For Information

Subcommittee on
Sewage Services (Sewage Charge) (Amendment) Regulation 2007,
Sewage Services (Trade Effluent Surcharge) (Amendment) Regulation 2007 and
Technical Memorandum on Procedures and Methods for Sampling and Analysis of Trade Effluents

Information on Issues raised by Members at the First Meeting on 19 April 2007

Purpose

In response to requests made by Members at the Subcommittee meeting on 19 April 2007, this paper provides additional information on the following topics:

(a) While the Government will continue to be responsible for the capital costs of the sewage services, the proposed increase of the cost recovery rate for the operational cost from about 54% to about 80% in 10 years' time; and

(b) the Administration's commitment to implementing the Harbour Area Treatment Scheme (HATS) Stage 2B.

Proposed Increase of the Cost Recovery Rate for Recurrent Operating Costs of Sewage Services in 10 Years' Time

2. In the next ten years, the Government plans to invest about $20 billion in new sewerage and sewage treatment facilities to enhance our water quality and protect public health. Apart from the next phase of HATS, we also have plans for substantial improvements for the sewerage infrastructures across the territory. The amount of investment to be met by the Government is almost as much as the amount invested in the last twenty years.

3. Under our proposed scheme, all the capital cost of the sewage services will continue to be borne by the Government, only the operating cost will be

shared by households and the trades to encourage reduction of sewage and to ensure long-term sustainability. The Government proposes that the Sewage Charge (SC) be increased gradually so as to raise the cost recovery rate from about 54% at present to about 80% in ten years' time, which is still below full operating cost recovery. (A graph showing the projected SC rates and corresponding recovery rates in the coming ten years is at Annex A.)

4. Under the proposed scheme, the increments for the coming ten years will remain modest, gradual and predictable providing a degree of certainty to all users. We have considered carefully other alternative schemes and concluded that the proposal represents the best way forward. For example, if the proposed increments are approved for a shorter period of time but the annual rate of increase remains at 9.3% per annum, we will fall short of the objective of strengthening the application of the polluter pays principle when bringing forward new sewerage projects aimed at further improving Hong Kong's water environment. We estimate that the major projects will increase the annual operating expenditure of sewage treatment services from about $1,150 million in 2005/06 to $2,450 million by 2016/17. If the proposed increment scheme is not accepted, this means that we would be moving further away from a sustainable approach based on the polluter-pays principle widely supported by the Legislative Council (LegCo) and the public, rather than moving closer to it.

5. Both LegCo and members of the public have shown clear support for the application of the polluter-pays principle in the provision of sewage services. During the extensive consultation exercise on HATS Stage 2 conducted from June to November 2004, the majority of the respondents supported this principle while many considered that affordability should also be considered. LegCo, at its meeting on 8 December 2004, urged that the sewage services charging scheme be reviewed with a view to ensuring that the charging scheme be fair and reasonable and that the polluter-pays principle be put into effect. LegCo Members and public deputations reaffirmed their support to the principle following the announcement of the package of proposals for reviewing the sewage services charging scheme last December.

6. As requested by Members, further information is provided below for the following specific issues:

(a) A comparison, with breakdowns, of the operating costs of Stages 1, 2A and 2B of the Harbour Area Treatment Scheme (HATS) is at Annex B.

(b) A list of the sewage treatment projects, including HATS Stage 2A, the operating costs of which have been factored into the 10-year SC increment projection, with information on their estimated capital and recurrent costs, is at Annex C.

(c) The pollutant removal efficiency achieved by Stage 1 and to be achieved by Stages 2A and 2B respectively, including the level of Biochemical Oxygen Demand and *E. coli*, as well as the overall improvements projected for Victoria Harbour, is at Annex D.

(d) On the need for disinfection, we have been acting to meet the LegCo request in the Report No. 42 (2004) of the Public Accounts Committee (PAC) for the Administration to "*take into account the high bacteria level of the effluent discharged from the Stonecutters Island Sewage Treatment Works in planning the further stages of HATS, and in evaluating the options for providing a permanent disinfection facility in the long term*". Regarding the question of the need for disinfection after HATS Stage 2B is commissioned, the water quality modeling results of the Environmental Impact Assessment (EIA) study for the Advance Disinfection Facilities (ADF) show that with the implementation of Stage 2B, compliance with the relevant Water Quality Objectives (WQOs) at most of the beaches could be achievable without the provision of disinfection. However, it is important to note that modeling cannot fully predict the high variability of some factors (e.g. salinity, natural ultra violet radiation and wind) that affect the density of *E. coli* in the receiving waters, particularly in very localized areas such as beaches. Therefore, disinfection is necessary to ensure consistent compliance with the WQOs to safeguard the well being of the beach and water body users.

