

**For information  
on 22 January 2007**

**Legislative Council Panel on Environmental Affairs**

**Progress Update on Harbour Area Treatment Scheme Stage 2A and  
the Proposal for Applying the Polluter-pays Principle  
in the Provision of Sewage Services**

**Purpose**

This paper:

- (a) briefs members on the implementation of the Harbour Area Treatment Scheme (HATS) Stage 2A; and
- (b) responds to some comments raised by Members at the meeting of 5 January on the Administration's proposal for applying the polluter-pays principle in the provision of sewage services (CB(1)600/06-07(01)).

**Improvements brought about by HATS Stage 1 and other sewerage projects**

2. The commissioning of HATS Stage 1 at the end of 2001 has resulted in significant water quality improvements in most parts of Victoria Harbour. Every day about 1.4 million tonnes of sewage generated on both sides of the harbour are collected and treated. As a result, about 600 tonnes of sewage sludge and its associated pollutants are prevented from entering the harbour every day, dissolved oxygen levels in the harbour have increased by about 10% overall, toxic ammonia levels have decreased by about 24% and *E. coli*. (an indicator of disease-causing organisms) levels have reduced by over 50% (**Annex A**). In 2005, the percentage compliance with the Marine Water Quality Objectives within the Victoria Harbour Water Control Zone was 83%, considerably higher than the 50% recorded in 2001 before HATS Stage 1.

3. In addition, as a result of our sewerage and enforcement programmes over the last 20 years, there have been significant improvements in our environmental water quality:

- (a) For rivers and streams, the rate of compliance with the Water Quality

Objectives (WQOs) has increased from 49% in 1986 to 85% in 2005, while the proportion of monitoring stations with "Excellent" or "Good" grading has climbed from 34% to 81%.

- (b) In terms of bathing beaches, the number of beaches with "Good" grading has more than doubled in the last two decades from 23% to 56%.
- (c) For marine waters, the overall compliance with the WQOs has increased from 76% in 1986 to 85% in 2005. Red tides were a very serious problem in Tolo Harbour in the 1980s with 43 cases recorded in 1988. With the improvement of water quality in Tolo Harbour, red tides have been reduced to around ten cases each year and the associated fish kills are rare nowadays.

## **Recommendations leading to HATS Stage 2**

4. In 2000 an independent panel of local and international experts ("The International Review Panel" or "IRP" for short) reviewed the plans for HATS and recommended that for the next stage we should aim to provide secondary treatment with a discharge of the treated effluent through a short outfall into the harbour, rather than a lower level of treatment coupled with a long outfall discharging into the deep fast-flowing currents of the South China Sea (the former "Strategic Sewage Disposal Scheme" or "SSDS"). To achieve this, the experts proposed four alternative treatment and discharge options, all involving the use of biological aerated filter technology<sup>1</sup> for treatment, deep tunnels for the sewage transfer system and short outfalls for disposal. These options differed in the degree of centralization and the locations of the proposed outfalls and required further detailed investigation so as to clearly define the pros and cons.

5. Between 2001 and 2004 these four options were exhaustively investigated under the overall supervision of the HATS Monitoring Group<sup>2</sup>. The report, which was published in 2004, stated that all four options were technically feasible and environmentally acceptable and in the long term would need to include disinfection and biological treatment, in addition to the current chemical

---

<sup>1</sup> One type of compact biological treatment technology.

<sup>2</sup> The Monitoring Group was set up to increase transparency and to monitor the progress of all studies and trials in relation to the way forward for the HATS recommended by the IRP. It was chaired by the then Secretary for the Environment and Food from 2001 to July 2002 and PSE from August 2002 to December 2003. The Group comprised three local members of the IRP, four members of the Advisory Council on the Environment, three members of the public, the Director of Environmental Protection and the Director of Drainage Services.

treatment process, in order to provide adequate protection for our harbour water quality.

