# Contents

# 7 Land Contamination

## 7.1 Legislation, Standards and Guidelines

### 7.1.1 General

**7.1.1.1** The relevant legislation, standards and guidelines applicable to the present study for the assessment of land contamination include:

- Annex 19 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Guidelines for Assessment of Impact On Sites of Cultural Heritage and Other Impacts (Section 3 – Potential Contaminated Land Issues), Environmental Protection Department (EPD), 1997;
- Guidance Note for Contaminated Land Assessment and Remediation, EPD, 2007;
- Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management, EPD, 2007; and
- Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011.

### 7.1.2 Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)

**7.1.2.1** Under Annex 19 of the EIAO-TM, a number of potentially contaminating historical and present land uses should be considered, including oil installations, gas works, metal workshops, car repair and dismantling workshops, which have the potential to cause or have caused land contamination. Nevertheless, any other potential contaminating activities/ installations/ facilities within the boundary of the Project and the works of the Project should be identified and considered based on professional judgement.

### 7.1.3 Guidance Note for Contamination Land Assessment and Remediation

**7.1.3.1** In accordance with EPD's *Guidance Note for Contamination Land Assessment and Remediation*, a contamination assessment evaluation should:

- Provide a clear and detailed account of the present land use and the relevant past land history, in relation to possible land contamination;
- Identify areas of potential contamination and associated impacts, risks or hazards; and
- Submit a plan to evaluate the actual contamination conditions for soil and/or groundwater, if required.

### 7.1.4 Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management

**7.1.4.1** The Guidance Manual introduces the risk-based approach in land contamination assessment and presents instructions for comparison of soil and groundwater data to the RBRGs for 54 chemicals of concern commonly found in Hong Kong. The RBRGs were derived to suit Hong Kong conditions by following the international practice of adopting a risk-based methodology for contaminated land assessment and remediation and were 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. The RBRGs for soil and groundwater are given in **Table 7.1** and **Table 7.2** respectively.

**Table 7.1** RBRGs for soil & soil saturation limit

| Chemical | Risk-Based Remediation Goals (RBRGs) for Soil | | | | Soil Saturation Limit ($C_{sat}$) (mg/kg) |
|---|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | Public Park (mg/kg) | |
| **VOCs** | | | | | |
| Acetone | 9,590 | 4,260 | 10,000* | 10,000* | *** |
| Benzene | 0.704 | 0.279 | 9.21 | 42.2 | 336 |
| Bromodichloromethane | 0.317 | 0.129 | 2.85 | 13.40 | 1,030 |
| 2-Butanone | 10,000* | 10,000* | 10,000* | 10,000* | *** |
| Chloroform | 0.132 | 0.0529 | 1.54 | 253 | 1,100 |
| Ethylbenzene | 709 | 298 | 8,240 | 10,000 | 138 |
| Methyl tert-Butyl Ether | 6.88 | 2.80 | 70.1 | 505 | 2,380 |
| Methylene Chloride | 1.30 | 0.529 | 13.9 | 128 | 921 |
| Styrene | 3,220 | 1,540 | 10,000* | 10,000* | 497 |
| Tetrachloroethene | 0.101 | 0.0444 | 0.777 | 1.84 | 97.1 |
| Toluene | 1,440 | 705 | 10,000* | 10,000* | 235 |
| Trichloroethene | 0.523 | 0.211 | 5.68 | 69.4 | 488 |
| Xylenes (Total) | 95.0 | 36.8 | 1,230 | 10,000* | 150 |
| **SVOCs** | | | | | |
| Acenaphthene | 3,510 | 3,280 | 10,000* | 10,000* | 60.2 |
| Acenaphthylene | 2,340 | 1,510 | 10,000* | 10,000* | 19.8 |
| Anthracene | 10,000* | 10,000* | 10,000* | 10,000* | 2.56 |
| Benzo(a)anthracene | 12.0 | 11.4 | 91.8 | 38.3 | - |
| Benzo(a)pyrene | 1.20 | 1.14 | 9.18 | 3.83 | - |
| Benzo(b)fluoranthene | 9.88 | 10.1 | 17.8 | 20.4 | - |
| Benzo(g,h,i)perylene | 1,800 | 1,710 | 10,000* | 5,740 | - |

