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LEGISLATIVE COUNCIL BRIEF

THE WAY FORWARD FOR SEWAGE TREATMENT FOR THE HARBOUR AREA

INTRODUCTION

At the meeting of the Executive Council on 27 February 2001, the Council ADVISED and the Chief Executive ORDERED that the Administration should -

(a) undertake trials and studies as recommended by the International Review Panel (IRP) so as to determine the feasibility of their proposals; and

(b) undertake an extensive public education programme to restate our water quality improvement strategy, to set out the IRP's proposals and to develop understanding of the means to achieve improvement of harbour waters.

BACKGROUND AND ARGUMENT

General Background

2. Water quality objectives have been set for all water bodies around Hong Kong. The objectives are designed to ensure that these waters can be used for beneficial purposes ranging from swimming and mariculture to navigation and provision of water for utilities. One of the key programmes to ensure that water quality objectives can be met is upgrading the sewage collection and treatment system across the territory. Within this programme, provision of a sewage treatment system for the harbour area, around which 65% of the population live, is the single largest component.

3. In 1989, the Sewage Strategy Study recommended a scheme to collect sewage from the main urban area using deep tunnels, to provide lime-assisted primary treatment at one or two large treatment plants, and to discharge the treated effluent into oceanic waters south of Hong Kong. This scheme was called the Strategic Sewage Disposal Scheme (SSDS). Implementation was divided into four stages,

with the first stage being designed to collect and treat sewage from the most densely populated and industralized areas to bring about early improvement to the quality of water in the Harbour.

4. The SSDS drew different views from several quarters. Some green groups considered that the scheme failed to offer sufficient treatment to pollutants before their discharge into the sea. Some parties claimed that the deep collection tunnels and large treatment plants were riskier than small treatment plants serving different catchment areas. A number of parties raised concerns about costs.

5. In 1994 consultants were commissioned to review options for future levels of treatment and discharge arrangements. The consultants' work was reviewed by a three member IRP. In 1995, that IRP recommended replacing the primary treatment[1] with lime dosing planned for the early years of operation of stage I by a permanent chemically enhanced primary treatment[2] process (CEPT). The reason was that lime dosing was no longer needed to deal with high levels of toxic metal from industrial discharges anticipated previously. It would allow all of Hong Kong Island's sewage to be treated at Stonecutters Island, saving the cost of another treatment plant proposed at Mount Davis. They also confirmed that the treated CEPT effluent should not be discharged within the Harbour and recommended that a detailed Environmental Impact Assessment (EIA) be carried out on a number of treatment and discharge arrangements for the remaining stages of the scheme.

6. The stage I treatment system was modified in the light of these recommendations. The EIA commenced in May 1996 and was overseen by an Expert Group established between Hong Kong and the Mainland.

7. After considering a wide range of options, the EIA study selected four for detailed assessment. Two added a disinfecting process to CEPT and assessed outfalls to the east, west or well to the south of Lamma Island. The other two added conventional secondary[3] and tertiary[4] treatment before discharge east or west of Lamma. These options were put out to public consultation in 1998, after which the administration indicated in January 1999 that it would proceed on the basis of CEPT enhanced with disinfection and an outfall east of Lamma. The EIA was accepted by the Expert Group but has not been submitted for formal approval under EIA procedures.

A 8. A map of the scheme accepted in January 1999 is at Annex A.

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1 In primary treatment, about 35% of biological oxygen demand (BOD) and 60% of suspended solids (SS)are removed by screening and settlement.

2 CEPT was expected to remove 55% to 65% of BOD and 75% to 80% of SS. In practice, the plant at Stonecutters Island is removing 74% of BOD and 83% of SS.

3 Secondary treatment adds a biological treatment stage to primary treatment. After secondary treatment, 80% to 90% of both BOD and SS are removed.

4 Tertiary treatment can add a variety of physical, chemical or biological processes, usually to remove nitrogen and phosphorus from the effluent.

9. Construction works for the stage I system were originally scheduled to be completed by mid 1997 at a cost of about $6.7 billion. While the treatment works were completed in May 1997, construction of the collection tunnel system experienced severe delays due in part to the default of the contractor who was responsible for execution of the tunnelling works under the two construction contracts and also due to difficult geological conditions. The contracts had to be re-entered in 1996 and the outstanding works were regrouped into three tunnel completion contracts. An additional $2 billion was approved by the Provisional Legislative Council in late 1997 for two contracts covering the four eastern tunnels.

10. The 23.6 km of collection tunnels were finally fully excavated in November 2000 and are now being lined and connected to the treatment works. The stage I system is expected to be commissioned by the end of this year.

