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Architectural Services Department

Preliminary Environmental Review Kwai Chung Crematorium

Final Report

July 1998



Consulting



125 Years of Pedigree as Freeman Fox & John Taylor



Architectural Services Department

**Preliminary Environmental Review
for Kwai Chung Crematorium**

Final Report

July 1998

Hyder Consulting Limited

3/F Somerset House, Taikoo Place,
979 King's Road, Quarry Bay, Hong Kong

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** First edition of this Final Report was issued on February 1998. At that time, the CAQ Study Report for Kwai Chung Crematorium was under EPD review. With EPD approval of the CAQ Study, this second edition incorporates the most up-date findings of the Final CAQ Study Report.*

1. INTRODUCTION

1.1 BACKGROUND AND STUDY OBJECTIVES

This Preliminary Environmental Review (PER) identified the potential environmental constraints likely to impose upon the surroundings by the expansion and upgrading of the existing Kwai Chung Crematorium.

The objectives of the PER are to:

- briefly assess the key environmental impacts in term of noise and air quality during construction and operational phase for the project;
- recommend practical mitigation measures and controls for the project; and
- determine and suggest the necessity of a further investigation and detailed Environmental Impact Assessment (EIA).

The PER report has been reviewed and approved by EPD, and a copy of the signed off PPFS Section 9 Summary is included in Annex A.

2. PROPOSED DEVELOPMENT

The proposed schedule for expansion and upgrading of the crematorium is as follows:

- | | |
|---------|--|
| Phase 1 | Construction of a new crematorium building on the lawn within the existing premises (see Figure 2.1) to incorporate four single cremators. These cremators will provide a total installed capacity of 630 kg/hr. Following the completion of this facility, the existing crematorium (with two twin cremators) will be closed down for demolition. |
| Phase 2 | Demolition of the existing crematorium. Figure 2.1 also shows the location of the existing crematorium building which was built 18 years ago. |
| Phase 3 | Construction of a new crematorium at the prime site, which will be equipped with four single cremators and having the same installed capacity as Phase 1. |

The total installed capacity of the cremators within the expanded Kwai Chung Crematorium will be 1260 kg/hr. The layout plan of the Phase 1 development is given in Annex B. The layout plan of the Phase 3 development is also expected to be similar to Phase 1.

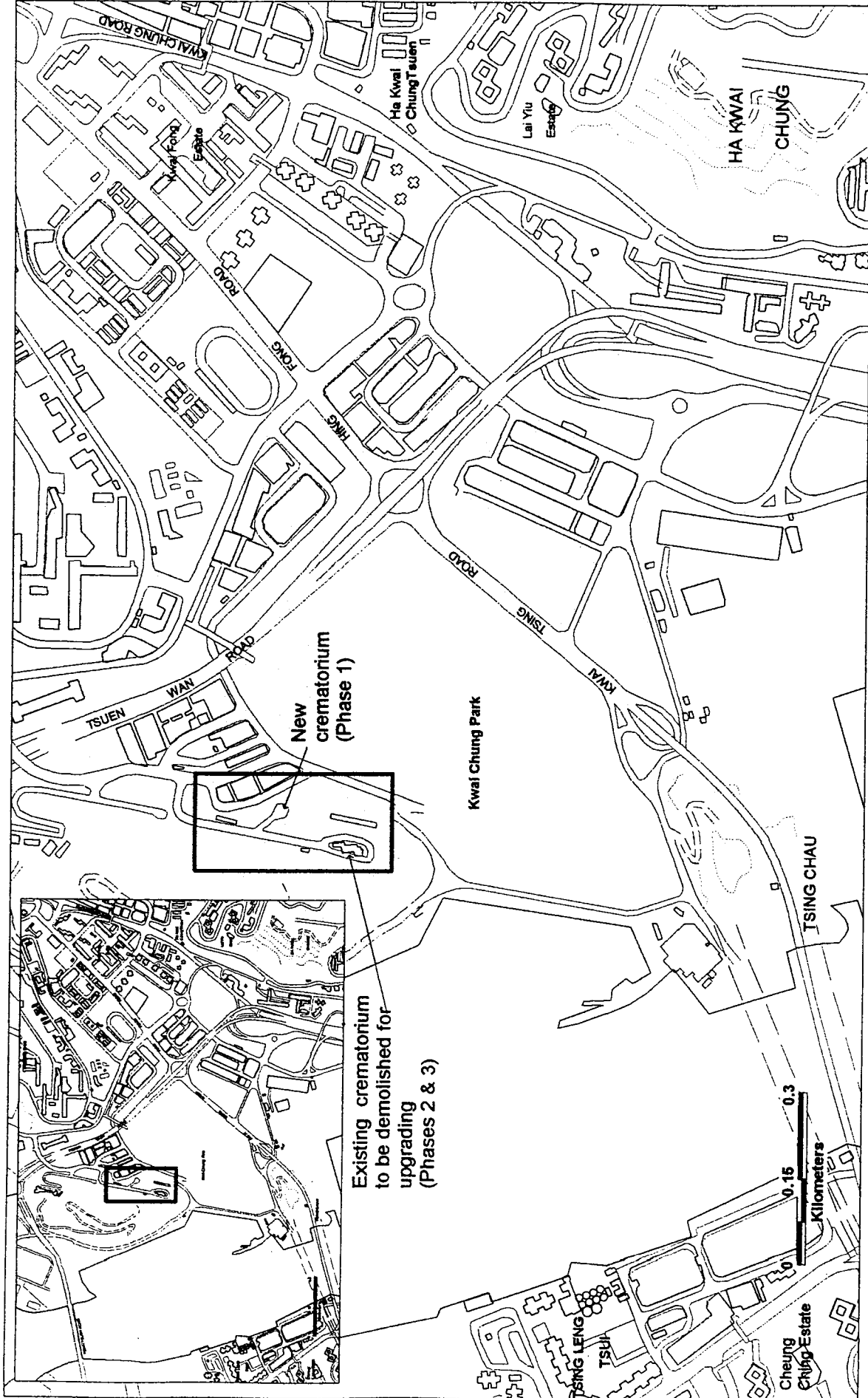
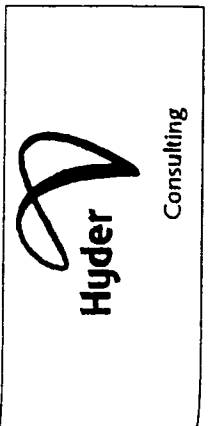


Figure 2.1 Site Location Map of Kwai Chung Crematorium



3. IDENTIFICATION OF KEY ISSUES

The potential environmental issues arising from this project were reviewed according to the requirements given in the Planning, Environmental and Lands Branch Technical Circular (PELBTC) No. 2/92. Annex C summarises the potential environmental issues identified.

3.1 CONSTRUCTION PHASE

Considering the small scale of this project and the nature of land use (mainly of industrial) around the crematorium, environmental impacts due to the construction work of the new crematorium building should not be a key constraint to this project. Although the Hong Kong Planning Standards and Guidelines (HKPSG), and relevant environmental legislation do not specify a crematorium itself as air and noise sensitive, the construction noise and dust should be minimized during the period of time when a funeral service is being held within the crematorium.

However, it should be noted that implementation of on site dust mitigation measures and controls (Section 4.1.2) is required according to Air Pollution Control Ordinance.

3.2 OPERATIONAL PHASE

The environmental concern matrix of the HKPSG suggests that air quality and odour are potential issues to cause concern due to the operation of a crematorium. It is understood that consideration should be given to the EPD Notes on Best Practicable Means Requirements for Incinerators for the planning of this project. A specified process license is required for operating the new cremators. Such licence will include all cremators in Kwai Chung Crematorium. This also applies to the transitional situation where construction of the new cremators in the Phase 1 development is complete but prior to the Phase 2 demolition work and the existing cremators are still in use.

The air quality impact due to the future operation of the expanded crematorium was assessed and presented in the Crematoria Air Quality (CAQ) Study Final Report. In addition, the assessment of potential health risk associated with its operations was also included in the CAQ Study. The CAQ Study show that adverse air quality impact and health risk should be unlikely provided that the design and operation of the crematorium strictly follow the CAQ Study's recommendations: A summary of these recommendations is given in Section 4.2 below.

