

For information

**Legislative Council
Panel on Environmental Affairs**

**Progress of Trials and Studies on the Way Forward
for the Harbour Area Treatment Scheme**

PURPOSE

This paper briefs Members on the progress of the trials and studies to ascertain the feasibility of options proposed by the International Review Panel to implement the further stages of the Harbour Area Treatment Scheme (HATS).

BACKGROUND

2. In April 2000, the Administration invited an International Review Panel (the IRP)¹ to carry out a review of the further stages of HATS. In its report released on 30 November 2000, the IRP proposed four alternative treatment and discharge options, all involving the use of Biological Aerated Filters (BAF) technology² for treatment, deep tunnels for the sewage transfer system, and short outfalls for disposal. In proposing the four options, the IRP recognized that there were several uncertainties that needed to be addressed. The IRP therefore recommended that trials and studies should be carried out before a final configuration for the subsequent stages of HATS is selected.

3. On 25 May 2001, Finance Committee (FC) approved \$73.6 million for the Administration to conduct the following trials and studies so as to ascertain the feasibility of the four IRP options:

- (a) **compact sewage treatment technologies trials** to test the feasibility and effectiveness of compact technologies, particularly the BAF technology, in treating local sewage;

¹ The IRP comprises six overseas, Mainland, and local experts in sewage treatment, tunneling, and economics.

² BAF is an advance sewage treatment process characterized by flexible operations and compact size.

- (b) **environmental and engineering feasibility studies** to verify the environmental and engineering feasibility of the IRP options for the development of the further stages of HATS; and
- (c) a **feasibility study for contractual framework** to review possible contractual arrangements, including “Design, Build, Operate” (DBO)³, and develop a framework that would help expedite the delivery of the project and to identify the most appropriate means for operating the project.

4. In addition, we informed Members that we would conduct the following two studies using existing resources to assist in evaluating the way forward for HATS :

- (d) a **HATS Stage I flow assessment study** to assess performance of the Stage I system for future population and development projections under both dry and wet weather conditions; and
- (e) a **capacity reassessment study for the Stonecutters Island Sewage Treatment Works (SCISTW)** to determine the maximum capacity of the Stage I Sedimentation Tanks at SCISTW and the effect of increased flow on the pollution removal efficiency.

MONITORING GROUP ON TRIALS AND STUDIES FOR HATS

5. To increase transparency and monitor the progress of the trials and studies, a Monitoring Group (MG), chaired by the Secretary for the Environment and Food, was set up in June 2001. The terms of reference of the MG are as follows -

- (a) to monitor the progress of the trials and studies being undertaken by the Government following the recommendations of the IRP;
- (b) to advise Government on the direction of the studies and on proposals or findings arising from them; and
- (c) to advise Government on the provision of information to and further

³ DBO contract is a procurement arrangement to acquire services from a contractor in one single contract to design, build and operate the facility.

consultation with the community on the development of HATS.

6. Members of the MG comprise three local members of the former IRP, four members nominated by the Advisory Council on Environment, and three members of the public. The Director of Environmental Protection, the Director of Drainage Services, and the Deputy Secretary for Works are official members of the Group. The membership of the Group is set out in **Annex A**.

7. Since it was set up in June 2001, the MG has discussed proposals from the Government on the scope of the trials and studies, as well as the mechanism and criteria for the selection of contractors/ consultants for the trials and studies. Their advice has assisted the Administration in shaping the direction and requirements of the trials and studies. The progress made is set out in the following paragraphs.

PROGRESS OF THE TRIALS AND STUDIES

Compact Sewage Treatment Technology Pilot Plant Trials (CSTTT)

8. These trials were recommended by the IRP to test the feasibility and effectiveness of the BAF technology in treating Hong Kong's saline sewage at Stonecutters Island. They will establish design parameters such as filter loading⁴ and sludge production rate⁵ which are considered essential for determining the viability of such technology. They will also assess the reliability and operational risk, land requirements, and the capital and recurrent costs of such technology.

9. As suggested by Members at the 3 April 2001 meeting, we decided to consider testing in the trials, in addition to the BAF technology, other well-proven compact sewage treatment technologies with a good track record of large-scale operations. However, given the limited space at SCISTW for accommodating the trial plants and financial constraints, we could only accommodate a maximum of three trials.