11. The capital and operation costs for the system were originally funded through the Sewage Services Trading Fund set up in 1994. Subsequently, approval to increase sewage charges was not obtained. The trading fund became insolvent and was wound up in March 1998, the capital works being transferred to the public works programme. Recurrent operating deficits at present are being covered by general public revenue.

12. Public concerns raised by the delays in the stage I project, coupled with continued criticism of the preferred treatment level and of reliance on large treatment plants and discharge arrangements, led to the Government's deciding in 1999 that further stages could not be implemented until stage I had been completed and greater public understanding and consensus had been established on the way forward. To this end, a new review was announced by the Chief Executive in the 1999 Policy Address.

13. Another IRP, comprising one Mainland, two overseasand three local experts, was set up to conduct a review through an open process of consultation and consideration of available studies taking into account the experience gained from the stage I project.

THE 2000 IRP REPORT

14. The 2000 IRP presented their report on 30 November 2000. In summary, the report -

(a) confirmed that stage I works should be completed as soon as possible as it provides a common base for any future development;

(b) suggested that tertiary treatment facilities could be incorporated at the Stonecutters Island Sewage Treatment Works by using Biological

Aerated Filters (BAF)[5] technology;

(c) suggested that if sewage was treated to tertiary standard it could be discharged permanently into the Western Harbour instead of through the proposed long oceanic outfall south-east of Lamma Island;

(d) suggested four options for full collection and treatment of the main urban area sewage. All these options adopt BAF technology, deep sewage-collection tunnels and short outfalls with different degrees of decentralization. Key attributes and graphic maps of these four options are at Annex B;

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(e) suggested that any of these four options would be cheaper and quicker to build than the preferred option from the EIA study;

(f) suggested a series of studies and trials to test the four options and the viability of the BAF in local conditions; and

(g) suggested that Design, Build, and Operate (DBO) approaches be adopted so as to expedite the completion of the subsequent works.

15. The detailed findings and recommendations of the IRP are set out in their report published and issued to the Legislative Council on 30 November 2000.

The Administration's Initial Comments on the IRP Findings/Recommendations

16. We are open minded on the suggestions that the space available at Stonecutters Island can be used for installing tertiary treatment, and that if tertiary treatment is provided, an oceanic outfall off Lamma Island is not needed. The feasibility of this arrangement, however, depends on a number of uncertainties and assumptions that have yet to be proven, namely -

(a) the effectiveness of BAF technology with Hong Kong's saline sewage;

(b) the level of tertiary treatment needed to meet environmental requirements[6] and the long term acceptability of discharging of even tertiary treated effluent into the Western Harbour;

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[5] This is an advanced treatment process characterized by compact size.

[6] There are different degrees of tertiary treatment which may involve the further removal of solids and disinfection. The first degree of treatment is nitrification by which ammonia, which could be harmful to marine life, is converted into nitrates. Depending on the natural purification capability of the receiving water bodies, a second degree of treatment, which is called denitrification, may be required for removing nitrates from the effluent. Additional treatment facilities are needed for the denitrification process, adding to capital and recurrent costs.

(c) whether BAF plant and disinfection facilities can actually be fitted into the limited space available at Stonecutters Island;

(d) whether it is acceptable to use up all the spare space at Stonecutters Island for these facilities, thereby reducing flexibility to respond to possible future demand to increase population density in Kowloon or Tsuen Wan;

(e) the availability of land (at North Point and Sandy Bay) and public acceptance of a treatment facility in their neighbourhood for the more distributed options suggested by the IRP;

(f) the accuracy of the IRP's financial assessments on capital and recurrent costs of the four options; and

(g) public acceptance of the recurrent costs of operating tertiary treatment facilities.

17. We recommend that we undertake the trials and studies recommended by the IRP before drawing conclusions on the technical and economic viabilities of their options. We will also need to consider the following points when pursuing these studies -

(a) the delivery timeframes (ranging from three to six years for completion) indicated by the IRP for its various options may not have taken into account the statutory and administrative procedures for implementing projects like this under the public works programme, even if new approaches to project implementation are taken;

(b) the validity of the IRP's claim that Stonecutters Island Sewage Treatment Works has sufficient spare capacity in the existing CEPT facilities to deal with all of Hong Kong Island's flows; and

(c) all the IRP options do away with a link between the stage III/IV collection tunnels and Shau Kei Wan (as proposed in the 1999 scheme). Providing this link so as to be able to divert flows from Chai Wan and Shau Kei Wan is likely to be important for increasing capacity in the Kowloon tunnels to meet anticipated demand in future years.

