Chapter 3

Harbour Area Treatment Scheme Stage I

The Harbour Area Treatment Scheme (HATS), previously known as the Strategic Sewage Disposal Scheme (SSDS), is an overall sewage collection, treatment and disposal strategy to deal with water pollution of Victoria Harbour. Implementation of HATS was divided into four stages. HATS Stage I was designed to collect and transfer 75% of the harbour sewage from the urban areas in Kowloon and Northeast Hong Kong Island via a sewage tunnel system to the Stonecutters Island Sewage Treatment Works (STW) for treatment. The remaining 25% of the sewage flow is to be dealt with by the further stages of HATS which are currently under planning.

2. Planning for HATS Stage I commenced in the early 1990s. It is a mega capital works programme comprising 19 individual works projects for designing and constructing four core components. These four components are a sewage tunnel system, the Stonecutters Island STW, a submarine outfall and the upgrading of existing preliminary treatment works. The Drainage Services Department (DSD) was responsible for the design and construction of the works under HATS Stage I.

3. The original target completion date for HATS Stage I was June 1997. However, due to problems encountered in the works projects, the final completion date was delayed by four and a half years to December 2001. While the total approved funding was $6,211.3 million, additional funding of $2,287.4 million was later sought to meet the substantial cost increase of the projects. The main cause of delay and cost increase was the problems encountered in constructing the sewage tunnel system.

4. The sewage tunnel system comprises six tunnels, namely Tunnels AB, C, D, E, F and G, built at an aggregate length of 23.6 kilometres and a depth of 80 metres to 150 metres below ground or sea level. In December 1994, two contracts (Contracts A and B) for constructing the six tunnels were awarded to the same contractor (Contractor A). In December 1996, the Government re-entered the two contracts as Contractor A unilaterally suspended works. The Government and Contractor A subsequently entered into arbitration to deal with the contractual disputes. In September 2001, a Settlement Agreement was signed to terminate all arbitration proceedings. Contractor A agreed to pay $750 million to the Government. Despite such payment, the Government incurred an additional works expenditure of $1,293 million and legal costs of $129 million as a result of the forfeiture of the two tunnel contracts.

5. In his Report No. 30 of June 1998, the Director of Audit reported on the acceleration of works in the SSDS Stage I and made recommendations for improvement in a number of areas. After considering the Audit Report, the Public Accounts Committee, in its Report No. 32 of July 1999, suggested that the Director of Audit should conduct, upon the conclusion of the SSDS Stage I, similar investigations to ascertain the full cost of the project and the factors leading to the budget overrun. Against this background, Audit recently conducted a review on the implementation of HATS Stage I.

Problems encountered in tunnel completion contracts

6. The Committee noted that after the forfeiture of the two original tunnel contracts (i.e. Contracts A and B) in December 1996, the outstanding tunnel works were re-tendered under three separate contracts (Contracts C, D and E). In July 1997, the DSD awarded Contract E to Contractor E for the completion of Tunnels F and G. In January 1998, the DSD awarded Contract C to Contractor C for completing Tunnels AB and C, and Contract D to Contractor D for completing Tunnels D and E.

Claims arising from use of forfeited plant

7. The Committee noted that in order to make better use of the forfeited plant and mitigate the losses arising from the forfeiture of Contracts A and B, the DSD had allowed Contractors C, D and E to choose whether or not to use the forfeited plant left over by Contractor A. The DSD did not intend to accept any liability arising from the use of such plant. Hence, an exclusion clause had been provided in the three tunnel completion contracts in order to protect the Government's interest. Moreover, the contractors had been required to sign a No Claim Statement to the effect that they had assessed the conditions and suitability of the forfeited plant and that they would not instigate any claim against the Government resulting from the use of such plant.

8. The Committee also noted that Contractor E commenced works in July 1997, which was about six months before Contractors C and D commenced their works. Between October and November 1997, Contractor E found that the mucking system could not operate effectively at full load. In January 1998, it submitted to the DSD its expert's findings on the defective mucking system and a claim for monetary compensation for the cost of replacement and extension of time. Upon receipt of the claim, the DSD's Consultant (the Consultant) commissioned a specialist to carry out an independent review of the defects of the mucking system and then made recommendations to the DSD. The DSD subsequently requested the Department of Justice (DoJ) to peruse the Consultant's assessment and give advice on the claim. After considering the views of the specialist, the

Consultant and the DoJ, the DSD accepted Contractor E's claim in March 1998. As the mucking systems of Contracts C and D were similar to the one used in Contract E and were likely to have the same problems, the DSD also instructed Contractors C and D to replace their systems. In the event, the Government incurred an additional cost of $135.7 million in settling the claims for replacement of the defective mucking systems.

9. In response to the Committee's enquiry concerning the experience of Contractors C, D and E in performing tunnelling works and in operating mucking systems, **Mr Raymond CHEUNG Tat-kwing, Director of Drainage Services**, said that:

- all the three contractors had tunnelling works experience, but it was not certain whether they had previously participated in tunnelling projects of a similar nature and scale as that of Contracts C, D and E. The tunnelling works under these three contracts were complex and difficult engineering works. They had been carried out deep underground as some of the tunnels were built as deep as 150 metres below ground or sea level; and

- all of them possessed knowledge in operating mucking systems. But they might not have practical experience in using the models left behind by Contractor A. These models were more sophisticated than ordinary mucking systems due to the complexity of the tunnelling works in question.

10. According to paragraphs 4.9 to 4.13 of the Audit Report, the specialist commissioned by the Consultant considered that the serious latent defects of the mucking system could not have reasonably been foreseen by a civil engineering contractor. On the other hand, given the importance of the system and the clear intention of the contract that the contractor had to accept the risk on the use of the system, it was not unreasonable to have expected that Contractor E would hire an expert to examine the suitability of the mucking system.

