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FIGURE

1. BASIC INFORMATION

Project Title

1.1 The title of the proposed project is "Replacement of Cremators at Fu Shan Crematorium, Shatin" (hereafter referred to as the Project).

Purpose and Nature of the Project

1.2 The existing Fu Shan Crematorium, which comprises two twin cremators, was completed in 1984 and has been in use since 1985. During the operation of the Crematorium, dark smoke is sometimes emitted. This situation has along been a subject of concern among the local community in Shatin and the Government. According to the Environmental Protection Department (EPD), residents of Tai Wai, Shatin, especially those of nearby recently developed housing estates, and some LegCo members had lodged 10 complaints of dark smoke emission from the crematorium between March 1998 and April 2000. They were very concerned about the potential air pollution caused by the dark smoke emitted. The Government has been identifying means to improve the situation since 1996.

1.3 The Electrical & Mechanical Services Department (EMSD) has conducted an in-depth study on feasibility of improving the performance of the existing cremators to comply with the emission requirements of the *Air Pollution Control (Smoke) Regulations*. Several alternative improvement measures have been proposed. However, upon consultation with EPD, EMSD is of the view that, with EPD's latest emission design requirements for crematoria taken into consideration, the existing cremators are technically not able to achieve these requirements even after the modification works. In addition, they are near the end of their serviceable life span (normally 15 to 20 years). EMSD, thus, considers their modification not practical and recommends their replacement by new cremator units.

1.4 The dark smoke emission problem in Fu Shan Crematorium is due to aging and outdated design of the existing cremators. Hence, replacement of existing cremators by more advanced ones, which are designed to meet fully with the requirements in the latest regulation, should be the most practical way of rectifying the dark smoke problem.

1.5 The purpose of the Project is to replace the existing cremators of the Fu Shan Crematorium for rectifying the existing dark smoke emission problem and compliance with the latest environmental protection requirements. The scope of the Project comprises:

(a) A new cremation room with four flat-bed type single cremators designed to meet the latest EPD standards.
(b) One pulverising room with a bone cremulator for pulverisation of cremated remains.
(c) One automatic transport system for delivering the coffin from the service halls into the cremators.
(d) One public toilet as a replacement to the existing one.
(e) Provision of emergency generator room, main switch room, fire services pump room tank, sprinkler tank and storeroom, etc. necessary for the operation of the new cremators.
(f) Re-alignment of the existing vehicle access.
(g) Reprovisioning of car parking spaces and upgrading of the overall landscape area.
(h) Renovation of the two existing service halls to cater for the change in the location of the new cremation room.

(i) Demolish and remove the existing cremators after the satisfactory commissioning of the new ones. Renovate the old cremation room into workshop for EMSD maintenance staff and storerooms.

(j) Installation of fire services provisions, including sprinkler system, hose reels, street hydrant etc. to the existing crematorium to meet current fire safety standards.

Name of Project Proponent

1.6 The Project Proponent is Architectural Services Department (ArchSD).

Location and Scale of Project and History of Site

1.7 The project site is within the existing site boundaries of Fu Shan Crematorium. A location plan of the site is shown in Figure 1.1. The Fu Shan Crematorium site cover approximately 24,000 m^2 which is currently occupied by the existing crematorium, columbarium and staff quarters. It was completed in 1984 and has been in use since 1985.

1.8 The new cremation room will be built in the area currently occupied by the public toilet, car park and garden. The new emergency generator room and main switch room will be located to the north-east of the existing crematorium and next to the existing transformer room respectively. The total construction floor area of the new cremation room and associated plant rooms is approximately 790 m^2 whereas the area of the existing cremation room is about 410 m^2.

Number and Types of Designated Projects Covered by the Project Profile

1.9 The Project involves the construction and operation of a crematorium. It is a Designated Project under item N.4 of Part I of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499).

Name and Telephone Number of Contact Person(s)

1.10 All queries regarding the project can be addressed to:

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

General

2.1 The project is to design and construct a new cremator room to accommodate four new flat-bed type cremators at the landscape area within the existing Fu Shan Crematorium. The landscape area is currently occupied by a car park, a toilet block and a garden. The project also includes removal of the existing cremators, renovation of the existing services halls and cremator rooms and improvement of the landscape works within the Fu Shan Crematorium.

