

7 LAND CONTAMINATION

7.1 INTRODUCTION

- 7.1.1 This *Section* presents the potential implications of land contamination due to historical and current land uses within the Project site.
- 7.1.2 Site appraisal, including desktop review and site walkover, was conducted to identify the presence of potential land contamination and assess the potential land contamination impacts within the Project site. Should any historical or current land contamination activities and potential land contamination issues be identified in this EIA, further land contamination assessment would be recommended to be undertaken prior to the commencement of the construction phase.

7.2 LEGISLATION, STANDARDS AND GUIDELINES

- 7.2.1 The following EPD's guiding documents are referenced for this land contamination assessment:
- *Annex 19 of the Technical Memorandum on Environmental Impact Assessment Process (Annex 19 of EIAO-TM)*;
 - *Guidance Note for Contaminated Land Assessment and Remediation (the RBRGs Guidance Note)*;
 - *Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management (the RBRGs Guidance Manual)*; and
 - *Practice Guide for Investigation and Remediation of Contaminated Land (the Practice Guide)*.
- 7.2.2 The following legislation, documents and guidelines may cover or have some bearing upon the assessment of contamination and the handling, treatment and disposal of contaminated materials for this Project:
- *Dangerous Goods Ordinance (CAP.295)*;
 - *Water Pollution Control Ordinance (WPCO) (CAP.358)*;
 - *Waste Disposal Ordinance (WDO) (CAP.354)*;
 - *Waste Disposal (Chemical Waste) (General) Regulation (CAP.354C)*; and
 - *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*.

7.3 DESCRIPTION OF THE ENVIRONMENT

- 7.3.1 This Project aims to improve the traffic mobility of Ming Kum Road, Tsing Wun Road and Lung Mun Road. A pair of elevated slip roads connecting Tsing Wun Road and Lung Fu Road (LFRSR NB and LFRSR SB), and a slip road between Tuen Mun Road and Hoi Wing Road (HWRSR) will be built under this Project. The locations of the LFRSR NB and LFRSR SB, and HWRSR Project sites and the relevant work limits are shown in **Figures 7.1a and 7.1b** respectively.

Slip road connecting Tsing Wun Road to Lung Fu Road (LFRSR NB and LFRSR SB)

7.3.2 As shown in the site location provided in **Figure 7.1a**, the LFRSR NB and LFRSR SB Project site are located on generally flat terrain and is mainly bounded by high-rise residential buildings to the southeast, multi-storey industrial buildings to the northeast, scattered villages, vegetated land and educational institutions to the west.

Slip road linking Tuen Mun Road and Hoi Wing Road (HWRSR)

7.3.3 Based on **Figure 7.1b**, the HWRSR Project site is located on flat terrain and is mainly bounded by high-rise residential buildings to the northeast and east, educational institutions and a community hall to the northwest, a temple to the southwest, and a vegetated slope to the south.

7.3.4 The Project work limits are shown in **Figures 7.1a and 7.1b**. The Project would include the construction of at-grade roads, elevated roads and other associated works where soil excavation would be anticipated within the Project sites.

3.2.4 The land uses in close vicinity of the three Project sites are urban residential, industrial use and vehicle road networks. As the land uses do not rely on the use of groundwater, it is considered that there were no sensitive receivers located adjacent to or in close proximity to the Project site from a land contamination assessment point of view.

7.4 ASSESSMENT METHODOLOGY

7.4.1 Land contamination assessment was undertaken in accordance with the criteria set out in Annex 19 of the EIAO-TM, as well as other Guidance Notes, Practice Guide, Guidance Manual and related legislation as presented in **Section 7.2**.

7.4.2 A site appraisal, including desktop review and site walkover, was conducted to identify the potentially contaminating activities that may pose an adverse impact on the Project sites. Site walkovers were conducted within the Project sites to review the general site conditions and to identify any sources of land contamination. For the desktop review, the following information was reviewed:

- Historical aerial photos from the Lands Department (LandsD);
- Hong Kong Geological Survey Map (Series HGM20) – Sheet No. 5 and 6 (1:20,000); and
- Records on dangerous goods (DGs), chemical wastes, chemical spillage/leakage and fire incidents from the identified potentially contaminated sites from Environmental Protection Department (EPD) and Fire Services Department (FSD).