| Chemical | Risk-Based Remediation Goals (RBRGs) for Soil | | | | Soil Saturation Limit ($C_{sat}$) (mg/kg) |
|---|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | Public Park (mg/kg) | |
| Benzo(k)fluoranthene | 120 | 114 | 918 | 383 | - |
| Bis-(2-Ethylhexyl)phthalate | 30.0 | 28.0 | 91.8 | 94.2 | - |
| Chrysene | 871 | 919 | 1,140 | 1,540 | - |
| Dibenzo(a,h)anthracene | 1.20 | 1.14 | 9.18 | 3.83 | - |
| Fluoranthene | 2,400 | 2,270 | 10,000* | 7,620 | - |
| Fluorene | 2,380 | 2,250 | 10,000* | 7,450 | 54.7 |
| Hexachlorobenzene | 0.243 | 0.220 | 0.582 | 0.713 | - |
| Indeno(1,2,3-cd)pyrene | 12.0 | 11.4 | 91.8 | 38.3 | - |
| Naphthalene | 182 | 85.6 | 453 | 914 | 125 |
| Phenanthrene | 10,000* | 10,000* | 10,000* | 10,000* | 28.0 |
| Phenol | 10,000* | 10,000* | 10,000* | 10,000* | 7,260 |
| Pyrene | 1,800 | 1,710 | 10,000* | 5,720 | - |
| **Metals** | | | | | |
| Antimony | 29.5 | 29.1 | 261 | 97.9 | - |
| Arsenic | 22.1 | 21.8 | 196 | 73.5 | - |
| Barium | 10,000* | 10,000* | 10,000* | 10,000* | - |
| Cadmium | 73.8 | 72.8 | 653 | 245 | - |
| Chromium III | 10,000* | 10,000* | 10,000* | 10,000* | - |
| Chromium VI | 221 | 218 | 1,960 | 735 | - |
| Cobalt | 1,480 | 1,460 | 10,000* | 4,900 | - |
| Copper | 2,950 | 2,910 | 10,000* | 9,790 | - |
| Lead | 258 | 255 | 2,290 | 857 | - |
| Manganese | 10,000* | 10,000* | 10,000* | 10,000* | - |
| Mercury | 11.0 | 6.52 | 38.4 | 45.6 | - |
| Molybdenum | 369 | 364 | 3,260 | 1,220 | - |
| Nickel | 1,480 | 1,460 | 10,000* | 4,900 | - |
| Tin | 10,000* | 10,000* | 10,000* | 10,000* | - |
| Zinc | 10,000* | 10,000* | 10,000* | 10,000* | - |
| **Dioxins / PCBs** | | | | | |
| Dioxins (I-TEQ) | 0.001 | 0.001 | 0.005 | 0.001 | - |
| PCBs | 0.236 | 0.226 | 0.748 | 0.756 | - |
| **Petroleum Carbon Ranges** | | | | | |
| C6 - C8 | 1,410 | 545 | 10,000* | 10,000* | 1,000 |
| C9 - C16 | 2,240 | 1,330 | 10,000* | 10,000* | 3,000 |

| Chemical | Risk-Based Remediation Goals (RBRGs) for Soil | | | | Soil Saturation Limit ($C_{sat}$) (mg/kg) |
|---|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | Public Park (mg/kg) | |
| C17 - C35 | 10,000* | 10,000* | 10,000* | 10,000* | 5,000 |
| **Other Inorganic Compounds** | | | | | |
| Cyanide, free | 1,480 | 1,460 | 10,000* | 4,900 | - |
| **Organometallics** | | | | | |
| TBTO | 22.1 | 21.8 | 196 | 73.5 | - |

Notes:

[1] For Dioxins, the cleanup levels in USEPA Office of Solid Waste and Emergency Response (OSWER) Directive of 1998 have been adopted. The OSWER Directive value of 1 ppb for residential use has been applied to the scenarios of "Urban Residential", "Rural Residential", and "Public Parks", while the low end of the range of values for industrial, 5 ppb, has been applied to the scenario of "industrial".

[2] Soil saturation limits for petroleum carbon ranges taken from the Canada-Wide Standards for Petroleum Hydrocarbons in Soil, CCME 2000.

[3] * indicates a 'ceiling limit' concentration.

[4] *** indicates that the Csat value exceeds the 'ceiling limit' therefore the RBRG applies.

**Table 7.2** RBRGs for groundwater and solubility limit

| Chemical | Risk-Based Remediation Goals (RBRGs) for Groundwater | | | Solubility Limit (mg/L) |
|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | |
| **VOCs** | | | | |
| Acetone | 10,000* | 10,000* | 10,000* | *** |
| Benzene | 3.86 | 1.49 | 54.0 | 1,750 |
| Bromodichloromethane | 2.22 | 0.871 | 26.2 | 6,740 |
| 2-Butanone | 10,000* | 10,000* | 10,000* | *** |
| Chloroform | 0.956 | 0.382 | 11.3 | 7,920 |
| Ethylbenzene | 1,020 | 391 | 10,000* | 169 |
| Methyl tert-Butyl Ether | 153 | 61.1 | 1,810 | *** |
| Methylene Chloride | 19.0 | 7.59 | 224 | *** |
| Styrene | 3,020 | 1,160 | 10,000* | 310 |
| Tetrachloroethene | 0.250 | 0.0996 | 2.95 | 200 |
| Toluene | 5,110 | 1,970 | 10,000* | 526 |
| Trichloroethene | 1.21 | 0.481 | 14.2 | 1,100 |
| Xylenes (Total) | 112 | 43.3 | 1,570 | 175 |
| **SVOCs** | | | | |
| Acenaphthene | 10,000 | 7,090 | 10,000* | 4.24 |
| Acenaphthylene | 1,410 | 542 | 10,000* | 3.93 |

