

**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 part 1

Ngong Ping sewerage, sewage treatment and disposal

Members are invited to recommend to Finance Committee –

- a) the upgrading of part of **208DS**, entitled “Outlying Islands sewerage, stage 1 phase 1 part 1 – Ngong Ping sewerage, sewage treatment and disposal”, to Category A at an estimated cost of \$235.3 million in money-of-the-day prices for the construction of a tertiary sewage treatment plant, public sewers and an effluent export pipeline at Ngong Ping, Lantau Island; and
- b) the retention of the remainder of **208DS**, retitled “Outlying Islands sewerage stage 1 phase 1 part 1 – Ngong Ping village sewerage works” in Category B.

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PROBLEM

There are no sewerage, sewage treatment and disposal facilities to serve the planned tourism and related developments in Ngong Ping. The sewage to be generated in the area, particularly upon the commissioning of the cable car system, will pose a high pollution risk on the water gathering ground for the Shek Pik Reservoir as well as the Southern Waters. The Shek Pik Reservoir is the third largest reservoir in Hong Kong and the major source of fresh water supply for about 250 000 persons on Lantau Island, Cheung Chau, Ping Chau and the western part of Hong Kong Island.

PROPOSAL

2. The Director of Drainage Services (D of DS), with the support of the Secretary for the Environment, Transport and Works, proposes to upgrade part of **208DS** to Category A at an estimated cost of \$235.3 million in money-of-the-day (MOD) prices for the construction of public sewers, a tertiary sewage treatment plant (STP) and an effluent export pipeline to serve the planned tourism and related developments in Ngong Ping.

PROJECT SCOPE AND NATURE

3. The part of **208DS** we now propose to upgrade to Category A comprises –

- (a) the laying of about 0.65 (kilometres) (km) of trunk and branch sewers with diameters ranging from 250 millimetres (mm) to 500mm in Ngong Ping;
- (b) the construction of a tertiary STP and installations of associated electrical and mechanical equipment in Ngong Ping; and
- (c) the laying of about 5.7 km of twin effluent export pipeline of some 200mm in diameter from the proposed Ngong Ping STP to Tung Wan¹.

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¹ Our original proposed scheme was to convey the effluent from the Ngong Ping STP to Tai O for discharge, which had been confirmed by the Environmental Impact Assessment (EIA) conducted for this project as the best option from environmental perspective. However, this proposal was strongly objected by some members of the Islands District Council, the Tai O Rural Committee and Tai O residents. In response to these objections, the Drainage Services Department (DSD) conducted an additional environmental study to evaluate the acceptability of discharging the effluent at Tung Wan. The additional environmental study, endorsed by the Advisory Council on the Environment, confirmed that the Tung Wan discharge option was environmentally acceptable.

4. We plan to start construction of the proposed works in August 2003 for completion in July 2005. A site plan showing the scope of the proposed works is at Enclosure 1. A photomontage illustrating the visual effect of the proposed Ngong Ping STP is at Enclosure 2.

5. The remainder of 208DS for retention in Category B comprises the sewerage works to be implemented within villages in Ngong Ping.

JUSTIFICATION

6. At present, there are neither public sewers nor sewage treatment works at Ngong Ping. Sewage generated from Ngong Ping is either tankered away or disposed of through the privately owned septic tank and soakaway systems².

7. In 1998, the Administration decided to develop a cable car system linking Ngong Ping and Tung Chung for tourism promotion, which will bring significant benefits to the economy of Hong Kong. We estimated that the cable car system and related developments may attract around 47 000 visitors a day to Ngong Ping. The quantity of sewage generated at Ngong Ping is hence expected to increase substantially.

