

## Harbour Area Treatment Scheme: Moving Forward

### Introduction

The Hong Kong harbour is a valuable resource for the people of Hong Kong. Like all coastal cities, Hong Kong is both a user of the harbour and a steward of its resources for future generations. The Harbour Area Treatment Scheme (HATS), formerly known as the Strategic Sewage Disposal Scheme, is the most important programme undertaken by the Government to enhance the water quality and environment of the harbour area, helping Hong Kong to continue its development as one of the world's most populous and advanced cities.



#### Pollution reduction achieved so far:

- ⊞ **95% of households are now served by the public sewerage system**
- ⊞ **The number of gazetted beaches with poor or very poor water quality dropped to 7 by 2001, compared with 17 in 1995.**
- ⊞ **About 1.84 million cubic metres per day ( $m^3/day$ ), or 73% of Hong Kong's total wastewater flows, now receives proper treatment**
- ⊞ **70% of sewage around the Victoria Harbour receives chemical treatment at Stonecutters Island**
- ⊞ **600 tonnes of sludge per day from the HATS Stage I catchment that used to pollute our waters is now prevented from entering the harbour**
- ⊞ **Water quality of the eastern harbour has improved since Stage I's full commissioning in late 2001 as reflected by a 90% reduction in bacteria and 15 to 20% increase in dissolved oxygen.**
- ⊞ **Collection and treatment system in Tolo Harbour has resulted in a drop in the occurrence of red tides from 43 in 1988 to 16 in 2000**

HATS is a massive infrastructure programme that comprises four stages. We have completed Stage I, which is already treating about 70% of the sewage around the harbour. A number of important trials and studies are now being conducted to help us decide the best way forward for the remaining stages of HATS. As part of these trials and studies, our experts will be applying certain criteria to various options to help decide on the best way forward. The purpose of this document is to tell you about these trials and studies, and explain how your opinion on the proposed water quality criteria can help the Government conduct these studies which will shape the way forward for HATS.

These trials and studies will finish by the end of 2003. The Government will then undertake full-scale public consultation on the various options and way forward, in preparation for implementation of the most favourable option. Until then, we will give you updated information on our progress at key junctures of the project.

## History of HATS

### Stage I Commissioning

Stage I of HATS, comprising a sewage treatment plant and a deep tunnel sewage collection system, has already been fully commissioned. Stonecutters Island Sewage Treatment Works has been in operation since 1997. In December 2001, 23.6km of deep tunnels were commissioned. These tunnels collect sewage from all of Kowloon, Tseung Kwan O and parts of eastern Hong Kong Island, and deliver it to Stonecutters Island for chemical treatment. Now, about 1.3 million cubic meters per day of sewage is being treated at Stonecutters Island. Additional information on the background to HATS is available at <http://info.gov.hk/cleanharbour/>