7.5 IDENTIFICATION OF POTENTIAL LAND CONTAMINATION

Desktop Appraisal

Historical Land Uses

7.5.1 A review of past land uses of the Project sites was conducted by reviewing the relevant historical aerial photographs in the years between 1963 and 2021 and the available topography map in 1977. The aerial photographs and topography map in 1977 were obtained from the Surveys and Mapping Office of LandsD. This review aims to evaluate potential land contamination implications associated with any land changes within the Project sites. The historical land uses within the LFRSR Project site and HWRSR Project site are presented in **Table 7.1** and **Table 7.2**, respectively. The referenced historical aerial photographs for the

LFRSR Project site and HWRSR Project site are attached in **Appendix 7.1a** and **Appendix 7.1b**, respectively. The topography map in 1977 is attached in **Appendix 7.1c** for reference.

Table 7.1 Summary of Historical Land Uses at LFRSR NB & LFRSR SB

Year	Aerial Photo Reference and Date	Land Use Observations
1963	63_6389 31 Jan 1963	LFRSR NB & LFRSR SB Project sites and the surroundings were mainly natural terrains, agricultural lands and sea areas.
1969	69_2452 date not available	Site formation and vehicle roads were developed along the coastline within LFRSR NB & LFRSR SB Project sites.
1977	19651 5 Dec 1977	Based on the topography map in 1977, sawmills were observed along the coastline at the south within LFRSR NB & LFRSR SB Project sites. Sawmills were for cutting timber logs to lumbers.
1983	50894 28 Nov 1983	Site formation was discovered at the east of the LFRSR NB & LFRSR SB Project sites. Wong Chu Road was developed to cross the Tuen Mun River Channel and connect Tsing Wun Road and Lung Mun Road. The remaining parts of LFRSR NB & LFRSR SB Project sites remained unchanged.
1984	55523 24 Jul 1984	Construction of at-grade and elevated vehicle road networks connecting Lung Mun Road, Lung Fu Road, Tsing Wun Road and Wong Chu Road and associated road access were observed. The remaining parts of LFRSR NB & LFRSR SB Project sites remained unchanged.
1989	A18589 6 Oct 1989	Road networks within the LFRSR NB & LFRSR SB Project sites were developed. The sawmills along the coastline were being demolished.
1990	A24339 3 Dec 1990	Reclamation works commenced at the south of the LFRSR NB & LFRSR SB Project sites. The sawmills along the coastline were being demolished.
1997	CN17418 28 May 1997	The roundabout at Lung Mun Road between the residential development Lung Mun Oasis and Glorious Garden was developed.
2008	CS21786 10 Dec 2008	The construction of Lung Chak Road was completed.
2014	CS48421 22 Jan 2014	The construction of Yip Wong Road was completed.
2021	E128363 18 Jan 2021	No significant change was observed since 2014.

Table 7.2 Summary of Historical Land Uses at HWRSR

Year	Aerial Photo Reference and Date	Land Use Observations
1963	63_0454 24 Feb 1963	The HWRSR Project site was mainly located within the natural terrain. The north part of the HWRSR Project site was located along the coastline of Castle Peak Bay.
1976	15703 18 Oct 1976	Site formation and construction of Tuen Mun Road were in progress at the southeast of the HWRSR Project site.
1978	23890 24 Nov 1978	Construction of Tuen Mun Road within the HWRSR Project site was completed.
1988	A15474 5 Nov 1988	Reclamation of sea and site formation works at the northwest of the HWRSR Project site were observed.
1990	A22816 1 Oct 1990	At the northwest of the HWRSR Project site, the construction of Hoi Wing Road was in progress.
1991	A29291 14 Nov 1991	The construction of Hoi Wing Road and Castle Peak Road (Castle Peak Bay) were completed at the northwest of the HWRSR Project site.
2001	CW31646 18 Jun 2001	No significant change was observed compared to 1991.

Year	Aerial Photo Reference and Date	Land Use Observations
2011	CW92671 11 Dec 2011	Retaining walls at Tuen Mun Road Northbound was observed. The construction of noise barriers and enclosures for Tuen Mun Road were also observed.
2021	E128906C 18 Jan 2021	No significant change was observed compared to 2011.

Site Geology

LFRSR NB & LFRSR SB

- 7.5.2 The superficial geology of the Project sites generally comprises fills materials and various Quaternary deposits. According to the published 1:20,000 Geological Map (Sheet No.5 and 6) and the archival ground investigation records, the LFRSR NB and LFRSR SB Project sites comprise fill materials, debris flow, marine sand and alluvium. The rock type to be encountered is Jurassic Tuen Mun Adesite Member (Jua) under Tuen Mun Formation. The Tuen Mun Adesite Member comprises fine to coarse grain, light grey lithic lapilli bearing metatuff.