8. In order to protect quality of the water gathering ground for Shek Pik Reservoir and other receiving water bodies after commissioning of the cable car system and its related developments, we propose to construct public sewers and a tertiary³ STP with disinfection at Ngong Ping to collect and treat the sewage. The proposed effluent export pipeline is for conveying and discharging the treated effluent into the Southern Waters at Tung Wan. Separately, since the effluent produced by the STP is of very high quality and has good potential for reuse, we also decide to launch a pilot scheme on various effluent reuse trials. Under the scheme, part of the effluent from the STP will be fed into a separate “flushing and

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² Septic tank and soakaway systems operate by utilising the microorganisms in the septic tank to degrade the suspended solids originated from the wastewater. Effluent leaving the septic tank would then percolate through the gravel in the soakaway pit where the organic pollutants and pathogens will be further degraded and removed by the microorganisms in a natural manner. Sludge generated in the septic tank will be tankered away periodically.

³ With tertiary treatment, sewage from Ngong Ping is treated by physical, biological and disinfection processes to reduce the level of organic pollutants, suspended solids, nitrogen (a nutrient) and pathogenic organisms to protect the sensitive receiving waters.

other non-potable” reclaimed water supply system⁴ for reuse at the public toilets at Ngong Ping and potentially the cable car terminal and related developments.

9. As a small part of the proposed sewage pipe laying works at Ngong Ping falls within the boundary of the cable car project and related developments to be implemented by the Mass Transit Railways Corporation Limited (MTRCL), the Administration will entrust the design and construction of the concerned pipe laying works to the MTRCL so as to avoid interface problems during construction and to minimise inconvenience to the public caused by road openings. The Administration will however engage its own consultants and contractor to implement the remainder of the proposed sewerage works in the usual manner.

FINANCIAL IMPLICATIONS

10. We estimate the capital cost of the proposed works to be \$235.3 million in MOD prices (see paragraph 11 below), made up as follows –

	\$million
(a) Construction of	196.0
(i) trunk and branch sewers (about 0.65 km)	7.4
(ii) STP in Ngong Ping	153.0
(1) civil works	96.0
(2) electrical and mechanical works	57.0
(iii) twin effluent export pipeline (about 5.7 km)	35.6
(b) Consultants’ fees for	29.0
(i) contract administration	1.0
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⁴ Construction of the flushing and other non-potable reclaimed water supply system will be funded under **Head 709 - 323WF**, which was approved by Finance Committee on 21 February 2003. The supply system will be entrusted to DSD for construction in conjunction with the Ngong Ping sewerage scheme. The additional works required to facilitate the effluent reuse pilot scheme will only cost \$4.1 million.

(ii) site supervision	28.0	
(c) On-cost ⁵ payable to MTRCL		0.8
(d) Environmental mitigation measures		4.5
(e) Contingencies		22.0
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	Sub-total	252.3 (in September 2002 prices)
(f) Provision for price adjustment		(17)
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	Total	235.3 (in MOD prices)
		<hr/>

A breakdown of the estimates for the consultants' fees by man-months is at Enclosure 3.

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

Year	\$ million (Sept 2002)	Price adjustment factor	\$ million (MOD)
2003 - 2004	48.3	0.94300	45.5
2004 - 2005	92.0	0.93003	85.6
2005 - 2006	64.0	0.93003	59.5
2006 - 2007	29.0	0.93003	27.0
2007 - 2008	19.0	0.93003	17.7
	<hr/>		<hr/>
	252.3		235.3
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⁵ An on-cost at 16.5% of the construction cost of the entrusted works (i.e. about \$6.0 million of paragraph 10 (a) (i)) of about \$0.99 million will be payable to MTRCL for undertaking the design and construction supervision of the entrusted sewerage works. The design cost of about \$0.19 million will be funded separately under Head 704 – 209DS “Outlying Islands sewerage, stage 1, phase 1 – consultants’ fees and investigations” and the construction supervision cost of about \$0.8 million will be funded under this item.

12. We have derived the MOD estimates on the basis of the Government's latest forecast of trend labour and construction prices for the period 2003 to 2008. We will tender the proposed works under a re-measurement contract because of uncertainties of the rock head level, and 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.

13. We estimate that the annual recurrent expenditure for operating and maintaining the proposed works would be about \$5.3 million.

14. 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 0.36%. This will be taken into account in determining the sewage charges.

