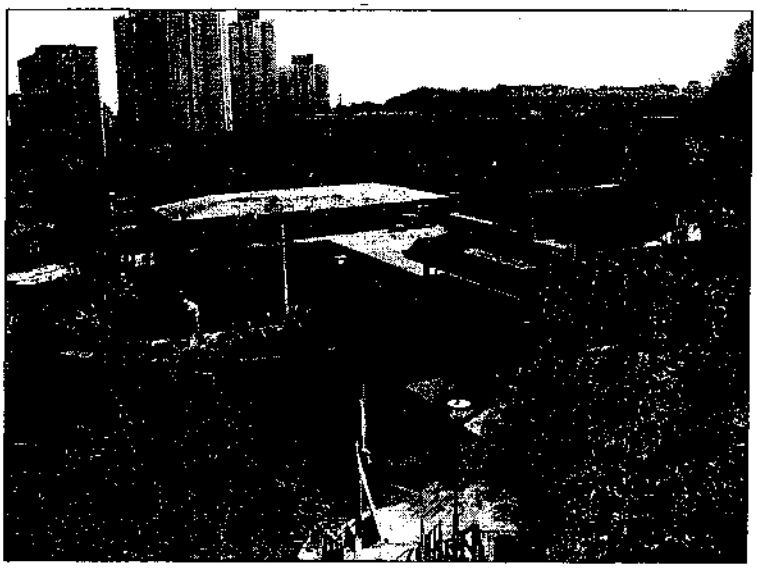
Hong Kong Productivity Council
香港生產力促進局

偉信 Scott Wilson



Reprovisioning of Diamond Hill Crematorium: Contamination Assessment Plan

Hong Kong Productivity Council /
Architectural Services Department

5 February 2003
Final Report

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INTRODUCTION

1.1 Background

1.1.1 Scott Wilson Limited have been commissioned by the Hong Kong Productivity Council to carry out an assessment of land contamination at the site of the Diamond Hill Crematorium.

1.1.2 This report presents the findings of a Phase I Contamination Assessment undertaken at the site of the current Diamond Hill Crematorium. The site area covered in this report includes the existing crematorium and the proposed location of the reprovisioned crematorium immediately to the south. The site location is indicated on Figure 1 and the site boundary is indicated on Figure 2.

1.1.3 This report comprises the Contamination Assessment Plan for the site and has been prepared in accordance with the guidance given in the following documents:

- Annex 19 of the Environmental Impact Assessment Ordinance – Technical Memorandum;
- Practical Note for Professional Persons (ProPECC) Note PN 3/94, "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", Environmental Protection Department, EPD/TR1/99.

1.2 Objectives

1.2.1 The objectives of this report are to:

- Determine the previous landuses of the site;
- Outline the current environmental setting of the site, in terms of surrounding landuses, geology and hydrogeology;
- Describe the processes carried out at the site;
- Identify potential sources of ground contamination;
- Outline potential contaminant sources, receptors, and the potential pathways between sources and receptors;
- Determine a suitable site investigation strategy to identify, quantify and delineate areas of ground contamination.

SITE DESCRIPTION

1.3 Location and Topography

1.3.1 The site is located in Kowloon, approximately 500m to the north of Diamond Hill MTR Station, and immediately to the north of Po Kong Village Road.

1.3.2 The site lies on a southwards-facing spur, with slopes downwards to the east and west, and a slope upwards to the north. The original topography has been altered by site formation works, which has consisted of the formation of level areas for building platforms and the formation of engineered slopes to the north, east and west.

1.4 Geology and Hydrogeology

1.4.1 Information on the underlying geology of the site and the surrounding area has been taken from the following publications:

- The Pre-Quaternary Geology of Hong Kong, Hong Kong Geological Survey, August 2000
- The Quaternary Geology of Hong Kong, Hong Kong Geological Survey, May 2000
- 1:20,000 Map of Solid and Superficial Geology, Sheet 11 (Hong Kong and Kowloon), Hong Kong Geological Survey, 1986

1.4.2 The geology of this part of Kowloon comprises Quaternary colluvial (debris flow) deposits of the Fanling Formation, overlying granite bedrock of the Kowloon Granite Formation.

1.4.3 The geological map shows a basalt dyke running in a south-west to north-easterly direction both to the south-west and north-east of the site, where the bedrock is not overlain by a significant thickness of colluvium.

1.4.4 Groundwater is usually present within colluvial deposits and weathered granite, with the normal groundwater table typically lying just above rockhead level. Groundwater is not utilised as a source of water supply in this part of Hong Kong.

1.4.5 Copies of existing drillhole and trial pits logs held by the Geotechnical Engineering Office have been inspected. A number of exploratory holes were undertaken in the existing slopes under Agreement CE57/96 "Stability Studies on Urban Council Slopes Maintained by ASD". Exploratory holes within the site indicate varying depths of sand and gravel fill overlying completely decomposed granite, which increases in strength with increasing depth. Alluvium was recorded overlying the granite in holes adjacent to the watercourse to the east of the site. There are no records of waste material in any of the exploratory holes, and no records of unusual odours or visual evidence of contamination.

1.5 Hydrology

1.5.1 A watercourse is present immediately to the east of the site, which consists of a natural rocky channel. Immediately to the south of the site, this watercourse passes into an artificial underground drainage channel, prior to ultimately discharging into Victoria Harbour.

1.6 Current Landuses

1.6.1 The site is currently used as a crematorium, and consists of a central building for carrying out services and cremations, several columbariums for storage of cremated remains, and a number of smaller structures such as stores and a substation. The grounds of the site are landscaped with many trees and shrubs.

1.7 Surrounding Landuses

1.7.1 The site is bounded to the north and east by cemeteries and grave sites, with Hammer Hill Road also lying to the east of the site. There are a number of buildings to the west, which include a columbarium for cremated remains and an electrical substation. Above ground high-voltage electricity cables are situated to the north of the site. Po Kong Village Road runs along the south-western edge of the site. Tate's Cairn Tunnel passes beneath the area, to the north and west of the site boundary.

1.8 Previous Landuses

1.8.1 Historical landuses have been determined by examination of historical aerial photographs and site plans and by interviews with current employees.

1.8.2 A total of six historical aerial photographs have been reviewed, as listed below:

- 81A/177, April 1949;
- 1935 Y72, 1972;
- 14304, June 1976;
- A18296, September 1989;
- A35622, July 1993;
- CN23166, June 1999.

1.8.3 The earliest aerial photo indicates that the site was, at this time, predominantly grassed, boulder-strewn hillside. A number of tracks cross the site, and the photograph suggests that graves are present to the west and north.

1.8.4 By the time of the 1972 photo, the area of graves had spread southwards, over part of the current crematorium site. The area to the south-west of the site (outside the current site boundary) appears to have been used as a car dismantling and repair facility. There are a number of buildings in the south-eastern corner of the site, comprising of the original Diamond Hill Crematorium and the associated staff accommodation. The 1976 photo shows the vehicles to the south-west to have been removed, and construction work appears to be underway. There is an area in the south-west of the current site which consists of irregular-shaped plots of land, and may represent a squatter area or small agricultural plots.

1.8.5 Construction of the current crematorium occurred between the photos of 1976 and 1989. Many of the grave plots shown in earlier photos were covered by the new crematorium development, and the structures in the south-eastern corner of the site were also removed. The basic layout of the crematorium in the 1989 photo is the same as at present. A large new building is also shown to the north-west of the site. The layout of the area does not appear to have altered significantly between the 1989 photo and the most recent photo of 1999.