Administration's Commitment to Implementing HATS Stage 2B

7. The Government is fully committed to implementing HATS Stage 2, including biological treatment of all HATS effluent under Stage 2B. We propose to implement the relatively straight-forward HATS Stage 2A first so that we can bring about further improvement to the water quality of our harbour as soon as we can. To take forward HATS Stage 2B, we have made a public commitment to thoroughly review the timing and methodology of commissioning Stage 2B. We believe this is a prudent and responsible approach for the following reasons:

(a) Procedures and time required for securing the site for Stage 2B

We have conducted studies and trials to determine the land requirement for biological treatment for HATS effluent under Stage 2B and concluded that even a very compact treatment plant could not be accommodated on the limited available land within the existing Stonecutters Island Sewage Treatment Works (SCISTW) site. We have identified an adjacent site which has the potential to accommodate the treatment facilities on a co-use basis. The site is currently zoned under the Stonecutters Island Outline Zoning Plan No.S/SC/8 for "Other Specified Uses" annotated "Container Related Uses" (Annex E). It is currently let on a number of short-term tenancies which expire in early 2010. To maximize the efficient use of the available land, particularly given its location close to other major container-related facilities, we propose that the biological treatment plant under Stage 2B should be constructed underground to allow other "container related" operations to take place above it. The originally intended use for the site must be settled before design work can start. To this end, we have commenced work to address the planning, interface and development issues involving different Government bureaux and departments concerned with the co-use of the site. Thereafter, we would also need to submit a planning application for consideration by the Town Planning Board for an "Amendment of Plan" under the Town Planning Ordinance. Given the complexity of the issues involved and the statutory process which we will have to go through for the rezoning application, at present we

roughly estimate that the earliest possible time for completing the above processes will be around the latter part of 2010. Given that the implementation of HATS Stage 2A can bring about further improvement to the water quality of the harbour, we consider it sensible to implement HATS Stage 2A first instead of holding up Stage 2A for another few years until 2B can proceed.

(b) Monitoring of water quality and other parameters to ensure timely and cost-effective implementation of Stage 2B

In deciding the optimal timing of commissioning the biological treatment plant planned under Stage 2B, we need to take into account not only the substantial capital investment and the land required for works of such a scale, but also the substantial annual operating cost which would have to be ultimately shared by all users of sewage services through the sewage charges. According to our estimates, the capital cost of Stage 2B will be around $ 10.8 billion[1]. The recurrent cost for the operation of biological treatment under Stage 2B is estimated to be around $700 million per year, compared with around $420 million for that of Stage 2A including the disinfection facilities. All things being equal, this scale of additional operating expenditure would result in a further increase in the average household sewage charge bill by roughly 28% over and above the figure now projected for 2016/17.

Based on the findings of the Environmental and Engineering Feasibility Studies (EEFS) released in 2004, HATS Stage 2A will enable us to achieve most of the Water Quality Objectives. It removes 80% of suspended solids and 70% of organic matter from the sewage – a performance equivalent to about 80% of that of a biological treatment process. We estimate that *E. coli* will be reduced by about 90% in the harbour environment. HATS 2A will also put a halt to the unacceptable situation whereby 450,000 tonnes of virtually untreated sewage are discharged into Victoria Harbour every day from the western and northern parts of Hong Kong Island.

Having regard to the significant improvements to be brought about by

[1] Based on September 2006 price level. Similar for the two figures following.

