For discussion **PWSC(2002-03)27**
on 22 May 2002

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 – DRAINAGE
Environmental Protection – Sewerage and sewage treatment
211DS – Outlying Islands sewerage, stage 1 phase 2

Members are invited to recommend to Finance Committee –

(a) the upgrading of part of **211DS**, entitled "Outlying Islands sewerage, stage 1 phase 2 – Peng Chau and Cheung Chau sewerage", to Category A at an estimated cost of $69.7 million in money-of-the-day prices; and

(b) the retention of the remainder of **211DS** in Category B.

PROBLEM

Domestic sewage from unsewered areas in Peng Chau and Cheung Chau contributes to water pollution in Southern waters[1].

PROPOSAL

2. The Director of Drainage Services, with the support of the Secretary for the Environment and Food, proposes to upgrade part of **211DS** to Category A at an estimated cost of $69.7 million in money-of-the-day (MOD) prices for implementing part of the Outlying Islands sewerage, stage 1 phase 2 works.

/**PROJECT** .....

[1] Southern waters refer to the water bodies to the south of Lantau Island and around Cheung Chau, Peng Chau, Lamma Island and Po Toi Islands. It also includes part of the water bodies to the south of the Hong Kong Island.

PROJECT SCOPE AND NATURE

3. The part of **211DS** we now propose to upgrade to Category A covers the village sewerage works in the central parts of Peng Chau and Cheung Chau. Location plans are at Enclosures 1A and 1B respectively. The scope of works comprises –

Peng Chau

(a) construction of about 2.0 kilometres (km) of sewers from 160 millimetres (mm) to 600 mm in diameter;

(b) demolition of the existing temporary sewage pumping station;

(c) construction of a new sewage pumping station;

(d) construction of about 130 metres of twin rising mains of 250 mm in diameter; and

Cheung Chau

(e) construction of about 4.1 km of sewers from 160 mm to 400 mm in diameter.

We plan to start the proposed works in September 2002 for completion in May 2006.

4. The remainder of **211DS** for retention in Category B comprises –

(a) implementation of Yung Shue Wan village sewerage phase 1 works;

(b) construction of sewage collection, treatment and disposal facilities at Sok Kwu Wan; and

(c) upgrading of Peng Chau Sewage Treatment Works (STW) and construction of a submarine outfall[2].

/**JUSTIFICATION** .....

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[2] The submarine outfall is essentially a submarine pipeline to convey the treated effluent offshore to achieve a better dilution effect.

JUSTIFICATION

5. At present, domestic sewage from the unsewered areas in Peng Chau and Cheung Chau is either partially treated by private treatment facilities or not treated at all before it is discharged into Southern waters. Treatment facilities currently in use in such areas are mostly septic tanks with soakaway systems in village houses. The effectiveness of these facilities in removing pollutants depends on the size of the facilities[3], whether ground conditions are suitable for the soakaway systems to work properly[4], and whether the systems are properly maintained. Sewage discharged from these unsewered areas is a source of pollution in Southern waters.

6. To address the water pollution problem at unsewered areas in the outlying islands, the Director of Environmental Protection (DEP) completed the "Outlying Islands Sewerage Master Plan (SMP) Study" (the Study) in December 1994. The Study recommends sewerage improvement works to be implemented in two stages in Lantau Island, Peng Chau, Cheung Chau, Lamma Island and other small islands to the west and south of Hong Kong Island. The stage 1 works are further divided into two phases. Construction of the phase 1 works for sewerage facilities in Lantau Island, Cheung Chau and Lamma Island began in June 1998 and would be completed in mid 2007. We now propose to upgrade part of the phase 2 works under **211DS** for improving sewerage facilities in Peng Chau and Cheung Chau.

7. The proposed sewers at unsewered villages in the central part of Peng Chau would serve an estimated population of 3 400. The existing Peng Chau Sewage Pumping Station which serves two public housing estates (Kam Peng Estate and Peng Lai Court) is only a temporary facility because the site in question together with the adjoining piece of land has been earmarked for other developments. We need to construct a new sewage pumping station to replace the temporary station so that the sewage collected from these two estates and other parts of the island can be conveyed to Peng Chau STW for secondary treatment[5].