1.8.6 A number of drawings have been provided by ASD, dating from the construction of the present crematorium in 1977/78. These drawings indicate the locations of the previous crematorium, the underground fuel storage tank, and the dangerous goods store. The drawings indicate that considerable earthworks and disturbance of the natural topography would have occurred during these construction works.

RESULTS OF SITE INSPECTION

1.9 Site Walkover Survey

1.9.1 A site inspection was carried out on 21st November 2002. The locations of the dangerous goods store, underground fuel tank and electricity substation were confirmed, although access to the interior of these buildings was not available. No visible evidence of contamination was noted during this site visit. A further site visit was undertaken on 11th December 2002, when access to all areas (excluding the CLP electricity substation) was possible. Site operatives were present during the site visits and provided verbal information on current and previous site practices. This information has been taken account of in determining the likely sources of contamination.

1.9.2 Photographs taken during the site inspection are included as Appendix A.

1.9.3 A Preliminary Site Checklist has been completed by site staff, and is included as Appendix C.

POTENTIAL CONTAMINANT SOURCES, PATHWAYS AND RECEPTORS

1.10 Contaminant Sources

1.10.1 On the basis of a review of historical information and current practices, and following the site inspection, the principal potential sources of contamination at the site have been identified. These are associated with the site's current and former use as a crematorium. Other land uses within and beyond the site boundary are considered unlikely to give rise to significant contamination within the site. The location of potential contaminant sources is shown in Figure 3.

1.10.2 Facilities or activities which may result in contamination, and the contaminants which may be present, are listed below.

Fuel Storage Tank

Potential Contaminants: Petroleum hydrocarbons (diesel range);

Polyaromatic hydrocarbons.

The fuel tank has been used for storage of diesel rather than petrol, so lighter range petroleum fractions (e.g. BTEX) are not likely to be present. The TPH analysis will include hydrocarbons range from C_6 to C_{36}. An underground fuel pipe is believed to lead from the main buried tank to a small tank inside the main building, in the roof space. The exact alignment of this pipe could not be precisely determined either from the available plans or from the site visit.

Dangerous Goods Store

Potential Contaminants: Petroleum hydrocarbons;

Polyaromatic hydrocarbons.

The interior of the Dangerous Goods Store was inspected during the site visit. The Store has a concrete floor, which appears largely free from staining or cracking. The contents of the store were found to be mainly non-hazardous items, although a small number of sealed plastic containers thought to contain oil were noted. There was no visual or olfactory evidence of any contamination within the Store or the immediate vicinity.

Electricity Sub-station (on site)

Potential Contaminants: Polychlorinated biphenyls (PCBs)

Petroleum hydrocarbons

It is not clear whether PCB-containing transformer oils have been used in this substation: information will be sought from CLP. In the absence of further information, it has been assumed that PCBs are potential contaminants in this area. Sampling beneath the sub-station is not possible whilst the sub-station is still in use, as this would lead to unacceptable safety risks. Sampling and analysis will be carried out following decommissioning of the sub-station.

Areas impacted by aerial deposition from stack emissions

Potential Contaminants: Polyaromatic hydrocarbons;

Dioxins;

Metals ("Dutch List": Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb)

It is considered unlikely that stack emissions would give rise to significantly elevated concentrations of soil contaminants under normal conditions. However, the possibility cannot be discounted and hence sampling and analysis will be carried out. Aerial deposition of contaminants arising from stack emissions would be greatest in the downwind direction from the stack. The prevailing wind direction is from east to west, meaning that aerial emissions from the stack would be predominantly carried to the west. Sampling effort will therefore be concentrated to the west of the stack, although confirmatory sampling will also be carried out to the north, south and east of the stack.

Crematorium Cremators

Potential Contaminants: Polyaromatic hydrocarbons;

Dioxins;

Metals ("Dutch List": Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb)

The cremators are situated within the building and above a concrete floor slab. Since the potential contaminants are be predominantly in the solid phase (e.g. particulate matter) it is considered very unlikely that they could migrate through the slab into the underlying soil and sampling and analysis beneath the slab is therefore not considered necessary. Particulate contamination may however be present within the cremators and flues.

Former Crematorium

Potential Contaminants: Petroleum hydrocarbons;

Polyaromatic hydrocarbons;

Dioxins;

Metals ("Dutch List": Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb)

No information is available on the layout or operation of the former crematorium. The site has undergone considerable disturbance due to site formation for the current facility. It is not therefore possible to identify specific features of the former crematorium where sampling and analysis is required. The former crematorium lies at depth within part of the site that will undergo minimal disturbance as part of the re-provisioning works, and therefore sampling is not considered necessary.

1.11 Potential Receptors

1.11.1 General classes of potential contaminant receptors include:

- Existing and future site users;
- Workers engaged in demolition and construction activities;
- Occupants of nearby properties;
- Groundwater beneath the site;
- Surface watercourses adjacent to the site.

1.11.2 Whether or not these receptors will be exposed to contamination depends on the presence of contaminant sources, and the existence of viable pathways whereby contaminants can come into contact with receptors.

1.12 Potential Pathways

1.12.1 The site is currently either covered with hardstanding, buildings or landscaped areas, with little or no areas of bare soil. Following demolition and reprovisioning, a similar situation is likely to apply.

1.12.2 The presence of landscaped areas raises the possibility of direct contact with soil via gardening activities or use of landscaped areas for recreation. However, the fact that the site is a crematorium suggests that the use of landscaped areas for recreation on a regular basis is unlikely. Site staff engaged in gardening or landscaping activities may come into direct contact with soil. Off-site migration of contaminated soil (other than deliberate removal during earthworks) is unlikely to occur either currently or following redevelopment, since there are unlikely to be significant areas of bare soil present.

1.12.3 During demolition and reprovisioning, there will be significant disturbance to the ground surface, including removal of structures and hardstanding, excavation and transport of soil. There is therefore a possibility that site workers may come into direct contact with any contaminated soil. Accidental off-site transport of contaminated soil (i.e. via wind-blown dust) is also possible. However, the application of general mitigation measures to prevent the generation of construction dust is likely to ensure that this potential pathway is of minimal significance. There are currently no residential areas bordering the site.

1.12.4 Groundwater may be impacted by the downwards migration of contaminants through the soil profile, and this may be increased where existing areas of hardstanding (which prevent infiltration) are removed. The degree of impact depends on the extent and concentration of any contaminants, and also their chemical properties such as solubility. Groundwater is not used as a resource in this area, and therefore impacts on groundwater quality are unlikely to impact upon human receptors.

1.12.5 The adjacent watercourse may be affected by run-off of contaminants from the site, either by leaching or direct transport of contaminated soil. Normal measures to mitigate the impacts of construction on water quality should prevent contaminated soil from directly entering the watercourse.

1.13 Summary

1.13.1 The source-pathway-receptor analysis has identified the following pollutant pathways associated with the site. A qualitative assessment of the estimated significance of each pollutant pathway is given.

Table 4.1: Summary of Potential Pollutant Linkages

Source	Pathway	Receptor	Estimated Significance
Contaminated soil and materials	Leaching to groundwater	Groundwater beneath site	Potentially significant
	Leaching to surface water	Watercourse adjacent to site	Potentially significant
	Direct transport of contaminated soil	Watercourse adjacent to site	Unlikely to be significant
	Direct exposure (ingestion, inhalation and dermal contact)	Workers engaged in demolition and construction	Potentially significant
		Site staff following redevelopment (particularly gardeners)	Potentially significant
		Site users (during redevelopment)	Potentially significant
		Future site users (following redevelopment)	Unlikely to be significant
		Occupants of neighbouring properties	Unlikely to be significant

SITE INVESTIGATION PROPOSALS

1.14 Proposed Exploratory Holes

Location of Holes

1.14.1 Exploratory holes will be sited to investigate the potential sources of contamination identified in Section 4.1 above.