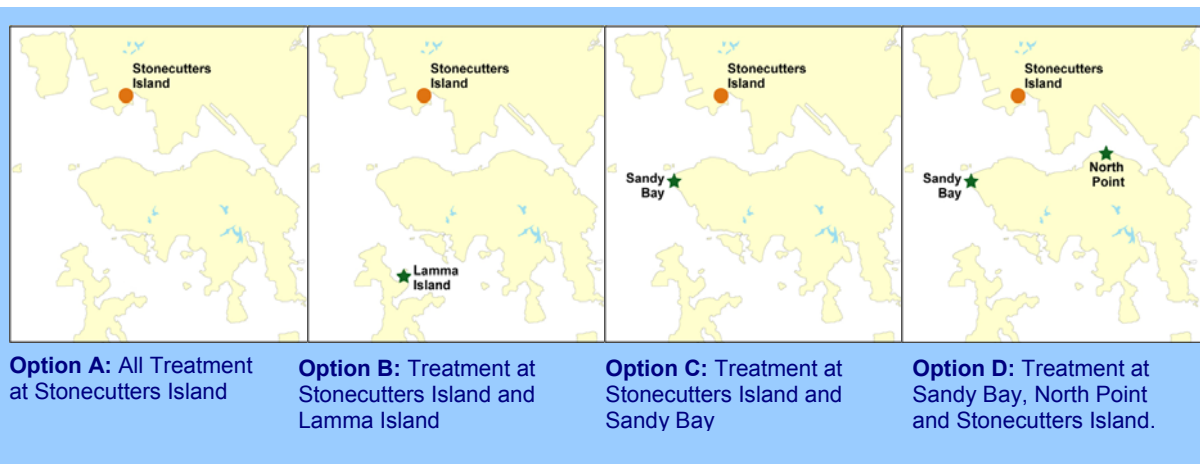
### New Trials and Studies Recommended

In 2000, an International Review Panel (IRP), an independent panel of experts appointed by the Government, reviewed plans for the remaining stages of HATS. These final stages involve collection and treatment of sewage from the northern and western districts on Hong Kong Island, as well as arrangements for discharge of treated effluent. The IRP considered that the remaining stages of the project might best be implemented using a different

scheme than that proposed earlier. By proposing the use of compact biological treatment technology to provide a very high level of treatment it identified four options (see maps below). Each of these four options involved discharging the highly treated effluent into the harbour waters. The IRP considered that all offered the same or better environmental protection than the earlier scheme but at lower overall costs. The IRP also identified the trials and studies that the Government should conduct to verify the effectiveness of compact sewage treatment technology in Hong Kong and decide on the best option for the next stages of HATS.

### Trials and Studies Underway

In November of 2001, the Government commissioned CDM, a locally-based environmental engineering consultant, to evaluate the environmental and engineering aspects of the IRP recommended options. Working in conjunction with international and local experts, CDM is carefully reviewing key scientific, technological and socio-economic issues arising from the IRP options. The study team will report on the relative merits of each option, so as to help the Government and community make a decision on the best way forward for HATS.



## Public Involvement

It is important that the people of Hong Kong, the ultimate owners and beneficiaries of HATS, are involved in its implementation and are part of the decision-making process. We thus welcome comments on the future proposals, and on the trials and studies.

## Key Challenges

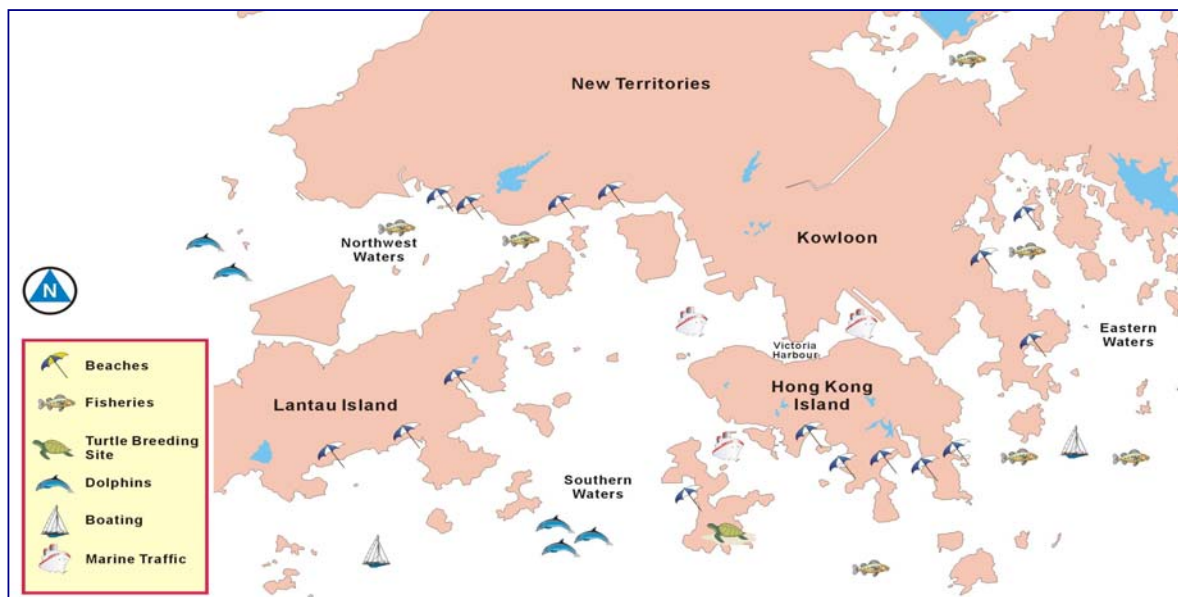
HATS is a major investment for Hong Kong and will protect the water quality and environment of the harbour area for many years to come. As with any other important public works project, HATS will require significant investment of financial resources. Therefore, it is important to carefully balance the benefits of the project with the financial cost to the community. In weighing up the choices the benefits of taking action, and the associated direct financial costs, would need to be weighed against the often intangible cost of doing nothing, that is the cost of allowing the continued degradation of arguably Hong Kong's most precious asset and an important part of its brand identity. Achieving the right balance between cost and benefit is one of the principal

objectives and the main challenge of these trials and studies.