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[3] Undersized septic tanks or soakaway systems would affect the pollutant removal efficiency of a system and may even lead to an overflow of effluent.

[4] Soakaway systems operate by allowing the effluent to percolate through the gravel whereby pollutants would be removed in a natural manner. However, if a system is located in an area where the underground water table is high, it cannot function properly.

[5] Secondary treatment refers to purification of sewage by means of biological treatment processes after the sewage has undergone primary treatment which comprises screening, removal of grit, and a sedimentation process. The organic matter in the settled sewage will be decomposed by micro-organisms in the biological treatment process.

Separately, as the existing sewerage system in Cheung Chau covers mainly its western region from Cheung Kwai Estate down to Sai Wan, we propose to construct sewers at the unsewered village development in the central part of Cheung Chau to serve an estimated population of 1 500. The collected sewage would be pumped and conveyed to Cheung Chau STW for primary treatment[6] before it is discharged into Southern waters.

8. Upon completion of the proposed works in Peng Chau and Cheung Chau, we will be able to improve the water quality of Southern waters by providing proper treatment to about 1 300 cubic metres (m^3) of sewage per day by 2006.

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of the proposed works to be $69.7 million in MOD prices (see paragraph 10 below), made up as follows –

			$ million
(a)	Sewers		42.3
	(i) Peng Chau	14.5	
	(ii) Cheung Chau	27.8	
(b)	Rising mains at Peng Chau		1.2
(c)	Sewage pumping station at Peng Chau		19.4
	(i) civil works	11.5	
	(ii) electrical and mechanical works	7.9	
(d)	Demolition of existing temporary sewage pumping station at Peng Chau		0.7

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[6] Primary treatment includes screening, removal of grit, and a sedimentation process. Solids larger than 6 mm in diameter as well as grit which consists of sands, bone pieces etc are removed from the sewage.

(e)	Environmental mitigation measures	0.9	
(f)	Contingencies	6.4	
	Sub-total	70.9	(in September 2001 prices)
(g)	Provision for price adjustment	(1.2)	
	Total	69.7	(in MOD prices)

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

Year	**$ million (Sept 2001)**	**Price adjustment factor**	**$ million (MOD)**
2002-2003	5.7	0.98625	5.6
2003-2004	19.8	0.98378	19.5
2004-2005	28.5	0.98378	28.0
2005-2006	11.8	0.98378	11.6
2006-2007	5.1	0.98378	5.0
	70.9		69.7

11. We have derived the MOD estimates on the basis of Government's latest forecasts of trend labour and construction prices for the period 2002 to 2007. We will tender the proposed civil works as a standard re-measurement contract because of uncertainties of the existence and location of underground utilities such as electricity cables, telephone cables, and water pipes. The contract will provide for price adjustments because the contract period will exceed 21 months. We will tender the electrical and mechanical works of the sewage pumping station under a fixed-price lump-sum contract because we can clearly define the scope of works in advance.

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12. We estimate the annual recurrent expenditure for maintenance works to be $1.0 million.

13. Based on the current level of expenditure on operation and maintenance of sewerage facilities, the proposed works by themselves would lead to an increase in the recurrent cost of providing sewage services by about 0.07%. This will need to be taken into account in determining sewage charges.

PUBLIC CONSULTATION

14. We consulted the then Islands Provisional District Board and the Peng Chau/Discovery Bay Area Committee on the proposed village sewerage works in the central part of Peng Chau in August and September 1999 respectively. They supported implementation of the proposed works. In addition, we consulted the Islands District Council and the Cheung Chau Area Committee on the proposed village sewerage works in the central part of Cheung Chau in August and September 2001 respectively. They supported implementation of the proposed works.

15. We consulted the Legislative Council Panel on Environmental Affairs on the proposed works on 26 November 2001. Members noted that we would submit the project proposal to the Public Works Subcommittee for discussion.