PUBLIC CONSULTATION

15. We consulted the Islands District Council (IDC) and Tai O Rural Committee (TORC) in December 2002 and January 2003 respectively on the proposed works. Both IDC and TORC supported the proposed works.

16. We consulted the Legislative Council Panel on Environmental Affairs on the proposed works on 10 April 2003. While generally supportive of implementation of the project, Members requested the Administration to explore more effluent reuse options. Members also requested the Administration to provide a more detailed breakdown of the project cost estimate and a comparison between the costs of adopting the proposed tertiary treatment technology using Sequencing Batch Reactor and the Biological Aerated Filter systems. The supplementary information is set out in Enclosure 4, together with further explanation on why other reuse options with possible body contact will necessitate much higher treatment to protect the public health and the associated cost will be far too expensive for this particular project. We have issued the note in Enclosure 4 to the Panel on 15 April 2003.

ENVIRONMENTAL IMPLICATIONS

17. The project is a designated project under Schedule 2 Part 1 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499) and an environmental permit is required for the construction and operation of the project.

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The project will avoid pollution problem due to the increased sewage arising from future and existing developments. In planning for the STP, the site has been chosen to avoid the ecologically sensitive area. For the pipeline, it has been planned to follow existing road network to avoid impacts on the country park area. In November 2002, the EIA report for the project⁶ was approved under the EIA Ordinance. The EIA also concluded that the environmental impact arising from the construction and operation of the project could be mitigated to within the criteria under the EIA Ordinance and the Technical Memorandum on EIA Process. The Director of Environmental Protection (DEP) issued an environmental permit for the construction and operation of the project in March 2003. We shall implement the measures recommended in the approved EIA report. The key measures include the installation of deodourisation units in the STP, adoption of aesthetic architectural design to make the STP harmonious with the environment, and the use of temporary noise barriers and silenced construction plant to reduce noise generation during the construction stage of the project. We estimate the cost of implementing the environmental mitigation measures to be \$4.5 million (in September 2002 prices). We have included this in the project estimate.

18. We have given due consideration to the need to minimise generation of construction and demolition (C&D) materials in designing the levels and layout of the STP and the levels and alignments of the proposed pipeline. To further minimise the generation of C&D materials, we will encourage the contractors to use steel instead of timber in formwork and temporary works. We estimate that about 82 000 cubic metre (m³) of construction and demolition (C&D) materials will be generated by the project. We will reuse about 23 000 m³ (28%) on site, 58 000 m³ (71%) as fill in public filling areas⁷ and dispose of 1 000 m³ (1%) at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be \$125,000 for this project (based on a notional unit cost⁸ of \$125/m³).

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⁶ The EIA study for the project incorporating the Tai O discharge option was approved by the DEP in November, 2002. Subsequently, the project profile, including a supplementary environmental study, for the Tung Wan discharge option was submitted to the DEP for permission to apply directly for an environmental permit. Having regard to the project profile, the permission was granted by the DEP in January 2003.

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

19. We will require the contractor under the contract to submit a waste management plan to the Engineer for approval, with appropriate mitigation measures, including the allocation of an area for waste segregation. We shall ensure that the day-to-day operations on site comply with the waste management plan. We will control disposal of public fill and C&D waste to designated public filling facility and landfills respectively through a trip-ticket system. We will record the disposal and reuse of C&D materials for monitoring purposes.

LAND ACQUISITION

20. The proposed works do not require land acquisition.

BACKGROUND INFORMATION

21. In 1994, the Environmental Protection Department completed the Sewerage Master Plan (SMP) Study under **146DS** “Outlying Islands Sewerage Master Plan Study – consultants’ fees and investigations” and recommended a series of sewerage improvement works for six areas, namely Cheung Chau, Peng Chau, Mui Wo, Siu Ho Wan, Yung Shue Wan and Ngong Ping. Under the SMP Study, the Ngong Ping sewerage scheme was planned to cater for about 12 000 visitors per day and 500 residents in Ngong Ping. The Administration subsequently included all these proposed sewerage projects under **208DS** “Outlying Islands sewerage stage 1 phase 1” in Category B in 1995.