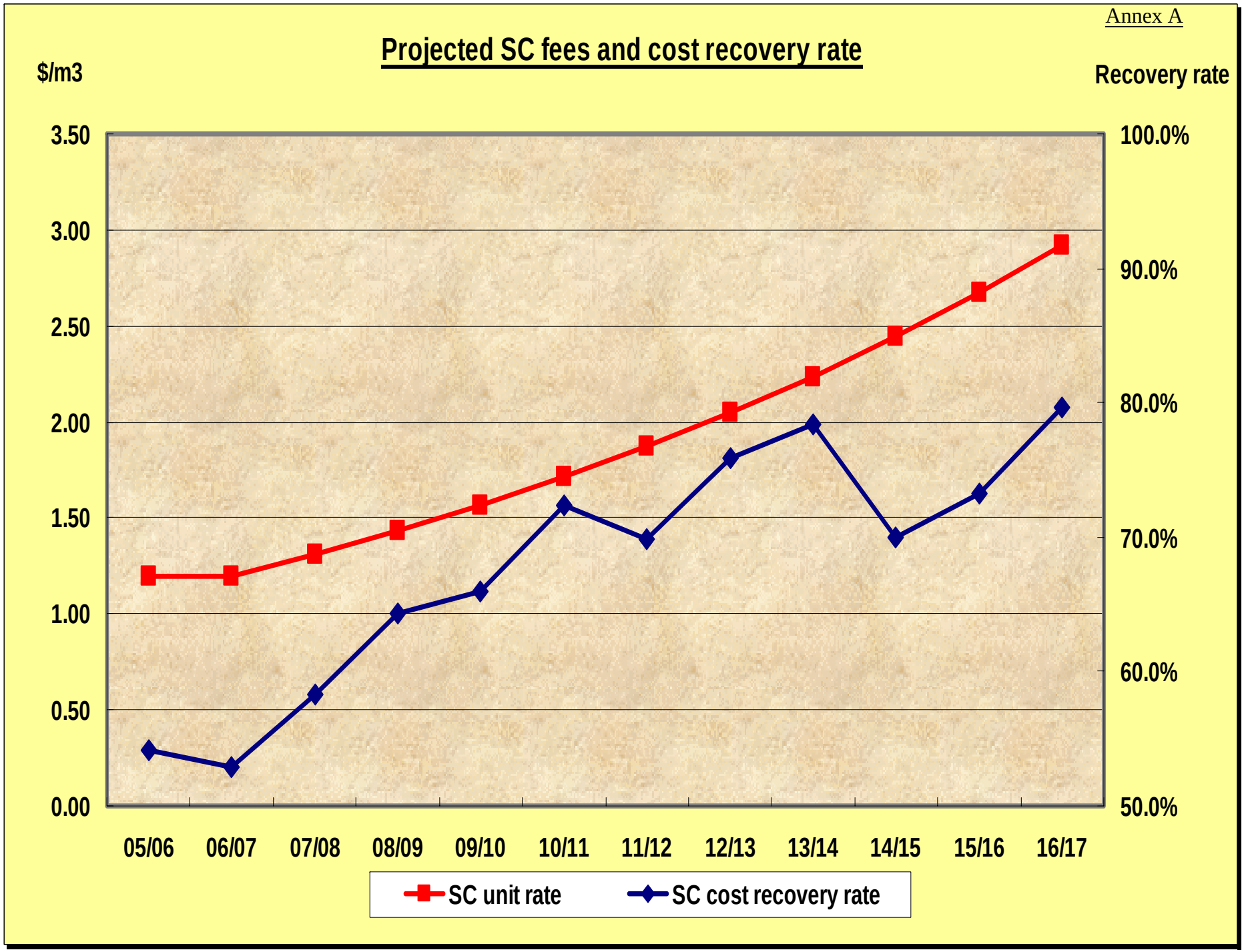
HATS 2A, and taking into account the sizable recurrent cost of HATS 2B, we consider it prudent that the actual environmental need should be taken into account in deciding the actual year of commissioning of HATS 2B. Indeed, this view was supported by a number of Members and public deputations at the Panel on Environment Affairs on 22 January 2007. To facilitate our decision on the optimal timing of implementing HATS 2B, we have been closely monitoring the water quality trends through targetted field surveys, and keeping the information concerning population growth and sewage flow forecasts up to date. When we conduct the review on the timing of the implementation of Stage 2B, we will take into account the latest developments in regard to the dual use of the site and technological advancements relating to biological treatment, as well as additional field data on the planning parameters for Stage 2B. We will then chart out the scale and timetable of the project, and provide an updated estimate on the operating cost of Stage 2B in accordance with the latest available information.

Conclusion

8. The community is very keen to see further improvement to the water quality of our harbour and therefore the Government has decided to implement HATS 2A first so as to meet such aspirations in the first instance. The outcome of our consultation [and other surveys] reveal that the community is fully behind our proposed approach and they are prepared to pay their fair share of the operating cost via a gradual and modest series of increases in the Sewage Charge in line with the polluter-pays principle. The Government will shoulder all capital costs relating to sewage services and is ready to commence HATS 2A once the regulations in question have been passed. At the same time, the Government is fully committed to commissioning HATS 2B. Bearing in mind the considerations in paragraph 7 above, the best and earliest timing for the review will be in 2010/11. Once we have completed the review in 2010/11 on the planning parameters, we will draw up an implementation programme with an updated estimate on the operating cost of Stage 2B in accordance to the latest available information.