The key to balancing harbour water quality goals and cost is to understand that Hong Kong's waters encompass a large area with multiple uses. We also have a responsibility to protect the ecology of our waters, so there may be different approaches to different areas, for example by achieving higher standards of treatment for discharges. In general terms we will want to provide a high level of treatment for effluents discharged into the water bodies used for more sensitive purposes (e.g., boating, habitats of important marine species, gazetted beaches). This high level of treatment may not be required for water bodies with less sensitive uses (e.g. commercial marine traffic). By adopting different approaches to different water bodies, we can properly allocate financial resources to meet our water quality needs, based on the uses of the water bodies concerned.

## Uses of Hong Kong Waters

As you can see in the map below, the harbour and surrounding waters are divided into four main areas.



The main types of use of water bodies in Hong Kong are:

**Fishery resources** including fish culture for human consumption

**Sensitive habitat** including areas of special significance for the protection of important marine life such as corals, turtles and dolphins

**Recreation** including swimming, water skiing, windsurfing, boating, sailing

**Scenic** including enjoyment of the harbour views

**Commercial** including marine traffic and shipping

**Table 1** shows these areas and the relative importance of each use to each area.

We have responded to these multiple uses by setting baseline water quality standards for the entire harbour area and surrounding waters. Such baseline standards comprise accepted scientific parameters such as the level of dissolved oxygen and ammonia. These baseline standards can be adjusted for particular areas if necessary. Of course, any increase in water quality standards will result in a

corresponding increase in the level and cost of sewage treatment as indicated in the table below.

**Table 2**, below, shows the general relationship between uses, levels of treatment and cost.

Table 2: Relationship between Uses, Treatment Levels and Cost		
Harbour Uses	Treatment Level Needed	Relative Cost
Fishery resources	High	\$\$\$\$
Sensitive Habitat	High	\$\$\$\$
Recreation	Standard/High	\$\$\$
Scenic	Standard	\$\$
Commercial	Low	\$

Table 1: Levels of Use in the Harbour and Surrounding Waters					
Area	Fishery Resources	Sensitive Habitat	Recreation	Scenic	Commercial
Victoria Harbour				//	////
Eastern Waters	///	///	///	//	/
North Western Waters	///	//	/	/	///
Southern Waters	///	///	//	//	/

## Assessment Criteria

The environment is not static. Therefore, the uses of our harbour and surrounding waters and the treatment levels required to support those uses may change occasionally with time and circumstances. Any changes in the uses may have an impact on our decisions on the level(s) of sewage treatment to be adopted and these changes may in turn affect the capital and recurrent costs of the next stages of HATS.

As we move forward to evaluate the IRP options, we will develop a set of assessment criteria to assess the performance of each of the IRP options. The criteria will reflect the uses in the harbour waters to be protected, as well as broader engineering, social and economic considerations. **Table 3** shows the criteria we have in mind.

remove the higher the cost will be. Thus there is an obvious link between uses, water quality criteria, and the eventual agreed scheme or schemes that are likely to be acceptable to the people of Hong Kong. It may be that we want to apply a very high use level and stringent water quality criteria in one area, but a lower use level and less stringent water quality criteria in another. **Table 4** on the following page shows typical harbour uses and the significant factors associated with each one.

