11 Land Contamination

11.1 Introduction

11.1.1 This section presents an assessment of the potential land contamination implications associated with the Project.

11.2 Environmental Legislations, Standards and Criteria

11.2.1 The relevant environmental legislations, guidelines and standards on land contamination include the following:

(a) 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), EPD, 1997;

(b) Guidance Manual for Use of Risk-based Remediation Goals (RBRGs) for Contaminated Land Management (the Guidance Manual), EPD, 2007;

(c) Guidance Note for Contaminated Land Assessment and Remediation (the Guidance Note), EPD, 2007; and

(d) Practice Guide for Investigation and Remediation of Contaminated Land (the Practice Guide), EPD, 2011.

11.2.2 The Risk-based Remediation Goals (RBRGs) stipulated in the Guidance Manual should be adopted as the criteria for assessing any soil and groundwater contamination.

11.3 Project Description

11.3.1 The Project involves upgrading of the Tai Po Sewage Treatment Works (TPSTW) and construction of sewage sludge and pre-treated food waste co-digestion facilities in TPSTW. Owing to the space limitation within the existing TPSTW and in order to maintain the sewage treatment services of the existing TPSTW, which is almost fully utilized, a piece of government land to the south of the existing TPSTW (about 1.6 hectares) is identified as the proposed expansion site for the Project. The location plan of the Project is shown in **Figure 1.1**. Should any excavation be proposed outside this excavation limit in the future, a land contamination assessment for the area concerned shall be conducted to identify the potential land contamination issues.

11.4 Study Area

11.4.1 The Study Area of this land contamination assessment covers the works area of the Project including the proposed upgrading works in existing TPSTW and the proposed expansion site as shown in **Figure 1.1**. The Study Area is about 92,800 m^2. The proposed excavation works limit of the Project is illustrated in **Figure 11.1**.

11.5 Assessment Methodology

11.5.1 Land contamination assessment was carried out according to the abovementioned EIAO-TM, Guidance Note, Practice Guide and Guidance Manual.

11.5.2 A site appraisal, including site walkover and desktop review, was conducted to identify the potentially contaminating activities that may pose adverse impact to the Project. Site walkover was conducted within the Project Area to review the general site conditions and to identify any sources of land contamination (or 'hotspots'). For the desktop review, the following information was reviewed:

- Selected historical aerial photographs between 1973 and 2020;
- The geological and hydro-geological conditions of the Study Area from the relevant Ground Investigation (GII) records.;
- Relevant EIAs (i.e. Tai Po Sewage Treatment Works – Stage V – Final EIA Report (AEIAR-081/2004)).

11.5.3 Based on the site appraisal, soil and groundwater sampling and testing at the potentially contaminated areas have been proposed. A Contamination Assessment Plan (CAP), detailed findings of the site appraisal and the proposed site investigation (SI) works, were prepared and enclosed in **Appendix 11.1.**

11.5.4 As reported in the CAP, all the identified potentially contaminated areas within the Project site are currently in operation, the SI works and the subsequent assessment / remediation works are therefore proposed to be carried out after decommissioning but prior to the construction works at the concerned areas. For these concerned areas, review of the initial contamination, possible remediation methods, potential insurmountable impacts, SI requirements as well as the tentative timeframe for subsequent submissions were presented in the CAP.

11.6 Description of the Environment

11.6.1 The Study Area is located in Tai Po Industrial Estate (TPIE) in East New Territories. TPIE is situated on a flat reclaimed land and is surrounded by gentle hills to the North and marine water to the South. The Study Area is bounded by industrial premises or factories to the North, South and West and the restored Shuen Wan Landfill (SWL) to the East. Part of the restored SWL is currently used as a golf driving range and golf park. A new Shuen Wan Golf Course (SWGC) will be constructed and operated in the restored landfill. The proposed Shuen Wan Golf Course (SWGC), involving the development of an 18-hole golf course, will be built and operated within the existing restored SWL site.

11.7 Identification of Potential Land Contamination Concern

Review of Historical Land Uses

11.7.1 According to DSD's information, the TPSTW comprises two independent plants, which are Stage 1/2 (West Plant) commissioned in 1979/1983 and Stage 4 (East Plant) commissioned in 1996. There is no TPSTW Stage 3. In order to cope with the rapid development in the District and more stringent effluent discharge standards, the Stage 5 Phase 1 and Phase 2 was completed by 2010 and 2013.

11.7.2 A review of aerial photographs has been taken to evaluate the likelihood of potential contamination associated with past land uses within the Study Area. The development history of the Study Area and the selected historic aerial photographs reviewed are detailed in Annex 2.1 of the CAP in **Appendix 11.1**. The Short-Term Tenancy (STT) records of the Lands Department have also been reviewed to facilitate the identification of occupants observed in the proposed expansion site from the historic aerial photos. The outcome of the review is summarized as follows.

Project Site

11.7.3 The Study Area (including the existing TPSTW site and the proposed expansion site) was part of the Tolo Harbour (i.e. the sea) in or before early 1970s. Subsequently, land reclamation was progressively carried out in the Study Area. The sites in the Study Area were formed via land reclamation during the 1970s. The TPSTW was then built on the reclaimed land and the first stage of TPSTW was commissioned in 1979. The Study Area within the existing TPSTW site boundary has been solely used as sewage treatment works since the reclaimed land was

formed. No other past land use was identified within the site. Some chemicals (e.g. lubricating oil) would be used and stored in TPSTW.