| Chemical | Risk-Based Remediation Goals (RBRGs) for Groundwater | | | Solubility Limit (mg/L) |
|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | |
| Anthracene | 10,000* | 10,000* | 10,000* | 0.0434 |
| Benzo(a)anthracene | - | - | - | - |
| Benzo(a)pyrene | - | - | - | - |
| Benzo(b)fluoranthene | 0.539 | 0.203 | 7.53 | 0.0015 |
| Benzo(g,h,i)perylene | - | - | - | - |
| Benzo(k)fluoranthene | - | - | - | - |
| Bis-(2-Ethylhexyl)phthalate | - | - | - | - |
| Chrysene | 58.1 | 21.9 | 812 | 0.0016 |
| Dibenzo(a,h)anthracene | - | - | - | - |
| Fluoranthene | 10,000* | 10,000* | 10,000* | 0.206 |
| Fluorene | 10,000* | 10,000* | 10,000* | 1.98 |
| Hexachlorobenzene | 0.0589 | 0.0234 | 0.695 | 6.20 |
| Indeno(1,2,3-cd)pyrene | - | - | - | - |
| Naphthalene | 61.7 | 23.7 | 862 | 31.0 |
| Phenanthrene | 10,000* | 10,000* | 10,000* | 1.00 |
| Phenol | - | - | - | - |
| Pyrene | 10,000* | 10,000* | 10,000* | 0.135 |
| **Metals** | | | | |
| Antimony | - | - | - | - |
| Arsenic | - | - | - | - |
| Barium | - | - | - | - |
| Cadmium | - | - | - | - |
| Chromium III | - | - | - | - |
| Chromium VI | - | - | - | - |
| Cobalt | - | - | - | - |
| Copper | - | - | - | - |
| Lead | - | - | - | - |
| Manganese | - | - | - | - |
| Mercury | 0.486 | 0.184 | 6.79 | - |
| Molybdenum | - | - | - | - |
| Nickel | - | - | - | - |
| Tin | - | - | - | - |
| Zinc | - | - | - | - |
| **Dioxins / PCBs** | | | | |

| Chemical | Risk-Based Remediation Goals (RBRGs) for Groundwater | | | Solubility Limit (mg/L) |
|---|---|---|---|---|
| | Urban Residential (mg/kg) | Rural Residential (mg/kg) | Industrial (mg/kg) | |
| Dioxins (I-TEQ) | - | - | - | - |
| PCBs | 0.433 | 0.171 | 5.11 | 0.031 |
| **Petroleum Carbon Ranges** | | | | |
| C6 - C8 | 82.2 | 31.7 | 1,150 | 5.23 |
| C9 - C16 | 714 | 276 | 9,980 | 2.80 |
| C17 - C35 | 12.8 | 4.93 | 178 | 2.80 |
| **Other Inorganic Compounds** | | | | |
| Cyanide, free | - | - | - | - |
| **Organometallics** | | | | |
| TBTO | - | - | - | - |

Notes:
[1] Blank indicates that RBRG could not be calculated because the toxicity or physical/chemical values were unavailable, or the condition of Henry's Law Constant>0.00001 was not met for the inhalation pathway.
[2] Water solubilities for Petroleum Carbon Range aliphatic C9-C16 and greater than C16 generally are considered to be effectively zero and therefore the aromatic solubility for C9-C16 is used.
[3] * indicates a 'ceiling limit' concentration.
[4] *** indicates that the solubility limit exceeds the 'ceiling limit' therefore the RBRG applies.

### 7.1.5 Practice Guide for Investigation and Remediation of Contaminated Land

**7.1.5.1** The EPD's *Practice Guide for Investigation and Remediation of Contaminated Land* includes a summary of the general steps of a contamination assessment study, which include site appraisal, site investigation and remediation.

## 7.2 Assessment Area

**7.2.1.1** **Figure 7.1** shows the location of the Project. The Project will be implemented by phases which involve the following key construction activities:

- A new Tung Chung East (TCE) Station (at-grade) and diversion of a section of existing Tung Chung Line (TCL);
- Railway alignment (in the form of a tunnel) extending from existing overrun of Tung Chung Station (TUC) to the new Tung Chung West (TCW) Station;
- A new TCW Station (underground) and overrun tunnel;
- Emergency Access Point (EAP)/ Emergency Egress Point (EEP) building;
- Station associated facilities (entrances, vent shaft structures, etc.); and

- Work sites / works areas, barging facility, etc.

**7.2.1.2** The assessment area for this land contamination assessment includes the Project as shown in **Figure 7.1** as well as the associated work areas of the Project except for the underground work area at TCW area. Since tunnelling work would be conducted underneath the soil layer for the underground work area at TCW area, land contamination is considered irrelevant issue for this underground work area and hence it has been excluded from the assessment area. The location of the assessment area is shown in **Figure 7.2**. As indicated in **Figure 7.2**, the assessment area is broken down into 13 sub-areas with unique assessment area ID assigned to each sub-area for ease of review. The tentative works to be involved in the sub-areas are summarized in **Table 7.3**.