Environmental Protection Department
April 2007

Annex A


Projected SC fees and cost recovery rate
$/m3
Recovery rate
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
05/06
06/07
07/08
08/09
09/10
10/11
11/12
12/13
13/14
14/15
15/16
16/17
SC unit rate
SC cost recovery rate

Sewage Charge element (with the proposed fee adjustments of 9.3%)
排污費部分(已計及建議的9.3%費用調整)

Annex A 附件A

	05/06 年度	**06/07 年度**	**07/08 年度**	**08/09 年度**	**09/10 年度**	**10/11 年度**	**11/12 年度**	**12/13 年度**	**13/14 年度**	**14/15 年度**	**15/16 年度**	**16/17 年度**
	Actual 實際	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計	Projected 預計
	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元	$M 百萬元
Total expenditure * 開支總額	1,154	1,196	1,213	1,231	1,348	1,380	1,607	1,653	1,783	2,232	2,388	2,453
SC Expenditure * 排污費開支	903	935	948	963	1,055	1,079	1,254	1,290	1,402	1,758	1,880	1,931
SC Revenue (with fee adj) 排污費收入(已計及費用調整)	489	495	553	619	696	781	875	980	1,099	1,230	1,376	1,538
SC Cost recovery rate 排污費成本收回率	54.1%	52.9%	58.3%	64.3%	66.0%	72.3%	69.8%	75.9%	78.4%	70.0%	73.2%	79.6%
Average household monthly SC bill ($) 平均每月每戶(住宅用戶)排污費(元)	11.0	11.0	12.0	13.1	14.4	15.7	17.2	18.8	20.5	22.4	24.5	26.8

* expenditure includes recurrent cost of HATS Stage 2A, Sludge Treatment Facilities and other planned sewage projects
開支包括淨化海港計劃第二期甲、污泥處理設施及其他已計劃的污水工程的經常開支。

Annex B

Harbour Area Treatment Scheme
Breakdown of Operating Costs

	Operating Costs of Stage 1 ($M)	Additional Operating Costs due to Stage 2A - ADF ($M)	Additional Operating Costs due to Stage 2A - Main Works ($M)	Additional Operating Costs due to Stage 2B ($M)
Staff	47	-	3	20
Light & Power	94	1	79	380
Chemical	32	86	111	-40
Sludge Disposal	21	-	20	50
Maintenance	126	1	120	290
Total	320	88	333	700

List of capital projects with recurrent consequences
基本工程(附經常開支)一覽表

Annex C
附件 C

	Project Code and Title 工程編號 及 名稱	Cat. 級別	Expected Completion Yr 預計 完成年份	Project Cost 工程費用 $M (百萬元)	Recurrent Consequences required in each financial year 每個財政年度所需的經常開支 08/09 $M (百萬元)	09/10 $M (百萬元)	10/11 $M (百萬元)	11/12 $M (百萬元)	12/13 $M (百萬元)	13/14 $M (百萬元)	14/15 $M (百萬元)	15/16 $M (百萬元)	16/17 $M (百萬元)
4211DS	Outlying Islands Sewerage Stage 1 Phase 2 - Remainder Peng Chau Sewage Treatment Works Upgrade 離島污水收集系統第1階段第2期— 坪洲污水處理廠改善工程餘下工程	A	07/08	93.000	2.380								
4229DS	Expansion to Shek Wu Hui Sewage Treatment Works 石湖墟污水處理廠擴建工程	A	08/09	270.980		4.110							
4215DS	Yuen Long and Kam Tin sewerage and sewage disposal - Kam Tin trunk sewerage, Phase 1 and Au Tau trunk sewers 元朗及錦田污水收集系統及污水排放設施— 錦田污水幹渠收集系統第1期及凹頭污水幹渠工程	A	09/10	348.423		4.110							
4222DS	Tai Po Sewage Treatment Works, Stage 5 Phase 1 大埔污水處理廠第5階段第1期工程	A	09/10	433.300		4.770							
4341DS	**Harbour Area Treatment Scheme Stage 2A - Advance disinfection (4341DS-2) 淨化海港計劃第2A期 —前期消毒設施(4341DS-2)**	**C**	**09/10**	**66.027**		**87.980**							
4347DS	Port Shelter Sewerage Stage 3 - Sai Kung Area 4 sewerage 牛尾海污水收集系統第3階段工程— 西貢第4區污水收集系統	A	09/10	60.469			1.565						
4052DS	Ting Kau Sewerage, Stage 2 汀九污水收集系統第2階段	B	09/10	62.491			0.712						
4126DS	Sham Tseng Sewerage, Stage 3 深井污水收集系統第3階段	B	09/10	43.474			0.585						