1.14.2 It is not proposed to carry out intrusive investigations beneath the floor slab of the existing crematorium building. As noted above, it is considered that there is a negligible likelihood that any particulate contamination within the crematorium building could have migrated through the concrete floor slab and into the underlying soil.

1.14.3 It is not feasible to take samples of material from within the cremators, flues and surrounding area at present since the facility is still in operation. It is therefore proposed that a sampling and analysis plan is implemented following decommissioning and prior to demolition. It is anticipated that this will comprise sampling of dust and particulate matter for a suite of parameters that will include metals, dioxins and asbestos. The sampling and analysis plan for the crematorium building will be submitted to EPD for endorsement following decommissioning and prior to demolition of the building.

1.14.4 It is not feasible to carry out intrusive investigations within the CLP sub-station whilst it is operational, as this poses unacceptable safety risks. It is therefore proposed that a sampling and analysis plan for the sub-station will be submitted to EPD for endorsement following decommissioning and prior to demolition of the sub-station.

1.14.5 The proposed locations of exploratory holes are shown in Figure 4.

Sampling Depths

1.14.6 The trial pits will be formed to a depth of 3m below existing ground level. The majority of potential contaminants (with the exception of fuel oils) are of relatively limited mobility, and it is considered likely that if contamination is present in significant quantities, it is likely to be detected in the upper 3m of the soil profile. Soil samples will be taken at depths of 0.5m, 1.5m and 3m below ground level.

1.14.7 In the vicinity of the underground fuel storage tank, it is proposed to form two drillholes to a depth of approximately 3m below the base of the tank, which is shown on the drawings to be approximately 4m below ground level. DH1 and DH2 will therefore be extended to 7m below ground level. Sampling will commence that a level of 0.5m below the base of the tank, and samples will be taken at depths of 4.5m, 5.5m and 7m below ground level. If groundwater is encountered in this drillhole, a sample will be recovered for analysis. A further trial pit will be situated adjacent to the main crematorium building, in order to investigate potential leakage from the underground fuel pipe which is likely to be present in this general area.

1.14.8 To the west of the stack, surface samples will be taken from a depth of 0 – 0.1m below ground level, in order to determine whether elevated concentrations of contaminants are present at the surface as a result of aerial deposition from stack emissions. Since the

main contaminants of concern in this area are likely to be relatively immobile, it is considered that the highest concentrations of these contaminants (if present) are likely to be in the surficial soil.

Table 5.1: Proposed Exploratory Holes

Location	Exploratory Hole (depth)	Sampling Depths (mbgl)	Analytical Requirements
Fuel storage tank	DH1 (7m)	4.5m; 5.5m; 7m #	TPH
	DH2 (7m)	4.5m; 5.5m; 7m #	PAH
	TP1	0.5m; 1.5m; 3m	
Dangerous Goods store	TP2 (3m)	0.5m; 1.5m; 3m	TPH
			PAH
West of stack	S1 (0.1m)	0.1m	
	S2 (0.1m)	0.1m	Metals
	S3 (0.1m)	0.1m	PAH
North of stack	S4 (0.1m)	0.1m	Dioxins
South of stack	S5 (0.1m)	0.1m	
East of stack	S6 (0.1m)	0.1m	

Groundwater will be sampled from DH1 and DH2 if encountered

1.15 Proposed Analytical Requirements

1.15.1 The suite of analysis will reflect the potential contaminants that have been identified in Section 4.1 above, and are listed in Table 5.2.

Table 5.2: Analytical Requirements

Parameter	Analytical Method
Total Petroleum Hydrocarbons (TPH)	GC-FID with carbon banding (USEPA 8015 or similar)
Polyaromatic Hydrocarbons (PAH)	GC-MS (USEPA 8270 or similar) or GC-FID (USEPA 8100 or similar) Results to be reported as individual concentrations of USEPA List of 16 Priority PAHs
Polychlorinated Biphenyls (PCB)	GC-ECD (USEPA 8082 or similar) or GC-MS (USEPA 8270 or similar) Results to be reported as total PCB concentration.
Dioxins (PCDDs/PCFDs)	GC-MS (USEPA 8280A or similar) Results to be reported as total 2,3,7,8-TCDD toxicity equivalence for all 2,3,7,8 substituted congeners.
Metals	ICP-AES (USEPA 6010 or similar), or ICP-MS (UESPA 6020 or similar) with Cold Vapour-AAS (USEPA 7471 or similar) for Mercury

1.15.2 Analysis should be undertaken at a laboratory which either holds HOKLAS accreditation for the chosen parameters, or (for non-HK laboratories) is accredited to a similar standard by a recognised national accreditation body.

1.15.3 If any samples are found to exceed the assessment criteria, and excavation and landfill disposal is selected as a remedial method, then TCLP testing of these samples will be required. Sufficient sample will therefore be retained to allow for TCLP analysis following completion of the main laboratory testing.

1.15.4 Additional screening tests will be carried out on approximately 10% of samples for the following suite of metals: Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb, Sb, Be, Se, Ag, Tl, V.

1.16 Particular Requirements

Sampling Collection and Storage

1.16.1 Where possible, undisturbed samples should be recovered by use of an open-tube sampler driven into the side or base of the trial pit, or the base of the drillhole. The ends of the sampling tube should be covered with plastic or aluminium film and sealed with a plastic lid immediately following sampling. Samples should be clearly marked with the name of the site, sampling point code and the depth of sample.

1.16.2 Following sampling, samples should be stored in a cool box at a temperature of between 0 and 4°C, and transported to the analytical laboratory at the earliest opportunity (and no later than the day on which they were taken), where they should be transferred to suitable laboratory cleaned, sealable, water-tight non-reactive containers.

Avoidance of Cross Contamination

1.16.3 To avoid cross contamination of samples, all sampling equipment must be thoroughly steam cleaned prior to sampling commencing and equipment used in exploratory holes must be thoroughly cleaned between taking of individual samples, by washing with non-phosphate detergent and rinsing with distilled water.

SUMMARY AND CONCLUSIONS

1.16.4 The site was previously used as a cemetery, and subsequently as a crematorium site. A small crematorium was present from some time after 1949 until approximately 1977, when the existing facility was built, which remains in operation. Other than the crematoria and associated facilities, no significant sources of on-site contamination have been identified.

