

## **ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE**

### **HEAD 703 – BUILDINGS**

#### **Environmental Hygiene – Burial grounds, columbaria and crematoria 13NB – Re-provisioning of Wo Hop Shek Crematorium**

Members are invited to recommend to Finance Committee the upgrading of **13NB** to Category A at an estimated cost of \$686.3 million in money-of-the-day prices for the re-provisioning of Wo Hop Shek Crematorium.

### **PROBLEM**

The four existing coffin cremators and the skeletal cremator at the Wo Hop Shek Crematorium (WHSC) are approaching the end of their serviceable life and should be replaced. There is also a need to enhance cremation service to meet the increasing public demand.

### **PROPOSAL**

2. The Director of Architectural Services (D Arch S), with the support of the Secretary for Food and Health, proposes to upgrade **13NB** to Category A at an estimated cost of \$686.3 million in money-of-the-day (MOD) prices to demolish the existing WHSC and provide in situ six technologically advanced new coffin cremators, a skeletal cremator and other ancillary facilities.

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**PROJECT SCOPE AND NATURE**

3. The project will be implemented in two phases. The scope of **13NB** comprises -

(a) Phase 1

- (i) demolition of the existing crematorium building, including the transformer room and the existing coffin cremators therein;
- (ii) construction of six new coffin cremators in situ. A new skeletal cremator to replace the existing one to be demolished in Phase 2 will also be constructed on this site;
- (iii) construction of a cremation plant room to house the new cremators to be provided under this project with space for future installation of two additional cremators, if required;
- (iv) construction of three service halls with ancillary facilities, including public toilets, clergy rooms and waiting rooms;
- (v) provision of a pulverising room, a bone storage room, a mortuary, ancillary service rooms, transformer and switch rooms, a battery fork lift charging room, pump rooms, dangerous goods stores and two emergency generator rooms;
- (vi) provision of office accommodation, store rooms and refuse storage chamber;
- (vii) provision of three joss paper burners with filtering devices;
- (viii) provision of a closed-circuit television (CCTV) system, public address system and anti-burglary devices at suitable locations;
- (ix) provision of devices for transferring coffins from the service halls to the cremation plant room; and

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- (x) provision of car parking spaces and landscaped areas.
- (b) Phase 2
  - (i) demolition of the existing old skeletal cremator cum-building after commissioning of the new skeletal cremator; and
  - (ii) site landscaping.

4. A site plan is at Enclosure 1 and the design outlook of the re-provisioned crematorium is at Enclosure 2. We plan to start the Phase 1 of works in July 2009 for completion in December 2011. Upon satisfactory commissioning of the new cremators, we will begin the Phase 2 of works in January 2012 for completion in April 2012.

#### **JUSTIFICATION**

5. WHSC is located in the Wo Hop Shek Cemetery in the North District. It has four coffin cremators and two service halls, providing about 3 800 cremation sessions a year. A skeletal cremator building with a single cremator operates at a site near the crematorium for the cremation of skeletal remains from earlier burials. The skeletal cremator and the coffin cremators were commissioned in the 1960's and 1991 respectively and are approaching the end of their serviceable life. It has become increasingly difficult to source spare parts of these old models of cremators for their repairs. In addition, the design of these old cremators is not compatible with modern day standards in terms of operational efficiency and technical competency. Their replacements will be more efficient and environmentally friendly.

6. On operational efficiency, the demand for cremation service has been on the rise in recent years, increasing steadily from 30 100 in 2003 to 34 400 in 2007, i.e. representing over 85% of the total number of deaths. We project that by 2012, the demand for cremation sessions provided by the Government will increase to 42 000. To fulfil our performance pledge of arranging a cremation session within 15 days of application, we have started a re-provisioning programme for cremators since 2003 to provide for more efficient cremators. The re-provisioning also helped to reduce emissions from cremators to meet the latest environmental standards. To date, we

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have replaced old cremators in Kwai Chung, Fu Shan, Diamond Hill Crematoria and have put in operation a total of 14 new cremators at these venues. WHSC and the Cape Collinson Crematorium (CCC) are the last two major crematoria yet to be upgraded.

