For discussion
on 5 January 2007

Legislative Council
Panel on Environmental Affairs
Application of the Polluter-pays Principle in the Provision of Sewage Services

Introduction

Following a review of the sewage services charging scheme, this paper presents to Members the Administration's proposals for strengthening the application of the polluter-pays principle in the provision of sewage services.

Recommendation

2. In the Policy Agenda 2005, we pledged to review the existing sewage services charging scheme according to the polluter-pays principle with a view to achieving an equitable sharing within the community of the responsibility for funding sewage collection, treatment and disposal. Subject to further fine-tuning in respect of the Trade Effluent Surcharge (TES) (see paragraph 3 below) we have completed the review and recommend that -

(a) as a long term goal, the operating cost of sewage services be fully recovered from the whole community, including both the public and the trades, in accordance with the polluter-pays principle;

(b) as an interim target, 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; and the fee levels in the coming ten-year period be set out in a single item of legislation; and,

(c) regarding the TES, to encourage pollution reduction measures and to address the concerns of the affected trades, the validity period of reassessment should be extended from one year to two years and the sampling requirement for small TES accounts (with daily pollution load less than 50 kg Chemical Oxygen Demand (COD[1])) be reduced from three days to two days.

[1] COD – Chemical Oxygen Demand, the measure of pollution load under the existing TES.

3. In addition, we aim to complete surveys of the quality of the effluents of all trades subject to the TES within 12 months with a view to adjusting their generic COD values and TES rates with effect from 1 April 2008.

Expanding the sewage services to improve water quality

4. Before the commissioning of the Harbour Area Treatment Scheme (HATS) Stage 1 at the end of 2001, 1.8 million m^3 of untreated sewage was being discharged into Victoria Harbour every day, posing health risks and a threat to marine life. Now, HATS Stage 1 collects sewage from the Kowloon side and the north-eastern part of Hong Kong Island and transfers it to Stonecutters Island Sewage Treatment Works (SCISTW) through deep tunnels for chemical treatment. As a result, we have seen substantial water quality improvements in most parts of Victoria Harbour, with dissolved oxygen levels increasing by about 10% overall, toxic ammonia levels decreasing by about 24%, and E coli levels decreasing by over 50% (see **Annex A**). In 2005, the percentage compliance with the Marine Water Quality Objectives within the Victoria Harbour Control Zone was 83%, considerably higher than the 50% recorded in 2001 before HATS Stage 1.

5. Despite the improvements brought about by HATS Stage 1, sewage from the remainder of the northern and western sides of Hong Kong Island continues to be discharged untreated into the Harbour area, polluting the sea from western district to North Point. We must deal with this situation and for this purpose, with the strong support from the community as evidenced in our previous consultation exercises, we propose to proceed with HATS Stage 2A as soon as possible. The project will entail building deep tunnels to transfer the untreated Hong Kong Island sewage to Stonecutters Island where it will receive treatment and disinfection. We will expand the existing treatment plant and, as suggested by the Public Accounts Committee in its report on Audit Report No 42, add a disinfection facility to it. This will build upon the improvements to water quality in Victoria Harbour achieved so far and help return it to an ecologically healthy state. Upon commissioning of the disinfection facility, it will be possible to reopen the four beaches in Tsuen Wan which had to be closed after HATS Stage 1 came on line.

6. Apart from HATS Stage 2A, we also have plans for substantial additional spending on sewerage infrastructure over the next decade or so. These include plans to upgrade sewage treatment at the Pillar Point, Shek Wu Hui, Sai Kung, San Wai, and Tai Po sewage treatment works, and to

provide new plants on Lamma Island. We have also earmarked funds to connect various villages to the public sewerage system, preventing their sewage from polluting the nearby rivers and sea areas. This sewage expansion programme is absolutely necessary to provide a hygienic world-class living environment.

The role of the polluter pays principle

7. It is an internationally recognized principle that all who create waste have a responsibility for helping to pay to clean it up. It is considered to be the only viable option for long-term sustainability of our environment. This fact is widely recognized and appreciated within our community and indeed strong support for the principle was affirmed in the Motion Debate held in the Legislative Council on 8 December 2004.

8. In 1995 the Government established the existing arrangements for charging for collection, treatment and disposal of our wastewater through the sewage services charging scheme. Under this scheme each member of the community, including trades and households, whose wastewater is collected and treated by the public sewerage system contributes to the costs. However in the 11 years of the scheme's existence the charges have never been adjusted, such that the SC now covers only about 54% of the costs attributed to it, and the TES only about 83%. The longer this situation continues, the less effective the application of the principle becomes.

