

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 – DRAINAGE

Environmental Protection – Sewerage and sewage treatment 222DS – Tai Po sewage treatment works, stage 5 phase 1

Members are invited to recommend to Finance Committee the upgrading of **222DS** to Category A at an estimated cost of \$463.3 million in money-of-the-day prices for the extension works for Tai Po sewage treatment works.

PROBLEM

Tai Po sewage treatment works (TPSTW) has reached its design capacity and will not be able to cope with the forecast sewage flow.

PROPOSAL

2. The Director of Drainage Services (DDS), with the support of the Secretary for the Environment, Transport and Works, proposes to upgrade **222DS** to Category A at an estimated cost of \$463.3 million in money-of-the-day (MOD) prices for the extension works for TPSTW.

PROJECT SCOPE AND NATURE

3. The scope of the proposed extension works for TPSTW comprises –

/(a)

- (a) expansion and modification of the existing inlet works, including additional pumping, degritting and screening facilities;
- (b) modification of four existing bioreactors;
- (c) construction of two final clarifiers and modification of six existing ones;
- (d) provision of sludge thickening facilities including a new building to accommodate the facilities;
- (e) provision of sludge dewatering facilities including an extension of the existing sludge dewatering house;
- (f) provision of filtrate treatment facilities;
- (g) provision of odour control facilities; and
- (h) provision of ancillary works including power supply systems, instrumentation and control equipment, pipeworks, chemical dosing facilities, building services installations, fire services installations, lifting appliances, cabling works and road works.

4. We plan to start construction of the proposed works in May 2005 for completion in September 2009. A site plan showing the scope of the proposed works is at Enclosure 1.

JUSTIFICATION

5. The existing TPSTW is located within the Tai Po Industrial Estate and serves the Tai Po district. It is a secondary treatment plant with a design capacity of 88 000 cubic metres (m³) per day. Treated effluent of TPSTW is conveyed by two effluent pumping stations at Tai Po and Sha Tin to Victoria Harbour for disposal. Due to continuous developments and expansion of sewerage networks in the Tai Po district in recent years, the flow to TPSTW has reached its design capacity. Based on the latest planning figures, we forecast that the sewage flow from residential, commercial, industrial and other developments in the Tai Po district will increase to 98 200 m³ per day by 2012. To cope with the projected increase in the sewage flow, it is necessary to implement the proposed extension works to increase the treatment capacity of TPSTW to 100 000 m³ per day.

6. Apart from the construction of new facilities, we propose to modify a number of the existing units to increase the overall treatment capacity and to improve the plant performance by enhancing the nitrogen removal process.

7. If we do not implement the proposed extension, the effluent quality of TPSTW will deteriorate as the sewage flow continues to increase, leading to discharge of inadequately treated effluent into Victoria Harbour.

8. DDS will deploy in-house staff to carry out site supervision. Due to inadequate in-house expertise, we propose to employ specialist consultants to carry out the specialist works¹, conduct environmental monitoring and audit, and carry out investigation and survey to ensure the smooth and effective delivery of the project.

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of this project to be \$463.3 million in MOD prices (see paragraph 10 below), made up as follows –

	\$ million
(a) Inlet works	22.6
(b) Modifications to bioreactors	57.5
(c) Final clarifiers	152.0
(d) Sludge treatment facilities	90.0
(i) Sludge thickening facilities	59.3
(ii) Sludge dewatering facilities	30.7
(e) Filtrate treatment facilities	12.0
(f) Odour control facilities	10.0
(g) Ancillary works	55.0

/(h)

¹ Specialist consultants are required to oversee commissioning process of the treatment facilities, and independent advisors would be jointly employed by the Government and contractors to help resolve and avoid contractual conflicts.

	\$ million	
(h) Environmental mitigation measures	5.0	
(i) Consultants' costs	17.9	
(i) specialist works	1.4	
(ii) environmental monitoring and audit	7.5	
(iii) investigation and surveys	9.0	
(j) Inspection of electrical and mechanical equipment overseas	0.2	
(k) Contingency	42.2	
Sub-total	464.4	(in September 2004 prices)
(l) Provision for price adjustment	(1.1)	
Total	463.3	(in MOD prices)

————— A breakdown of the estimates for the consultants' costs is at Enclosure 2.

