

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 - DRAINAGE

Environmental Protection - Sewerage and sewage treatment 208DS - Outlying Islands sewerage, stage 1, phase 1

Members are invited to recommend to Finance Committee –

- (a) the upgrading of part of **208DS**, entitled "Outlying Islands sewerage stage 1 phase 1C – upgrading of Siu Ho Wan sewage treatment plant", to Category A at an estimated cost of \$779.4 million in money-of- the-day prices; and
- (b) the retention of the remainder of **208DS** in Category B.

PROBLEM

The existing Siu Ho Wan sewage treatment plant (SHWSTP) will not be able to cope with the forecast sewage flow and pollution loads generated from Tung Chung, Tai Ho and Penny's Bay areas on Lantau Island.

PROPOSAL

2. The Director of Drainage Services, with the support of the Secretary for the Environment and Food, proposes to upgrade part of **208DS** to Category A at an estimated cost of \$779.4 million in money-of-the-day (MOD) prices to expand SHWSTP's design capacity from the existing 120 000 cubic

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metres per day to 180 000 cubic metres per day and to upgrade the plant's treatment process from preliminary level to include chemical treatment and disinfection.

PROJECT SCOPE AND NATURE

3. The part of the project we now propose to upgrade to Category A comprises -

- (a) construction of one detritor;
- (b) construction of six primary sedimentation tanks together with a sludge pumping gallery;
- (c) construction of disinfection facilities with the associated effluent pumping station;
- (d) construction of sludge de-watering facilities including a sludge de-watering house, sludge buffer tanks and a return liquor pumping station;
- (e) construction of associated buildings and structures including one chemical building, one administration building and structures such as store, electricity supply sub-station, washwater pumping station and gatehouse;
- (f) construction of associated road works, drainage works, pipeworks and landscaping works; and
- (g) supply and installation of ancillary equipment for the treatment plant including power supply, electrical switch-gears, transformers, and a control and data acquisition system.

A location plan showing the proposed works is at Enclosure 1.

4. The remainder of **208DS** for retention in Category B comprises -

- (a) construction of a sewerage system and a sewage treatment plant in Ngong Ping on Lantau Island; and

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- (b) construction of a sewage treatment plant and a submarine outfall in Yung Shue Wan on Lamma Island.

JUSTIFICATION

Expanding the capacity

5. At present, Tung Chung, Tai Ho and Penny's Bay areas are served by a preliminary sewage treatment plant at Siu Ho Wan with a design capacity of 120 000 cubic metres per day. The present daily sewage flow from Tung Chung and Tai Ho is around 20 000 cubic metres. We anticipate that the daily sewage flow will gradually increase to about 50 000 cubic metres by 2005 due to the occupation of new residential developments in Tung Chung and Tai Ho areas. Upon the opening of the theme park in Penny's Bay in the same year, the daily sewage flow will increase to about 70 000 cubic metres. The daily sewage flow will reach the design capacity of the plant of 120 000 cubic metres by 2008 and will further increase to 180 000 cubic metres by 2011. To cope with future flow demands and to protect water quality in the receiving water bodies, we propose to increase the design capacity of the plant by 50% to 180 000 cubic metres per day.

Upgrading the treatment level

6. Although earlier studies confirmed that upgrading the sewage treatment plant from preliminary treatment to primary treatment level would be adequate for meeting the discharge standard, we propose to further upgrade the treatment level to include chemical treatment and disinfection. Chemical treatment will reduce Biochemical Oxygen Demand and suspended solid levels substantially. This will prevent any build up of oxygen depleting solids in the vicinity of the outfall and thus protect the ecology of the sea bed. Consequently, the discharge will not have any adverse impact on local fish stocks. Disinfection is a precautionary measure to provide additional protection to Chinese White Dolphins living within the North Western Water Control Zone.

7. If we do not proceed with the proposed works, the existing SHWSTP will not be able to handle the increasing amount of sewage generated from Tung Chung, Tai Ho and Penny's Bay areas. The quantity of pollutants discharged into the North Western Water Control Zone will increase and its water quality will deteriorate. This will have an adverse effect on the aquatic life, including the Chinese White Dolphins in the receiving water bodies.

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FINANCIAL IMPLICATIONS

8. We estimate the capital cost of the proposed works to be \$779.4 million in MOD prices (see paragraph 9 below), made up as follows –

	\$million	
(a) detritor	8.3	
(b) primary sedimentation tanks	79.7	
(c) disinfection facilities	126.3	
(d) sludge de-watering facilities	99.1	
(e) buildings and structures	111.5	
(f) road, drainage, pipeworks and landscaping works	29.7	
(g) supply and installation of ancillary equipment	36.8	
(h) environmental mitigation measures	27.6	
(i) consultants' fees	16.0	
(j) resident site staff	62.3	
(k) contingencies	58.2	
	Sub-total	655.5 (in December 1999 prices)
(l) Provision for price adjustment	123.9	
	Total	779.4 (in MOD prices)

A breakdown by man months of the estimates for consultants' fees is at Enclosure 2.