Project Code and Title 工程編號 及 名稱		Cat. 級別	Expected Completion Yr 預計 完成年份	Project Cost 工程費用 $M (百萬元)	Recurrent Consequences required in each financial year 每個財政年度所需的經常開支								
					08/09 $M (百萬元)	09/10 $M (百萬元)	10/11 $M (百萬元)	11/12 $M (百萬元)	12/13 $M (百萬元)	13/14 $M (百萬元)	14/15 $M (百萬元)	15/16 $M (百萬元)	16/17 $M (百萬元)
4230DS	Outlying Islands sewerage, stage 1 phase 1 part 2 - Yung Shue Wan sewerage, sewage treatment works and outfall 離島污水收集系統第1階段第1期工程第2部分— 榕樹灣污水收集系統、污水處理廠及海底排放管道	B	10/11	268.396			3.996						
4234DS	Outlying Islands sewerage, stage 1 phase 2 - Sok Kwu Wan sewage collection, treatment and disposal facilities 離島污水收集系統第1階段第2期工程— 索罟灣污水收集、處理及排放設施	B	10/11	252.380			6.185						
4350DS	Yuen Long and Kam Tin sewerage and sewage disposal - consultants' fees and investigations 元朗及錦田污水收集系統及污水排放計劃— 顧問費及勘測工作	A	10/11	28.000				0.000					
4338DS	Improvement and upgrading of the sewerage systems in Sha Tin/Ma On Shan New Town 沙田/馬鞍山新市鎮污水收集系統改善及擴建工程	B	10/11	73.038				0.000					
5233DS	(under EPD) (在環境保護署項下) Sludge treatment facilities 污泥處理設施	C	10/11	2,713.000				130.985					
4237DS	North District and Tolo Harbour Sewerage, Sewage Treatment & Disposal - High Priority Works Tai Po Tai Wo Road Pumping Station 北區及吐露港污水收集系統、污水處理及排放設施— 優先工程—大埔太和路泵房	B	11/12	98.455				2.300					
4329DS	Upgrading of Pillar Point sewage treatment works 望后石污水處理廠改善工程	B	11/12	834.006				53.600					
4342DS	Tai Po sewage treatment works, stage 5 phase 2A - disinfection 大埔污水處理廠第5階段第2A期— 消毒設施	B	11/12	45.675				4.400					

Project Code and Title 工程編號及名稱		Cat. 級別	Expected Completion Yr 預計完成年份	Project Cost 工程費用 $M (百萬元)	Recurrent Consequences required in each financial year 每個財政年度所需的經常開支								
					08/09 $M (百萬元)	09/10 $M (百萬元)	10/11 $M (百萬元)	11/12 $M (百萬元)	12/13 $M (百萬元)	13/14 $M (百萬元)	14/15 $M (百萬元)	15/16 $M (百萬元)	16/17 $M (百萬元)
4343DS	Outlying Islands sewerage stage 2 - Peng Chau Village sewerage phase 2 離島污水收集系統第2階段— 坪洲鄉村污水收集系統第2期	B	11/12	25.375				0.545					
4348DS	North District and Tolo Harbour sewerage, sewage treatment and disposal - regional sewerage works, part 1- sewerage upgrade 北區及吐露港污水收集系統，污水處理及排放— 區域污水收集系統工程—第1部分— 污水收集系統改善工程	B	11/12	364.933					4.510				
4235DS	Yuen Long and Kam Tin sewerage and sewage disposal 元朗及錦田污水收集系統及污水排放設施	B	12/13	850.875						33.947			
4339DS	North District sewerage, stage 1 phases 2B and 2C and stage 2 phase 1 北區污水收集系統第1階段第2B及2C期及 第2階段第1期工程	B	12/13	391.055						8.000			
4344DS	Upgrading of Central and East Kowloon sewerage - package 1 九龍中部及東部污水收集系統改善工程 第1部分	B	12/13	47.502						0.447			
4157DS	Yuen Long and Kam Tin Sewerage Stage 2 Phase 3B, 3C, 4B, 4C, 5B, 5C and 5D 元朗及錦田污水收集系統第2階段 第3B、3C、 4B、 4C、5B、5C 及 5D期	B	13/14	49.735						1.900			
4160DS	Tuen Mun Sewerage, Stage 1 屯門污水收集系統第1階段	B	13/14	116.725						2.000			
4181DS	Tuen Mun Sewerage, Stage 2 屯門污水收集系統第2階段	B	13/14	185.745						5.800			

