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For discussion
On 7 November 2000

Legislative Council
Panel on Environmental Affairs

Water Quality at Shing Mun River

Purpose

At a Legislative Council case conference on the pollution problem at Shing Mun River (the River) on 21 September 1999, Members noted the improvement measures being implemented or planned with a view to improving the water quality of the River. This paper briefs Members on the current environmental conditions of the River and the progress of implementing these measures. In addition, Members' support is sought for a proposal to seek Finance Committee's approval to upgrade part of Public Works Project Item 5051DP, namely "Environmental improvement of Shing Mun River – Stage 1", to Category A at an estimated cost of $70.0 million in money-of-the-day (MOD) prices.

Background

2. The River is a 7.5 km long artificial tidal channel constructed during the reclamation of the Sha Tin inlet in 1970s for flood prevention purposes. It has a catchment area of 37 km^2 which covers both rural and low density developments at its upstream and the densely populated Sha Tin New Town at its downstream.

3. The River was heavily polluted in the 1980s due to rapid increase in population in Sha Tin and indiscriminate discharges from industrial, commercial, livestock and domestic sources. The organic pollution load discharged into the River in 1987 was around 9,000 kg Biochemical Oxygen Demand (BOD) per day which is equivalent to the waste discharge from about 160,000 persons.

Current Environmental Conditions of the River

4. The pollution load discharging into the River has been substantially reduced following the declaration of the Tolo Harbour and Channel Water Control Zone under the Water Pollution Control Ordinance (WPCO) in 1987, the

implementation of the revised Livestock Waste Control Scheme in 1994, and the phased provision of sewerage network for the unsewered villages there. After implementing these programmes, high compliance rates for major water quality objectives, such as dissolved oxygen[1], suspended solids[2] and pH[3], have been recorded. The *E.coli* level[4] of the River has also reduced ten fold, to a geometric mean value of 2,000 counts per 100 mL in the main channel in 1999. The following graphs demonstrate the improvement in the water quality of Shing Mun River over the years-

Annex 1: pollution load reduction achievement over the past 13 years
Annex 2: percentage compliance with the water quality objectives of the River since 1990
Annex 3: reduction of *E.coli* level in the Main Channel since 1990

5. Compared with 1987, the pollution load discharging into the River has dropped by 91% to some 800 kg BOD per day by the end of 1999. The remaining pollution load and *E.coli* level of the River are mainly caused by untreated sewage from some 40 villages within the catchment.

6. The River's water quality has also been adversely affected by the contaminated sediment which accumulated over the years on its riverbed. Unless it is properly treated or removed, this contaminated sediment would continue to give rise to obnoxious odour, particularly during low tide, and affect the development of a balanced natural ecology within the river.

Actions to Reduce Pollution Load

7. To reduce the pollution load from unsewered villages, the Tolo Harbour Stage I sewerage scheme is being implemented to provide sewerage network for these areas. It is projected that more than 70% of the pollution load from unsewered villages will be reduced when the Stage I sewerage scheme is completed in 2005/06. The remaining pollution load will be addressed under the proposed Tolo Harbour Sewerage Scheme Stage II (THSS Stage II).

[1] It is necessary to maintain high dissolved oxygen (DO) level to sustain aquatic life. Under our water quality objective, DO should not be less than 4 mg/L.
[2] High level of suspended solids (SS) would render the water turbid and may cause suffocation in fish. Under our water quality objective, SS should not be higher than 25 mg/L.
[3] Highly alkaline or acidic environment should be avoided to protect aquatic life. Under our water quality objective, pH should not exceed the range of 6 - 9 at any time.
[4] To protect human health for secondary contact recreational purpose, the *E.coli* level should be lower than 1000 counts per 100 mL.

8. EPD is maintaining stringent enforcement in the Sha Tin area to curb illegal discharges into the River catchment. Between January 1999 to June 2000, EPD carried out some 3,500 inspections in the Sha Tin area. These led to 41 convictions for non-compliance with the WPCO.