Responsibilities of Parties

2.2 ArchSD is the overall Project Proponent, who oversees and manages the Project. The Project Proponent has commissioned an Environmental Consultant to conduct an Environmental Impact Assessment (EIA) in accordance with the Environmental Impact Assessment Ordinance (EIAO) and to compile an Air Pollution Control Plan (APCP) in accordance with the Air Pollution Control Ordinance (APCO). The Project will be implemented by Contractor(s) to be appointed by the Project Proponent at the subsequent stages.

Project Time Table

2.3 The Project will be implemented under 2 stages as follows:

- Stage I: Construction of a new cremator plant room, new generator room, ancillary facilities, installation of four new single cremators, renovation of the existing service halls in the crematorium. A specified process licence will be obtained for the operation of the new cremators.

- Stage II: Demolition of the two existing twin cremators after the satisfactory commissioning of the new cremators and renovation of the old cremator rooms.

2.4 According to the tentative project programme in the Preliminary Project Feasibility Study Report, the construction phase of the Project will last from May 2002 to December 2003. The construction period is estimated to be 20 months, which includes 17 months for Stage I and 3 months for Stage II.

Interactions with Other Projects

2.5 There are no other projects likely to interact with this proposed development.

3. POSSIBLE IMPACT ON THE ENVIRONMENT

General

3.1 A Preliminary Environmental Review (PER) for the proposed Replacement of the Existing Cremators in Fu Shan Crematorium at Shatin was carried out in 2000 to identify the potential environmental concerns, the likely mitigation measures required, and the scope of the Environmental Impact Assessment (EIA) study. On the basis of the findings of the PER, the potential environmental impacts that may arise from the construction and operation of the Project are discussed in the following sections.

Noise

3.2 The major noisy construction activities will be the site formation, foundation and building works in Stage 1 of the Project. Construction noise impact in Stage 1 is considered limited due to the presence of the screening effect of the existing crematorium. However, noise arising from the demolition of the existing cremators in Stage 2 will likely impact on the nearby sensitive receivers. Cumulative noise impact due to construction of the new cremation room and demolition of the existing twin cremators is not envisaged as the demolition will only be carried out when the new cremators are in operation.

3.3 During the operation phase, road traffic noise on the proposed development is not expected as the location of the crematorium is remote from the major roads such as Tai Po Road – Tai Wai. Furthermore, noise nuisance arising from the operation of the new cremators is not anticipated because plant equipment will be housed indoors.

Air Quality

3.4 The likely air quality impacts associated with the construction activities of the Project are dust nuisance and gaseous emissions from plant and vehicles. Major sources of dust on site are expected to be from site clearance, excavation, materials handling and wind erosion.

3.5 Vehicular emissions from surrounding local roads including Heung Fan Liu Street and Lower Shing Mun Road will not pose significant air quality impact on the crematorium. In view of the new cremation room being some 30 m away from the Lower Shing Mun Road and the low traffic flow in adjacent roads, air quality impact due to vehicular emission would be minimal.

3.6 No major industrial emissions have been identified within 500 m of the proposed development. Hence, adverse air quality impact from industrial emissions on the proposed development is unlikely.

3.7 Pollutants emitted from the operation of the cremators could affect the nearby air sensitive receivers. To reduce the emission, air pollution control equipment will be installed for the cremators.

3.8 During operation phase, odour nuisance from the proposed cremators on the nearby sensitive receivers is also envisaged.

Water Quality

3.9 During construction phase, construction site runoff and drainage, potential liquid (that is, lubricant oil, fuel oil, solvent, etc.) spillage, and sewage from the on-site construction workforce could result in water quality impacts on the environment. Silts from site runoff may cause blockage of sewers and drains, and increase suspended solids concentrations in receiving water.

3.10 Sewage from toilets and wastewater from the refuse room will arise during operation of the Project. The sewage effluent and wastewater from the toilets and refuse room will be discharged to the foul sewer. Given the small quantity of sewage to be generated on-site, adverse water quality impact is unlikely.