10. The selection mechanism, assessment criteria and tentative programme were all discussed and endorsed by the MG before the Government kicked off the tendering exercise for the trials. In response to views expressed by the MG, we have

⁴ Filter loading refers to the volume of BAF filter required for removal of unit load of pollutants from sewage per day. It is a design parameter for determining the treatment capacity of a BAF plant.

⁵ Sludge production rate is the rate at which sludge will be produced from a BAF plant.

also made the following changes in the trials so as to improve the quality of the trial findings and provide independent monitoring of the trial results:

- (a) to extend the trial period to 10 months from three months as originally proposed by the Government in the submission to the Finance Committee in May 2001, so as to cover both hot and cold seasons and provide more comprehensive trial results;
- (b) Government to appoint an Independent Checker to assist in overseeing the trials and to verify the trial results; and
- (c) Government to appoint a single laboratory to carry out sampling/analysis work for the trials.

11. The Drainage Services Department (DSD) subsequently invited open tenders for the trials on 28 September 2001 through the Government Gazette and on the “Clean Harbour” website (<http://www.info.gov.hk/cleanharbour>); and notifications to consulates and trade commissions in Hong Kong. The tender invitation exercise was closed on 26 October 2001. 13 tenders were received from nine companies, including five tenders based on BAF technology and eight based on non-BAF technologies.

12. To take full advantage of the expertise of MG members in sewage treatment, we invited them to offer their expert views on the technical submissions of the 13 tenders. With the benefit of these expert views, the Government’s Tender Assessment Panel completed its evaluation of the 13 technical proposals and scored them in accordance with a pre-determined marking scheme. Qualified tenders were ranked in accordance with their overall scores which were attained from their technical merits and fee proposal. On 24 December 2001, DSD awarded contracts to the following three bidders with the highest overall scores.

<u>Name of Contractor</u>	<u>Partner/Owner of Technology</u>	<u>Contract Sum</u>
<u>BAF technology</u>		
• CST Engineering Ltd	Vivendi Water	\$5,385,000
• ATAL Engineering Ltd	BHU Umwelttechnik GmbH	\$6,200,000

Non-BAF technology

- Binnie Black & Veatch Hong Kong Ltd Seven Trent Services/Capital Controls \$5,588,000

13. The trials, scheduled to commence in April 2002, would last 10 months (April 2002 to January 2003) covering both the hot and cold seasons. If necessary, the trials could be further extended on a month-to-month basis for a maximum of three months.

14. As the contract sum for the Independent Checker (paragraph 10(b) above) is less than \$1.3 million, the DSD has invited restricted tenders from seven local universities and the Hong Kong Productivity Council in accordance with the Government's Stores and Procurement Regulations on 23 January 2002. The Independent Checker will be appointed in mid-March 2002 to tie in with the commissioning of the trials. DSD also invited open tenders for the laboratory services for the trials (paragraph 10(c) above) on 8 February 2002.

Environmental and Engineering Feasibility Studies (EEFS)

15. The studies will evaluate the potential impacts of options for the further stages of HATS on the receiving water environment and their effectiveness in achieving the Water Quality Objectives⁶ and meeting other relevant agreed criteria. The effectiveness of the options in meeting long term demands for treatment capacity for the whole HATS catchment area will also be examined. Specific potential sites to accommodate the various facilities required under different options will be identified and updated estimates of capital and recurrent costs for various options will be developed. A list of feasible options will be proposed.

16. Taking into account comments from the MG, the scope of the studies has been refined to include the following specific tasks:

- (a) to conduct cost-benefit analysis and comparison of the various options for the further stages of HATS;
- (b) to arrange at least one public forum to discuss the environmental criteria

⁶ Water Quality Objectives define the maximum levels of pollutants which are acceptable and the minimum levels of essential constituents which are required if designated resources and users are to be maintained in rivers and marine waters.

that should be applied in evaluating the environmental acceptability of the various options; and

- (c) to assess the severity and acceptability of impacts of the IRP options on beaches (in addition to other sensitive receivers such as fish nursery and spawning areas, maricultural sites, corals, etc.) .

