

## 7. LAND CONTAMINATION

### Introduction

- 7.1 The potential environmental issues associated with land contamination have been reviewed and are presented in this section. The implications of land contamination for the proposed land uses at the study area, including Hong Kong School of Motoring (HKSM), Citybus Depot (CBD) and the existing Ocean Park site, have been assessed in accordance with the EIA Study Brief (No. ESB-125/2005).

### Environmental Legislation, Policies, Plans, Standards and Criteria

- 7.2 The Practice Note for Professional Persons ProPECC PN3/94 “*Contaminated Land Assessment and Remediation*” and “*Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*” issued by the Environmental Protection Department (EPD) provide guidance on land contamination assessment. The *Guidance Notes* make reference to criteria developed in the Netherlands (the “Dutch Guidelines”), which are most comprehensive and are widely used for contaminated site assessment.
- 7.3 Further consideration of contamination issues is provided in Section 3 (*Potential Contaminated Land Issues*) of Annex 19 “Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts” of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM).

### Assessment Methodology

- 7.4 The methodology adopted in this assessment is in accordance with EPD’s Practice Note ProPECC PN3/94 “*Contaminated Land Assessment and Remediation*” and “*Guidance Notes for Investigation and Remediation of Contamination Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*”.
- 7.5 Site appraisal was carried out by reviewing the historical aerial photographs, site inspection, consultation with relevant Government departments and interview with the existing land users. All collected information and inspection findings were analysed thoroughly to evaluate the potential impact of land contamination associated with the historical/current operations.

### Description of the Environment

#### **Baseline Condition**

- 7.6 The current Ocean Park is built on the northern and southern sides of Nam Long Shan consisting three areas – Lowland, Headland and Tai Shue Wan. The surrounding areas mainly compose of undeveloped natural hill slope at the Headland and residential/commercial sites at the Lowland with coastline of Tai Shue Wan surrounding part of the site. Under this Project, the existing Park will be expanded across the unused area at Nam Long Shan and also partly or wholly across areas that are currently occupied by the CBD and HKSM. These two identified areas are suspected to have activities such as vehicle repairing/maintenance and petrol filling carried out inside the sites. Beside, the electrical and mechanical (E&M) workshops, transformer rooms, plant rooms, chemical and dangerous goods storage areas within the existing Ocean Park would also give rise to potential concern of land contamination if excavation works are to be carried out at these areas. As such, the HKSM, CBD and the existing Ocean Park area are covered in the land contamination assessment.

**Site History and Geology**

7.7 The site history of the subject sites was obtained by reviewing relevant historical aerial photographs. **Table 7.1** is a summary of the aerial photographs reviewed:

**Table 7.1 Aerial Photographs Reviewed**

Year	Ref. no	Height (ft)	Land use	
			HKSM site	CBD site
1963	6732	<4000	Farmland	Farmland
1967	5362	<4000	Farmland	Farmland
1972	1868	<4000	Farmland	Farmland
1976	12803	<4000	Open space	Open space
1977	20553	<4000	Car park	Open space
1979	26779	<4000	Car park	Open space
1980	29919	<4000	Car park	Open space
1982	45437	<4000	Car park	Open space
1983	47746	<4000	Car park	Open space
1985	A03869	<4000	HKSM	Open space
1987	A10402	<4000	HKSM	Car park
1989	A17731	<4000	HKSM	Car park
1991	A28121	<4000	HKSM	Car park
1996	CN15482	<4000	HKSM	CBD
1999	CN22933	<4000	HKSM	CBD

7.8 The review of available historical aerial photographs indicated that the HKSM was under construction in 1983 and in full-scale operation since 1985. The site was undeveloped land before and used for car parking from 1977 to 1983. Both of the uses identified before 1983 would not cause any contamination concern. No change of land use is identified at the site after operation of the HKSM.

7.9 For the CBD Site, the historical aerial photographs review indicated that the CBD was in place in 1996. The land was vacant before 1987 and used as a car park from 1987 to 1991. Both of which would not give rise to land contamination concern. Further information obtained from the site personnel that the CBD was used as vehicle washing and refuelling leased by Citybus Limited from the Ocean Park Corporation (OPC) since 1993. No record of industrial land usage is identified for the CBD site prior to 1993 nor is there any change of site activities since the depot operation was commissioned.

7.10 For the existing Ocean Park, the site has been operating since 1977 and no significant change of site layout is noted since.

7.11 The Hong Kong Geological Survey - Solid and Superficial Geology Map (Series: HGM20) – sheet 15 (1:20,000 scale) (Edition 1, 1986) published by the Geotechnical Control Office, Civil Engineering Services Department has been reviewed. It indicates that the land within the subject area comprises of Eutaxite under the repulse bay volcanic group of sedimentary volcanic rock.

**Review of Environmental Information from the Government**

7.12 Specific information, that is, historical records of chemical spillage and any violations of environmental regulations, have been requested from the Fire Services Department (FSD) and the Regional Office (South) of Environmental Protection Department (EPD).

7.13 There is no record of spillage/ leakage of dangerous goods stored within the concerned areas. Both the HKSM and CBD have been registered for Dangerous Goods (DG) storage and the details are presented in **Table 7.2**:

**Table 7.2 Records of Current and Past Registration of Storage of Dangerous Goods**

Name of Licensee	Date of Issue	Dangerous Goods Storage Details
Hong Kong School of Motoring Ltd.	24 June 1983	An approved underground tank with capacity of 18,200 litres for storage of petrol
Citybus Ltd.	26 August 1993	Two approved underground tanks with each capacity of 45,460 litres for storage of diesel

7.14 The HKSM has been registered as a chemical waste producer since November 1993. The volume of spent engine oil produced is about 1,600 to 1,800 litres per year. There is no record of chemical spillage happened in the past within the HKSM site.

**Identification of Potential Environmental Impacts**

7.15 A number of site visits were conducted from January 2005 to February 2006 to the HKSM, CBD and the existing Ocean Park. The potential contaminative land uses identified within the study area are listed below:

***The Hong Kong School of Motoring***

7.16 A site inspection to the HKSM was conducted in January 2006 in the presence of Civil Engineering and Development Department, Land's Department and HKSM representatives. Based on the nature of activities and observations of the existing site conditions, the potential contaminative areas with details of its descriptions and potential contaminants are identified as shown in **Table 7.3**. **Figure 7.1** shows the site photographs and locations of the potential contaminative areas in the HKSM.