### **Phased Implementation of HATS Stage 2**

6. The Government accepted the report's findings and the recommendation that HATS sewage should receive secondary treatment ultimately and be discharged in the harbour area, and considered the centralisation of treatment at Stonecutters Island to be the preferred option. During the course of the studies it was found that to provide secondary treatment extra land would be required next to Stonecutters Island Sewage Treatment Works (SCISTW). Furthermore, there were some uncertainties as to the likely rate of future population increase and sewage flow build-up. Consequently, bearing in mind the very significant improvements to overall water quality that had already been brought about by HATS Stage 1, the Government considered that the most pragmatic approach would be to pursue a phased implementation of the IRP's findings, with the first step being to focus on providing the same highly effective chemical treatment to the remainder of the harbour area sewage as had been applied in HATS Stage 1 plus the provision of disinfection process for all sewage collected from both HATS Stage 1 and Stage 2A. This was the recommendation that the Government put forward during the extensive public consultation exercise between 21 June 2004 and 20 November 2004, during which two public forums, 35 meetings with green groups, professional bodies and District Councils, and three meetings with the Panel on Environmental Affairs (EA Panel) of the Legislative Council (LegCo) were held.

### **Results of the 2004 Consultations on HATS Stage 2**

7. The major findings of the consultation were that:
- (a) the community attaches high importance to cleaning up Victoria Harbour as a matter of priority;
  - (b) while some would like to see both Stages 2A and 2B implemented in one go, the majority opinion is willing to accept a phased programme given the scale of the project, the financial implications, and uncertainty surrounding the future sewage flow build-up;
  - (c) while some queried the need for disinfection, the main concern was the technique to be adopted i.e. the chlorination/dechlorination process; and

- (d) the community believes that it is worth paying higher sewage charges if the outcome is a cleaner harbour, though there are some concerns about the possible scale of such increases.

The Government presented the results to the EA Panel on 25 April and 5 July 2005.

### **Phased Implementation of HATS Stage 2**

8. In April 2005, the Chief Executive in Council endorsed the proposal to centralize all treatment facilities on Stonecutters Island and a two-phase implementation strategy for HATS Stage 2. In October 2005, the CE announced the decision in his Policy Agenda that Government aims to complete HATS Stage 2A by 2013-2014 subject to acceptance by the community of the need for the full recurrent costs to be recovered through the sewage services charging scheme. The timing of Stage 2B will be subject to further review at a later stage. Stage 2A will collect the remaining untreated sewage from Hong Kong Island, which accounts for around 450,000 tonnes per day or about 25% of the total sewage generated on both sides of the harbour, and transfer it to an expanded SCISTW for highly effective chemical treatment prior to discharge. A two-phase approach is preferred so that Stage 2A can commence immediately while the issue concerning additional requirement for land necessary for Stage 2B can take its course to be resolved. This approach also allows the step-by-step upgrading of the existing sewage treatment facilities so as to properly manage the uncertainties regarding future population growth and sewage flow build-up and the time required to finalise land and planning issues related to Stage 2B. According to the results of the public consultation in 2004, 68% of the key stakeholders and 50% of the individuals who expressed a view on the subject supported phased implementation. We have therefore been proceeding with the two-phase approach in accordance with what we believe to be the consensus view. In this way we can avoid saddling users of sewage services with the associated extra \$700 million per annum recurrent costs of biological treatment before it is necessary.

### **Review of the Timing for Implementing HATS Stage 2B**

9. The Government has made a public commitment that the timing for the implementation of Stage 2B, i.e. the addition of biological treatment, will be reviewed in 2010/11 and this is an integral part of the HATS Stage 2 implementation programme. Biological treatment requires a substantial

investment as well as the allocation of further land so it is important that the timing of the implementation of Stage 2B be carefully assessed to ensure that public funds are spent in a cost effective manner while providing adequate protection to the marine environment.

### **Updated Progress on HATS Stage 2A**

10. Following a full discussion at the EA Panel meeting held on 5 July 2005, Members agreed that the Administration could proceed to submit a funding proposal to PWSC for moving forward HATS Stage 2A. Subsequently, Finance Committee approved the upgrading of Item 4238DS to Category A in the Public Works Programme at an estimated cost of \$166.5 million in money-of-the-day-prices at its meeting on 16 December 2005. The scope of the project comprises:

- (a) The environmental impact assessment (EIA) study for HATS Stage 2A
- (b) Site investigations for HATS Stage 2A; and
- (c) Planning and design of the tunnel conveyance system.