**Table 7.3:** Summary of the tentative works to be involved in the sub-areas of the assessment area

| Assessment Area ID | Location | Tentative Works |
|---|---|---|
| • TCE-1<br>• TCE-2<br>• TCE-3<br>• TCW-1<br>• TCW-4<br>• TCW-5 | • East of Ying Tung Estate<br>• South of Ying Tung Estate<br>• East of Caribbean Coast<br>• Near Tung Chung Crescent<br>• North and West of Yat Tung Estate<br>• At and in the vicinity of Yu Tung Road | Tentative works to be conducted at these sub-areas may involve site formation, excavation works, foundation works, construction of station box, at-grade station, at-grade track, EAP/EEP, ventilation shafts, etc. |
| • TCE-4<br>• TCE-5<br>• TCWF-1<br>• TCW-2<br>• TCW-3<br>• TCW-6<br>• TCW-7 | • Near Tung Chung North Park<br>• Near Tuen Mun Chek Lap Kok Link<br>• At Tung Chung Waterfront<br>• North of Mun Tung Estate near Yu Tung Road<br>• Northwest of Mun Tung Estate near Chung Mun Road<br>• Northeast of Mun Tung Estate and South of Yu Tung Road<br>• Near Ma Wan New Village | These sub-areas may be used for material storage, site office, workshop, barging facility, etc. |

## 7.3 Agreed Land Contamination Review Report

**7.3.1.1** A land contamination review (LCR) report was prepared:

- To provide an account of the present land use within the assessment area and relevant past land use history in relation to possible land contamination;
- To identify areas of potential contamination and the associated impacts, risks or hazards; and
- To identify the chemicals of concern and scoping of requirements for sampling and laboratory testing of soil and groundwater samples if required.

**7.3.1.2** The LCR report was submitted to EPD on 23 December 2020 and was subsequently agreed by EPD on 11 January 2021. An updated LCR report was further submitted to EPD on 28 May 2021 to reflect the latest changes of the Project

and was subsequently agreed by EPD on 11 June 2021. The agreed LCR report is provided in **Appendix 7.1**.

## 7.4 Assessment Methodology

### 7.4.1 Overview

**7.4.1.1** The land contamination assessment has been conducted according to the following procedures. Each of these procedures listed below is further discussed in the following sections.

- Desktop review of the site history; and
- Site survey to identify any potentially contaminated areas.

### 7.4.2 Desktop Review

**7.4.2.1** For the purpose of conducting the desktop review, the best available relevant information in the public domain is collected. This information includes the following that would illustrate the features of the assessment area as well as any changes in land use over the previous decades. The following have been reviewed:

- Selected historical aerial photographs between Year 1973 and Year 2018;
- Hong Kong Geological Survey Map that provides information on geology of the assessment area and its vicinity;
- Outline Zoning Plans (i.e. S/I-TCTC/24 - Tung Chung Town Centre Area, S/I-TCE/2 - Tung Chung Extension Area) that show the latest land uses of the assessment area and its vicinity; and
- Any relevant EIAs (i.e. Tung Chung New Town Extension (TCNTE) EIA (AEIAR-196/2016)) and environmental Site Investigation (SI) works under the Project undertaken in, or nearby, the assessment area.

### 7.4.3 Site Surveys

**7.4.3.1** Site surveys were conducted between August and November 2020 and between March and May 2021 to verify the findings of the desktop review and to identify any other land uses within the assessment area which may have potential to cause land contamination. Possible contaminants, if any, would be identified in accordance with EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*.

# 7.5 Desktop Review

## 7.5.1 Findings from the Approved Tung Chung New Town Extension EIA

**7.5.1.1** Land contamination assessment was conducted in the approved TCNTE EIA (AEIAR-196/2016). As part of the assessment, site appraisal for the possible development areas (PDAs) at TCE area and TCW area as well as works areas for the associated infrastructures was conducted in Year 2015. Based on the site appraisal findings, no potentially contaminated site was identified except for 13 sites with industrial land uses which required further detailed site survey. Among those 13 sites, only 1 site (i.e. TC-2) within the assessment area of the Project was identified with land contamination potential. Upon further detailed site survey, contaminated land impacts were also not identified at TC-2. The boundary of the PDAs and locations of the 13 sites with industrial land uses identified in the EIA study are provided in **Figure 7.3**. Nevertheless, site re-appraisal was recommended in the approved TCNTE EIA to address any change in land use that might give rise to potential land contamination issues.

## 7.5.2 Historical Land Use

**7.5.2.1** Selected historical aerial photographs between Year 1973 and Year 2018 of the assessment area have been reviewed to ascertain any historical land use with potential for land contamination. The historical aerial photographs are shown in Appendix A of **Appendix 7.1**. The findings of the historical aerial photographs are summarized in **Table 7.4**.

