

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 709 – WATERWORKS

Water Supplies – Fresh water supplies

334WF – Expansion of Tai Po water treatment works and ancillary raw water and fresh water transfer facilities – part 2 works

Members are invited to recommend to Finance Committee the upgrading of **334WF** to Category A at an estimated cost of \$6,176.7 million in money-of-the-day prices.

PROBLEM

There is a need to expand the capacity of Tai Po Water Treatment Works (WTW) to ensure a reliable and adequate water supply.

PROPOSAL

2. The Director of Water Supplies, with the support of the Secretary for Development, proposes to upgrade **334WF** to Category A at an estimated cost of \$6,176.7 million in money-of-the-day (MOD) prices for increasing the output capacity of the existing Tai Po WTW, upgrading of two pumping stations serving Tai Po WTW, expanding a fresh water service reservoir and laying water mains.

/PROJECT

PROJECT SCOPE AND NATURE

3. The scope of the proposed works comprises –
- (a) upgrading the existing water treatment facilities and constructing additional water treatment components at Tai Po WTW to increase its output capacity from 400 million litre per day (Mld) to 800 Mld;
 - (b) upgrading the capacities of the existing Tai Po Tau No. 4 raw water pumping station (RWPS) and Tai Po fresh water pumping station (FWPS);
 - (c) expanding the storage capacity of the existing Butterfly Valley fresh water primary service reservoir (FWPSR) from 40 000 m³ to 120 000 m³; and
 - (d) laying about 900 metres associated fresh water mains with diameters ranging from 900 millimetres (mm) to 1 800 mm in Sham Shui Po and Kowloon City.

———— The locations of the proposed works are shown on the plans at Enclosures 1 and 2.

4. The design for the proposed works mentioned in paragraph 3 above has been completed. Subject to the funding approval of the Finance Committee (FC), we plan to commence the proposed works in February 2013 for completion in May 2017. Tenders for items (a) and (b) in paragraph 3 above have already been invited to enable works to commence as soon as possible. We will award the contracts after having secured FC's funding approval.

JUSTIFICATION

5. Sha Tin WTW and Tai Po WTW are two major water treatment works in Hong Kong and have been put into service since 1964 and 2003 respectively. Currently, the total quantity of fresh water supplied by Sha Tin WTW and Tai Po WTW can meet about half of the total demand of fresh water in Hong Kong. In order to maintain a continuous supply of treated water to the supply zones during the planned in-situ reprovisioning of Sha Tin WTW in stages, we consider it necessary to increase the output capacity of Tai Po WTW from 400 Mld to 800 Mld as detailed in paragraph 3(a) above in order to take up part of the loading of Sha Tin WTW so that Sha Tin WTW could be partially shut down for the reprovisioning works.

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6. To match the increased capacity of Tai Po WTW, we need to uprate the capacities of the two existing pumping stations serving Tai Po WTW as detailed in paragraph 3(b) above and expand the storage capacity of the existing Butterfly Valley FWPSR as detailed in paragraph 3(c) above. We also propose to carry out mainlaying works as detailed in paragraph 3(d) above in order to enhance integration of the supply networks of Tai Po WTW and Sha Tin WTW. Upon completion of the proposed works, the increased output capacity of Tai Po WTW can take up the existing loading of Sha Tin WTW for supplying fresh water to a significant part of Kowloon, Central and Western districts of Hong Kong Island. This can pave the way for the in-situ reprovisioning of the Sha Tin WTW, while enhancing the overall resilience, flexibility and reliability of the water supply system.

FINANCIAL IMPLICATIONS

7. We estimate the capital cost of the proposed works to be \$6,176.7 million in MOD prices (please see paragraph 9 below), broken down as follows –

	\$ million
(a) Civil works	2,615.6
(i) Construction of water treatment components	2,286.4
(ii) Expansion of service reservoir	244.3
(iii) Laying of water mains	84.9
(b) Electrical and mechanical (E&M) works	1,526.2
(i) Installation of E&M plant and equipment	1,465.6
(ii) Uprating of raw water pumping station	25.3
(iii) Uprating of fresh water pumping station	35.3
(c) Environmental mitigation measures	19.3

/(d)

		\$ million	
(d)	Consultants' fee	60.9	
	(i) contract administration	30.8	
	(ii) management of resident site staff	30.1	
(e)	Remuneration of resident site staff	323.8	
(f)	Contingencies	454.5	
	Sub-total	5,000.3	(in September 2012 prices)
(g)	Provision for price adjustment	1,176.4	
	Total	6,176.7	(in MOD prices)

8. We have engaged consultants to carry out detailed design of the proposed works. Due to insufficient in-house resources, we propose to engage consultants to undertake contract administration and site supervision of the proposed works. A breakdown of the estimates for consultants' fees and resident site staff costs by man-months is at Enclosure 3.