4. ENVIRONMENTAL MITIGATION MEASURES

4.1 CONSTRUCTION PHASE

4.1.1 Noise

The following construction noise mitigation recommendations should be provided, and these assume construction work at the Kwai Chung Crematorium will be carried out during normal daytime working hours :

- use silenced PME if possible;
- keep the total number of PME operating simultaneously as less as possible;
- use of noise barriers or enclosure for the PME if appropriate; and
- spot checking of resultant noise levels at nearby noise sensitive receivers.

A guideline of 75dB(A) in terms of $L_{Aeq, 5 \text{ minutes}}$ measured at the building facade of the crematorium is recommended for controlling the noise emissions from the construction work to minimise the noise nuisance during a funeral is held.

4.1.2 Air

The dust arising from the construction phase of this project is controlled by the Air Pollution Control (Construction Dust) Regulation. It is expected that the following 'notifiable works' will be undertaken during the construction and demolition of the crematorium:

- site formation;
- demolition of a building;
- construction of the foundation of a building; and
- construction of the superstructure of a building.

It should be noted that a contractor is responsible to notify EPD for undertaking any of the above notifiable works prior to its commencement. In addition, the contractor is required to fulfil specific dust control requirements given in the Regulation's Schedule for the specific jobs. Details are included in Annex D.

4.2 OPERATIONAL PHASE

The following summarises the environmental measures recommended in the CAQ Study.

4.2.1 Cremator Design

The cremator design should ensure that the resultant stack emissions from each crematorium during its normal operation satisfy all BPM limits. The new cremators should also adopt the best available control technology to limit its emissions of cadmium, nickel and arsenic to be as low as reasonably practicable. In particular, the source emission of nickel should be limited to within 0.15mg/m^3 (@ 273K, 101.3kPa, 11% O₂ dry) or 0.15 times of the EPD BPM.

4.2.2 General Operation

A high standard of housekeeping should always be maintained. There should be an effective preventive maintenance for all plant and equipment concerned with the control of air pollutant emissions. Essential spare parts and consumable should be kept on site, or should be readily available from suppliers so that problems due to equipment failure or breakdown of plant can be rectified within a short time. Any malfunction or breakdown that leads to abnormal emissions should be fixed promptly until normal operation can be restored. Typical reporting requirements set in a specified process licence is to inform EPD within two hours from the incident, followed by a written notification within three working days. In this case, RSD will be responsible for these reporting, and need to inform EPD in writing who is the responsible staff for the operational control of the crematorium.

Air quality monitoring should be undertaken in a regular basis to confirm the emissions from the cremators are within the BPM limits.

4.2.3 Fuel Restriction

Low sulphur liquid fuel must be used. The sulphur content of the liquid fuel should be at least less than 0.3 per cent by weight, and its viscosity not to exceed 6 centistokes at 40°C. Gaseous fuel can be considered as an alternative if connection to the gas supply is made available.

4.2.4 Material Handling, Storage and Disposal

The removal of ash and non combustible residues should be handled with care in order to avoid fugitive dust emissions:

- Remains in the cremators should only be moved when each incineration is completed.
- Cremated remains should be moved and stored in a covered container.
- Local extraction hoods connecting to a bag filter should be provided above workstations where treatment of cremated remains usually takes place.

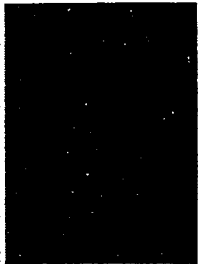
4.2.5 Staff Training

Proper training and clear instruction should be provided to crematorium staff who have responsibilities to control the cremation process. Such training should consist of start up, shut down and handling procedures for abnormal conditions in order to avoid unacceptable air pollutant emissions. These procedures should be in strict compliance to the equipment's manufacturer instructions.

5. CONCLUSIONS

Operational air quality is the key issue for this project. According to the CAQ Study, it confirms that the resultant air pollutant concentrations and health risk at the nearby air sensitive receivers would be within the established standards provided that the design and operation of the crematorium strictly follow the CAQ Study's recommendations. Construction noise and dust impacts are considered to be minor. A detailed EIA study is not suggested to undertake at a later stage.

Section 9 - Environmental Review Summary



Project Title : Proposed Extension of Kwai Chung Crematorium

SECTION 9 - Preliminary Environmental Review

(A) Broad Description of Review :

A preliminary environmental review (PER) has been carried out by consultants engaged by the Architectural Services Department to assess the potential environmental impacts of the proposed expanding and upgrading works for the existing Kwai Chung Crematorium, during both the construction and operation phases.

(B) Key Findings of Review :

Construction Phase

DArchS will implement appropriate pollution control measures in the construction contract to control noise, dust and site run-off nuisance to within established standards and guidelines.

Operation Phase

Air emissions will be a concern. DArchS should implement mitigation measures including the implementation of Best Practical Means, good housekeeping management, use of low sulphur fuel or gas and proper handling procedures to control the emissions impacts to within established standards and guidelines.

(C) Environmental Impact/Risk Assessment needed in Later Stage:

An Environmental Impact Assessment is not required.

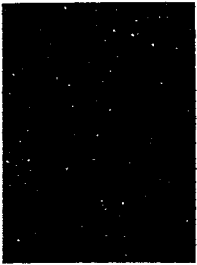
Signed : 