3.11 If there is effluent discharged from the air pollution control system that may contain pollutants, treatment may be needed before discharge into foul sewer, or disposed of as chemical wastes. The issues should be addressed when details of the air pollution control system and scrubbing system are available.

Waste

3.12 Waste to be generated during the construction phase of the proposed development will comprise excavated material and Construction and Demolition Materials (C&DM) including asbestos, and general refuse. The handling and disposal of waste arising from the construction site may pose environmental impacts if not properly managed.

3.13 During the operation of the crematorium, general refuse will arise from visitors and staff at crematorium. The waste will be stored in lidded metal bins and disposed of at landfill. Given the small quantity of waste to be handled and disposed of, it is not expected to cause any environmental concerns.

Visual Appearance

3.14 The proposed site is located on a hillside and is topographically shielded from most of the nearby sensitive receivers with the exception of Lakeview Garden that has direct line of sight to the site.

3.15 During construction phase, the presence of demolition equipment and stockpiled materials will be the potential sources of unsightly visual appearance. However, the visual impact is considered temporary and minimal. Upon the completion of the Project, potential visual impact associated with the new cremation room is anticipated.

Hazard

3.16 Building debris arising from the demolition works of the cremators will likely contain pollutants and toxic substances that might be generated and accumulated during the combustion process of the existing cremators. Hazard may arise during handling, transportation and disposal of these contaminated materials.

Other Impacts

3.17 There will not be any impacts to local ecology, site of cultural importance or listed buildings. There will be no other impact on natural resources including watercourses or groundwater.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

Sensitive Receivers

4.1 The proposed project site is located to the east of Lower Shing Mun Reservoir, to the south of Heung Fan Liu and to the north of Shatin Fu Shan Public Mortuary with Lower Shing Mun Road as main access. To the south-west of the site is a slope rising up to about 150 mPD. Housing developments (R(A)), about 400 m to the east of the site, are proposed in Shatin Area 38A and 4C to accommodate a population of 17,000.

4.2 The existing sensitive receivers in the vicinity of the project site have been identified and are tabulated in Table 4.1 and illustrated in Figure 4.1.

Table 4.1 Sensitive Receivers

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Sensitive Receivers	Description
Heung Fan Liu	Village houses
Fu Shan Crematorium Staff Quarter	Residential buildings
Lakeview Garden	Residential buildings
Po Leung Kuk Y. C. Cheng Centre	Educational institution
Proposed housing developments in Area 38A and 4C	Residential buildings

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

Mitigation Measures

Noise

5.1 Construction noise impact can be alleviated by the use of quiet construction method and equipment. The contractor should aim to meet the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM) noise criteria at the nearest noise sensitive receivers (NSRs) during normal working hours. No evening or night-time work is expected.

5.2 In general, good site practice and noise management can considerably reduce the impact of the construction site activities on nearby NSRs. The following measures will be incorporated into the Contract Specifications.

- Only well maintained plant should be operated on-site and plant should be serviced regularly during the construction period.
- Machines and plant used intermittently should be shut down between work periods or should be throttled down to a minimum.
- Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction period.
- Material stockpiles and other structures should be effectively utilised, where possible, be orientated so that the noise is directed away from the nearby NSRs.
- Mobile plant should be sited as far away from NSRs as possible.
- Mobile noise barriers should be positioned within a few metres of noisy plant items.

Air Quality

5.3 The mitigation measures stipulated in the *Air Pollution Control Ordinance* should be incorporated in the Contract Specification in order to minimise any potential dust nuisance arising from the construction activities of the Project to be within the acceptable levels.

5.4 *A Guidance Note on the Best Practicable Means for Incinerators (Crematoria) BPM 12/2* provide guidelines for the design of cremators as follows:

- The cremators should be designed to ensure complete combustion and should be fitted with a secondary combustion zone. As one of the means of achieving good combustion, the cremators should be designed so that there is adequate secondary air in the primary combustion zone to ensure good turbulence.
- The gases should be held at 850 ^{o}C for a minimum (at all times) of 2 seconds in the secondary combustion zone. The residence time should be determined by direct measurement of the volume rate of the flue gases throughout the cremation cycle at the cremator exit with appropriate corrections made for changes in temperature and oxygen.
- The concentration of oxygen at the outlet of the secondary combustion zone should not be less than 6% by volume, if measured on a wet basis, or an average of 6% by volume with a minimum of 3% by volume if measured dry.