**Table 7.4:** Summary of the findings of the historical aerial photographs

| Year | Description | | |
|---|---|---|---|
| | **Tung Chung East** | **Tung Chung Waterfront** | **Tung Chung West** |
| 1973 | • The assessment area at TCE area (TCE-1, TCE-2, TCE-3, TCE-4 and TCE-5) was mostly part of the sea and yet to be reclaimed. | • The assessment area at Tung Chung Waterfront (TCWF) (TCWF-1) was part of the sea and yet to be reclaimed. | • The assessment area at TCW area (TCW-1, TCW-2, TCW-3, TCW-4, TCW-5, TCW-6 and TCW-7) was mostly occupied by farmland and vegetated land with some village roads and village houses observed.<br>• Part of the assessment area to the north of Rocky Lion Hill (TCW-1) was part of the sea and yet to be reclaimed. |
| 1982 | • No significant change in land use was observed as compared with Year 1973 within the assessment area at TCE area (TCE-1, TCE- | • No significant change in land use was observed as compared with Year 1973 within the assessment area at TCWF (TCWF-1). | • Some farmland within the assessment area at TCW area towards the west (TCW-2, TCW-3, TCW-5 and TCW-6) was cleared |

| Year | Description | | |
|---|---|---|---|
| | **Tung Chung East** | **Tung Chung Waterfront** | **Tung Chung West** |
| | 2, TCE-3, TCE-4 and TCE-5). | | and replaced by vegetated land.<br>• No other significant change in land use was observed as compared with Year 1973 within the assessment area at TCW area (TCW-1, TCW-2, TCW-3, TCW-4, TCW-5, TCW-6 and TCW-7). |
| 1993 | • No significant change in land use was observed as compared with Year 1982 within the assessment area at TCE area (TCE-1, TCE-2, TCE-3, TCE-4 and TCE-5). | • No significant change in land use was observed as compared with Year 1982 within the assessment area at TCWF (TCWF-1). | • Part of the assessment area to the north of Rocky Lion Hill (TCW-1) was reclaimed.<br>• No other significant change in land use was observed as compared with Year 1982 within the assessment area at TCW area (TCW-1, TCW-2, TCW-3, TCW-4, TCW-5, TCW-6 and TCW-7). |
| 2004 | • Part of the assessment area at TCE area near the shoreline (TCE-1) was reclaimed. Rail tracks, pedestrian walkway and seawall were observed.<br>• Vacant land and containers were observed within the reclaimed part of the assessment area at TCE area towards the west (TCE-2, TCE-3 and TCE-4).<br>• The assessment area at TCE area towards the east (TCE-5) was part of the sea and yet to be reclaimed. | • The assessment area at TCWF (TCWF-1) was reclaimed.<br>• Vacant land was observed within the assessment area at TCWF (TCWF-1). | • Some roads and an open space were observed at the reclaimed part of the assessment area at TCW area to the north of Rocky Lion Hill (TCW-1).<br>• Some roads and vegetated land as well as an open bicycle parking area were observed within the assessment area at TCW area at and in the vicinity of Yu Tung Road and Chung Mun Road (TCW-2, TCW-3 and TCW-5).<br>• Some temporary structures (abandon containers) were observed within the assessment area at TCW area to the west of Yat Tung Estate (TCW-4).<br>• An open carpark was observed within the assessment area at TCW area to the south of Yu Tung Road (TCW-6).<br>• No significant change in land use was observed as compared with Year 1993 within the northern portion of the assessment area at |

| Year | Description | | |
|---|---|---|---|
| | **Tung Chung East** | **Tung Chung Waterfront** | **Tung Chung West** |
| | | | TCW area near Ma Wan New Village (TCW-7). |
| 2012 | • More vegetation was observed within the assessment area at TCE area towards the west (TCE-2).<br>• The containers observed within the assessment area at TCE area towards the west (TCE-3) in Year 2004 were removed.<br>• No other significant change in land use was observed as compared with Year 2004 within the assessment area at TCE area (TCE-1, TCE-2, TCE-3, TCE-4 and TCE-5). | • More vegetation was observed within the assessment area at TCWF (TCWF-1).<br>• Some vegetation at the western corner of the assessment area at TCWF (TCWF-1) was cleared and left vacant. | • No significant change in land use was observed as compared with Year 2004 within the assessment area at TCW area (TCW-1, TCW-2, TCW-3, TCW-4, TCW-5, TCW-6 and TCW-7). |
| 2018 | • The vegetation observed within the reclaimed part of the assessment area at TCE area towards the west (TCE-4) in Year 2004 and Year 2012 was cleared and left vacant.<br>• New temporary structures were observed within the reclaimed part of the assessment area at TCE area towards the west (TCE-2).<br>• No other significant change in land use was observed as compared with Year 2012 within the assessment area at TCE area (TCE-1, TCE-2, TCE-3, TCE-4 and TCE-5). | • The vegetation observed within the assessment area at TCWF (TCWF-1) in Year 2012 were cleared.<br>• A temporary structure and construction material storage were observed within the assessment area at TCWF (TCWF-1). | • Less vegetation was observed within the assessment area at TCW area near Chung Mun Road (TCW-3). Some vegetation at the northern part was cleared and left vacant.<br>• The open carpark observed within the assessment area at TCW area to the south of Yu Tung Road (TCW-6) in Year 2004 and Year 2012 were removed and occupied by temporary structures.<br>• Some vegetation observed within the assessment area at TCW area near Ma Wan New Village (TCW-7) since Year 1973 was cleared and occupied by temporary structures.<br>• No other significant change in land use was observed as compared with Year 2012 within the northern portion of the assessment area at TCW area (TCW-1, TCW-2, TCW-3, TCW-4, TCW-5, TCW-6 and TCW-7). |

