



7. LAND CONTAMINATION

7.1 Introduction

7.1.1 This section presents the appraisal of the baseline situation for the land lots within the Study Area due to their past and present land uses history, which could be a potential of contaminated land issue, and the assessment on the implications of land contamination associated with the Project.

7.1.2 This assessment has based on the guidelines for evaluation and assessment of potential contaminated land as stated in Annex 19 of the EIAO-TM and has covered the scope outlined in Sections 3.4.5.3 and 3.4.5.4 of the EIA Study Brief.

7.2 Relevant Legislation, Standards & Guidelines

7.2.1 According to Annex 19 of the EIAO-TM, if a site with historical land uses which have the potential to cause or have caused land contamination, a Contamination Assessment Plan (“CAP”) has to be submitted as part of the EIA Report to the EPD for endorsement prior to conducting a contamination assessment of the site. The land contamination assessment results should be documented in a Contamination Assessment Report (“CAR”). If land contamination is confirmed, a Remediation Action Plan (“RAP”) should be prepared and submitted with the CAR as a combined report for the EPD’s approval. Upon the approval of the CAR/RAP, the site shall be cleaned up the contamination according to the approved RAP prior to any development or redevelopment of the site. The preparation of CAP, CAR and RAP shall be prepared in accordance with the relevant standards and guidelines issued by the EPD.

7.2.2 The EPD has issued three publications in relation to the land contamination assessment. They are:

- Guidance Note for Contaminated Land Assessment and Remediation (“Guidance Note”);
- Guidance Manual for use of Risk-based Remediation Goals (“RBRGs”) for Contamination Land Management (“Guidance Manual”); and
- Practice Guide for Investigation and Remediation of Contaminated Land (“Practice Guide”).

7.2.3 The Guidance Note sets out the requirements for proper assessment and management of potentially contaminated sites, provide guidelines on how site assessment should be conducted and suggest practical remedial measures that can be adopted for the clean-up of a contaminated site.

7.2.4 The Guidance Manual provides the background of the use of RBRGs and presents instructions for comparison of soil and groundwater data to the RBRGs.

7.2.5 The Practice Guide outlines the process for conducting land contamination assessment and remediation in Hong Kong and presents the standard investigation methods and remediation strategies for the range of potential contaminated sites and contaminants typically encountered in Hong Kong.



7.3 Assessment Methodology

7.3.1 The Study Area is defined as the areas within the Project boundary according to the EIA Study Brief. In order to identify land lots / sites within the Study Area that are potential contaminated sites and evaluate the land contamination impacts, the following approach was adopted for the land contamination assessment:

- Desktop study to review the current and historical land uses and identify any potential contaminative land uses within the Study Area; and
- Site reconnaissance to identify the existing land uses and confirm the general environmental conditions associated with each of the identified sites.

7.3.2 In addition, the following sources of information have been collected and reviewed:

- Aerial photographs from Lands Department (“LD”) taken between 1945–2011;
- Acquisition of information related to potential land contamination from the Environmental Compliance Division of EPD and Fire Services Department (“FSD”); and
- Records and photographs from site reconnaissance.

7.3.3 Potential contaminants and their associated potential hazardous risks to the land users and surrounding environment would be evaluated with reference to the EPD’s Guidance Note, Guidance Manual and Practice Guide.

7.4 Description of the Environment

7.4.1 Tai O is predominantly rural. The project areas are generally low-rise and low density developed areas including Wang Hang Village, Shek Tsai Po, Leung Uk Tsuen, Nam Chung Tsuen, Hang Mei, Fan Kwai Tong and Tai O Town.

7.4.2 These areas are composed of mainly residential developments, mixed with communal facilities and local shops.

7.5 Site History

7.5.1 Historical aerial photographs (as listed in **Table 7.1**) available in the Survey and Mapping Office at LD were reviewed to identify the potential contaminated sites.