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

Year	\$ million (Sept 2004)	Price adjustment factor	\$ million (MOD)
2005 – 2006	68.7	0.99000	68.0
2006 – 2007	127.8	0.98753	126.2
2007 – 2008	95.0	0.99123	94.2
2008 – 2009	91.9	0.99990	91.9
2009 – 2010	57.1	1.01515	58.0

/2010 – 2011

Year	\$ million (Sept 2004)	Price adjustment factor	\$ million (MOD)
2010 – 2011	12.6	1.03241	13.0
2011 – 2012	7.3	1.04996	7.7
2012 – 2013	4.0	1.06781	4.3
	464.4		463.3

11. We have derived the MOD estimate on the basis of the Government's latest forecast of the trend rate of change in the prices of the public sector building and construction output for the period from 2005 to 2013. We will implement the works under three contracts: a civil works contract and two electrical and mechanical (E&M) works contracts. We will tender the civil works on a remeasurement basis because of uncertain ground conditions. The civil contract will provide for price adjustments because the contract period will exceed 21 months. We will tender the two E&M contracts for the supply and installation of E&M equipment for the treatment facilities on a lump-sum basis without any price adjustment.

12. We estimate the annual recurrent expenditure arising from the proposed works to be about \$8 million.

13. Based on the current level of expenditure on operation and maintenance of sewerage facilities, the proposed works by themselves will lead to an increase in the recurrent cost of providing sewage services by about 0.49%, which will need to be taken into account in determining future sewage charges.

PUBLIC CONSULTATION

14. On 12 March 2004, we consulted the Environment and Works Committee of the Tai Po District Council on the project and obtained their support for the proposed works. We also consulted the village representatives of Fung Yuen Village located near TPSTW and the Estate Management Office of Tai Po Industrial Estate in February 2004. They had no objection to the proposed works.

15. We consulted the Legislative Council Panel on Environmental Affairs for the proposed works on 22 November 2004. Members supported the implementation of the proposed project.

ENVIRONMENTAL IMPLICATIONS

16. This project is a designated project under the Environmental Impact Assessment (EIA) Ordinance and an environmental permit is required for its implementation and operation. On 28 October 2004, the Director of Environmental Protection approved the EIA report of the project. The report has concluded that with implementation of mitigation measures, the environmental impacts of the project can be controlled to within the criteria set out in the Technical Memorandum on the EIA Process. We will implement the mitigation measures as recommended in the report. We will incorporate pollution control measures in the works contracts to control noise, dust and run-off onsite during the construction stage. For long term impacts, key mitigation measures include the installation of deodorisation facilities in TPSTW and the addition of chemicals to control odour. We will conduct environmental monitoring and auditing to ascertain the effectiveness of the mitigation measures. We have included about \$5 million in September 2004 prices in the project estimate for implementation of the environmental mitigation measures.

17. We estimate that the proposed works will generate about 81 200 m³ of construction and demolition (C&D) materials. Of these, we will reuse about 2 700 m³ (3%) on site, 6 200 m³ (8%) off site, 70 800 m³ (87%) as fill in public filling area² and dispose of 1 500 m³ (2%) at landfills. We have considered ways of minimising the C&D materials and maximising the use of recycled C&D materials according to the recommendations of the EIA report. The notional cost of accommodating C&D waste at landfill site is estimated to be \$187,500 for this project (based on a notional unit cost³ of \$125/m³).

/18.

² A public filling area is a designated part of a development project that accepts public fill for reclamation purposes. Disposal of public fill in a public filling area requires a licence issued by the Director of Civil Engineering and Development.

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/m³), nor the cost to provide new landfills (which are likely to be more expensive) when existing ones are filled. The notional cost estimate is for reference only and does not form part of this project estimate.