22. In 1996, Finance Committee approved the upgrading of 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 impact assessment and investigation works for the sewerage works in these six areas, and the detailed design of the sewerage works at Ngong Ping and Siu Ho Wan. The design for the other four areas is done in-house. Preliminary investigation works for the Ngong Ping sewerage scheme commenced in May 1996 and were completed in early 1998.

23. We completed detailed design of the “Stage 1 phase 1A – upgrading of sewage sludge dewatering facilities at Mui Wo sewage treatment plant” in April 1998 under block allocation **Subhead 4100DX** “Drainage works, studies and investigations for items in Category D of the Public Works Programme”. We commenced construction of the stage 1 phase 1A works in June 1998 and completed the works 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 STP. We commenced the construction works in September 2000 and substantially completed the works in April 2003.

25. In May 2000, we upgraded part of **208DS** to Category A as **224DS** “Outlying Islands sewerage, stage 1 phase 1C – upgrading of Siu Ho Wan sewage treatment plant” for expanding the capacity of the Siu Ho Wan STP and for upgrading the plant’s treatment process from preliminary level to chemical treatment and disinfection. We commenced the construction works in July 2001 for completion in January 2005.

26. To implement the Administration’s decision to develop a cable car system linking Ngong Ping and Tung Chung for tourism promotion, EPD completed a review of the Ngong Ping sewerage scheme in 2001 and concluded that the sewerage scheme should be expanded to cater for around 47 000 visitors per day and related developments. In June 2001, Finance Committee approved an increase of the approved project estimate of **209DS** by \$12.6 million from \$24.0 million to \$36.6 million in MOD prices to cover the costs of impact assessments, investigation and design work for the revised Ngong Ping sewerage scheme.

27. In December 2002, we sub-divided **208DS** into **208DS** “Outlying Islands sewerage, stage 1 phase 1 part 1 – Ngong Ping sewerage, sewage treatment and disposal” and **230DS** “Outlying Islands sewerage, stage 1 phase 1 part 2 – Yung Shu Wan sewage treatment works and outfall”.

28. We have substantially completed the design and plan to start the construction of the proposed STP, public sewers and the effluent export pipeline in August 2003 for completion in July 2005 to tie in with the target commissioning date of August 2005 for the cable car system.

29. We estimate that the proposed works will create some 150 jobs, including 25 professional/technical staff and 125 labourers, totalling 3 000 man-months.

Environment, Transport and Works Bureau
April 2003



工程計劃項目第208DS/B號
PWP ITEM No. 208DS/B

圖則名稱 Drawing No.
離島污水收集系統第1階段
第1期第一部份 - 昂坪污水
收集系統 - 污水處理及排放設施
OUTLYING ISLANDS SEWERAGE,
STAGE 1, PHASE 1 PART 1 -
NGONG PING SEWERAGE,
SEWAGE TREATMENT AND DISPOSAL

繪圖 Drawn	Original Signed	CW CHAN	日期 Date	11-02-2003
核對 Checked	Original Signed	H.S. FONG	日期 Date	11-02-2003
審核 Approved	Original Signed	K.W. MAK	日期 Date	11-02-2003
製作 Title	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION			

圖例 LEGEND	
	擬議之三級污水處理廠的位置 PROPOSED TERTIARY SEWAGE TREATMENT PLANT SITE
	擬議離島污水收集系統出口管 PROPOSED TANK EFFLUENT EXPORT PIPELINE
	擬議之污水渠 PROPOSED SEWERS

圖則編號 Drawing No.	208 DS/B
DCM/2003/007	
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擬建污水處理廠
PROPOSED SEWAGE TREATMENT PLANT

纜車站位置
CABLE CAR TERMINAL SITE



由天壇大佛觀望之污水處理廠模擬圖像
PHOTOMONTAGE VIEW OF THE FUTURE SEWAGE TREATMENT PLANT FROM THE TIAN TAN BUDDHA