1.16.5 A qualitative risk assessment has been carried out, which has identified a number of potential source of contamination, receptors and pathways. The main potential sources of contamination are as follows:

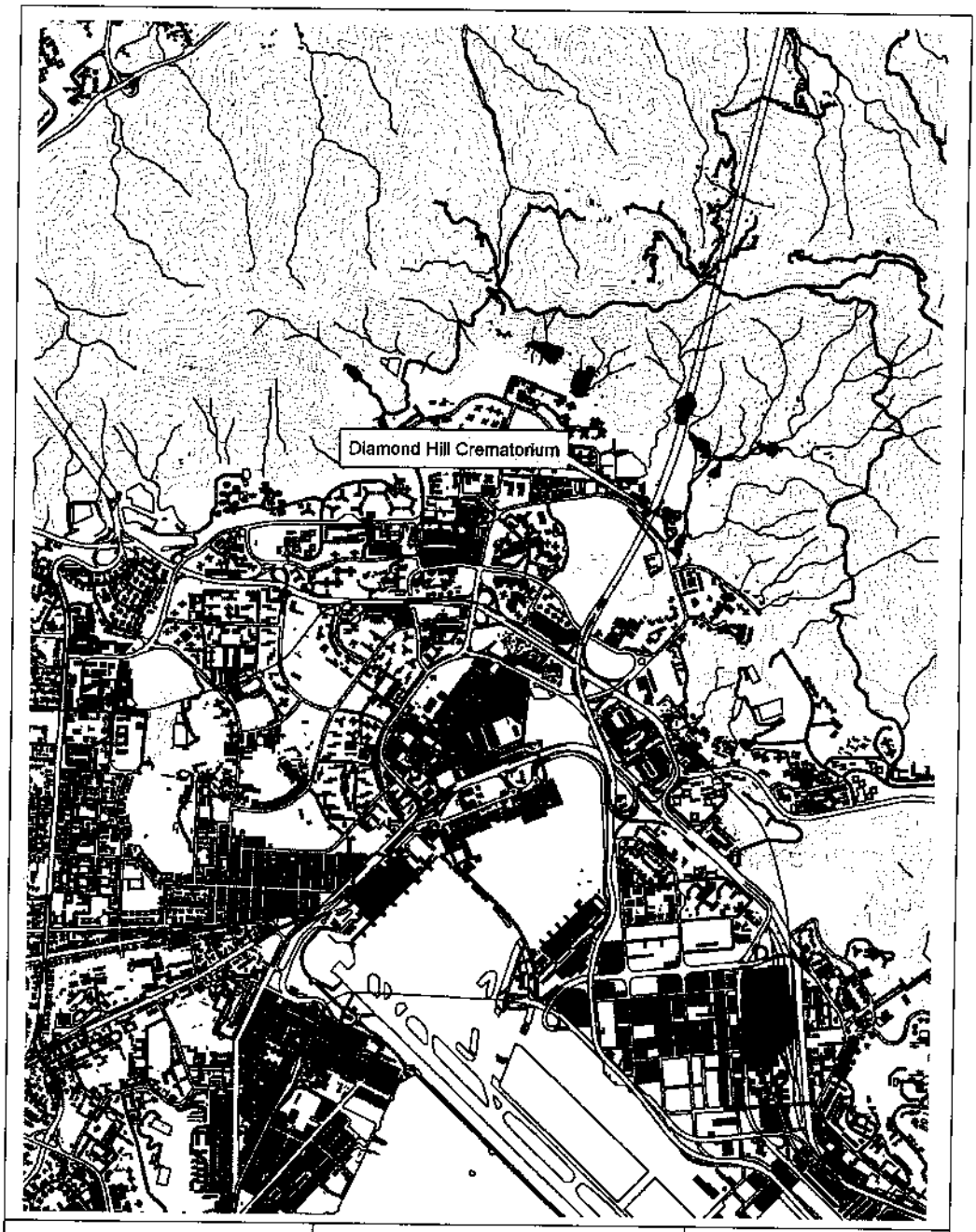
- Underground fuel tank;
- Dangerous goods store;
- Electricity substation;
- Areas impacted by stack emissions;
- Former crematorium site;
- Existing crematorium crematorss.

The area of the former crematorium is unlikely to be disturbed by the current works, and therefore investigation is not considered necessary. The areas around the existing crematorium cremators and within the electricity sub-station cannot be investigated at the present time, whilst the facility is still operational. It is therefore proposed that sampling and analysis in this area is carried out after decommissioning and prior to demolition.

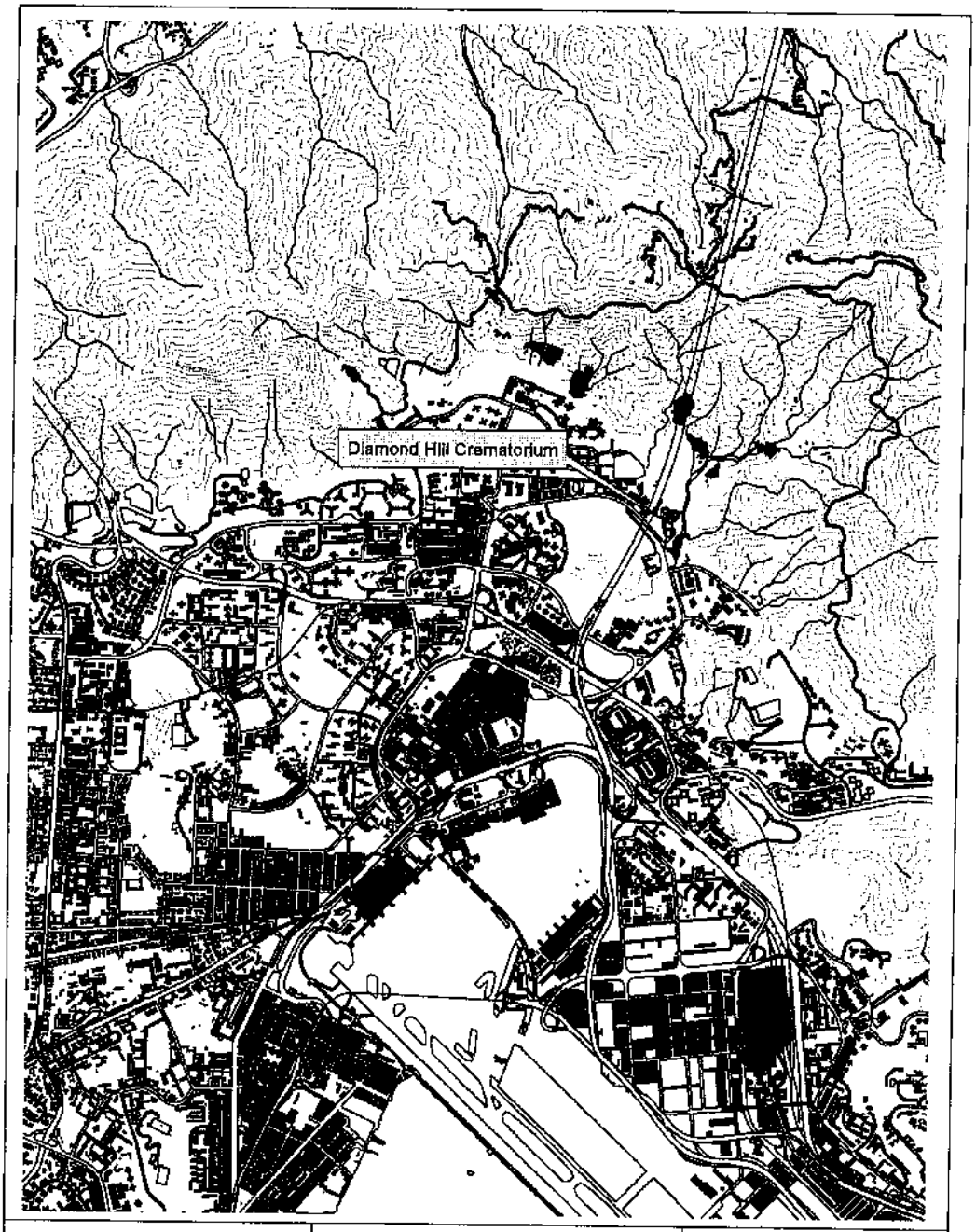
1.16.6 A site investigation is proposed to identify and delineate the extent of contamination that may be present. This investigation will consist of the formation of two trial pits to 3m depth, two drillholes to 7m depth, and six surface sampling locations. Approximately 18 soil samples and two groundwater samples (if encountered) will be recovered for analysis.