**Table 7.3 Potential Contaminative Areas/Activities in the Hong Kong School of Motoring**

Area/Activity	Site Descriptions	Potential Contaminants
Petrol filling station with underground fuel storage tank	Unleaded petrol which is stored in an underground fuel tank is used by the private vehicles of the motoring school. Two fuel dispensers were noted and no apparent stain was observed on the paved ground.	Petroleum product
Fuel interceptors	Five interceptors are located adjacent to the underground fuel storage tanks. All possible spillage during vehicle refuelling is collected through a series of channels into the fuel interceptor.	Petroleum product
Vehicle maintenance workshop	The workshop is for maintenance of the private vehicles of the motoring school. The ground was paved with concrete but the vehicle repairing area was found with apparent oil stain.	Paint, chlorinated solvent, lubricating oil, hydraulic oil
Chemical waste storage area	Drums of oils including hydraulic oil and engine oil were stored at the chemical waste storage area located at the south east corner of the site. The drums were placed without drip trays and apparent stains were observed in the drum storage area.	Chlorinated solvent, petroleum product, lubricating oil, hydraulic oil

**Citybus Depot**

7.17 A site inspection was conducted at the bus depot on 9 February 2006 in the presence of Citybus Depot's representatives. As informed, this area is used for parking, car washing and refuelling only. The areas identified with potential land contamination concern are listed in **Table 7.4**. **Figure 7.2** shows the site photographs and locations of the potential contaminative areas in the CBD.

**Table 7.4 Potential Contaminative Areas/Activities in the Citybus Depot**

Area/Activity	Site Descriptions	Potential Contaminants
Bus refuelling area with underground fuel storage tanks	Diesel fuel which is stored in the underground fuel tanks (2 tanks with each capacity of 45,460 litres) is used by the vehicles of City bus. Five fuel dispensers were noted and no apparent stain was observed on the concrete paved ground.	Petroleum product
Diesel fuel interceptors	Three interceptors are located adjacent to the underground fuel storage tanks. All possible spillage during bus refuelling is collected through a series of channels into the fuel interceptor.	Petroleum product
Vehicle washing facility	Mild cleaning solvent is used for vehicle washing. The water used is collected by the drainage channels around the car washing facilities and recycled by using the built-in recycling unit.	Petroleum product washed out from buses

**Existing Ocean Park Area**

7.18 A site walk-through to the existing Ocean Park was undertaken on 9 February 2006 in the presence of Ocean Park and Civil Engineering and Development Department representatives. Based on the site observations, the areas identified with potential land contamination concern are listed in **Table 7.5**. **Figure 7.3** shows the site photographs and location of the potential contaminative areas with inspection.

**Table 7.5 Potential Contaminative Areas/Activities in the Existing Ocean Park**

Area/Activity	Location	Site Descriptions	Sign of Potential Contamination
<i>Lowland</i>			
3.3kv transformer room	Near the tennis court	No apparent stain, no spillage record and no crack observed on the concrete paved ground. The room was tidy and maintained with good housekeeping.	Nil
DG storage	Near the Country Club	No apparent stain, no spillage record and no crack observed on the concrete paved ground. The storage was tidy and maintained with good housekeeping.	Nil
Plant rooms (Compressor, pump, chiller etc.)	The dolphin university	No apparent stain, no spillage record and no crack observed on the concrete paved ground. All rooms were tidy and maintained with good housekeeping.	Nil
<i>Headland</i>			
Plant rooms (Compressor, pump, chiller etc.)	The shark aquarium	No apparent stain, no spillage record and no crack observed on the concrete paved ground. All rooms were tidy and	Nil

Area/Activity	Location	Site Descriptions	Sign of Potential Contamination
		maintained with good housekeeping.	
E&M workshop and chemical storage	The dragon	Small area (about 0.5m x 0.5m) with stain was observed. No large-scale spillage recorded and no crack observed on the concrete paved ground. Possibility of migration to soil underneath the slab is very low.  The workshop and chemical storage area were tidy and maintained with good housekeeping.	Minor spillage indicated by sign of few drips of lubricant on the concrete slab.
Liquid Propane Gas (LPG) storage area	Headland workshop area (in the middle between atoll reef and eagle)	No apparent stain, no spillage record and no crack observed on the concrete paved ground. All areas were tidy and maintained with good housekeeping.	Nil
E&M workshop			Nil
Chemical storage			Nil
Plant room and backup generator	The ocean theatre	The generator is used for backup service only. No apparent stain, no spillage record and no crack observed on the concrete paved ground. The room was tidy and maintained with good housekeeping.	Nil
Plant room (Compressor, pump etc.)	The Ocean Park tower	The room was tidy without apparent stain observed and maintained with good housekeeping.	Nil
Plant room (Generator)	At the pacific pier	The room was tidy without apparent stain observed and maintained with good house keeping.	Nil

### Identification of Sensitive Receivers

- 7.19 Construction workers are the most likely group to be exposed to any potential contaminated material during the construction stage. Workers may be exposed during excavation and preparation of foundation works. Depending on the nature of the contaminants, hazard during preparation of foundations and subsurface services may be of concern. The principal exposure routes for workers include:
- Direct ingestion of contaminated soils through eating or drinking/smoking on site; and
  - Dermal contact with contaminated soils.
- 7.20 According to the development layout plan, part of the existing HKSM site would become the new Ocean Park Entrance and the existing CBD would become part of the access road and the public transport drop-off (refer to **Figure 7.6**). Visitors to, and staff of, Ocean Park would be the principal users during the operation stage.
- 7.21 Contaminated groundwater would be regarded as a potential source of water pollution as a result of percolation and infiltration if the soil contamination was severe.