On the basis of the various uses of the harbour areas as set out in Table 1 above, we have developed a set of proposed water quality criteria described fully in the Annex attached to this document. We welcome the views of all interested parties on these criteria. We recognise that the details in the Annex are highly technical. We believe, nevertheless, that the concept -

Table 3: Likely Initial Assessment Criteria	
<p><b>Marine Water Quality Criteria</b></p> <ul style="list-style-type: none"> <li>II <i>Protection of Bathing Beaches</i></li> <li>II <i>Protection against Toxic Impacts</i></li> <li>II <i>Protection against Harmful Algal Blooms</i></li> <li>II <i>Protection of Areas of Special Significance</i></li> </ul>	<p><b>Onshore Environmental Criteria</b></p> <ul style="list-style-type: none"> <li>II <i>Noise</i></li> <li>II <i>Air</i></li> <li>II <i>Traffic</i></li> <li>II <i>Land Use Compatibility</i></li> <li>II <i>Visual Impacts</i></li> <li>II <i>Protection of Areas of Special Significance</i></li> </ul>
<p><b>Engineering Criteria</b></p> <ul style="list-style-type: none"> <li>II <i>Compatibility with Other Development Plans</i></li> <li>II <i>Construction Issues</i></li> <li>II <i>Operational Issues</i></li> <li>II <i>Flexibility</i></li> </ul>	<p><b>Socio-Economic Criteria</b></p> <ul style="list-style-type: none"> <li>II <i>Capital Cost</i></li> <li>II <i>Operating Costs</i></li> <li>II <i>Net Present Values</i></li> <li>II <i>Job Creation</i></li> </ul>

Although there will be many relevant criteria, the significant ones are those which apply to marine water quality. To reach the highest quality standards to protect the most sensitive uses we need to remove the greatest amounts of pollutants from the sewage. The more pollutants we have to

that we need to establish water quality criteria to protect uses that are consistent with the aspirations of the community - is of significance to everyone. In this spirit, we also welcome feedback on what aspirations you have for our harbour and surrounding waters.

Table 4: Harbour Uses and Associated Significant Factors		
Harbour Use	Examples of Uses	Factors
<b>Fishery Resources</b>	<ul style="list-style-type: none"> <li>II Fish farming operations</li> <li>II Fish spawning for native (wild) fisheries</li> </ul>	<ul style="list-style-type: none"> <li>II High dissolved oxygen, to allow fish to breathe</li> <li>II Low concentrations of dangerous substances, such as ammonia and metals to prevent toxic effects on fish</li> <li>II Low nutrients such as nitrogen and phosphorus to prevent harmful algae</li> </ul>
<b>Sensitive Habitat</b>	<ul style="list-style-type: none"> <li>II Corals</li> <li>II Turtle nesting grounds</li> <li>II Dolphin and porpoise habitats</li> </ul>	<ul style="list-style-type: none"> <li>II High dissolved oxygen, to allow marine life to breathe</li> <li>II Low levels of dangerous substances, such as ammonia and metals to prevent toxic effects</li> </ul>
<b>Recreation</b>	<ul style="list-style-type: none"> <li>II Swimming</li> <li>II Water contact sports, for example windsurfing</li> </ul>	<ul style="list-style-type: none"> <li>II Low levels of <i>E. coli</i>, which is a measure of bacterial contamination by sewage indicating the likelihood of users contracting minor disease from contact with the water</li> </ul>
<b>Scenic</b>	<ul style="list-style-type: none"> <li>II Enjoyment of harbour views</li> </ul>	<ul style="list-style-type: none"> <li>II Little suspended matter to ensure good visibility and lack of odours</li> </ul>
<b>Commercial</b>	<ul style="list-style-type: none"> <li>II Marine traffic and shipping</li> <li>II Cooling water for air conditioning</li> <li>II Water for toilet flushing</li> </ul>	<ul style="list-style-type: none"> <li>II Freedom from large floating debris</li> <li>II Moderate dissolved oxygen which prevents odours in the system.</li> <li>II Reduced <i>E. coli</i> to guard against health risks from contaminated water in the cooling and flushing systems.</li> </ul>

### Contact Us

The study team aims to furnish the Government and the community with the technical, engineering, environmental, and financial information they need to make decisions that will enhance and preserve the Hong Kong Harbour Area for themselves and future generations. As part of this process we have prepared this document, which is issued with the Government's agreement.

We will be sharing more information with you in the course of this project.

Meanwhile, should you have any views on the proposed water quality criteria set out in the Annex, please send your comments by 27th July, 2002 to:

**HATS Project Team**

**CDM International Inc.**

**4305-12 Metroplaza Tower 1**

**223 Hing Fong Road, Kwai Fong**

*or fax us at 24249114*

*or e-mail us at: hats@cdm.com.hk*