1.16.7 Based on the results of the site investigation, and Contamination Assessment Report will be prepared, detailing the findings of the site investigation and assessing the results in the light of current Government guidance. If remediation is required, a Remediation Action Plan will also be prepared.

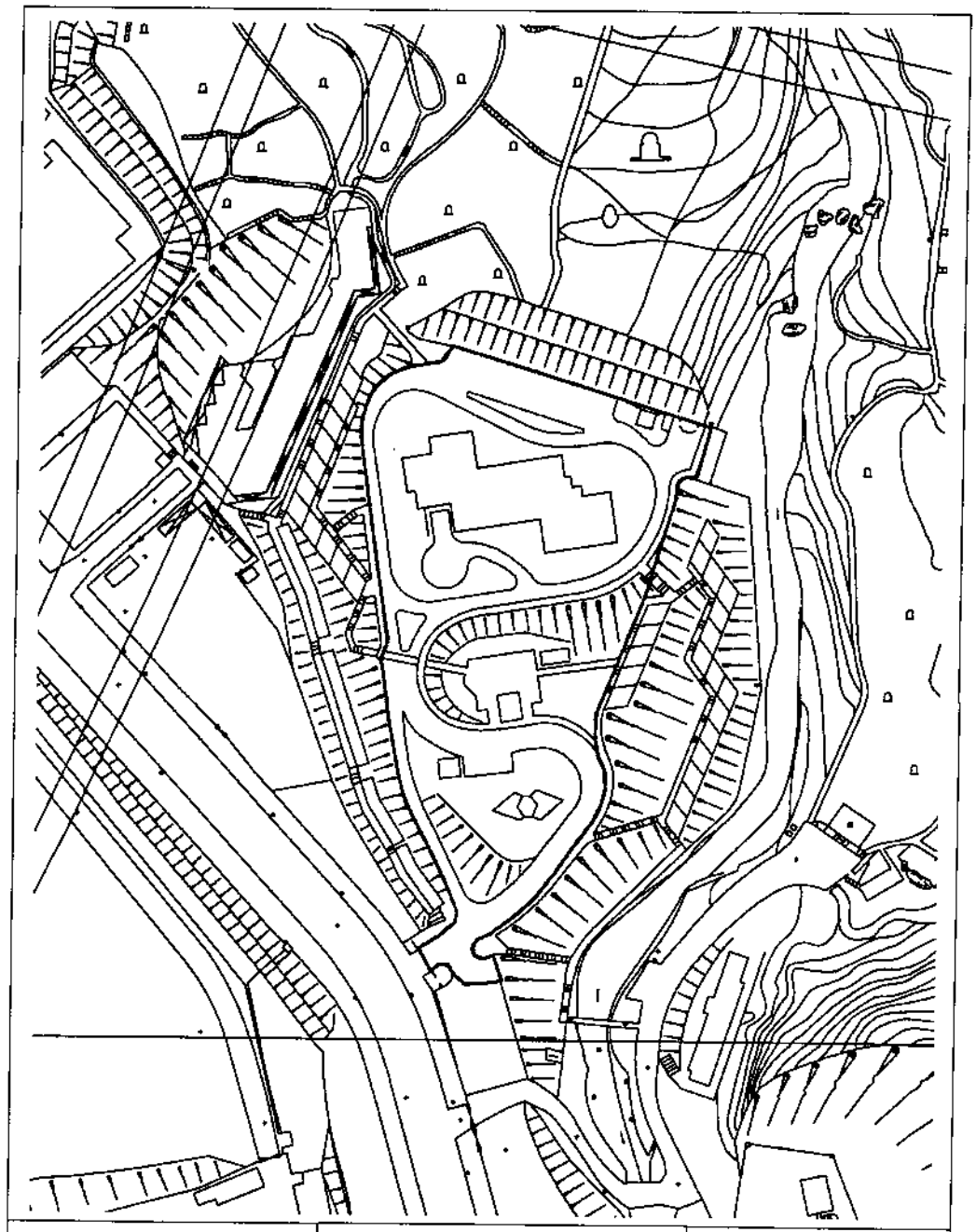
FIGURES



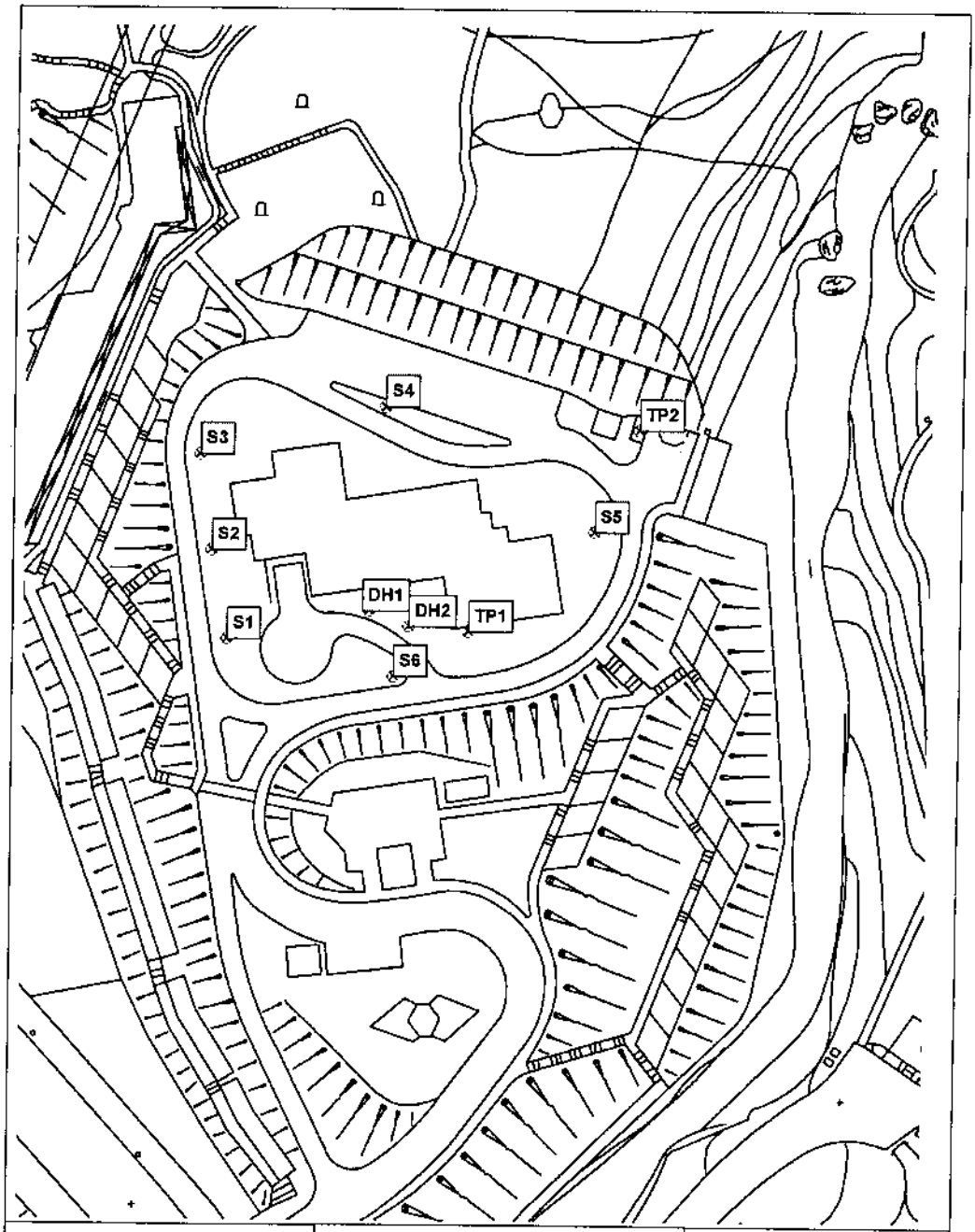
Reprovisioning of Diamond Hill Crematorium Contamination Assessment Plan	Figure 1: Site Location	Scott Wilson Ltd