9. We estimate that the major projects listed above together with the numerous other planned projects will increase the annual operating expenditure of sewage treatment services from about $1,150 million in 2005/06 to $2,450 million by 2016/2017. If the charges are not adjusted the subsidy from taxpayers will rise from some $460 million in 2005/06 to about $1530 million in 2016/17. This means that the Government would have to increase the annual subsidy by more than $1 billion, which in turn would mean that rather than moving closer to a sustainable approach based on the polluter pays principle we would be moving further away from it. **Annex B** shows the projected financial position of sewage services as a whole taking into account the proposed expansion programme, but assuming that current fee levels remain unchanged.

10. Taking into account the operating cost of new sewage projects in future, and the importance of applying the polluter-pays principle, the Administration decided in April 2005 that for HATS Stage 2A to proceed the whole community would need to be committed to making an appropriate contribution to the costs of collecting and treating our

wastewater. In terms of a fair distribution of costs between the public purse and individual members of society, the Government would pay the costs of construction of new sewage projects, including HATS Stage 2A, while the users of wastewater collection and treatment services would need to shoulder the operating costs through the sewage charging scheme.

Review of the SC element of the sewage services charging scheme

11. Notwithstanding the need for polluters to meet the full operating costs of sewage services in the long term, we propose that the operating costs will continue to be shared between the Government and individual members of the community for at least the next ten years. To strike a balance between on the one hand the need to fully apply the polluter-pays principle and on the other hand the need to avoid adverse impact on people's livelihood, we propose a modest and gradual adjustment plan that aims at recovering about 80% of the projected operating cost (excluding depreciation) through ten annual increments. The SC rate will increase from $\$1.2/m^3$ at present to $\$2.9/m^3$ in 2016/17. This means that even after taking inflation into account, the average SC of domestic accounts will increase from about $11 per month at present to about $12 per month in 2007/08, to about $13 per month in 2008/09, and so on until eventually reaching a level of about $27 per month in 2016/17. Our research indicates that such a charge will remain very much at the lower end of the scale of charges levied in developed economies **(**see **Annex C)**. A table showing the projected fee levels in the coming ten years under this proposal is at **Annex D**.

12. Considering the water consumption patterns of different households, when fully implemented in 2016/17 the proposed increases will have the following impacts:

(a) around 15% of the households will not be affected by the increase as they do not need to pay SC at all;
(b) for about 60% of the households (including the 15% in (a)), their SC bill would be less than $24 per month, implying an increase of less than $14 per month over the ten years;
(c) for about 75% of the households (including the 60% in (b)), their SC bill would be less than $37 per month, implying an increase of less than $22 per month over the ten years; and
(d) only for about 10% of the households will the increase in SC over the ten years be more than $29 per month. These households are paying more than $20 SC per month at present.

13. The impact of the proposed SC increment on an average household will be very modest. For most households, the annual increment will be less than 10 cents per day. We believe that this is a level which is affordable for all households including lower income groups. Moreover, under the Comprehensive Social Security Assistance (CSSA) Scheme, a monthly allowance is payable to recipients to meet the SC. The level of the allowance is subject to review taking into account changes in the SC.

14. The impact on the trades is minimal as well. Take the restaurant trades as an example. About 80% of the restaurants pay less than $500 SC each month at present. They will pay not more than $547 in 2007/08 and $1,217 ten years later. The details of the foregoing projections are provided at **Annex E**. We believe the magnitude of the increments should be acceptable and affordable to the majority of the public and the trades.

15. The proposed adjustments to the SC will provide stronger economic incentives for households and business to reduce the production of wastewater and economise on the use of potable water, as well as provide adequate recurrent resources to support the operation of HATS Stage 2A and other new sewage treatment facilities in the pipeline. This is in full compliance with the polluter-pays principle consistently supported by this Panel and, as mentioned in paragraph 7 above, by the Legislative Council as a whole. In the provision of existing service and planning for the development of new sewage treatment facilities, the government will steadfastly adhere to this principle to share out the responsibilities of protecting the environment amongst all members of the society. If the proposed SC adjustment is not supported, our total water management plan for protecting the water environment of Hong Kong and the Pearl River Delta region will be seriously upset. This can result in highly undesirable environmental consequences and will be detrimental to the overall interest of Hong Kong.