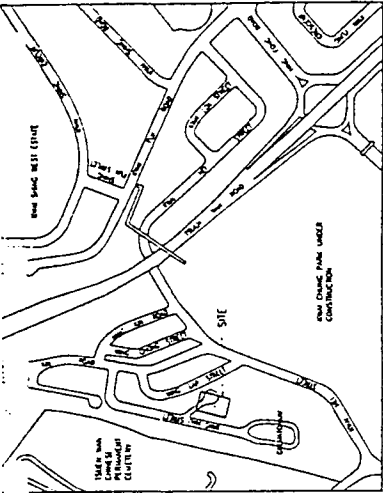
Name : B.I. Dubin

EPD/Post : Senior Environmental Protection Officer

Date : 31 MAR 1998

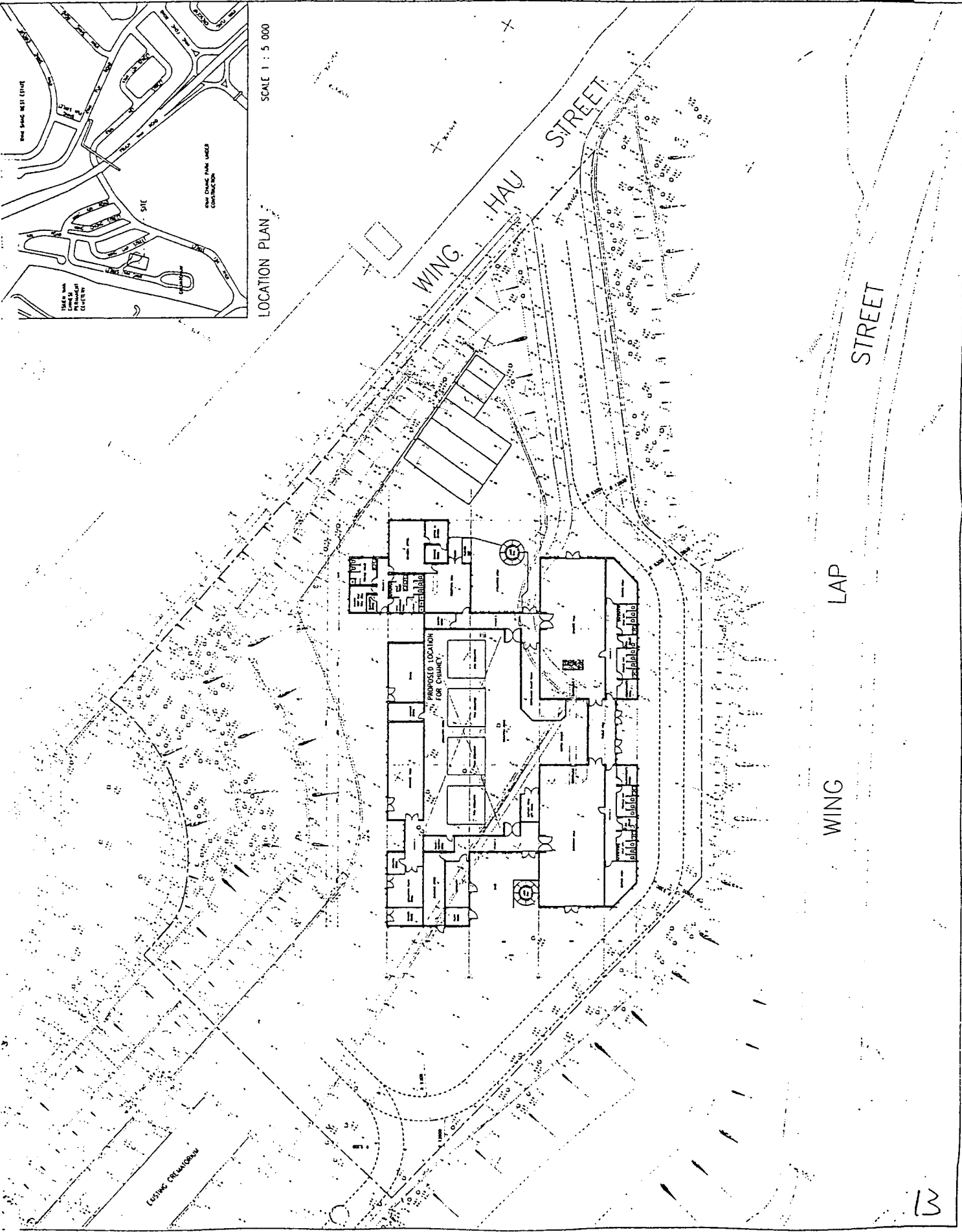
Layout Plan of Phase I Development





LOCATION PLAN
SCALE 1 : 5 000

NO.	DATE	REVISIONS	BY
1	20/01/01	PRELIMINARY DESIGN	ARCH/01
2	20/02/01	REVISED DESIGN	ARCH/01
3	20/03/01	FINAL DESIGN	ARCH/01
4	20/04/01	AS BUILT	ARCH/01
APPROVED Chief Architect Senior Architect Project Architect CONTRACT NO. 5415 PROJECT NO. AB/5415/XA01 DRAWING NO. 500			

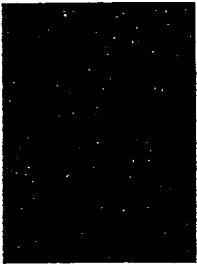


ADDITION OF CREMATORIUM AT
 KWAI CHUNG CREMATORIUM
 AREA 26, KWAI CHUNG

SITE LAYOUT PLAN

ARCHITECTURAL SERVICES DEPARTMENT
 ARCHITECTURAL BRANCH

A Checklist for Identification of
Key Environmental Issues



ANNEX C A Checklist for Identification of Key Environmental Issues

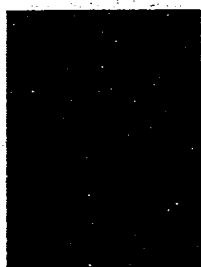
The following environmental issues given in the Planning, Environmental and Lands Branch Technical Circular No. 2/92 were considered.

No.	Types of likely environmental issues	Construction	Operation
		Phase	Phase
1.	Gaseous emissions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2.	Dust	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.	Odour	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.	Noisy operations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5.	Night-time operations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.	Traffic generation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7.	Liquid effluents, discharges, or contaminated runoff	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8.	Generation of waste or by-products	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9.	Storage, handling, transport, or disposal of hazardous materials or wastes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10.	Risk of accidents which would result in pollution or hazard	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11.	Disposal of spoil material, including potentially contaminated material	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12.	Disruption of water movement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13.	Unsightly visual appearance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Key : Potential to cause concern Unlikely

Annex D

Dust Control Requirements for Construction Work



ANNEX D Dust Control Requirements for Construction Work

Construction of the superstructure of a building

In the case of the construction of the superstructure of a building

- i. where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting shall be provided to enclose the scaffolding from the ground floor level of the building, or if a canopy is provided at the first floor level, from the first floor level, up to the highest level of the scaffolding;
- ii. any skip hoist for material transport shall be totally enclosed by impervious sheeting; and

General requirements

- i. Any air pollution control system, equipment or measure required by any provision of this Schedule shall be operated or implemented (as the case may be) properly and effectively whenever the plant or process concerned is in operation or the activity concerned is engaged in.
- ii. In the event of a malfunctioning or breakdown of any air pollution control system or equipment, the plant, process or activity concerned shall be stopped as soon as practicable until such time as the air pollution control system or equipment is restored to proper functioning.
- iii. Except for cleaning formwork or other surfaces receiving concrete prior to concreting, a compressed air jet shall not be used for cleaning or clearing dust from any vehicle, equipment, other materials or person.
- iv. Any proposal to use a dust suppression chemical for the purpose of this Regulation within or in the immediate vicinity of any water storage or gathering ground of the Water Supplies Department shall be submitted to the Director of Water Supplies for approval.
- v. The use of any particular dust suppression chemical within a location referred to in subsection (iv) shall be subject to the prior approval of the Director of Water Supplies.

Site boundary and entrance

Except for road opening or resurfacing work, or for construction work carried out in a construction site that is completely paved or completely covered with hardcore.

- i. vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point;
- ii. the area where vehicle washing takes place and the section of the road between the washing facilities and the exit point shall be paved with concrete, bituminous materials or hardcores;

- iii. where a site boundary adjoins a road, street, service lane or other area accessible to the public, boarding of not less than 2.4m high from ground level shall be provided along the entire length of that portion of the site boundary except for a site entrance or exit.

Exposed earth

Exposed earth shall be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen or other suitable surface stabilizer within 6 months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.

Dusty materials

Cement, pulverized fuel ash or any other dusty materials collected by fabric filters or other air pollution control system or equipment shall be disposed of in totally enclosed containers.

Stockpiling of dusty materials

Any stockpile of dusty materials shall be either

- i. covered entirely by impervious sheeting;
- ii. placed in an area sheltered on the top and the 3 sides; or
- iii. sprayed with water or a dust suppression chemical so as to maintain the entire surface wet.

Loading, unloading or transfer of dusty materials

Except for cement and pulverized fuel ash and for cases where the moisture content of the dusty materials is a matter of concern, all dusty materials shall be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.

Use of vehicles

Immediately before leaving a construction site, every vehicle shall be washed to remove any dusty materials from its body and wheels.

Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle.

Pneumatic or power-driven drilling, cutting and polishing

Water or a dust suppression chemical shall be continuously sprayed on the surface where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation that causes dust emission is carried out, unless the process is accompanied by the operation of an effective dust extraction and filtering device.

Debris handling

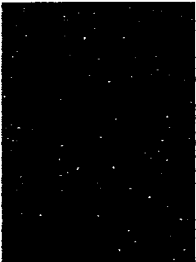
- i. Any debris shall be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the 3 sides.
- ii. Every debris chute shall be enclosed by impervious sheeting or similar materials.
- iii. Before debris is dumped into a debris chute, it shall be sprayed with water or a dust suppression chemical so that it remains wet when it is dumped.

Excavation or earth moving

The working area of any excavation or earth moving operation shall be sprayed with water or a dust suppression chemical immediately before, during and immediately after the operation so as to maintain the entire surface wet.

Site clearance

- i. The working area for the uprooting of trees, or vegetation or for the removal of boulders, poles, pillars or temporary or permanent structures shall be sprayed with water or a dust suppression chemical immediately before, during and immediately after the operation so as to maintain the entire surface wet.
- ii. All demolished items (including trees, shrubs, vegetation, boulders, poles, pillars, structures, debris, rubbish and other items arising from site clearance) that may dislodge dust particles shall be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides within a day of demolition.



Project Communication Correspondence

URGENT BY FAX

(Fax No : 2810 5372)

MEMO

From Director of Environmental Protection
Ref (22) in EP1/KC/26/28
Tel No 2835 1186
Fax No 2591 0558
Date 8 April 1998

To Project Manager 321, Arch S D
(Attn : Mr Wilson LEE)
Your Ref : ASD301/5415/IC/RCC.001/2
Dated :
Total No. of Page(s) 5

Preliminary Environmental Review (PER) for
Kwai Chung Crematorium

Further to our memo of the series dated 18.3.98 and 31.3.98, please be aware that this project is a Designated Project under the EIA Ordinance. Unless it is exempted under S9(2) of the Ordinance, an Environmental Permit will be required under 9(1).

2. Please note that the Consultants' revised modelling results are acceptable to us. The minor final comments on the PER report is attached. We would be grateful if your consultants could incorporate the comments and the revised modelling results into the finalised version of the PER and send us three copies of finalised PER for our record.