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

Year	\$ million (Sept 2012)	Price adjustment factor	\$ million (MOD)
2012 – 2013	24.8	1.00000	24.8
2013 – 2014	371.2	1.06250	394.4
2014 – 2015	1,178.3	1.12625	1,327.1
2015 – 2016	1,152.0	1.19383	1,375.3
2016 – 2017	829.5	1.26545	1,049.7

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Year	\$ million (Sept 2012)	Price adjustment factor	\$ million (MOD)
2017 – 2018	699.4	1.34138	938.2
2018 – 2019	527.8	1.41180	745.1
2019 – 2020	217.3	1.48239	322.1
	5,000.3		6,176.7

10. We have derived the MOD estimates on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output for the period from 2012 to 2020. We will deliver the works under a combined civil engineering works and E&M works contract, and a civil engineering works contract. We will deliver the civil engineering works on re-measurement basis because of the uncertain underground conditions. We will deliver the E&M works on lump-sum basis as the scope of works can be well defined. The contracts will provide for price adjustments in respect of the civil engineering works.

11. We estimate the additional annual recurrent expenditure arising from proposed works to be \$15.2 million. The project by itself will lead to an increase in the production cost of water by 1.94% in real terms by 2020¹.

PUBLIC CONSULTATION

12. We consulted the Tai Po Rural Committee, the Lam Tsuen Valley Committee and the Environment, Housing and Works Committee of the Tai Po District Council on 12 April, 25 April and 11 May 2011 respectively in respect of the proposed works at Tai Po WTW and the two pumping stations. Members of the Committees supported the proposed works.

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¹ The increase in production cost of water is calculated at the present price level and on the assumption that the water demand remains static during the period from 2012 to 2020.

13. We consulted the Housing and Infrastructure Committee of the Kowloon City District Council and the Environment and Hygiene Committee of the Sham Shui Po District Council on 19 May and 9 June 2011 for the proposed mainlaying works in Sham Shui Po and Kowloon City respectively. Members of the Committees supported the proposed works.

14. We consulted the Community Affairs Committee of the Kwai Tsing District Council on 14 June 2011 in respect of the proposed construction of additional compartments at the existing Butterfly Valley FWPSR. Members of the Committee supported the proposed works.

15. We consulted the Legislative Council Panel on Development on the proposed works on 27 November 2012. Members raised no objection to the proposal. As regards Members' request for further information on the estimated cost of the in-situ reprovisioning works for Sha Tin WTW and whether Tai Po WTW could be upgraded to take up all the loading of Sha Tin WTW so that the site of Sha Tin WTW could be released, and the associated cost-effectiveness comparison, the requested information was submitted to the Panel on 7 December 2012.

ENVIRONMENTAL IMPLICATIONS

16. The proposed expansion of Tai Po WTW is a designated project under the Environmental Impact Assessment (EIA) Ordinance, Cap. 499 ("the Ordinance"). We had completed an EIA study in 1996 to address the environmental impacts of Tai Po WTW and Tai Po FWPS. We also completed an Environmental Review (ER) in February 2009. The EIA report and ER concluded that, with the implementation of mitigation measures, the environmental impacts of the project could be controlled to within the established standards and criteria.

17. The proposed uprating of Tai Po Tau No. 4 RWPS is not a designated project under the Ordinance. We carried out a Preliminary Environmental Review (PER) in May 2009. The PER concluded that, with the implementation of mitigation measures, the environmental impacts of the project could be controlled to within the established standards and criteria.

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18. During construction, we will control noise, dust and site run-off nuisances to within established standards and guidelines through the implementation of appropriate 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. We will implement an Environmental Monitoring and Audit programme during the course of construction to ensure that potential impacts are adequately addressed. We have included a sum of \$19.3 million (in September 2012 prices) in the project estimate for the implementation of the environmental mitigation measures.

19. At the planning and design stages, we have optimised the size of the sludge thickening tanks to reduce the generation of construction waste wherever practicable. In addition, we will require the contractor to reuse inert construction waste (e.g. demolished concrete and excavated soil and rock) on 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 facilities². We will encourage the contractor to maximise the use of recycled/recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

20. At the construction stage, we will also require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation 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 at public fill reception facilities and landfills respectively through a trip-ticket system.