7. If the proposed re-provisioning project of WHSC is supported, it is envisaged that by its scheduled completion in late 2011/early 2012, these new cremators, together with other existing facilities and proposed facilities for the first phase of the re-provisioning of the CCC<sup>1</sup>, will increase cremation capacity to a total of 43 000 sessions a year. This will meet the demand for cremation service at the time.

8. In view of the above, we propose to demolish the existing WHSC and construct in situ six new cremators and a replacement for the old skeletal cremator. As a support for the replacement skeletal cremator, one of the six new cremators will have a dual purpose design capable of handling either coffin or skeletal cremation.

9. All new cremators at the re-provisioned WHSC will adopt the latest cremation and air pollution control technology aimed at meeting prevailing environmental protection criteria and standards. Their environmental performance will be governed by the Specified Process Licence of the Air Pollution Control Ordinance (Cap. 311). The new cremators will be equipped with high temperature secondary combustion chambers to ensure complete combustion during the cremation process, and a flue gas filtering system to filter out particles and waste gases in the emissions from the cremators. The above design was adopted for new cremators installed in our recently re-provisioned crematoria, such as the Diamond Hill Crematorium, and has proven effective in reducing emission of particles/waste gases and dark smoke.

10. Furthermore, we propose that the layout of the new WHSC should include scope for addition of two more cremators to be developed in the longer term if need be. This is based on the consideration that as Hong Kong is densely populated, it is difficult to find new suitable sites for crematorium development. Significant lead time is also required in developing a new crematorium. We

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<sup>1</sup> The first phase of the re-provisioning of the CCC is targeted for submission to the LegCo Panel on Food Safety and Environmental Hygiene and the Public Works Subcommittee for discussion in the second quarter and the fourth quarter of 2009 respectively.

therefore propose to maximize land use by allowing scope and flexibility in the design layout of the new WHSC to cater for the need for moderate expansion in future, without affecting the structure and operation of the crematorium.

## FINANCIAL IMPLICATIONS

11. We estimate the capital cost of the project to be \$686.3 million in MOD prices made up as follows -

	<b>\$ million</b>
(a) Demolition	10.5
(b) Site formation and geotechnical works	32.0
(c) Building	148.3
(d) Building services	36.6
(e) Drainage	8.0
(f) External works	26.5
(g) Additional energy conservation measures	1.0
(h) Supply and installation of cremators, flue gas filtering system and supporting machinery	265.0
(i) Furniture & Equipment <sup>2</sup>	2.5

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<sup>2</sup> Based on the provision of furniture and equipment of existing crematoria and the market price of the items required.

	<b>\$ million</b>	
(j) Consultants' fees for construction stage –	10.4	
(i) Contract administration	0.5	
(ii) Site supervision	9.9	
(k) Contingencies	<u>52.0</u>	
Sub-total	592.8	(in September 2008 prices)
(l) Provision for price adjustment	<u>93.5</u>	
Total	<u>686.3</u>	(in MOD prices)

We propose to engage consultants to undertake contract administration and site supervision. A breakdown of the estimate for consultants' fees by man-months is at Enclosure 3. The construction floor area (CFA) of **13NB** is 7 116 square metres (m<sup>2</sup>). The estimated construction unit cost, represented by building and building services costs, is \$25,984 per m<sup>2</sup> of CFA in September 2008 prices. We consider the estimated construction unit cost comparable to similar projects built by the Government.

12. Subject to approval, we will phase the expenditure as follows –

	<b>\$ million (Sept 2008)</b>	<b>Price adjustment factor</b>	<b>\$ million (MOD)</b>
2009 – 10	14.4	1.04000	15.0
2010 – 11	57.3	1.08160	62.0
2011 – 12	272.0	1.12486	306.0

/2012 – 13 .....