### 7.5.3 Site Geology

**7.5.3.1** The onshore superficial deposits adjacent to the TCE area typically consist of reclamation fill, underlain by alluvial deposits. In closer proximity to the natural

terrain located to the south, colluvial deposits of sand, gravel, cobbles, and boulders in a clay/silt/sand matrix are also expected.

**7.5.3.2** The onshore superficial deposits around TCW area are generally composed of alluvium and slope debris over the terrain. Localised patches of beach deposits are located close to the existing coastline with marine sand in the shallow sea environment to the north of Ma Wan Chung. Reclamation fill can also be found near the existing Tung Chung Station. The bedrock is dominated by granite and feldsparphyric rhyolite.

## 7.6 Site Surveys

**7.6.1.1** Site surveys were conducted from Aug to Oct 2020 and from Feb to May 2021. The findings of the site surveys are described in **Table 7.5** and the site survey photographs are presented in **Figure 7.4**. The site survey checklist is annexed in Appendix B of **Appendix 7.1**.

**Table 7.5:** Summary of the findings of the site surveys

| Assessment Area ID | Location | Observation |
|---|---|---|
| TCE-1 | East of Ying Tung Estate | • Rail tracks and pedestrian walkway were observed (**Photo 1** and **Photo 1a** in **Figure 7.4a**)<br>• Some land was under reclamation (**Photo 2** and **Photo 2a** in **Figure 7.4a**)<br>• No potential contamination activity was observed |
| TCE-2 | South of Ying Tung Estate | • Civil Engineering and Development Department (CEDD) site offices, car parking area and storage area for general construction materials (e.g. steel bars and core boxes) were observed. The ground was observed to be concrete-paved (**Photo 3** and **Photo 4** in **Figure 7.4b**)<br>• No potential contamination activity was observed |
| TCE-3 | East of Caribbean Coast | • Open carpark and pedestrian walkway were observed. The ground was observed to be concrete-paved (**Photo 5** to **Photo 7** in **Figure 7.4c**)<br>• No potential contamination activity was observed |
| TCE-4 | Near Tung Chung North Park | • Vacant land was observed. The ground was observed to be unpaved. Vegetation was observed on the ground. No stain with land contaminating potential was revealed. (**Photo 8** and **Photo 9** in **Figure 7.4d**). Part of the ground which has relatively darker colour as shown in **Photo 8** and **Photo 9** was mixture of grass and rocks with no land contaminating potential<br>• No potential contamination activity was observed |
| TCE-5 | Near Tuen Mun Chek Lap Kok Link | • Land was under reclamation (**Photo 10** in **Figure 7.4e**)<br>• No potential contamination activity was observed |
| TCWF-1 | At Tung Chung Waterfront | • CEDD site offices, car parking area and storage area for general construction materials and |

| Assessment Area ID | Location | Observation |
|---|---|---|
| | | equipment (e.g. steel bars, container site offices, barriers and mobile cranes) were observed (**Photo 11** to **Photo 13** in **Figure 7.4f**)<br>• The ground was observed to be concrete-paved<br>• No potential contamination activity was observed |
| TCW-1 | Near Tung Chung Crescent | • Open space, Shun Tung Road and vegetated land at the hillside of Rocky Lion Hill were observed (**Photo 14** and **Photo 15** in **Figure 7.4g**)<br>• No potential contamination activity was observed |
| TCW-2 | North of Mun Tung Estate near Yu Tung Road | • Vegetated land was observed (**Photo 16** in **Figure 7.4h**)<br>• No potential contamination activity was observed |
| TCW-3 | Northwest of Mun Tung Estate near Chung Mun Road | • Vegetated land and open bicycle parking area were observed (**Photo 17** and **Photo 18** in **Figure 7.4i**)<br>• No potential contamination activity was observed |
| TCW-4 | North and West of Yat Tung Estate | • Access road and pedestrian walkway were observed along Yat Tung Estate (**Photo 19** to **Photo 22** in **Figure 7.4j**)<br>• Place of worship was observed at the northern part (**Photo 23** in **Figure 7.4j**)<br>• Access road and vegetated land surrounded by fence were observed at the northern and central parts (**Photo 24** to **Photo 26** in **Figure 7.4k**)<br>• Vegetated land and open storage areas for household items including tables, chairs and plants were observed at the southern part. Rainwater stains were observed on the ground. No stain with land contaminating potential was revealed (**Photo 27** and **Photo 28** in **Figure 7.4k**)<br>• No potential contamination activity was observed |
| TCW-5 | At and in the vicinity of Yu Tung Road | • Yu Tung Road, pedestrian walkway and vegetated land were observed (**Photo 29** to **Photo 32** in **Figure 7.4l**)<br>• No potential contamination activity was observed |
| TCW-6 | Northeast of Mun Tung Estate and South of Yu Tung Road | • Vacant land was observed. The ground was observed to be unpaved. Vegetation was observed on the ground. No stain with land contaminating potential was revealed. (**Photo 33** and **Photo 34** in **Figure 7.4m**)<br>• No potential contamination activity was observed |
| TCW-7 | Near Ma Wan New Village | • Water Supplies Department (WSD) site offices, car parking area, storage area for general construction materials (e.g. wooden plank, plastic pipework) and access road were observed. The ground was observed to be unpaved. Vegetation was observed on the ground. No stain with land contaminating potential was revealed (**Photo 35**, **Photo 36** and **Photo 36a** in **Figure 7.4n**)<br>• No potential contamination activity was observed |