11. The environmental impact assessment (EIA) study for HATS Stage 2A has commenced in February 2006 and is targeted for completion in the latter half of 2007. The objective of the study is to identify potential environmental and ecological impacts during the construction and operation of the whole HATS Stage 2A project including the modifications and improvements required to the contributing preliminary treatment works (PTWs) in the HATS catchment on Hong Kong Island; the tunnel conveyance system which transfers the sewage from these PTWs to SCISTW; the enhancement of the capacity of SCISTW and so on. The study will also select preferred options and propose appropriate mitigation measures. It is currently progressing to schedule.

12. The main site investigations under PWP Item 4238DS commenced in November 2006 and are well underway, with completion of investigations for the sewage conveyance system programmed for the latter half of 2008.

13. The planning and design of the sewage conveyance system commenced in January 2006 and is targeted to complete in late 2008. The total length of the system, with a depth of up to 100 m or more, will be over 20 km and will collect the sewage discharged from the upgraded PTWs at North Point,

Wan Chai, Central, Sandy Bay, Cyberport, Aberdeen, Wah Fu and Ap Lei Chau. Current progress is satisfactory.

14. In addition, a Category D item was also created in the earlier part of the year at an estimated cost of \$5.03 million for the EIA study for the provision of disinfection facilities at SCISTW. The EIA commenced in July 2005 and is expected to complete in the second quarter of 2007. The final report will then be made available for public inspection and comment under the statutory Environmental Impact Assessment Ordinance, after which all views will be reviewed and taken into account.

### **Future Programme for Stage 2A**

15. Upon LegCo's approval of the proposed sewage charge adjustment with a view to implementing the polluter-pays principle as proposed in paper No. CB(1)600/06-07(01), we aim to complete the advance disinfection facilities by the last quarter of 2009 and the entire Stage 2A by the last quarter of 2014. To achieve this our targets for the necessary funding approvals are:

June 2007 - to seek approval from PWSC to proceed to FC for funding for the planning and design of the upgrading works of SCISTW and associated facilities at an estimated cost of about \$ 118M at September 2006 prices.

November 2007 - to seek approval from PWSC to proceed to FC for funding for construction of the advance disinfection facilities at an estimated cost of about \$ 61M at September 2006 prices.

First half of 2009 - to seek approval from PWSC to proceed to FC for funding for construction of the sewage conveyance system and upgrading of SCISTW and associated facilities at an estimated cost of about \$ 7,580M at September 2006 prices.

### **Applying the Polluter-pays Principle: LegCo Discussion on 5 January 2007**

16. On 5 January 2007 the Environmental Affairs Panel discussed paper No. CB(1)600/06-07(01), which contained the Administration's proposals for adjusting the sewage charge (SC) in a modest and gradual manner so as to

achieve 80% recovery of the operating cost through ten annual increments. Members requested additional information in relation to a number of aspects of the proposals. The Administration's preliminary responses are as set out below.

### ***Improvements to be achieved by HATS Stage 2A***

17. Stage 2A would provide chemical treatment to tackle the remaining portion of untreated sewage, amounting to around 450,000 tonnes a day, now entering into the harbour and polluting the sea from the northern and southwestern parts of Hong Kong Island. It would also provide disinfection of all the effluent. When Stage 2A is completed, based on the same performance indicators achieved in HATS Stage 1, it is expected that a further 190 to 500 tonnes of sludge<sup>3</sup> would be prevented from being discharged into the harbour every day. The pollutant levels will also be further reduced. In particular, sewage pathogens (*E.coli*, an indicator of disease-causing organisms) will be reduced by 90% in the harbour environment after disinfection facilities are in place. Toxic ammonia will be further reduced by an average of 10%, and nutrients in terms of total inorganic nitrogen and phosphorus (which in rich supply can promote excessive algal growth) by a further 5% and 8% respectively. The dissolved oxygen level is also expected to further increase by 5%.

