (Guidance Manual)*  
Guidance Manual introduces a risk based approach to land contamination assessment and presents instructions for comparison of soil and groundwater data to the Risk-Based Remediation Goals (RBRGs) for 54 chemicals of concern commonly found in Hong Kong. The RBRGs were derived to suit Hong Kong conditions and follow a risk-based methodology for contaminated land assessment and remediation, designed to protect the health of people who could potentially be exposed to land impacted by chemicals under four broad post restoration land use categories. The RBRGs also serve as the remediation targets if remediation is necessary.

### **Assessment Methodology**

- 10.4 The first step was to identify and assess any potentially contaminated sites within the Project area. The following tasks have been undertaken to identify and evaluate the potential land contamination impacts associated with the Project:
- Desktop study to review the current and historical land uses;
  - Acquisition of information related to potential land contamination from Environmental Compliance Division of Environmental Protection Department (EPD) and Fire Services Department (FSD); and
  - Site reconnaissance to identify the existing land uses and potential sources of contamination.
- 10.5 In addition, the following sources of information have been collated and reviewed:
- Selected aerial photographs from Lands Department;
  - Hong Kong Geological Survey Map (Series HGM20) – Sheet No. 11 (1:20,000);
  - Information on dangerous goods for potentially contaminated areas from Fire Services Department (FSD);
  - Records and photographs obtained during site visit; and
  - Previous ground investigation (GI) reports from Civil Engineering and Development Department (CEDD).
- 10.6 Based on the desktop review and site appraisal results, a Contamination Assessment Plan (CAP) was prepared specifying the sampling and testing requirements for the soil and groundwater samples. The CAP was approved by EPD on 8 October 2009 and is presented in [Appendix 10.1](#).
- 10.7 Subsequent to the approval of the CAP, some proposed sampling locations were relocated. An additional assessment area, Mong Kok Freight Terminal, was also included. To address the adjustments to the Site Investigation (SI) plan due to these changes, a Supplementary CAP was prepared. The Supplementary CAP was approved by EPD on 11 March 2010 and is presented in [Appendix 10.2](#) (the “approved Supplementary CAP”).
- 10.8 Another change subsequent to the approval of the above-mentioned CAPs involved minor shift of the Project alignment at the section from Portal 1A to Chatham Road Interchange (CRI). As such, the SI plan for one of the Assessment Areas (i.e. Area 1) in the approved CAP is slightly modified to accommodate the alignment and works changes. A Supplementary CAP for the revised alignment was, therefore, submitted to EPD which was endorsed on 23 November 2010 (attached as [Appendix 10.3](#)).
- 10.9 Sampling and laboratory testings were proposed for areas identified to have high potential for contamination (potential hotspots). After completion of the SI works, the soil and groundwater analytical results were compared against the adopted RBRGs. Due to site constraints, SI works were conducted in different stages as described in the abovementioned CAPs.
- 10.10 All SI works have been completed. The nature, level and extent of land contamination are evaluated and the findings documented in the Contamination Assessment Report (CAR) which has been submitted to EPD for endorsement. The CAR is presented in [Appendix 10.4](#).

### **Description of the Environment**

- 10.11 The latest Project boundary and the alignment are indicated in [Figure no. NEX2213/C/361/ENS/M50/501](#). The assessment areas for land contamination under this Project were divided into five geographic categories which are shown in [Figure nos. NEX2213/C/361/ENS/M57/505](#) and [NEX2213/C/361/ENS/M57/506](#).

Area 1<sup>1</sup>: Works Area North of the Covered Section of Hung Hom Freight Terminal (HFT)

- 10.12 Area 1 generally covers the section of the proposed Project alignment starting from the tunnel near Oi Man Estate extending south-easterly through the Chatham Road Interchange to the works area north of the covered section of HFT, but excludes the locomotive running shed and the underground storage tanks (USTs) in the northeast.

Area 2: Works Area within the Covered Section of HFT

- 10.13 Area 2 includes the covered section of HFT, the locomotive running shed and the USTs in the northeast. The proposed alignment passes through the existing HFT (approx. area 100,000 m<sup>2</sup>) and major construction works in this area include cut-and-cover tunnel construction, modification, reprovisioning, construction and demolition of facilities in support of the railway construction works.