21. We estimate that the project will generate in total about 551 900 tonnes of construction waste. Of these, we will reuse about 54 000 tonnes (10%) of inert construction waste on site and deliver 491 500 tonnes (89%) of inert construction waste to public fill reception facilities for subsequent reuse. We will dispose of the remaining 6 400 tonnes (1%) of non-inert construction waste at

/landfills

² 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.

landfills. The total cost for accommodating construction waste at public fill reception facilities and landfill sites is estimated to be \$14 million for this project (based on a unit cost of \$27 per tonne for disposal at public fill reception facilities and \$125 per tonne³ at landfills).

HERITAGE IMPLICATIONS

22. The proposed works will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interest and Government historic sites identified by the Antiquities and Monuments Office.

LAND ACQUISITION

23. The proposed works do not require any land acquisition.

TRAFFIC IMPLICATIONS

24. To minimise possible disruption to traffic during construction, we have completed a traffic impact assessment (TIA) for the proposed works. The TIA has concluded that the proposed works would not cause significant impact to the local traffic network.

BACKGROUND INFORMATION

25. In October 2007, we submitted an information paper to the Legislative Council Panel on Development for briefing Members on our strategy on re-provisioning of Sha Tin WTW. In view of the considerable risk of interruption to the supply of fresh water due to difficulties in maintaining the operation of Sha Tin WTW during the re-provisioning works, we have proposed to adopt a two-stage approach in which Tai Po WTW and the associated transfer system would be upgraded first in order to enable the subsequent in-situ re-provisioning works of Sha Tin WTW.

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³ This estimate has taken into account the cost for 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 per m³), nor the cost to provide new landfills (which is likely to be more expensive), when the existing ones are filled.

26. We upgraded **334WF** to Category B in November 2007. In June 2008, we engaged consultants to carry out the investigation study for the proposed works under **334WF** at a cost of \$10.0 million under the block allocation of **Subhead 9100WX** “Waterworks, studies and investigations for items in Category D of the Public Works Programme”. The investigation study was substantially completed in March 2009 as scheduled.

27. On 8 May 2009, we upgraded part of **334WF** to Category A as **339WF** “Expansion of Tai Po water treatment works and ancillary raw water and fresh water transfer facilities – design and site investigation” at an approved project estimate of \$43.4 million in MOD prices. We engaged consultants in June 2009 to undertake the design and site investigation works. We have substantially completed the detailed design of the proposed works mentioned in paragraph 3 above.

28. On 2 February 2010, we upgraded part of **334WF** to Category A as **343WF** “Expansion of Tai Po water treatment works and ancillary raw water and fresh water transfer facilities – part 1 works” at an approved project estimate of \$259.9 million in MOD prices. The works were substantially completed in December 2011 to increase the output capacity of Tai Po WTW from 250 Mld to 400 Mld.

29. Of the 236 trees within the project boundary, 80 trees will be preserved. The proposed construction works will involve the removal of 156 trees, including 126 trees to be felled and 30 trees to be transplanted elsewhere. All trees to be removed are not important trees⁴. We will incorporate planting proposals as part of the project, including estimated quantities of 316 trees and 17 000 m² of grassed area.