11. The Consultant considered that, on a balance of probability, Contractor E was unlikely to succeed in arguing that the exclusion clause was ineffective. On the other hand, if it attacked the applicability of the exclusion clause, this would be an arguable case because an arbitrator or a judge might be sympathetic to a contractor when the risk allocation was unfavourable to the contractor. Since Contractor E's claim was not a clear case and there was doubt about the applicability of the exclusion clause, the Consultant considered it desirable, from a dispute resolution point of view, to take into account the Government's overall cost. If the dispute was escalated, the Government would have to incur significant legal costs and the project would be delayed. With these considerations,

the Consultant recommended that Contractor E should be given the benefit of doubt and the claim should be resolved under the terms of the contract in favour of the contractor. After examining the merits and demerits of the case, both the DSD and DoJ endorsed the Consultant's recommendations.

12. The Committee also noted from paragraphs 4.6 and 4.7 of the Audit Report that Contractors C, D and E had been given the opportunity to inspect the forfeited plant, including the mucking systems, before tendering. The decision to use the plant had been taken by them voluntarily and effected by the provision of an exclusion clause in the contract and the signing of a No Claim Statement, which clearly stipulated the contractor's liability in connection with the use of the forfeited plant. It therefore appeared to the Committee that claims should not be allowed on the grounds that the contractor did not or could not foresee any problem in connection with the use of the plant, and that the risks arising from such use should be fully borne by the contractors. In this connection, the Committee asked whether the DoJ had been consulted on the terms of the exclusion clause and No Claim Statement, if so:

- why the Government still cast doubt on the applicability of the exclusion clause over Contractor E's claim, and how the relevant provisions could protect the Government's interest; and

- whether there was a need to improve the terms of the exclusion clause and No Claim Statement so as to better protect the Government's interest.

13. The **Director of Drainage Services** responded that:

- the DoJ had been consulted on the terms of the exclusion clause and No Claim Statement. Outside legal advice had also been sought. Hence, he did not consider that there was any problem with the terms of the clause and the Statement. In his view, every legal provision, including exclusion clauses, had its own limitations;

- as the serious latent defects of the mucking system could not have reasonably been foreseen by either the contractor or the Government, and the problem could only be identified after the system was put to repeated use under full-load conditions, it would be unreasonable for the Government to shift all the risks to the contractor who had already suffered from very significant financial consequences due to the defects of the system. In this case, the Government considered that there should be a suitable balance in risk-sharing between the two parties; and

- in future, the Government would conduct a risk-benefit analysis on the use of forfeited plant that were critical to the completion of the works, so as to better protect its interest. Any forfeited plant for which the Government had doubts about their reliability would be discarded.

14. The Committee asked whether it was the Government's policy not to take legal proceedings against contractors of public works projects as far as possible in order to avoid causing delay in works, incurring significant legal cost and festering the working relationship between the Government and the contractors and, if so, how the interests of the Government and the public could be safeguarded.

15. In reply, **Dr Hon Sarah LIAO Sau-tung, Secretary for the Environment, Transport and Works**, said that:

- the Government would critically consider the circumstances of each case before deciding whether or not legal action should be pursued. The factors considered included the presence of precedent cases, the chance of winning and the likely impact on the project; and

- the appointment of arbitrators to deal with contractual disputes in works projects was increasingly common because arbitrators were able to offer professional advice which were, on many occasions, very technical in nature. Such advice were not normally obtainable from courts.

16. The Committee further enquired:

- whether legal advice had been sought on the possibility of lodging claims against the supplier of the mucking systems for their defects; if so, what the legal advice was; if not, whether the Administration would consider doing so; and

- as the problems of the mucking system used by Contractor E had surfaced in December 1997 and a claim for replacement of the system was submitted by the contractor in January 1998, why the DSD had not taken the decision to proceed with the replacement until late March 1998.

17. The **Director of Drainage Services** stated at the hearing and in his letter of 13 May 2004, in ***Appendix 18***, that:

- the DSD had not sought legal advice specifically on the possibility of lodging claims against the supplier of the mucking systems. When the problem with the mucking system in Contract E was first revealed in late 1997, the DSD had been working closely with the DoJ and external legal advisors as a team on the arbitration with Contractor A and related problems arising from the forfeited contracts. The possibility of claiming against the supplier of the mucking systems had not been considered by the team because the Government did not have a contract with the supplier and the cost incurred in replacing the mucking system could be claimed against Contractor A as part of the additional cost arising from the forfeiture of the contracts. The claims had eventually been settled with a significant sum successfully recovered from Contractor A;

- following the Committee's enquiry, legal opinion had been sought on the possibility of lodging claims against the supplier of the mucking systems at this stage. The legal advice received suggested that such possibility was almost "zero". As the Government had no contract with the supplier, any action would have to be based on tort. Even assuming that it was not time barred by the six-year limitation period which had already expired, any claim in tort would also be very difficult; and

- there had been no delay in replacing the mucking systems. After receiving expert advice that the mucking system was not safe, Contractor E decided to replace the system in January 1998 and at the same time submitted his claim to the Government. Purchase order for the essential components of the replacement system was placed in the same month. The DSD's decision made in March 1998 on the claim submitted by Contractor E in January 1998 was only to accept the financial consequence of the replacement and the consequential time extension, which had not caused any delay to the replacement activities. To avoid unnecessary delay for Contracts C and D, the Government had notified the contractors of the mucking system problem at the time of contract commencement in January 1998. The decision to accept the financial and time extension consequences could only be made two months after receipt of the claim because the assessment process was technically and contractually complicated which required the input of expert advice.

Difficult ground conditions

18. The Committee noted that prior to tendering the tunnelling works, the DSD had made use of the geological information of the Geotechnical Engineering Office and had conducted extensive geological investigations to assess the ground conditions. A total of 150 boreholes had been drilled and the expenditure for the site investigations was $220 million. However, the actual ground conditions were subsequently found to be worse than those indicated by the site investigations. Hence, the contractors had carried out additional ground strengthening and stabilisation measures. In the event, the DSD had to bear an additional cost of $346 million. The additional works for tackling the difficult ground conditions had also seriously disrupted the progress of the works. In this connection, the Committee asked:

- when the site investigations were conducted; and

- whether the Government had misjudged the scope of and methodology for the site investigations.