11.7.4 The proposed expansion site is within the government land. Currently, the expansion site comprises 3 Short Term Tenancy (STT) lots, 1 temporary Government Land Allocation (GLA) lot and a vacant land. The STT lots have been occupied by a number of existing and past waste recycling industries involving paper, glass, plastics, tyres, electronics and scrap metals recycling works. Besides the waste recycling industries, no other past land use was identified in the STT lots since the sites were formed. The waste recycling processes in the STT lots may include handling of oil, metals and petrol from trucks and machineries etc. On the other hand, the past or existing land uses of the GLA lot and the existing vacant land include government's and contractor's offices only. No maintenance activities nor storage of fuel and chemicals has been carried out at the GLA lot and the vacant land based on available record including the information acquired from government departments and the result of site reconnaissance. Existing / past land uses in the GLA lot and the vacant land mainly involve daily office works, which are not potentially contaminating activities.

11.7.5 Based on the desktop review of aerial photographs and land uses, historical potentially contaminating activities in the Study Area may include the use and storage of chemicals in TPSTW and the recycling industries in the STT areas of the proposed expansion site.

Surrounding Off-site Areas

11.7.6 The surrounding areas include only the TPIE and Shuen Wan Restored Landfill (SWRL). Industrial operations in TPIE have been controlled and confined within concrete buildings and protected with concrete floor slab. The SWRL is provided with leachate management and lining system. According to Section 5.4.4 of the approved EIA Report for "TPSTW Stage V" published in 2004 (EIAO Register No.: AEIAR-081/2004), land contamination assessment was carried out in TPSTW, and the assessment showed that there was no exceedance in the Dutch B levels (i.e. soil clean-up targets) for all soil samples in the excavation works areas of TPSTW Stage V, which concluded that the area was not contaminated [1]. Thus, widespread of land contamination influencing from these surrounding off-site facilities is not anticipated. The surrounding areas including the industrial buildings and SWRL facilities will not be affected by this Project and will remain intact during construction and operational phases. No land contamination issue associated with the Project works is identified.

Review of Site Geology and Hydrogeology

11.7.7 The Study Area within the proposed works limit was originally part of the Tolo Harbour and was formed through land reclamation. Based on the available site investigation records, the geological profile of Study Area generally comprise a fill layer with thickness varying between 4.0m to 20m. Underneath the fill is marine deposits with thickness up to 12.3m or alluvium with thickness up to 14m. Rocks of various degrees of decomposition present below the marine deposit layer or alluvium layer or immediately underneath the fill layer. Within the proposed upgrading works area of this Project, bedrock is encountered at a depth ranging from about -30.81 mPD to -61.54 mPD as compared to the ground surface of about +6 mPD.

11.7.8 Groundwater monitoring was carried out in selected boreholes within the Project site and the surrounding areas in TPIE. The highest groundwater levels recorded over the monitoring period ranged between +6.20 mPD (in a borehole to the north of the Project site) and +2.68 mPD (in a borehole to the south of the Project site). Natural hillside to the north of TPIE would

[1] Details of the land contamination site investigation results are not reported in the EIA and also not available from DSD.

be the key groundwater source in TPIE (including the Project site). Rainwater infiltrates into the ground of the hillside would continue downward until it reaches the impermeable bottom (bedrock). The highest absolute ground level is expected to occur in the aquifers uphill to the north of TPIE. Water in the saturated in aquifers would flow down gradient from uphill towards the areas of lower hydraulic head in TPIE and eventually drain into the marine water. Thus, the generalized groundwater flow direction would be from the north to the south. The Ground Investigation records are presented in Annex 2.7 of the CAP in **Appendix 11.1.**

Acquisition of Information from Government Departments

11.7.9 The Environmental Protection Department (EPD) and Fire Services Department (FSD) have been contacted for (i) records for any spillage / leakage of chemicals and chemical waste, (ii) records of Dangerous Goods (DG), (iii) records of Chemical Waste Producer(s) (CWP) and (iv) records of reported fire incidents within the Study Area of TPSTW.

11.7.10 According to the replies given by EPD and FSD, there were no records of spillage / leakage of chemicals / DGs reported at the Project site. In addition, no records fire incidents were found within the Project Site by the FSD. Several DG licenses of TPSTW were recorded by FSD. However, with reference to the consultation with the DSD, all DGs recorded by FSD are not used in the TPSTW.

11.7.11 There are three CWP records for the TPSTW. The relevant details are presented in the CAP provided in **Appendix 11.1**. Based on the records, chemical used in TPSTW that may potentially cause land contamination impact include thinners, lubricant oil, paints and diesel fuel oil.

Site Reconnaissance

11.7.12 Site walkovers were conducted between October 2020 to August 2021 to investigate any contaminative issue associated with current land uses and activities within the Study Area and the surrounding area. Questionnaire was conducted with available site representatives.

11.7.13 Site appraisal findings of the major facilities and areas within the Study, including the necessity for site investigation (SI) works, are detailed in **Table 11.1** to **Table 11.3** below. The photographic records are shown in Annex 2.4 of the CAP in **Appendix 11.1**. Locations of major facilities and areas within the Study Area are shown in Annex 2.1A of the CAP in **Appendix 11.1.**

11.7.14 According to the findings of the site appraisal, the following 4 facilities/areas in the Project Site are identified with potential land contamination concerns:

- Lubricant Oil Store
  (Refer to Annex 2.4 of the CAP in **Appendix 11.1** photo no. EP- 22)
- Lot No. STT 1449 – Canny Star Environmental Protection Limited
  (Refer to Annex 2.4 of the CAP in **Appendix 11.1** photo no. EA-1)
- Lot No. STT 1450 - C & H Import and Export Co.
  (Refer to Annex 2.4 of the CAP in **Appendix 11.1** photo no. EA- 11 to EA-23)
- Lot No. STT 1745 - Lau Choi Kee Plastic Company Limited
  (Refer to Annex 2.4 of the CAP in **Appendix 11.1** photo no. EA- 24 to EA-38)