HWRSR

- 7.5.3 The superficial geology of the Project sites generally comprises fills materials and various Quaternary deposits. According to the published 1:20,000 Geological Map (Sheet No.5 and 6) and the archival ground investigation records, the HWRSR Project site comprise fill materials and marine deposits (including marine mud and marine sand). The rock type to be encountered within the HWRSR Project site is Jurassic Lantau Granite (Jml_gc), which is coarse-grained biotite granite grey in colour and contains quartz, plagioclase feldspar and alkali feldspar in roughly equal proportions, as well as hornblende and biotite.

Record of Chemical Waste Producer

- 7.5.4 An enquiry was made to the EPD on the chemical waste producer record of all the Project sites. A visit to the Chemical Waste Collection Licensing Section of the EPD Territorial Control Office was arranged on 21 December 2021 and information related to Chemical Waste Producer (CWP) registered in the Project sites was extracted. Only one valid CWP record (see **Table 7.3**) was found in EPD's current and historical CWP registration. The location of the CWP record is presented in **Figure 7.2**.

Table 7.3 Record of CWP Registration

Location	Name of CWP	Description of the CWP Registration	Status
LFRSR NB & LFRSR SB	Chun Wo Construction and Engineering Company	For DSD's project DC/2018/09 – "Rehabilitation of Trunk Sewers in Tuen Mun"	Valid

- 7.5.5 Based on the available CWP record from EPD, the CWP record is associated with the construction of the Drainage Service Department (DSD)'s project DC/2018/09 – "Rehabilitation of Trunk Sewers in Tuen Mun". A site visit was arranged on 29 March 2022 to the DSD's construction site. As advised by the DSD's site representatives, the DSD's construction site is divided into two areas, named "Works Area" and "Site Office" (hereafter "DSD's Works Area" and "DSD's Site Office"). The storage area of chemical waste is located within the "DSD's Site Office", which is outside of the LFRSR NB & LFRSR SB Project sites. It is expected that any chemical waste storage and/or handling associated with the CWP record is not anticipated within the LFRSR NB & LFRSR SB Project sites.
- 7.5.6 In view of the above, with no chemical waste storage and/or handling within the LFRSR NB & LFRSR SB Project sites based on the CWP record, no land contamination issue at the LFRSR NB & LFRSR SB Project sites is anticipated.

Record of Chemical Spillage Incidents

- 7.5.7 Letters were sent to the EPD and Fire Service Department (FSD) on the records of chemical spillage incidents and chemical leakage for all the Project sites (see **Appendix 7.2**). Based on the replies from EPD and FSD, no records of chemical spillage incidents and chemical leakage were found within all the Project sites.

Record of Fire Incidents

- 7.5.8 A letter was sent to the FSD on the records of Dangerous Goods (DGs) and records of reported fire incidents at the Project sites (see **Appendix 7.2**). Based on the reply from FSD, there were no DG license records identified within all the Project sites. Yet, eight fire incidents were reported within all the Project sites. **Table 7.4** below presents the incident records provided by FSD. The locations of the fire incidents are shown in **Figure 7.3**.

Table 7.4 Record of Fire Incidents from FSD

Incident ID	Date	Project Site Involved	Approximate Address	Type of Incident
1	4 October 2019	LFRSR NB & LFRSR SB	Near Lamppost AD0417B, Lung Mun Road	Vehicle Fire
2	29 April 2020	HWRSR	Near Lamppost DD2121, Near Castle Peak Road	Vehicle Fire
3	5 May 2020	HWRSR	Near On Ting Estate, Tuen Mun Road	No.2 Fire Alarm
4	15 October 2020	LFRSR NB & LFRSR SB	Near Lamppost AD0409, Near Lung Mun Road	No.1 Fire Alarm
5	15 December 2020	LFRSR NB & LFRSR SB	Near Lamppost AD0422, Near Lung Mun Road	No.1 Fire Alarm
6	19 December 2020	LFRSR NB & LFRSR SB	Near Lamppost AD0409, Near Lung Mun Road	No.1 Fire Alarm
7	20 April 2021	LFRSR NB & LFRSR SB	Near Lamppost AD0395, Lung Mun Road	No.1 Fire Alarm
8	5 June 2021	LFRSR NB & LFRSR SB	Near Lamppost AD0395, Lung Mun Road	No.1 Fire Alarm