19. In response, the **Director of Drainage Services** said that:

- the site investigation cost of $220 million was incurred for all stages of HATS, not only for Stage I. The site investigation cost for Stage I was around $124 million;

- these site investigations were carried out between 1992 and 1993. The delay of the whole HATS Stage I project was four and a half years, including the three years' delay caused by the forfeiture of the two original contracts and the remaining one and a half years by the unexpected difficult ground conditions and other problems;

- at the time of planning and implementing the projects, the DSD did not have any experience in this kind of tunnelling works. Therefore, it had to rely on the geological information compiled by the Geotechnical Engineering Office and the expert advice given by its consultant;

- similar to other tunnel projects, the boreholes could only provide an indication of the ground conditions. This reflected the inherent uncertainties of ground conditions for deep tunnel projects. Precise information on the actual ground conditions at each location could only be ascertained during tunnel excavation. Nevertheless, the DSD agreed that it had under-estimated the complexity of the works and the site investigations conducted were not sufficient to reveal the actual ground conditions; and

- even if the difficult ground conditions had been detected prior to commencement of the works, the contract sums of the tunnel completion contracts would also go up because the contract periods would have been extended to cater for the necessary ground strengthening and stabilisation works. However, in such case, the Government would have been able to work out a more accurate assessment of project costs and works progress.

20. The Committee noted that the Government had compensated the contractors for the direct and prolongation costs arising from unexpected difficult ground conditions. It appeared to the Committee that such an arrangement was unable to protect the Government's interest. The Committee asked whether the Government would consider introducing a mechanism or other measures to enable it to recoup funds from contractors in cases where the contractors were able to complete the works ahead of schedule not due to efforts of their own. For example, in the case of HATS Stage I, the Government should preferably be able to recoup part of the contract sum from the contractors if the ground conditions were subsequently found to be better than those indicated by the site investigations.

21. The **Director of Drainage Services** said that:

- it was a matter of risk-sharing between the Government and the contractors. If the Government allocated all the risks to the contractors, the tender prices would go up. However, if the anticipated complications that had been factored in the tender prices did not occur eventually and hence the actual outturn prices were lower than the accepted tender prices, the contractors would be overpaid;

- if the Government shared the risks with the contractors, there would be room for the tender prices to go down. However, in the circumstances, the approval of the Finance Committee (FC) for increases in the approved project estimates (APEs) might have to be sought from time to time in the light of actual development and progress of the works; and

- in some overseas countries, a "partnering" arrangement was adopted in the tendering of works projects. Under this arrangement, there were no tender prices. Instead, the parties concerned would agree on a target contract price and aim at sharing the risks on an equal basis. The Administration would continue to examine how to strike a good balance in risk-sharing between the Government and its works contractors.

22. Given the unsatisfactory outcome of the site investigations, the Committee queried whether the consultant appointed by the DSD for ground conditions assessment was the appropriate personnel for this task. The **Director of Drainage Services** replied that, with the benefit of hindsight, the consultant was not the most appropriate personnel for this task. In response to the Committee's further enquiry, **Mr CHUI Wing-wah, Chief Engineer/ Harbour Area Treatment Scheme, DSD**, said that the consultancy fee for conducting the ground conditions assessment, including feasibility study and site investigations, was approximately $80 to $90 million.

23. The Committee questioned whether any government officials should be held responsible for having appointed an inappropriate consultant for the ground conditions assessment which cost about $90 million of public money. The **Director of Drainage Services** responded that:

- although, in his view, the consultant was not the most appropriate personnel for the task, it did not mean that this consultant was totally not suitable for the task; and

- the consultant indeed came from a consortium of four world-recognised construction companies which had abundant experience in tunnelling works at that time.

24. The **Secretary for the Environment, Transport and Works** supplemented that:

- undoubtedly, the Environment, Transport and Works Bureau (ETWB) should be accountable for works departments' failure in performing their duties relating to the management and supervision of public works projects. However, in her view, before identifying where the responsibilities should lie and deciding whether or not officials in the ETWB should be held responsible for the unsatisfactory outcome of the works, the Administration should ascertain whether:

  (a) the works had been carried out with the application of suitable professional knowledge and expertise, and in accordance with relevant guidelines, established procedures and international best practices;

  (b) the unsatisfactory outcome could have reasonably been foreseen; and

  (c) the officials, or the consultants/experts appointed by the Government, had proceeded with the works with due diligence; and

- each works project had its own uncertainties and it was not possible to wholly eliminate all uncertainties before commencement of the works. In the case of HATS Stage I, a deep tunnel conveyance system was adopted to achieve the shortest route and to minimise disturbance and nuisance to the public, the environment, traffic, existing utilities, transport systems and buildings during construction. To achieve the purpose, the tunnels were built 80 metres to 150 metres below ground or sea level (which were some 40 to 60 storeys in height). There was not much experience in the world in excavating tunnels at such depths and under such high water pressure.

Substantial cost increase in tunnel completion contracts

25. The Committee noted that as a result of the replacement of the defective mucking systems and the additional works relating to difficult ground conditions, the three tunnel completion contracts had experienced significant delay and substantial cost increases. However, as the accepted tender prices of these three contracts were much lower than the estimated contract sums in the APEs, the surplus funds arising from the over-estimation of the contract sums were eventually used to meet the cost increases.