11.7.15 Locations of these 4 facilities / areas are indicated in Figure 4.1 of the CAP in **Appendix 11.1**. Possible contaminating activities in the STT sites may include storage and processing of waste materials, storage and transfer of chemicals, solvents, fuels, lubricants for machinery and vehicle maintenance activities. Possible contaminating activities in TPSTW may include

chemical spillage in the Lubricant Oil Store. Potential Chemicals of Concern (COCs) in the contaminated areas of TPSTW and STT sites may include:

- Metals (including antimony, arsenic, barium, cadmium, chromium III, chromium VI, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, tin and zinc).
- Petroleum carbon ranges (PCRs) including C6 – C8, C9 – C16 and C17 – C35.
- Volatile organic chemicals (VOCs) including BTEX (benzene, toluene, ethylbenzene, and total xylenes), MTBE (methyl tert-butyl ether), acetone, bromodichloromethane, 2-butanone, chloroform, methylene – chloride, styrene, tetrachloroethene, and trichloroethene.
- Semi-volatile organic chemicals (SVOCs) including polyaromatic hydrocarbons (PAHs) (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene), bis-(2-ethylhexyl)phthalate, hexachlorobenzene, and phenol.
- Polychlorinated biphenyls (PCBs)

11.7.16 Since no burning activities is observed is the STT sites, and the waste recycling workshops in the STT sites involved metals, raw paper/plastic etc. with no thermal treatment. Dioxin is not anticipated in these sites

Table 11.1 Site Appraisal Findings of the Major Facilities and Areas within the Study Area in West Plant of TPSTW