Hyder Consulting Limited			
Date received 09 APR 1998			
Reg no. 1998-123911			
Div/Dep ENV			
Manager B. Todd			
Date received in Div/Dep 9/4			
For Action	For Info	Sign	Date
MC			29.4.98
Copy to			
Reply date			
File ref FA00140			



(Clara P S Yu)
Environmental Protection Officer
for Director of Environmental Protection

c.c.
Hyder

(Attn : Mr Martin CHAN)

Fax : 2827 2891

Annex 1

P. 1/4

Comments on
PER for Kwai Chung Crematorium

Please note that subsequently to the submission of the Final PER report, Hyder has revised the Air Quality Impact Assessment. Hyder has faxed the revised tables containing the predicted results and e-mailed the air modelling files to us on 25.2.1998. The revised modelling results are acceptable and should be incorporated into the PER.

- 2. Section 3.2- The third and fourth sentences of the first paragraph should be revised as "A specified process licence will also be required for operating the new cremators. Such licence should include all cremators in Kwai Chung Crematorium."
- 3. Section 3.2, 2nd paragraph, line 3 - Please delete "for comments" and add "adverse" before the last word "air".
- 4. Section 5, line 4 - Please replace " the air quality impact should be unlikely" with " the predicted air quality impacts on the identified air sensitive receivers would be within the established standards".
- 5. Annex B, Section 9 - Please replace it with your revised version (ref. your fax of the reference EP1/KC/26/28 dated 19.3.1998) with my suggested amendment.

Appendix D - Crematoria Air Quality Study

- 6. Section 3.1.1, first and second sentences - They should be revised as "The EPD notes on Best Practicable Means (BPM) for Incinerators list the minimum requirements for operating incinerators for destruction of general wastes including carcasses with incineration capacity greater than 0.5 tonne per hour. The proposed crematorium is considered to fall within the category of incinerators. These BPM requirements.....".
- 7. Section 3.1.1, last sentence - It should be revised as "According to the BPM, the with equivalent performance and destruction & removal efficiency of 99.99 percent will be achieved."
- 8. Section 3.1.2. - The second paragraph (Two subsidiary process..... of the new cremators.) should be deleted.
- 9. Table 3.4 - The WHO's Air Quality Guidelines for Europe was amended in 1996, please ensure the latest set of WHO's guidelines is used in the assessment. WHO only recommends guidelines for a limited number of chemicals. The consultant should refer to other organisations such as the USEPA, California Air Resources Board (CARB), California Air Pollution Control Officers Association (CAPCOA) etc. for the standards for other chemicals in the assessment.

Page

10. Section 3.1.2 - The cancer health impacts of the concerned toxic air pollutants (TAPs), viz. Cadmium, Nickel and Arsenic should also be assessed. For the assessment of the cancer health risks, the risk from the facility should meet the attached preliminary health risk guidelines. The preliminary set of unit risk factors recommended for the assessment is also attached. P. 2/4
11. Section 3.3, Table 3.7 - Detailed calculation of the emission rates provided in this table should be provided in this section for reference.
12. Section 3.3, Source Emission Data - It is noted that only fuel consumption rates for Kwai Chung crematorium are provided in Table 3.8. As the diesel consumption rate of the cremators in Cape Collinson Crematorium was used for modelling, these data should also be provided in the same table.
13. Table 3.9.1 - Please state in the footnote of this table that the SO₂ concentrations at the receivers were based on the actual fuel consumption rate of the Cape Collinson Crematorium while the concentrations of other pollutants were based on the emission data according to EPD BPM.
14. Appendix A - In the second row of the second page of the table, "RingelmannChart" should read "Ringelmann Chart".

P/S
P3/4

Preliminary Environmental Review for Kwai Chung Crematorium		
Preliminary Set of HK Unit Risk Factors		
Source	Cancer Classification (IARC/US EPA)	Hong Kong Unit Risk Factor (URF) (Lifetime = 70 years)
Cadmium	1/B1	2.70E-03
Nickel	1/B2	2.90E-04
Arsenic	1/-	3.80E-03
		Geometric Mean of URF available from other international organisations
		Geometric Mean of URF available from other international organisations
		Geometric Mean of URF available from other international organisations

1998/3/26

~~Final A-16~~

Preliminary Risk Guidelines for the Assessment of Cancer Health Risk from Exposure to Air Toxics in Air

P4/K

Acceptability of cancer risks

Reference Levels
Each Chemical
Maximum Acceptable
To bring the risk from exposure to individual TAP to below 10^{-6} per year (Lifetime = 7×10^3)
ALARP
For those TAPs with risk level between 10^{-6} per year and 10^{-3} per year (Lifetime between $7 \times 10^3 - 7 \times 10^7$), the best available control technology should be adopted to ensure emissions of individual TAP are as low as reasonably practicable.
Negligible
Ultimate goal would be to bring the risk from exposure to individual TAP to below the negligible risk level of 10^{-8} per year (Lifetime = 7×10^7).

The total risk from the facility should not exceed a level of 10^{-3} per year (Lifetime risk of 7×10^{-4})

FAX

URGENT BY FAX
(Fax No : 2810 5372)

MEMO

From Director of Environmental Protection Ref (18) in EP1/KC/26/28 Tel No. 2835 1186 Fax No. 2591 0558 Date 18 March 1998	To Project Manager 321, Arch S D (Attn : Mr Wilson LEE) Your Ref : Dated : Total No. of Page(s) 2
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Preliminary Environmental Review (PER) for Kwai Chung Crematorium

We concur with the PER findings that no EIA is necessary at later stage for the captioned project. In view of your project programme, we would advise you to amend the Section 9 of PPFs according to the comments below and send us 3 revised copies for our Senior Environmental Protection Officer, Mr Ian Dubin's review and signature:

- (i) Please add "Project Title" under the heading of Section 9
- (ii) Please amend Section (a) to read as "A preliminary environmental review (PER) has been carried out by the consultants engaged by the Architectural Services Department to assess the potential environmental impacts of the proposed expanding and upgrading works for the existing Kwai Chung Crematorium during construction and operational phases."
- (iii) Please amend the Construction Phase paragraph of Section (b) to read as "DArchS will implement appropriate pollution control measures in the construction contract to control noise, dust and site run-off nuisance to within established standards and guidelines."
- (iv) Please amend the Operational Phase paragraph of Section (b) to read as "Air emissions would be a concern that DArchS should implement mitigation measures including the implementation of Best Practical Means, good housekeeping management, use of low sulphur fuel or gas and proper handling procedures to control the emissions to within established standards and guidelines."

Hyder Consulting Limited			
Date received	18 MAR 1998		
Req no.	1998-117442		
Div/Dep.	ENV		
Manager	Wood		
Date received in Div/Dep./2		
For Actor	For Info	Sign	Date
MC	Edman		18.3.98
Copy to	ASAP		
File ref	E-30062		

(v) Please amend Section (c) to read as "An Environmental Impact Assessment is not required."

2. Our further minor comment on the PER will be sent to you later.



(Clara P S Yu)
Environmental Protection Officer
for Director of Environmental Protection

C.C.
Hyder

(Attn : Mr Martin CHAN)

Fax : 2827 2891

MEMO

From Director of Architectural Services
 Ref. _____
 Tel. No. 2867 3766
 Fax No. 2810 5372
 Date 26 February, 1998

To See Distribution
 Attn: _____
 Your Ref. _____ in _____
 Fax No. _____ Total Pages 5
 dated _____

Preliminary Environmental Review (PER) for
 Kwai Chung Crematorium

D of EP's memo ref (15) in EP1/KC/26/28 refers.

2. Please find attached a copy each of the following drawings for your information as requested.

<u>Drawing No.</u>	<u>Drawing Title</u>
SK-1	Site Context & Constraint
SK-6	Schematic Block Plan
SK-7	Schematic Section A-A & B-B
AB/5415/XA03	Level 1 plan (Phase 1)

3. Please be informed that the site area for phase I is 4405M². The proposed development which is one storey high has a GFA of 1938M² i.e. a site coverage of 45%. The drawings mentioned above are used to demonstrate the feasibility of the project only. Detail design will be carried out after the project is upgraded to Cat 'B'.