26. For Contracts C and D, the DSD did not have to seek additional funding from the FC because the cost increase of these two contracts totalling $188.6 million was covered by the over-provision in the APEs of $373.2 million ($116 million for Contract C and $257.2 million for Contract D). The DSD had also not informed the FC of such over-provision. For Contract E, the DSD sought additional funding of $115 million from the FC because the over-provision in the APE of $143.2 million was insufficient to meet the cost increase of $248.4 million. However, the DSD had not informed the FC of the actual cost increase of $248.4 million. Instead, it only provided the justifications for the additional funding of $115 million. Details about the over-provision in the APEs, increase in the contract sums and the additional funding sought from the FC, where necessary, of the three tunnel completion contracts are summarised in the table below:

**Over-provision in the APEs,
increase in contract sums and
additional funding sought from the FC
in the three tunnel completion contracts**

	Contract C	**Contract D**	**Contract E**
Surplus funds in the APE from over-estimation of contract sum (i.e. over-provision)	$116 million	$257.2 million	$143.2 million
Percentage of over-estimation	13%	30.9%	28.6%
Cost increase (i.e. increase in contract sum)	$48.7 million	$139.9 million	$248.4 million
Cost increase as a percentage of original contract sum	6.3%	24.3%	69.6%
Additional funding sought from the FC	Nil	Nil	$115 million

27. As revealed in paragraph 4.46 of the Audit Report, despite the various guidelines, the DSD had not reduced the APEs of the tunnel completion contracts even though the accepted tender prices were much lower than the estimated contract sums in the APEs. Audit could not find any documentation of the reasons for the DSD not to do so. The Committee was very concerned that the heads of works departments were given too much discretionary power to decide whether or not to adjust the APE even when the accepted tender price was much lower than the estimated contract sum in the APE. In particular, the APE might be used to cover huge sums of highly uncertain dispute settlements and contract variations. It appeared to the Committee that the existing practices of works departments rendered it difficult for the Legislative Council (LegCo) to effectively monitor the use of funding for works projects.

28. The **Director of Drainage Services** stated that:

- it was not the DSD's intention to over-estimate the contract sums of the three tunnel completion contracts. The awarded contract sums, which were heavily affected by the prevailing market conditions, the pricing strategies and the perception of risks of individual contractors, did not necessarily give an accurate indication of the final costs of the works. The final costs were influenced by the nature of the works and necessary variations for completion. Moreover, tenderers were in a better position to capture more up-to-date market information because of their commercial backgrounds. It was therefore not always easy for the Government to accurately estimate the cost of each project;

- the prices of the tenders received for the three tunnel completion contracts varied widely. For each contract, the average price of the tenders received was very close to or even higher than the estimated contract sum in the APE. There was no clear indication that the contract sums were grossly over-estimated;

- the problems with the mucking system surfaced in early November 1997, which was shortly after the commencement of Contract E in July 1997. In early February 1998, difficult ground conditions were encountered and tunnel excavation had to be suspended. As Contracts C and D were awarded in January 1998, it was not considered prudent to adjust the APEs downwards in view of these problems and the likely financial implications although the contracts were awarded at relatively lower tender prices. The subsequent development and the final contract sums showed that the consideration at the time was appropriate; and

- the above decision was in line with the spirit of the DSD Technical Circular No. 5/93 referred to in paragraph 4.45 of the Audit Report. As the DSD was not satisfied that the APEs of the three tunnel completion contracts could be reduced, it did not seek the approval of the Secretary for Financial Services and the Treasury to reduce the APEs.

29. According to paragraph 4.37 of the Audit Report, upon the approval by the FC, the APE of a works project became the expenditure ceiling under the project. Project proponents should estimate the cost accurately to avoid over-estimation of the APE. The Secretary for Financial Services and the Treasury had the delegated authority for approving an increase in the APE of up to $15 million. Application for supplementary provision for increasing the APE by more than $15 million had to be approved by the FC. The

Committee was concerned about the magnitude of the over-estimation of contract sums in Contracts C, D and E, which had all far exceeded the $15 million threshold. Against this background, the Committee asked:

- when the administrative cap arrangement to ensure proper control and use of funding under the APE mentioned in paragraph 4.54(a) of the Audit Report was promulgated, how effective it was in ensuring that works departments would reduce the APE when the accepted tender price was significantly lower than the estimated contract sum in the APE, and whether it had been strictly followed by works departments;

- about the details of the guidelines and/or measures that were in force during the relevant period of Contracts C, D and E, which required works departments to reduce the APE when the awarded contract sum was lower than the estimated contract sum in the APE; and

- whether the DSD's not reducing the APEs to reflect the lower tender prices had breached any of the guidelines and/or measures.

30. **Miss Amy TSE, Deputy Secretary for Financial Services and the Treasury (Treasury) 3**, responded at the hearing and in the letter of 15 May 2004, in ***Appendix 19***, that:

- each year, the Administration had to make due allowance for the outstanding commitments of all Category A projects, i.e. the total APE minus the actual expenditure to date, before earmarking resources for Category B and other new projects. These outstanding commitments would be inflated if the project estimates were not suitably adjusted over time, taking into account actual works progress and any savings from reduction in scope or change in design or lower tender price, etc. In the light of this, the Administration had introduced the administrative cap arrangement since May 2002 to prevent internal resources allocated to Category A projects from being locked up unnecessarily;

- under the administrative cap arrangement, the FSTB would administratively adjust downwards the capital funding allocated to the projects as approved by the FC, i.e. the APE, taking into account the lower-than-estimated outturn tender price, the actual works progress and planning development in the course of the annual resource allocation exercise. This lower spending limit would then become the administrative cap on the project expenditure. While this arrangement would help release internal resources for allocation to other

worthwhile projects, it would not obviate the need to seek necessary approval from the FC for an increase in the APE. Since its introduction, the administrative cap arrangement had been duly observed by works departments;

- with the administrative cap arrangement in place, works departments had to apply to the Treasury Branch for the lifting of the administrative cap to cover any subsequent increase in forecast expenditure even when the overall APE had not been exceeded. In doing so, works departments would need to account for the changes in the latest forecast expenditure as against the administrative cap. Through this process, any surplus fund in the APE used to cover an increase in forecast expenditure could be more clearly identified. The FSTB considered that this measure would enhance the transparency in the implementation of the works projects and help track down the changes and the reasons for such changes in the project estimates. As recommended by the Audit Report in paragraph 4.52(b), the Administration had already required all works departments to set out in their submissions to the FC for an increase in the APE information on the deployment of surplus funds under the APE to cover any cost increase; and