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
Old Administration Building (39) **(252 m²)**	▪ The Old Administration Building is a two-storey building located on concrete paved slab. ▪ The building is used for administration works.	Photo No. WP-1, WP-2 and WP-3 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No
Electrical Workshop (40) **(233 m²)**	▪ The electronical workshop is located on concrete paved slab. ▪ Equipment and tools are stored properly. ▪ Cracks were observed on the floor. ▪ Maintenance activity of small equipment was carried out and no chemicals were used or stored within the Electrical Workshop.	Photo No. WP-4 to WP-7 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No
Car Park (51) **(320 m²)**	▪ There is 1 car park located within the Study Area. ▪ The car park is located on concrete paved floor with no oil stains/ leakage observed. ▪ Shelters were built to protect cars and the floor from weathering.	Photo No. WP-8 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No
Maintenance Building (14) **(643 m²)**	▪ The Maintenance Building is located within the assessment area ▪ The building is paved with concrete paved floor with no stains/ leakage observed. Only stain caused by weathering is observed. ▪ Equipment and tools are mainly stored in this building, some of them are placed on steel racks and wooden panel in good order, some bigger equipment was placed on the floor.	Photo No WP-9 to WP-12 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	▪ Lubricant oil, Cutting Oil, Paint and wasted oil were stored inside the cabinets on concrete paved floor. ▪ No maintenance work was carried out in the building.			
Administration Building (15) **(348 m²)**	▪ The Administrative Building is a two-storey building located on concrete paved floor. The building housed offices and laboratory. The laboratory is located on the second floor of the building.	Photo No WP-13 to WP-16 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Control and Storage House (53) **(257 m²)**	▪ The Control Building is a two storey building located on concrete paved slab with the storage room on the ground floor and the control room on the second floor. ▪ No oil stain or leakage is found on the floor this location	Photo No. WP-17 to WP-21 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No
Dangerous Goods Store (49) **(29 m²)**	▪ One Dangerous Good Store (DG Store) is located within the Study Area of TPSTW ▪ The DG Store comprises 2 DG store rooms located next to each other and close to the Maintenance Building on concrete paved floor. ▪ The store only used to store dangerous good (e.g. thinners) and lubricant oil (e.g. hydraulic oil, soluble cutting oil, etc.) ▪ All DG are properly stored and contained in DG tanks and located on steel panel on concrete paved floor. All floors observed are paved with concrete under steel panel with no oil stain or leakage observed.	Photo No WP-22 to WP-24 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	▪ No record of leakage nor spillage was found in this location. The concrete paved floor can prevent soil contamination.			
Inlet Pumping Station (1) **(500 m²)**	▪ There is one Inlet Pumping Station located in west plant of TPSTW. ▪ The Inlet Pumping Station is concrete paved and houses 4 screw pumps (each situated on concrete plinth of about 2.3m thick) located on the first floor of the building about 3.4m above ground level). Each pump was connected to a water transfer pipe down to about 5m below ground level (bgl). A control room is located on top of the screw pumps. ▪ Small amount of lubricating oil is typically required for the operation and maintenance of the screw pumps (located 3.4 m above the ground level). No chemical is stored. ▪ The concrete paved surfaces in all accessible areas were observed to be in good condition with no oil stains observed.	Photo No. WP-25 to WP28 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No
Screen House (2) **(203 m²)**	▪ There is one screen house located in the west plant of TPSTW respectively. ▪ The screen house situated on concrete plinths with a control panel. ▪ The facilities only handle sewage. No potential and past land contaminating activities were identified and recorded. ▪ All floors observed are paved with concrete in good condition with no oil stains observed.	Photo No WP-29 and WP-30 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
Detritors (3) **(668 m²)**	▪ There are 2 detritors within the detritor chambers which are of concrete construction for removing grits in sewage prior to further treatment. ▪ No potential and past land contaminating activities were identified and recorded. ▪ The detritors are located on concrete paved ground. All concrete surfaces observed were in good condition with no oil stains observed.	Photo No WP-31 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Final Sedimentation Tanks (6) **(5,343 m²)**	▪ There are 10 Final Sedimentation Tanks located within the Study Area for final wastewater sedimentation processes. ▪ The tanks contain wastewater only and are located on concrete paved ground of good condition with no oil stains / stressed vegetation / potentially contaminating activities observed.	Photo No WP-32, WP-33, WP-43, WP-44 and WP-45 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Primary Sedimentation Tanks (4) **(5,821 m²)**	▪ There are 8 Primary Sedimentation Tanks located in west plant of TPSTW for primary wastewater treatment processes. ▪ The tanks mainly handle wastewater only and are located on concrete paved ground of good condition with no oil stains / stressed vegetation / potentially contaminating activities observed.	Photo No WP-34, WP-38, WP-39, WP-40 and WP-41 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Aeration Tanks (5) **(4,260 m²)**	▪ There are 6 Aeration Tanks located in the west plant of TPSTW for secondary wastewater treatment process. ▪ The Aeration Tanks contain sewage only and are located in a concrete paved area observed to be in good condition with no oil stains / stressed	Photo No WP-35, WP-36 and WP-37 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	vegetation / potentially contaminating activities observed.			
Waste Storage Area (50) **(378 m²)**	▪ A waste storage area was observed in the site visit. ▪ The area is enclosed and surrounded by fence, with no oil stain. ▪ Only equipment, furniture and garbage are stored in this area. ▪ No chemical-containing waste ever been disposed of in the area since the operation of TPSTW as confirmed by the plant operator.	Photo No WP-42 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Workshop (55) **(189 m²)**	▪ The Workshop is located on concrete paved slab with shelters on the top of the workshops area. ▪ Water stain is observed due to bad weather, no oil stain/leakage is observed in this location. ▪ The Workshop is mainly used as store room and staff room for storing staff clothes and resting area for staff usage. ▪ No chemical was used or stored within the Workshop. ▪ No maintenance activity was carried out in the Workshop.	Photo No. WP-46 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Return Activated Sludge Pumping Station (8) **(424 m²)**	▪ There is 1 Return Activated Sludge Pumping Station in the west plant of TPSTW. ▪ The pumps only handle biologically active sewage sludge from the aeration tanks ▪ The station is situated with the concrete plinths and concrete paved floors.	Photo No WPS-1 and WPS-2 Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	▪ Small amount of lubricating oil is typically required for the operation and maintenance of the pumps No oil stain was observed. No incident of chemical spillage was recorded.			