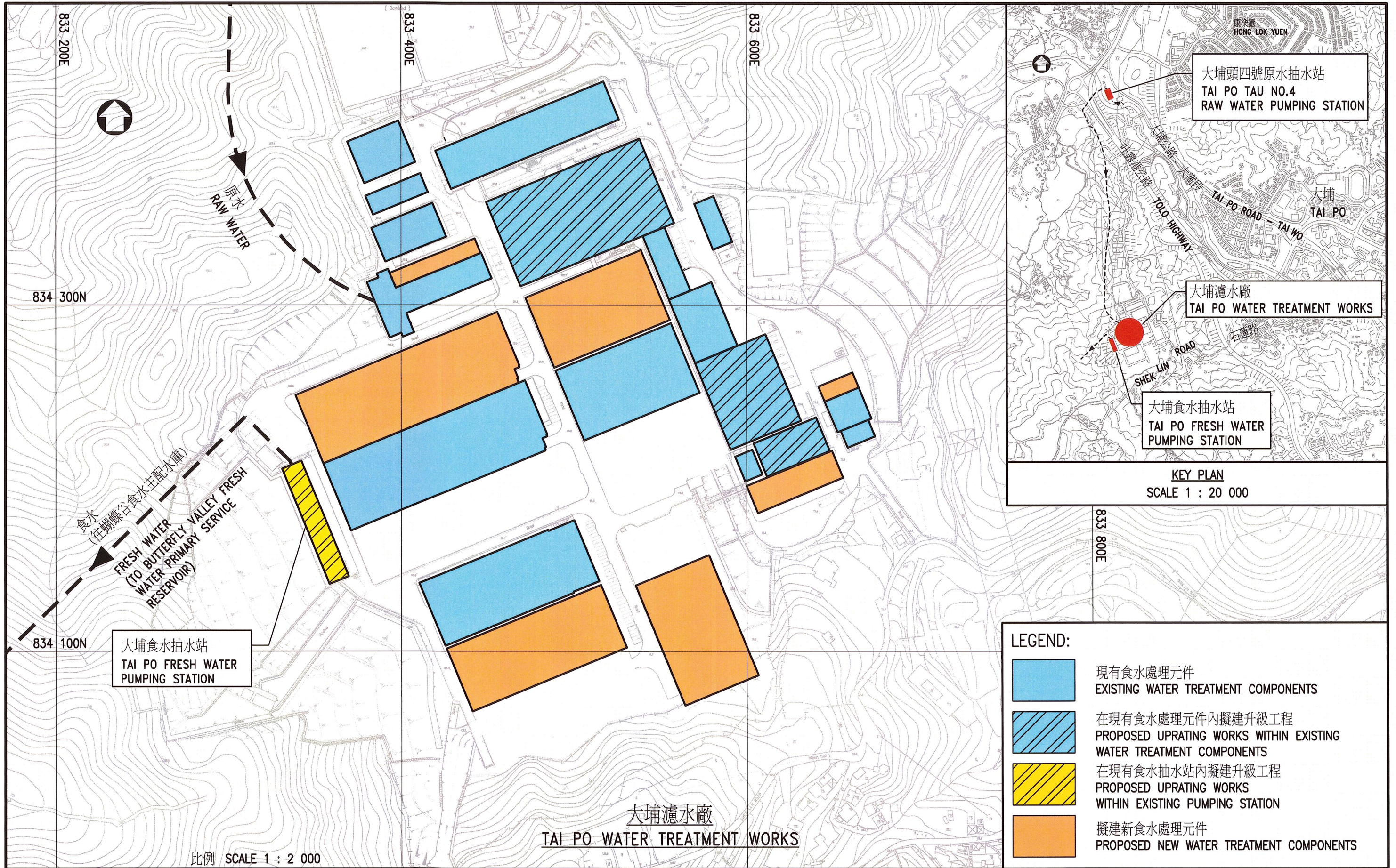
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⁴ “Important trees” refer to trees in the Register of Old and Valuable Trees, or any other trees that meet one or more of the following criteria –

- (a) trees of 100 years old or above;
- (b) trees of cultural, historical or memorable significance e.g. Fung Shui trees, trees as landmark of monastery or heritage monument, and trees in memory of important persons 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 m (measured at 1.3 m above ground level), or with height/canopy spread equal or exceeding 25 m.

30. We estimate that the proposed works will create about 1 330 jobs (1 070 for labourers and another 260 for professional/technical staff) providing a total employment of 56 000 man-months.