18. We will require the contractor to submit a waste management plan (WMP) for approval. The WMP will include appropriate waste mitigation measures, such as designating an area for waste segregation. We will ensure that the day-to-day operations on site comply with the approved WMP. We will require the contractor to reuse the excavated material as filling material on site or on other construction sites as far as possible to minimise the disposal of public fill. To further minimise the C&D materials, we will encourage the contractor to use non-timber formwork and recyclable material for temporary works. We will control the disposal of public fill and C&D waste to designated public filling facilities and landfills respectively through a trip-ticket system. We will require the contractor to separate public fill from C&D waste for disposal at appropriate facilities. We will record the disposal, reuse and recycling of C&D materials for monitoring purposes.

LAND ACQUISITION

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

BACKGROUND INFORMATION

20. TPSTW is located at the Tai Po Industrial Estate in Tai Po. It has been developed in four stages, namely 1, 2, 4A and 4B. Since its completion in 1979, stage 1 has been providing secondary sewage treatment. In 1982, we commissioned the stage 2 extension, consisting of the expansion of the stage 1 treatment facilities and the installation of sludge treatment facilities. The combined design capacity of the stages 1 and 2 works is 33 600 m³ per day.

21. Stages 4A and 4B were two other extensions commissioned in 1986 and 1995 respectively, providing a total capacity of 54 400 m³ per day in addition to the stages 1 and 2 works. The overall plant design capacity is 88 000 m³ per day. The stages 1 and 2 works, and the stages 4A and 4B works have been designed to operate independently but are interconnected to provide flexibility in operation. The proposed works will entail upgrading part of the existing treatment facilities and provision of additional facilities to increase the treatment capacity.

22. We have substantially completed the design and plan to start the proposed upgrading works in May 2005 for completion in September 2009.

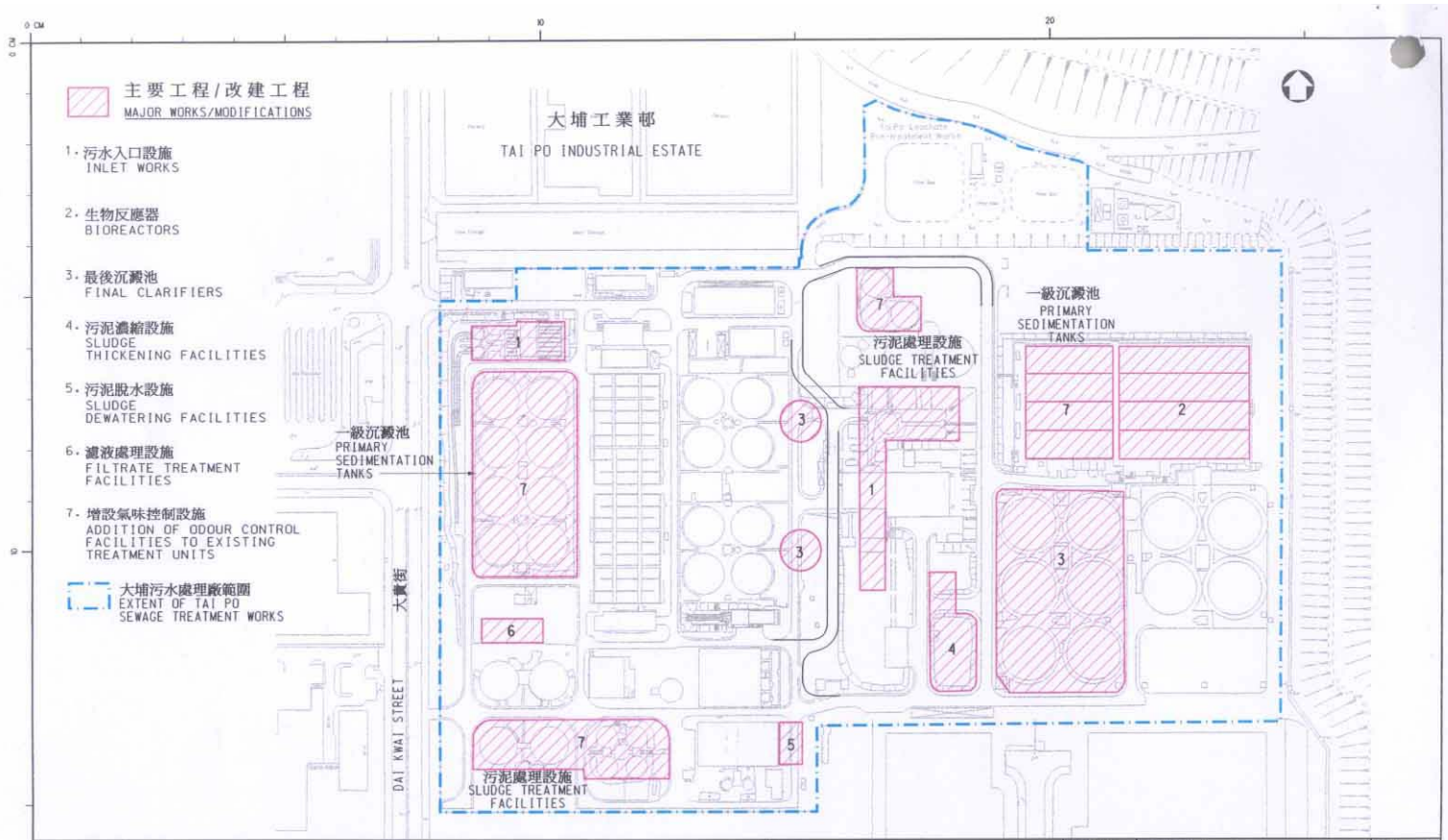
23. The proposed sewage treatment works will affect 75 common trees, all of which will be transplanted within the same site. The trees to be transplanted are not important trees⁴. This project does not involve additional planting as the open space of TPSTW has been provided with a good foliage cover.