## Land Contamination Assessment

### *Hong Kong School of Motoring*

#### *Contamination Assessment Plan*

- 7.22 The site area of the HKSM is approximately 14,400 m<sup>2</sup>. As observed, except the main office building located at the north of the site, most of the remaining areas are open space for learning driving including vehicle/motorcycle parking. No apparent stain or ground dis-colourisation was observed during the site visit. The areas with contamination concern are confined in the 1) petrol filling station supplying fuel to the vehicles of the HKSM, 2) the vehicle maintenance area and 3) chemical waste storage area, which are all located at the southeast of the school site with approximate area of 1,800m<sup>2</sup>. With reference to the *Guidance Notes for Investigation and Remediation of Contamination Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*", 10 sampling points are proposed for the contamination investigation at this site. Locations of the proposed site investigation (SI) locations are shown in **Figure 7.4**.
- 7.23 The majority of sampling locations (i.e. 6 drill holes) are proposed around the hotspots near the underground fuel storage tanks, underground fuel interceptors, vehicle maintenance area and chemical waste storage area to investigate any contamination due to fuel seepage or localised chemical spillage. Additional SI locations (i.e. 4 drill holes) are proposed at the open ground and the site boundary to assess any migration of contaminants from the hotspot areas.
- 7.24 The HKSM site is located on Government land under the tenancy agreement (No. SHX-13). It is expected (Scenario A) that this site will be cleaned up by HKSM before handing over to Ocean Park if contamination is identified. An alternative scenario (Scenario B) is discussed in the later sections.
- 7.25 As required by the EIA Study Brief, a Contamination Assessment Plan (CAP) has been prepared as given in **Appendix 7.1a** taking account of all available information. The CAP provides detailed information of the proposed sampling locations as well as a sampling and testing schedule for HKSM. It is expected that the SI works for the HKSM Site will be carried out by HKSM in accordance with the CAP as approved by EPD (also see Scenario A).
- 7.26 HKSM's consent for the preparation of this CAP has not been obtained. In this sense, the attached CAP (**Appendix 7.1a**) might be considered as being illustrative. In the event that HKSM or another party wishes to revise this CAP, they will be required, as the Proponent of this remediation to separately submit this to EPD and gain EPD's acceptance. By definition an alternative CAP, whether more or less extensive than included within this EIA Report will need to be sufficient to ensure the land contamination status is clear, as agreed with EPD.

### *Citybus Depot*

#### *Contamination Assessment Plan*

- 7.27 The entire bus depot site is approximately 2,800m<sup>2</sup>. As observed during the site inspection, no apparent stain or ground dis-colourisation was noted. There is also no accident and spillage recorded. The site is concrete paved and has been maintained in good condition. Overspill diesel, if any, would have been collected via drainage channels and then passed through oil interceptors prior to disposal.
- 7.28 As required by the EIA Study Brief, a Contamination Assessment Plan (CAP) has been prepared as given in **Appendix 7.1b** taking account of all available information. Citybus's consent for the preparation and inclusion of the CAP in this EIA Report has been obtained.
- 7.29 The CBD site falls into the areas owned by Ocean Park and Lands Department respectively, i.e. the site is largely within the lot boundary of Ocean Park (leased to Citybus Limited) and a portion of the site is on Government land which is held by Citybus Limited under a short term tenancy (No. SHX

844). The potential contaminated area within the CBD site is currently under the Ocean Park's land allocation.

7.30 The CAP provides detailed information of the proposed sampling locations as well as a sampling and testing schedule. With reference to the *Guidance Notes for Investigation and Remediation of Contamination Sites of: Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops* (GN), 10 sampling points are proposed for the contamination investigation at the CBD. Locations of the proposed SI locations are shown in **Figure 7.4**.

7.31 Most of the sampling locations (i.e. 9 drill holes) are proposed near the potential contaminative uses, including bus refuelling area, underground fuel storage tanks and underground fuel interceptors. One additional drill hole is proposed near the bus washing facility.

*Site Investigation*

7.32 Envex (HK) Limited (hereafter called 'Envex') has been appointed by Citybus Limited as their Consultant to conduct the SI in accordance with the CAP (**Appendix 7.1b**) at the CBD site. The SI has been conducted from 31 March 2006 to 3 April 2006. A Contamination Assessment Report (CAR) presenting the SI data and results interpretation has been prepared by Envex as given in **Appendix 7.2**.

7.33 The sampling strategy used during the SI followed the principles of the Environmental Protection Department's *"Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards, Car Repair / Dismantling Workshops"*, and also the principles of the Practice Note PN3/94 *"Contaminated land Assessment and Remediation"*. Soil samples were obtained using the 'Trial Pit' and 'Bore-Hole' method and were collected from each of the 10 sampling locations. Three (3) samples were taken vertically from various depths in accordance with the CAP. A total of 30 samples were analysed for a range of heavy metals, BTEX and total petroleum hydrocarbons (TPH) by an approved laboratory.

*Result Analysis and Interpretation*

7.34 In order to determine whether or not the ground was contaminated, the results of the soil analysis were compared with the soil criteria used in The Netherlands for contaminated land assessments, namely the "Dutch List" of guideline values (in mg/kg) of A, B and C where the A value is essentially regarded as unpolluted, B regarded as potential pollution, requiring further investigation or remediation and C regarded as 'presence of pollution and necessity for remediation'.

7.35 In general, elevated concentrations of TPH and heavy metals were noted in the soil samples. BTEX analysis results did not exceed the "A" values for any of the soil sampling locations.

7.36 Groundwater was not encountered during the soil sampling exercise. Migration of contaminants due to hydraulic movement is not expected.

*Heavy Metal*

7.37 The results of the soil analysis showed that concentration of arsenic and tin exceeded the relevant Dutch B values. Except these two metals at those specified locations, the concentration of the other heavy metals in the soil samples are all acceptably low. The exceedance of heavy metals in the soil samples are summarized in **Table 7.6a**.

**Table 7.6a Summary of Elevated Levels of Heavy Metal in Soil Samples at CBD Site**

Borehole	Sampling Depth (m below ground)	Parameter	Dutch "B" Level (mg/kg)	Concentration (mg/kg)
BH-5	4.20 to 4.62	Arsenic	30	50
BH-1	4 to 4.45	Arsenic	30	34*
BH-3	4 to 4.45	Arsenic	30	43

Borehole	Sampling Depth (m below ground)	Parameter	Dutch "B" Level (mg/kg)	Concentration (mg/kg)
BH-4	4 to 4.45	Arsenic	30	51
BH-9	4 to 4.45	Arsenic	30	86
BH-9	5 to 5.45m	Tin	50	63

Note: \* This result only marginally exceeds the Dutch "B" guideline. Considering the laboratory testing uncertainty ( $\pm 10-15\%$ ), remediation action is not recommended at this location.