- 7.5.9 Based on the FSD's records, there were five "No.1 Fire Alarm" fire incidents and one vehicle fire incident reported within the LFRSR NB & LFRSR SB Project site in the last two years. Although those fire incidents were within the Project sites, they were minor fire cases in terms of extinguishing resources allocated by FSD. No burnt stains remained nearby the locations of "No.1 Fire Alarm" incidents. The vehicle fire incident was properly extinguished by FSD and no oil or burnt stains remained on the road. It is not expected to pose any potential land contamination issues to the LFRSR NB & LFRSR SB Project sites.
- 7.5.10 One "No.2 Fire Alarm" fire incident reported near On Ting Estate was a vehicle fire incident. The vehicle fire incident was properly extinguished by FSD and no oil or burnt stains remained on the road. As the fire incident location is situated more than 500m to the north of the HWRSR Project site (refer to **Figure 7.3**), the fire incident is not expected to pose any potential land contamination issues to the HWRSR Project site.
- 7.5.11 One vehicle fire incident was reported within the HWRSR Project site. The vehicle fire incident was properly extinguished by FSD and no oil or burnt stains remained on the road. The fire incident is not expected to pose any potential land contamination issues to the HWRSR Project site.

Site Walkover

- 7.5.12 Site walkovers were conducted on 23 December 2021, 29 March 2022 and 3 April 2022 to observe all the Project sites' land conditions and identify signs of potential land contamination. Site walkover checklists are provided in **Appendix 7.3**.

LFRSR NB & LFRSR SB

- 7.5.13 Based on the findings of site walkovers, the LFRSR NB & NFRSR SB Project sites are mainly occupied by non-contaminating land uses including Lung Fu Road, Lung Mun Road, Tsing Wun Road, pedestrian access roads, vegetated land and trees (see Photos 1 to 6 in **Appendix 7.4a**). A construction site for DSD's project DC/2018/09 – "Rehabilitation of Trunk Sewers in Tuen Mun" is observed within LFRSR NB & LFRSR SB Project sites.
- 7.5.14 On 29 March 2022, a site visit was conducted for the construction site for DSD's project DC/2018/09 – "Rehabilitation of Trunk Sewers in Tuen Mun". As advised by the DSD's site representative, the DSD's construction site is divided into "DSD's Works Area" and "DSD's Site Office". The "DSD's Works Area" is within the LFRSR NB & LFRSR SB Project sites and undergoing the construction works; whilst the "DSD's Site Office" is outside of the LFRSR NB & LFRSR SB Project sites. Only construction equipment and materials are temporarily stored in the "DSD's Works Area", as advised by the site representative during the site visit. Neither storage/ handling of hazardous chemicals nor equipment repair/ maintenance activities were anticipated at the "DSD's Works Area" within the LFRSR NB & LFRSR SB Project sites (see Photos 7 to 11 in **Appendix 7.4a**). No potentially contaminating land activities and issues were identified within the "DSD's Works Area" during the site walkover.

HWRSR

- 7.5.15 Based on the findings of site walkovers, the HWRSR Project site is mainly occupied by non-contaminating land uses including a small portion of Hoi Wing Road, Castle Peak Road (Castle Peak Bay), Tuen Mun Road and street vegetation including trees (see Photos 17 to 18 in **Appendix 7.4b**). No potentially contaminating land uses or activities were observed in the HWRSR Project site during the site walkover.
- 7.5.16 During another site visit on 3 April 2022, a temporary site office under Civil Engineering and Development Department (CEDD)'s Contract No.GE/2019/10 – "Landslip Prevention and Mitigation Programme, 2017, Package D, Landslip Prevention and Mitigation Works" (Tuen Mun 6SW-A/R84 Slope) were observed on the pedestrian road within the HWRSR Project site. Some plastic fences were placed surrounding the CEDD's site office. As advised by the site representative, the temporary site office is only for office uses only. Neither storage/ handling of hazardous chemicals nor equipment repair/ maintenance activities are anticipated within the HWRSR Project site (see Photos 19 to 20 in **Appendix 7.4b**). No potentially land contamination activities and issues were identified within the CEDD's site office during the site walkover.

Summary

- 7.5.17 During the site walkovers, all Project sites are well paved with concrete, except for the DSD's works area at the LFRSR NB & LFRSR SB Project sites was bare land with vegetation. Neither storage/ handling of hazardous chemical and chemical waste nor equipment repair/ maintenance activities were observed within all Project sites. No evidence of oil stains or chemical leakages/ spillages was observed. Besides, no potential land contamination facilities, such as underground fuel oil storage tanks, underground oil pipelines, chemical and chemical waste storage areas, dangerous goods stores, wastewater treatment facilities and transformer rooms at all Project sites. Also, no signs of obvious/ suspected contamination such as abnormal odour and/or distressed vegetation were observed or notified at all Project sites.