	<b>\$ million (Sept 2008)</b>	<b>Price adjustment factor</b>	<b>\$ million (MOD)</b>
2012 – 13	96.6	1.16986	113.0
2013 – 14	78.1	1.21665	95.0
2014 – 15	51.4	1.26532	65.0
2015 – 16	23.0	1.31593	30.3
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	<u>592.8</u>		<u>686.3</u>

13. We have derived the MOD estimates on the basis of the Government's latest forecast of trend rate of change in the prices of public sector building and construction output for the period 2009 to 2016. We will award the contract on a lump-sum basis because we can clearly define the scope of the works in advance.

14. At present, the annual recurrent expenditure for the WHSC is \$7.8 million. We estimate the annual recurrent expenditure upon completion of the project to be \$49.7 million. The increase in recurrent expenditure is mainly due to the increase in number of cremators, change of cremator fuel from ultra-low sulphur diesel to town gas and other supporting services.

## **PUBLIC CONSULTATION**

15. We briefed the Legislative Council (LegCo) Panel on Food Safety and Environmental Hygiene on 11 November 2008. The Panel supported the proposal.

16. We also consulted the District Minor Works and Environmental Improvement Committee of the North District Council (NDC) on 17 March 2008. Members generally supported the replacement of the existing four cremators and related facilities in WHSC. However, individual members and some local resident organisations were not supportive of the proposed construction of additional cremators. They were concerned about the possible adverse impact on air quality arising from the operation of the additional cremators. They hoped that more

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information on the Environmental Impact Assessment (EIA) could be provided and consultation conducted. To address their concern, the Food and Environmental Hygiene Department (FEHD) and Architectural Services Department (Arch SD) arranged technical briefing sessions for members of NDC on 29 April 2008 to explain the findings of the EIA (see paragraph 19 below). We assured NDC members that air emissions from the new cremators would be kept under close monitoring and emission samples taken regularly for testing to ensure they meet the stringent and most up-to-date requirements as approved. We also provided NDC members with the air emission data collected from one of the recently re-provisioned crematoria for reference. As a further step to alleviate residents' concern, we have undertaken at the Panel meeting that we will provide the NDC with information on air emissions when the re-provisioned crematorium comes into operation to enable local residents to have a better understanding of the operation of the new cremators.

17. During local consultation, there was a suggestion that we should only build four new cremators to replace the old ones. We have carefully considered the proposal and consider that it will not be able to meet the demand for cremation service even upon commissioning. Assuming that only four new cremators at WHSC were built, by 2011/2012, the total available cremation sessions then will be 39 000 whilst the projected demand is estimated at 42 000. In other words, there would be an immediate shortfall of about 3 000 sessions upon commissioning of the new WHSC with only four cremators. The shortfall will continue to grow to about 4 000 sessions a year for at least 3 to 4 years which could only be eased after the planned completion of the re-provisioning of CCC in 2015. However, with only four new cremators at WHSC, the situation will deteriorate again from around 2019 - unless new cremators are built. By comparison, if we could provide six cremators in this re-provisioning project (i.e. four to replace the existing old cremators and two additional cremators), there will be sufficient cremation sessions to meet demand until around 2023.

18. We will maintain close liaison with the NDC and local representatives through the North District Office during the construction stage as well as after commissioning of WHSC. We will also keep under review the demand for cremation service. Should there be a need to take forward the expansion plan at WHSC, we will consult the NDC and the relevant LegCo Panel again.

**/ENVIRONMENTAL .....**



## ENVIRONMENTAL IMPLICATIONS

19. This is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and an Environmental Permit (EP) is required for the construction and operation of the project. The EIA report concluded that the environmental impact arising from the project could be controlled to within the criteria under the EIA Ordinance and the Technical Memorandum on EIA Process. The Director of Environmental Protection approved the EIA report for the project in June 2008 after the statutory public inspection process.

20. We shall implement the mitigation measures and the environmental monitoring and audit programme during the construction and operation stages of the project as recommended in the approved EIA report. A summary of the key recommended mitigation measures is at Enclosure 4.

21. During construction, we will control noise, dust and site runoff nuisances to within established standards and guidelines through the implementation of mitigation measures in the relevant contracts. These include the use of silencers, mufflers, acoustic lining or shields for noisy construction activities, frequent cleaning and watering of the site, and the provision of wheel-washing facilities.