- 7.38 The presence of arsenic and tin in the soil samples at elevated levels is probably not due to past site activities (as open ground, a car park and most recently as a bus refuelling and washing facility). The heavy metal distribution is also unlikely caused by surface spillage. Such discrete soil samples with elevated concentration of heavy metals are very much localised and are likely due to the naturally occurring minerals in the fill materials.
- 7.39 According to the development layout plan, the existing CBD would become part of the access road and the public transport drop-off (refer to **Figure 7.6**). The excavation depth for construction works would be down to a maximum depth of 3m below ground. As such, the presence of the layer with elevated level of arsenic/tin (~4m below ground) would be untouched during the construction stage.
- 7.40 A further study, Toxicity Characteristic Leaching Procedure (TCLP) testing, should be conducted in order to determine the leachability (hence the toxic risk) of the soil with elevated level of metals at the CBD site. The TCLP test is an international recognized method for evaluation of heavy metal pollution in soils. This test can give additional information of the mobility of the heavy metals and hence the likelihood of metals to be leached out from the soil particles.
- 7.41 For a conservative approach, clean-up strategy is proposed for the soil contaminated with heavy metals. It is recommended that the soil materials from the borehole locations should be removed for a radius of 3m horizontally and a depth of 3.5m to 4.5m vertically (for boreholes 3, 4 and 5) & a depth of 4m to 6m vertically (for borehole 9). The total volume of arsenic and tin contaminated soil to be excavated is about 150m<sup>3</sup>, as shown in **Table 7.6b**.
- 7.42 The materials above 3.5m should be regarded as uncontaminated soil so this material can be stockpiled on site for later use as clean fill. For the contaminated soil, on-site cement solidification/stabilisation (CS/S) is proposed for remediation of heavy metals contaminated soil. This method is well proven, simple and easy to implement on-site. It involves mixing cementitious material with the contaminated soil to create a chemically inert and structurally sound matrix. Should other site data be available (e.g. TCLP results), the proposed clean-up strategy may be reviewed.

**Table 7.6b Estimated Volume of Heavy Metals Contaminated Soil for CS/S Treatment**

Contaminants	Borehole	Estimated Horizontal Extent (m)	Estimated Vertical Extent (m below existing ground level)	Estimated Contaminated Soil Volume (m <sup>3</sup> )
Arsenic	BH-3	3m radius	3.5 to 4.5	29
	BH-4	3m radius	3.5 to 4.5	29
	BH-5	3m radius	3.5 to 4.5	29
Arsenic and Tin	BH-9	3m radius	4.0 to 6.0	57
Total:				~150

TPH

- 7.43 Elevated TPH concentrations above the B value of 1,000mg/kg were found at two discrete soil samples (at separate 2 sampling locations) in the immediate vicinity of the underground refuelling tanks. Such contamination is suspected to have been caused by minor fuel spillage from the underground tanks possibly during installation stage. Soil remediation at these locations is recommended.



- 7.44 It is anticipated that initial excavation for the purpose of extracting the fuel tanks will need to be at least 2m around the perimeter of each tank's concrete protection and to a depth of 5m in order to free the sides of the tanks from the surrounding ground and gain sufficient access to the bottom of the tanks in order to attach the lifting chains. The excavation of BH-2 will need to be 8m below grade. The excavation of BH-6 and the remaining area around the tank will be 6m below grade which equates to maximum soil volume of about 150m<sup>3</sup>. This volume of potentially TPH contaminated soil is calculated from the contaminated area minus the total void volume created by the excavation and removal of the concrete encased underground fuel tanks.
- 7.45 There are two options recommended for remediation for this quantity of TPH contaminated soil, including i) biopiling and ii) excavation and disposal.
- 7.46 Biopiling makes use of biological processes to turn contaminants into harmless products, ultimately to carbon dioxide, water and simple inorganic compounds. Biopiling process had been adopted in previous land contamination projects such as Decommissioning of Cheoy Lee Shipyards with soil treatment capacity over 10,000m<sup>3</sup>, the decontamination of North Tsing Yi Shipyards with soil treatment capacity over 80,000m<sup>3</sup> and the capacity of the past biopile for the soil remediation due to hydrant leakage at the North Apron of former Kai Tak Airport is over 100,000m<sup>3</sup>. At the present time, biopiling is in progress at the Passenger Terminal Building of North Apron in the former Kai Tak Airport with soil treatment capacity about 10,000m<sup>3</sup>.
- 7.47 Excavation and disposal is to remove contaminated soil from the site permanently. This method is relatively quick and ensures definite removal of contamination, as well as elimination of secondary impact associated with on-site remediation. However, the disposal of excavated soils will consume valuable landfill space if the volume is large.
- 7.48 Other soil remediation measures are not further considered because of critical disadvantages such as long-term liability and no demonstrated local experience etc.
- 7.49 The estimated TPH contaminated soil volume for remediation from CBD site is approximately 150m<sup>3</sup>. This quantity of soil is significantly smaller than the soil volume in the decommissioned or existing biopiles as mentioned in Section 7.46. There is uncertainty in the practicability of constructing such a small biopile. Operation factors for effective treatment such as maintaining moisture content and uniform aeration rate would be a concern. Fahnestock et al.<sup>1</sup> (1998) indicated that the use of biopile to remediate soil contaminated with petroleum hydrocarbon is generally applicable when the soil volume is greater than 191m<sup>3</sup>. Therefore, the use of biopiling is considered not practical for the CBD case. Considering the quantity of contaminated soil is small, excavation and landfill disposal is proposed to be the remediation method.
- 7.50 The HKSM site has different programme for SI and the nature of contamination is not known without the support of SI results. Biopile co-treatment of the organic contaminated soils from both CBD and HKSM sites will necessitate storage of contaminated soil on site. This will lead to environmental risk (e.g. fugitive emission and leachate) resulting from the extended period required for the stockpiling of the CBD soil. As such, the option for co-treatment of the contaminated soil from both sites is considered not practical at this stage.
- 7.51 A Remedial Action Plan for CBD site has been prepared as given in **Appendix 7.3**. The portion under the short term tenancy (No. SHX 844) has also been covered in the CAP. Site appraisal revealed that no potential contaminative activities have been carried out at such area. With reference to the CAR, no exceedance was found at the nearest borehole (i.e. #10) and no groundwater was encountered throughout the site during the SI. Migration of contaminant through groundwater movement to that portion of land is not anticipated. Remediation works is thus considered not necessary.