Setting out the future fees in one piece of legislation

16. The SC is set out in the Sewage Services (Sewage Charge) Regulations (Cap. 463 Sub. Leg A). To implement the fee increment proposal, we propose to set out the SC rates in the coming ten years in a single item of subsidiary legislation, which will be tabled in the Legislative Council for negative vetting. Given the long projection period, there could be deviations in factors affecting the unit cost of the SC as compared with the assumptions now used to assess the operating costs. The Administration will monitor the recovery rate annually and unless the deviations are very substantial and persistent, we do not propose to review and adjust the SC

fees in the coming ten years once our finalized proposals for the increases have been endorsed by the Legislative Council. The modest and gradual increments aim to implement and sustain the cleaning up of our waters; it is imperative that the society make this firm commitment to enable the commencement of HATS Stage 2A and other sewerage projects.

Review of the TES element of the sewage services charging scheme

Reducing the cost of reassessment under the TES element

17. We have also reviewed the TES element of the scheme. Each TES trade is allocated a generic value for its effluent COD, upon which the charge rate for the relevant trade is determined. Individual account holders may apply to have their charge rates reduced, based on empirical evidence they supply suggesting that the COD values of their discharge is lower than the respective generic values. However, the TES trades have complained that the reassessment cost is too high to offer a sufficient financial incentive for them to reduce the quantity of pollution discharged.

18. Two controllable factors affecting the overall costs of the reassessment process are:

(a) the period for which a reassessment remains valid; and

(b) the number of days' sampling which must be conducted in order to arrive at an estimate of effluent quality.

19. Under the existing legislation a reassessment is valid for one year. We propose to extend this to two years. By doing so the cost of a reassessment will be effectively halved, without affecting the integrity of the assessment process.

20. With regard to the number of sampling days, at present this varies from three to six depending on the pollution load of a TES establishment. The minimum requirement of three sampling days applies to establishments discharging less than 100 kg COD per day. We propose that for small establishments discharging less than 50 kg COD per day the number of specified sampling days be reduced to two. Given the small amount of pollution discharged from individual establishments in this band, the relaxation will not compromise the integrity of the system. It should however help enhance the incentives and encourage a larger portion of these small establishments to consider applying for reassessment.

Reviewing the generic CODs of the TES trades

21. The target recovery rate for TES is 100% of operating costs. However, given that the TES overall cost recovery is already at the 80% level, we can afford to defer increases to the TES rates and take the opportunity to review the generic CODs of all TES trades by carrying out trade-specific effluent surveys. We will liaise with the trades individually. We aim to complete the reviews within 12 months and then make any adjustments required to the generic COD values. We will then bring forward proposals for adjusting the TES rates to achieve the target recovery rate.

Savings and Efficiency Measures

22. We have been very conscious about the need to control the operating costs of the sewage services and have adopted various measures in recent years to reduce costs and improve efficiency. These include streamlining staff structure, outsourcing sewerage maintenance and supporting operations, adopting energy saving technologies, and making better use of biogas produced in secondary sewage treatment works.

23. Our increase in outsourcing and other staff-related savings measures have enabled us to reduce staff costs and civil service staff numbers despite an increase in the number of installations maintained in recent years. The average unit cost per cubic metre of sewage treatment (excluding depreciation) has reduced by 11% between 2002/03 and 2005/06, even after the general increase in operating costs upon the commissioning of the HATS Stage 1 at the end of 2001. We are committed to monitoring our operating expenditure closely to ensure that our sewage service provides good value for money.

Advice sought

24. Members are invited to consider and support our proposals outlined in paragraph 2 above.

Environmental Protection Department
December 2006

The Harbour Area Treatment Scheme (HATS) Stage 1

The Coverage

Construction of HATS Stage 1 commenced in April 1994 and was completed in December 2001. It was the largest sewerage infrastructure project ever constructed in Hong Kong and consists of a 23.6km deep tunnel conveyance system collecting sewage from Tseung Kwan O, Kwun Tong to Kowloon Bay area, the whole of Kowloon peninsula, Kwai Chung, Tsuen Wan, Tsing Yi, Chai Wan and Shau Kei Wan. It treats about 75% of the sewage (about 1.4 million cubic metres per day) generated on both sides of the harbour. The sewage tunnels transfer the collected sewage to the Stonecutters Island Sewage Treatment Works (SCISTW) for chemically-enhanced primary treatment (CEPT) and subsequent discharge through a submarine outfall to western waters.

2. The CEPT plant at Stonecutters Island is one of the most efficient chemically-enhanced sewage treatment plants in the world, with a high efficiency removing: –

(a) 70% of the organic pollutants in terms of biochemical oxygen demand;
(b) 80% of the suspended solids; and
(c) 50% of bacteria in the sewage.

