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ACE-EIA Paper 7/2007
For Advice

Environmental Impact Assessment Ordinance (Cap.499)
Environmental Impact Assessment Report
Harbour Area Treatment Scheme (HATS) – Provision of Disinfection Facilities at Stonecutters Island Sewage Treatment Works

Purpose

This paper presents the key findings and recommendations of the Environmental Impact Assessment (EIA) report for the Harbour Area Treatment Scheme (HATS) – Provision of Disinfection Facilities at Stonecutters Island Sewage Treatment Works (SCISTW) (hereafter known as the Project), submitted under section 6(2) of the Environmental Impact Assessment Ordinance (EIAO) with the application no. EIA-134/2007. The Drainage Services Department (the applicant) and their consultants will make a presentation. Comments from the public and the Advisory Council on the Environment will be taken into account by the Director of Environmental Protection when she makes the decision on the approval of the EIA report under the EIAO.

Advice Sought

2. Members' views are sought on the findings and recommendations of the EIA report.

Need for the Project

3. Based on the EIA report, Stage 1 of the HATS commissioned in 2001 has brought about water quality improvements to the Victoria Harbour. About 1.4 million m^3 per day of effluent from previously dispersed sources along the coasts of Kowloon and eastern Hong Kong Island was diverted to the Stonecutters Island Sewage Treatment Works (SCISTW) outfall.

4. The Public Account Committee (PAC) of the Legislative Council expressed

concerns in May 2004 about the increase in *E. coli* levels at the Tsuen Wan beaches and urged the Administration to advance the provision of part of the permanent disinfection facilities under HATS Stage 2A such that the gazetted beaches can be re-opened for public use. In response, the Government planned to expedite part of the permanent disinfection facilities for early completion in 2008-09 to facilitate re-opening of the Tsuen Wan beaches at the earliest possible time.

5. At present, seven beaches along the Tsuen Wan coastline (Angler's, Approach, Casam, Gemini, Hoi Mei Wan, Lido and Ting Kau) are closed for water quality reasons. Based on the EIA report, both the HATS Stage 1 effluent discharge and local pollution sources such as sewage from unsewered villages, are contributing to the poor beach water quality at the seven closed Tsuen Wan beaches. The proposed advance disinfection facilities (ADF), together with reduction of localized un-treated wastewater discharges being implemented under the regional sewerage schemes, are necessary to improve the Tsuen Wan beach water quality and facilitate the re-opening of these beaches.

Description of the Project

6. The Project is to construct and operate the advance disinfection facilities (ADF) within the existing SCISTW, which is providing chemically enhanced primary treatment (CEPT). Location plan and general layout of the Project is shown in **Figure 1**. Key elements of the Project include:

- Six sodium hypochlorite storage tanks (8 m in diameter, 12.5 m in height)
- One day tank for sodium hypochlorite storage (capacity of about 100 m^3)
- Two sodium bisulphite storage tanks (6 m in diameter, 6.2 m in height)
- Pipes in pipe trenches
- Other associated facilities including bund walls and switch rooms

7. The Project is classified as a designated project under Item F.1 Part I Schedule 2 of the EIAO: "*Sewage treatment works with an installed capacity of more than 15,000m^3 per day*".

Consideration of Alternative Disinfection Options for Avoidance of Environmental Impacts

8. The EIA study considered various disinfection options before recommending the preferred option. Taking into consideration the scale of the proposed project and

environmental setting of the existing outfall, the EIA concluded that only chlorination and UV radiation are technically feasible for HATS.

9. Comparison was made on the environmental benefits and disbenefits of the two options. With regard to chlorination, the major disbenefits include potential discharges of residual chlorine, generation of chlorination by-products and the potential hazard to life due to handling and storage of chemicals. Toxicity tests and risk analysis however concluded that with appropriate measures including dechlorination, the chlorination option would not induce unacceptable environmental impacts.

10. For UV radiation, the major disbenefits include the need for disposal of spent UV lamps which contain mercury, and the generation of additional sludge of about 100 wet tonne per day requiring disposal due to the change of coagulant from ferric chloride to alum.