### ***Closure of Tsuen Wan beaches following HATS Stage 1 and prospect for their re-opening***

18. Seven beaches along the Tsuen Wan coast have been affected by pollution from background sources for some time. Three beaches, namely Anglers', Approach, and Ting Kau Beaches have been closed since the mid 1990s' due to poor water quality. The sources are both local (from unsewered villages in the beach hinterlands) and from further afield (mainly borne on the tides from the Victoria Harbour area). Regional sewerage improvement works together with the partial commissioning of SCISTW in mid 1997 resulted in improvements at some beaches, such as Lido and Casam beaches, between 1997 and 2001.

19. Despite the general improvements to many water quality parameters, the full commissioning of HATS Stage 1 by the end of 2001 caused a stronger than predicted bacteria influence at the Tsuen Wan beaches. The increase in bacteria level due to the concentrated discharge of undisinfecting effluent from SCISTW worsened the beach water quality, resulting in the closure of the

---

<sup>3</sup> The actual amount would depend on the then daily flow.

remaining four beaches, namely Lido, Gemini, Hoi Mei Wan, and Casam beaches along the Tsuen Wan coast.

20. Due to limitations of the water quality model adopted in the planning of HATS Stage 1, the HATS influence at the beaches was not accurately predicted<sup>4</sup>. Information on the discrepancies between the data predicted by the model and the actual impact of HATS Stage 1 on the water quality of the Tsuen Wan beaches was provided to Members in January 2006<sup>5</sup>. This is attached at **Annex B** for reference.

### ***Reopening of Tsuen Wan Beaches***

21. Our plan is to advance part of the disinfection facilities under Stage 2A for commissioning in 2009, in order to improve the beach water quality, and enable re-opening of the beaches. Preliminary investigations conducted as part of the environmental impact assessment for the advance disinfection facilities indicate that if the HATS effluent is disinfected, its influence on the beaches will become insignificant. The water quality of the seven beaches would then be brought back to a state even better than that before the commissioning of HATS Stage 1, thus facilitating early re-opening of the four beaches mentioned in paragraph 18 above.

22. We have also taken active measures to tackle local pollution sources. The implementation of upgrading works at Pillar Point Sewage Treatment Works, and local sewerage programmes at Sham Tseng and Ting Kau which are scheduled to commence next month for example, would further improve beach water quality.

---

<sup>4</sup> The model used in the planning of HATS Stage 2 is based on a model (the HATS Model) set up using the Delft3D model suite. The HATS Model was rigorously set up and extensively calibrated and verified with more than ten years of monitoring data. It is a sophisticated software tool which allows the full 3-dimensional circulation of the Hong Kong and surrounding waters to be simulated. The simulation takes into account the complex hydrodynamic and transport processes, and all the relevant physical-chemical-biological interactions in the water body, rendering its predictions more reliable than that of the model adopted in HATS Stage 1.

<sup>5</sup> The request was raised when the item on “Mang Kung Uk Sewerage” was discussed in the Public Works Subcommittee (PWSC) on 23 Nov 2005, and the related information about HATS was thus submitted via a supplementary PWSC information paper, together with other supplementary information for Mang Kung Uk Sewerage requested in the same PWSC meeting (Paper No. PWSCI(2005-06)20)



### ***Breakdown of the fixed and variable costs of sewage treatment service***

23. A Member asked for a breakdown of the fixed and variable costs for providing sewage treatment services. This is provided in **Annex C** for Members' reference.

### ***Rationale for implementing the proposed adjustment over a ten year period***

24. Suggestions were made that consideration should be given to shortening the period over which adjustments to the sewage charge should be introduced so as to take into account the prevailing economic situation and also so as not to set a precedent leading to other requests for increases in fees and charges to take place over a long period.