4. Our consultant "Hyder" will continue to liaise with you to obtain endorsement of Section 9 of the EPFS.

Hyder Consulting Limited	
Date	27 FEB 1998
Ref.	1998-111261K
	ENV
	B-702D
	27/2
Date	
MC [Signature] 27/2	
File ref	FA00140

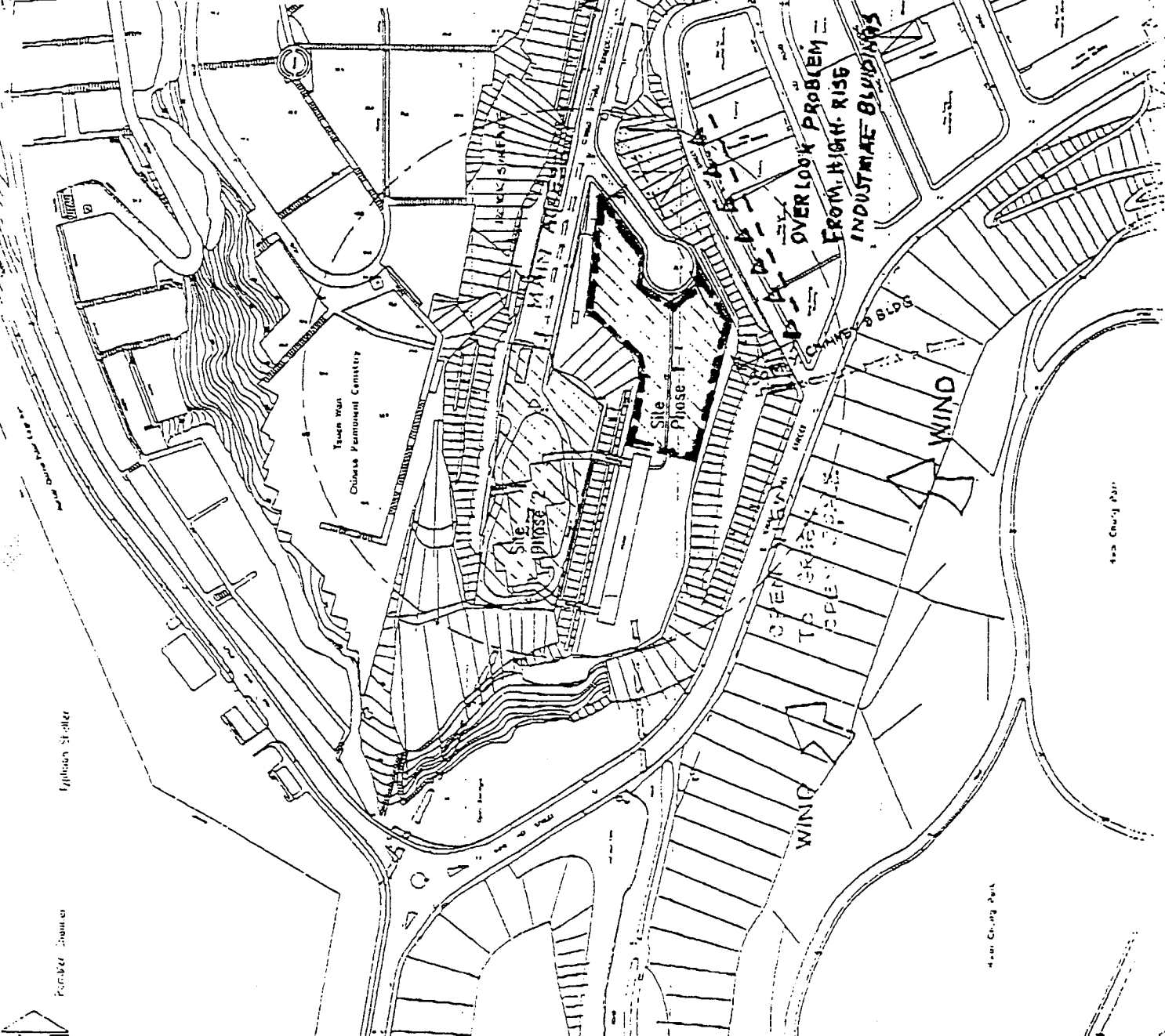
[Signature]
 (Wilson Lee)
 PM321
 for Director of Architectural Services

Distribution
 DPO/TKS
 DEP

(Attn: Mr Ronald Chiu) Fax No: 2412 5435
 (Attn: Ms Clara Yu) Fax No: 2591 0558

c.c. CTP/Metro Group, TDD (Attn: Ms Irene Man) Fax No: 2577 3075 we
 Hyder (Attn: Mr Martin Chan) Fax No: 2827 2891 we.

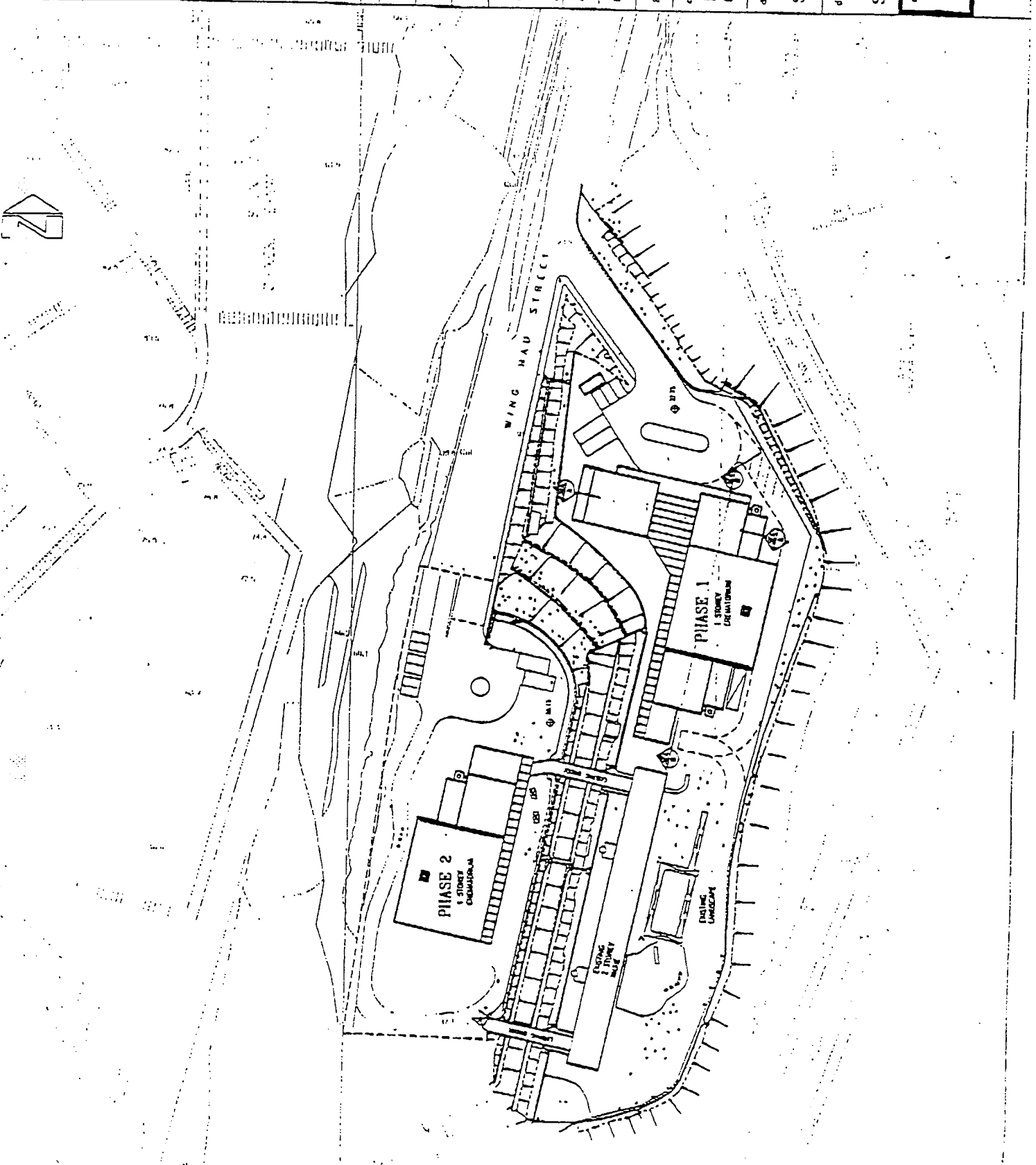
The site for both phases are located within the existing Kwai Chung Crematorium. The main vehicular access to site is from Wing Hau Street. It is surrounded by high-rise industrial building at its north-east with an open view to Kwai Chung Park at east and south. The Chinese cemetery is at the its back which is part of the complex. The site for Phase I is levelled and vacant for development. The existing crematorium at higher level platform is going to be demolished and replaced. This kind of Land Use is always difficult to obtain. High site utilisation and efficiency is the most concern in the design options.