- Coffins should not be introduced to the cremators unless the secondary combustion zone temperature exceeds 850 ^{o}C or other minimum temperature accepted by the Authority.

5.5 In addition, the BPM 12/2 specified the concentration limits of emissions from the cremation process as shown below:

Particulate matter	100 mg m^{-3}
Hydrogen chloride (excluding particulate matter)	100 mg m^{-3}
Carbon monoxide	100 mg m^{-3} (60 minute average)
Organic compounds (excluding particulate matter and expressed as total carbon)	20 mg m^{-3}
Dioxins	1 ng m^{-3}

5.6 In order to ameliorate the potential air quality impact associated with the operation of the new cremators, the new cremators should be designed in compliance with above mentioned *A Guidance Note on the Best Practicable Means for Incinerators (Crematoria) BPM 12/2*. In addition, a Flue Gas Cleaning Plant will be installed to further alleviate the impact.

5.7 The new cremators should also be operated in accordance with the BPM 12/2. The operation procedures should incorporate continual monitors and controls to ensure that the cremation process is being controlled properly. Chimney flue ductwork should be cleaned regularly to prevent accumulation of deposits. The removal of ash and non-combustible residues should be undertaken carefully so as to prevent dust emissions. Cremated remains should be moved and stored in a covered container.

5.8 To eliminate the odour nuisance, mitigation measures will be implemented such as installation of deodorization system and use of deodorant.

Water Quality

5.9 Since only land based construction activities will be undertaken, minimal water quality impact arising from the Project is expected. However, in order to ensure that no adverse environmental impacts will arise during construction, good practices outlined in *ProPECC PN 1/94 "Construction Site Drainage*" should be followed to control the site runoff and drainage.

5.10 To minimise the impacts on water quality from the operation of the proposed facility, the following mitigation measures are required:

- Proper connections to public sewers from the proposed development.
- All effluent should comply with the appropriate effluent standards stipulated in the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (WPCO-TM).*
- Effluent from the Flue Gas Cleaning Plant and any chemical wastes shall be treated before discharge into the foul sewer or, where appropriate, disposed off at licensed facilities.

Waste

5.11 Good waste management practices including avoiding, minimising, reusing and recycling will be adopted to reduce waste generation during construction phase. In addition, on site sorting of demolition debris will be carried out. Scrap metals or abandoned equipment will be recycled if practical.

5.12 General refuse generated from the operation of the Project will be collected from lidded bins and delivered to a central collection point and should be stored in enclosed containers to prevent odour, windblown litter, vermin, water pollution and visual impact. Chemical waste will be handled in accordance with *Waste Disposal (Chemical Waste) (General) Regulation* and *the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*.

Visual Appearance

5.13 Proper landscape, building and chimney design will be incorporated in order to alleviate the potential visual impact.

Hazard

5.14 Safety measures for the transportation, handling and disposal of contaminated materials and toxic substances will be identified in the EIA study to minimise any potential hazard.

Possible Severity, Distribution and Duration of Environmental Effects

Short Term Effect

5.15 Potential environmental impacts identified will only last for the duration of the construction period (tentatively 20 months). As such the effects are considered to be temporary and short term. With the implementation of appropriate mitigation measures, no insurmountable impacts are expected.

Beneficial Effects

5.16 The Fu Shan Crematorium has been in use since 1985 and the existing cremators are unable to meet the current statutory requirements. There were records of continuous dark smoke emission from the Crematorium of duration exceeding the limit stipulated in *the Air Pollution Control (Smoke) Regulations 1990*. The Project would upgrade the cremators of the Fu Shan Crematorium to meet with the latest statutory requirements and rectify the dark smoke emission problem of the Crematorium. The air quality in the surroundings would be enhanced. This is in line with the Administration's policy objective for improving the air quality of Hong Kong.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1 No previous EIA report has been approved or submitted for the subject development.