The Way Forward

18. We will proceed as follows -

(a) invite manufacturers to offer pilot plant to test out viable and proven

compact sewage treatment technologies applicable to Stonecutters Island;

(b) carry out an assessment of the water quality impacts of the IRP proposals;

(c) determine the engineering feasibility of accommodating all aspects of tertiary treatment at SCISTW including denitrification and disinfection, taking account future expansion needs;

(d) examine in more detail the financial implications of the various IRP options and assess the impact on the sewage charges;

(e) consider the suggestion of adopting the DBO approach in implementing subsequent works;

(f) set up a monitoring group chaired by the Secretary for the Environment and Food to oversee the study and trial programme;

(g) put in place arrangements to keep key stakeholders informed about the progress of studies and deliberations, and to be able to contribute to the process; and

(h) make a public presentation of the Government's initial response to the IRP report and programme for further work. This will include public education measures to make clear our objectives for cleaning up the harbour.

19. We will drop the term 'Strategic Sewage Disposal Scheme'. It is misleading since our objective is a clean harbour through sewage treatment. Building the harbour area system is only one part of the overall wastewater collection and treatment strategy.

20. The trials on compact sewage treatment technologies will take about eight months while the other studies are expected to take about 24 months to complete, excluding the time required for the funding application and the selection of consultants.

Consultation with the Mainland

21. At the last meeting of the Expert Group on Sewage Disposal on 22 February 2000, it was agreed that the SSDS EIA Study Report should be submitted to the Hong Kong Special Administrative Region Government for reference and consideration. The Expert Group also agreed that "the decision on which sewage disposal option

Hong Kong should eventually adopt was entirely a matter that rested with the Hong Kong Special Administrative Region Government". We will keep the relevant Mainland authorities informed of the progress with the further studies so as to ensure that our proposed measures would not cause unacceptable impact to the marine environment of the Pearl River Delta.

FINANCIAL AND STAFFING IMPLICATIONS

22. We estimate that the BAF trials, and water quality, engineering and contract arrangement studies for the IRP options will cost about $67 million in total. The costs of the public education programme will be absorbed within the existing budget of the Environmental Protection Department and Drainage Services Department. There are no additional staffing implications arising from these trials and studies. The estimated construction and recurrent costs for the remaining stages of works can only be ascertained after these studies are completed, but are expected to be significant[7]. We will seek the necessary funding through the resource allocation system and the Finance Committee of the Legislative Council in due course.

ECONOMIC IMPLICATIONS

23. It is imperative to determine the most appropriate configuration and content for the remaining parts of the harbour sewage treatment system, having regard to cost, certainty and effectiveness of performance, degree of ease in accommodating changing territorial, regional and local development needs, and the attainment of acceptable water quality objectives. The public investment involved will be substantial and the extensive fixtures and the specialized facilities once erected will be difficult to substantively modify, particularly against Hong Kong's tight space and other circumstantial constraints. While the overall cost of implementation is yet to be assessed in more precise terms, and the wider community benefits of upholding a satisfactory water quality standard for the Harbour are difficult to quantify, it is widely recognized that further deterioration of water quality in the Harbour would be deleterious to community well-being and damaging to Hong Kong's image as a modern cosmopolitan city. At worst, Hong Kong's sustainable development in the long run could be put in jeopardy. The aforementioned trials and studies will help ensure that we get the overall treatment system right.

24. With the implementation of the remaining harbour area works, the costs of operating the whole sewerage system will inevitably increase. However, the implications of increased operating costs on the levels of sewage charge and trade effluent surcharge cannot be ascertained until the completion of the recommended

[7] The IRP estimated that their options would cost between $14.3 billion and $15.5 billion in capital and $1.65 billion to $2.1 billion in recurrent costs, at 2000 prices. The IRP's estimate for the January 1999 plan is up to $20.7 billion in capital and $1.57 billion in recurrent costs.

trials and studies and until a way forward is identified and agreed.

ENVIRONMENTAL IMPLICATIONS

25. With the completion of stage 1 of the SSDS later this year, 70% of the sewage flow entering the Harbour will receive proper treatment. This will bring substantial relief to the Harbour. However, we will not be able to meet all the water quality objectives of the Harbour, as the remaining 30% of the sewage flow (from the area from North Point through Central and round to Aberdeen) will still be entering the Harbour each day without proper treatment. Deterioration will resume as the population on both sides of the Harbour continues to grow.

26. It is therefore important that we proceed as soon as possible with the trials and studies recommended by the IRP so as to establish the relative feasibilities of the options they have identified. This will facilitate the early evaluation of a way forward which will ensure compliance with water quality objectives. The works and the associated facilities will be subject to proper environmental impact assessment.

PUBLICITY

27. A press release will be issued on 1 March 2001. We will also meet the press on the same day to set out the Administration's initial views and elaborate on arrangements for taking the matter forward, including the setting up of the monitoring group.

ENQUIRIES

28. For any enquiries, please contact Mr Donald Tong, Principal Assistant Secretary for the Environment and Food, at 2136 3277.

Environment and Food Bureau
1 March 2001