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<sup>1</sup> F.M. von Fahnestock, G.B. Wickramanayake, R.J. Kratzke and W.R. Major (1998) *Biopile Design, Operation, and Maintenance Handbook for Treating Hydrocarbon-Contaminated Soils*, published by Battelle Press.

### ***Existing Ocean Park***

- 7.52 All concerned workshops, transformer rooms, plant rooms, chemical DG storage areas were inspected and most of the concerned areas were tidy and maintained with good housekeeping. No apparent stain or ground decolourisation were found at the time of site inspection except the workshop area adjacent to 'the Dragon' within the Park.
- 7.53 For the E&M workshop and chemical storage area located near 'the Dragon', these areas in general are kept in good condition by day-to-day housekeeping and only a very small area was observed with oil stain during the inspection. As revealed by the site personnel, the workshop only has small-scale maintenance works which involve limited use of chemicals, lubricants, solvents or paints. No spillage/accident was recorded. Based on the nature of workshop without heavy machinery works and the good housekeeping in the chemical storage area/workshop, significant land contamination in these areas are not suspected. As such, no SI would be proposed within the existing Ocean Park.

### **Prediction and Evaluation of Environmental Impacts**

#### ***Hong Kong School of Motoring Site***

- 7.54 Based on the findings of site inspection, potential areas with land contamination concern have been identified in the HKSM site. As the HKSM site is still in operation, the land is currently not available for carrying out the SI to ascertain the extent of contamination at this EIA stage.
- 7.55 The implications of potential land contamination for future development at the HKSM site include:
- Health and safety concern for workers during site clearance/ construction activities, resulting from potential exposure to hazardous or flammable materials in soil; and
  - Disposal of potentially contaminated spoil arising from site clearance or construction works.
- 7.56 Since the existing land-uses identified are not major contaminative industry, area-wide contamination causing insurmountable impacts to the environment is considered very unlikely. Given that there was never any chemical/ fuel spillage ever recorded and the site observations also showed without apparent sign of contamination at this site, it is suspected that only localised contamination caused by small-scale leakage/spillage might be encountered. The overall land contamination impact would not be significant and only proper handling of contaminated materials is required if contamination is identified.
- 7.57 As noted earlier, HKSM has not given its consent to the Consultant either to prepare or submit the CAP on their behalf (**Appendix 7.1a**). It is expected however, that HKSM is committed to undertake any remediation if needed and they will prepare the Contamination Assessment Report (CAR) after completing the SI works following the requirements of the CAP (which is expected to follow the illustrative CAP which is enclosed). The CAR would compare the findings with relevant standards and Remediation Action Plan (RAP) would be prepared to propose appropriate remediation action if land contamination is confirmed. No adverse residual impact in respect of land contamination is anticipated after necessary remediation works are carried out.

#### ***Citybus Depot Site***

- 7.58 Elevated levels of heavy metals were found very localised in the fill materials and that level of materials would be kept untouched during the construction stage, significant impact to the construction workers would not be expected.
- 7.59 A further study i.e. TCLP test will be conducted to assess the leachability of the heavy metals from soil at the CBD site. For a conservative approach, remediation action i.e. cement solidification/stabilisation work is proposed for the soil with elevated heavy metal levels. An estimate of 150 m<sup>3</sup> of heavy metals contaminated soil is proposed to be excavated, treated on site and backfilled to original position. The CS/S mixing procedure would be carried out within a skip or

equivalent. Assuming a production rate of 30m<sup>3</sup> per day (i.e. 6 skips per day & 5m<sup>3</sup> per skip), about one month would be required to complete the whole process including soil excavation, mixing, testing, and backfilling. During mixing, water spraying would be provided to suppress dust emissions. Other mitigation measures are also recommended for CS/S in Section 7.78. Environmental impact related to contaminated land is therefore considered minimal.

- 7.60 For the estimated ~150 m<sup>3</sup> of TPH contaminated soil, it is proposed to be excavated and disposed of at EPD's designated landfill site. Mitigation measures are proposed to minimise environmental impacts during soil excavation and transportation, as given in Section 7.76. Therefore, environmental impact related to contaminated land is considered insignificant.

#### **Preliminary Programmes for Site Investigation and Remediation (Alternative Scenarios for HKSM site)**

- 7.61 With Scenario A (which is the expected scenario), the additional land to be incorporated within OPC's extended Site is expected to be handed over in a clean condition. The existing users (i.e. HKSM) would fulfil their responsibilities for the SI (described in the CAP) and any required remediation works within their Site. For Scenario A, no further action from OPC is required and OPC would subsequently grant access to its contractors to the Site to begin work.
- 7.62 An alternative scenario, namely Scenario B, has been considered as the "fall-back" option. It would only arise in the event that the existing user or responsible parties do not hand over the Site in a clean condition. Under this Scenario, the whole HKSM site will initially be fenced off and the suspected contaminated area will be fully demarcated and isolated. The purpose of fencing the site is to restrict access to ensure there would be no risk to the general public. In order to safeguard the health of both visitors to Ocean Park and staff of OPC, OPC will ensure these fenced off areas are secure.
- 7.63 Following this, OPC undertakes to carry out, to the extent outstanding, the site investigation (refer to **Appendix 7.1a**). Such an undertaking does not relieve the existing users of their obligations to clean the site, nor does it in any way restrict OPC's rights to recover the costs of carrying out the SI works from the responsible parties.
- 7.64 Once the SI results are available, the potential contaminated area could be identified and the fenced-off area could be adjusted to isolate only the area of contamination. OPC would ensure that no work would be undertaken within the fenced off area. OPC would modify the design of the new entry plaza and access road so as to accommodate this fenced off area in its layout and to limit access to, as well as circulation around it.
- 7.65 Consideration of the extent of any SI works to be undertaken by OPC to cater for Scenario B would take account of the outcome of any SI and/ or works undertaken by others.
- 7.66 OPC has reviewed the construction and implementation programme for the redevelopment and has confirmed that its programme would accommodate delayed handover to its contractors and that it would proceed with works in other areas even if portions of the HKSM Site were not available when expected.