Replacement of Cremators at Fu Shan Crematorium, Shatin

Location Plan of Site

Scale 1 : 1000		Project No. A15800	
Date Jan 2001		Figure No. 1.1	

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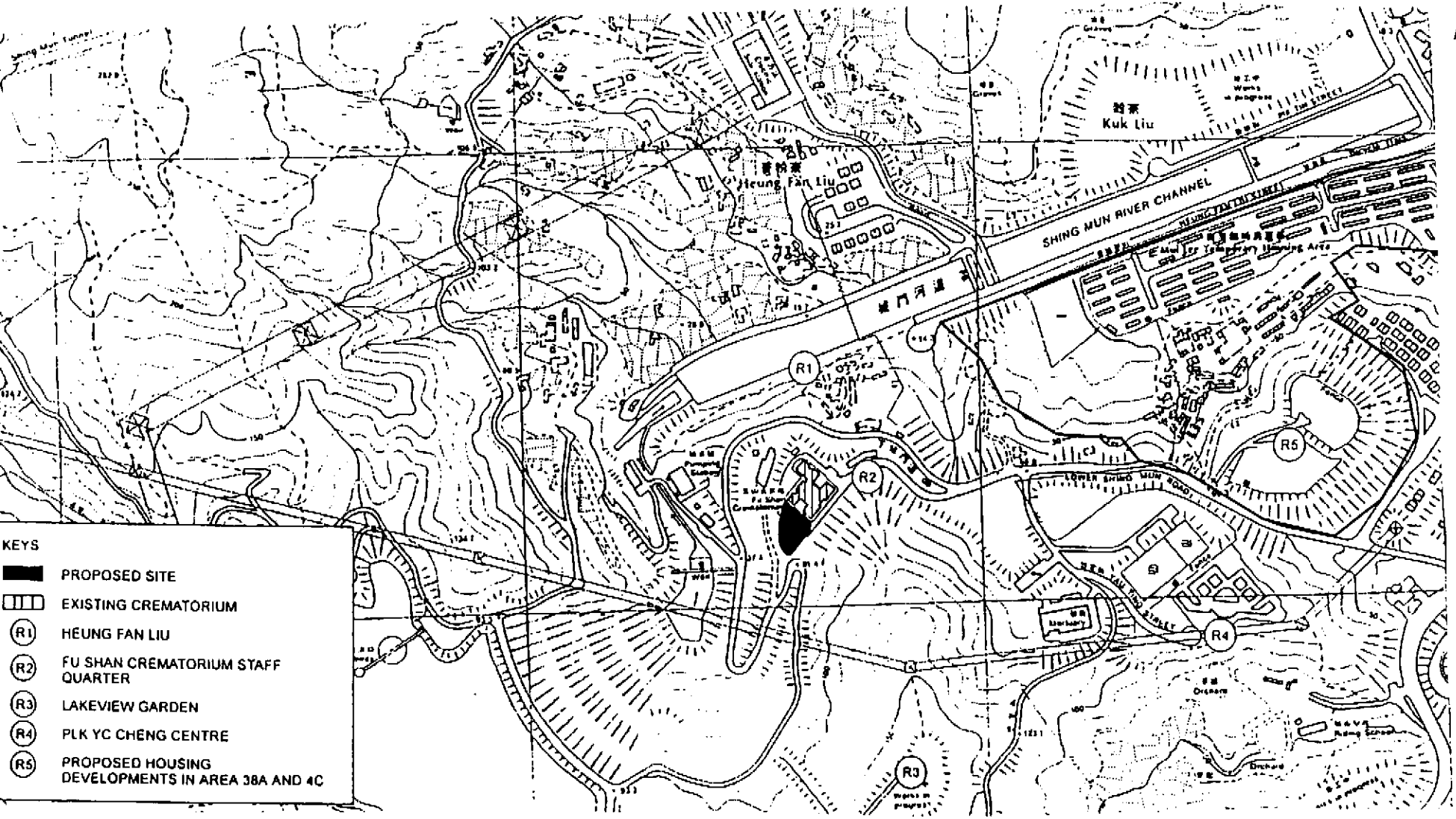

Replacement of Cremators at Fu Shan Crematorium, Shatin

Locations of Sensitive Receivers

Scale	Project No.
N.T.S.	A15800
Date	Figure No.
Jan 2001	4.1

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