Sludge Pumping Station (8) **(508 m²)**	▪ The Sludge Pumping House is situated on concrete plinths. ▪ There are 4 sludge pumping pumps handling sewage sludge only (at the bgl), a control panel (at ground floor) and an electronic boiler (at ground level). ▪ Small amount of lubricating oil may be used for the pump operation. The internal floors are paved with concrete in good condition with no oil stains observed. ▪ No storage of chemicals and no historic chemical spills or leaks were recorded.	Photo No WPS-3, WPS-4 and WPS-5 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Blower House (21) **(429 m²)**	▪ The Blower House is a single-storey building. ▪ All (5 sets of) air blowers are placed on the ground floor. According to the site representative, small amount of lubricating oil is used for operating the air blowers. The ground floor is paved with concrete in good condition with no oil stain. ▪ No storage of chemicals and no historic chemical spills or leaks were recorded.	Photo No WPS-6, WPS-7 and WPS-8 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Biogas Holding Tank (13) **(168 m²)**	▪ One biogas holding tank is located in the west plant of TPSTW. ▪ The tanks are located on concrete paved ground with no oil stains / stressed vegetation or	Photo No. WPS-9 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	potentially contaminating activities observed in the area.			
Sludge Digestion Tanks (9) **(1,127 m²)**	▪ There are 2 Sludge Digestion Tanks located the west plant of TPSTW. ▪ The tanks are constructed with concrete located on concrete paved ground in good condition with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No. WPS-10 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Sludge Consolidation Tank (10) **(978 m²)**	▪ There are 2 Sludge Consolidation Tanks located in the west plant of TPSTW. ▪ The tanks are constructed with concrete located on concrete paved ground in good condition with no oil stains /stressed vegetation or potentially contaminating activities observed in the area.	Photo No. WPS-11 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Filtrate Treatment Complex (25) **(279 m²)**	▪ The Filtrate Treatment Complex mainly handle the process of filtration to remove particles from suspension in the water ▪ The Complex is constructed with concrete located on concrete paved ground in good condition with no stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No WPS-12 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Filtrate Treatment Units (26) **(725 m²)**	▪ The Filtrate Treatment Units mainly handle the process of filtration to remove particles from suspension in the water. ▪ The Units are constructed with concrete located on concrete paved ground in good condition with no oil stains / stressed vegetation or	Photo No WPS-13 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	potentially contaminating activities observed in the area.			
Primary Sludge Gravity Thickeners (16) **(934 m²)**	▪ There are 4 Primary Sludge Gravity Thickeners located in the west plant of TPSTW for handling primary sludge gravity thickening processes ▪ The thickeners are constructed with concrete located on concrete paved ground in good condition with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No WPS-14 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Chemical House (17) **(504 m²)**	▪ The Chemical House is located between the Sludge Dewatering House and the Extension of Sludge Dewatering House for material storage. Ferric chloride solutions are stored in the Chemical House. ▪ No chemical other than ferric chloride was stored in the Chemical House. ▪ The Chemical House is constructed with concrete and located on concrete paved ground in good condition with no oil stains.	Photo No WPS-17, WPS-18 and WPS-19 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Sludge Dewatering House (20) **(604 m²)**	▪ The Sludge Dewatering House is a 2-storey building. The internal floors were paved with concrete in good condition with no oil stains observed. ▪ The Sludge Dewatering House is mainly comprised of the following areas: 1) the Chemical Store and Handling Area which mainly consists of sludge dewatering facilities including 2 polymer mixing tanks and 2 ferric chloride storage tanks; 2) the Sludge Feed Pump Room which consists of 5 sets of sludge feed pumps	Photo No WPS-15, WPS-16, WPS-20 and WPS-21 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	and an air compressor; and 3) the Sludge Loading Area and a General Store. ▪ All pumps and compressors were situated on concrete plinths in good condition. ▪ The facilities mainly handle sewage sludge. According to the site representatives, small amount of lubricating oil is required for operation and maintenance of all pumps and compressors. No oil stains were observed on the concrete paved floors. No incident of chemical spillage was recorded. ▪ All chemicals stored in the house are not COC.			
Extension of Sludge Dewatering House (24) **(277 m²)**	▪ The Extension of Sludge Dewatering House is located next to the Chemical House. ▪ All pumps and compressors were situated on concrete plinths in good condition. ▪ According to the site representatives, small amount of lubricating oil is required for operation and maintenance of all pumps and compressors. No oil stains were observed on the concrete paved floors. ▪ No incident of chemical spillage and no chemical storage was recorded.	Photo No WPS-22, WPS-23 and WPS-24 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Combined Heat and Power Generating System (31) **(33 m²)**	▪ The Combined Heat and Power Generating System is located on concrete paved ground with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No WPS-25 and WPS-26 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
Ferric Chloride Dosing System (33) **(40 m²)**	▪ The Ferric Chloride Dosing System #1 is located near the Filtrate Treatment Complex on an elevated platform with concrete slab. Shelter is constructed to protect the FeCl3 from damage. ▪ The two FeC13 Storage Tanks are located on the concrete slab platform with barriers. ▪ FeCl3 stain is observed on the platform and the floor.	Photo No.WPS-27 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
UV Disinfection Facilities (29) **(191 m²)**	▪ The UV Disinfection Facilities is located on concrete paved slab. Vegetation is observed near the facilities in good condition. ▪ The floor under the shelter of the UV Disinfection Facilities is paved with concrete slab and covered by green floor mat. ▪ No oil stain/ leakage is observed.	Photo No. WPS-28 to WPS-29 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Effluent Pumping Station (18) **(1393 m²)**	▪ There is one Effluent Pumping Station located within the Study Area in the West Plant. ▪ The Wet Well is constructed with concrete paved bund wall, treated effluent is transferred from the UV disinfection facilities and stored in the wet well. ▪ The transfer pumps, gear boxes, monitors and the Control Panel are located on the ground floor of the Effluent Pumping Station. The floor is paved with concrete slab ▪ The transfer pumps are located under the ground floor. Assessible path is constructed with steel panel.	Photo No. WPS-30 to WPS-34 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
West Plant				
	▪ The Gate Valve is located under the ground floor. The Gate Valve is connected to the Wet Well of the Effluent Pumping Station. ▪ Small amount of lubricating oil is required for operation and maintenance of pumps. ▪ No oil stain or leakage is observed. Water stain is observed due to handling of effluent.			
Transformer (56) **(20 m^2)**	▪ The transformer is located on concrete paved floor surrounded by vegetation. No oil/leakage is found in this located. ▪ Cracks are observed near the transformer. However, the transformer is in good condition and maintained by CLP, No leakage of transformer oil is observed.	Photo No. WPS-35 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Effluent Sampling Shelter (46) **(60 m^2)**	▪ Effluent sampling equipment is observed in this location. ▪ The shelter is surrounded by vegetation, concrete paved road / surfaces. ▪ No oil stains and stressed vegetation are observed.	Photo No. WPS-36 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Table 11.2 Site Appraisal Findings of the Major Facilities and Areas within the Study Area in East Plant of TPSTW

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
Sludge Consolidation Tanks (10) **(921 m²)**	▪ There are three Sludge Consolidation Tanks located in east plant of TPSTW. ▪ The tanks are constructed with concrete located on concrete paved ground in good condition with no oil stains /stressed vegetation or potentially contaminating activities observed in the area.	Photo No. EP-7 to EP-9 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Ferric Chloride Dosing System (33) **(32 m²)**	▪ The Ferric Chloride Dosing System #2 is located on an elevated platform with concrete slab. Shelter is constructed to protect the FeCl3 from damage. ▪ The two FeC13 Storage Tanks are located on the concrete slab platform with barriers.	Photo No. EP-10 and EP-13 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Sludge Digestion Tank (9) **(1,723 m²)**	▪ There are three Sludge Digestion Tanks located in the east plant of TPSTW. ▪ The tanks are constructed with concrete located on concrete paved ground in good condition with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No. EP-11 to EP-12 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Biogas Holding Tank (13) **(164 m²)**	▪ There are two biogas holding tank located within the east plant of TPSTW. ▪ Both tanks are located on concrete paved ground with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No. EP-14 to EP-15 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
Screen House (2) **(548 m²)**	▪ The screen house is situated on concrete plinths with a control panel. ▪ Emergency generators including 1 Generator Daily Fuel (Diesel Oil) Tank (450L) is observed inside this facility. The floor is paved with concrete slab. ▪ The Generator Daily Fuel Tank is located in bund wall constructed with an elevated concrete platform. The tank looked clean. No oil stain/leakage is observed in this location. ▪ 1 pump is located inside this facility on concrete paved floor next to the Generator Daily Fuel Tank on an elevated concrete paved platform. No oil stain/leakage is observed in this location. ▪ The facilities mainly handle sewage. No potential and past land contaminating activities were identified and recorded. ▪ All floors observed are paved with concrete in good condition with no oil stains observed.	Photo No. EP-16, EP-17, EP-39 and EP-40 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Inlet Pumping Station (1) **(570 m²)**	▪ There is one Inlet Pumping Station located in East plant of TPSTW. ▪ The settings and environment of this Inlet Pumping Station are similar to that of the Inlet Pumping Station located in the west plant.	Photo No. EP-18 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Combined heat and power generating system (31) **(299 m²)**	▪ The Combined Heat and Power Generating System is located on concrete paved ground with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No. EP-19 and EP-25 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
Primary Sludge Gravity Thickener (16) **(322 m²)**	▪ There are 1 Primary Sludge Gravity Thickener located in the east plant of TPSTW for handling primary sludge gravity thickening processes ▪ The thickeners are constructed with concrete located on concrete paved ground in good condition with no oil stains / stressed vegetation or potentially contaminating activities observed in the area.	Photo No. EP-20 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Decanting Chamber (47) **(22 m²)**	▪ There is 1 Decanting Chamber located within the Study Area. ▪ The Decanting Chamber is located on concrete paved floor connecting to the Primary Sludge Gravity Thickener surrounding by vegetation. ▪ The chamber is in good condition where no damage or large area of dirty stain is found.	Photo No. EP-21 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Lubricant Oil Store (52) **(37 m²)**	▪ There is 1 Lubricant Oil Store located within the Study Area. ▪ The Lubricant oil store is located on concrete paved floor and steel panel. It is mainly used for storing lubricant oil and chemical waste. ▪ Chemical waste is stored in this location. ▪ Lubricant Oil stain is observed on the concrete paved floor outside the store and on the floor inside the store.	Photo No. EP-22, EP-22a, EP-23 and EP-24 in Annex 2.4 of the CAP in **Appendix 11.1**.	Possible land contamination with metals (full list), PCRs, VOCs, SVOCs and PCBs	Yes
Central Building Complex (23) **(801 m²)**	▪ There is 1 Central Building Complex within the Study Area. ▪ The Central Building Complex is a two-storey building, with the equipment storage on the ground floor and the control room together with staff room on the second floor.	Photo No. EP-26, EP-27 and EP-28 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
	▪ The floor is paved with concrete slab in good condition with no oil stain/leakage is observed.			
Waste Biogas Burner (42) **(39 m²)**	▪ The biogas burn is used to burn the methane generated from wastewater process. ▪ The Waste Biogas Burner is located on an elevated platform with concrete slab on concrete paved floor. ▪ Handling and burning of biogas, which is a gaseous fuel, will not lead to ground contamination. ▪ Diesel oil are stored inside the fuel oil tanks within a bunded area at this location. ▪ No oil stain/leakage is observed in this area.	Photo No. EP-29 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Gas Transfer Station (44) **(34 m²)**	▪ There is 1 Gas Transfer Station located within the Study Area. ▪ The Gas Transfer Station is located on concrete paved floor next to the Screen House. ▪ Only biogas (gaseous fuel) is handled and transferred in this station. ▪ No other chemical is stored in this station. ▪ No oil stain/ leakage is observed in this location.	Photo No. EP-30 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Biogas Holding Tank Valve Chamber (35) **(56 m²)**	▪ There is 1 Biogas Holding Tank Valve Chamber located within the Study Area. ▪ It is located on concrete slab elevated platform next to the Biogas Holding Tank. ▪ Water stain is observed and no oil stain/leakage is observed.	Photo No. EP-31 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
Service Tower Building (54) **(93 m²)**	▪ The Service Tower Building is located on concrete paved slab. ▪ Pumps area connected to the Sludge Digestion Tanks of the East Plant outside the Tower. Rusty stain is observed., Water stain is observed due to handling of sludge ▪ No oil stain / leakage is observed.	Photo No. EP-32 to EP-34 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Detritors (3) **(385 m²)**	▪ There are two detritors located in the east plant of TPSTW. ▪ No potential and past land contaminating activities were identified and recorded. ▪ The detritors are located on concrete paved ground. All concrete surfaces observed were in good condition with no oil stains observed.	Photo No. EP-37 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Primary Sedimentation Tank Distribution Chamber (19) **(80 m²)**	▪ There is 1 Primary Sedimentation Tank Distribution Chamber within the Study Area ▪ It is connected to the two Detritors on the elevated slope with a concrete paved platform surrounding by vegetation. No oil stain/ leakage is observed.	Photo No. EP-38 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Chemical Store (32) **(78 m2)**	▪ The chemical store is located on concrete paved floor. ▪ Leatheroid are found on steel panel inside the chemical store above concrete paved floor. Some leatheroid are located on wooden panel. ▪ Store empty drums are found inside the chemical store on steel panel above the concrete paved floor.	Photo No. EP-41 to EP-43 in Annex 2.4 of the CAP in **Appendix 11.1**.	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (ID in Annex 2.1A of Appendix 11.1) (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
East Plant				
	▪ Caustic Soda were stored inside cans on steel panel inside the chemical store above concrete paved floor. ▪ No oil stain/leakage is observed.			