Overall, it prevents about 600 tonnes of sewage sludge and its associated pollutants from entering the harbour everyday.

Water Quality Improvement

3. When HATS Stage 1 commenced full operation in December 2001, there was a marked improvement in harbour water quality. The average dissolved oxygen level in the harbour increased by about 10%. Similar improvements were observed in other water quality parameters. The levels of key pollutants generally decreased as follows (up to end 2004):-

(a) nutrients in terms of total inorganic nitrogen and phosphorus,

which in rich supply can promote excessive algal growth, dropped by 17% and 28% respectively;

(b) ammonia, which is harmful to marine life, declined by 24%, and

(c) the overall bacteria level, using *E.coli.* as an indicator of disease-causing organisms, reduced by some 57%.

Closing of Tsuen Wan Beaches

4. The completion of HATS Stage 1 brought about a general improvement in harbour water quality, with significant improvements in the eastern part of the harbour. However, the western waters deteriorated due to the lack of disinfection facilities in HATS Stage 1. Treated effluent is not disinfected. A large volume of undisinfected effluent is discharged through a single outfall, thereby affecting the water quality of the sea areas near the outfall. This discharge of undisinfected effluent coupled with the existing discharges of locally untreated sewage has resulted in the closure of four beaches in the Tsuen Wan area.

5. The situation will improve once HATS Stage 2A and the advance disinfection facilities at SCISTW are completed.

Annex B

Financial Projections of the Sewage Services

(at current fee levels and taking into account HATS Stage 2A and other new projects under planning)

		05/06 Actual $M	06/07 Estimate $M	07/08 Estimate $M	08/09 Estimate $M	09/10 Estimate $M	10/11 Estimate $M	11/12 Estimate $M	12/13 Estimate $M	13/14 Estimate $M	14/15 Estimate $M	15/16 Estimate $M	16/17 Estimate $M
Revenue													
SC	Note 1	489.0	494.5	506.0	518.3	532.9	547.1	560.9	574.5	589.8	603.8	618.2	632.1
TES		209.0	207.5	190.4	200.0	211.9	223.3	234.2	244.6	256.7	267.7	278.8	289.3
Total		698.0	702.0	696.4	718.3	744.8	770.4	795.1	819.1	846.5	871.5	897.0	921.4
Operating and maintenance expenses	Note 2 & 3												
SC		903.1	935.2	948.1	962.5	1054.6	1079.3	1253.7	1290.3	1401.7	1757.7	1879.6	1931.5
TES		250.9	261.1	264.7	268.5	293.8	300.2	353.5	362.8	381.7	474.6	508.1	521.7
Total		1154.0	1196.3	1212.8	1231.0	1348.4	1379.5	1607.2	1653.1	1783.4	2232.3	2387.7	2453.2
Depreciation	Note 3												
SC		470.7	502.2	509.8	530.8	543.2	579.4	673.5	712.6	756.7	839.3	1090.1	1130.0
TES		113.0	121.7	123.6	128.9	132.4	141.7	171.1	178.3	178.3	185.8	236.8	246.4
Total		583.7	623.9	633.4	659.7	675.6	721.1	844.6	890.9	935.0	1025.1	1326.9	1376.4
Subsidy by Government (excluding depreciation)													
SC		414.1	440.7	442.1	444.2	521.7	532.2	692.8	715.8	811.9	1153.9	1261.4	1299.4
TES		41.9	53.6	74.3	68.5	81.9	76.9	119.3	118.2	125.0	206.9	229.3	232.4
Total		456.0	494.3	516.4	512.7	603.6	609.1	812.1	834.0	936.9	1360.8	1490.7	1531.8

Note 1: Amount includes notional revenue from supplies to Government establishment.

Note 2: Reflects inflation effect and recurrent cost of HATS Stage 2A projects, all exising facilities, and new facilities under planning.