24. We estimate that the proposed works will create about 170 jobs (145 for labourers and another 25 for professional/technical staff) providing a total employment of 6 400 man-months.

Environment, Transport and Works Bureau
January 2005

⁴ Important trees include trees on the Register of Old and Valuable Trees, and any other trees which meet one or more of the following criteria –

- (a) trees over 100 years old;
- (b) trees of cultural, historical or memorable significance;
- (c) trees of precious or rare species;
- (d) trees of outstanding form; or
- (e) trees with trunk diameter exceeding one metre (measured at one metre above ground level).



圖則名稱 drawing title
 4222DS - 大埔污水處理廠第5階段第1期工程
 TAI PO SEWAGE TREATMENT WORKS STAGE 5 PHASE 1

繪畫 drawn	SIGNED W.K. TAM	日期 date	12.01.05
核對 checked	SIGNED S.K. IP	日期 date	12.01.05
批核 approved	SIGNED H.S. KAN	日期 date	12.01.05
部門 office	污水工程部 SEWERAGE PROJECTS DIVISION		

圖則編號 drawing no.	比例 scale
DDN/222DS/1915	DIAGRAMATIC
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ENCLOSURE 1 附件 1

222DS – Tai Po sewage treatment works, stage 5 phase 1

Breakdown of estimates for consultants' costs

		Estimated man- months	Average MPS* salary point	Multiplier (Note 1)	Estimated Fee (\$million)
Consultants' staff costs (Note 2)					
(a) Specialist works	Professional	9	38	2.0	1.0
	Technical	11	14	2.0	0.4
(b) Environmental monitoring and audit					
(i) Environmental checking during construction	Professional	22	38	2.0	2.4
	Technical	50	14	2.0	1.8
(ii) Odour trial and monitoring	Professional	3	38	2.0	0.3
	Technical	6	14	2.0	0.2
(iii) Water quality monitoring	Professional	20	38	2.0	2.2
	Technical	16	14	2.0	0.6
Sub-total					8.9
Investigation and surveys					
(a) process commissioning					2.2
(b) environmental monitoring and audit					6.8
Sub-total					9.0
Total Consultants' costs (Note 3)					17.9

* MPS = Master Pay Scale

Notes

1. A multiplier factor of 2.0 is applied to the average MPS point to arrive at the full staff costs including the consultant's overheads and profit, as the staff will be employed in the consultant's offices. (As at 1 January 2005, MPS Pt. 38 = \$54,255 per month and MPS Pt. 14 = \$18,010 per month.)
2. The consultants' staff costs include supervision of investigation works and environmental monitoring works.
3. We will only know the actual man-months and actual fees when we have selected the consultant through the usual competitive lump-sum fee bid system.