Table 7.1 : Historical Aerial Photos Reviewed for Tai O

Year	Height (Feet)	Photograph Reference No.	Year	Height (Feet)	Photograph Reference No.
1945	20000	3092	1988	1100	A12483
1956	16700	0146	1990	2000	A20322
1962	30000	0012		2000	A21310
	30000	0014		2000	A20701
1963	3900	1047	1992	2000	CN2967
	3900	4536	1994	4000	CN9066
1968	NA	779	1996	3500	A43571
	NA	783	1998	4000	CN20508
1972	7700	1512	2000	4000	A51027
1973	6000	3570	2002	4000	CW43588
	1500	4035	2004	4000	CW59386
	1700	7105	2006	4000	CW72970
1973	1500	4037	2007	6000	CS07541



Year	Height (Feet)	Photograph Reference No.	Year	Height (Feet)	Photograph Reference No.
	1700	7122		6000	CS07535
1974	4000	10303	2008	6000	CS19217
1978	4000	22996		6000	CS12016
1980	5000	29189	2009	6000	CS22906
1982	NA	41938		6000	CS22755
1984	6000	57274	2010	6000	RS01327
1985	4000	A03496		6000	CS30757
1986	2000	A04119	2011	6000	CS33835
				6000	CS33828

7.5.2 The review of available historical aerial photographs indicates that Tai O consists of mainly residential villages, farmlands and salt pans areas. The oldest aerial photograph for Tai O was taken in 1945 when stilted houses were already built. In 1972, the Tai O Road was constructed. The aerial photograph of 1978 reveals that site formation work was undertaken for the farmlands located at north of Tai O Road. Lung Tin Estate was built in 1980 according to the 1980 aerial photograph. The 1994 aerial photograph indicates that Lung Hin Court was built in 1994. There were not many changes in land uses in Tai O after 1994. **Figures 7.1 to 7.6** show the aerial photographs of 1945, 1972, 1978, 1980, 1994 and 2011 for Tai O, respectively.

7.6 Review of Environmental Information from the Government

7.6.1 Information regarding historical records of chemical spillage, violations of environmental regulations and licenses / permits was requested from the FSD and the Regional Office (South) of the EPD for a review.

7.6.2 According to the information provided by the EPD, there are no records of chemical spillage in the past within the Project Areas. The relevant correspondence is provided in **Appendix 7.1**. The applicable period of chemical spillage record from EPD is summarized in **Table 7.2**.

Table 7.2 : Applicable Period of Chemical Spillage from EPD

Date of EPD response	Applicable Period
11 th October 2011	Based on information held in EPD database
25 th March 2015	2011 - 2015

7.6.3 In addition to the information provided from Regional Office (South) of the EPD, the list of Chemical Waste Producers was reviewed at Chemical Waste Collection Licensing Section of EPD on 1st October 2011, 18th October 2013 and 25th March 2015. **Table 7.3** lists the Chemical Waste Producers ("CWP") that are registered under the Waste Disposal (Chemical Waste) (General) Regulation near vicinity of the Project.



Table 7.3 : Records of Registration of Chemical Waste Producer near vicinity of the Project