Area 3: Works Area South of the Covered Section of HFT

- 10.14 Area 3 generally covers the area south of the covered section of HFT, including the International Mail Centre (interfacing with the project area of SCL – Tai Wai to Hung Hom Section), Hung Hom Freight Yard (HFY), and the cargo pier at Hung Hom waterfront. The North Ventilation Building, Plant Rooms and Emergency Access (NOV) under SCL – Hung Hom to Admiralty Section is proposed to be constructed to the north of the Kowloon Freight Building.

Area 4<sup>2</sup>: Supporting Works Area east of Hung Hom Station (HUH)

- 10.15 Area 4 includes the supporting works areas for ancillary purposes such as site offices and stockpiling are also proposed under the Project. They are all located to the northeast/east of the HFT.

Area 5: Mong Kok Freight Terminal (MFT)

- 10.16 Area 5 is the Mong Kok Freight Terminal (MFT), mainly covering Mong Kok East station, which will be used as an additional works area for modification of buildings and facilities of the existing goods yard.

**Identification of Potential Environmental Impacts**

Identification of Impact Sources

- 10.17 The identification of potentially contaminated sites within the Project areas has been completed through the site appraisal exercise. Potentially contaminated sites were identified in Areas 1-3 and the details are summarised in [Table 10.1](#) below. For Area 4, no works will be carried out according to the latest design. No SI works will, therefore, be carried out. Since the current land use of Area 5 is drinks storage without historic potential land uses recorded, and no potentially contaminated site was identified during site appraisal, no intrusive SI is proposed.

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<sup>1</sup> “Area 1” in the approved CAP ([Appendix 10.1](#)) has been slightly modified due to the adjustment in the alignment design. Details regarding the change can be referred to in the relevant Supplementary CAP for Works Area in Area 1 ([Appendix 10.3](#) of this EIA report).

<sup>2</sup> The supporting area where potential hotspot was identified (i.e. Waste diesel storage area at DSD site office) in the approved CAP will no longer be required, according to the latest design. Sampling and testing for the proposed borehole were, therefore, not conducted.

**Table 10.1 Potentially Contaminated Sites Identified under the Latest Design**

Site ID	Current Land Use	Planned Post-Restoration Land Use	Reference Figure
<b>Area 1</b>			
1-10	Open storage for construction materials (previously a D.G. store for paint)	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/507</a>
1-18	Emergency generator and associated fuel tank	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/507</a>
1-22	MTR railway operations (Historic railway maintenance facility area)	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/507</a>
<b>Area 2</b>			
2-02	Locomotive traverser	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/509</a>
2-04	Locomotive running shed (A sampling location southeast of the locomotive running shed was not excavated to the proposed depth; underground structures were encountered during excavation)	To be demolished and adapted for railway facilities	<a href="#">NEX2213/C/361/ENS/M57/508</a>
2-05	USTs for diesel storage	To be demolished and adapted for railway facilities	<a href="#">NEX2213/C/361/ENS/M57/508</a>
2-06	Aboveground lubricating oil storage tank	To be demolished and adapted for railway facilities	<a href="#">NEX2213/C/361/ENS/M57/508</a>
2-07	Fuel dispensers/pump islands	To be demolished and adapted for railway facilities	<a href="#">NEX2213/C/361/ENS/M57/508</a>
2-08	Part of the railway tracks in HFT	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/510</a>
2-09	D.G. store containers	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/509</a>
<b>Area 3</b>			
L17	International Mail Centre <ul style="list-style-type: none"> <li>• D.G. store</li> <li>• Chemical storage</li> <li>• Emergency generator room</li> <li>• Fuel tank room</li> <li>• Open car park (previously open storage with unknown purposes)</li> </ul>	Facilities and buildings in this site will be demolished to accommodate construction of SCL - Mong Kok East to Hung Hom Section and SCL – Tai Wai to Hung Hom Section	<a href="#">NEX2213/C/361/ENS/M57/509</a>
3-02	Container stacker refuelling and maintenance area at HFY	Railway facilities	<a href="#">NEX2213/C/361/ENS/M57/509</a>

Identification of Sensitive Receptors

- 10.18 Onsite construction workers have the potential to be exposed to potentially contaminated materials during the decommissioning stage. The principle exposure pathways for onsite workers include:
- Direct ingestion of contaminated soil through eating, drinking or smoking onsite; and
  - Dermal contact with contaminated soil.
- 10.19 Through the correct implementation of occupational health and safety guidelines and correct use of personal protective equipment these potential pathways can be successfully managed.
- 10.20 Other potential sensitive receptors include water bodies and other humans working or travelling near the sites and during the intrusive investigation and remediation work stages. During these stages there is a potential to generate dust emissions and water discharges that have the potential to affect the surrounding sensitive receivers (e.g. human receivers and water bodies). However, adoption of appropriate work practices and precautionary measures during investigation and remediation works will ensure that these risks can be successfully managed.