昂坪路
NGONG PING ROAD



近距離景觀
CLOSE UP VIEW

工程計劃項目第208DS/B號
PWP ITEM No. 208DS/B

圖則名稱 drawing title

擬建之昂坪污水處理廠模擬圖像
PHOTOMONTAGE VIEWS OF THE PROPOSED
NGONG PING SEWAGE TREATMENT PLANT

繪圖 Original Signed	T.C. CHAN	日期 Date	02-04-2003
核對 Original Signed	H.S. FONG	日期 Date	02-04-2003
批准 Original Signed	K.W. MAK	日期 Date	02-04-2003
部門 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

圖則編號 drawing no.	比例 scale
DCM/2003/011	N.T.S.
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Enclosure 2 附件 2

**208DS - Outlying Islands sewerage, stage 1 phase 1 part 1
Ngong Ping sewerage, sewage treatment and disposal**

Breakdown of estimates for the consultants' fees

Consultants' staff cost		Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee (\$million)
(a)	Contract administration	-	-	-	0.58
	(Note 2)	-	-	-	0.46
(b)	Site supervision by resident site staff employed by the consultants	80	38	1.6	7.40
	(Note 3)	670	14	1.6	20.60
Total consultants' staff cost					29.04

* MPS = Master Pay Scale

Notes

1. A multiplier of 2.0 is applied to the average MPS point to estimate the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier of 1.6 is applied in the case of resident site staff supplied by the consultants. (As at 1.10.2002, MPS pt. 38 = \$57,730 per month and MPS pt. 14 = \$19,195 per month.)
2. The consultants' staff cost for contract administration is calculated in accordance with the consultancy agreement between the D of DS and the consultants for the design and construction of the project **208DS**.
3. The consultant's staff cost for site supervision is based on the estimates prepared by the D of DS. We will only know the actual man-months and actual costs after the completion of the construction works.

For information

Legislative Council Panel on Environmental Affairs

Supplementary Information on 208DS – Outlying Islands sewerage, stage 1 phase 1 part 1 Ngong Ping sewerage, sewage treatment and disposal

Purpose

This paper provides supplementary information on the detailed cost breakdown of the Ngong Ping Sewage Treatment Plant (STP), and a cost comparison between adopting the Sequencing Batch Reactor¹ (SBR) technology and the Biological Aerated Filters² (BAF) technology in treating sewage as requested by Members during the discussion on **208DS** – “Outlying Islands sewerage, stage 1 phase 1 part 1, Ngong Ping sewerage, sewage treatment and disposal” on 10 April 2003. In view of Members' interest on the effluent reuse opportunities raised at the meeting, additional information is also included in this paper.

Detailed cost breakdown of the Ngong Ping STP

2. The detailed cost breakdown of the Ngong Ping STP is as follows –

	\$ million (in Sept 2002 prices)
A. Treatment Facilities	90
(a) Inlet pumping stations and inlet works (screens and grease separators)	25

¹ Sequencing Batch Reactor is a kind of biological treatment process which utilises suspended growth of microorganisms to remove organic pollutants and nutrients from wastewater. It has the benefit of small in size and high flexibility to handle high fluctuating sewage flows.

² Biological Aerated Filter is a new kind of biological treatment process which utilises microorganisms that attach on a granular media, for removing of organic pollutants and nutrients from wastewater. It is even smaller in size as compared with Sequencing Batch Reactor but the experience of its operation in warmer climate like Hong Kong is limited.

	(b) SBR tanks	33
	(c) Dual media granular filter and UV disinfection system	13
	(d) Sludge digestion, dewatering and storage facilities	19
B.	Earthwork	31
	(a) Site formation	10
	(b) Excavation for underground structures	21
C.	Emergency storage tank	25
D.	Landscaping works and miscellaneous	7
		153
	Total	153

Comparison of SBR and BAF

3. A comparison of the SBR and the BAF treatment technologies is as follows –

Estimated Unit Capital Cost

	SBR (HK\$/m ³)	BAF (HK\$/m ³)	Difference in %
Inlet pumping stations and inlet works (screens and grease separators)	8,300	8,300	0
SBR tanks and BAF facilities	10,900	14,200 ³	30%
Dual media granular filter and UV disinfection system	4,500	4,500	0

³ The capital cost estimates of the BAF facilities are derived having regard to overseas experience. The cost of using BAF facilities are 30% higher than that of using SBR tanks due to the need to build additional tanks and to cater for backwash. Due to our lack of experience in building BAF facilities suitable for meeting local requirements, the actual costs may vary from the figures quoted.

