NOTE FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

Supplementary Information on
211DS – Outlying Islands sewerage, stage 1 phase 2

INTRODUCTION

In considering PWSC(2002-03)27 on **211DS** at the Public Works Subcommittee meeting held on 22 May 2002, Members requested the Administration to provide supplementary information to explain the differences between primary and secondary sewage treatment levels and why different treatment levels are used in Peng Chau Sewage Treatment Works (STW) and Cheung Chau STW.

THE ADMINISTRATION'S RESPONSE

Comparison of different treatment levels

2. A comparison of the treatment performance and costs of primary treatment, chemically enhanced primary treatment (CEPT) and secondary treatment for a typical medium-sized STW is provided at Enclosure 1.

Criteria in determining treatment levels

3. We protect our waters because they serve many useful purposes, which include water supply, mariculture, recreation, marine parks, conservation, etc. As different beneficial uses demand different water quality, our strategy is to develop a specific set of Water Quality Objectives (WQOs) for each type of beneficial uses and apply these accordingly to the waters. In simple terms, WQOs are mainly the physical and chemical characteristics (such as dissolved oxygen, nutrients and bacteria) that we want to see in our water bodies. They define the maximum level of pollutants that can be tolerated and the minimum level of essential constituents required to support the beneficial uses.

/4. .....

4. In determining the sewage treatment requirements and the location of the discharge, we have to consider a number of factors. The principal ones are the assimilative capacity of the receiving water bodies, the quantity of discharge and whether the discharge will lead to infringement of the established WQOs, and consequently unacceptable environmental impact.

5. Assimilative capacity is the amount of waste that a water body can safely absorb by itself without leading to an infringement of WQOs. It depends on the natural dispersive characteristics of the water body in question. Essentially, an area of deep water and strong currents where pollutants are rapidly diluted and dispersed will have a high assimilative capacity whereas semi-enclosed areas, such as shallow bays, will have a low assimilative capacity.

6. Taking into account WQOs we need to achieve, the characteristics of the receiving waters and the quantity of discharge, we usually make use of computer mathematical models to help determine the treatment levels required.

7. For sensitive waters with weak currents, low assimilative capacity and stringent WQOs, sewage will be treated and diverted away from them. For example, sewage from Shatin and Tai Po is treated to secondary level before diversion out of the Tolo Harbour catchment. For discharges to waters with moderate assimilative capacity, secondary treatment will be required. Examples are Port Shelter and Stanley. For waters with strong currents and high assimilative capacity, such as the northwestern waters to which the Siu Ho Wan STW discharges, primary treatment or CEPT plus disinfection will be required.

8. To sum up, we cannot apply a fixed standard to all discharges and each case has to be considered on its own merits based on the above principles.

Cheung Chau and Peng Chau STWs

(a) Cheung Chau

9. The existing Cheung Chau STW, commissioned in 1985, provides primary treatment to sewage. The treated effluent is then discharged off-shore through a 300-metre (m) long outfall into the Adamasta Channel.

/10. .....

10. The Adamasta Channel is 750 m in width and 7.5 m in depth with strong currents. The natural dilution in the Channel has proven to be sufficient and effective in ensuring that the current volume of the treated effluent from Cheung Chau STW would not have any adverse impact on the receiving environment.

(b) Peng Chau

11. The existing Peng Chau STW, located at Tai Lei Island, provides secondary treatment plus disinfection to treat the sewage collected from two housing estates (Kam Peng Estate and Peng Lai Court).

12. The waters to the east of Lantau Island around Peng Chau have limited natural dilution effect due to the relatively weak water currents there. The potential port development in North-east Lantau also makes it not feasible to build a long outfall for discharging the treated effluent. Since the treated effluent has to be discharged to areas close to the shore, we have built a secondary treatment plus disinfection plant at Peng Chau so as to protect the receiving waters there.

13. As explained in paragraphs 9 – 12 above, we offer different levels of sewage treatment in Peng Chau and Cheung Chau STWs due to the differences in assimilative capacity of the receiving water bodies, albeit both discharge points are within Southern waters. Despite the relatively lower level of treatment in Cheung Chau STW, it has been demonstrated that the quality of the receiving water bodies has not been affected.

Future upgrading of Cheung Chau STW

14. The present proposal to upgrade part of **211DS** to cover the unsewered village developments in Central Cheung Chau will increase the flow to the existing Cheung Chau STW. In order to provide better dilution and dispersion to the larger volume of discharge, we are replacing the existing 300 m long submarine outfall by a 750 m long outfall under **220DS** "Outlying Islands sewerage – stage 1 phase 1B – outfall replacement and sewage sludge dewatering facilities upgrading at Cheung Chau sewage treatment plant". Construction of the new outfall is now underway for completion in 2003. Separately, to provide added protection to marine life, we are also considering the need to upgrade the existing treatment level of Cheung Chau STW to CEPT plus disinfection and are consulting the Islands District Council. The estimated capital cost of upgrading the treatment

/level .....

level of Cheung Chau STW to CEPT plus disinfection is $75 million and the corresponding annual running cost will increase from the current $6 million to about $9 million. Should the upgrading proposal be pursued, we plan to start construction in 2006 for completion in 2009. If the treatment level were to be raised to secondary even though it is considered not necessary on environmental grounds at present, we estimate that the capital outlay and annual running costs would be increased to $120 million and $20 million respectively.

Environment and Food Bureau
June 2002

(inf211dsfin.doc)

Enclosure 1 to PWSCI(2002-03)13

Comparison of treatment levels for a typical medium-sized sewage treatment works

	Primary Treatment	**Chemically Enhanced Primary Treatment (CEPT) (with disinfection facilities)**	**Secondary Treatment (with disinfection facilities)**
General definition	Normally involves screening, removal of grit and a primary sedimentation process. Solid waste and suspended solids are removed from the sewage.	Chemicals are added during the CEPT process to enhance the removal of suspended solids and pollutants with oxygen demand.	The sewage is purified by means of biological treatment processes after the sewage has undergone primary treatment. The organic matters in the settled sewage are decomposed by micro-organisms in the biological treatment process.
Percentage of suspended solids (SS) removed	Approximately 55%	Approximately 75%	Approximately 85%
Percentage of biochemical oxygen demand (BOD) removed	Approximately 30%	Approximately 70%	Approximately 90%
Indicative average capital cost per cubic meter of sewage per day	$10,500	$13,500	$24,000
Indicative average recurrent cost per cubic meter of sewage per day	$500	$750	$1,700

Remarks: Costs may vary by factors such as remoteness of site, ground condition etc.