### Prediction and Evaluation of Environmental Impacts

#### Site Investigation Results

- 10.21 SI works at identified hotspots have been conducted. A summary of the SI status and findings is provided in [Table 10.2](#) below:

**Table 10.2 Summary of SI Status and Findings**

Site ID	SI Status	No. of Borehole/ Trial Pits Sampled	No. of Sample Tested*	Compliance to Industrial RBRGs
<b>Area 1</b>				
1-10	Completed	1	11	All samples tested indicated compliance
1-18	Completed	1	3	All samples tested indicated compliance
1 - 22	Completed	6	40	All samples tested indicated compliance
<b>Area 2</b>				
2-02	Completed	1	8	All samples tested indicated compliance
2-04, 2-06 and 2-07**	Completed	10	110	All samples tested indicated compliance
2-05	Completed	3	15	All samples tested indicated compliance
2-08	Completed	5	24	All samples tested indicated compliance
2-09	Completed	1	8	All samples tested indicated compliance
<b>Area 3</b>				
L17	Completed	4	20	All samples tested indicated compliance
3-02	Completed	2	12	All samples tested indicated compliance
<b>Total</b>		<b>34</b>	<b>251</b>	-

Notes:

\*: Number of tested soil and groundwater (if encountered) samples. Number of duplicate soil samples is not included in this table.

\*\* : SI for Sites 2-04, 2-06, and 2-07 were carried out collectively.

- 10.22 A total of 231 soil samples and 20 groundwater samples were collected at 34 locations identified as potentially contaminated sites. According to the analytical results, no exceedances of the RBRGs (industrial) were found among all soil and groundwater samples collected.

## **Remediation Actions and Precautionary Measures to Be Undertaken during Construction**

### Review of Remediation Options, Method and Target

- 10.23 Based on SI results of the soil and groundwater samples, no exceedance of the adopted RBRG guidelines has been confirmed at the identified potentially contaminated sites; therefore no remediation actions are needed for these sites.

### Summary of Proposed Precautionary Measures to Be Undertaken during Construction

- 10.24 Although no exceedance was found, to be conservative, precautionary measures such as visual inspection are recommended during construction for the sites of which only preliminary SI has been carried out. The inspection process should involve a visual observation of excavated soils for discolouration and the presence of oils, together with identifying the presence of odours, which may also indicate soil and/or groundwater contamination.
- 10.25 The following is a summary of proposed precautionary measures to be carried out during construction:

#### *Site ID 1-18: Emergency Generator and the Associated Fuel Tank*

- 10.26 Due to site constraints, only a trial pit was conducted outside the identified hotspots, i.e. the emergency generator and its associated fuel tank rooms. Visual inspection for the presence of contamination should therefore be carried out during construction of the cut and cover tunnel in the proximity of this site and attention paid to potential contamination due to the historic and current operation.

#### *Site ID 1-22: Historical Railway Maintenance Facility*

- 10.27 Due to site constraints, three out of six boreholes could only be constructed to 3 to 6.5m. At the time of cut and cover railway construction, an inspection should consider visual evidence of potential contamination due to its past operation.

#### *Site ID 2-02: Locomotive Traverser*

- 10.28 Due to site constraints, only one borehole for preliminary screening for potential land contamination was conducted. Visual inspection should be carried out for soil and groundwater (if encountered) especially during cut and cover tunnel construction in part of this site and attention paid to potential contamination due to the historic and current operation as a locomotive traverse for which lubricating oil is used for regular maintenance.

#### *Site ID 2-05: Underground Storage Tanks*

- 10.29 Due to site constraints, three borehole locations were sampled around the UST. Visual inspection should be carried out during demolition of the USTs to confirm whether a leakage or spillage of stored fuel had occurred and caused soil contamination.

#### *Site ID: 2-08: Railway Tracks inside Hung Hom Freight Terminal*

- 10.30 Five boreholes were proposed for preliminary screening of potential land contamination. Visual inspection should be carried out along the railway tracks area where construction works will be carried out, to look for signs of potential contamination due to past and current operations for marshalling.