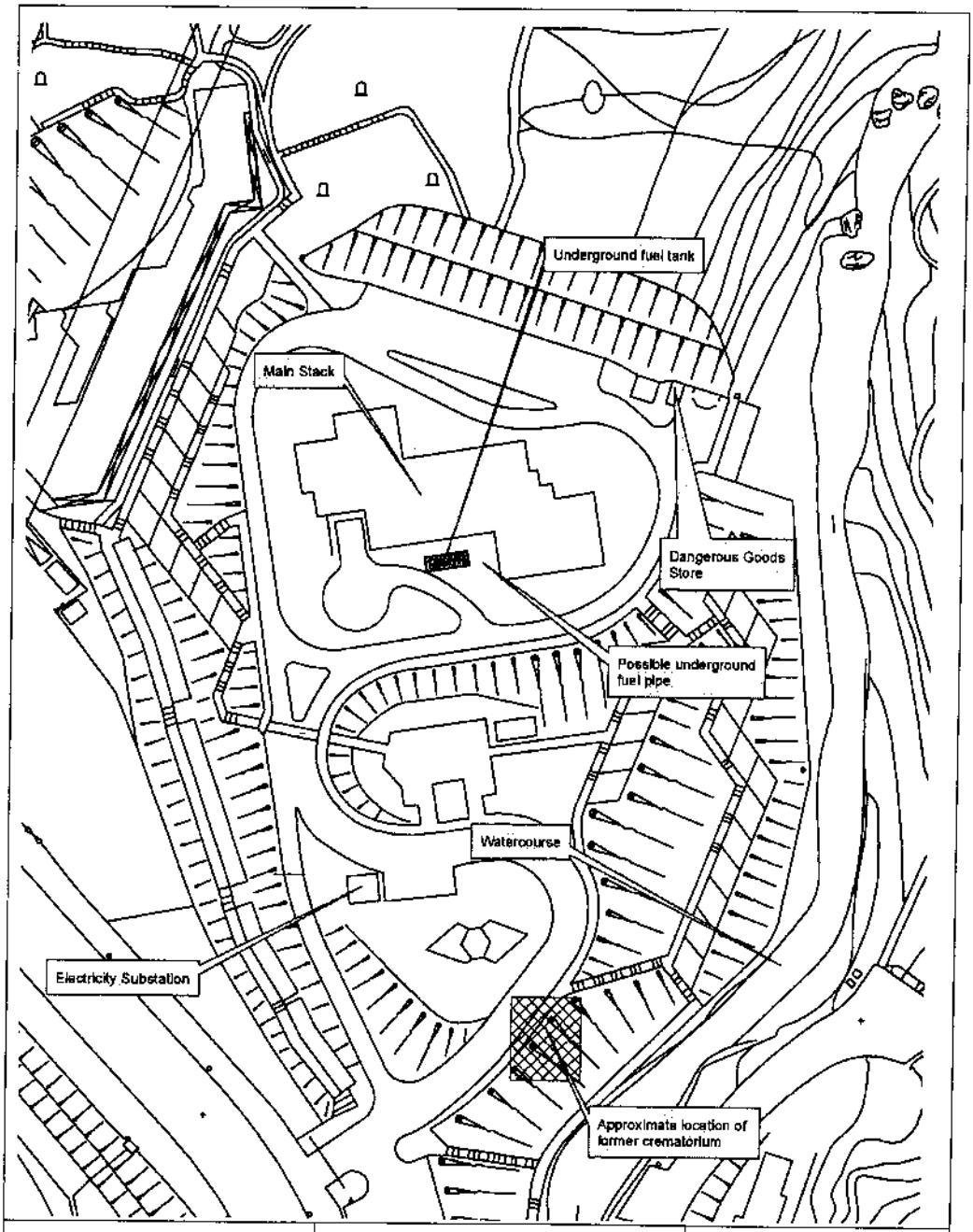
Reprovisioning of Diamond Hill Crematorium Contamination Assessment Plan	Figure 1: Site Location	Scott Wilson Ltd 仕德顧問集團有限公司



Reprovisioning of Diamond Hill Crematorium Contamination Assessment Plan	Figure 2: Site Boundary	Scott Wilson Ltd



Reprovisioning of Diamond Hill Crematorium Contamination Assessment Plan	Figure 4: Proposed Location of Exploratory Holes	Scott Wilson Ltd 偉信顧問集團有限公司



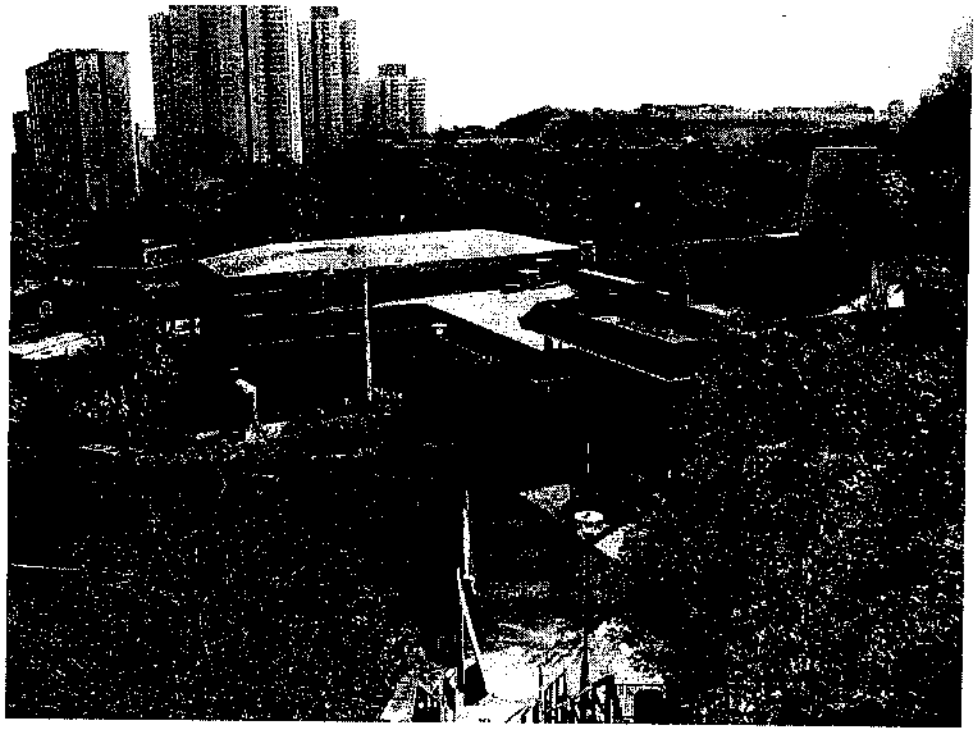
Reprovisioning of Diamond Hill Crematorium
Contamination Assessment Plan