9. To prevent floating rubbish from causing pollution to the River, contractors deployed by the District Lands Office (Sha Tin) have been carrying out routine collection of floating refuse in the River every alternate day. Additional special collection operations may be arranged as necessary. Cleansing staff from the Food and Environmental Hygiene Department maintain constant street cleaning to reduce rubbish and pollutants being carried into the river after getting into the drainage system.

Proposed Actions on Contaminated Sediment

10. In 1996, EPD commissioned a study to formulate the most cost-effective and environmentally acceptable methods to tackle the contaminated sediments. The applicability of various improvement techniques, including aeration, in-situ bioremediation, chemical treatment, ex-situ treatment, dredging and other engineering methods have been evaluated under the study. As bioremediation is a relatively new technology that has not been practised in Hong Kong on a scale comparable to the River, a 3-month pilot field trial was conducted at a section of the Shing Mun Main Channel near Chun Shek Estate to ascertain the applicability and effectiveness of the technique. The results indicated that there was a significant reduction in the organic contaminant content in the treated sediment. The emission of obnoxious odour was also reduced. The study concluded that a combined strategy of bioremediation and dredging, to be carried out in parallel with other pollution control measures, would be the most cost-effective and environmentally acceptable means to tackle the problem. This recommendation has been accepted by the Administration.

<u>The Proposal</u>

11. Subject to funds approved for the improvement works, we plan to start off with bioremediation treatment at sections of the River with most severely polluted sediments. Dredging will be conducted at selected sections to enhance the level of environmental improvements by bioremediation. We will move to other less polluted sections in phases.

12. The Civil Engineering Department (CED) - the works agent for the improvement works - has just completed the detailed design of the bioremediation and dredging project to bring early improvement to the River. We plan to start works for the first stage of the project in March 2001 for completion by December 2002. We will be seeking the approval of the Finance Committee to upgrade part of Public Works Project Item 5051DP, namely "Environmental improvement of Shing Mun River – Stage 1", to Category A at an estimated cost of $70.0 million in money-of-the-day (MOD) prices. The proposal will be discussed at the Public Works Subcommittee meeting on 22 November 2000.

13. We anticipate that upon completion of this project, the odour problem at the area treated will be largely reduced and the dissolved oxygen in water will increase. This will lead to a healthier ecological system in the River and benefit local residents as well as visitors and spectators taking part in various water-related activities such as rowing and boating in the River.

14. The second stage of the improvement works, involving the environmental monitoring programme and the undertaking of further bioremediation and/or dredging where necessary, will commence in January 2003 for completion by December 2005.

Future Prospects

15. Long term improvement and maintenance of the River rely on the successful implementation of a suite of activities, which include pollution control at source by sewerage connection, stringent enforcement actions against illegal discharges, implementation of the proposed bioremediation/dredging works, and continuous environmental monitoring and auditing of the above measures. Government departments will continue to work hard to make sure that the improvement to be brought about by the bioremediation and dredging of contaminated sediments on the riverbed would sustain.