no	date	description
		HT16104
drawn		
checked		
approved		
L. CHOW	Feb 98	
C.B. CHOW	Feb 98	
J. AH HEUNG	Feb 98	
Project architect		
contract no.	11/A	
file no.	ASD 57/3115/10/REC/001	
project no.	700K	
contract		
EXTENSION OF KWAI CHUNG CREMATORIUM		
drawing title	SITE CONTEXT & CONSTRAINT	
drawing no.	scale	
SK-1	1 : 2000	
office		
ARCHITECTURAL BRANCH		
ARCHITECTURAL SERVICES DEPARTMENT		

NOTES

- 1. ALL DIMENSIONS ARE IN METERS
- 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
- 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
- 4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED
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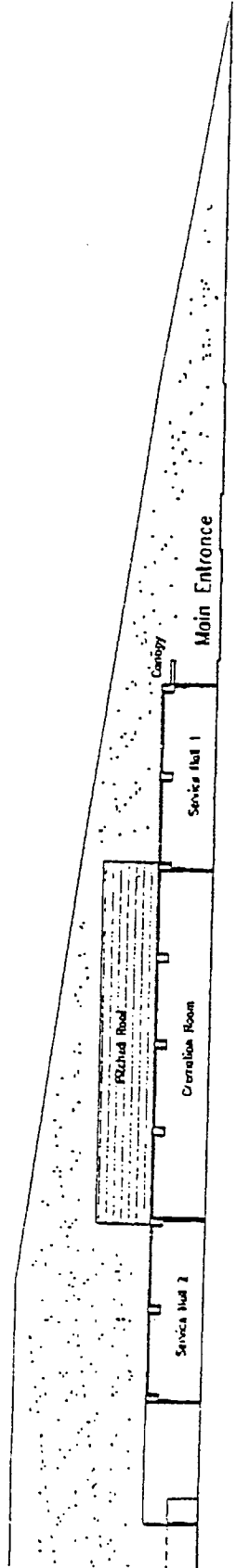


no.	date	description
REVISION		
drawn		
checked		
approved		
K. CHUNG	Feb 98	
C.B. CHOW	Feb 98	
J. AU YUANG	Feb 98	
contract no.	N/A	
file no.	ASD 57/3415/K/ACC/001	
project no.	704E	
contract	EXTENSION OF KWAI CHUNG CREMATORIUM	
drawing title	SCHEMATIC BLOCK PLAN	
drawing no.	SK-0	scale
		1 : 1000
office	ARCHITECTURAL BRANCH	
	ARCHITECTURAL SERVICES DEPARTMENT	

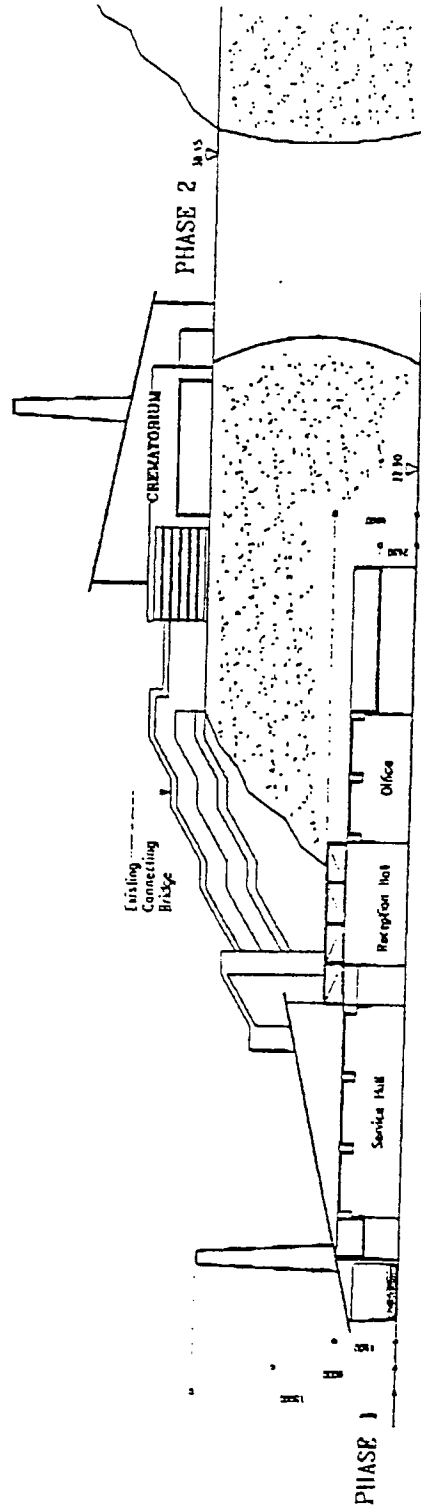


no.	date	description
REVISION		
drawn		
checked		
approved	Jun 98	
I. CHONG	Jun 98	
C.B. CHAN	Jun 98	
J. JO YUWIC	Jun 98	
Project Architect		
contract no.	N/A	
file no.	ASD 32/5015/C/RCC/003	
project no.	20ME	
contract	EXTENSION OF KWAI CHUNG CREMATORIUM	
drawing title	SCHEMATIC SECTION A-A & B-B	
drawing no.	SK-7	scale 1 : 400
office	ARCHITECTURAL BRANCH	
ARCHITECTURAL SERVICES DEPARTMENT		