17. In July 2001, the Environmental Protection Department (EPD) invited response to Expressions of Interest (EOIs) from a longlist of 18 consultants drawn up by a Consultant Selection Assessment Panel consisting of Government officials.

18. After assessing the EOIs based on a set of pre-determined criteria, four consultants were shortlisted and invited to provide separate technical and fee proposals for bidding the consultancy contract. In accordance with established procedures laid down by the Engineering and Associated Consultants Selection Board (EACSB), the Consultant Selection Assessment Panel then ranked the shortlisted consultants having regard to their combined scores attained from both their technical merits and fee proposal. EPD awarded the EEFS consultancy to Camp Dresser & McKee International Inc. on 29 November 2001 at a price of \$21 million. The EEFS will last for 24 months and is scheduled for completion before the end of 2003.

19. EPD is at present working on the proposed environmental criteria which would later be used for assessing the environmental impact of the IRP options on the receiving water bodies. We will consult stakeholders such as local academics, green groups and professional institutions and seek endorsement of the MG before we finalize these proposed criteria.

Study on Procurement Options

20. This study, formerly known as “Feasibility Study for Contractual Framework”, will review possible contractual arrangements, including Design-Build-Operate (DBO), and develop a procurement framework that will help expedite the delivery of the project, achieve best quality and value-for-money for the proposed works that meet the required standard and satisfactory control of risk. In addition, it will identify the most appropriate means of operating the selected scheme.

21. The study involves a two-stage approach with two separate consultancies. The first one will review possible contractual arrangements and identify and develop the most efficient and effective contractual arrangement for the implementation of the subsequent stages of HATS. The second one will prepare necessary core contract documents to effect the selected procurement option for the follow-on implementation of the project.

22. DSD invited in September 2001 interested candidates to apply for inclusion in the longlist of consultants for the first consultancy study through notices in the Government Gazette, Government websites, advertisements in international journals, letters to a list of prospective consultants, etc. After assessing applications from interested consultants in accordance with a set of pre-determined criteria, a longlist of 10 consultants was developed, based on which responses to EOIs were invited in November 2001. Six responses were subsequently received. The Government's Consultant Selection Assessment Panel then shortlisted four consultants in December 2001 and invited them to provide separate technical and fee proposals. The Consultant Selection Assessment Panel is still accessing the technical proposals and expects to come up with a recommendation in mid-March 2002. The consultancy is scheduled to start in end-March 2002 for completion in March 2004.

23. The second consultancy, which will involve contract document preparation work to effect the selected procurement arrangement for the implementation of HATS, is scheduled to start in May 2004 for completion in November 2004. This, however, will have not have any adverse impact on the evaluation of the options or the public consultation on the way forward for the subsequent stages of HATS.

Stage I Flow Reassessment Study

24. 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. The model was completed in late 2001. Full calibration/verification of the model has commenced in February 2002 and will continue through the wet season until October 2002.

25. The calibrated model, together with the SCISTW Capacity Reassessment Study (paragraph 26 below), will help us assess the likely hydraulic and treatment performance of the Stage I system for future population and planning projections. Such information will assist the EEFS consultant in determining the design capacity

of the various treatment facilities under the subsequent stages of HATS.

SCISTW Capacity Reassessment Study

26. As recommended by the IRP, surface loading trials⁷ would be carried out at the SCISTW after full commissioning of the Stage I system 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. DSD plans to commence the trials at SCISTW in early March 2002 for completion in May 2002.

27. A latest programme for the studies and trials is at **Annex B**.

FINANCIAL POSITION

28. Due to highly competitive tender prices, the total budget for the EEFS has been lowered to \$26 million (\$21 million for lump sum fee in the consultancy contract and \$5 million for possible additional work). Savings in the EEFS will be used to offset the additional costs to be incurred by the compact sewage technologies trials whose duration and monitoring work have been changed as recommended by the MG (please see details in paragraph 10 above).

29. Our latest assessment is that we should be able to complete the trials and studies within the approved project estimate of \$73.6 million as approved by the Finance Committee. A table setting out the latest financial position of the trials and studies is at **Annex C**.

ADVICE SOUGHT

30. Members are requested to note the latest progress of the trials and studies on the further stages of HATS in the preceding paragraphs.