Advice Sought

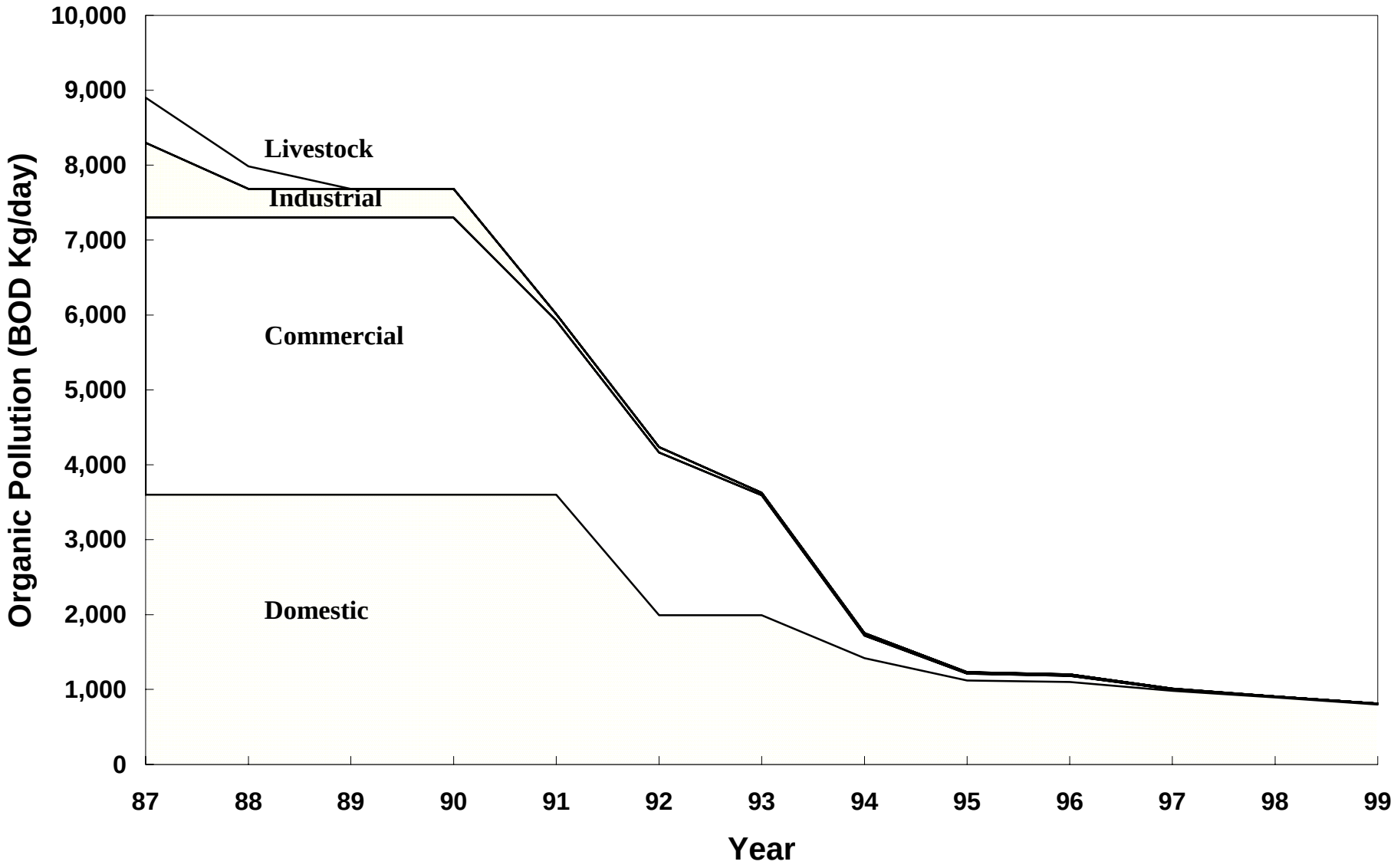
16. Members are requested to note the following points-

(a) the improvement in the water quality of Shing Mun River (paragraphs 4 to 6);
(b) the progress of our programme to reduce the pollution load to Tolo Harbour (paragraphs 7 to 9); and

(c) our proposal to seek the Public Works Subcommittee's approval on 22 November 2000 for implementing a project to improve the sediment on the riverbed of Shing Mun River (paragraphs 11 to 14).

Environment and Food Bureau
October 2000

Annex 1 -Pollution Load in Shing Mun River (Kg/d)



Annex 2 – Level of Compliance with the Water Quality Objectives in Shing Mun River

Water Quality Objective (WQOs)	% Compliance									
	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
pH	73	81	86	81	88	87	89	80	84	83
Dissolved Oxygen	78	80	88	88	93	92	93	97	95	98
Suspended Solids	60	80	90	80	90	80	90	90	100	100
Chemical Oxygen Demand (COD)	48	64	66	63	67	62	58	62	70	74
5-day Biochemical Oxygen Demand (BOD_5)	26	17	20	60	53	48	51	63	66	58
E.coli	0	0	0	0	0	0	0	0	0	0

Annex 3- Reduction of *E.coli* at Shing Mun River Main Channel