22. We will adopt measures in the planning and design stages to reduce the generation of construction waste where possible (e.g. using metal site hoardings and signboards so that these materials can be recycled or reused in other projects). In addition, we will require the contractor to reuse inert construction waste on site (e.g. use of excavated materials for filling within the site) or in other suitable construction sites as far as possible, in order to minimise the disposal of inert construction waste to public fill reception facilities<sup>3</sup>. We will encourage the contractor to maximise the use of recycled or recyclable inert construction waste, as well as the use of non-timber formwork to further minimise the generation of construction waste.

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<sup>3</sup> Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

23. We will also require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigating means to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We will require the contractor to separate the inert portion from non-inert construction waste on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste to public fill reception facilities and landfills respectively through a trip-ticket system.

24. We estimate that the project will generate in total about 42 650 tonnes of construction waste. Of these, we will reuse about 18 110 tonnes (42.5%) of inert construction waste on site and deliver 22 920 tonnes (53.7%) of inert construction waste to public fill reception facilities for subsequent reuse. In addition, we will dispose of 1 620 tonnes (3.8%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at public fill reception facilities and landfill sites is estimated to be \$821,300 for this project (based on a unit cost of \$27/tonne for disposal at public fill reception facilities and \$125/tonne<sup>4</sup> at landfills).

## ENERGY CONSERVATION MEASURES

25. This project has adopted various forms of energy efficient features, including –

- (a) light emitting diode (LED) type exit sign; and
- (b) LED type feature lighting.

26. We will install photovoltaic panels to provide renewable energy for environmental benefits.

27. We will adopt the green features in appropriate areas for environmental and amenity benefits, including -

- (a) smokeless joss paper burners;

/(b) .....

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<sup>4</sup> This estimate has taken into account the cost of developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at \$90/m<sup>3</sup>), nor the cost to provide new landfills (which is likely to be more expensive) when the existing ones are filled.

- (b) vertical greening to retaining walls; and
- (c) temporary hard paving to be used at construction access road and storage areas during construction.

28. We will install rain water recycling system for landscape irrigation with a view to conserving water.

29. The total estimated additional cost for adoption of the above features is around \$8.3 million, which has been included in the cost estimate for this project. There will be about 1.5 % energy savings in the annual energy consumption.

### HERITAGE IMPLICATIONS

30. This project will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interests and Government historic sites identified by the Antiquities and Monuments Office.

### LAND ACQUISITION

31. The project does not require land acquisition.

### BACKGROUND INFORMATION

32. We upgraded **13NB** to Category B in January 2004. We employed term contractors to carry out site investigations in March 2004, topographical surveys in June 2005 and modellings in February 2007. We engaged consultants to carry out an EIA in July 2005, Drainage Impact Assessment (DIA) in April 2006 and geotechnical work in March 2007. We charged the total cost of \$2.6 million to block allocation **Subhead 3100GX** "Project feasibility studies, minor investigations and consultants' fees for items in Category D of Public Works Programme". The term contractor and consultants have completed the site investigation, topographical survey, DIA and EIA. We have completed the detailed design of the project and are preparing the tender documents with in-house staff resources.

33. The proposed construction works will include removal of 136 trees, including 10 dead trees, 54 trees to be felled, 72 trees to be transplanted elsewhere. All trees to be removed are not important trees<sup>5</sup>. We will incorporate planting proposals as part of the project, including estimated quantities of 100 trees, 1 700 shrubs, 800 groundcovers/annuals and 1 400 m<sup>2</sup> of grassed area.

34. Due to site constraint, the existing WHSC will be closed down and demolished to make way for the construction of the new crematorium. During the interim period, FEHD will flexibly adjust the hours of operations of the cremators at Kwai Chung, Fu Shan and CCC to cope with public demand as necessary. We project that during the construction period of the project, there will be a shortfall of cremation sessions ranging from 2 000 in 2009 to the peak of about 6 000 in 2011. In order to meet this shortfall, we will adjust the operating hours of the above-mentioned crematoria with a view to providing extra sessions and will schedule their maintenance time-table to ensure maximum service during peak periods. We would also encourage bereaved families to be flexible in making use of available slots as far as possible. Through the above arrangements, we hope to make best endeavours in meeting our performance pledge of providing an available session within the next 15 days from date of booking.