25. We have considered the timeframe and scale of the increases very carefully. On the one hand some green groups would like to see full cost recovery implemented immediately. On the other hand there will always be a few members of the community who do not want to see any increase. The programme of increases we have mapped out strikes a balance between these views, having particular regard to public affordability.

26. Even with the proposed ten-year fee increments, the SC cost recovery rate by 2016-17 is expected to be only around 80%, which is still below full operating cost recovery. Compared with other alternative schemes, we believe that the proposed modest and gradual increments over a period of ten years represent the best way forward. In particular it is important that for a proposal entailing a more than doubling of charges, all sectors should have a clear view of the scale of increases involved and the time when they will come into effect, so that they can plan with some certainty. Similarly the Government needs to be certain of the extent to which it can expect to receive revenue to defray the costs of providing sewage services so that the funding of public services can be better managed. In addition, the following factors are also relevant:

- (a) Only around 54% of the SC operating cost is recovered at the moment. If the increase to 80% operating cost recovery is made in one go or if increments are only introduced in the year when a major sewage treatment project (e.g. HATS Stage 2A in 2014) is commissioned for service, sharp fee increases will be required. Under our proposed approach, such unwelcome variations will be evened out, so that the increments for the coming ten years will

remain modest, gradual and predictable providing a degree of certainty to the users;

- (b) If the proposed increments are to take place over a shorter period of time, the magnitude of the annual increments will need to increase as a result, thus affecting the affordability of the proposal to households and the trades. We believe the current proposal strikes the appropriate balance between the need to further implement the polluter-pays principle on the one hand, and the affordability of the community on the other. Spacing out the SC increases over ten years achieves this objective.
- (c) If increases are imposed for a shorter period but the rate of increment remains at the same level, we will fall short of the aim of ensuring adequate resources are provided in future to cover the operating cost of major sewage treatment projects. This will undermine not only the polluter-pays principle widely supported by the community, but also our ability to implement such projects in a timely manner to further improve the water environment of Hong Kong, given that long lead times are usually required for such major projects.
- (d) Environmental improvement needs long-term policies to sustain and LegCo's commitment by supporting the 10-year SC plan is vital.

### ***Adhering to the Polluter-pays Principle***

27. Over the coming 10 years, the Government will need to commit more than \$ 20 billion to build HATS Stage 2A and other sewerage programmes throughout the territory. The annual operating expenditure of sewage treatment services will increase from about \$ 1,150 million in 2005/06 to \$ 2,450 million by 2016/17. These figures illustrate that sewage treatment infrastructure requires very substantial capital investment, incurs significant recurrent operating expenses, and requires a long planning lead-time for implementation. If the SC is not adjusted over the coming ten years, the recovery rate for the SC will further decline from 54% of the operating cost at present to 33% in 2016/17. Rather than moving closer to a sustainable approach based on the polluter-pays principle we would be moving further away from it. It is important that the LegCo together with the community should make a long term commitment to implement the principle and enable the HATS Stage 2A and other sewerage projects to go ahead.

### *Legality of the proposal*

28. In formulating our proposal to adjust SC through the annual increments to be set out in a single piece of legislation, we have obtained legal advice confirming that our proposals are constitutional and legally in order.

### *Possible deviations from the projected SC recovery rate*

29. To provide transparency and certainty to all parties concerned, the Administration undertakes to monitor the SC recovery rate annually and unless the deviations are very substantial and persistent, we do not propose to review and adjust the fees in the coming ten years once our proposal is endorsed by the LegCo. Concern has been raised about whether there are objective criteria in determining whether the deviations in the projected unit rate of SC are substantial and persistent.

30. Given that the target SC recovery rate for 2016/17 is 80%, it is quite unlikely that the recovery rate in the coming ten years would reach or exceed 100%. We will continue to monitor the situation closely and on a regular basis. As the annual revenue and expenditure of the Drainage Services Department are publicly disclosed and uploaded onto its website, Members of LegCo and the general public will also be able to continue to access the relevant information and monitor whether we are deviating substantially from the recovery rate target.