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

Year	\$ million (Dec 1999)	Price Adjustment Factor	\$ million (MOD)
2000 – 2001	1.0	1.00000	1.0
2001 – 2002	80.0	1.04500	83.6
2002 – 2003	143.5	1.10770	159.0
2003 – 2004	190.0	1.17416	223.1
2004 – 2005	120.0	1.24461	149.4
2005 – 2006	74.0	1.31929	97.6
2006 – 2007	47.0	1.39845	65.7
	655.5		779.4

10. We have derived the MOD estimates on the basis of Government's latest forecasts of trend labour and construction prices for the period 2000 to 2007. We will tender the civil works contracts as re-measurement contracts because the quantities of piling works may vary with the actual ground conditions. As the construction period will exceed 21 months, we will allow for price adjustment to the tender prices. We will tender the electrical and mechanical (E&M) works contracts as fixed-price lump-sum contracts because a major part of the works will be the supply and installation of E&M equipment, the scope of which can be clearly defined.

11. We estimate the additional annually recurrent expenditure for maintenance works to be \$44.1 million. The increase in recurrent costs is mainly due to an increase in consumables and maintenance works required for the operation and maintenance of the sewage treatment works, such as electricity, chemicals and sludge disposal.

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12. Based on the current level of expenditure on the operation and maintenance of sewerage facilities, the proposed works by itself will lead to an increase in the recurrent cost of providing sewage services by about 4.0% in real terms which will need to be taken into account in determining sewage charges.

PUBLIC CONSULTATION

13. We presented the proposal on the sewerage extension and improvement works to the Islands District Board on 24 April 1995. The Board supported the proposal. After completing the preliminary design of the upgrading of SHWSTP, we consulted the Islands Provisional District Board (IsPDB) on 23 February 1998. The IsPDB supported the implementation of the works.

14. We consulted the LegCo Panel on Environmental Affairs on the proposed works on 7 April 2000. Members supported implementation of the proposed works.

ENVIRONMENTAL IMPLICATIONS

15. This project is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance and an environmental permit is required for its construction and operation. The environmental impact of the project has been adequately assessed in an EIA report which was approved and listed on the Register under the EIA Ordinance. As a precautionary measure to protect the Chinese White Dolphins in the North Western Water Control Zone, we recommended to enhance the effluent quality further by including a disinfection facility in SHWSTP. The Advisory Council on the Environment endorsed our recommendation at its meeting on 27 April 1998. We have conducted a study on the proposed disinfection facility and found that bacteria in the treated effluent can be reduced by 99.9% without causing adverse environmental impacts.

16. We will implement the measures recommended in the approved EIA report for the project. The key measures include provision of a chemical dosing system to the primary sedimentation tanks, covering and enclosing the sludge treatment facilities, and ventilating air to an odour treatment unit with 95% odour removal efficiency prior to stack exhaust. We will carry out a water quality monitoring and audit programme during the construction and initial operation period.

17. We estimate the cost for implementing the mitigation measures to be \$27.6 million in December 1999 prices. We have included this cost in the overall project estimate.

18. We considered at the planning and design stage measures to minimise the generation of construction and demolition material (C&DM). We will reuse the fill generated from the project either on site or in other construction sites as far as possible. We estimate that about 18 000 cubic metres (m³) of fill will be delivered to public filling areas after allowing for reuse and about 100m³ of C&DM will be disposed of at landfills. We will encourage the contractor to use steel instead of timber in formwork and temporary works to reduce the generation of waste. We will require the contractor to sort the C&DM on-site to facilitate reuse, recycling and disposal as appropriate. We will control the disposal of C&DM through a trip-ticket system and in accordance with a waste management plan to be approved. We will record the disposal, reuse and recycling of C&DM for monitoring purposes.

LAND ACQUISITION

19. The project does not require any land acquisition.

BACKGROUND INFORMATION

20. Tung Chung, Tai Ho and Penny's Bay areas are served by SHWSTP which was constructed under **2429CL** "North Lantau Development phase 1 remaining works" at a cost of about \$204 million and was commissioned in end 1996.

21. We included **208DS** "Outlying Islands sewerage stage 1 phase 1" in Category B in October 1995 for provision of sewerage improvement works in Cheung Chau, Mui Wo, Siu Ho Wan, Yung Shue Wan and Ngong Ping.