35. We estimate that the proposed works will create about 340 jobs (295 for labourers and another 45 for professional/technical staff) providing a total employment of 6 800 man-months.

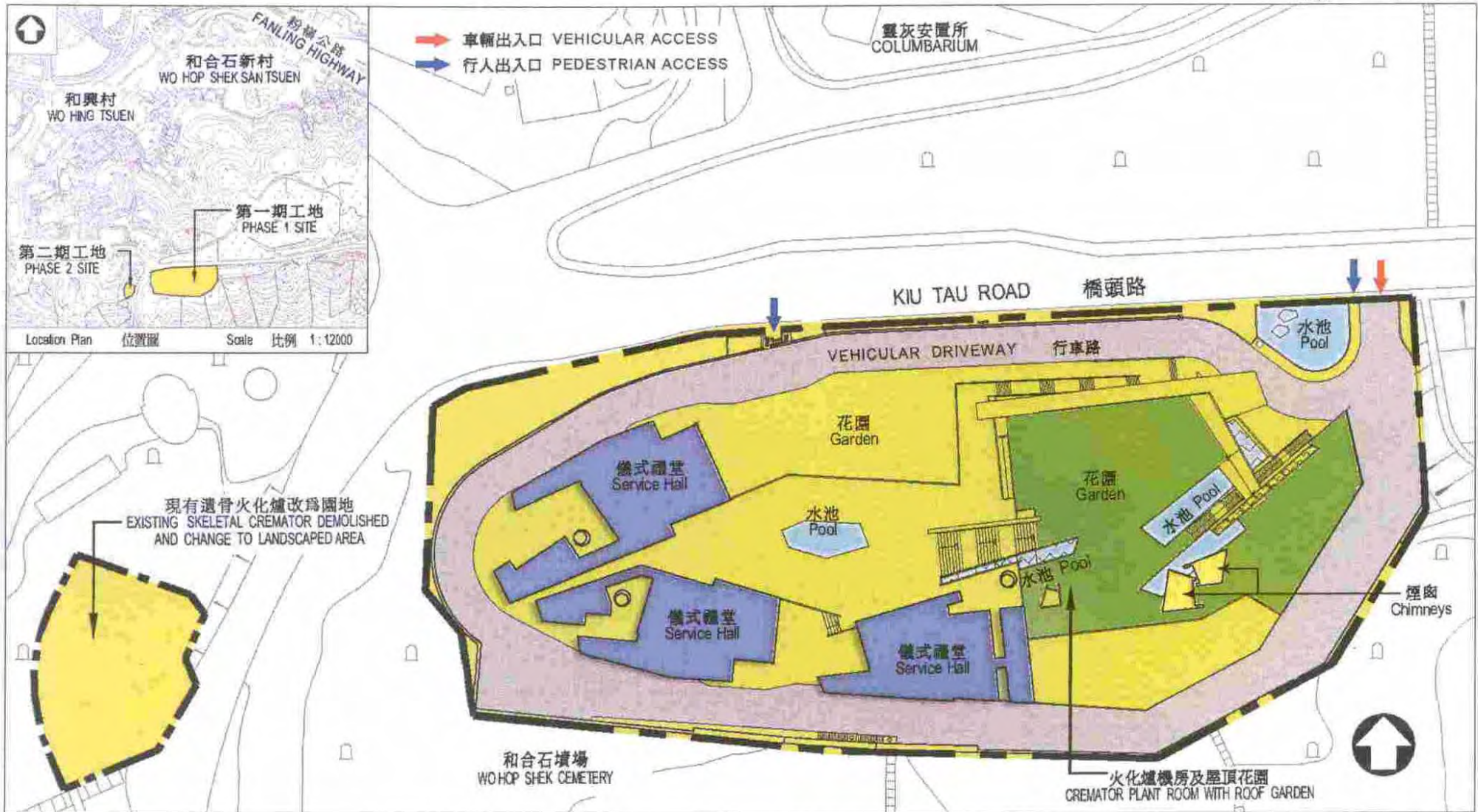
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Food and Health Bureau  
January 2009

