

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 1B - outfall replacement and sewage sludge dewatering facilities upgrading at Cheung Chau sewage treatment plant", to Category A at an estimated cost of \$111.3 million in money-of-the-day prices; and
- (b) the retention of the remainder of **208DS** in Category B.

PROBLEM

The existing sewage sludge dewatering facilities at Cheung Chau sewage treatment plant cannot effectively dewater sewage sludge to the required standard for disposal at landfill sites. In addition, the existing submarine outfall at Cheung Chau cannot effectively disperse the treated effluent.

/PROPOSAL

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 \$111.3 million in money-of-the-day (MOD) prices for carrying out improvement works at Cheung Chau sewage treatment plant.

PROJECT SCOPE AND NATURE

3. The part of the project we now propose to upgrade to Category A comprises the following works at Cheung Chau sewage treatment plant -

- (a) upgrading of existing sludge dewatering facilities;
- (b) replacement of existing submarine outfall by a new outfall 750 metres long and 600 millimetres in diameter;
- (c) construction of an outfall pumping station; and
- (d) construction of ancillary civil and drainage works.

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

- (a) construction of a sewerage system and sewage treatment plant at Ngong Ping on Lantau Island;
- (b) upgrading of the preliminary sewage treatment plant constructed under **429CL** "North Lantau development phase 1 remaining works" at Siu Ho Wan on Lantau Island to chemically enhanced primary level with disinfection; and
- (c) construction of a sewage treatment plant and a submarine outfall at Yung Shue Wan on Lamma Island.

/JUSTIFICATIONS

JUSTIFICATIONS

5. In December 1994, we completed the Outlying Islands sewerage master plan (SMP) study under project item **146DS** "Outlying Islands sewerage master plan study - consultants' fees and investigations". The study identified the need to dewater the sludge to a dry solids content of 30% by weight before disposal at landfill sites. We consider it necessary to dewater sludge to this standard because wet sludge, which has a higher moisture content, would cause operational problems¹ at landfills as well as environmental problems arising from excessive leachate² generation.

6. Sewage sludge produced by the Cheung Chau sewage treatment plant is currently dewatered by means of drying beds. However, the drying bed method is not very effective in the wet season as it will take much more time to dewater sludge to the required standard, leading to accumulation of sludge on drying beds. Excessive accumulation of sludge causes storage and odour problems. To ensure that we would be able to meet the sludge dewatering standard at all times and overcome storage and odour problems, we need to replace the sludge drying beds at the Cheung Chau sewage treatment plant with membrane filter presses which are capable of dewatering sludge to a dry solids content of not less than 30%.

7. In addition, we need to construct a reinforced concrete sludge dewatering house to accommodate the new presses and ancillary equipment and to store the dewatered sludge before disposal. At present, we pack the dewatered sludge in plastic bags and place the bags on open ground within the plant before collecting them for disposal. This arrangement creates odour nuisance and is unsatisfactory.

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¹ High moisture sludge is more difficult to compact and forms less stable slopes at landfills.

² Leachate is liquid draining from a landfill site. As leachate contains pollutants, exceeding the capacity of the existing leachate collection/treatment facilities would result in contamination of the groundwater in the vicinity of the landfill site.

8. The SMP study also revealed that the dispersal of the treated effluent from the existing 300 metres long submarine outfall at Cheung Chau sewage treatment plant is ineffective. As the existing outfall is close to the Tai Kwai Wan beach, discharge has occasionally affected the water quality of the beach and the Adamasta Channel. To abate the water pollution problem, the SMP study recommended replacing the existing submarine outfall at Cheung Chau with a new and longer submarine outfall with improved dispersal capability. We will build a new outfall 750 metres in length and 600 millimetres in diameter to replace the existing outfall. In addition, we need to construct a pumping station to discharge the treated effluent through the longer submarine outfall. The proposed new sludge dewatering facilities and replacement outfall would not preclude the possibility of any future upgrading in the treatment level should this be found necessary.