- the then Finance Branch had announced in 1993 a simplified procedure whereby relevant departments could make a request for reduction in the APE by memorandum to the then Secretary for the Treasury. The DSD subsequently included the above guideline in the DSD Technical Circular No. 5/93 issued in April 1993 concerning Public Works Subcommittee submissions. This guideline was in force during the period of Contracts C, D, and E, i.e. from 1997 to 2000. While the procedure promulgated then did not specifically require works departments to reduce the APE when the awarded contract sum under a works project was lower than the estimated contract sum in the APE, as a general financial management and control principle, works departments should put forward realistic estimates and review the project estimates in the light of actual progress so as not to lock up valuable resources. Under this principle, works departments would judge when the APE of a project should be reduced taking into account all relevant considerations including the outturn tender price. The FSTB, therefore, expected that the DSD had followed the simplified procedure as announced in 1993 when it came to the conclusion that there was no need to reduce the APE to reflect the lower tender prices. Seen in this light, the FSTB did not consider that the DSD had breached the above-mentioned simplified procedure.

31. At the invitation of the Committee, the **Director of Audit** commented, in his letter of 22 May 2004 in ***Appendix 20***, that:

- the administrative cap arrangement was not introduced to replace the mechanism for reducing the APE, which was a means to enhance financial accountability to the FC over the approved funding of works projects. Under the mechanism for reducing the APE, when the APE of a works project was reduced, a subsequent request for additional funding in excess of $15 million over the reduced APE was required to be submitted to the FC for approval. Currently, both the administrative cap arrangement and the mechanism for reducing the APE were in force. These two measures, if properly implemented, would enhance the control and use of funding under the APE;

- in the letter of 15 May 2004, the Secretary for Financial Services and the Treasury mentioned the simplified procedure announced by the then Finance Branch in 1993 and the DSD Technical Circular No. 5/93. In Audit's view, the March 1996 information paper mentioned in paragraph 4.43 of the Audit Report also provided useful information on the guidelines. In that information paper, the Administration informed the FC that:

  > "Where the tender sum is below the estimate approved by the Finance Committee, we will consider reducing the approved project estimate to reflect the lower forecast outturn price."; and

- Audit was aware that these guidelines allowed the relevant project controller to exercise judgement as to whether the APE could be reduced. In paragraph 4.46 of the Audit Report, Audit did not conclude that the DSD had breached the guidelines. Audit only noted that, despite the guidelines, the DSD had not reduced the APEs of the tunnel completion contracts even though the accepted tender prices were much lower than the estimated contract sums in the APEs. However, Audit could not find any documentation of the reasons for the DSD not to do so. Therefore, Audit had recommended in paragraph 4.51(b) of the Audit Report that the Director of Drainage Services should take action to reduce the APE of a project when the tender price was significantly lower than the estimated contract sum in the APE, and document the reasons where a reduction in the APE was considered not warranted.

32. On the same questions, **Mr KWOK Ka-keung, Deputy Secretary (Works) 1**, informed the Committee that:

- since January 2000, each works department had set up a committee to examine the project estimate of each works project before tendering. A database had also been established in November 2000 to help monitor the project estimates and prices of the tenders received. These measures had proved to be very effective in deterring works departments from attempting to over-estimate the project costs. After the implementation of these measures, the accuracy of project estimates prepared by works departments had generally improved; and

- in 2003, the differences between the estimated contract sums and the accepted tender prices were in the range of 10% to 15% on average. He believed that, with this mechanism, the possibility of works departments reserving a substantial part of the contract sum for contingency was very remote. As it was not always possible to have very accurate project estimates and in view of the inherent uncertainties in works projects, the 10% to 15% difference was considered to be reasonable in serving as a buffer for works departments to cope with unforeseen circumstances.

33. Since there were guidelines stipulating that works departments should adjust the APE in cases where the awarded tender price was significantly lower than the estimated contract sum in the APE, the Committee asked whether, in the view of the Secretary for the Environment, Transport and Works, the DSD was at fault in not following the guidelines to reduce the APE.

34. The **Secretary for the Environment, Transport and Works** responded that:

- as project estimates might fluctuate from time to time, it was not desirable to reduce the APE whenever the latest estimate was lower than the APE, due to lower tender prices or other reasons, except where the Controlling Officer was certain that there would ultimately be significant surplus funds under the project. To have done otherwise would involve the FC and the FSTB in the micro-management of contracts and would detract them from the deliberation of other more important financial issues; and

- in her view, the DSD's decision not to reduce the APE of the three tunnel completion contracts was understandable and justifiable in view of the complex nature of the projects and the various problems encountered during the course of the works. Moreover, under the existing tendering arrangement, works departments did not normally have the liberty to refuse the lowest tender even if the tender prices varied widely. From the practical point of view, it was not desirable to reduce the APE whenever the latest estimate was lower than the APE as some flexibility should be allowed to cope with uncertainties. Despite these considerations, the ETWB was willing to consider how the procedure in this regard could be improved.

35. The Committee did not agree that the requirement for reduction of the APE would lead to the micro-management of works contracts by the FC and the FSTB. While it appreciated the need for works departments to retain some flexibility to cope with uncertainties in works projects, it should not be taken to mean that they were not required to follow the guidelines to reduce the APEs. It also did not mean that they might choose not to seek approval from the FC for an increase in the APE that exceeded $15 million and/or inform the FC of any over-provisions in the APEs. In this connection, the Committee asked about the views of the Secretary for the Environment, Transport and Works on the feasibility of implementing the following requirements in respect of all works projects:

- the APE should be reduced when the tender price was significantly lower than the estimated contract sum in the APE; and

- after the reduction of the APE, a new application should be submitted for approval by the FC for supplementary provision to increase the APE in cases where the increase in the estimated contract sum was more than $15 million; for cases where the supplementary provision was $15 million or below, the applications should only require the approval of the FSTB.

36. Noting that the Secretary for the Environment, Transport and Works had agreed to remind all works departments to follow the guidelines to adjust the APE when the tender price was significantly lower than the estimated contract sum in the APE (paragraph 4.52(a) of the Audit Report), the Committee asked:

- about the details of the guidelines; and

- whether and how these guidelines had been promulgated to works departments.