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					08/09 $M (百萬元)	09/10 $M (百萬元)	10/11 $M (百萬元)	11/12 $M (百萬元)	12/13 $M (百萬元)	13/14 $M (百萬元)	14/15 $M (百萬元)	15/16 $M (百萬元)	16/17 $M (百萬元)
4274DS	Yuen Long and Kam Tin Sewerage Stage 3, Phase 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B, 6A, 6B, 7A & 7B 元朗及錦田污水收集系統第3階段第2A、2B、 3A、 3B、 4A、4B、 5A、 5B、 6A、 6B、 7A 及 7B期	B	13/14	188.892						7.630			
4236DS	Tai Po sewerage treatment works, stage 5 phase 2B 大埔污水處理廠第5階段第2B期工程	C	13/14	407.000						15.992			
4331DS-1	Outlying Islands sewerage stage 2 - Mui Wo Village sewerage phase 2 and Mui Wo sewage treatment works upgrade 離島污水收集系統第2階段— 梅窩鄉村污水收集系統第2期及 梅窩污水處理廠改善工程	C	13/14	198.660						12.329			
----DS	Sewerage to Chuen Lung Village, Kau Wa Keng Old village and Lo Wai 川龍村、九華徑舊村及老圍的污水收集系統	C	13/14	58.370						0.992			
4332DS	Lam Tsuen Valley Sewerage 林村谷污水收集系統	B	13/14	304.500							5.800		
4346DS	Upgrading of Tuen Mun sewerage, phase 1 屯門污水收集系統改善計劃第1期	B	13/14	502.425							12.000		
4226DS	Sai Kung sewage treatment works phase 2 upgrading 西貢污水處理廠第2期改善工程	C	13/14	230.000							10.871		
4331DS-2	Outlying Islands sewerage stage 2 - Tai O and Cheung Chau sewerage 離島污水收集系統第2階段— 大澳及長洲污水收集系統	C	13/14	303.100							26.312		
4331DS-3	Outlying Islands sewerage stage 2 - Lamma Village sewerage phase 2 離島污水收集系統第2階段— 南丫島鄉村污水收集系統第2期	C	13/14	81.050							3.520		

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4125DS	Tolo Harbour sewerage of unsewered areas 爲吐露港內未有污水設施地區而興建的 污水收集系統	B	14/15	388.110							11.091		
4337DS	Upgrading of Central and East Kowloon sewerage - packages 2 and 3 九龍中部及東部污水收集系統改善工程— 第2部分及第3部分	C	14/15	163.000							1.200		
4341DS	**Harbour Area Treatment Scheme Stage 2A - Remaining works (4341DS-1 and 4341DS-3, including 4238DS)** **淨化海港計劃第2A期** **—餘下工程 (4341DS-1及4341DS-3，包括4238DS)**	**C**	**14/15**	**7,873.500**							**333.000**		
4272DS	Port Shelter sewerage stage 2 牛尾海污水收集系統第2階段工程	C	14/15	245.000								9.403	
4273DS	Port Shelter sewerage stage 3 牛尾海污水收集系統第3階段工程	C	14/15	130.000								5.323	
4345DS	North District sewerage stage 2 part 2A 北區污水收集系統第2階段第2A期工程	B	15/16	178.305								4.633	
4223DS	Yuen Long and Kam Tin sewerage treatment upgrade- Upgrade of San Wai sewage treatment works 元朗及錦田污水處理系統改善工程— 新圍污水處理廠改善工程	C	15/16	1,168.400								76.058	
4203DS	North District sewerage Stage 2 part 2B 北區污水收集系統第2階段第2B期工程	C	15/16	95.500									2.475
	Total : 總額 :			20,238.871	2.380	100.970	13.043	191.830	4.510	89.037	403.794	95.417	2.475

Total Recurrent Consequences (經常開支總額) : $903.5M

Project Code and Title 工程編號 及 名稱	Cat. 級別	Expected Completion Yr 預計 完成年份	Project Cost 工程費用 $M (百萬元)	Recurrent Consequences required in each financial year 每個財政年度所需的經常開支 08/09 $M (百萬元)	09/10 $M (百萬元)	10/11 $M (百萬元)	11/12 $M (百萬元)	12/13 $M (百萬元)	13/14 $M (百萬元)	14/15 $M (百萬元)	15/16 $M (百萬元)	16/17 $M (百萬元)