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of the proposed works to be \$111.3 million in MOD prices (see paragraph 10 below), made up as follows –

	\$million
(a) Upgrading of existing sludge dewatering facilities	27.5
(i) civil works	15.0
(ii) electrical & mechanical works	12.5
(b) Replacement of existing submarine outfall	35.0
(c) Construction of an outfall pumping station	19.5
(i) civil works	16.0
(ii) electrical & mechanical works	3.5
(d) Construction of ancillary civil and drainage works	3.1

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	\$million	
(e) Environmental mitigation measures	4.2	
(f) Contingencies	7.7	
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Sub-total	97.0	(at December 1998 prices)
(g) Provision for price adjustment	14.3	
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Total	111.3	(in MOD prices)
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10. Subject to approval, we will phase the expenditure as follows -

Year	\$ million (Dec 1998)	Price adjustment factor	\$ million (MOD)
2000 – 2001	13.7	1.05814	14.5
2001 – 2002	31.3	1.11104	34.8
2002 – 2003	36.0	1.16660	42.0
2003 – 2004	9.0	1.22493	11.0
2004 – 2005	7.0	1.28617	9.0
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	97.0		111.3
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11. We have derived the MOD estimates on the basis of the Government's latest forecasts of trend labour and construction prices for the period 2000 to 2005. We will tender the civil works of the project under a re-measurement contract because of the uncertain quantities of dredged and filled materials for the construction of the outfall and the depth of piling works for the sludge dewatering house. As the period for civil works will not exceed 21 months, we will not allow for price adjustments to the tender price. We will tender the electrical and mechanical works under a fixed price lump sum contract as the quantity of works is known.

12. We estimate the additional annual recurrent expenditure for maintenance works to be \$2.1 million.

13. Based on the current level of expenditure on operation and maintenance of sewerage facilities, the proposed works by itself will lead to a 0.4% real increase in the recurrent cost of providing sewage services which will need to be taken into account in determining sewage charges.

PUBLIC CONSULTATION

14. We presented the proposal on the sewerage extension and improvement works proposed under the SMP study to the Islands District Board on 24 April 1995. The Board supported the proposal. After completing the preliminary design for Outlying Islands sewerage stage 1 phase 1 works under **209DS** "Outlying Islands sewerage, stage 1, phase 1 - consultants' fees and investigations", we consulted the Islands Provisional District Board (IPDB) on 23 February 1998. The IPDB also supported the implementation of the works.

15. We consulted the LegCo Panel on Environmental Affairs (EA) Panel on the proposed project on 11 June 1999. Panel Members were concerned about the adequacy of the level of treatment of the Cheung Chau sewage treatment plant and requested further information on the scheme. We provided the information to Panel Members on 14 June 1999. When this proposal was first submitted to this Subcommittee on 16 June 1999, Members of the EA Panel indicated that they wanted more time to consider the issues, and the proposal was withdrawn.

16. We consulted the EA Panel again on 5 November 1999, providing an overview of the general sewage treatment strategy and addressing the environmental gains expected to be brought about by the proposed works. Panel Members raised a number of issues, mainly on the adequacy of the level of sewage treatment, at the meeting. In response, we issued an information paper on 30 November 1999 to address Members' concerns. The Clerk to the EA Panel then invited Members to submit their comments on the paper and their further views on the proposed works before 11 January 2000. No further comments were received from Members. We consulted the EA Panel on the proposed works again on 10 February 2000 and Members supported the implementation of the project.

ENVIRONMENTAL IMPLICATIONS

17. The submarine outfall 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. We completed the EIA study for stage 1 phase 1 of the Outlying Islands sewerage in October 1997. The Advisory Council on the Environment endorsed the EIA in October 1997. The EIA concluded that the new submarine outfall will provide adequate dispersion of effluent that meets the requirements. We will provide silt curtains during the construction of the outfall to reduce the transient impact in water quality.

18. The pumping station and the sewage sludge dewatering facilities are not designated projects. The Director of Environmental Protection completed an Environmental Review on the dewatering facility in January 1997 which concluded that no EIA was required. The pumping station and the sludge dewatering facilities will be housed within enclosed structures with deodourization installations to reduce the odour and noise impacts arising during operation. We will also incorporate, in the contract, standard pollution control measures, such as water-spraying to reduce emission of fugitive dust and the use of noise barriers and silenced construction plants to reduce noise generation and to control construction impacts to within the established standards and guidelines.

19. We estimate the cost for implementing the mitigation measures to be \$4.2 million. We have included this cost in the overall project estimate.

20. We considered in the planning and design stages arrangements to minimize the generation of construction and demolition (C&D) material. We will reuse the public fill generated from the project either on site or in other construction sites as far as possible. We estimate that about 2,000 cubic metres of public fill will be delivered to public filling areas after allowing for reuse and about 100 cubic metres of C&D waste 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. The contractor will be required to sort the C&D material on-site to facilitate reuse, recycling and disposal as appropriate. We will control the disposal of C&D material through a trip-ticket system and in accordance with a waste management plan approved by the Engineer. The disposal, reuse and recycling of C&D material will be recorded for monitoring purpose.