Table 11.3 Site Appraisal Findings of the Major Facilities and Areas within the Study Area in Proposed Expansion Site

Facility /Area (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
Proposed Expansion Site				
Canny Star Environmental Protection Limited **(6,891 m²)**	▪ The site is located in Lot No. STT 1449 of the proposed expansion site. ▪ Site walks and questionnaire surveys were not allowed by the tenants. ▪ According to the record of Lands Department, existing and past site activities may involve recovery and recycling of metals, paper, plastics, tyres, electrical and electronic appliances, glass, textile and old clothes, wood or furniture in municipal solid waste. ▪ Possible existing and past contaminating activities may include storage and processing of waste materials, storage and transfer of chemicals, solvents, fuels, lubricants for machinery and vehicle maintenance activities.	Photo No. EA-1 in Annex 2.4 of the CAP in **Appendix 11.1.**	Possible land contamination with metals (full list), PCRs, VOCs, SVOCs and PCBs	Yes
DSD's and Contractor Site Office **(2,020 m²)**	▪ The DSD's site Office is located in Lot No. GLA-TPP 776 of the proposed expansion sit. ▪ No previous uses with potential land contamination issue has been identified.	Photo No. EA-2 to EA-9 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No
Vacant Land **(909 m²)**	▪ The vacant land is located in Lot No. GLA-TPP 786 of the proposed expansion site. ▪ The vacant land was previously used as CEDD's and Contractor's site offices. ▪ No previous uses with potential land contamination issue has been identified.	Photo No. EA-10 in Annex 2.4 of the CAP in **Appendix 11.1.**	No land contamination impact is anticipated as no land contamination issues were identified.	No

Facility /Area (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
Proposed Expansion Site				
C & H Import & Export Co. **(2,818 m²)**	▪ The C & H Import and Export Co. is located in Lot No. STT 1450 of the proposed expansion site. ▪ It is a metal / steel recycling workshop and warehouse for storage of metal / steel waste operated since 2012. ▪ From site inspection, stockpiles of metal waste, large machineries and equipment were found in the open site area. Some fuel oil was stored in open area with no bund wall and no secondary containment. ▪ No record of previous land use before 2012 is available. It is likely that the site was also used for waste recycling in the past. ▪ Possible existing and past contaminating activities may include storage and processing of waste materials, storage and transfer of chemicals, solvents, fuels, lubricants for machinery and vehicle maintenance activities.	Photo No. EA-11 to EA-23 in Annex 2.4 of the CAP in **Appendix 11.1.**	Possible land contamination with metals (full list), PCRs, VOCs, SVOCs and PCBs	Yes

Facility /Area (Approx. area)	Site Appraisal Findings	Reference	Potential Land Contamination Impact	Necessity for Intrusive Site Investigation (SI)
Proposed Expansion Site				
Lau Choi Kee Plastic Company Limited **(2,620 m²)**	▪ Lau Choi Kee Plastic Company Limited is located in Lot No. STT 1745 of the proposed expansion site (operated since 2017). ▪ It is a plastic recycling workshops, operations involve recovery and recycling or reprocessing of plastics from municipal solid waste. ▪ From site inspection, stockpiles of plastic waste, large amount of plastic fragment, waste carboards were found within the site area. Some lubricant oil was stored under shelter on unpaved floor. Oil stain was found on unpaved floor with no panel or secondary containment. ▪ From available record, past land use before 2013 may involve recovery and recycling or reprocessing of metals, papers, plastics, types, electrical and electronic appliances, glass, textile and old clothes, wood and furniture, organic waste (excluding chemical waste) from municipal solid waste. ▪ Possible existing and past contaminating activities may include storage and processing of waste materials, storage and transfer of chemicals, solvents, fuels, lubricants for machinery and vehicle maintenance activities.	Photo No. EA-24 to EA-38 in Annex 2.4 of the CAP in **Appendix 11.1.**	Possible land contamination with heavy metals (full list), PCRs, VOCs, SVOCs and PCBs	Yes

11.8 Future Land Uses

11.8.1 Land contamination assessment on the potentially contaminated sites would need to be evaluated against the Risk-based Remediation Goals (RBRGs), soil saturation limits (Csat) / solubility limits for non-aqueous phase liquid (NAPL), as stipulated in Table 2.1 and Table 2.2 of the Guidance Manual.

11.8.2 The RBRGs were developed based on a risk assessment approach to suit the local environmental conditions and community needs in Hong Kong. Decisions on contaminated soil and groundwater remediation are based on the nature and extent of the potential risks that are posed to human receptors as a result of exposure to chemicals in the soil and/or groundwater. RBRGs were developed for four different land use scenarios as below reflecting the typical physical settings in Hong Kong under which people could be exposed to contaminated soil and groundwater:

- Urban residential
- Rural residential
- Industrial
- Public parks

11.8.3 In addition to the RBRGs, screening criteria (soil saturation limits, Csat, developed for NAPL in soil and solubility limits for NAPL in groundwater) for the more mobile organic chemicals must be considered to determine whether a site requires further action.

11.8.4 As the proposed development is a sewage treatment works, the RBRGs for Industrial land use scenario are considered appropriate for the assessment.

11.9 Prediction and Evaluation of Environmental Impacts

11.9.1 Based on the site appraisal, 4 facilities / areas within the TPSTW and the proposed expansion site as listed in Section 11.7.14 were identified with potential land contamination concerns and required further SI works. However, as all the concerned facilities / areas are in operation, it would not be feasible to carry out the proposed SI works under the EIA Study.