Development Bureau
December 2012



核准 APPROVED

總工程師/顧問工程管理 CE/CM

12/11/2012

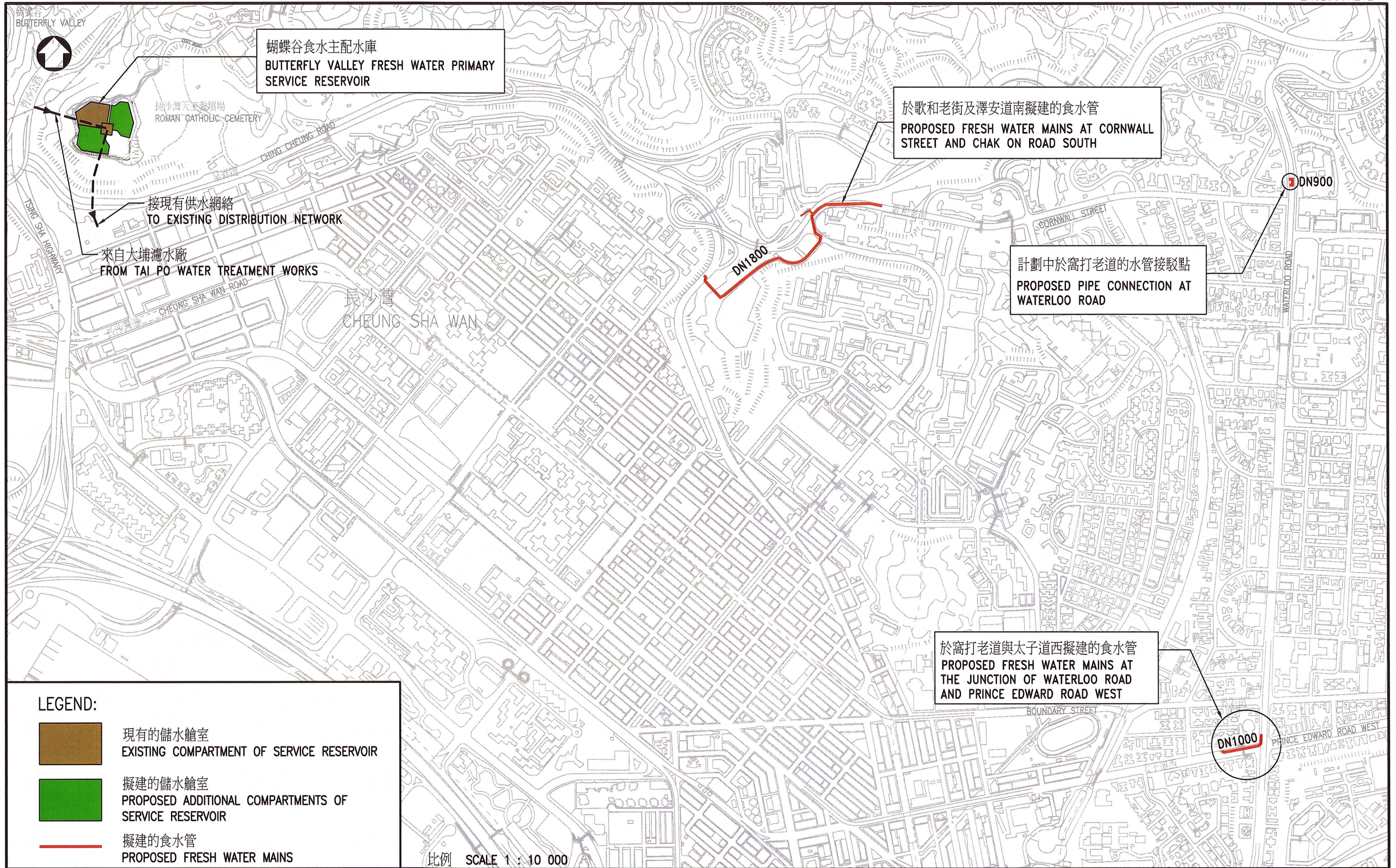
工務計劃項目第 334WF 號 -
大埔濾水廠及附屬原水和食水輸送設施擴展工程 - 第二期工程 - 位置圖

P.W.P. ITEM NO. 334WF -
EXPANSION OF TAI PO WATER TREATMENT WORKS AND ANCILLARY RAW WATER AND FRESH WATER TRANSFER FACILITIES - PART 2 WORKS - LOCATION PLAN

水務署
Water Supplies Department

草圖編號
SKETCH NO. SK62012/505

REF. SK62012_505.dwg



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總工程師/顧問工程管理 CE/CM

30/11/2012

工務計劃項目第 334WF 號 -
大埔濾水廠及附屬原水和食水輸送設施擴展工程 - 第二期工程 - 位置圖

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水務署
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REF. SK62012_507.dwg

Enclosure 3 to PWSC(2012-13)44

334WF – Expansion of Tai Po water treatment works and ancillary raw water and fresh water transfer facilities – part 2 works

Breakdown of the estimates for consultants' fees and resident site staff costs (in September 2012 prices)

		Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fees (\$ million)
(a) Consultants' fees for contract administration ^(Note 2)	Professional	--	--	--	27.7
	Technical	--	--	--	3.1
				Sub-total	30.8
(b) Resident site staff costs ^(Note 3)	Professional	2 047	38	1.6	215.2
	Technical	3 870	14	1.6	138.7
				Sub-total	353.9
Comprising –					
(i) Consultants' fees for management of resident site staff					30.1
(ii) Remuneration of resident site staff					323.8
				Total	384.7

*MPS = Master Pay Scale

Notes

1. A multiplier of 1.6 is applied to the average MPS salary point to estimate the cost of resident site staff supplied by the consultants (as at now, MPS point 38 = \$65,695 per month and MPS point 14 = \$22,405 per month).
2. The consultants' staff cost for contract administration is calculated in accordance with the existing consultancy agreement for the design and construction of the project. The construction phase of the assignment will only be executed subject to Finance Committee's approval to upgrade the proposed works to Category A.
3. The actual man-months and actual costs will only be known after completion of the construction works.