Notes

(1) The above information is compiled based on 2006 Resource Allocation Exercise bid. All Cat. C projects have been subsequently upgraded to Cat. B.
上述資料是根據2006年資源分配工作的撥款申請而編訂。所有丙級工程計劃其後已提升爲乙級。

(2) Harbour Areas Treatment Scheme Stage 2A (HATS 2A) comprises 'Advance disinfection' and 'Remaining works', the expected completion year of which is in 2009-10 and 2014-15 respectively and total recurrent conquences are $420.98M.
淨化海港計劃第二期甲包括「前期消毒設施」及「餘下工程」，這兩項工程預計分別 於 2009-10 年度及 2014-15 年度完成，經常開支總額爲 4.2098 億元。

(3) Recurrent consequences are at the price levels of the respective years.
經常開支反映有關年度的價格水平。

Table 1. Stonecutters Island Sewage Treatment Works - Pollutant Removal Efficiency

表一　昂船洲污水處理廠除污率

Parameter **參數**	**HATS** **「淨化海港計劃」**		
	Stage 1 **第一期**	**Stage 2A** **第二期甲**	**Stage 2B** **第二期乙**
Treatment process 處理程序	Chemically enhanced primary treatment (CEPT) 化學處理	CEPT + Disinfection 化學處理+消毒	CEPT + Biological Treatment + Disinfection 化學處理+生物處理 +消毒
E. coli(1) *大腸桿菌*(1)	50%	99.9%	99.9%
Organic pollutants (BOD) 有機污染物 (生物需氧量)	70%	70%	90%
Suspended solids 懸浮固體	80%	80%	88%
Nitrogen (mainly organic N) 氮(有機氮爲主)	20-25%	20-25%	83%
Phosphorus 磷	40-50 %	40-50%	60%

Note:

(1) Disinfection of wastewater aims to prevent the spread of waterborne diseases, many of which are caused by bacteria. Apart from removing 99.9% of E. coli, chlorine disinfection can destroy most pathogenic enteric organisms, including those responsible for causing typhoid fever (Salmonella typhosa), paratyphoid (Salmonella paratyphi), dysentery (Shigella dysenteriae), etc. Streptococcus, Staphylococcus, and Pseudomonas species, frequently associated with skin, eye, and other recreational contact diseases, are also controlled by chlorine disinfection.

附註：

(1) 爲防止由污水傳染疾病.我們會在廢水處理過程中加入氯氣消毒.除了可以除去 99.9%的大腸桿菌,更消除其他致病細菌,包括傷寒沙門氏菌,副傷寒沙門氏菌,痢疾志賀氏菌等.還有與一般皮膚,眼睛,或因消閒活動而感染的接觸性疾病,包括鏈球菌,葡萄球菌,及假單胞細菌,均可經氯氣消毒過程而除去.