## 7.7 Information from Relevant Government Departments

### 7.7.1 Environmental Protection Department

**7.7.1.1** Information requests have been sent to EPD to enquire:

- Past and present chemical spillage/ leakage records in the assessment area; and
- Records of Chemical Waste Producers Registration (CWPR) in the assessment area.

**7.7.1.2** Based on the information provided by EPD on 16 March 2021, no record of chemical spillage/ leakage incident within the assessment area was found. Record of CWPR was reviewed at EPD office on 10 May 2021. No record of CWPR within the assessment area was found. The correspondence with EPD is enclosed in Appendix C of **Appendix 7.1**.

### 7.7.2 Fire Services Department

**7.7.2.1** Information requests have been sent to Fire Services Department (FSD) to enquire:

- Records of Dangerous Goods (DGs) License issued in the assessment area;
- Any past and present information related to the use and/ or storage of DGs in the assessment area; and
- Past and present incident records in the assessment area.

**7.7.2.2** Based on the information provided by FSD on 24 March 2021, no record of DGs license and spillage/ leakage of DGs within the assessment area were found. Ten incident records were found in which two of them (i.e. traffic accident at Yu Tung Road and vehicle fire at Hei Tung Street) could potentially involve oil/ fuel leakage. Upon review of further information provided by FSD, it was revealed that one of these concerned incidents (i.e. vehicle fire at Hei Tung Street) was happened outside the assessment area (i.e. at open ground near public works regional laboratory (North Lantau)). For the other concerned incident (i.e. traffic accident at Yu Tung Road), oil/ fuel leakage was not involved. The correspondence with FSD is enclosed in Appendix D of **Appendix 7.1**.

## 7.8 Future Land Use

**7.8.1.1** The RBRGs have developed four different post-restoration land uses, namely "Urban Residential", "Rural Residential", "Industrial" and "Public Parks", to reflect actual settings which people could be exposed to contaminated soil or groundwater. Definitions of post-restoration land uses are given in EPD's *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management*.

7.8.1.2 The land use element to be considered within the assessment area is "Railways". Hence, in case environmental SI works are required, the RBRGs for "Industrial" would be adopted for result comparison.

## 7.9 Identification of Potentially Contaminated Area

### 7.9.1 South of Ying Tung Estate (TCE-2)

7.9.1.1 From the Year 2018 aerial photograph, temporary structures were observed within the assessment area at TCE area to the south of Ying Tung Estate (TCE-2). Those temporary structures were confirmed to be CEDD site offices during the site surveys conducted in Year 2020 and Year 2021 with no land contaminating potential. Therefore, no land contamination issue is anticipated.

### 7.9.2 East of Caribbean Coast (TCE-3)

7.9.2.1 From the Year 2004 aerial photograph, containers were observed within the assessment area at TCE area to the East of Caribbean Coast (TCE-3). In order to confirm the use and nature of those containers, historical site survey photograph in Year 2009 was found and reviewed. From the Year 2009 site survey photograph (**Photo 37** in **Figure 7.4c**), containers were also observed at the same location. Those containers were observed to be unused site offices installed with windows and doors. It is thus believed that those containers observed in the Year 2004 aerial photograph were also site offices with no land contaminating potential. In addition, it was observed that the land condition within TCE-3 remained the same since 2004 in which the ground was well-paved with concrete. Therefore, no land contamination issue is anticipated.

### 7.9.3 At Tung Chung Waterfront (TCWF-1)

7.9.3.1 From the Year 2018 aerial photograph, a temporary structure was observed within the assessment area at TCWF (TCWF-1). The temporary structure was confirmed to be CEDD site office during the site surveys conducted in Year 2020 and Year 2021 with no land contaminating potential. Therefore, no land contamination issue is anticipated.

### 7.9.4 North and West of Yat Tung Estate (TCW-4)

7.9.4.1 No potential land contaminating land uses were observed within the assessment area to the north and west of Yat Tung Estate (TCW-4) which include the observed access road, pedestrian walkway, place of worship, vegetated land and open storage areas for household items.