22. In April 1996, Finance Committee approved upgrading part of **208DS** to Category A as **209DS** "Outlying Islands sewerage, stage 1, phase 1 - consultants' fees and investigations" for employing consultants to carry out site investigations, the EIA study and the preliminary design for the Outlying Islands sewerage stage 1 phase 1 works as well as detailed design for the sewerage improvement works in Siu Ho Wan and Ngong Ping. We completed the preliminary design and EIA study in 1998.

23. We completed the detailed design of the “Stage 1 phase 1A - upgrading of sewage sludge dewatering facilities at Mui Wo sewage treatment plant” in April 1998 and included an item under block allocation **Subhead 4100DX** “Drainage works, studies and investigations for items in Category D of the Public Works Programme”. We commenced the construction works of the stage 1 phase 1A in June 1998 for completion in May 2000.

24. In March 2000, we upgraded part of **208DS** to Category A as **220DS** “Outlying Islands sewerage, stage 1, phase 1B - outfall replacement and sewage sludge dewatering facilities upgrading at Cheung Chau sewage treatment plant” for improvement works at the Cheung Chau sewage treatment plant. We plan to commence the construction works in October 2000 for completion in January 2003.

25. We have completed the detailed design for the proposed upgrading works for SHWSTP under **209DS**. We plan to start construction works in February 2001 for completion in August 2004.

26. We are carrying out detailed design for the remaining sewerage improvement works under **208DS** and we plan to commence construction in end 2001 for completion in mid 2005.

27. The Director of Environmental Protection is now carrying out the “Outlying Islands Sewerage Master Plan stage 2 review”. The review will investigate the need to expand SHWSTP further to cope with increasing demand for sewage treatment facilities after 2011. The review will be completed at the end of 2000. Provision for possible further extension has been allowed for in the present project. The proposed works will not be rendered abortive in any way if future expansion is considered necessary under the stage 2 review.

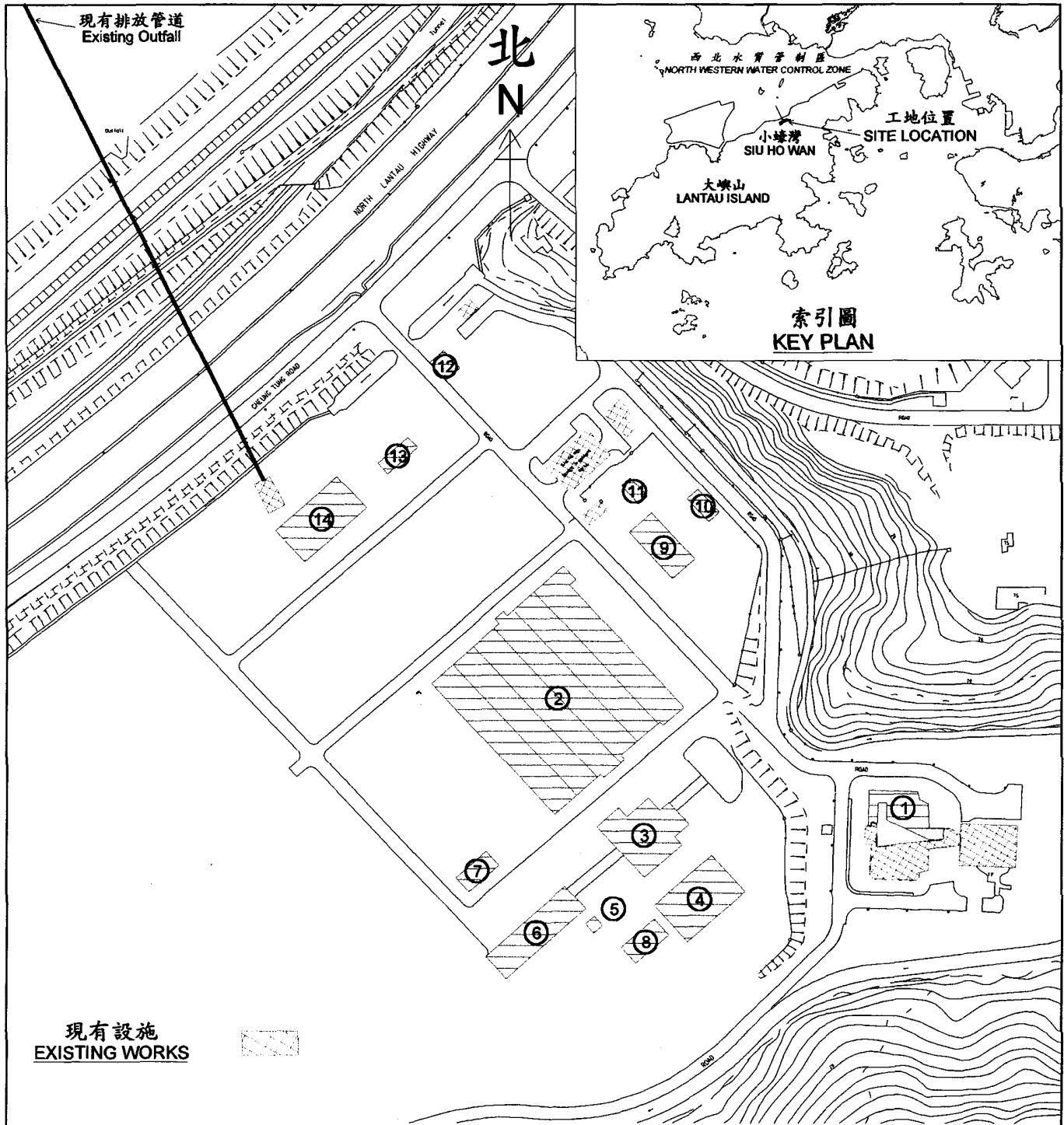
28. We estimate that the proposed stage 1 phase 1C works will create some 230 new jobs during the construction stage. These will comprise 40 professional or technical staff and 190 labourers, totaling 6 700 man months.