#### *Site ID 2-09: D.G. Store*

- 10.31 Due to site constraints, SI was conducted outside of the D.G. storage containers. Visual inspection for the presence of contamination should therefore be carried out during the construction of the cut and cover tunnel in the proximity of this site.

#### *Site ID L17: International Mail Centre*

- 10.32 Due to site constraints, only two trial pits were sampled outside the identified hotspots namely the emergency generator and the associated fuel tank as well as the D.G. store. Visual inspection on

the presence of contamination should therefore be carried out onsite where building demolition, road works and construction of a cooling tower under this Project and an interfacing project (SCL – Tai Wai to Hung Hom Section) will be carried out.

*Site ID 3-02: Hung Hom Freight Yard (HFY)*

- 10.33 Since the HFY used to contain a refuelling and lubrication area for container stackers, should this land use have caused contamination at the HFY, the contamination has the potential to migrate to where intrusive works including cut and cover tunnel construction and building of the NOV will be carried out. However, due to site constraints, only preliminary assessment of potential land contamination was carried out between the hotspot and the future cut-and-cover construction area. Visual inspections should therefore be carried out during the construction of this building.
- 10.34 If soil discolouration or the presence of oil/unnatural odour is noted during visual inspection, sampling and testing should also be undertaken to verify the presence of contamination. Should concentrations of COCs exceed the adopted RBRGs, remediation works should be undertaken with reference to the CAR and RAP. A Remediation Report (RR) will then be prepared and submitted to EPD to demonstrate that the decontamination work is adequate and has been carried out in accordance with the endorsed CAR and RAP. Information such as soil treatment/disposal records (including trip tickets), confirmatory sampling results and photographs will be included in the RR. No construction work will be carried out prior to endorsement of the RR by EPD.

Potential Remediation Works

- 10.35 If land contamination is identified, a RAP detailing the proposed remediation works will be prepared. In order to minimise environmental impacts arising from the handling of potentially contaminated materials, the following environmental precautionary measures are recommended to be utilised during the course of any required site remediation:
- Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety;
  - Excavation should be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils;
  - Supply of suitable clean backfill material is needed after excavation;
  - If proposed remediation methods employ chemical oxidation methods as the contaminant mass reduction technology, chemicals will be securely and separately stored away from sources of ignition or oxidisable items. Handling will be undertaken by personnel with appropriate training and Personal Protective Equipment;
  - Vehicles containing any excavated 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;
  - Speed control for the trucks carrying contaminated materials should be enforced;
  - Vehicle wheel and body washing facilities at the site's exit points should be established and used; and
  - Pollution control measures for air emissions e.g. from biopile blower, noise emissions e.g. from blower, and water discharges e.g. runoff control should be implemented and complied with relevant regulations and guidelines.

Summary of Proposed Occupational Health and Safety Controls

- 10.36 In the event that remediation is required the Occupation Safety and Health Ordinance (OSHO) (Chapter 509) and its subsidiary Regulations should be followed by all site personnel working on the site at all times to minimise the potential adverse effects on the health and safety of construction workers during the course of site remediation. In addition, basic health and safety measures should be implemented, but not limited to the followings:

- Set up a list of safety measures for site workers;
- Provide written information and training on safety for site workers;
- Keep a log-book and plan showing the contaminated zones and clean zones;
- Maintain a hygienic working environment;
- Avoid dust generation;
- Provide face and respiratory protection gear to site workers if necessary;
- Provide personal protective clothing (e.g. chemical resistant jackboot, liquid tight gloves) to site workers if necessary; and
- Provide first aid training and materials to site workers.

10.37 The corresponding responsible party for the above precautionary measures are provided in the implementation schedule of this EIA.

#### **Evaluation of Residual Environmental Impacts**

10.38 No exceedances of the adopted standards were detected in soil and groundwater samples collected in the SI works. During the construction phase, precautionary measures outlined in **Sections 10.26 through 10.35** should be implemented.

#### **Conclusion**

10.39 This land contamination assessment evaluates potentially contaminative land uses within the relevant Assessment Area and includes assessment of potentially contaminative impacts on future use. The assessment incorporates site appraisals, site investigations, and assessments of the extent of contamination impacts. Based on the findings from the SI works, no adverse impacts have been identified within the Assessment Areas.