ID	Name of Registered Chemical Waste Producers	Address	Business Type	Location Identified? (Yes / No)	Situated within proposed sewer works? (Yes / No)	Approximate distance from Project site boundary (m)
CWP1	Buddhist Fat Ho Memorial College	Tai O Road, Outlying Island, NT	Secondary School	Yes, refer to Figure 7.7	No	30
CWP 2	Department of Health	103 Shek Tsai Po Street, Tai O, Outlying Island, NT	Dispensary	Yes, refer to Figure 7.8	No	3
CWP 3	Hospital Authority	Tai O Jockey Club Clinic, 103 Shek Tsai Po Street, Tai O, Outlying Island, NT	Health Care	Yes, refer to Figure 7.8	No	3
CWP 4	PCCW-Lung Tin Exchange Station	Shop 7, Lung Tin Estate, Outlying Island NT	Provision of Telephonic Services	Yes, refer to Figure 7.7	No	15
CWP 5	PCCW-HK Limited	LOT 390, DD302, Shek Tsai Po St, Tai O, Outlying Island, NT	Provision of Telephonic Services	Yes, refer to Figure 7.8	No	6
CWP 6	Tai O (Sub-Div) Fire Station	120 Tai O Road, Outlying Island, NT	Fire Station	Yes, refer to Figure 7.7	No	6
CWP 7	Tai O (Old) Fire Station	102 Shek Tsai Po Street, Outlying, Island, NT	Civil Service	Yes, refer to Figure 7.8	No	3
CWP 8	Housing Department (Lung Tin Estate)	Lung Tin Estate, Tai O, Lantau Island	Public Rental Housing	Yes, refer to Figure 7.7	No	3
CWP 9	Water Supplies Department Hong Kong & Island	Tai O Road, Outlying Island, NT	Provision of Water Supplies & Attendant Services	Not identified in the vicinity of Project areas during site visits.	No, refer to Section 7.6.5	N/A
CWP 10	China International Water & Electric Corporation	Works Area "A", next to Yim Tin Pok Temporary Playground, Tai O, Lantau Island, N.T.	Corp.	Not identified in the vicinity of Project areas during site visits.	No, refer to Section 7.6.5	N/A
CWP 11	Tysan Foundation Limited	Study Area 9SW-C1SA1 in Tai O, Lantau Island, Outlying Island, N.T.	Foundation Engineering	Not identified in the vicinity of Project areas during site visits.	No, refer to Section 7.6.5	N/A

N/A: Not applicable

7.6.4 The location of CWP 1 to CWP 8 was identified during the site visits within the vicinity of the Project areas. Based on site observation they were considered not to pose any land contaminating risk to adjacent area. The locations of identified chemical waste producers are shown in **Figure 7.7 and 7.8**.

7.6.5 There is no sufficient information at EPD's office to map the exact locations of CWP9, CWP 10 and CWP 11 and no similar uses were identified in the vicinity of the project areas during the recent site visits in December 2014. Therefore, no



potential land contamination is anticipated from the CWP's to the Project as all CWP's as shown in **Table 7.3** are situated outside the proposed sewer works.

- 7.6.6 According to the information provided by the FSD (**Appendix 7.2**), there are no records of chemical spillage in the past within the Project Areas (**Table 7.4**). To this end, it no particular land contamination potential was identified, due to the operation of the identified CWP's.

Table 7.4 : Applicable Period of Chemical Spillage from FSD

Date of FSD response	Applicable Period
15 th November 2013	Past 3 years (November 2010 – November 2013)
18 th March 2015	Past 3 years (March 2012 – March 2015)

- 7.6.7 **Table 7.5** lists the dangerous goods stores that are near vicinity of the Project.

Table 7.5 : Records of Registration of Dangerous Goods Stores

ID	Location of Registrant	Type of Dangerous Goods	Method of Storage	Location Identified? (Yes / No)	Situated within proposed sewer works? (Yes / No)	Approximate distance from Project site boundary (m)
DG1	Kat Hing Street, Tai O, Lantau Island	Substances giving off inflammable vapour	Licensed DG Store on G/F	Yes, refer to Figure 7.9	No	15
DG2	Shek Tsai Po Street, Lantau Island	Ethyl Alcohol	Licensed DG Store on G/F	Not identified in the vicinity of Project areas during site visits.	N/A	N/A

N/A: Not applicable

- 7.6.8 DG1 was considered to be kerosene storage for domestic cooking use. The location of the store was provided in **Figure 7.9**. DG1 was concrete paved with no sign of spillage or leakage. The storage was considered to be well-maintained and not to pose any land contaminating risk to adjacent area.
- 7.6.9 The location of DG2 was not identified within the vicinity of the Project areas during the site visits, DG2 was considered not to pose any land contamination risk to the Project adjacent area.
- 7.6.10 According to information provided by the FSD (**Appendix 7.2**), there are no records for spillage or leakage of dangerous goods at the above listed dangerous good stores. Furthermore, all dangerous goods stores are situated outside the proposed sewer works and no potential land contamination is anticipated from the dangerous goods stores to the Project.