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29. We will also implement the upgrading works for other major sewage treatment plants in the North Western Water Control Zone under separate items. We have completed the planning study for the upgrading works at San Wai and we plan to commence construction in 2004 for completion in 2008. The planning study for the upgrading works at Pillar Point is in progress for completion in 2001.

Environment and Food Bureau
April 2000

(PWSC0260/WIN10)



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|---|--|---|
| 1. 砂礫清除器
DETRITOR | 6. 化學樓
CHEMICAL BUILDING | 11. 危險品貯存倉
DANGEROUS GOODS STORE |
| 2. 六個初級沉澱池
6 NOS. PRIMARY TANKS | 7. 化學品貯存缸
CHEMICAL STORAGE TANKS | 12. 閘門控制室
GATEHOUSE |
| 3. 污泥脫水樓
SLUDGE DEWATERING HOUSE | 8. 除臭設施
ODOUR TREATMENT FACILITIES | 13. 變電站
ELECTRICITY SUB-STATION |
| 4. 污泥貯存缸
SLUDGE BUFFER TANKS | 9. 行政樓
ADMINISTRATION BUILDING | 14. 消毒設施及泵站
DISINFECTION FACILITY WITH PUMPING STATION |
| 5. 回流液泵站
RETURN LIQUOR PUMPING STATION | 10. 沖洗水泵站
WASHWATER PUMPING STATION | |

drawing title 圖則名稱 小蠔灣污水處理廠改善工程 UPGRADING OF SIU HO WAN SEWAGE TREATMENT PLANT	drawn by 繪畫 <i>Bel Chan</i> C.W. CHAN	date 日期 19-04-2000	drawing no. 圖則編號 DCM/2000/001D	scale 比例 1:2400
	approved 批准 <i>H.K. Tung</i> H.K. TUNG	date 日期 19-04-2000	香港特別行政區政府渠務署 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION	
	office 部門 顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION			

208DS - Outlying Islands sewerage, stage 1, phase 1

Breakdown of estimates for consultants' fees

			Estimated man months	Average MPS Salary Point	Multiplier factor	Estimated fee (\$ million)
(1) Consultants' fee						
(a)	Consultants' fees at the construction stage	Professional	33	40	2.4	5.0
		Technical	50	16	2.4	2.5
(b)	Environmental checking during construction	Professional	10	40	2.4	1.5
		Technical	10	16	2.4	0.5
(c)	Water quality monitoring & auditing	Professional	30	40	2.4	4.5
		Technical	36	16	2.4	1.8
Total consultants' fee						15.8
(2) Resident site staff (RSS) costs						
(a)	Site supervision by resident site staff employed by the consultants	Professional	270	40	1.7	28.8
		Technical	938	16	1.7	33.5
Total RSS costs						62.3
(3) Out-of-pocket expenses						
(a)	Reimbursable expenses for inspections of equipment overseas					0.2
(b)	Sampling, testing and detailing investigation works for water quality monitoring					9.9
Total out-of-pocket expenses						10.1

Notes

1. A multiplier factor 2.4 is applied to the average MPS point to arrive at the full staff costs including the consultants' overheads and profits as the staff will be employed in the consultants' offices. A multiplier factor of 1.7 is applied in the case of site staff supplied by the consultants. (As at 1.4.1999, MPS p. 40 = \$62,780 p.m. and MPS p. 16 = \$21,010 p.m.)
2. The consultants' fees at the construction stage are based on the lump-sum fees calculated in accordance with the Director of Drainage Services' agreement with the consultants undertaking the design and construction of the project. The costs of resident site staff are based on the Director of Drainage Services' estimates. We will only know the actual man months and costs when we have completed the construction works.
3. The out-of-pocket expenses for water quality monitoring are included in the cost for environmental mitigation measures.