7.6 PREDICTION AND EVALUATION OF ENVIRONMENTAL IMPACTS

- 7.6.1 With reference to the aerial photos and topography maps reviewed from the Survey and Mapping Office of LandsD, all of the Project sites were in undeveloped status (i.e. natural terrain, agricultural land and part of the Castle Peak Bay) in 1963 and before. Those Project sites were formed and gradually developed as the present. Based on the available topography map in 1977 and related aerial photos, sawmills were observed along the south of the coastline within LFRSR NB & LFRSR SB Project sites since 1977 and they were demolished in 1990. These sawmills were used for cutting timber logs into lumbers and no potential contamination activities were expected. No historical potential land contamination activities were identified within all Project sites. Details of the aerial photos were discussed in **Section 7.5.1** and presented in **Appendix 7.1a** and **7.1b**, and the topography map in 1977 is presented in **Appendix 7.1c**.
- 7.6.2 Based on the available CWP records from EPD, one valid CWP record was found associated with the DSD's construction site which is partially located in the LFRSR NB & LFRSR SB Project sites. The exact chemical waste storage area is located outside of the LFRSR NB & LFRSR SB Project sites. Based on the CWP record, it is expected that any chemical waste storage/handling is not anticipated within the LFRSR NB & LFRSR SB Project sites. Details of the CWP records were presented in **Table 7.3** and discussed in **Sections 7.5.4** to **7.5.6**. Moreover, further to the response from EPD and FSD, there are no records of chemical spillage incidents and chemical leakage incidents within all Project Sites. The responses from these government departments were provided in **Appendix 7.2**.
- 7.6.3 Referring to the responses from FSD, no DG licence records were identified within all Project sites. Yet, eight fire incidents were reported within all Project sites. Those fire incidents were minor fire cases in terms of extinguishing resources allocated by FSD. No burnt stains and no oil and/or burnt stains remained at and/or nearby the locations. In this connection, those reported fire incidents are not expected to pose any potential land contamination at the Project sites. Details of the incident records were presented in **Table 7.4** and **Appendix 7.2** and discussed in **Sections 7.5.7** to **7.5.11**.
- 7.6.4 In addition, according to the site walkovers, the majority of the area of all Project sites comprises concrete paved vehicle road networks and pedestrian access. DSD's Works Area and CEDD's site office were identified at the LFRSR NB & LFRSR SB Project sites and HWRSR Project site, respectively. No potential contamination activities (e.g. handling of hazardous chemical/chemical waste and repair/maintenance activities) and no potential land contamination facilities (e.g. aboveground/ underground fuel oil storage tank and oil pipeline, chemical and chemical waste storage area, dangerous goods store, wastewater treatment facility and transformer room) were observed at all three Project sites. Also, no signs of obvious/ suspected contamination such as abnormal odour and/or distressed vegetation were observed at all of the Project sites. Therefore, no potential land contamination activities and facilities were identified in all three Project sites. Details of the site walkovers were discussed in **Sections 7.5.12** to **7.5.16**, while site walkover checklists and photos are presented in **Appendices 7.3** and **7.4**.
- 7.6.5 In view of the above, no potential land contamination activities and facilities were identified within the Project sites. Therefore, it is considered that the land contamination impact associated with the Project is not anticipated. Further site investigation and mitigation measures are considered not necessary.

7.7 EVALUATION OF RESIDUAL IMPACTS

- 7.7.1 No land contamination impacts are anticipated for the Project. Thus, no residual impacts are expected.

7.8 ENVIRONMENTAL MONITORING AND AUDIT

- 7.8.1 No land contamination impacts are anticipated for the Project. Thus, environmental monitoring and audit for the Project are not required.

7.9 CONCLUSION

- 7.9.1 A desktop appraisal and site walkover were carried out to identify any potential land contamination activities and facilities within all Project sites.
- 7.9.2 Further to the discussion in **Section 7.6**, based on the findings of the desktop appraisal (including a review of historical aerial photos, request for information from related government departments and site walkovers), no potentially contaminating activities and facilities were identified within all the Project sites. Therefore, no adverse environmental impact in respect of land contamination is anticipated. Further SI works and mitigation measures are deemed not necessary for the Project.