#### ***Programme for Site Investigation***

- 7.67 Given that only limited areas have been identified as potential contamination area at HKSM site, about 4 weeks time would be required for the SI works including site preparation, drilling, sampling and testing. Further 4 weeks time is required for reporting (CAR and RAP) and solving comments from relevant authorities for EPD's endorsement.

#### ***Programme for Remediation***

- 7.68 The major contamination concern at the HKSM Site is the potential fuel leakage from the underground storage tanks. However, taking into account the known operation history and relevant tank records without prior release, no bulk fuel leakage from the underground tanks is anticipated.
- 7.69 Some recent completed EIA projects with petroleum contamination by oil tanks have also been referenced to in order to provide information for possible contamination extent and planning of contamination material handling and remediation, such as:
- *EIA Report (EIA-098/2004) for Kowloon Southern Link:* Two underground oil storage tanks inside TST Fire Station, which is at approximately 60m to the west of the alignment were identified. The SI results did not find any related contamination. No remediation action was proposed.
  - *EIA Report (EIA-119/2005) for Lamma Power Station Units L4 & L5 Flue Gas Desulphurization Plant Retrofit Project:* 600m<sup>3</sup> of TPH contaminated soil was estimated at No.5 oil tank. On-site biopile treatment was proposed.
  - *EIA Report (EIA-092/2003) Reprovisioning of Diamond Hill Crematorium:* The facility had fuel tanks, DG store and electric sub-station. The SI results showed no TPH contamination was found around the fuel tank area and only minor metal contaminated soil of less than 100m<sup>3</sup> was found near the stack. Landfill disposal was then proposed.
- 7.70 Based on consultant experience gained from the past projects involving leaks from underground storage tanks, the contamination would normally be found at the “smeared” zone (i.e. 1m below and above ground water table). The volume of the contaminated soil for excavation is therefore estimated to be around 400m<sup>3</sup>. **Table 7.7** gives an initial estimate of the contaminated soil volume at the identified hotspots.

**Table 7.7 Estimated Volume of Contaminated Soil at Identified Hotspots in HKSM**

Site	Hotspot	Estimated Horizontal Extent of Contamination (m <sup>2</sup> )	Estimated Vertical Extent of Contamination (m)	Estimate Volume of Contaminated Soil (m <sup>3</sup> ) *
HKSM	1 underground fuel storage tank	10 x 10	3	300
	Chemical waste storage area and vehicle maintenance workshop	20 x 5	1	100
<i>Total Estimated Volume of Contaminated Soil</i>				400

Note: \* The actual extent and quantity of contaminated soil at the site should be subject to SI results.

- 7.71 The possible scenarios with proposed remediation methods and duration are summarized in **Table 7.8**. In view of the nature of business of HKSM with potential contaminants including petroleum hydrocarbons and heavy metals, biopiling and/or cement solidification/stabilisation are proposed for remediation in the unlikely event of significant contamination found. These two remediation methods have been proved to successfully treat the soil contaminated by petroleum hydrocarbons or heavy metals, such as in the decontamination projects of Cheoy Lee Shipyard, North Tsing Yi Shipyard and the former Kai Tak Airport.

**Table 7.8 Possible Remediation Options and Preliminary Remediation Programme For HKSM Site**

Scenario	Possible Quantity of Contaminated Soil <sup>(1)</sup>	Possible Remediation Options <sup>(2)</sup>	Preliminary Remediation Programme
Scenario 1	No contaminated soil	Nil	Nil

Scenario	Possible Quantity of Contaminated Soil <sup>(1)</sup>	Possible Remediation Options <sup>(2)</sup>	Preliminary Remediation Programme
Scenario 2	Small volume of contaminated soil	Landfill disposal	3 to 5 months <sup>(3)</sup>
Scenario 3	Large volume of contaminated soil which requires for the set-up of on-site/off-site treatment plant	Option 1 – On-site treatment by biopiling and/or cement solidification/stabilisation	12 to 18 months
		Option 2 – Off-site treatment by biopiling and/or cement solidification/stabilisation	12 to 18 months

Notes:

(1) Small volume of contaminated soil is expected to be a few hundreds cubic meters while the large volume of contaminated soil is likely more than a thousand cubic meters.

(2) A complete comparison of the pros and cons of all possible remediation options (plus recommendation) to be provided in the future RAP submission so as to justify the proposed remediation options and determine the best feasible option for contaminated soil treatment.

(3) Application of landfill disposal to Facilities Management Group of EPD is normally required 3 months before disposal. Such application would be made as soon as possible if excavation and landfill disposal is confirmed for soil remediation.

7.72 Either on-site or off-site treatment would be considered depending on the site and time availability. The contaminated soil should be treated by biopile (if TPH exceedance found in the SI) and/or CS/S (if heavy metals exceedance found in the SI). On-site possible areas for remediation could be in Tai Shue Wan or the open space 100m away from the existing Nam Long Shan Road rest garden, which is a more remote area located in the Headland of the Ocean Park. **Figures 7.5a and 7.5b** show the proposed locations for biopiling and CS/S treatment. The areas have been designed to accept the estimated 400 m<sup>3</sup> of spoil, and also allow sufficient room for equipment, etc. In the case that the heavy metal contaminated soil volume is small, such soil would be considered to be treated in the HKSM site. However, in an unlikely event that large heavy metal contaminated soil is identified, CS/S will be carried out at Tai Shue Wan or Rest Garden sites. Off-site treatment options (same as the proposed on-site treatment options) may be considered, if needed, as a fall-back option. Options of on-site or off-site treatment would be further studied after the SI results are obtained. The soil treated by biopiling or CS/S will be finally re-used on-site.

7.73 Transportation of the contaminated soil from the HKSM Site to both treatment sites would be by road. The approximate distances would be of 3.5km to 4.5km via Police School Road and Shum Wan Road to the Tai Shue Wan Site or 3.0km to 4.0km via Police School Road and Nam Long Shan Road to the Rest Garden Site. Assuming 5m<sup>3</sup> capacity dump truck to be used, the maximum number of laden truck movements of excavated contaminated materials from HKSM to the treatment site is estimated to be 80. The period of transportation of contaminated materials is expected to be about 10 -20 days, depending on excavation progress. It is estimated that about 1 trip per hour is generated and traffic impact to the nearby area would therefore not be anticipated during the excavation period. The truck frequency should be subject to review based on the actual quantity of contaminated soil identified from the SI.