### **CONCLUSION**

31. Members are invited to note that the overall progress on HATS Stage 2A is satisfactory. It is on programme to meet the commitment for completion in 2014, provided that the Administration's proposals for adjustments in the sewage charge can be endorsed by the legislature by May 2007. Further improvements in the water environment can be expected if HATS Stage 2A and other major sewage treatment projects are implemented in a timely manner with the support of the community in adhering to the polluter-pays principle in recovering the operating cost.

---

Environmental Protection Department  
January 2007

**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.

**Comparison of Water Quality Predictions  
and Actual Impact for SCISTW**

The SCISTW was built as part of the sewerage facilities under the Harbour Area Treatment Scheme (HATS) Stage 1. It now treats 1.4 million m<sup>3</sup>/day of sewage from urban Kowloon, Tseung Kwan O, and Kwai Tsing, and from Chai Wan and Shaueiwan on Hong Kong Island. Treated effluent is discharged via an outfall at the western harbour. The original scheme for HATS was to provide chemical treatment to all of the HATS sewage at SCISTW, followed by the transfer of the effluent to the southeast of Lamma Island for disposal in deep off-shore waters. The outfall at the western harbour was thus planned for interim use only under the original scheme.

2. The predicted *E.coli* levels at the Tsuen Wan beaches due to HATS 1, using the WAHMO model suite and the actual observed levels, are tabulated in Table 1. The average results for the wet season (May to September)<sup>1</sup> in terms of *E. coli* were about 119 counts/100mL and 436 counts/100mL, based respectively on model predictions, and calculations using field measurements taken from 2002 to 2004. The model-predicted average bacteria outcome was therefore found to be about 27% of the field data-based outcome, and under-predicted the impact of the effluent discharged from the SCISTW.

Table 1 – Comparison of model-predicted results and calculations based on field measurements in the wet season from May to September (all units in counts of *E. coli*/100mL)

	<b><i>E.coli</i> level at Tsuen Wan Beaches</b>
<b>Model predicted HATS-related influence for 2006</b>	<b>119</b>
Summary of Field Measurements:	
◆ No impact from HATS Stage 1(average of year 2000 to 2001 data) [A]	349
◆ With impact from HATS Stage 1(average of year 2002 to 2004 data) [B]	785
<b>Average influence due to HATS Stage 1 = [B] - [A]</b>	<b>436</b>

<sup>1</sup> The wet season in Hong Kong is taken to be from May to September, and constitutes a major part of the local bathing season. Water quality modeling was conducted for the wet season, since it had to take into account heavy summer rainfall which had implications for the hydrodynamics of the water body being modeled.

**Fixed and Variable Costs in Sewage Services**

The fixed and variable costs in providing sewage services are provided as follows:

Year	Operating Cost		Total Operating Cost
	Fixed	Variable	
2001-02	\$162.1M(14.1%)	\$984.8M (85.9%)	\$1,146.9M
2002-03	\$164.4M(13.5%)	\$1,049.6M (86.5%)	\$1,214.0M
2003-04	\$162.9M(14.0%)	\$1,004.3M (86.0%)	\$1,167.2M
2004-05	\$159.4M(13.0%)	\$1,064.2M (87.0%)	\$1,223.6M
2005-06	\$126.7M(11.0%)	\$1,027.3M (89.0%)	\$1,154.0M

It can be observed that the fixed operating costs are generally on a downward trend, both in terms of percentages and absolute amounts, due to continuous efforts in containing the overhead costs despite the increases in operating and maintenance services for new installations. The new installations commissioned during 2001-06 include the Sham Tseng sewage collection, treatment and disposal system and upgrading of Shek Wu Hui Sewage Treatment Works and Siu Ho Wan Sewage Treatment Works.

Note:

- (a) Since depreciation costs are at present not recovered under the Sewage Charging Scheme, they are not included as fixed cost in the calculation above.
- (b) *Fixed operating costs* include costs for administering the Sewage Charging Scheme and for the provision of general departmental support.
- (c) *Variable operating costs* are the costs incurred in operating the sewage treatment plants and works and maintaining the sewerage system in general.