Figure 3:
Potential Sources of Contamination

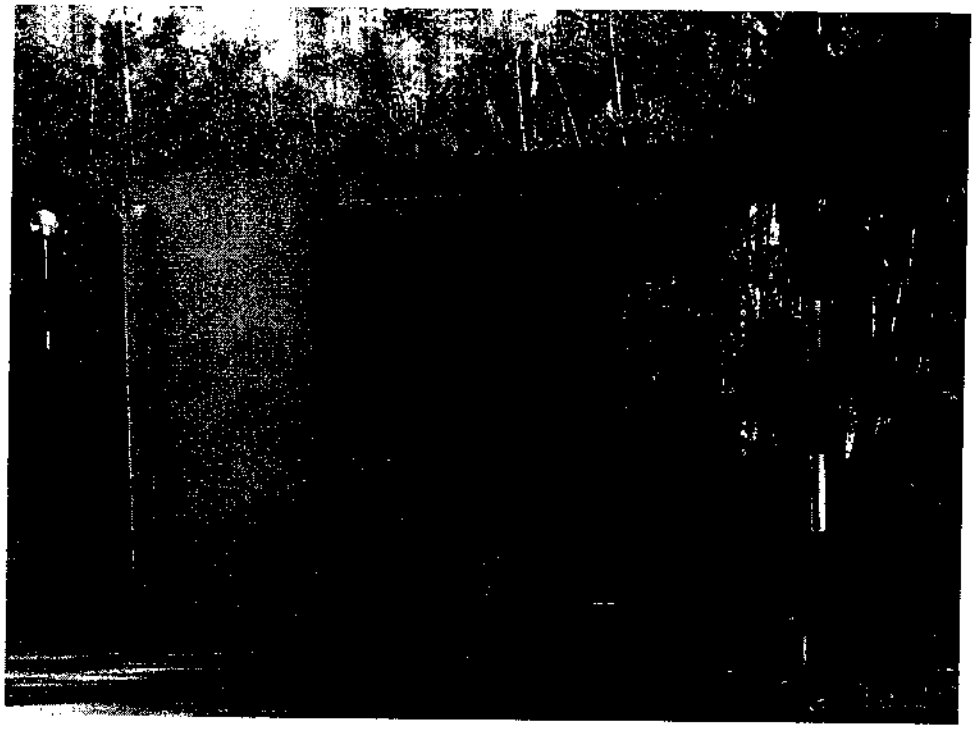
Scott Wilson Ltd 偉信顧問有限公司

APPENDIX A:
PHOTOGRAPHS FROM SITE VISIT

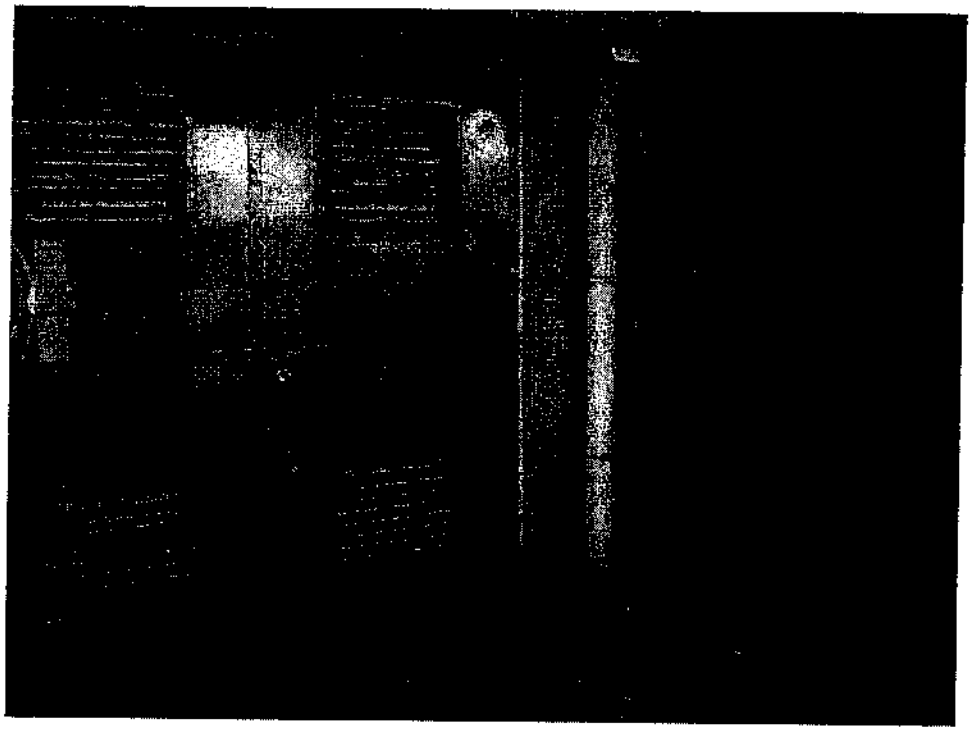
Photograph 1: Underground Fuel Tank



Photograph 2: Crematorium Building from North, showing Stack (to left of photo)