37. The **Secretary for the Environment, Transport and Works** responded, in her letter of 18 May 2004 in ***Appendix 21***, that:

- in theory, it would be feasible to reduce the APE for a project when the tender price was significantly lower than the estimated sum in the APE for the relevant contract. However, it was necessary to note that a lower tender price might not necessarily lead to a corresponding surplus of the same amount in the APE. For example, in the case of a multi-contract project, the lower tender price for one contract might be off-set by the higher-than-estimated tender price for another contract. Market conditions might also change considerably within a short period of time thus requiring larger estimated sums for the remaining contracts under the project. A larger contingency sum for the project might also be necessary to cater for unfavourable ground conditions. For these reasons, reducing the APE by the same amount of the whole of the saving from the lower tender price would not be feasible. Instead, it would only be reasonable to require works departments to first review the APE after awarding a contract at a price significantly lower than the original estimated sum. Works departments should then suitably adjust the APE where there would likely be surplus funds for the whole project after such a review;

- provided that an APE was to be reduced only after a review by the works departments as proposed above, the ETWB had no difficulty with the proposed requirement that after reducing the APE, a new application should be submitted for approval by the FC for supplementary provision to increase the APE, if so required, of more than $15 million. For cases where the required supplementary provision to increase the APE was $15 million or below, the approval of the FSTB under delegated authority would be sought;

- as stated in paragraph 4.41 of the Audit Report, in January 2000, the then Secretary for Works expressed concern about the over-estimation of APEs in some works projects. In that connection, he issued guidelines to works departments to require them to improve the accuracy of the project estimates and review the system of collecting, updating and sharing of the centralised database of unit costs of construction. He also directed works departments that the APE of projects should be suitably adjusted, if necessary, when the tender price was much lower than the approved estimates; and

- the above instruction was promulgated to all works departments in an internal memorandum on 12 January 2000. On 27 April 2004, in response to the recommendation in paragraph 4.52(a) of the Audit Report, the Works Branch further issued a memorandum to remind all works departments to suitably

adjust the APE of projects when a tender price was significantly lower than the estimated contract sum in the APE and when there would likely be surplus funds under the project.

Impact on water quality of Victoria Harbour

38. The Committee noted that since the full commissioning of HATS Stage I, there had been a significant improvement in the water quality in Victoria Harbour, especially in the eastern and central harbour areas, and at beaches on the eastern side of Hong Kong Island. However, there had been a substantial increase in the level of E. coli in the western harbour area, where the treated effluent from the Stonecutters Island STW was discharged, and in the Tsuen Wan beaches. Because of the increased bacteria level, four more Tsuen Wan beaches, in addition to the three already closed in the mid-1990s, had been closed since the 2003 bathing season.

39. The Committee also noted that the high bacteria level in the western harbour area would only be improved when the further stages of HATS were completed, with the treatment level at the Stonecutters Island STW upgraded and a permanent disinfection facility installed.

40. In view of the above findings, the Committee questioned whether the Administration had assessed the risks and benefits of HATS Stage I on the water quality of Victoria Harbour, in particular the bacteria level in the western harbour area and the Tsuen Wan beaches, and how it could ensure that the water quality of the harbour would not be adversely affected after the commissioning of HATS Stage I.

41. **Mr Robert Law, Director of Environmental Protection**, replied at the public hearing and in his letter of 18 May 2004, in ***Appendix 22***, that:

- the Administration had actually assessed the effects that HATS Stage I might have on the water quality of Victoria Harbour. The assessment was conducted by means of a computer-based water quality modelling tool and the results were broadly in line with the actual observed outcome, taking the harbour as a whole. The water quality at the eastern end of the harbour and the beaches to the east of the harbour had improved dramatically as predicted. At the western end of the harbour, in the general vicinity of the outfall, it was expected that there would be some deterioration in water quality due to the concentration of the treated effluent in this area. This expected deterioration

was judged to be acceptable, particularly having regard to the planned temporary nature of the outfall and the fact that the Tsuen Wan beaches were marginal beaches with relatively few swimmers;

- however, the small area of the harbour in question, i.e. in the vicinity of the Tsuen Wan beaches, was hydrodynamically very complex, with several narrow channels through which the water might flow. The model used at the time simply could not deal with such complexity of water movement on such a very fine geographical grid. The Environmental Protection Department (EPD) was, therefore, not aware that the expected deterioration in water quality at the western end of the harbour would affect the Tsuen Wan beaches to the extent that had been observed; and

- there was considerable uncertainty as to the degree of reduction in bacteria that the chemical treatment process might achieve on its own. This, together with the distance between the outfall and the Tsuen Wan beaches and the fact that the outfall was intended to be only temporary, led the EPD to believe that the prudent course of action would be to await the actual operation of the plant before drawing any conclusions about the need for disinfection because the cost for this would have been very high.

42. The **Secretary for the Environment, Transport and Works** supplemented at the public hearing and in her letter of 18 May 2004 that:

- HATS was divided into four stages. Stage I was only designed to treat 75% of the harbour sewage from the urban areas in Kowloon and Northeast Hong Kong Island at the Stonecutters Island STW. Hence, the Administration did not expect that HATS Stage I would be able to solve all the problems;

- at present, the Stonecutters Island STW was a chemically enhanced primary treatment works with no disinfection facility. It could only remove 50% of the bacteria in the sewage. The ETWB was considering, in the context of the development of the further stages of HATS, upgrading the treatment level at the Stonecutters Island STW and installing a disinfection facility. In the design of the Stonecutters Island STW, target rates were set on its pollutant removal efficiency. According to the DSD, the Stonecutters Island STW had exceeded the target pollutant removal rates and its performance had been excellent; and

- the Administration was planning to consult the public shortly on HATS Stage II. If the public supported the project, the Administration planned to commence the detailed design and environmental assessment, etc, on the part of the permanent disinfection facilities for treating the Stage I flow by the end of 2004, after completing the necessary administrative procedures in bidding for resources. If the above preparatory work was completed smoothly, the Administration would be able to start the tendering process and seek the funding approval from the FC in parallel as early as 2006. Subject to the FC's approval, the construction of the disinfection facilities could start in the second half of 2006 for completion by the end of 2008 at the earliest.