⁷ Surface loading is a key design parameter for sedimentation tanks and the objective of these trials is to determine the maximum capacity of Stage I sedimentation tanks.

Environment and Food Bureau
Drainage Services Department
Environmental Protection Department
February 2002

**Monitoring Group on Trials and Studies
for the Harbour Area Treatment Scheme
Membership List**

Chairman

Mrs Lily Yam Secretary for the Environment and Food

Members

Dr Albert Koenig (Former IRP Member)

Prof Leonard K H Cheng (Former IRP Member)

Prof Rudolf S S Wu (Former IRP Member)

Prof Peter Hills (Member of Advisory Council on the Environment)

Dr Ho Kin-chung (Member of Advisory Council on the Environment)

Ms Iris Tam (Member of Advisory Council on the Environment)

Dr Ng Cho-nam (Member of Advisory Council on the Environment)

Mr Chan Bing-woon

Mr Jimmy Kwok Chun-wah

Mrs Josephine Mak Chen Wen-ning

Mr Robert Law Director of Environmental Protection

Mr John Collier Director of Drainage Services

Mr W S Chan Deputy Secretary for Works

Secretary

Mr Raistlin Lau Principal Assistant Secretary, Environment and Food Bureau

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

Task Name	Start	Finish	2001	2002	2003	2004	2005
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 finetuning & flow data collection	01/11/01	28/02/02					
4.3 Hydraulic model calibration after Stage I commissioning	01/03/02	31/10/02					
5. SCISTW Capacity Reassessment Study							
5.1 In-house trial	Completed						
5.2 Verification after Stage I commission	01/03/02	31/05/02					
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	24/12/01					
7.2 Trial	21/01/02	31/01/03					
7.2.1 Design and Construction of Pilot Plants	02/01/02	31/03/02					
7.2.2 Phase I Trials	01/04/02	31/01/03					
7.2.3 Phase II Trials (provisional)	01/02/03	30/04/03					
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	30/05/03					
8.3 Stage I capacity constraint assessment	30/11/01	31/10/02					
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	30/05/02					
8.5 Engineering feasibility assessment including development of land requirement, schematic design, preliminary design, cost estimate & programme based on findings of relevant studies	30/11/02	30/05/03					
8.6 Option comparison and recommended feasible option(s)	30/05/03	30/07/03					
8.7 Feasible Options endorsed by Technical Group on HATS	20/08/03	20/08/03					
8.8 Feasible Options endorsed by Monitoring Group on HATS	01/09/03	01/09/03					
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	15/03/02					
9.2 Study I : Phase I (Initial review)	16/03/02	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)	01/11/03	31/03/04					
9.5 Consultant Selection of Study II	01/11/03	30/04/04					
9.6 Study II (Contract document preparation for the selected option of HATS)	01/05/04	30/11/04					
10. Feasibility Studies for Selected Option							
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					

Annex C

Items	Original estimates (\$ million in MOD prices)	Change to original estimates (\$ million in MOD prices)		
A. Trials on compact sewage treatment technologies	16.2	<u>10-month</u> <u>trial period</u>	<u>13-month</u> <u>trial period</u>	
		Trials	17.2	17.4
		Laboratory services*	4.2	5.5
		Independent Checker*	1.3	1.3
		Total	22.7	24.2
(*The need for an Independent Checker and Laboratory services was not specified in our funding submission.)				
B. Studies				
(i) Environmental and engineering feasibility study (EEFS)	34.6	26.0 ⁸		
(ii) Study on Procurement Options (previously known as Feasibility Study for Contractual Framework)	8.0	8.0		
C. Field survey and lab tests (for the EEFS only)	11.0	11.0		
Sub-total (A + B + C)	69.8	67.7 (for 10-month trial); and 69.2 (for 13-month trial)		

⁸ The contract cost (\$21M) is the lump sum fee quoted by the consultant. \$26M is the estimated total fee which includes the said lump sum fee plus the fees for any possible additional work

Annex C

Items	Original estimates (\$ million in MOD prices)	Change to original estimates (\$ million in MOD prices)
D. Provision for price adjustment due to inflation	3.8	3.8
Total amount approved by Finance Committee (A + B + C + D)	73.6	