Photograph 3: Electricity Substation



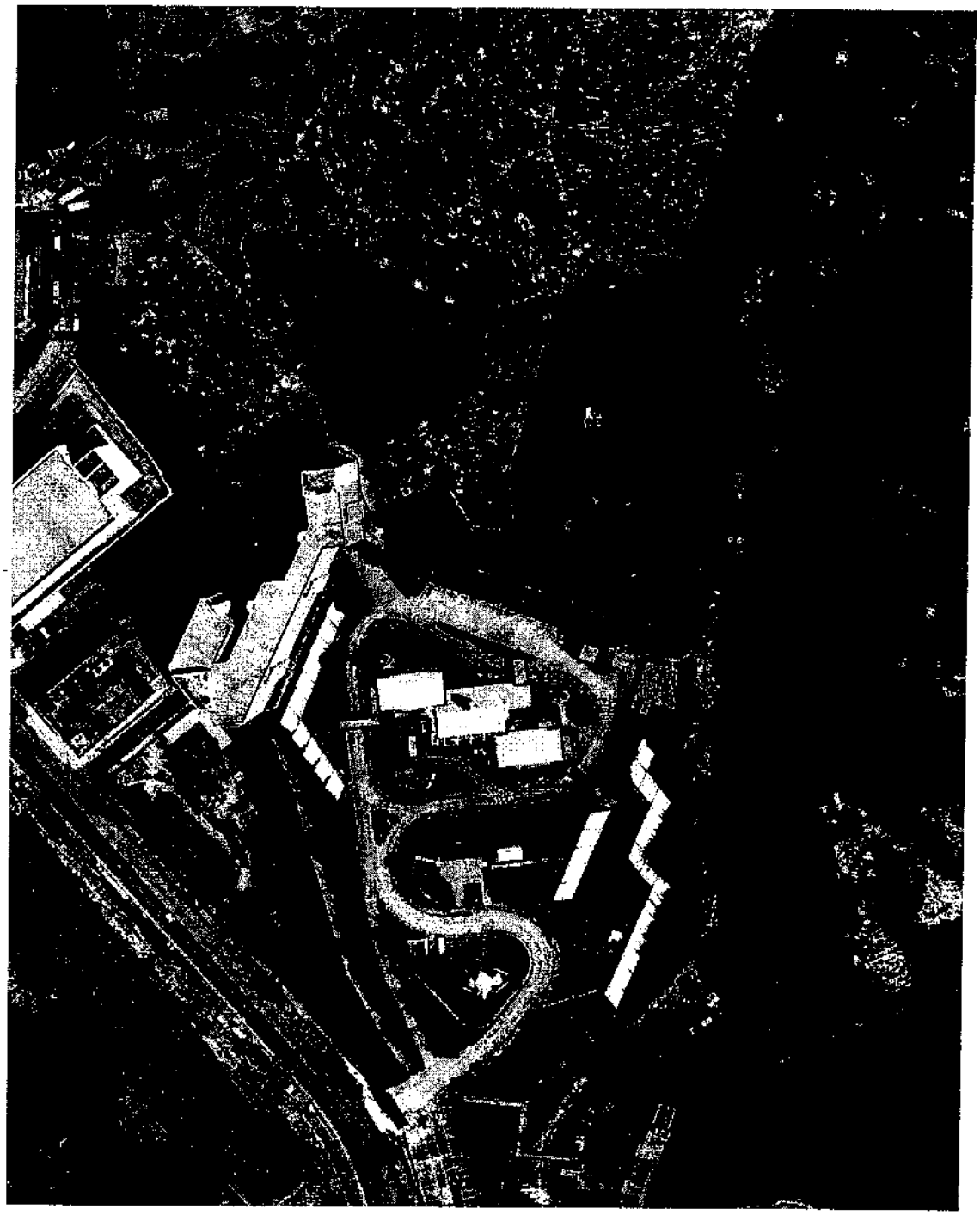
Photograph 4: Dangerous Goods Store

APPENDIX B:
AERIAL PHOTOGRAPHS

Aerial Photograph 1; Dated 1949

Aerial Photograph 2; Dated 1972

Aerial Photograph 3; Dated 1976



Aerial Photograph 4; Dated 1989

Aerial Photograph 5; Dated 1993

Aerial Photograph 6; Dated 1999

APPENDIX C:
PRELIMINARY SITE APPRAISAL CHECKLIST

PRELIMINARY SITE APPRAISAL CHECKLIST

Name of Company: Food and Environmental Hygiene Department

Site Address: No. 199 Po Kong Village Road, Wong Tai Sin, Kowloon

Date: 16.1.2003

1. What is your company's main current activities/operations at the above address?	Cremation of dead bodies
2. What is the approxiamte area of the site?	9,000 sq. m
3. How long has the company been operating at the current premises?	Since 1979
4. Do you know the type of land use before you took over the site?	No

5. Have you ever received any notices of violation of environmental regulations or public complaints? (If yes, please give details.)	Some complaints have been received.
6. Do you have regular checks for spillage and monitoring of chemicals handled? (If yes, please give details.)	No spillage and monitoring of chemicals have ever been handled.
7. Have any tank or truck leakages occurred on the site? (If yes, please give details.)	No.
8. Do you have any registered hazardoues installations as defined under relevent ordinances? (If yes, please give details.)	No.
9. Do you have any underground storage tanks? (If yes, please give details.)	Yes. The storage tank is situated outside the cremation room with about 10,000 litre capacity.
10. Do you have any records of major renovation of your site or rearrangment of underground utilities, pipework or undergroudn tanks? (If yes, please give details.)	No.

Materials	Possible Source	Details (e.g. type, quantity, method of storage)	Method of Disposal (current and historical) if applicable (see * below)
1. Fuels	Petroleum storage, LPG storage	Diesel stored within underground storage tank	-
2. Lubricating oils and hydraulic fluids	Spillage, maintenance and dismantling of equipment, scrapped tanks and pipeworks, vehicle maintenance	Nil	
3. Cleaning solvents	Engine room and equipment maintenance	Equipment maintained by EMSD	
4. Chemical solutions	Engine coolant, battery fluid	Nil	
5. Acids	Treating steel plate to remove millscale	Nil	
6. Asbestos	Application and removal of engine room insulation	Nil	
7. Transformer oil (PCB)	Scrapped electrical equipment	Nil	
8. Anti-corrosive paints, thinners	Application of anti-corrosive coatings	Nil	

9. Coal, ash, oily tank and bilge sludge	Boiler room/engine room maintenance, tanke cleaning	Nil	
10. Finely divided metal wastes	Grinding and milling operations, welding joints	Nil	
11. Electrical wiring	Electrical installation, maintenance, scrapped electrical equipment	Nil	
12. Low-level radioactive waste	Scrapped instruments	Nil	
13. Wood preservatives	Timber treatment	Nil	
14. Polyurethane foam	Hull manufacture/maintenance	Nil	
15. Any other chemicals	-	Nil	

Note: Methods of disposal may include:

(i) collection by a municipal solid waste contractor;
(ii) collection by a licensed chemical waste contractor;
(iii) disposal to foul sewer in liquid form;
(iv) disposal to storm drain in liquid form;
(v) burial in pits within the site.

APPENDIX D:
RESPONSES TO COMMENTS

Reprovisioning of Diamond Hill Crematorium
Contamination Assessment Plan (CAP)

Department	Comments	Responses
Marlene Ho Environmental Protection Officer Environmental Protection Department 28 January 2003	Our comments on the CAP are provided as follows: a) <u>Sections 1.8.2 & 1.8.4</u> Please note that there is no aerial photo dated 1972 in Appendix B.	Noted. The photo captions and text have been amended to refer to the photos taken in 1972 and 1976.
	b) <u>Section 1.10.2</u> (i) Fuel storage tank The consultants should check and confirm the type(s) of fuel oil which has been stored in the underground fuel storage tank. It should also be ensured that the analytical method to be used for the sample analysis will fully cover the hydrocarbon range of the potential contaminants present in the soil.	The Preliminary Site Appraisal Checklist has been included as Appendix C. This notes that diesel has been stored in the underground tank. The consultants will ensure that the TPH analysis includes diesel range hydrocarbons.
	(ii) Areas impacted by aerial deposition from stack emissions The paragraph "The prevailing wind .... will be carried out." is quite confusing and should be rewritten.	The paragraph has been re-writen to clarify the meaning.
	c) <u>Section 1.14.3</u> It should be noted that the sampling and analysis plan for the existing crematorium building should be submitted to EPD for endorsement following decommissioning and prior to demolition of the building.	The text has been amended as suggested.
	d) <u>Section 1.14.4</u> Since the areas at the north, east and south of the stack within the site could also have been affected by the stack emissions, additional sampling locations (at least one at each direction) within the site in areas at the north, east and south of the stack, should also be proposed for determining whether elevated concentrations of contaminants are present as a result of aerial deposition.	The text, tables and figures have been amended as suggested.

Department	Comments	Responses
	TP2 and TP3 should be located inside the Dangerous Goods Store and Electricity Substation, respectively.	TP2 has been relocated to inside the Dangerous Goods Store, and Figure 4 amended. Since the sub-station is in operation, it will not be possible to dig a trial pit inside the sub-station. The text has therefore been amended to note that investigation of the soil beneath the sub-station will be carried out following decommisioning of the sub-station.
	e) <u>Section 1.14.6</u> The soil directly below the tanks and the buried fuel pipe should also be inspected after their removal. Depending on the inspection results, further sampling may be required to determine whether the soil is contaminated.	This will be recommended as part of the Contamination Assessment Report.
	f) <u>Table 5.1</u> Additional screening tests (about 10% of the total no. of samples) on a wider range of metals; including Sb, Be, Se, Ag, T1 and V plus the full suite of heavy metals covered in the Dutch List; have to be conducted to determine their presence or otherwise and whether they are of concern.	The text has been amended as suggested.
Marlene Ho Environmental Protection Officer Environmental Protection Department 5 February 2003	a) <u>Response to comment item b(i)</u> Please indicate in the CAP the range of hydrocarbons (i.e. $C_n - C_n$) that will be covered in the TPH analysis.	The range of hydrocarbons to be covered in the TPH analysis is from C_6-C_{36}. This information is now included in the Final CAP.