11. While both options would comply with relevant environmental assessment criteria stipulated under the Technical Memorandum on Environmental Impact Assessment Process (TM) and are environmentally acceptable, chlorination/dechlorination was proposed to be the disinfection technology for HATS as it would bring about pathogen reduction at the earliest opportunity, result in less abortive work at Stage 2B when biological treatment is implemented in future, lower total lifecycle cost and be regarded as a more proven application for large scale sewage treatment works.

12. Different dosages for chlorination (sodium hypochlorite) and dechlorination (sodium bisulphite) were also tested to establish the optimal dosage to be adopted to minimize adverse impacts due to residual chlorine and chlorination by-products (CBPs), while maintaining the effectiveness of disinfection.

Specific Environmental Aspects to Highlight

Water Quality

13. While the proposed project would reduce *E. coli* levels at the beaches and secondary contact recreation subzones along the Tsuen Wan coast and the seawater intakes in western Victoria Harbour, total residual chlorine (TRC) and CBPs generated during the chlorination process are potential causes for concern. A dechlorination agent (sodium bisulphite) would be injected to the disinfected effluent prior to submarine discharges to remove any remaining TRC. Adequate measures such as standby pumping system and uninterruptible power supply system would also be provided to

avoid the discharge of excessive TRC due to failure of the dechlorination system.

14. Laboratory tests and chemical analysis were conducted on the Contaminants of Potential Concerns in the effluent before and after chlorination/dechlorination. The results indicated that out of the 34 CBPs tested, only 8 CBPs were detected in the CEPT effluent after chlorination and dechlorination, in the range of parts per billion. Moreover, most of these 8 CBPs were already present in the raw effluent, and the chlorination/dechlorination process only introduced 3 CBPs with concentrations less than 10 parts per billion. The EIA confirmed that the worst predicted TRC and CBPs levels in the receiving waters would comply with the assessment criteria, and the discharge of effluent after chlorination and dechlorination would not cause adverse water quality impact.

15. Whole Effluent Toxicity Tests using representative local species were also conducted to assess the whole effluent toxicity of chlorinated/dechlorinated effluents, which would reflect the cumulative effects of all CBPs and other toxic contaminants that may be present in the raw sewage effluent. The EIA concluded that the worst predicted chronic toxicity unit at the edge of mixing zone and the acute toxicity unit at the edge of initial dilution zone, being 0.074 and 0.069 respectively, were within the criteria of 1 and 0.3.

Marine Ecology and Fisheries

16. The existing SCISTW outfall is located in an area with low ecological and fisheries resources. The EIA confirmed that the predicted impact is localized around the existing outfall and the potential risks due to chlorinated/dechlorinated effluent imposed to aquatic life and marine mammals would be minimal and acceptable. No significant adverse ecological and fisheries impacts are anticipated.

Risk to Human Health

17. The EIA confirmed that, even with the adoption of conservative assessment approaches and assumptions, the potential risk to human health due to CBPs present in the chlorinated/dechlorinated HATS effluent would be low and acceptable under the established assessment criteria in all Project Scenarios.

Hazard to Life

18. There is potential risk associated with the mixing of incompatible chemicals involving ferric chloride and sodium hypochlorite/sodium bisulphite and the release of

toxic gases such as chlorine or sulphur dioxide. Precautionary measures were recommended to design out/minimize the potential risk from handling and storage of chemicals on site. In particular, the proposed storage tanks for sodium hypochlorite were relocated to provide adequate separation distance of chemical storage areas (about 200 m) and with screening structures in between, and specific hose connection design (such as coupling size, type and colour) would be used for each chemical. Quantitative risk assessments were also carried out to confirm that both individual and societal risk levels would be within the acceptable criteria stipulated under the TM.

Other Environmental Impacts

19. The EIA report also assessed the impacts of air quality, noise, and waste management, and recommended mitigation and monitoring measures to minimize the associated impacts. The assessments concluded that, with appropriate mitigation measures in place, the anticipated environmental impacts are considered acceptable in meeting relevant requirements under the TM.

Environmental Monitoring and Audit

20. The EIA report includes an Environmental Monitoring and Audit (EM&A) Manual which recommends an EM&A programme during both the construction and operation phases of the Project.

Public Consultation

21. The applicant has applied the Continuous Public Involvement process and consulted some green groups, academics and professional institutions to seek their comments on the Project during the preparation of the EIA report.