7.74 The difference between Tai Shue Wan and the open space near the rest garden are described in **Table 7.9** below:

**Table 7.9 Comparison between Tai Shue Wan and Open Space near the Rest Garden for Biopile Treatment**

Location	Tai Shue Wan	Rest Garden
Area to be occupied for biopile treatment	25m x 25m	40m x 15m
Maximum height of biopile	2m from existing ground	2m from existing ground
Sensitive Receivers	The existing facilities will be demolished. The space can be used as biopile treatment. The closest receivers will be about 50m from the proposed treatment site	The rest garden is identified as an ASR, which is 100m from the proposed treatment site

Location	Tai Shue Wan	Rest Garden
Environmental concerns	Air, Noise, Water, Waste and Visual	Air, Noise, Water, Waste and Visual
Engineering concerns	Ground level (1% fall shall be provided for the proposed platform, the area shall also be paved with concrete) Power supply (at least 100kW for the biopile equipment and lighting) Water supply Erect hoarding (with minimal 5m setback to the public.	Ground level (1% fall shall be provided for the proposed platform, the area shall also be paved with concrete) Power supply (at least 100kW for the biopile equipment and lighting) Water supply Erect hoarding (with minimal 5m setback to the public. Access road (at least 3.5m width)

**Remediation of Contaminated Soil**

7.75 The likely amount of contaminated soil, under the reasonably worst-case scenario, estimated from the best available information and relying on professional judgment gained from projects having similar type/ likelihood of contamination is expected to be less than 400 m<sup>3</sup>. The treated soil should be used as backfilling materials for OP re-development. Nevertheless, without the benefit of detailed evidence gained from a site investigation, there is some uncertainty in this volume. Accordingly, the remediation site at Tai Shue Wan (or the alternative site at Nam Long Shan road) has been selected because there is flexibility to accommodate larger quantities of soil at those sites, either by limited extension in the area used, and/ or by constructing higher biopiles. As a further fall-back option in case the volume of contaminated soil is substantially more than anticipated, both sites (Tai Shue Wan and Nam Long Shan Road) may both be made available. Since both sites are situated on land owned by, and within the control of, OPC, no problems of land availability are foreseen. Alternatively, off-site option may need to be considered. This would be confirmed once the SI results are available.

**Mitigation Measures for Land Contamination**

7.76 Mitigation measures are proposed for handling of the contaminated materials in order to minimise (1) the potentially adverse effects on the health and safety of construction workers and (2) the impacts arising from the disposal of potentially contaminated materials. These measures for contaminated material excavation and transportation include:

- Construction workers' potential contact with contaminated materials should be minimised by using bulk earth-moving excavator equipment;
- Exposure to any contaminated materials should be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (when interacting directly with suspected contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during such activities;
- Stockpiling of contaminated excavated materials on site should be avoided as far as possible;
- The use of contaminated soil for landscaping should be prohibited unless there is proper treatment of soil;
- Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions;
- Only licensed waste haulers should be used to collect and transport any contaminated material to an appropriate treatment/disposal site and procedures should be developed to ensure that illegal disposal of waste does not occur;
- Speed control for the trucks carrying contaminated materials should be enforced;

- The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35), as required;
- Records of the quantities of wastes generated and disposed of should be maintained; and
- In accordance with good construction practice, silt traps should be used to reduce the impact to drainage caused by suspended solids arising from disturbed ground, or any construction materials such as cement and gravel. Wastewater, surface runoff or extracted groundwater should be disposed of in accordance with the WPCO.

7.77 Key potential environmental impacts induced by biopiling and CS/S processes include:

- Odour, run-off and dust emission from biopile and cement solidification/stabilisation plant;
- Noise generated from biopile blower and cement solidification/stabilisation process; and
- Volatile organic carbons (VOCs) and benzene from biopile emission exhaust.

7.78 The following mitigation measures are proposed for biopiling and CS/S processes (applicable to both Tai Shue Wan and the open space near the rest garden) which are the possible remediation actions in the unlikely event of significant contamination found.

#### Air Quality Impact

- Biopile should be covered by tarpaulin or low permeable sheet to avoid dust emission;
- Vented air from biopile should be connected to blower and carbon adsorption system for treatment before release to the atmosphere. Exhaust air from the blower and carbon adsorption system should be monitored regularly;
- The materials which may generate airborne dust emissions e.g. untreated contaminated soil should be adequately wetted prior to and during the loading, unloading and handling operations;

#### Noise Impact

- Silencers should be installed at biopile blower to minimise noise impact;
- Quiet plant shall be used for biopile treatment such as generator, blower, etc.

#### Water Quality Impact

- Impermeable liners should be placed at the bottom of biopile and leachate collection sump should be constructed along the perimeter of biopile to minimise contaminated run-off. The leachate should be recycled back to the biopile or trucked away to Chemical Wastes Treatment Centre for disposal;
- Mixing of contaminated soils and cement/water/other additive(s) should be undertaken at a solidification plant to minimise the potential for leaching;
- Run-off from the solidification/stabilisation area should be prevented by constructing a concrete bund along the perimeter;

#### Waste

- The loading, unloading, handling, transfer and storage of cement should be carried out in an enclosed system;
- The contaminated soils should be transported by roll-off trucks (containerisation). This provides the most effective way to control the handling of contaminated soil and minimise the chance of spillage/ leakage during transportation.
- Mixing process and other associated material handling activities should be properly scheduled to minimise potential noise impact.

#### Visual Impact

- Temporary hoarding should be provided around the treatment area in order to minimize the visual impact.

7.79 With implementation of the above proposed mitigation measures, no adverse environmental impacts would be expected for biopiling and CS/S process.

#### **Residual Environmental Impact**

7.80 The proposed remediation methods would completely remove contaminants from the site through excavation followed by disposal, degradation of the contaminants to non-toxic substances by biopiling or immobilizing the contaminants by cement solidification/ stabilisation. After completion of soil remediation, residual impact in respect of land contamination on the future users should not be expected.