43. In response to the Committee's enquiry as to whether interim measures would be implemented to reduce the bacterial level in the western harbour area having regard to the fact that the further stages of HATS might take many years to complete, the **Director of Environmental Protection** said that:

- the Administration was considering advancing the provision of part of the permanent disinfection facility under HATS Stage II with a view to improving the water quality in the western harbour area, which had deteriorated after the full commissioning of HATS Stage I; and

- such facility could be provided in around 30 months' time after the required funding was approved by the FC, but the recurrent cost for providing such facility would be high.

44. In the light of the above response, the Committee enquired about:

- the capital and recurrent costs of and the timetable for providing the said disinfection facility, and whether the recurrent costs would be met by existing resources; and

- apart from the provision of the said disinfection facility, whether there were other interim measures that might be put in place to improve the water quality in the western harbour area.

45. In her letter of 18 May 2004, the **Secretary for the Environment, Transport and Works** informed the Committee that:

- the Administration had examined the possibility of advancing the provision of part of the permanent disinfection facilities that were proposed to be built under HATS Stage II with a view to improving the water quality (in terms of E. coli) in the western harbour waters. This would involve the installation of an electro-chlorination plant to produce the disinfectant agent (sodium hypochlorite or bleach solution) and ancillary facilities for dosing the disinfectant on the effluent before the effluent was discharged via the submarine outfall at the Stonecutters Island STW. Based on the Administration's preliminary estimation, the capital cost and annual recurrent cost of the disinfection facilities required for treating the Stage I flow would be around $240 million and $60 million respectively. The recurrent expenditure could not be met by existing resources; and

- regarding possible interim measures, the Administration had explored the possibility of installing temporary facilities to enable the disinfectant solution to be delivered in bulk by barge directly to the Stonecutters Island STW. Such temporary facilities included a barge unloading facility and a number of large storage tanks for storing the bleaching agent on-site. The capital cost for the temporary facilities would be about $67 million and the recurrent cost about $90 million per annum. Most of the temporary facilities would become redundant upon completion of the permanent disinfection facilities mentioned above. Hence, it would be more cost-effective to expedite the permanent installation instead of constructing the temporary facilities.

46. The Committee observed that there were still quite a large number of swimmers in the Tsuen Wan beaches although they were not suitable for swimming due to their high bacteria levels. The Committee enquired about the measures that the Administration had implemented and/or would implement to prevent the public from swimming in these polluted beaches in order to safeguard their health.

47. The **Director of Leisure and Cultural Services** responded in the letter of 27 May 2004, in ***Appendix 23***, that:

- the Leisure and Cultural Services Department (LCSD) had posted notices and banners at prominent locations near the entrances of the beaches advising the public not to swim in these closed beaches;

- public announcements were made in Cantonese and English at regular intervals at the more popular beaches (i.e. the Lido and Casam Beaches) advising the public not to swim in these polluted beaches;

- press releases on the re-opening of the gazetted beaches and the continued closure of certain beaches with very poor water quality, including those in the Tsuen Wan District, were issued at the beginning of each bathing season;

- the EPD had been issuing weekly press releases on the water quality of gazetted beaches. These press releases included the message that the seven gazetted beaches in the Tsuen Wan District were closed to swimmers throughout the year because of very poor water quality. The public were also advised not to swim at these closed beaches; and

- the staff of the LCSD also gave verbal warning to people who were found swimming in these closed beaches.

48. The Committee noted from Table 4 in Chapter 7 of the Director of Audit's Report No. 42 concerning "Provision of aquatic recreational and sports facilities" that the daily average numbers of beach goers at the seven closed Tsuen Wan beaches were low in recent years. It doubted the accuracy of the figures as, according to its observation, there were still quite a large number of swimmers in the Tsuen Wan beaches, e.g. the Lido Beach, especially in the early morning from 5:00 am to 7:00 am. In this connection, the Committee invited Audit to help verify the numbers of swimmers at these beaches.

49. In his letter of 5 June 2004, in ***Appendix 24***, the **Director of Audit** advised that:

- the said Table 4 only provided the daily average numbers of beach goers at the Tsuen Wan beaches for the whole year from 2000 to 2002. Audit had further examined the statistics compiled by the LCSD, and provided a more comprehensive set of attendance figures of the Tsuen Wan beaches during the bathing season, from March to October, in 2001, 2002 and 2003;

- these figures provided the average daily attendance, indicating separately the attendance on weekdays and during weekends (including public holidays). In addition, the peak day and peak month attendance figures were also provided. The peak attendance figures showed that, despite the poor water quality, some of the Tsuen Wan beaches were quite popular. For example, for the Lido Beach in 2003, while the average daily attendance was 149 on weekdays and 283 on weekends and public holidays, the peak day attendance

was as high as 3,950 and the peak month attendance was 8,430. Indeed, the total attendance during the period from March to October 2003 was 41,071; and

- according to paragraph 5.21 of the Audit Report, the Secretary for the Environment, Transport and Works had accepted Audit's recommendation to reduce the bacteria level in the western harbour area and the Tsuen Wan beaches. She had also indicated the Administration's intention to advance the provision of part of the permanent disinfection facilities at the Stonecutters Island STW so as to reduce the bacteria level of the treated effluent.

50. **Conclusions and recommendations** The Committee:

Delay in works and increase in cost

- expresses dismay that there were substantial increase in cost and delay in works in completing Harbour Area Treatment Scheme (HATS) Stage I;

- notes that the Director of Drainage Services has agreed to:

  (a) implement effective measures to ensure that large-scale works projects are delivered on time and within budget; and

  (b) take action to ensure that Drainage Services Department (DSD) officers follow the guidelines promulgated in DSD Technical Circular No. 9/2000 for improving project management and budgetary control of time-critical projects, and that the guidelines are updated regularly;

- notes that the Secretary for the Environment, Transport and Works has conducted a post-implementation review of HATS Stage I. The findings will be reported to the Legislative Council (LegCo) Panel on Planning, Lands and Works in late June 2004;

Forfeiture of original tunnel contracts

- expresses serious concern that:

  (a) the DSD failed to ensure that the duly executed contract instruments for the completion contracts were submitted within the stipulated time limits; and

(b) in the forfeited contracts, while the Government had paid more than 40% of the contract sum, only about 15% of the works had been completed up to the date of forfeiture;

- notes that the Director of Drainage Services has agreed to:

  (a) strictly implement the contract conditions for the provision of parent company guarantee and performance bond to ensure that the required instruments are submitted by contractors within the stipulated time limits; and

  (b) for large-scale works projects, critically devise the contract payment schedules to ensure that progress payments are made, as far as possible, in line with the actual progress of works;

- notes that the Secretary for the Environment, Transport and Works has notified all works departments to take on board Audit's recommendations relating to contract forfeiture, for general application in future projects;

Problems encountered in tunnel completion contracts

- disagrees with the view of the Secretary for the Environment, Transport and Works that it is not desirable to reduce the approved project estimate (APE) whenever the latest estimate is lower than the APE (due to lower tender prices or other reasons) except where the Controlling Officer is certain that there will ultimately be significant surplus funds under the project;

- considers that the heads of works departments are given too much discretionary power to decide whether or not to adjust the APE even when the accepted tender price was much lower than the estimated contract sum in the APE, especially when the APE might be used to cover huge sums of highly uncertain dispute settlements and contract variations;

- expresses serious dismay that the DSD:

  (a) did not reduce the APEs of the tunnel completion contracts even though the accepted tender prices were much lower than the estimated contract sums in the APEs;

  (b) only informed the Finance Committee (FC) that the shortfall for Contract E was $115 million, whereas the true total cost increase was $248.4 million;

(c) failed to inform the FC of the over-provision in the APEs for Contracts C and D of $373.2 million ($116 million for Contract C and $257.2 million for Contract D) at all, and that it had used such over-provision to cover the cost increase of these two contracts totalling $188.6 million, which was largely used for settling claims submitted by the two contractors concerned; and

(d) incurred an additional cost of $135.7 million to replace the defective mucking systems in order to avoid further delays;

- notes that the Director of Drainage Services has agreed to:

(a) review the arrangement for the use of forfeited plant in completion contracts, in particular, the applicability of the exclusion clause and No Claim Statement, with a view to formulating guidelines to protect the Government's interests;

(b) conduct a risk-benefit analysis, if there is intention to allow a contractor to use forfeited plant in a completion contract, on the use of those items of forfeited plant that are critical to the completion of the works;

(c) improve the methodology for conducting site investigations by adopting new technology;

(d) conduct comprehensive site investigations for major works projects involving substantial underground works (e.g. the further stages of HATS), with the assistance of geotechnical and tunnelling experts to provide more accurate information about the ground conditions;

(e) take action to improve the accuracy of project estimates and ensure that the promulgated guidelines for preparing project estimates are complied with; and

(f) take action to reduce the APE of a project when the tender price is significantly lower than the estimated contract sum in the APE, and document the reasons for cases where a reduction in the APE is considered not warranted;

- notes that the Secretary for the Environment, Transport and Works:

  (a) has reminded all works departments and relevant policy bureaux to state clearly in their submissions to the Public Works Subcommittee and FC, when seeking an increase in the APE for works projects:

    (i) the total cost increase and the reasons for the increase; and

    (ii) whether any surplus funds in the APE have been used to meet the cost increase; and

  (b) has agreed to:

    (i) take into account Audit's recommendations relating to the use of forfeited plant in completion contracts in considering the revision of the contract re-entry procedures; and

    (ii) promulgate guidelines for improving site investigations, particularly for tunnel projects;

- recommends that, in order to ensure the LegCo's effective monitoring of the use of funding for works projects and to minimise the possibility of works departments' covering up their administrative bungles and settlement of claims of substantial amount, the works departments concerned should inform the LegCo, with full justifications provided, under the following circumstances:

  (a) when the difference between the accepted tender price and the estimated contract sum in the APE is $15 million or more, irrespective of whether or not there will be any substantial variations in the contract cost that may warrant an adjustment of the APE and/or require the FC's approval of an increase in the APE to cover the ultimate outturn price; and

  (b) when the expenditure relating to dispute settlement under a works contract amounts to $15 million or more;

Impact on water quality of Victoria Harbour

- expresses serious concern that:

  (a) there has been a rise in the bacteria level (E. coli) in the western harbour area and the Tsuen Wan beaches;

(b) the Stonecutters Island Sewage Treatment Works is not provided with disinfection facility; and

(c) the Environmental Protection Department failed to accurately predict the impacts of HATS Stage I on the water quality in the western harbour area;

- expresses grave concern that some of the seven closed gazetted beaches in Tsuen Wan still had a large number of beach goers during the bathing season (e.g. the Lido Beach had a patronage of 41,071 from March to October 2003), despite the fact that their poor water quality poses a health hazard to swimmers;

- considers that the Administration has the responsibility to improve the water quality in the affected area in order that the gazetted beaches can be re-opened for public use;

- urges the Administration to:

(a) step up publicity effort and conduct more patrols to warn the public not to swim in the closed gazetted beaches; and

(b) advance the provision of part of the permanent disinfection facilities under HATS Stage II in order to improve the water quality in the western harbour area;

- notes that the Director of Environmental Protection has agreed to:

(a) continue to closely monitor the impact of HATS Stage I on the water quality of Victoria Harbour, particularly the bacteria level in the western harbour area and the Tsuen Wan beaches; and

(b) 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; and

Follow-up action

- wishes to be kept informed of the actions taken by the Administration to address the various issues cited above.