PHASE 2 PLATFORM

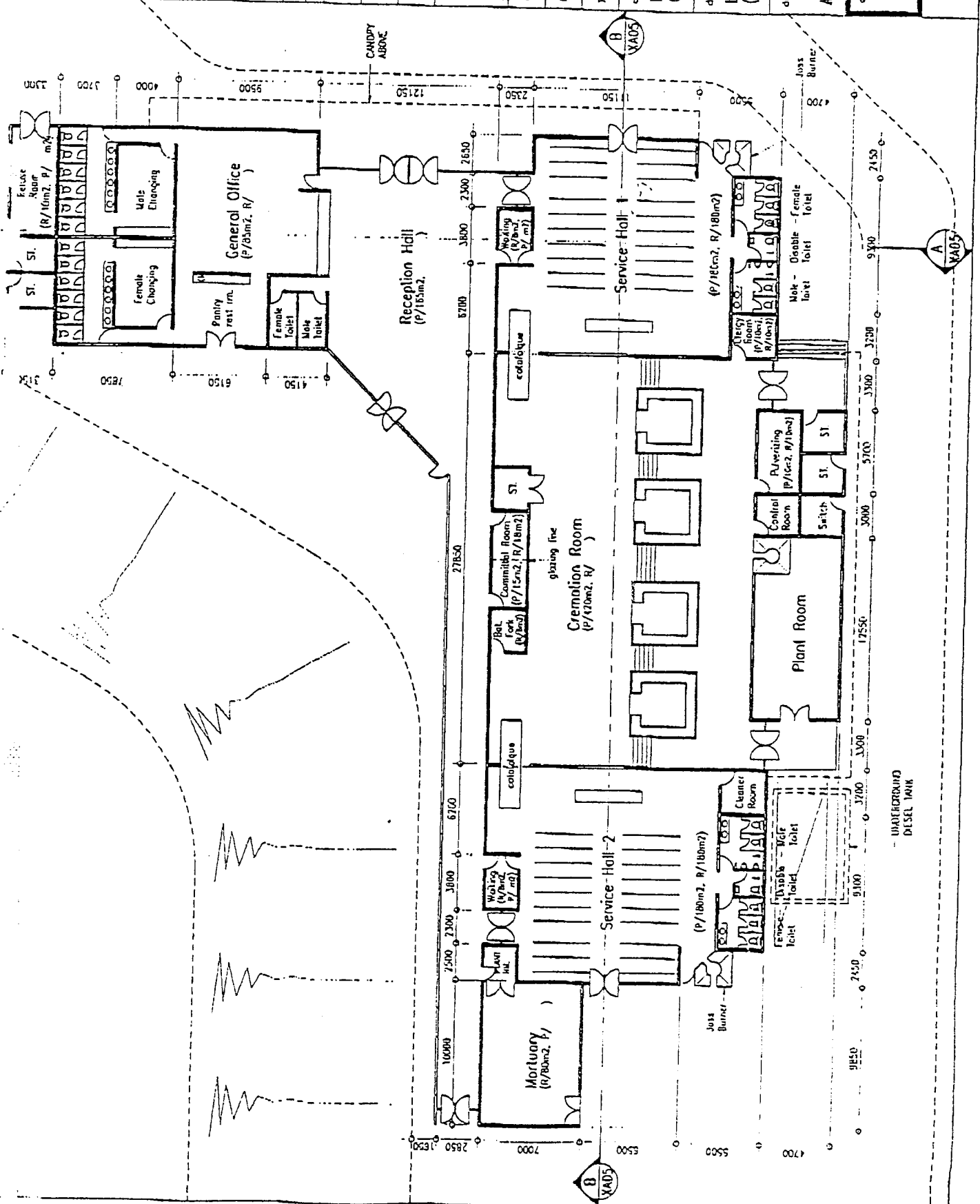



SECTION B-B



SECTION A-A

M



2 2 JAN 1998		FOR P.P.T.S	
o	Jan 98	date	description
REVISION			
drawn	C. W. U		
checked	K. K. U		
approved	Jun 98 L. CHENG Jun 98 C.B. CHAN Jun 98 J. AU YING		
contract no.	N/A		
file no.	ASD 57/5415/E/RCC/001		
project no.	204E		
contract	EXTENSION OF KWAI CHUNG CREMATORIUM		
drawing title	LEVEL 1 PLAN (PHASE 1)		
drawing no	AD/5415/XA03		
scale	1 : 250		
office	ARCHITECTURAL BRANCH		
 ARCHITECTURAL SERVICES DEPARTMENT			

FAX

URGENT BY FAX

(Fax No : 2810 5372)

MEMO

From Director of Environmental Protection
Ref (15) in EP1/KC/26/28
Tel No. 2835 1186
Fax No. 2591 0558
Date 25 February 1998

To Project Manager 321, Arch S D
(Attn : Mr Wilson LEE)
Your Ref :
Dated :
Total No. of Page(s) 1

Preliminary Environmental Review (PER) for
Kwai Chung Crematorium

Further to Hyder's fax (ref: ENV98110204.doc/EA00140/mc/el) dated 24.2.98 addressed to us and copied to your goodself, we have clarified with your consultants, Mr Martin Chan of Hyder this afternoon that the Section 9 of the PPFS cannot be signed off until (i) the revised PER report, in particular the air quality section is in order; (ii) DPO/TKS confirm whether visual impact assessment will be required in the detailed design stage; and (iii) Section 9 of the PPFS will be revised according to the comments from relevant departments.

2. By copied of this memo, we would inform DPO/TKS that Arch S D's consultants, Hyder will submit the requested information (including the layout of Phase 1, the scale and development intensity of the proposed development) via your memo (ref: (73) in PD/TKS G/USD/2) dated 24.2.98 to facilitate your review and comment on the captioned project.

Hyder Consulting Limited
Date: 26 FEB 1998
Ref: 1998-110853
ENV
B. TIDD
26/2
MC 26.2.98
File ref: EA00140

(Clara P S Yu)
Environmental Protection Officer
for Director of Environmental Protection

c.c.

DPO/TKS

CTP/Metro Group, TDD

Hyder

(Attn : Mr Ronald CHIU)

(Attn : Ms Irene MAN)

(Attn : Mr Martin CHAN)

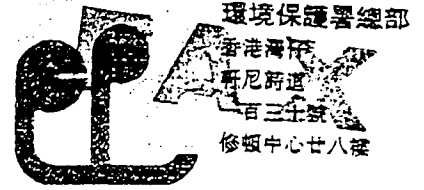
Fax : 2412 5435

Fax : 2577 3075

Fax : 2827 2891

本署編號
OUR REF: (11) in EP1/KC/26/28
來函編號
YOUR REF: ENV98109158.doc/EA00140/mc/kt
電話
TEL NO.: 2835 1186
圖文傳真
FAX NO.: 2591 0558

Hong Kong Government
Environmental Protection Department
Headquarters
28th Floor, Southern Centre,
130 Hennessy Road,
Wan Chai, Hong Kong.



Hyder Consulting Ltd
Environmental Division
3/F Somerset House
Taikoo Place
979 King's Road
Quarry Bay, Hong Kong
(Attn : Mr Martin K F Chan)

Hyder Consulting Limited			
Date received	24 FEB 1998		
Reg no.	1998-110053		
Div/Dep	ENV		
Manager	Wadd		
Date received in Div/Dep	24/2		
For Action	For Info	Sign	Date
MC		82/24/2	
Copy to			
Reply date			
File ref: EA00140			

URGENT BY FAX
(Fax : 2827 2891)
23 February 1998

Dear Martin,

Preliminary Environmental Review (PER) for
Kwai Chung Crematorium

Further to your fax under reference dated 20.2.98 and the telephone conversation with our Mr C Y Mak and yourself, the revised PER report is still not satisfied due to incorrect calculation results in your air quality section. Therefore, we consider that the revised Section 9 of PPFS cannot be signed. Please further revised your PER report and Section 9 of the PPFS for our comment.

2. As per our telephone conversation two weeks ago, we are still waiting for Plan D and FSD's comment whether there will be any potential visual, landscape and ecological impacts. Grateful if you can contact them direct (Dr Dick Choi of AFD and Mr Alex Kiu of Plan D) for any relevant queries.

3. Our comments on the PER of Wo Hop Shek Skeletal Crematorium will be given to you separately by our colleagues.

(Clara P S Yu)
Environmental Protection Officer
for Director of Environmental Protection

c.c.
Arch S D
RSD
AFD
DPO/TKS

(Attn : Mr Wilson LEE/ Ms Susanna CHEUNG) Fax : 2810 5372
(Attn : Mr S S CHUNG) Fax : 2696 2097
(Attn : Dr Dick CHOI) Conservation Officer Fax : 2311 3731 Tel : 2733 230
(Attn : Mr Alex KTU) Senior Marine Conservation Officer Fax : 2412 5435 Tel : 28770387
Technical Services Div Tel : 28782743

OUR REF: (7) in EP1/KC/26/28
UN REF: ENV97-93755.DOC/EA00140-EAV01D/
1759-001A/MC/SO/kt
TEL NO: 2835 1186
FAX NO: 2591 0558

Hong Kong Government
Environmental Protection Department
Headquarters
28th Floor, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong.



環境保護署總部
香港灣仔
軒尼詩道
一百三十號
樓頂中心廿八樓

FAX

Urgent By Fax
(Fax : 2827 2891)

3 February 1998

Hyder Consulting Ltd.,
Environmental Division
3/F., Somerset House,
Taikoo Place,
979 King's Road,
Quarry Bay,
Hong Kong.
(Attn : Mr Martin K.F. CHAN)

Hyder Consulting Ltd.
Date received - 3 FEB 1998
File no 1998-103816
Div/Sec ENV
Manager B. Todd
Date received in Div/Sec
For Action
TC
WL
3.2.98
EA00140

Dear Martin,

Preliminary Environmental Review (PER) for Kwai Chung Crematorium

Further to your letter under reference regarding the draft Preliminary Environmental Review (PER) report for the captioned project, our comments on the PER report are as follows :

Air Quality

- (i) Section 2 - The relative location of the existing crematorium, the new crematorium should be shown in Figure 2.1. ✓
- (ii) Section 3.2
 - (a) The study "Crematoria Air Quality (CAQ)" report mentioned in this section should be attached with the ER for our reference. ✓
 - (b) Please note that a specified process licence will be required for the operation of all the cremators in the crematorium, not just the new cremators. This is particularly applicable to the transitional situation where the construction of the new cremators in the Phase I development is completed but the Phase 2 demolition work is yet to start and the existing cremators are still in use.