7.9.4.2 As mentioned in **Table 7.5**, rainwater stains were observed on the ground at TCW-4. No stain with land contaminating potential was revealed.

**7.9.4.3** In the approved TCNTE EIA, a site with industrial land use (i.e. TC-2) which contained abandoned containers with no land contaminating potential were revealed within the assessment area to the west of Yat Tung Estate (TCW-4). Nevertheless, site re-appraisal was recommended in the approved TCNTE EIA to address any change in land use that might give rise to potential land contamination issues. From the Year 2018 aerial photograph, neither land contaminating land uses nor activities were observed within TCW-4. This was further confirmed by site surveys conducted in Year 2020 and Year 2021 in which the abandoned containers were found to be removed and only non-land contaminating land uses such as vegetated land and open storage areas for household items were observed within TCW-4. Therefore, no land contamination issue is anticipated.

### 7.9.5 Northeast of Mun Tung Estate and South of Yu Tung Road (TCW-6)

**7.9.5.1** As mentioned in **Table 7.5**, vegetation was observed on the ground at TCW-6. No stain with land contaminating potential was revealed.

**7.9.5.2** From the Year 2004 and Year 2012 aerial photographs, an open carpark was observed with the assessment area at TCW area to the south of Yu Tung Road (TCW-6). As no land contaminating activities such as vehicle repairing were observed within TCW-6, no land contaminating potential was identified. From the Year 2018 aerial photograph, temporary structures were observed within TCW-6. In order to confirm the use and nature of those temporary structures, historical site survey photograph in Year 2017 was found and reviewed. From the Year 2017 site survey photograph (**Photo 38** in **Figure 7.4m**), temporary structures were also observed at the same location. Those temporary structures were observed to be site offices. It is thus believed that that temporary structures observed in the Year 2018 aerial photographs were also site offices with no land contaminating potential. Site surveys were conducted in Year 2020 and Year 2021 to review the latest land condition at TCW-6. As summarized in **Table 7.5**, vacant land with unpaved ground was observed. Nevertheless, based on the Year 2004, Year 2012 and Year 2018 aerial photographs, TCW-6 was previously concrete-paved. The concrete paving at TCW-6 was likely removed by contractor prior to the return of the land to government. No potential contamination activity was observed. Therefore, no land contamination issue is anticipated.

### 7.9.6 Near Ma Wan New Village (TCW-7)

**7.9.6.1** From the Year 2018 aerial photograph, temporary structures were observed within the assessment area at TCW area near Ma Wan New Village (TCW-7). Those temporary structures were confirmed to be WSD site offices during the site surveys conducted in Year 2021 with no land contaminating potential. Apart from the site offices, car parking area as well as storage area for general construction materials were also observed during site surveys with no sign of land contamination.

Moreover, interview was conducted with the site agent. It was confirmed during the interview that no chemicals had been used on site for daily operations and there was no underground oil storage tank on site. Therefore, no land contamination issue is anticipated.

### 7.9.7 Rest of the Assessment Area

**7.9.7.1** No land contamination issue is anticipated for the rest of the assessment area (i.e. TCE-1, TCE-4, TCE-5, TCW-1, TCW-2, TCW-3 and TCW-5) based on desktop review findings and confirmed by site surveys.

## 7.10 Conclusion

**7.10.1.1** This land contamination assessment examined the potential contaminative land uses within the assessment area and their potential impacts to future use. The assessment involved desktop review, site surveys and identification of potentially contaminated area etc.

**7.10.1.2** Based on desktop review findings, the information collected during the site surveys and from relevant government departments, no potentially contaminated areas are identified within the assessment area, which includes the Project as shown in **Figure 7.1** as well as the associated work areas of the Project except for the underground work area at Tung Chung West area. Since tunnelling work would be conducted underneath the soil layer for the underground work area at Tung Chung West area, land contamination is considered irrelevant issue for this underground work area and hence it has been excluded from the assessment area. No land contamination issue within the assessment area, and thus the Project Area, is anticipated, and environmental SI works are not recommended.

**7.10.1.3** Since major construction works for the Project are anticipated to commence in 2023, site re-appraisal would be recommended by the Project Proponent to assess the latest site situation prior to the commencement of the construction. The objective of re-appraisal is to ensure any new changes in land use activities that might cause land contamination issue after the agreement of the LCR but before commencement of the construction could be addressed.

**7.10.1.4** If environmental SI is deemed necessary upon site re-appraisal, a Contamination Assessment Plan (CAP) will be prepared. A Contamination Assessment Report (CAR) will be prepared following SI activities, if required. If contamination is identified in the CAR, a Remediation Action Plan (RAP) will be developed to deal with these areas prior to the construction works for the Project. The RAP would follow the requirements specified in EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*. A Remediation Report (RR) would be prepared to demonstrate adequate clean-up and submitted to EPD for endorsement prior to the commencement of development works within the Project Area.