Note 3: The year from which recurrent expenses of the following projects are assumed to incur -

(a) 2009/10 – HATS Stage 2A – Advance disinfection facility

(b) 2011/12 – Sludge Treatment Facility

(c) 2011/12 – Upgrading of Pillar Point sewage treatment works

(d) 2013/14 – Yuen Long and Kam Tin sewerage and sewage disposal

(e) 2014/15 – HATS Stage 2A - Remaining works

(f) 2014/15 – Outlying Islands sewerage stage 2 – Tai O and Cheung Chau sewerage

(g) 2015/16 – Yuen Long and Kam Tin sewage treatment upgrade – Upgrade of San Wai sewage treatment works

Annex C

Sewage Charges in Major Cities

City	Recovery of operating and maintenance costs	Recovery of capital costs	Sewage Charge Indicator (HK$/month)
Edinburgh	✓	✓	**$347**
Sydney	✓	*	**$161**
Boston	*	*	**$127**
Melbourne	✓	*	**$117**
London	✓	✓	**$115**
New York	✓	*	**$79**
Los Angeles	✓	*	**$75**
Tokyo	*	*	**$65**
Singapore	*	*	**$46**
Vancouver	*	*	**$43**
Hong Kong (by 2016/17)	*	-	**$27**
Taipei	*	-	**$14**
Hong Kong (Present)	*	-	**$11**
Shanghai	*	-	**$8**
Guangzhou	*	-	**$8**
Beijing	*	-	**$7**
Shenzhen	*	-	**$6**

Notes:

1. ✓= Full, * = Partial, - = Nil
2. Information is based on a study in 2003 and sewage charges listed are based on exchange rate on 9 February 2006. Sewage Charge Indicator assumes monthly water consumption is 12 cu.m. which is the average for domestic accounts in Hong Kong.

Annex D

Projected Increments for Sewage Charge (SC) Rate and Associated Financial Implications

Year	SC rate ($/m³)	Average domestic bill ($/Month) (Note 1)	SC Revenue ($M)	Government Subsidy (SC element) ($M) (Note 2)	Recovery rate (SC) (Note 2)
05/06 (A)	1.20	11	489	414	54.1%
06/07 (P)	1.20	11	495	441	52.9%
07/08 (P)	1.31(+9.3%)	12	553	395	58.3%
08/09 (P)	1.43(+9.3%)	13	619	343	64.3%
09/10 (P)	1.57(+9.3%)	14	696	359	66.0%
10/11 (P)	1.71(+9.3%)	16	781	298	72.3%
11/12 (P)	1.87(+9.3%)	17	875	379	69.8%
12/13 (P)	2.05(+9.3%)	19	980	311	75.9%
13/14 (P)	2.24(+9.3%)	21	1,099	303	78.4%
14/15 (P)	2.44(+9.3%)	22	1,230	528	70.0%
15/16 (P)	2.67(+9.3%)	25	1,376	503	73.2%
16/17 (P)	2.92(+9.3%)	27	1,538	393	79.6%

(A) – actual figures; (P) – projected figures

- The expenditure projection has taken into account various inflation factors, and recurrent expenditure of HATS Stage 2A and other planned new sewage projects. Expenditure allocation ratio between SC and TES is assumed to remain unchanged throughout the projection period.

- The revenue projection has taken into account the water consumption projection and the proposed increases in SC rate.

Notes

1. Average domestic bill means the total SC revenue received from all domestic accounts divided by the number of those accounts.

2. The recovery rate and government subsidy are related to the SC element of the sewage services charging scheme only. The TES element is not reflected as the TES fees are not revised under the current proposal.

Annex E

Projected household SC payment patterns

SC in 05/06	% of account	SC in 07/08 (projected)	SC in 08/09 (projected)		SC in 16/17 (projected)	Increase over 10 years
$/mth		$/mth	$/mth		$/mth	$/mth
0.0	15.6%	0.0	0.0		0.0	0.0
up to 5.0	36.4%	up to 5.5	up to 6.0		up to 12.2	up to 7.2
up to 10.0	57.3%	up to 10.9	up to 11.9		up to 24.3	up to 14.3
up to 15.0	75.6%	up to 16.4	up to 17.9		up to 36.5	up to 21.5
up to 20.0	87.3%	up to 21.9	up to 23.9		up to 48.7	up to 28.7

Projected restaurant SC payment patterns

SC in 05/06	% of account	SC in 07/08 (projected)	SC in 08/09 (projected)		SC in 16/17 (projected)	Increase over 10 years
$/mth		$/mth	$/mth		$/mth	$/mth
up to 100.0	42.6%	up to 109.3	up to 119.5		up to 243.3	up to 143.3
up to 200.0	61.8%	up to 218.6	up to 238.9		up to 486.7	up to 286.7
up to 500.0	83.1%	up to546.5	up to 597.3		up to 1216.7	up to 716.7
up to 1000.0	91.4%	up to 1093.0	up to 1194.6		up to 2433.3	up to 1433.3

Note:
% of accounts is based on the consumption pattern of sewered accounts as at 31 July 2006.