- 2 -

(iii) Section 4.2.1

- (a) The third sentence should be revised as "Any malfunction or breakdown that has led or may lead to abnormal emissions should be fixed promptly until normal operations can be restored."
- (b) How about the proposal for monitoring mentioned in (b) of Annex B?
- (c) General Operation, 8th line - Though it may be too early to discuss the actual licence requirement at this stage, it is worthwhile to note that the typical reporting requirement on malfunction and breakdown which is now being set in a specified process licence is to inform EPD of the incident by telephone or facsimile within two hours from the incident, followed by a written notification within 3 working days.
- (iv) The subject site falls within "OU" as shown on the Kwai Chung OZP and the proposed development should be compatible with the surrounding landuses.
- (v) There should have no major air quality impact arising from the proposed project, provided that the standard pollution control clauses and adequate dust suppression measures are to be implemented to mitigate the potential dust impacts on the surrounding environment during construction stage.
- (vi) Whereas for the operational phase of the proposed project, please draw the applicant's attention to the fact that a Specified Process licence would be required for the operation of all the cremators in the crematorium, not just the new cremators. This is particularly applicable to the transitional situation where the construction of the new cremators in the Phase I development is completed but the Phase 2 demolition work is yet to start while the existing cremators are still in use. Should the BPMs be fully implemented, no major operational air quality issues are expected.
- (vii) The PER and Section 9 - PER should be acceptable on air quality impact and an EIA is considered not necessary to address the air quality issues.

Noise

- (i) The paragraph "Construction Phase" under "Key Findings of Review" in S.9 of the PPFS :
 - The sentence starting in the 2nd line "Noise mitigation recommendations.....using quiet PME" is suggested to be amended to "It is recommended that 'Recommended Pollution Control Clauses for Construction Contracts' to be incorporated into the works contracts to ensure all construction noise impacts are kept within the relevant standards and guidelines."

2. Please revise both PER report and Section 9 of the PPFs according to the suggested amendments and send us three copies of revised Section 9 for our signature. Three copies of final PER report are also required for our record purpose.

Yours sincerely,



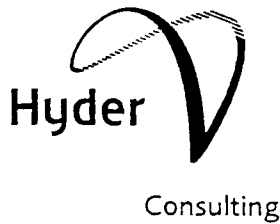
(Clara P.S. YU)
Environmental Protection Officer
for Director of Environmental Protection

c.c. By despatch

PD3, Arch S D (Attn : Mr S.K. WONG)
RSD (Attn : Mr S.S. CHUNG)
DO/KT (Attn : Miss Hilman WONG)
DEHS/KT

ID NO. LTR3.2.98 [E(UA)-1]/word

EPD - 3
ASD - 2 (Wilson Lee)
(Raymond Kan)
RSD - 1 (Mr. Cheung)



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 香港鯉魚涌
 英皇道979號
 太古坊
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 Fax: (852) 2827 2891
 E-mail: hyderenv@hk.super.net

Fax

Hyder Consulting Limited is incorporated in Hong Kong with limited liability.
 COI Number 126012

To	C Y Mak	From	Martin K F Chan
Company	Environmental Protection Department	Reference	ENV98-110666 /EV00060/MC
Fax no.	2827-8040	Date	25.2.98
		Subject	AIR MODELLING - KWAI CHUNG CREMATORIUM

Number of pages (including this one)

2

If you have any problems receiving this fax please contact us on (852) 2911 2233

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Enclosed please find the following addendum note for your information.

(i) Replace Table 3.5 of Section 3.2 by the revised Table given below:

Table 3.5 EPD 1996 Ambient Air Quality Monitoring Data in $\mu\text{g}/\text{m}^3$

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)			
	1 hr	8 hr	24 hr	Annual Average
Sulphur dioxide	213*	-	85***	21
Carbon monoxide	-	7610**	-	
Total suspended particulates	-	-	171***	-

* 1st highest 1 hr
 ** 1st highest 8 hr
 *** 1st highest 24 hr

(ii) Replace the two last sentences at the first paragraph of Section 3.4 by:

The predicted SO₂ levels within the crematorium (at the breathing zone and about 1.5m above ground) are 342 $\mu\text{g}/\text{m}^3$ and 127 $\mu\text{g}/\text{m}^3$ for an exposure period of one hour and 24 hours, respectively. All these levels do not exceed the AQO criteria of 800 $\mu\text{g}/\text{m}^3$ for one hour and 350 $\mu\text{g}/\text{m}^3$ for 24 hours.

(iii) Replace Tables 3.9.1 and 3.9.2 of Section 3.4 by the revised Tables given below:

Table 3.9.1 Predicted Highest Pollutant Concentrations at the Nearest ASR

Parameter	Predicted Maximum Concentration* ($\mu\text{g}/\text{m}^3$)	Criterion ($\mu\text{g}/\text{m}^3$)
Particulates	223(24hr)	260
Total mercury (Hg) & cadmium (Cd)	0.01(1 yr)	1 (Hg), 0.02(Cd)
Total nickel (Ni) & arsenic (As)	1.2(8hr)	N/A
Carbon monoxide (CO)	7986(1hr), 7726(8hr)	30000(1hr) 10000(8hr)
Hydrogen sulphide (H ₂ S)	2.6(24hr)	150
Hydrogen chloride (HCl)	376(1hr), 116(8hr)	N/A
Hydrogen fluoride (HF)	2.1(24hr)	40
Sulphur dioxide (SO ₂)	581(1hr), 136(24hr)	800(1hr), 350(24hr)
Total organic compound (TOC)	75.2(1hr)	N/A

* Emission date according to EPD BPM

Table 3.9.2 Predicted Ground Level Pollutant Concentrations in Micrograms Per Cubic Metre of Air

Parameter	KCP	TCTHA	TS	KSWE
Particulates	174(24hr)	174(24hr)	172(24hr)	176(24hr)
Total mercury (Hg) & cadmium (Cd)	0.002(1yr)	0.0008(1yr)	0.0001(1yr)	0.0007(1yr)
Total nickel (Ni) & arsenic (As)	0.10(8hr)	0.06(8hr)	0.04(8hr)	0.13(8hr)
Carbon monoxide (CO)	7623(1hr), 7620(8hr)	7623(1hr), 7616(8hr)	7622(1hr), 7614(8hr)	7671(1hr), 7623(8hr)
Hydrogen sulphide (H ₂ S)	0.15(24hr)	0.13(24hr)	0.07(24hr)	0.26(24hr)
Hydrogen chloride (HCl)	13.3(1hr), 9.5(8hr)	12.7(1hr), 5.7(8hr)	11.8(1hr), 4.1(8hr)	60.6(1hr), 13.1(8hr)
Hydrogen fluoride (HF)	0.12(24hr)	0.11(24hr)	0.06(24hr)	0.21(24hr)
Sulphur dioxide (SO ₂)	226(1hr) 88(24hr)	225(1hr) 88(24hr)	224(1hr) 86(24hr)	271(1hr) 90(24hr)
Total organic compound (TOC)	2.7(1hr)	2.5(1hr)	2.4(1hr)	12.1(1hr)

KCP - Kwai Chung Park; TCTHA - Tsing Chau Temporary Housing Area; TS - Typhoon Shelter; KSWE - Kwai Shing West Estate

Kind regards



Martin Chan

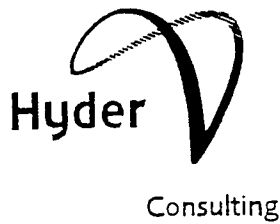
Senior Environmental Consultant

p.s. Electronic data files will be sent by email.

cc

Arch S D - Wilson Lee (2810-5372)

- Wilson Lee (PM for Kwai Chung Crematorium)



安誠工程顧問有限公司

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Fax

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COI Number 126012

To	Miss Clara Yu	From	Martin K F Chan
Company	Environmental Protection Department	Reference	ENV98110204.doc/ EA00140/mc/el
Fax no.	2591-0558	Subject	RESPONSE TO EPD COMMENTS - KWAI CHUNG CREMATORIUM
Number of pages (including this one)	1	If you have any problems receiving this fax please contact us on (852) 2911 2233	

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Please find below is our response to your fax of 23.2.98 (your Ref. (11) in EP1/KC/26/28):

(i) We confirm the previous conclusions of the PER and the air quality impact assessment remain valid. Note that this has been confirmed by further modelling using a higher anemometer height that EPD requested. Results and output files will be sent to EPD for checking. We therefore do not expect there will be major changes for the latest PER version we submitted for EPD to sign off.

(ii) This is your first time to mention that comments from Plan D and AFD for potential visual, landscape and ecological issues are also required for this Kwai Chung Crematorium. However, we will contact the relevant officers to response to any queries they may have.

Thank you for your attention.

Kind regards

Martin Chan
Senior Environmental Consultant

- cc
- Arch S D (2810-5372)
- Wilson Lee (PM for Kwai Chung Crematorium)
- Susanna Cheung (PM for Wo Hop Shek Skeletal Crematorium)