ENVIRONMENTAL IMPLICATIONS

16. We completed an environmental review (ER) for the proposed works as part of the SMP Study in 1994. The ER concluded that the proposed works would not cause adverse environmental impact and no environmental impact assessment was therefore required. For short-term impact during construction, we will control noise, dust and site run-off within established standards and guidelines through implementation of mitigation measures, such as the use of temporary noise barriers and silenced construction plants to reduce noise generation, water-spraying to reduce emission of fugitive dust, and strict control on diversion of sewage flows in the works contracts.

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17. We estimate the cost of implementing the environmental mitigation measures to be $900,000. We have included this in the overall project estimate.

18. At the planning and design stages, we have given due consideration to the need to minimise the generation of construction and demolition (C&D) materials when designing the level and layout of the proposed works. We will require the contractor to submit a waste management plan (WMP) for approval. The WMP will include appropriate mitigation measures to avoid, reduce, reuse, and recycle C&D materials. We will ensure that the day-to-day operations on site comply with the approved WMP. We will control the disposal of public fill and C&D waste in 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. We estimate that the project will generate about 10 400 m^3 of C&D materials. Of these, we will reuse about 7 450 m^3 (72%) on site, 2 900 m^3 (28%) as fill in public filling areas[7], and dispose of 50 m^3 (less than 0.5%) at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be $6,250 for this project (based on a notional unit cost[8] of $125/$m^3$).

LAND ACQUISITION

19. The proposed works in Cheung Chau require land acquisition. The land resumption and clearance cost for the project is estimated at $13.8 million and will be charged to **Head 701** – Land Acquisition. All the statutory procedures for resuming the required land have been completed in accordance with the Water Pollution Control (Sewerage) Regulation. The proposed works in Peng Chau do not require land acquisition.

/BACKGROUND .....

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[7] 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.

[8] 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 $90/$m^3$), nor the cost to provide new landfills (which are likely to be more expensive) when the existing ones are filled. The notional cost estimate is for reference only and does not form part of this project estimate.

BACKGROUND INFORMATION

20. In December 1994, DEP completed the SMP Study under **146DS** "Outlying Islands Sewerage Master Plan Study – consultants' fees and investigations" and recommended a series of sewerage improvement works at Lantau Island, Peng Chau, Cheung Chau, Lamma Island, and other small islands to the west and south of Hong Kong Island. We subsequently divided the proposed sewerage works into two stages and splitted the first stage into two phases.

21. In October 1995, we included **208DS** "Outlying Islands sewerage stage 1 phase 1" into Category B for implementation of sewerage improvement works recommended under the Study in Lantau Island, Cheung Chau, and Lamma Island. We upgraded **208DS** in parts to Category A in April 1996, March 2000 and May 2000. Construction of the phase 1 works began in June 1998 and would be completed in mid 2007.

22. In August 1996, we included **211DS** "Outlying Islands sewerage stage 1 phase 2" into Category B for the provision of sewerage systems recommended under the Study to the central parts of Peng Chau and Cheung Chau, amongst others.

23. In October 1998, we included an item under block allocation **Subhead 4100DX** for the minor sewerage works in Peng Chau under stage 1 phase 2 of **211DS**. The works commenced in March 1999 and would be completed in September 2002.

24. In January and February 2002, DEP completed a preliminary project feasibility study for the upgrading works in Peng Chau STW and the "Outlying Islands SMP Stage 2 Review" respectively. Both studies recommended the upgrading works for the existing Peng Chau STW, including the provision of secondary treatment facilities, a submarine outfall, and the associated supporting facilities. We plan to start the upgrading works in Peng Chau STW as early as practicable.

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25. Using in-house resources, we have substantially completed the design of the proposed stage 1 phase 2 sewerage works under **211DS**. We plan to start the construction works in September 2002 for completion in May 2006. Following completion of the proposed works, DEP will serve notice to request villagers to carry out the final house connection works under the Water Pollution Control Ordinance.

26. The proposed works mainly involve construction of sewers and a sewage pumping station in the village areas of the two outlying islands. Since traffic impact on existing roads will be minimal, no traffic impact assessment is necessary.

27. We estimate that the proposed works will create some 55 jobs comprising ten professional/technical staff and 45 labourers, totalling 1 470 man-months.

Environment and Food Bureau
May 2002

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