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<sup>5</sup> “Important trees” refer to trees in the Register of Old and Valuable Trees, or any other trees that meet one or more of the following criteria –

- (a) trees of 100 years old or above;
- (b) trees of cultural, historical or memorable significance e.g. Fung Shui tree, tree as landmark of monastery or heritage monument, and trees in memory of an important person or event;
- (c) trees of precious or rare species;
- (d) trees of outstanding form (taking account of overall tree sizes, shape and any special features) e.g. trees with curtain like aerial roots, trees growing in unusual habitat; or
- (e) trees with trunk diameter equal or exceeding 1.0 metre (measured at 1.3 metre above ground level), or with height/canopy spread equal or exceeding 25 metres.



Title 13NB 重建和合石火葬場 REPROVISIONING OF WO HOP SHEK CREMATORIAM	Drawn by DANIEL SO	Date OCT, 2008	Drawing no. AB/5549/XA101	Scale 1:800
	Approved A. NAM	Date OCT, 2008		
	Office ARCHITECTURAL BRANCH	 <b>ARCHITECTURAL SERVICES DEPARTMENT</b>		





從東北面望向火葬場的構思圖  
VIEW OF CREMATORIUM FROM  
NORTH-EASTERN DIRECTION  
(ARTIST'S IMPRESSION)

Title  
13NB 重建和合石火葬場  
REPROVISIONING OF WO  
HOP SHEK CREMATORIUM

Drawn by

DANIEL SO

Date

OCT, 2008

Drawing no.

AB/5549/XA102

Scale

NTS

Approved

A. NAM

Date

OCT, 2008

Office

ARCHITECTURAL BRANCH



ARCHITECTURAL  
SERVICES  
DEPARTMENT

## 13NB – Reprovisioning of Wo Hop Shek Crematorium

## Breakdown of the estimate for consultants' fees

Consultants' staff costs		Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee (\$ million)
(1) Contract administration (Note 2)	Professional	-	-	-	0.2
	Technical	-	-	-	0.3
(2) Site supervision (Note 3)	Technical	312	14	1.6	9.9
<b>Total</b>					10.4

\*MPS = Master Pay Scale

### Notes

1. A multiplier of 1.6 is applied to the average MPS point to estimate the cost of resident site staff supplied by the consultants. (As at 1 January 2008, MPS point 14 = \$19,835 per month.)
2. The consultants' staff cost for specialist consultant is calculated in accordance with the existing consultancy agreement for **13NB**. The assignment will only be executed subject to the Finance Committee's approval to upgrade **13NB** to Category A.
3. The staff cost for site supervision is based on estimates prepared by the Director of Architectural Services. We will only know the actual man-months and actual costs after completion of the construction works

**13 NB – Re-provisioning of Wo Hop Shek Crematorium**

**Key Environmental Mitigation Measures in EIA Report**

- (i) The design of the new cremators will adopt the latest air pollution control technology. Gaseous emissions from the new cremators will meet all relevant criteria.
- (ii) A flue gas filtering system will be adopted to control the quality of the gas emitted from the cremators.
- (iii) The outdoor areas will be landscaped, including planting lawn on the roof top of the new cremation plant room, if appropriate.
- (iv) The operating parameters (e.g. temperature, oxygen content) of the new cremators will be monitored on a continuous basis and the stack emission from the new cremators will be monitored on a regular basis throughout the operation life of the new crematorium.
- (v) The soil contamination hot spots will be cleaned up.
- (vi) Supplementary contamination assessment will be conducted to confirm the presence of additional contaminated soil and materials under the existing structures, if any, and will carry out the necessary remedial works if contamination is identified.
- (vii) An Environmental Team will be established and an Independent Environment Checker will be employed for environmental monitoring and audit during the construction period.