#### **Environmental Monitoring and Audit Requirements**

7.81 Details of the environmental monitoring and audit requirements are provided in Chapter 13 of this EIA and a stand-alone EM&A Manual.

#### **Conclusions**

7.82 An investigation of the historical/current land uses, including a desk-top review and site inspection, at the Hong Kong School of Motoring (HKSM), Citybus Depot (CBD) and existing Ocean Park has been carried out as initial part of the land contamination assessment. The results indicated that no contaminative land uses are identified before the operation of the HKSM, CBD and existing Ocean Park.

7.83 The concern of contamination at the HKSM and CBD arises from the presence of vehicle refuelling/ washing area, vehicle maintenance workshop and chemical waste storage area. For the existing Ocean Park area, most of the potential contaminative workshops were maintained in good condition by good housekeeping. The ground was well paved without cracks or stains and therefore no sign of contamination was noted within the Park.

7.84 Two Contamination Assessment Plans (CAP) which detail the sampling locations and testing schedules of the site investigation (SI) have been prepared. A total of 20 sampling locations are proposed for the HKSM and CBD, with 10 sampling points at each site. Citybus Limited has given its consent to Ocean Park Corporation (OPC) to submit the CAP on their behalf. The CAP prepared for HKSM under this EIA is for illustrative purpose only. The party responsible for land contamination SI at the HKSM site in the future would need to separately submit a CAP for Environmental Protection Department (EPD)'s approval.

7.85 For CBD site, the SI was conducted from 31 March to 3 April 2006. The results as presented in the CAR indicated that the concentration of most of the heavy metals in the soil samples are acceptably low except arsenic and tin at five specified locations. Considering that the elevated levels of heavy metals are found very localised in the fill materials, the source is probably not due to the past site activities/surface spillage and the level of materials would be kept untouched during the construction stage, direct impact to the construction workers would not be anticipated.

7.86 A further study, Toxicity Characteristic Leaching Procedure (TCLP) testing, will be conducted in order to determine the leachability (hence the toxic risk) of the soil with elevated level of metals at the CBD site. For a conservative approach, clean-up strategy is proposed for the soil contaminated with heavy metals with details in the Remediation Action Plan (RAP).

7.87 The soil with elevated level of arsenic/tin (~150 m<sup>3</sup>) is proposed to be excavated, treated on site using cement solidification/ stabilisation (CS/S) and backfilled to original position. The mixing procedure would be carried out within a skip or equivalent. Assuming a production rate of 30m<sup>3</sup> per day (i.e. 6 skips per day & 5m<sup>3</sup> per skip), about 1 month would be required to complete the whole



CS/S process. Environmental impact related to contaminated land is considered minimal with implementation of the proposed mitigation measures. This proposed clean-up strategy may be reviewed should other site data (e.g. TCLP results) be available.

- 7.88 Elevated total petroleum hydrocarbon (TPH) concentrations above the B value of 1,000mg/kg were found in two sampling locations in the immediate vicinity of the underground refuelling tanks. Soil remediation at these locations is recommended with details in the RAP. The excavation of BH-2 is proposed to be down to 8m below grade. The excavation of BH-6 and the remaining area around the tank is proposed to be down to 6m below grade which equates to maximum soil volume of about 150m<sup>3</sup>. Considering that the quantity of contaminated soil would be small (~150m<sup>3</sup>), such contaminated soils are proposed to be excavated and disposed of to landfill site.
- 7.89 For HKSM Site, in view of the current site condition observed from site inspection, information obtained from Fire Services Department (FSD)/Environmental Protection Department (EPD) without bulk spillage/ leakage and nature of business without heavy contaminative activities involved, only small-scale contamination caused by localised leakage/ spillage is likely to be encountered. Insurmountable impacts on the surrounding environment in respect of land contamination would therefore not be anticipated.
- 7.90 Based on professional judgement and experience gained from other similar projects involving leaks from underground storage tanks, the contamination would normally be found at the “smeared” zone (i.e. 1m below and above ground water table). The volume of the contaminated soil for excavation is estimated to be around 400m<sup>3</sup>. Nevertheless, without the benefit of detailed evidence gained from a SI, there is some uncertainty in this volume.
- 7.91 The SI for HKSM should be conducted as soon as possible after the site operation ceases. A CAR should be prepared to document the findings of the SI and identify any need for remediation. If land contamination is confirmed, a RAP should be drawn up to formulate necessary remedial measures. The subsequent CAR and RAP should be endorsed by EPD prior to implementation of any remedial works.
- 7.92 Different remediation options and associated treatment programme have been proposed based on the estimated quantity of contaminated soil and nature of possible contaminants. Both Tai Shue Wan and the open space near the existing Nam Long Shan rest garden are considered technically feasible for the proposed remediation works. The CS/S works for heavy metal contaminated soil is proposed to be carried out in the HKSM site if the soil volume is small. The biopile and/or CS/S treated soil will be re-used on site. Appropriate mitigation measures have been recommended to minimise environmental impacts during soil excavation, transportation and remediation. No adverse residual impact in respect of land contamination is anticipated if necessary remediation works are carried out in respect of any identified contaminated land.
- 7.93 In the event that the current users or responsible parties of the HKSM Site do not fulfil its obligations to undertake a CAP, CAR or RAP or the necessary remediation to the satisfaction EPD, and the site handed-over to OPC is not totally cleaned (for technical or other reasons), then the whole HKSM site will initially be fenced off and the suspected contaminated area will be fully demarcated and isolated. The purpose of fencing the site is to restrict access to ensure there would be no risk to the general public. Following this, OPC undertakes to carry out, to the extent outstanding, the site investigation. Such an undertaking does not relieve the existing users of their obligations to clean the site, nor does it in any way restrict OPC’s rights to recover the costs of carrying out the SI works from the responsible parties.
- 7.94 Once the SI results are available, the potential contaminated area could be identified and the fenced-off area could be adjusted to isolate only the area of contamination. OPC would ensure that no work would be undertaken within the fenced off area. OPC would modify the design of the new entry plaza and access road so as to accommodate this fenced off area in its layout and to limit access to, as well as circulation around it.

- 7.95 OPC has confirmed that the space and time requirements for contamination investigation and/or treatment of contaminated soil can be accommodated in the overall design and redevelopment programme for Ocean Park.