7.7 Identification and Evaluation of Potential Impacts

- 7.7.1 Site reconnaissance was first undertaken on 17th November 2011. Based on site observations, the majority of the proposed sewerage pipes are along public and vehicular access roads which are concrete paved areas. The proposed Hang Mei SPS and Fan Kwai Tong SPS were vacant. There were no potential contaminated sites identified within the proposed construction areas at Hang Mei SPS and Fan Kwai Tong SPS. Current site photographs for the proposed Hang Mei SPS and Fan Kwai Tong SPS are shown in **Figure 2.12** and **Figure 2.13**. The existing Tai O STW was a primary treatment facility comprised an Imhoff Tank for solid separation and sedimentation. The existing layout of plan of Tai O STW is provided in **Figure 7.10**. The process was only a physically process and no chemical was applied during the treatment and there is no chemical storage or potential land contaminative activities undertaking in existing Tai O STW. Therefore, the existing Tai O STW is not considered to have potential for land contamination with reference to the Practice Guide. Current site photographs for the existing Tai O STW and the proposed layout plan of Tai O STW are shown in **Figure 2.2**.
- 7.7.2 Recent site reconnaissance was undertaken on 12th December 2014. The findings were similar to the previous reconnaissance. No potential contaminated sites were identified within the Project Area. Additional photographic log with location plan was provided in **Appendix 7.3**.
- 7.7.3 The review of historical aerial photographs and with Tai O origin as a traditional fishing village also indicated that there were no potential contaminated land uses within the Tai O STW project site boundary and in the vicinity of the proposed construction areas at Hang Mei SPS and Fan Kwai Tong SPS. The proposed construction areas at Hang Mei SPS and Fan Kwai Tong SPS has been vacant land since 1945.
- 7.7.4 Site visits were also undertaken for the chemical waste producer and dangerous goods stores as listed in **Tables 7.3** and **7.5**. The Buddhist Fat Ho Memorial College (CWP1) and PCCW Lung Tin Telephone Exchange Station (CWP4) are located approximately 15-30m away from the proposed sewers. The Tai O Jockey Club Clinic (CWPs 2 and 3), Tai O (Old) Fire Station (CWP7) and Lung Tin Estate (CWP8) are approximately 3m away from the proposed sewers/manhole. The PCCW Tai O Exchange Station (CWP5) and Tai O (Sub-Div) Fire Station (CWP6) is about 6m away from the proposed sewer works. Kerosene storage (DG1) is about 15m away from the proposed sewer works. These building sites were seen to be concrete paved with no sign of spillage or leakage. All potential land contaminative land use (i.e. CWPs and dangerous goods stores) were situated outside the proposed sewer works and did not pose any land contaminating risk.
- 7.7.5 According to the information provided by the EPD (**Appendix 7.1**) and FSD (**Appendix 7.2**), there have been no accidents of spillage and leakage within the study area. Therefore, potential land contamination impacts from these CWPs and DG store are not expected to occur. There is no need for further investigation on potential land contamination at the Study Area based on the review of the past and present land-uses on site.

7.8 Residual Impacts

- 7.8.1 No potential land contamination sites are located within the construction areas of the proposed SPSs, sewers works and the upgraded Tai O STW. No unacceptable residual impact is anticipated during the construction and operation of the Project.



7.9 Environmental Monitoring and Audit Requirements

7.9.1 There is no need for further investigation on potential land contamination at the Study Area based on the review of the past and present land-uses on site. There are no EM&A requirements for land contamination.

7.10 Conclusions

7.10.1 The land contamination assessment was undertaken by reviewing historical and current land uses and site reconnaissance. No potential land contamination impacts have been identified based on the review of the past and present land-uses on site. There is no need for further investigation on potential land contamination at the Study Area. Unacceptable impacts from land contamination are not expected to arise due to the Project.