22. The applicant has also made the EIA report, EM&A Manual and Executive Summary available for the public to comment under the EIAO staring from 16 August 2007 for 30 days. Members will be briefed on any comment received from the public at the meeting.

August 2007
Environmental Assessment Division
Environmental Protection Department

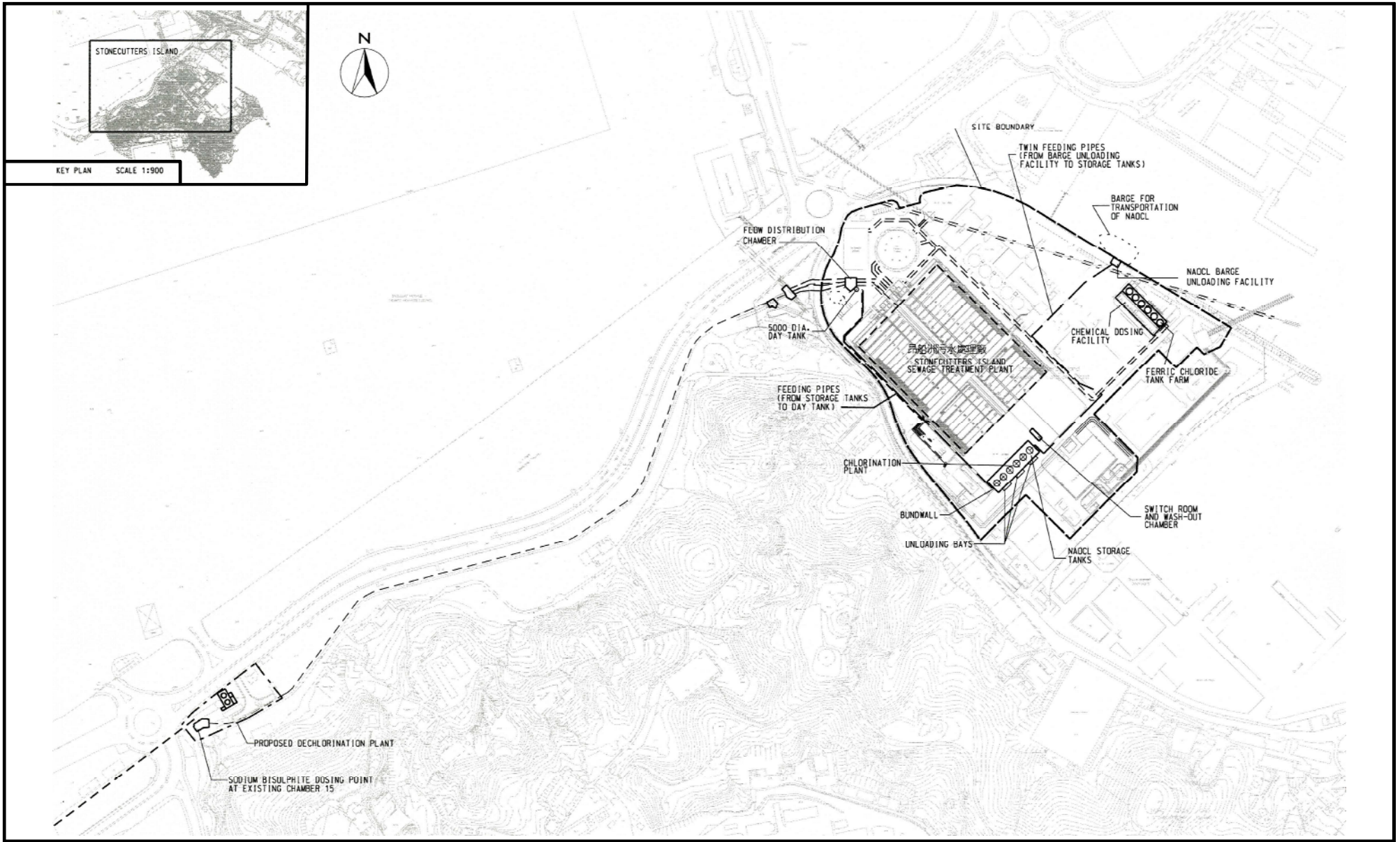

Figure 1: General Layout of Proposed Chlorination / Dechlorination Disinfection System (Reproduced from Figure 2.1 of the EIA Report)

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