Sludge digestion, dewatering and storage facilities	6,300	6,000 ⁴	-5%
Total ⁵	30,000	33,000	10%

Estimated Unit Operational Cost

	SBR (HK\$/m ³)	BAF (HK\$/m ³)	Difference in %
Staff Cost	1.4	1.4	0%
Materials and Chemicals	1.2	1.4 ⁶	17%
Energy	0.7	0.8 ⁷	14%
Buildings and Civil Maintenance (by independent contractors)	1.5	1.7 ⁸	13%
Miscellaneous (laboratory testing, laboratory equipment, workshop services)	1.2	1.2	0%
Total	6	6.5	8%

4. The higher capital and operational costs for the BAF systems are mainly due to the additional costs associated with building and operating the additional tanks and backwash facilities.

Justification for adopting the SBR in Ngong Ping STP

5. We have selected the SBR treatment technology for the Ngong Ping STP. Apart from the cost consideration, we have also taken into account the following factors in arriving at the conclusion that the SBR treatment technology is more suitable for the Ngong Ping STP –

- (a) To provide tertiary treatment for the Ngong Ping sewage, we need the biological treatment process. Technically, there are only two generic types of biological treatment, namely the suspended growth

⁴ The lower cost is due to the better sludge characteristics in terms of sludge processing.

⁵ The total cost does not include items B, C and D under paragraph 2 above as these items are only specific to the Ngong Ping STP due to its unique location.

⁶ The higher cost is due to the additional polymer/lime required for sedimentation and filter media for BAF.

⁷ The higher cost is due to the additional energy consumption for air blowing/scraping in the additional sedimentation tanks/equalisation tanks.

⁸ The higher cost is due to the additional sedimentation tanks and equalisation tanks required for BAF.

activated sludge process (e.g., SBR) and the attached growth biological reactor (e.g., BAF).

- (b) Of the various activated sludge processes, SBR is more suitable for the Ngong Ping STP situation because it does not require a continuous operation mode, and hence can have greater flexibility to cope with the very high fluctuation in sewage flows at Ngong Ping between weekdays and holidays.
- (c) Although there are successful BAF installations overseas, we need more time to evaluate the performance of BAF technology under Hong Kong's conditions. However, the programme of the Ngong Ping STP is very tight as the STP has to be completed before the commissioning of the Tung Chung Cable Car Project in August 2005. Hence, we consider it prudent not to adopt the BAF or other less proven technology in the case of Ngong Ping STP.
- (d) The chief merit of BAF treatment technology in comparison to SBR is space-saving. However, space availability is not a critical factor for the Ngong Ping STP as the whole STP is on Government land and no land resumption is required.

Effluent Reuse Opportunities

6. Various effluent reuse opportunities have been duly considered, namely for washing cable car, uses by cooling towers etc. The idea of cable car washing has been dropped because the MTRCL has indicated that its car washing operation will very likely be conducted at the Tung Chung Terminal, not at Ngong Ping. Moreover, it should also be noted that although the quality of the effluent after tertiary treatment is high, it still needs additional treatment to bring it up to standard for reuse options with non-direct body contact, e.g. flushing and irrigation in a controlled manner. Should the treated effluent be used for purposes with possible body contact, even higher additional treatment will be required to meet the stringent standard to protect the public health. The additional cost involved will be far too expensive to be justified for this particular project. The additional works required to support the currently proposed reuse options, i.e. flushing and landscape irrigation, will only cost \$4.1 million, the funding of which has been approved under another PWP project under the Water Supplies Department, namely, **9323WF** by Finance Committee on 21 February 2003.