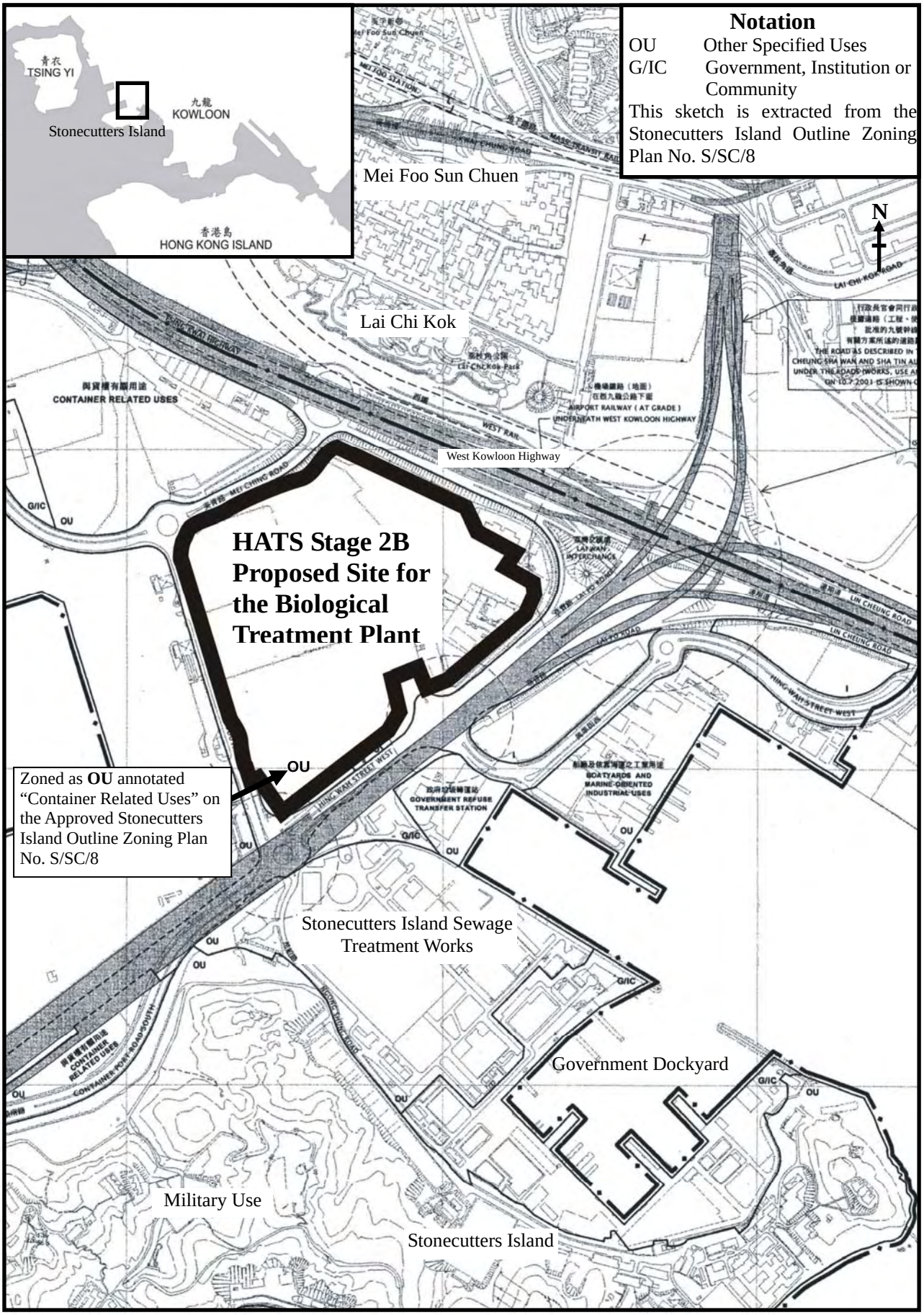
Table 2. Improvements to Victoria Harbour Water Quality from HATS

表二 「淨化海港計劃」爲維多利亞港水質帶來的改善

Parameter **參數**	**HATS** **「淨化海港計劃」**			
	Stage 1 **第一期**	**Stage 2A** **第二期甲**	**Stage 2B** **第二期乙**	**Stage 2 total** **第二期全期**
Treatment process 處理程序	CEPT 化學處理	CEPT + Disinfection 化學處理+消毒	CEPT + Biological Treatment + Disinfection 化學處理 +生物處理+消毒	CEPT + Biological Treatment + Disinfection 化學處理 +生物處理+消毒
E. coli *大腸桿菌*	Reduced by 50% 減少 50%	Reduced by about 90% (3) 減少約 90%(3)	Reduced by about 90% (3) 減少約 90%(3)	Reduced by about 90% (3) 減少約 90%(3)
Dissolved oxygen 溶解氧	Increased by 10% 增加 10%	Further increased by an additional 5% 額外增加 5%	Further increased by an additional 5% 額外增加 5%	Increased by a total of 10% 總共增加 10%
Ammonia 氨	Reduced by 25% 減少 25%	Further reduced by an additional 10% 額外減少 10%	Further reduced by an additional 50% 額外減少 50%	Reduced by a total of 60% 總共減少 60%
Total inorganic nitrogen 總無機氮	Reduced by 16% 減少 16%	Further reduced by an additional 5% 額外減少 5%	Further reduced by an additional 25% 額外減少 25%	Reduced by a total of 30% 總共減少 30%
Phosphorus 磷	Reduced by 36% 減少 36%	Further reduced by an additional 8% 額外減少 8%	Further reduced by an additional 7% 額外減少 7%	Reduced by a total of 15% 總共減少 15%

Note: (3) *E. coli* level at a specific location is also subject to the influence of local sources such as urban runoffs and polluted stormwater discharges.

附註：(3) 在指定地點內的大腸桿菌水平亦受到地區性污染源，如城市雨水徑流和受污染的雨水排放的影響。



HATS Stage 2B – Land Requirement for the Biological Treatment Plant