LAND ACQUISITION

21. The project does not require any land acquisition.

BACKGROUND INFORMATION

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

23. In April 1996, we upgraded 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, an environmental impact assessment and preliminary design of the Outlying Islands sewerage stage 1 phase 1 works (completed in January 1998) and detailed design of the proposed works at Ngong Ping and Siu Ho Wan. We undertook the detailed design and construction supervision for Cheung Chau, Mui Wo and Yung Shue Wan using in-house staff.

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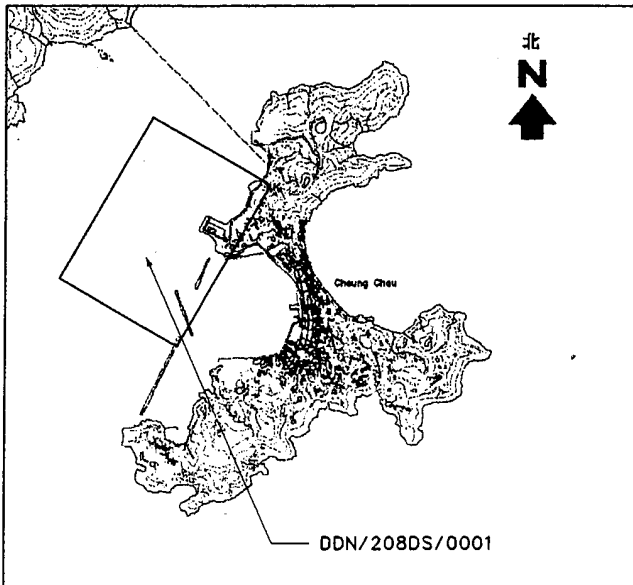
24. On 16 June 1999, we submitted to the Public Works Subcommittee a proposal regarding the upgrading of the existing sludge dewatering facilities, replacement of the existing outfall, construction of the outfall pumping station and ancillary civil and engineering works at the Cheung Chau sewage treatment plant, with a view to upgrading these works to Category A. For the reasons stated in paragraph 15 above, we withdrew the paper to allow for further discussion at the EA Panel. After further discussion with the EA Panel on 5 November 1999, we circulated an information paper on 30 November to address Members' concerns. We further consulted the EA Panel on 10 February 2000. We now resubmit the proposal for Members' consideration.

25. We have completed the detailed design for the sewerage improvement works in Cheung Chau using in-house staff. We plan to start the construction works in October 2000 for completion in January 2003.

26. We are carrying out the detailed design for the remaining sewerage improvement works under **208DS** and plan to commence construction by end 2000 for completion in mid 2005.

Environment and Food Bureau
February 2000

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索引圖 比例
KEY PLAN SCALE 1:50 000



大鬼灣沙灘
TAI KWAI WAN BEACH

長洲污水處理廠
CHEUNG CHAU SEWAGE
TREATMENT WORKS

擬建污泥壓榨設施
PROPOSED SLUDGE
DEWATERING FACILITIES

擬建泵房
PROPOSED OUTFALL
PUMPING STATION


現存直徑 600 毫米海底排污渠出口
EXISTING 600mm DIAMETER SUBMARINE OUTFALL

北長洲海峽
ADAMASTA CHANNEL

直徑 600 毫米
600mm DIAMETER

擬建海底排污渠出口
PROPOSED SUBMARINE OUTFALL

工務計劃項目第 208DS 號
PWP ITEM No. 208DS

圖則名稱 drawing title 長洲污水處理廠的 海底排污渠出口更新及 污泥壓榨設施改善工程 OUTFALL REPLACEMENT & SEWAGE SLUDGE DEWATERING FACILITIES UPGRADING AT CHEUNG CHAU SEWAGE TREATMENT WORKS	繪畫 drawn by (SIGNED) K.W. FONG	日期 date 18.3.99	圖則編號 drawing no. DDN/208DS/0001	比例 scale 1:5 000
	批核 approved (SIGNED) P.W. CHAN	日期 date 18.3.99		
	部門 office 污水工程部 SEWERAGE PROJECTS DIVISION			 香港特別行政區政府渠務署 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION