For discussion
on 25 November 2002

Legislative Council
Panel on Environmental Affairs

2nd Progress Report on Trials and Studies for the Harbour Area Treatment Scheme

PURPOSE

This paper briefs Members on the latest progress of the various trials and studies undertaken to ascertain the feasibility of compact sewage treatment technology and options proposed by the International Review Panel (IRP) to implement the further stages of the Harbour Area Treatment Scheme (HATS).

BACKGROUND

2. In March 2002, we informed Members of the progress of various trials and studies which the Government has been conducting to ascertain the feasibility of the compact sewage treatment technology and the four IRP options. We also informed Members that a HATS Monitoring Group (MG), currently chaired by the Permanent Secretary for the Environment, Transport and Works (Environment), had been set up since June 2001 to monitor the progress of these trials and studies. We undertook at the March 2002 meeting to report further progress of the trials and studies to keep Members abreast of the latest development before end of 2002.

PROGRESS OF THE TRIALS AND STUDIES

Environmental and Engineering Feasibility Studies (EEFS)

3. Camp Dresser & McKee International Inc. (CDM) was appointed in November 2001 to undertake the EEFS to verify the environmental and engineering feasibility of the IRP options for the development of the further stages of HATS. Its first major task was to formulate the Water Quality Criteria (WQC) for assessing the water quality impact of the IRP options on the receiving water bodies. After drawing up the initial WQC and seeking the advice of the MG in February, CDM conducted a consultation exercise between June and September 2002 to solicit views on its WQC

proposals, including -

- a presentation to the Advisory Council on the Environment (ACE) in June;
- a view sharing workshop with stakeholders including academia, green groups, professional institutions, etc in June;
- the issue of a public consultation document in addition to the technical details to explain the WQC in layman's language for distribution to the public through District Offices for comments. Copies of the document have also been distributed to Members through the Panel Secretariat; and
- uploading the above document to the Internet for wider access by the public.

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4. CDM reviewed all comments received and provided feedback to the originators of the comments whenever possible. Following endorsement of the finalized WQC by the MG in October 2002, we have circulated the consultation report together with the list of the finalized WQC to all stakeholders and uploaded them to the "Clean Harbour" website - http://info.gov.hk/cleanharbour/.

5. Apart from drawing up the WQC, CDM has carried out tasks such as field surveys, wastewater flow estimations and model calibration for the purpose of water quality assessment. It has also ascertained the implications for the footprint requirements of the sewage treatment works (STW) for incorporation into the future layout design work. It would soon complete its site search study for the four IRP options and develop the layout designs of the STWs for these IRP options.

Compact Sewage Treatment Technology Pilot Plant Trials (CSTTT)

6. These trials were recommended by the IRP to test the feasibility and effectiveness of compact technology, particularly the Biological Aerated Filter (BAF)[1] technology, in treating Hong Kong's saline sewage at Stonecutters Island. Drainage Services Department (DSD) awarded three trial contracts to three different contractors in December 2001, with two employing different designs of the BAF technology and one employing the Submerged Aerated Filter (SAF)[2] plus denitrification technology. DSD also appointed Professor Howard Huang of the Hong Kong University of Science and Technology as the Independent Checker to audit the trial results, and CMA Testing and Certification Laboratories, a laboratory accredited under Hong Kong Laboratory

[1] BAF is an advance treatment process characterized by flexible operations and compact size.
[2] SAF is another advance treatment process also characterized by flexible operations and compact size. It differs from BAF in that an additional downstream solid removal device is required in the treatment process.

Accreditation Scheme to provide laboratory services for all the trials. The pilot plant trials, commenced in April 2002, would last for 11 months till end of February 2003. Samples of chemically enhanced primary treated (CEPT) sewage and treated effluent from the pilot plants are being collected for analysis.

7. One BAF contractor has proposed three alternative configurations for its pilot plant. The biological process of the first configuration had stabilized by the end of April 2002 with both nitrification and denitrification achieved[3] in May 2002 and has been able to operate satisfactorily at the designed average flow rate. The testing of the second configuration of the plant commenced in September and the process was satisfactorily established at low flow in the same month.

8. The second BAF pilot plant also has two configurations. The biological process of the first one stabilized in May 2002, with both nitrification and denitrification achieved in May 2002. The pilot plant operated satisfactorily at the designed average flow rate since September 2002 after addition of methanol for denitrification. The testing of the second configuration, with less methanol addition, has commenced in early October 2002.

9. The SAF plus denitrification pilot plant first achieved both nitrification and denitrification in June 2002. However, due to poor media quality, the media in the SAF required replacement in early July 2002 and the nitrification process was re-established in early August 2002. At the end of September, the pilot plant was operating at about 70% of the design flow. There were some discrete occurrences of mechanical equipment failure, which affected the effluent quality. Apart from this, both the nitrification and denitrification processes were satisfactory in the months of August and September. The biological process at the design flow-rate has yet to be established.

10. DSD has been holding regular meetings separately with the contractors in order to closely monitor the project progress and to resolve site issues. The interim report for the trials, based on the data collected up to the end of August, is currently being reviewed by CDM for incorporation into the EEFS.

Study on Procurement Options (SPO)

[3] Nitrification is the process of turning ammonia in sewage into nitrates and denitrification is the removal of nitrates. Ammonia is a harmful substance while excessive nitrates (a nutrient) may lead to over-abundant growth of algae, which can upset the oxygen balance resulting in fish kills. Successful achievement of nitrification and denitrification by the pilot plants would mean that the processes are suitable for treating Hong Kong sewage under Hong Kong conditions.

11. This consultancy aims to review possible procurement options and to develop the most efficient and effective contractual arrangement for the implementation of further stages of HATS. The consultants selection exercise was completed in February 2002 and DSD subsequently appointed Maunsell Consultants Asia Ltd (Maunsell) to undertake the assignment in March 2002[4].

12. Maunsell has reviewed local and international practice and experience on various procurement arrangements, generic merits and demerits for various procurement options as well as potential constraints under the existing government policies and practices and interviewed stakeholders in July and August. In order to enable the project stakeholders to deliberate on the procurement options and to allow the evaluation criteria for short-listing options to be developed as well as to build consensus, a Value Management Workshop was held in October 2002. In addition, interviews with those involved with the operational and maintenance aspects of the existing HATS facilities have been carried out.

Stage I Flow Reassessment Study

13. This study was prompted by the need to address capacity issues associated with developments in East Kowloon. Construction of a mathematical model of the HATS Stage I sewage-tunnel system commenced in 2000. Calibration of the hydraulic model against flow data obtained from the fully commissioned HATS Stage I has been completed. The model is now being used to simulate different scenarios. The key results of the model simulations, completed in October 2002, have been made available to CDM for use in determining the sewage treatment capacity requirements at Stonecutters Island, and the need for implementation of any capacity-constraint relieving option. Further supplementary work is continuing.

Stonecutters Island Sewage Treatment Works (SCISTW) Capacity Reassessment Study

14. As recommended by the IRP, this study is to determine the maximum capacity of the Stage I sedimentation tanks at SCISTW and the effect of increased flow on the pollution removal efficiency of SCISTW. Trials using the full HATS Stage I flow have been completed. It was concluded that the maximum flow that can be handled by the

[4] As explained in the last progress report, the study would be split into two stages. The first stage of the study on procurement arrangements for feasible options would be completed by end of April 2003. The remaining stages of this study including procuring arrangements for the selected option of HATS and the contract document preparation would proceed only after we have consulted the community on the way forward for HATS and will complete by end of November 2004.

sedimentation tanks, without changing the design settings/parameters, is in line with the maximum design flow of 39.94m^3/sec.

15. In an effort to test the performance of the sedimentation tanks for peak flows higher than the design peak flow, further trials were carried out by lowering the adjustable weirs (adjustable gates provided at the discharge end of each sedimentation tank to adjust the flow distribution between the tanks). The results indicated that the sedimentation tanks might be able to handle a maximum peak flow of up to 10% higher than the design maximum flow. The performance of the tanks suffered mainly during the duration of the enhanced peak flow. A report on these trials has been made available to CDM.

Programme Timetable & Publicity

16. A latest programme for the studies and trials is at **Annex I**. All trials and studies are generally progressing in accordance with the programme. We remain confident that we would be able to complete the trials and studies before the end of 2003 as planned.

17. To enhance public understanding of the HATS and pave the way for the public consultation on the way forward, the Government plans to undertake more proactive publicity on the HATS project. In addition to uploading the latest development on HATS onto the website, the Government has published in October a leaflet entitled "Our Harbour: A Cleaner Tomorrow" (**Annex II**) summarizing, in a simple and reader-friendly manner, the key facts about HATS and its progress and programme for distribution to public through various channels including the District Offices. The Government would also be conducting briefing sessions for the District Councils in the next few months to update them on the HATS project.

FINANCIAL POSITION

18. Although we have taken into account the recommendations of the MG to extend the period of the pilot plant trials from an initial three months to the present eleven months; and to appoint an independent checker and a single accredited laboratory to verify and carry out the trial analysis respectively (paragraph 6 above), we anticipate that all the trials and studies could still be completed within the overall allocation of $73.6M.

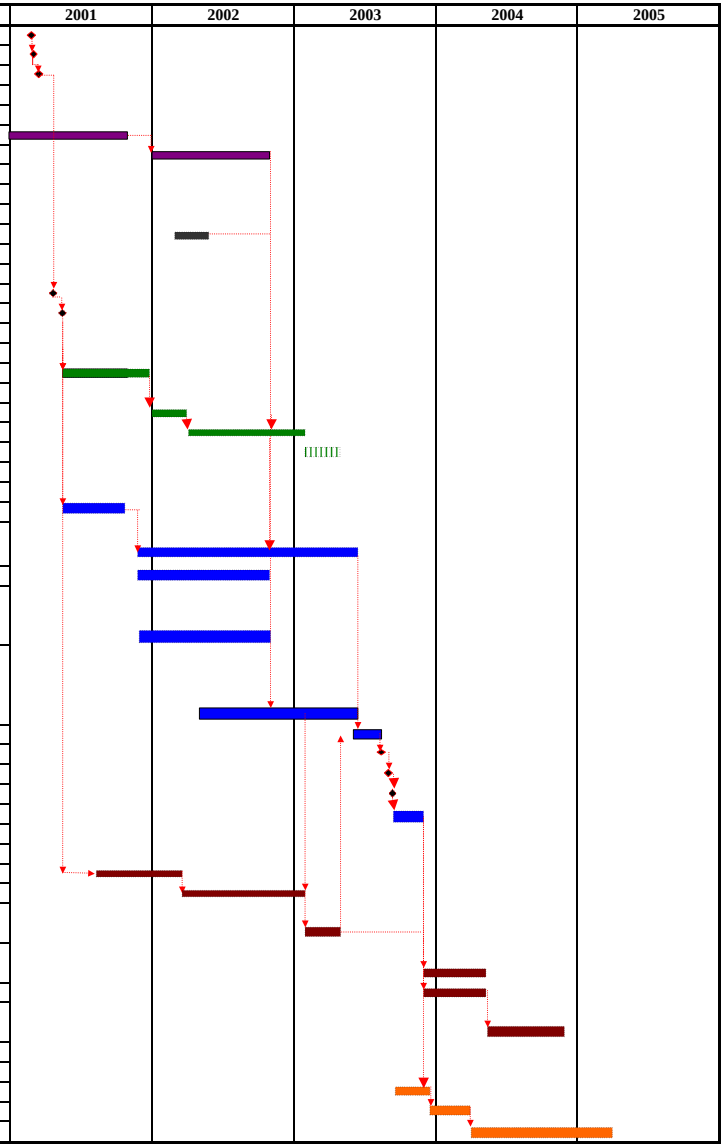
ADVICE SOUGHT

19. Members are requested to note the latest progress of the trials and studies on the further stages of HATS.

Environment, Transport and Works Bureau
November 2002

Programme for the Trials and Studies in relation to the Harbour Area Treatment Studies

Task Name	Start	Finish
1. Way forward endorsed by EXCO	27/02/01	27/02/01
2. Release of Public Briefing Document	01/03/01	01/03/01
3. EA Panel briefing	19/03/01	19/03/01
4. Stage I Flow Reassessment Study		
4.1 Developing hydraulic model		31/10/01
4.2 Hydraulic model calibration after Stage I commissioning	01/01/02	31/10/02
5. SCISTW Capacity Reassessment Study		
5.1 In-house trial	Completed	
5.2 Verification after Stage I commission	01/02/02	30/04/02
6. Funding Application for 7, 8 & 9		
6.1 PWSC	25/04/01	25/04/01
6.2 FC	25/05/01	25/05/01
7. Compact Sewage Treatment Technology Pilot Plant Trials		
7.1 Contractor selection	25/05/01	01/01/02
7.2 Trial	02/01/02	01/02/03
7.2.1 Design and Construction of Pilot Plants	02/01/02	01/04/02
7.2.2 Phase I Trials	02/04/02	01/02/03
7.2.3 Phase II Trials (provisional)	02/02/03	01/05/03
8. Environmental & Engineering Feasibility Assessment Studies		
8.1 Consultant selection	28/05/01	26/10/01
8.2 Environmental feasibility assessment including supplementary marine survey and water quality modelling	30/11/01	15/06/03
8.3 Stage I capacity constraint assessment	30/11/01	29/11/02
8.4 Environmental and general engineering feasibility assessment for Tseung Kwan O relieving option and the identification of other feasible relieving options	30/11/01	29/11/02
8.5 Engineering feasibility assessment including development of land requirement, schematic design, preliminary design, cost estimate & programme based on findings of relevant studies	30/04/02	15/06/03
8.6 Option comparison and recommended feasible option(s)	30/05/03	13/08/03
8.7 Feasible Options endorsed by Technical Group on HATS	06/08/03	20/08/03
8.8 Feasible Options endorsed by Monitoring Group on HATS	21/08/03	05/09/03
8.9 Submission of final Executive Summary	15/09/03	15/09/03
8.10 Public Consultation on Recommended Feasible Options	15/09/03	29/11/03
9. Study on Procurement Options		
9.1 Consultant Selection of Study I	15/08/01	20/03/02
9.2 Study I : Phase I (Initial review)	21/03/02	31/01/03
9.3 Study I : Phase II (Procurement arrangements for feasible options of HATS)	01/02/03	30/04/03
9.4 Study I : Phase III (Procurement arrangements for the selected option of HATS)	30/11/03	08/05/04
9.5 Consultant Selection of Study II	30/11/03	08/05/04
9.6 Study II (Contract document preparation for the selected option of HATS)	09/05/04	30/11/04
10. Feasibility Study		
10.1 Funding application & approval	16/09/03	15/12/03
10.2 Fast track consultant selection	16/12/03	31/03/04
10.3 Study	01/04/04	31/03/05



Date: November 2002

Annex II

Our Harbour: A Cleaner Tomorrow

Decisions on Victoria Harbour water quality are needed in **THE NEXT TWO YEARS**

WHAT are these decisions ?

WHY are they needed ?

WHO will decide ?

These are important questions for everyone

The Harbour

Why should we care?

Living in a modern city is so convenient. Pull a plug, flush, or press a button and our wastewater disappears from sight, thanks to an efficient sewerage system. But as our population continues to grow, the Harbour is paying a high price for our convenience.

Rising pollution levels from sewage entering Victoria Harbour have been arrested for now. In fact, water quality in the eastern Harbour improved by 90% in terms of bacteria content at the beginning of 2002, due to the full commissioning of Stage One of the Harbour Area Treatment Scheme (HATS).

This sewage treatment milestone bought us some time by treating 70% of Harbour sewage, but much more needs to be done to restore our Harbour to a more natural, healthier, condition.

Looking ahead, we must choose the most appropriate form of sewage treatment, or the Harbour water quality will once again decline.

Protecting the Harbour from future degradation will require decisions from the community on sewage treatment options entailing significant financial, environmental, location and technology considerations. Achieving the right balance between the benefits of taking action and the associated costs will be a challenge we must face around the end of 2003.

Is our Harbour special?

Yes, Hong Kong's famous Victoria Harbour is arguably our most precious natural asset. Consider some of the reasons for this:

- It is a major feature of our brand identity, our heritage and our legacy;
- Tourists are attracted by our spectacular harbourside location;
- It has brought, and continues to bring, inestimable economic benefits;
- It lends distinction, charm and contrast to the hectic pace of our city life;
- It is a source of pride to the vast majority of our citizens.

Where are we now?

The Harbour Area Treatment Scheme is a major infrastructure programme that comprises several stages. Building this system has involved an investment of $8.2 billion so far.

A number of important trials and studies are now being conducted to decide the best way forward for the remaining stages. Upon completion of these trials and studies in the next 18 months, the Government will undertake a full-scale public consultation on the various options before selecting the most favourable model.

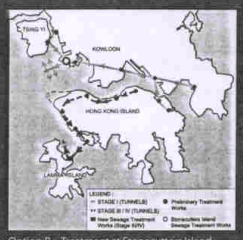
It is important that the people of Hong Kong, the ultimate owners and beneficiaries of HATS, are part of the decision-making on what to build. To facilitate this process, updated information will be made available at key junctures, to assist the community to form views and provide comments.

WHAT ARE THE OPTIONS?

In 2000, an independent panel of experts, appointed by the Government, reviewed plans for the remaining stages of HATS. They proposed employing compact biological treatment technology to remove almost all the pollutants from the wastewater, and identified four options.

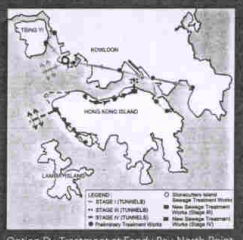
Each of these options involves discharging highly treated effluent into the Harbour waters. Nevertheless, the panel members considered that all offered the same, or better, environmental protection compared to previous plans but at lower overall costs. They also identified the trials and studies that the Government should conduct to verify the effectiveness of the recommended sewage treatment technology in Hong Kong, in order to decide on the best option for the remaining stages.

Option A : All treatment at Stonecutters Island



Option B : Treatment at Stonecutters Island and Lamma Island

Option C : Treatment at Stonecutters Island and Sandy Bay



Option D : Treatment at Sandy Bay, North Point and Stonecutters Island

DO YOU WANT TO HAVE A SAY?

If you want to learn more and contribute to this debate, visit the HATS website at:
http://info.gov.hk/cleanharbour/

HARBOUR WATER WATCH

Printed with environmentally friendly ink on recycled paper