11.9.2 The potential land contamination concerns for the abovementioned facilities / areas were associated with handling and storage of chemicals. The sizes of the concerned facilities / areas ranged from 248m^2 to 6,891m^2.

11.9.3 Site re-appraisal and land contamination assessment including intrusive SI works and, if required, remediation works should to be carried out at a later stage of the Project and should follow EPD's Guidance Manual, Guidance Note and Practice Guide. Any soil/groundwater contamination would be identified and properly treated prior to the commencement of construction works under the Project. The potential COCs identified include metals, VOCs, SVOCs, PCRs and PCBs and there are commercially available technologies that could tackle these COCs (refer to Section 5.2 of the CAP provided in **Appendix 11.1**).

11.9.4 Given the above, land contamination impacts are considered not insurmountable to the Project if the recommended actions as outlined in Section 11.10 were followed and contaminated soil and groundwater (if any) were properly treated using appropriate remediation methods and according to EPD's agreed Remediation Action Plan (RAP).

11.10 Mitigation of Adverse Environmental Impacts

Recommended Further Works

11.10.1 All the existing facilities in the Project site are currently in operation and it would not be feasible to carry out the proposed SI works under the EIA Study. The proposed SI works and any necessary remediation action are recommended to be carried out after decommissioning but prior to the construction works at the concerned facilities / areas. The SI proposal including the sampling and analysis plan is presented in Section 4 of the CAP in **Appendix 11.1**.

11.10.2 Prior to the commencement of the SI works, site-re-appraisal and review of the CAP provided in **Appendix 11.1** should be conducted to confirm proposed SI works (e.g. sampling locations, testing parameters etc.). Supplementary CAP(s), presenting findings of the review, the latest site conditions and updated sampling strategy and testing protocol, should be submitted to EPD for endorsement. The SI works should be carried out according to EPD's agreed supplementary CAP(s). Following completion of SI works and receipt of laboratory test results, CAR(s) should be prepared to present the findings of the SI works and to discuss the presence, nature and extent of contamination. If contamination is identified, RAP(s) which provides details of the remedial actions for the identified contaminated soil and / or groundwater should be endorsed by EPD.

11.10.3 Remediation action, if necessary, will be carried out according to EPD endorsed RAP(s) and Remediation Report(s) (RR(s)) will be submitted after completion of the remediation action. The RR(s) should be endorsed by EPD prior to the commencement of construction works at the respective identified contaminated areas (if any).

Possible Remediation Measures

11.10.4 According to the Practice Guide, the need to remediate the contaminated areas and the nature, level and extent of contamination would be determined based on the findings of the SI works to be presented in the CAR(s). The appropriate remediation methods should be selected based on the findings of the SI works and would be presented in the RAP(s). The possible remediation methods are detailed in Section 5.2 of the CAP provided in **Appendix 11.1**.

Mitigation Measures for Remediation Works

11.10.5 Mitigation measures for the remediation works would depend on the nature / extent of contamination and the method of treatment. The mitigation measures will be recommended in the RAP and would typically include the following:

- Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety;
- Excavation shall be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils;
- Supply of suitable clean backfill material (or treated soil) after excavation;
- Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust emission. If this is not practicable due to frequent usage, regular watering shall be applied. However, watering shall be avoided on stockpiles of contaminated soil to minimise contaminated runoff.
- Vehicles containing any excavated materials shall be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates shall be sealed to prevent any discharge during transport or during wet conditions;
- Speed control for the trucks carrying contaminated materials shall be enforced;

- Vehicle wheel and body washing facilities at the site's exist points shall be established and used; and
- Pollution control measures for air emissions (e.g. from biopile blower and handling of cement), noise emissions (e.g. from blower or earthmoving equipment), and water discharges (e.g. runoff control from treatment facility) shall be implemented and complied with relevant regulations and guidelines.

11.11 Evaluation of Residual Impacts

11.11.1 The recommended further land contamination assessment and, if required, remediation works for the Project site would follow EPD's Guidance Manual, Guidance Note and Practice Guide and any soil/groundwater contamination would be identified and properly treated prior to the commencement of construction works under the Project. Land contamination impacts are therefore considered acceptable if the follow up actions as outlined in Section 11.10 were followed and contaminated soil and groundwater (if any) were properly treated using appropriate remediation methods and according to the EPD approved RAP. No unacceptable residual impacts are anticipated.

11.12 Environmental Monitoring and Audit Requirements

11.12.1 Remediation works, if necessary, would be carried out based on the recommended further works outlined in Section 11.10. Mitigation measures as recommended in the future EPD endorsed RAP should be implemented during the remediation works. The Environmental Monitoring and Audit (EM&A) requirements should be carried out in the form of regular site inspection to ensure the recommended mitigation measures are properly implemented.

11.13 Conclusion

11.13.1 Site appraisal was carried out in the period from October 2020 to August 2021 with site walkovers conducted in the same period. Based on the site appraisal, a total of 4 areas were identified as potentially contaminated within the Project Area.

11.13.2 As the existing facilities in the existing Project site is still in operation and will continue to operate during the EIA stage, further assessment and, if required, remediation works are recommended to be carried out after decommissioning of the concerned facilities / areas but prior to the construction works at the concerned facilities / areas. The recommended further assessment and remediation works, including the submission of supplementary CAP(s), CAR(s)/RAP(s) and RR(s) would need to follow EPD's Guidance Manual, Guidance Note and Practice Guide and according to Section 11.10 of this report.

11.13.3 With the implementation of the recommended further works for the Project, any soil/groundwater contamination would be identified and properly treated prior to the construction works. No insurmountable land contamination impacts to the Project are therefore anticipated.